

# DHC<sup>®</sup>

Model BT2000HD

HEAVY DUTY

BATTERY & ELECTRICAL SYSTEM ANALYZER



## OWNER'S MANUAL

READ ENTIRE MANUAL BEFORE USING THIS PRODUCT

## MODEL NO. BT2000HD

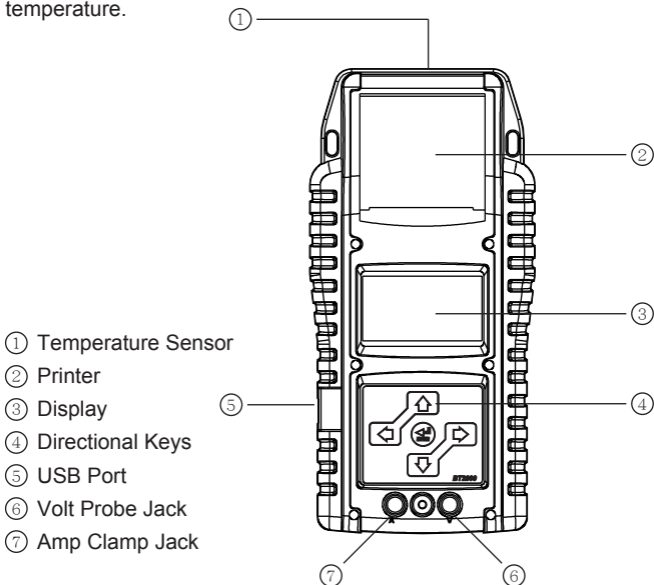
### HEAVY DUTY BATTERY & ELECTRICAL SYSTEM ANALYZER

#### TEST PROCEDURES / OPERATING INSTRUCTIONS

##### IMPORTANT :

1. For testing 6 and 12 volt batteries, 12 and 24 volt cranking and charging systems and 12 volt battery pack test.

2. Suggested operation range 32°F(0°C) to 122°F(50°C) in ambient temperature.



## WARNING :

1. Working in the vicinity of a lead acid battery is dangerous. Batteries generate explosive gases during normal battery operation. For this reason, it is of utmost importance, if you have any doubt, that each time before using your tester, you read these instructions very carefully.
2. To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in the vicinity of the battery. Observe cautionary markings on these items.
3. Do not expose the tester to rain or snow.

## PERSONAL SAFETY PRECAUTIONS :

1. Someone should be within range of your voice or close enough to come to your aid when you work near a lead acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
3. Wear safety glasses and protective clothing.
4. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least ten minutes and get medical attention immediately.
5. NEVER smoke or allow a spark or flame in vicinity of battery or engine.
6. Be extra cautious to reduce risk of dropping a metal tool onto the battery. It could spark or short-circuit the battery or other electrical parts and could cause an explosion.
7. Remove personal metal items such as rings, bracelets, necklaces and watches when working with a lead acid battery. It can produce a short circuit current high enough to weld a ring or the like to metal causing a severe burn.

## WARNING :

⚠ WARNING This product can expose you to chemicals including arsenic, which is known to the State of California to cause cancer. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

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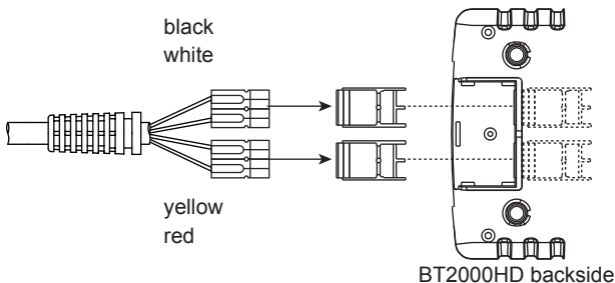
## PREPARING TO TEST :

1. Be sure area around battery is well ventilated while battery is being tested.
2. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
3. Inspect the battery for cracked or broken case or cover. If battery is damaged, do not use tester.
4. If the battery is not sealed maintenance free, add distilled water in each cell until battery acid reaches level specified by the manufacturer. This helps purge excessive gas from cells. Do not overfill.
5. If necessary to remove battery from vehicle to test, always remove ground terminal from battery first. Make sure all accessories in the vehicle are off to ensure you do not cause any arcing.

## OPERATION & USE:

### INSERTION OR REPLACEMENT OF LEAD WIRE

1. Remove the cover at the backside bottom of the battery tester.
2. Insert the connectors which contain black-white pair and yellow-red pair in one end of the lead wire into the sockets which can be found when you remove the cable cover. Be sure to make colors matched between the connectors and sockets as shown below.



## BATTERY TEST

1. Before you test a battery in a vehicle, turn off the ignition, all accessories and loads. Close all the vehicle doors and the trunk lid.
2. Make sure you have put 6 AA 1.5V batteries into the battery chamber. Oxyride batteries are not recommended because of the initial 1.7 Volt output. If the internal 1.5V batteries run out of power, the display will show "POWER LOW". Replace those 6 AA 1.5V batteries before starting a new test.

Note that nothing will be seen on the display until the tester is connected to a vehicle battery.

3. Make sure the battery terminals are clean. Wire brush them if necessary. Connect the red clamp to the positive battery terminal post; connect the black clamp to the negative battery terminal post. For the most accurate results, clamp the lead part of the terminal only. Attaching to the clamp or fixture rather than directly on the terminal will lead to the unstable test results.

#### 4. Paper load:

- a. Open the clear cover.



- b. Place a new paper roll in the compartment.



- c. Pull a short length of paper from the compartment and press down the clear cover to close.



5. Press the ◀ ▶ key to select Battery Test. Press «ENTER» button.

6. Select USER ID if there are set up user ID's that have been transferred to the unit via the SYNC. Please refer to "BT2000 USB INSTALLATION & USER GUIDE".

USER ID:  
XXXXXX  
XXXXXX  
XXXXXX

7. If you are testing batteries IN PARALLEL, select "YES" for processing pack test.

Select "NO" for single battery test and go to step 9 directly.

TRUCK/GROUP 31?  
YES/NO

8. Press the ◀ ▶ key to confirm the number of batteries.

# OF BATTERY  
IN PARALLEL:  
1/2/3/4/5/6

9. Press the ◀ ▶ key to select the battery type :

- a. REGULAR LIQUID
- b. AGM FLAT PLATE
- c. AGM SPIRAL
- d. VRLA/GEL

Press «ENTER» to confirm choice.

BATTERY TYPE  
AGM FLAT PLATE

10. Press the ◀ ▶ key to select the battery rating: SAE (CCA), EN, IEC, DIN or JIS. Press «ENTER» to confirm choice.

SELECT RATING  
SAE

11. Press the ◀ ▶ key to input the battery capacity.

SAE (CCA): 100~3000

EN: 100~2830

DIN: 60~1685

IEC: 70~1985

JIS: Battery Type No.

Press «ENTER» to begin the test.

SET CAPACITY  
XXXX SAE

**12.** Testing battery.



**13.** Aim the "Temperature Measurement Sensor" 2.5 cm (1 inch) from the top or sides of the battery case and press «ENTER». Measured temperature may be varied by distance, under hood conditions and ambient temperature.

POINT TO BATTERY  
READ TEMPERATURE  
PRESS ENTER

**14.** Press «ENTER» when the battery temperature is shown on the screen.

BATTERY TEMP.  
68 F 20 C  
PRESS ENTER

**15.** If testing a single battery, please go to page 8 for readout. If testing a PACK, one of the two results will be displayed:

## GOOD PACK

GOOD PACK  
12.XXV

The PACK is good & capable of holding a charge. Press ENTER to go to printing step.

## CHECK PACK

SEPARATE PACK  
CONNECT ONLY  
BATTERY #1

The PACK has problem, please test batteries separately. Disconnect and separate pack and test each battery.

BATTERY #1  
START TEST

NOTE that disconnect pack batteries ONLY when the screen shows the message "SEPARATE PACK".

**16.** Press the ◀ ▶ key to confirm that the battery is fully charged or not. Press «ENTER» to confirm.

BATTERY  
CHARGED? YES



17. When test is completed, the display shows the results as following {Press the ◀ ▶ key to select: SOH (STATE OF HEALTH) or SOC (STATE OF CHARGE)}.

## GOOD & PASS

The battery is good & capable of holding a charge.

GOOD & PASS  
XX.XXV XXXXSAE

## GOOD & RECHARGE

The battery is good but needs to be recharged.

GOOD & RECHARGE  
XX.XXV XXXXSAE

## RECHARGE & RETEST

Battery is discharged. The battery condition cannot be determined until it is fully charged. Recharge & retest the battery.

RECHARGE & RETEST  
XX.XXV XXXXSAE

## BAD & REPLACE

The battery will not hold a charge. It should be replaced immediately.

BAD & REPLACE  
XX.XXV XXXXSAE

## BAD CELL & REPLACE

The battery has at least one cell short circuit. It should be replaced immediately.

BAD CELL & REPLACE  
XX.XXV XXXXSAE

## CAUTION

The battery may be serviceable but with decreased capacity to start the engine. The battery might fail under extreme climate conditions or with a poor connection between the vehicle and the battery to affect the charging function. Please pay attention to the battery for possible replacement and charging system analysis.

CAUTION  
XX.XXV XXXXSAE

**NOTE** that there might be some message displayed to different circumstances as below.

## LOAD ERROR

LOAD ERROR

The tested battery is bigger than 3000SAE (CCA). Or the connection is not properly established. Check the battery & make sure the clamp lead is properly connected.

## SURFACE CHARGE

TEST IN VEHICLE?  
YES

Batteries are sluggish and cannot convert lead sulfate enough during charge. The tester will ask if the tested battery is installed in vehicle or out of vehicle. It is recommended to follow the tester's steps to remove the affect of surface charge.

## MEMORY FULL

MEMORY FULL  
WILL OVERWRITE  
MEMORY  
PRESS ENTER

The tester can recorded 1000 test results. Continuing to test will over write previous saved test data. It is recommended to upload test data to PC through the SYNC.

## MEMORY ERROR

MEMORY ERROR  
REFER TO MANUAL  
PRESS ENTER

BT2000 is unable to save the test result due to the memory error. Please execute the CLEAR MEMORY function. The stored test data will be deleted.

## 24V SYSTEM PRINTING

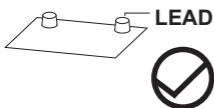
PRINT 24V SYSTEM  
RESULT? YES

To print 24V system test result, user must save the test result first. The 24V system test result will be recorded until you connect to a 12V battery. The message to check printout will be displayed after you reconnect to the battery.

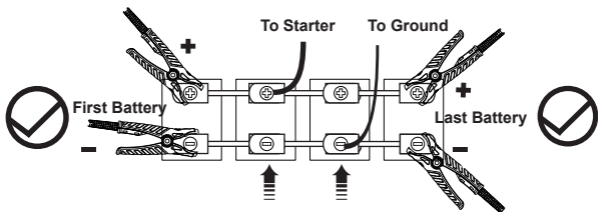
## PACK TEST

Please make sure the following steps are followed when testing a pack of batteries.

1. The preferred test position is at lead battery terminals or lead adaptors on the stainless steel threaded studs. If the battery is not accessible, you may test at the jumper post or fastening nuts. Don't test at battery stainless steel threaded post, result may be inaccurate and result in failing a good battery.



2. Connect the clamps to the first or last battery and rock clamps back and forth for good contact to get the most accurate reading.



Not a recommended connection, connecting at these locations may provide an inaccurate result.

3. Break down the batteries then test the battery individually.



## SYSTEM TEST

1. Press «ENTER» button, you will view the following screen.

SYSTEM TEST  
XX.XXV

2. Turn off all vehicle accessory loads such as lights, air conditioning, radio, etc. Before starting the engine.

TURN OFF LOADS  
START ENGINE

3. When the engine is started, one of the three results will be displayed along with the actual reading measured.

## CRANKING VOLTS NORMAL

The system is showing normal draw. Press «ENTER» to perform the charging system test.

CRANKING VOLTS  
XX.XXV    NORMAL

## CRANKING VOLTS LOW

The cranking voltage is below normal limits, troubleshoot the starter with manufacturers recommended procedure.

CRANKING VOLTS  
XX.XXV    LOW

## CRANKING VOLTS NO DETECTED

The cranking voltage is not detected.

CRANKING VOLTS  
NO DETECTED

4. If the cranking voltage is normal, press «ENTER» to begin charging system test.

PRESS ENTER FOR  
= CHARGING TEST =

5. Press the «ENTER» key, you will view the following screen.

MAKE SURE ALL  
LOADS ARE OFF

6. Press the «ENTER» key, one of the three results will be displayed along with the actual reading measured.

## LOW CHARGING VOLTS WHEN TEST AT IDLE

The alternator is not providing sufficient current to the battery. Check the belts to ensure the alternator is rotating with engine running. If the belts are slipping or broken, replace the belts and retest.

ALT. IDLE VOLTS XX.XXV	LOW
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Check the connections from the alternator 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 condition, replace the alternator.

## CHARGING SYSTEM NORMAL WHEN TEST AT IDLE

The system is showing normal output from the alternator. No problem is detected.

ALT. IDLE VOLTS XX.XXV	NORMAL
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## HIGH CHARGING VOLTS WHEN TEST AT IDLE

The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. Check to ensure there is no loose connection and the ground connection is normal.

ALT. IDLE VOLTS XX.XXV	HIGH
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If there is no connection issue, replace the regulator. Since most alternators have the regulator built-in, this will require you to replace the alternator. The normal high limit of a typical automotive regulator is 14.7 volts +/- 0.05. Check manufacturer specifications for the correct limit, as it will vary by vehicle type and manufacturer.

7. Following the charging system at idle, press «ENTER» for the charging system with accessory loads. Turn on the blower to high (heat), high beam headlights, and rear defogger (If equipped). Do not use cyclical loads such as air conditioning or windshield wipers.

TURN ON LOADS  
AND PRESS ENTER

8. When testing older model diesel engines, the users need to run up the engine to 2500 rpm for 15 seconds. You will view the screen as follows:

RUN ENGINE UP TO  
2500 RPM 15 SEC.

9. Press «ENTER» to look for the amount of ripple from the charging system to the battery. One of two testing results will be displayed along with the actual testing measured.

## RIPPLE DETECTED NORMAL

Diodes function well in the alternator / stator.

RIPPLE DETECTED  
XX.XXV    NORMAL

OR

NO RIPPLE DETECT

## EXCESS RIPPLE DETECTED

One or more diodes in the alternator are not functioning or there is stator damage. Check to ensure 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.

RIPPLE DETECTED  
XX.XXV    HIGH

10. Press the «ENTER» key to continue the charging system with accessory loads. One of the three results will be displayed along with the actual testing measured.

## CHARGING SYSTEM **HIGH** WHEN TEST WITH ACC. LOADS

The voltage output from the alternator to the battery exceeds the normal limits of a functioning regulator. Check to ensure there are no loose connections and that the ground connection is normal. If there are no connection issues, replace the regulator. Since most alternators have the regulator built-in, this will require you to replace the alternator.

ALT. LOAD VOLTS XX.XXV	HIGH
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## CHARGING SYSTEM **LOW** WHEN TEST WITH ACC. LOADS

The alternator is not providing sufficient current for the system's electrical loads and the charging current for the battery. Check the belts to ensure the alternator is rotating with the engine running. If the belts are slipping or broken, replace the belts and retest. Check the connections from the alternator to the battery. If the connection is loose or heavily corroded, clean or replace the cable and retest. If the belts and connections are in good working condition, replace the alternator.

ALT. LOAD VOLTS XX.XXV	LOW
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## CHARGING SYSTEM **NORMAL** WHEN TEST WITH ACC. LOADS

The system is showing normal output from the alternator. No problem detected.

ALT. LOAD VOLTS XX.XXV	NORMAL
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## SETTINGS AND INFORMATION RETRIEVAL

### LANGUAGE SELECT

1. Hook the tester up to a battery.
2. The tester defaults to the BATTERY TEST display. Press the directional keys to get to the LANGUAGE SELECT display.
3. Press ENTER and the display will show the language options. Press the directional keys to select the language you want the tester to display.
4. Press ENTER and the display returns to BATTERY TEST.

### SETTING THE DATE AND TIME

1. Hook the tester up to a battery.
2. The tester defaults to the BATTERY TEST display. Press the directional keys to get to the CURRENT DATE/TIME display.
3. Press ENTER and the display will show the ADJUST YEAR. Press the directional keys to change the setting.
4. Press ENTER and the display will show the ADJUST MONTH. Press the directional keys to change the setting.
5. Press ENTER and the display will show the ADJUST DAY. Press the directional keys to change the setting.
6. Press ENTER and the display will show the ADJUST HOUR. Press the directional keys to change the setting.
7. Press ENTER and the display will show the ADJUST MINUTE. Press the directional keys to change the setting.
8. Press ENTER and the display will show the ADJUST SECOND. Press the directional keys to change the setting.
9. Press ENTER and the display returns to BATTERY TEST.

### ADJUST THE DISPLAY BRIGHTNESS

1. Hook the tester up to a battery.
2. Get to the BRIGHTNESS display.
3. Press the directional keys to adjust the brightness of the display.



## AMP CLAMP & VOLT PROBE INSTRUCTION GUIDE

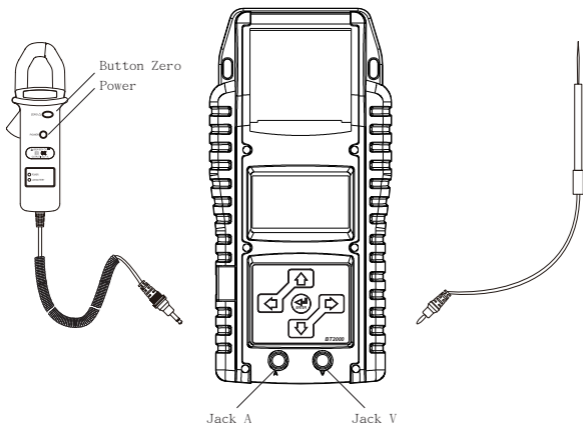
### DC/AC Current measurement

1. Install the 9V battery.
2. Connect Clamp Meter to the jack A on BT2000HD. Press POWER.
3. Press the button ZERO. Make sure the display reads zero.
4. Press the trigger to open the transformer jaws and clamp one electrical wire.
5. Make sure the clamp jaw is perfectly closed.
6. Read the displayed value.

### DC Voltage Measurements

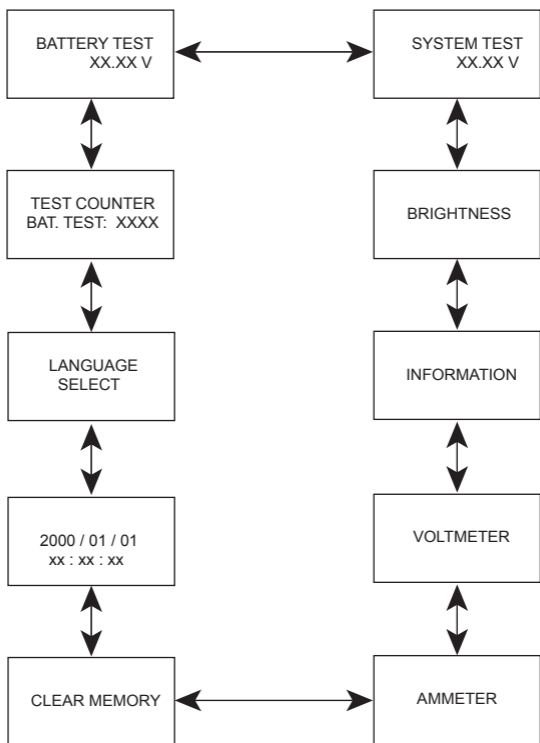
1. Connect Red Test Lead to the jack V on BT2000HD.
2. Use the test lead to touch a point within the network of the battery.
3. Read the displayed value.

NOTE: Do not test the volt more than 60V. It may damage the tester.



## TEST FLOW

Press **LEFT / RIGHT** buttons to select the following functions when the unit is turned on.



## WARRANTY

Any battery tester defective in material or workmanship will be repaired or replaced according to published defective return test repair procedures. The existence of a defect shall be determined by the seller in accordance with published procedures. The published test procedures are available upon request.

This warranty does not cover any unit that has been damaged due to accident, abuse, alternation, use for a purpose other than that for which it was intended, or failure to follow operating instructions. This warranty is expressly limited to original retail buyers. This warranty is not assignable or transferable. Proof of purchase is required for all alleged claims. Warranty cannot be authorized without proof of purchase. Warranty claims must be sent pre-paid with dated proof of purchase. Damage incurred during shipment is the responsibility of the shipper (customer returning unit) If the returned unit qualifies for warranty, the shipper will only incur shipping cost. The seller reserves the right to substitute or offer alternative warranty options at its discretion.

The sole and exclusive remedy for any unit found to be defective is repair or replacement, at the option of the seller. In no event shall the seller be liable for any direct, indirect, special, incidental, or consequential damages (including lost profit) whether based on warranty, contract, tort, or any other legal theory.

## RETURN GOODS

Pack with sufficient over-pack to prevent damage during shipment. Damage incurred during return is not covered under this warranty. Repair costs for such damages will be charged back to shipper.

## REMARK

WHEN RETURNING GOODS, PLEASE SHOW "RETURN GOODS" ON ALL INVOICES & RELATED SHIPPING DOCUMENTS TO PREVENT ANY EXTRA CHARGE."