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support@foxwelltech.com

One-Year Limited Warranty

Subject to the conditions of this limited warranty, Shenzhen Foxwell Technology Co., Ltd ("FOXWELL") warrants its customer that this product is free of defects in material and workmanship at the time of its original purchase for a subsequent period of one (1) year.

In the event this product fails to operate under normal use, during the warranty period, due to defects in materials and workmanship, FOXWELL will, at its sole option, either repair or replace the product in accordance with the terms and conditions stipulated herein.

Terms and Conditions

1 If FOXWELL repairs or replaces the product, the repaired or replaced product shall be warranted for the remaining time of the original warranty period. No charge will be made to the customer for replacement parts or labor charges incurred by FOXWELL in repairing or replacing the defective parts.

2 The customer shall have no coverage or benefits under this limited warranty if any of the following conditions are applicable:

a) The product has been subjected to abnormal use, abnormal conditions, improper storage, exposure to moisture or dampness, unauthorized modifications, unauthorized repair, misuse, neglect, abuse, accident, alteration, improper installation, or other acts which are not the fault of FOXWELL, including damage caused by shipping.

b) The Product has been damaged from external causes such as collision with an object, or from fire, flooding, sand, dirt, windstorm, lightning, earthquake or damage from exposure to weather conditions, an Act of God, or battery leakage, theft, blown fuse, improper use of any electrical source, or the product was used in combination or connection with other product, attachments, supplies or consumables not manufactured or distributed by FOXWELL.

3 The customer shall bear the cost of shipping the product to FOXWELL. And FOXWELL shall bear the cost of shipping the product back to the customer after the completion of service under this limited warranty.

4 FOXWELL does not warrant uninterrupted or error-free operation of the product. If a problem develops during the limited warranty period, the consumer shall take the following step-by-step procedure:

a) The customer shall return the product to the place of purchase for repair or replacement processing, contact your local FOXWELL distributor or visit our website www.foxwelltech.com to get further information.

b) The customer shall include a return address, daytime phone number and/or fax number, complete description of the problem and original invoice specifying date of purchase and serial number.

c) The customer will be billed for any parts or labor charges not covered by this limited warranty.

d) FOXWELL will repair the Product under the limited warranty within 30 days after receipt of the product. If FOXWELL cannot perform repairs covered under this limited warranty within 30 days, or after a reasonable number of attempts to repair the same defect, FOXWELL at its option, will provide a replacement product or refund the purchase price of the product less a reasonable amount for usage.

e) If the product is returned during the limited warranty period, but the problem with the product is not covered under the terms and conditions of this limited warranty, the customer will be notified and given an estimate of the charges the customer must pay to have the product repaired, with all shipping charges billed to the customer. If the estimate is refused, the product will be returned freight collect. If the product is returned after the expiration of the limited warranty period, FOXWELL' normal service policies shall apply and the customer will be responsible for all shipping charges.

5 ANY IMPLIED WARRANTY OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OR USE, SHALL BE LIMITED TO THE DURATION OF THE FOREGOING LIMITED WRITTEN WARRANTY. OTHERWISE, THE FOREGOING LIMITED WARRANTY IS THE CONSUMER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. FOXWELL SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF ANTICIPATED BENEFITS OR PROFITS, LOSS OF SAVINGS OR REVENUE, LOSS OF DATA, PUNITIVE DAMAGES, LOSS OF USE OF THE PRODUCT OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF ANY SUBSTITUTE EQUIPMENT OR FACILITIES, DOWNTIME, THE CLAIMS OF ANY THIRD PARTIES, INCLUDING CUSTOMERS, AND INJURY TO PROPERTY, RESULTING FROM THE PURC HASE OR USE OF THE PRODUCT OR ARISING FROM BREACH OF THE WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT, OR ANY OTHER LEGAL OR EQUITABLE THEORY, EVEN IF FOXWELL KNEW OF THE LIKELIHOOD OF SUCH DAMAGES. FOXWELL

SHALL NOT BE LIABLE FOR DELAY IN RENDERING SERVICE UNDER THE LIMITED WARRANTY, OR LOSS OF USE DURING THE PERIOD THAT THE PRODUCT IS BEING REPAIRED.

6. Some states do not allow limitation of how long an implied warranty lasts, so the one-year warranty limitation may not apply to you (the Consumer). Some states do not allow the exclusion or limitation of incidental and consequential damages, so certain of the above limitations or exclusions may not apply to you (the Consumer). This limited warranty gives the Consumer specific legal rights and the Consumer may also have other rights which vary from state to state.

Safety Information

For your own safety and the safety of others, and to prevent damage to the equipment and vehicles, read this manual thoroughly before operating your tester. The safety messages presented below and throughout this user's manual are reminders to the operator to exercise extreme care when using this device. Always follow all BCI (Battery Council International) safety recommendations. Read, understand and follow all safety messages and instructions in this manual.

Safety Message Conventions Used

We provide safety messages to help prevent personal injury and equipment damage. Below are signal words we used to indicate the hazard level in a condition.

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or to bystanders.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to the operator or to bystanders.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or to bystanders.

Important Safety Instructions

And always use your tester as described in the user's manual, and follow all safety messages.

⚠ WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals know to the state of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

Table of Contents

ONE-YEAR LIMITED WARRANTY **2**

SAFETY INFORMATION **5**

Safety Message Conventions Used 5

Important Safety Instructions 5

1 USING THIS MANUAL **7**

1.1 Bold Text 7

1.2 Symbols and Icons 7

1.2.1 Solid Spot 7

1.2.2 Arrow Icon 7

1.2.3 Note and Important Message 7

2 INTRODUCTIONS **8**

2.1 Tester Descriptions 8

2.2 Accessory Descriptions 9

2.3 Specifications 9

2.4 Current Clamp 9

3 OPERATIONS **10**

3.1 Connecting The Tester 10

3.2 Battery Test 11

3.3 Cranking Test 15

3.4 Charging Syste m test 16

4 VIEWING/PRINTING TEST RESULTS **18**

5 LANGUAGE **20**

6 VERSION INFO **21**

1 Using This Manual

We provide tool usage instructions in this manual. Below is the conventions we used in the manual.

1.1 Bold Text

Bold text is used to highlight selectable items such as buttons and menu options.

Example:

Press the **ENTER** button to select.

1.2 Symbols and Icons

1.2.1 Solid Spot

Operation tips and lists that apply to specific tool are introduced by a solid spot ●.

Example:

When System Main Menu is selected, a menu that lists all available options displays. Menu options include:

- BATTERY TEST
- VIEW/PRINT
- LANGUAGE

1.2.2 Arrow Icon

An arrow icon indicates a procedure.

Example:



To change menu language:

1. Scroll with the arrow keys to highlight **Language** on the menu.
2. Press the **ENTER** button to select.

1.2.3 Note and Important Message

Note

A NOTE provides helpful information such as additional explanations, tips, and comments.

Example:

NOTE

Test results indicate a faulty component or system.

Important

IMPORTANT indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

Example:

IMPORTANT

Do not soak product as water might find its way into the tester.

---

2 Introductions

The newly developed BT-780 Battery Analyzer from Foxwell aims to test start-stop AGM and EFB batteries. And it is developed to test 12V regular flooded, AGM flat plate, AGM spiral and gel batteries and 12V & 24V starting and charging system. Advanced conductance test and ripple voltage test provide a quick, easy and affordable solution for technicians to check battery health and detect faults of starting and charging system. Besides, built-in thermal printer allows technicians to print the test data at anytime and anywhere.

2.1 Tester Descriptions

This section illustrates external features, ports and connectors of the tester.



A **LCD Display** - shows menus, test results and operation tips.

B **BACK Button** - exits a screen and generally returns to previous screen.

C **Menu Button** - access the Main Menu options of the tester.

D **ENTER Button** - executes a selected option and generally goes to the next screen.

E /H UP and Down Buttons - selects an option or scroll to menu options.

F/G **Left and Right Buttons** - moves the cursor left or right to select characters when inputting the plate number of the car.

I **Print Button** - Prints test results through optional Bluetooth printer.

J **Power Switch** - Turn off/on battery for testing.

IMPORTANT

Do not use solvents such as alcohol to clean keypad or display. Use a mild nonabrasive detergent and a soft cotton cloth**.**

2.2 Accessory Descriptions

This section lists the accessories that go with the tester. If you find any of the following items missing from your package, contact your local dealer for assistance.

1 **BT-780 Battery Analyzer**

2 **User's Guide**

3 **O-1000A Current Clamp (Optional)**

2.3 Specifications

Display: 128 * 64 pixels, large, backlit display screen

Working Temperature: -20 to 60°C (-4 to 140°F)

Storage Temperature: -20 to 70°C (-4 to 158°F)

Power Supply: 8-30V DC

Dimensions (L*W*H**)**: 90*240*45mm

Net Weight (without printer): 0.8 KG

Net Weight (with printer): 1.0KG

2.4 Current Clamp

To test cranking amps and charging current, first connect the current clamp before tester startup, then turn on the current clamp power switch.

After tester connected, current clamp is able to work.

Press the reset key of the current clamp and connect the current clamp jaw to the anode wiring between the battery to be tested and the generator.

As the minimum width of the current clamp jaw is only 28mm, choose the connection cable or connection pole with diameter less than 28mm to test. Otherwise, the current clamp jaw cannot close completely.

NOTE: 1. Current clamp jaw must close to avoid test tolerance.

2. Current clamp uses 9V alkaline battery. Turn the clamp power off after using the current clamp.

3. Before testing the current, take off the current clamp from the battery positive connection cable, and reset.

3 Operations

This section describes how to use the tester to perform tests on car batteries and 12V&24V starting and charging system. The menu-driven display will guide you step by step through the test process.

3.1 Connecting The Tester

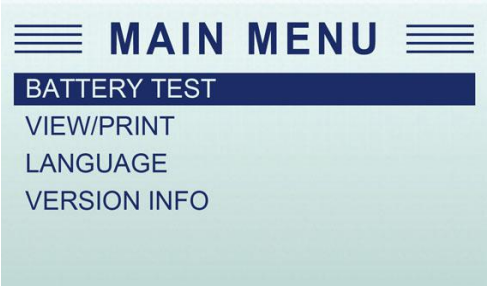
The tester powers on automatically when it is correctly connected to the battery. The preferred test position is at the battery terminals. If the battery is not accessible, you may test at the jumper post; however, the power measurement may be lower than the actual value.

▶ To connect the tester:

1. Clean the battery posts or side terminals.
2. Connect the red clamp to the positive (+) terminal and the black clamp to the negative (-) terminal.
3. Rock the clamps back and forth to make sure the clamps are firmly connected. In case the connection is poor, a “CHECK CONNECTION” message displays.
4. When the tester is correctly connected, it boots up automatically and show the voltage of the battery.



5. Press the **MENU** button to go to the Main Menu.



NOTE

Do not connect the tester to a voltage source greater than 30V DC; otherwise you may damage the tester.

NOTE

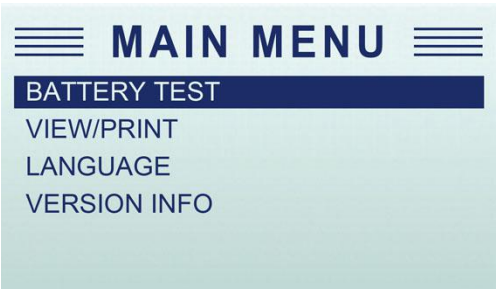
If you are testing inside a vehicle, make sure all accessory loads are cut off, the key is not in the ON position and the doors are closed.

3.2 Battery Test

Battery Test is mainly targeted to analyze the battery healthy status to calculate the actual cold cranking capability of the battery and the aging extent, which provide reliable analysis evidence for the test and maintenance of the battery.It notifies the user to replace battery in advance when the battery is getting aged.

▶ To start a battery test:

1. Scroll with the **UP** or **DOWN** button to highlight **Battery Test** from Main Menu and press the **ENTER** key.



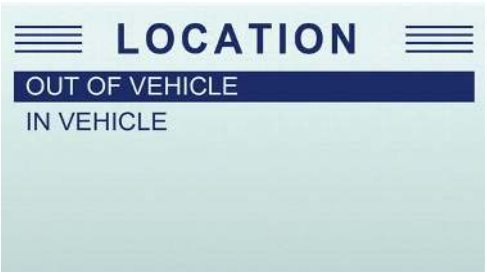
2. Scroll with the **UP** or **DOWN** button to highlight the voltage from Main Menu and press the **ENTER** key.



3. Scroll with the **UP** or **DOWN** button to highlight the **TEST TYPE** from Main Menu and press the **ENTER** key.



4. Scroll with the **UP** or **DOWN** button to highlight **OUT OF VEHICLE** or **IN VEHICLE** from BATTERY LOCATION menu and press **ENTER** to select the battery location.



5. Scroll with the **UP** or **DOWN** button to highlight **TOP POST** or **SIDE POST** from POST TYPE menu and press **ENTER** to select the battery post type.



6. Scroll with the **UP** or **DOWN** button to select the battery type from **BATTERY TYPE** menu and press **ENTER** to confirm.



7. Scroll with the **UP** or **DOWN** button to select the battery standard from **BATTERY STANDARD** menu and press **ENTER** to confirm. Not all rating systems are available for each application.



You may find the battery type and battery rating label on every battery.

Global Rating Systems

No.	Standard	Description	BT780 Testing Range
1	CCA	Cold Cranking Amps, as specified by SAE. The most common rating for cranking batteries at 0°F (-18°C)	100-2000
2	BCI	Battery Council International standard	100-2000
3	CA	Cranking Amps standard. The effective starting current value at 0°C (32°F).	100-2000
4	MCA	Marine Cranking Amps standard. The effective starting current value at 0°C	100-2000

		(32°F).	
5	JIS	Japanese Industry Standard, shown on a battery as a combination of numbers and letters	26A17--245H52
6	DIN	Deutsche Industrie-Norm	100-2000
7	IEC	International Electrotechnical Commission	100-2000
8	EN	Europa-Norm	100-2000
9	SAE	Society of Automotive Engineers	100-2000
10	GB	China National Standard	100-2000

8. Use **UP** or **DOWN** button to change measure range till you enter the correct range of your battery. Press **ENTER** to start the test.



If your battery belongs to CCA system, just select the right CCA number and press **ENTER** to start the test.

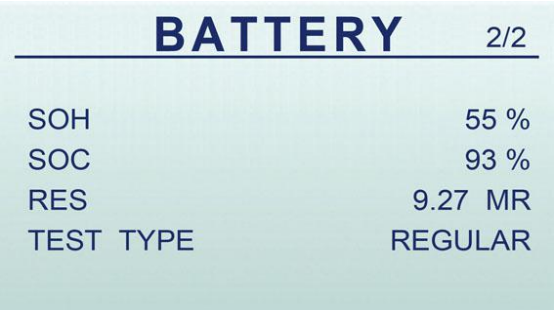
9. View test results on the screen. Depending on battery status, one of the following test results may display.



No.	Test Results	Interpretation
1	GOOD BATTERY	The battery is in good condition.
2	GOOD-RECHARGE	The battery is in good condition but low current. Fully charge the battery and return it to service.

3	CHARGE & RETEST	Fully charge the battery and retest. Failure to fully charge the battery before testing may result in inaccurate results. If you still get CHARGE & RETEST message after you fully charge the battery, replace it.
4	REPLACE BATTERY	The battery is almost dead or the connection between the battery and battery cable is poor. Replace the battery and retest; or disconnect the battery cables and retest the battery using the out-of-vehicle test before replacing it.
5	BAD CELL-REPLACE	The battery may be damaged such as broken cell or short circuit. Replace the battery and retest.

10. Use **UP** or **DOWN** button to check the second page of battery test result which include state of health (**SOH)**, state of charge (**SOC),** and resistance (**RES).**



11. Press the **BACK** button to return to Main Menu. Or, press the ENTER button for cranking test if you are processing an in-vehicle test.

NOTE

The tester keeps the results of last test only. When you start a new test, the last results are overwritten.

3.3 Cranking Test

NOTE

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.

After an in-car battery test, the display alternates between the battery test results and the message PRESS FOR CRANKING TEST.

▶ To start cranking test:

1. Press the **ENTER** button for cranking test.
2. Start the engine when prompted.
3. The tester displays the decision on the starter system, cranking voltage, and cranking time in seconds. For instance, as below display, the starter system is REPLACE BATTERT, cranking voltage is 10.76 V, and cranking time in second is 0.86 S.



No.	Test Results	Interpretation
1	CRANKING NORMAL	The starter voltage is normal and the battery is fully charged.
2	LOW VOLTAGE	The starter voltage is low and the battery is fully charged.
3	CHARGE BATTERY	The starter voltage is low and the battery is discharged. Fully charge the battery and repeat the starter system test.
4	REPLACE BATTERY	Battery must be replaced before the starting system can be tested.
5	NO START	No vehicle start detected.
6	CRANKING SKIPPED	A start was not detected.

4. Press **ENTER** button to proceed with the charging system test, **Print** button to print the test results, **BACK** button to return to the main menu.

NOTE

For an in-vehicle test, the display alternates between the test results and the message. Press **ENTER** for charging test.

3.4 Charging System test

Once you have completed an in-vehicle test, the display alternates between the battery test results and the message press **ENTER** for charging test. Press **ENTER** to proceed with the charging test.

▶ To start charging system test:

1. Follow the on-screen prompts to Rev the engine.

2. Turn on high beams headlights and the blower fan.

3. Rev engine with loads on.

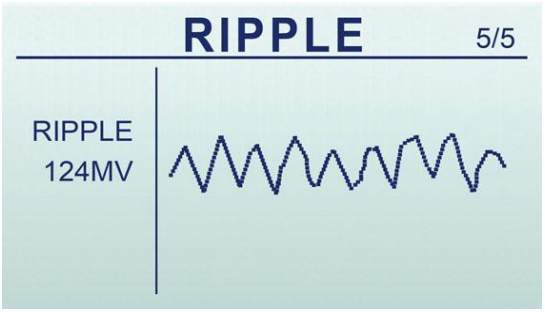
4. Idle engine and turn off loads.

5. The Charging System decision is displayed at the end of the procedure.



No.	Test Results	Interpretation
1	NO PROBLEMS	System is showing normal output from the alternator.
2	NO OUTPUT	No alternator output detected. 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.)
3	LOW OUTPUT	Alternator not providing sufficient 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 reparable the cable and retest.
4	HIGH OUTPUT	Alternator voltage output exceeds the normal limits. Make sure there are no loose connections and the ground connection is normal. If there are no connection problems, replace the regulator. Most alternators have a built-in regulator that requires replacing the alternator. In older vehicles that use external voltage regulators, you may need to replace only the voltage regulator.
5	EXCESSIVE RIPPLE	Excessive AC ripple detected. One or more diodes in the alternator are not functioning or there is stator damage.

6. Use **UP** or **DOWN** button to check the **RIPPLE**.



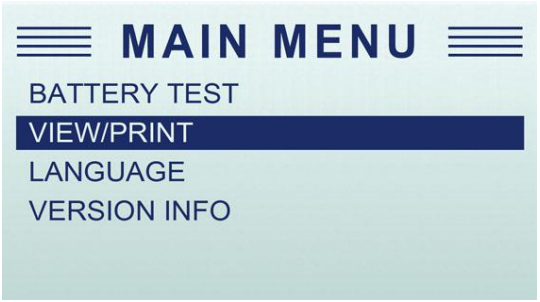
7. Press **ENTER** to print the test results or **BACK** to return to the main menu.

4 Viewing/Printing Test Results

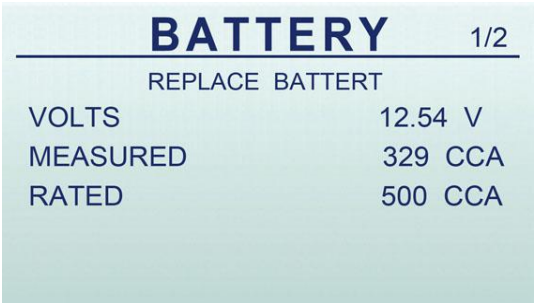
View/Print menu lets you view test results and print the data via optional Bluetooth printer.

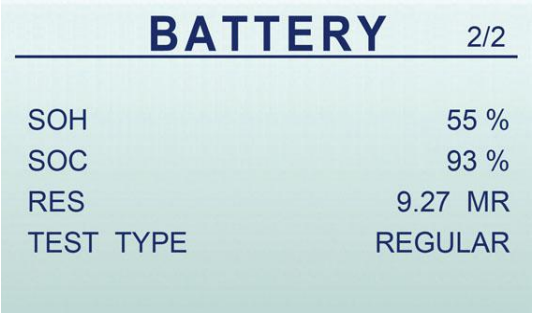
To view and print the test results:

1. Scroll with the **UP** or **DOWN** button to highlight **View/Print** from Main Menu and press the **ENTER** key.

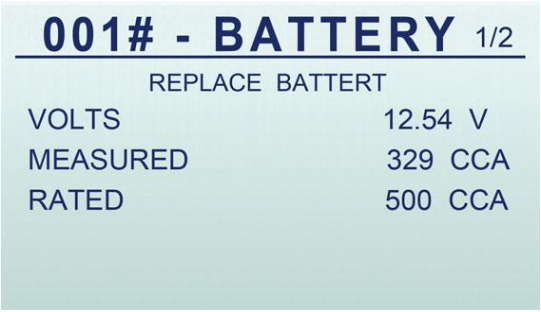


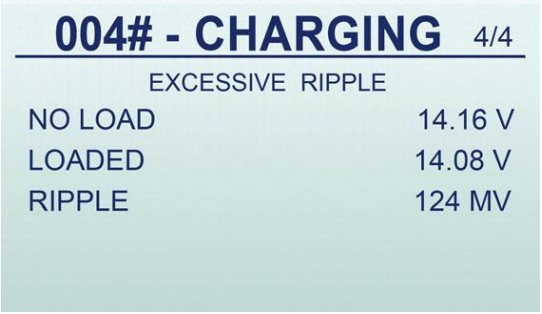
2. Review the test results on the screen. Use the **UP** or **DOWN** button to scroll back and forth through Battery Result, Charging Result and Cranking Result to view.



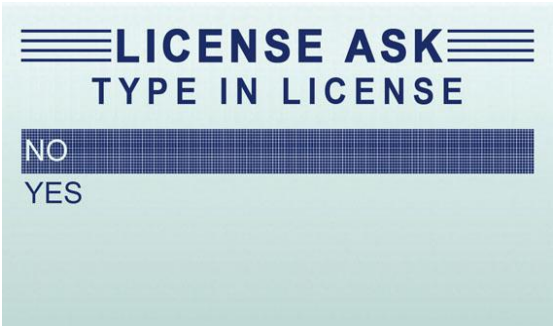


3. Press **Lift button** or **Right button** to check different test results.





4. To print the test results, just press the **Print** button on the unit.



5. Select **Yes** to type in the plate number so the test ticket could show test result with the exact plate number. Or select **No** to quit typing plate number.
6. Follow the on-screen prompt to input the plate number.



7. After entering the plate number, the test result will be printed.

NOTE

Build-in Battery is Alkaline Zinc-Manganese Dry Battery 9 volt. If the battery has no power please change it.

The results will be recorded even the battery has no power.

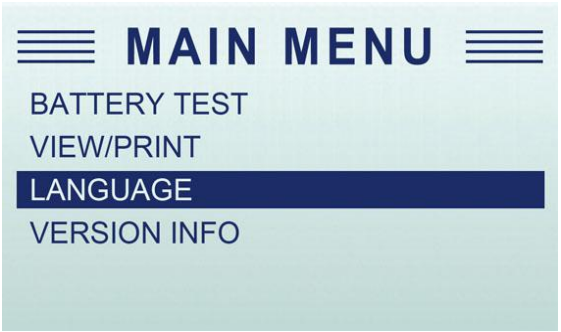
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5 Language

Language menu lets choose system language. The test is set to English menu by default.

To change the language setting:

1. Scroll with the **UP** or **DOWN** button to highlight **Language** from Main Menu and press the **ENTER** key.



2. Use the **UP** or **DOWN** button to select the language you need and press the **ENTER** key to confirm and return. Or press **BACK** button to return without saving.



6 Version Info.

Version Info menu lets you view software information of the tester.

To check the software version:

1. Select Version Info from the main menu. The follow screen shows the version of the tester.



