



## **BVA-300**

### **Operator's Manual**

#### ***Hand Held-Accuracy with a 40 Amp Load***

The BVA-300 is the a hand-held tester that is the auto industry's answer to portability in a professionally accurate battery load tester and system analyzer.

# CONGRATULATIONS!

You have purchased one of Auto Meter's hand-held Battery, Starting and Charging System Analyzers. It is designed to test each component of a vehicle's electrical system with speed and accuracy. If you should have any questions about your tester, testing procedures, or service see page 24 for contact information.

## BVA 300

Load Test Capacity .....	40 Amp
Battery Sizes .....	200-1600 CCA
Digital Display .....	1" x 2.5" - 4 line x 16 character
Volt Ranges.....	Digital 0-30
Cooling .....	Heat Sink Ventilation
Leads .....	Load Amp-2 1/2 ft., 16 Gauge
Size .....	3 3/4" x 6 3/4" x 1"
Memory .....	stores the last 50 tests
Internal Battery.....	9 Volt Alkaline
<i>Optional AC-22</i> .....	Infrared printer and carrying case
<i>Optional AC-21</i> .....	Carrying case only
<i>Optional AC-12</i> .....	PC Interface adapter cord
Weight.....	1.34 lbs.

## What to Expect from the BVA-300:

***Immediately determine battery condition and perform a complete starting and charging system analysis.*** The BVA-300 is a portable full-featured menu-driven battery tester and system analyzer that provides quick, professional load results using Auto Meter's Pulsed Load. Preliminary quick battery checks will increase charging productivity. The BVA-300 is user friendly. It tells you what to do. The stator-diode test automatically indicates open or shorted stator-diodes. It is professionally accurate. Detailed test results are LCD displayed after each test and can be reviewed and/or printed from memory.

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**Note:** The BVA-300 performs a preliminary check, load tests 6 volt and 12 volt batteries and tests 12 Volt and 24 Volt starting and charging systems. The following examples illustrated are for a 12 Volt system. The BVA-300 automatically identifies the appropriate voltage and displays the menu selection and instructions needed for that system.

## SAFETY

- Carefully read all operating instructions before using the BVA-300
- Wear proper protection when working around batteries.
- Be sure each test is complete before removing load clamps to prevent arcing and potential explosion from battery gases. Keep sparks, flames, or cigarettes away from batteries.
- Keep hair, hands, and clothing as well as tester leads and cords away from moving blades and belts.
- Provide adequate ventilation to remove car exhaust.
- In extremely cold temperatures, check for frozen electrolytic fluid before applying load. Do not attempt to Load Test or charge a battery under 20 degrees. Allow the battery to warm to room temperature before testing or charging.
- **Warning!** Never attach the BVA-300 to a battery that is connected to any other tester or charging unit. Damage may result.



## CAUSE OF BATTERY FAILURE

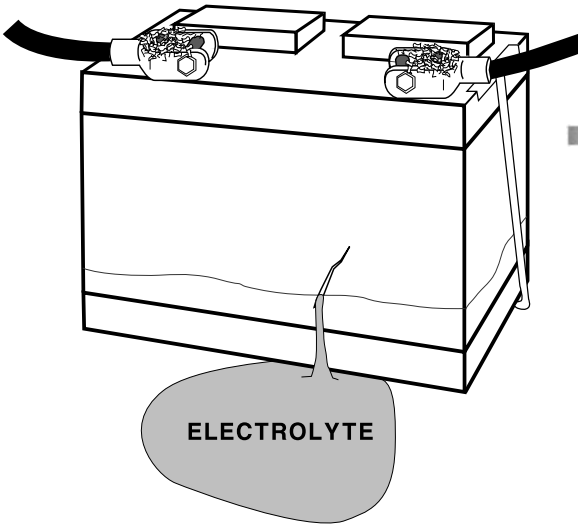
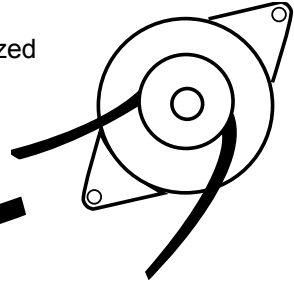
- **Incorrect Application:** Wrong size battery may have inadequate cold cranking Amp rating for original vehicle specifications.
- **Incorrect Installation:** Loose battery hold-downs cause excessive vibration, which can result in damage to the battery plates.
- **Improper Maintenance:** Low electrolytic fluid and corrosion on battery connections can greatly reduce battery life and affect battery performance.
- **Age of Battery:** If the date code on the battery indicates it is old, the failure may be caused by natural causes.
- **Overcharging:** Overcharging caused by a high voltage regulator setting or incorrect battery charging can cause excessive gassing, heat and water loss.
- **Undercharging:** Undercharging caused by a faulty charging system or low voltage regulation can cause lead sulfate to gradually build up and crystallize on the plates greatly reducing the battery's capacity and ability to be charged.

# INSPECTION

- Valid automotive electrical system testing depends on all the components being in good operating condition. In addition, the battery **MUST** have sufficient charge for testing. Carefully perform the following before attempting any electrical diagnosis.

## VISUAL CHECK

- **Inspect Belts and Pulleys** for cracks, glazed surface and fraying. Tighten loose belts.



- **Inspect Battery** for terminal corrosion, loose or broken posts, cracks in the case, loose hold-downs, low electrolyte level, moisture and dirt around the terminals.

- **Inspect Starting System.** Check starter, solenoid, and regulator for loose connections, loose mounts and frayed or cracked wires.
- **Important Note:** A known defective battery must be replaced before proceeding.

## CONTROLS AND FUNCTIONS

### LCD:

Displays menus and test results.

### KEYS:

When each key is pressed, a beep sounds to assure contact has been made.

### On/Off Key:

This is the manual on/off key. The display will show "READY TO CONNECT!" when the unit is turned on.

### Y Enter Key:

This key selects the next menu, the cursor line item and answers 'yes' to a test progression.

### +Up Key:

This key moves the cursor up in order to select a menu line item and increments certain displayed values.

### -Down Arrow Key:

This key moves the cursor down in order to select a menu line and decrements certain displayed values.

### N Esc Key:

This key cancels a test or progression. It also returns to the previous menu.

### Print Key:

Point the BVA-300 infrared print light towards the *Optional AC-22* infrared printer receiver and press the print key. Test results will be printed.



### Infrared Print Light:

When the print button is pressed infrared data will be transmitted to the printer when pointed in the approximate direction of the printer (up to 40 ft.).

### PC Download Jack:

By removing the boot the adapter cord AC-12 can be inserted.

# MAINTENANCE

## CLAMP MAINTENANCE:

- Both jaws of each clamp must firmly engage the battery terminal. The wire

CHECK OFTEN FOR LOOSE JAWS  
OR DAMAGED INTERNAL INSULATOR

soldered to the copper insert jaw must be insulated from the other wire soldered to the opposite handle. This insulation is required so that one can read the Amps and the other reads the Volts. Damaged clamps or loose wires will affect readings. Make sure the copper jaw insert is properly insulated from the clamp and the clamps are clean and in good repair.

Over time the battery clamps will need to be replaced if any of the following are indicated:

- CCA values seem extreme.
- If there is continuity between the copper insert and the clamps.
- If there is excessive damage or corrosion to the cables or clamps.

## CLAMP and BATTERY REPLACEMENT

- Remove the screws from the back cover.
- Separate top and bottom cover and open like a book leaving the ribbon in contact with the PC board that will remain with the back cover.
- **CLAMPS:** Remove the cables and strain relief. With the new load clamp leads pointing down; insert the new strain relief into the back cover. Make sure the red clamp wires are attached to the left two screws of the green screw terminal (labeled POS) and the black clamp wires are connected to the right two screws (labeled NEG). It does not matter if either of the two red clamp wires is switched. The same applies to the two black clamp wires. Just make sure the red clamp wires are to the left (POS) and the black clamp wires are to the right. (NEG)
- **BATTERY:** Remove the battery and replace with a 9 Volt battery. Match the (+) on the new battery with the (+) on the PC board.
- Reverse the procedure to assemble the unit.

# 1

## HOOK UP

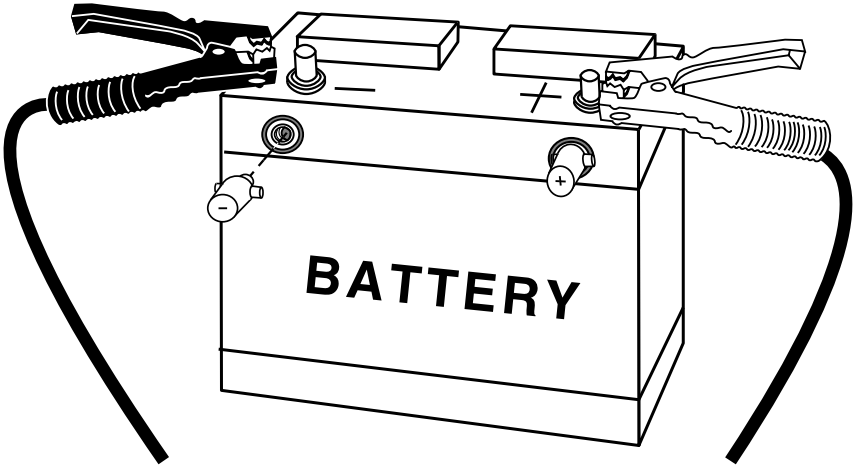
Press the On/Off button: Connect the clamps as instructed on the LCD.

```
AUTO METER  
BVA 300  
SYSTEM ANALYZER  
READY TO CONNECT
```

```
>ENTER BATTERY  
TEMP 70F  
USE +/-  
'Y' TO CONTINUE
```

Enter the approximate battery temperature in degrees Fahrenheit or Celsius (seen note) then press (Y Enter).

**Note:** Go to the setup to change temp scale to Celsius. The temperature request only appears once for each battery tested. If the clamps are disconnected you will be prompted again to begin a new battery test.



**Note!** Take special care when connecting to battery side terminals. If necessary use a side post adapter to prevent thread damage. When testing dual post batteries always connect load clamps to the post to which the system is attached. If a load test is made from a post connection and the alternator is mounted to side terminals a battery load test can be completed, but a continuity problem may still be in the side terminals when testing the alternator.

### CONNECTION ERRORS

- If the clamps are reversed the Reversed Connection screen will flash.
- If one or both of the clamps are not in complete contact (including both jaws) CHECK CONNECTIONS! will flash.



# 2

## PRELIMINARY CHECK

If connections are proper the following will be displayed:

```
CHECKING BATTERY  
PLEASE WAIT...
```

After the battery check is complete the results will be displayed. The following are two sample results.

```
PRELIM. CHECK  
12.24V CHRG 50%  
EST. CCA 1100  
'Y' TO CONTINUE
```

**Press (Y Enter) and continue the load test.**

```
CHARGE AND RETEST  
10.95V CHRG 5%  
EST. CCA 300  
'Y' TO CONTINUE
```

**The battery needs charging before a Load Test can be made.**

If you continue to the Load Test on a battery under 11.0 Volts. You may be asked the following during the sequence:

```
>HAS BATTERY  
BEEN CHARGED?  
  
'N' OR 'Y'
```

# 3

## BATTERY LOAD TEST

After the Preliminary Check the following will appear:

```
>ENTER RATED CCA  
600  
USE +/-.  
'Y' TO CONTINUE
```

Press the (+Up) or (-Down) key to increment or decrement to the rated CCA of the battery.

You can also select **Battery Test** from the main menu and then press (Y Enter).

```
>BATTERY TEST  
STARTER TEST  
ALTERNATOR TEST  
OTHER
```

For ease of adjustment the estimated CCA rating from the battery check will appear unless you have set a default CCA rating in the SETUP menu. Press (Y Enter) to continue test.

```
>ENTER BATTERY  
TEMP 70F  
USE +/-.  
'Y' TO BEGIN
```

**Note:** Enter the approximate battery temperature in degrees Fahrenheit or Celsius (See Note on page 8). This request will only appear if the load clamps have been disconnected since the preliminary check.

```
TESTING BATTERY  
PLEASE WAIT...
```

During the test the following will appear.

**Wait for test results.**

After the Load Test is completed one of the following sample results will appear.

```
#32 12V BATTERY  
GOOD BATTERY.  
12.84V CHG 100%  
EST CCA 650
```

**Ready for service.**

```
#32 12V BATTERY  
MARGINAL BATTERY.  
12.84V CHG 100%  
EST CCA 450
```

**If the battery is marginal, it should be replaced under adverse driving conditions.**

```
#33 12V BATTERY  
BAD BATTERY  
12.45V CHG 75%  
EST CCA 120
```

**Replace Battery**

```
#34 12V BATTERY  
GOOD NEEDS CHRG..  
12.24V CHG 50%  
EST CCA 600
```

**Charge and place into service.**

```
#35 12V BATTERY  
CHARGE AND RETEST  
12.06V CHG 25%  
EST CCA 320
```

**Battery did not have a sufficient charge for a complete Load Test. Charge and retest.**

# 4

## STARTER OVERVIEW

The starter draw test measures the amount of current needed to crank the engine and provides the initial information to diagnose and/or further test the starting system if necessary. What may appear to be a major problem may turn out to be a minor problem. Also, what appears to be a starter problem may be something more major.

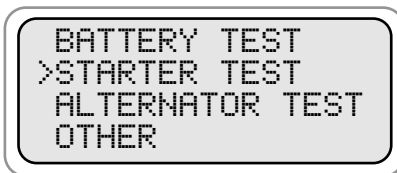
### Symptomatic Check before Proceeding:

- Check all cables and connections.
- Check the battery for corrosion and dirty terminals.
- Check starter/solenoid for visual defects.
- Check the ignition switch and any magnetic switches for loose or bad wiring, loose mounting, or connections and sticking contacts.
- Check for starter/solenoid noise. The type of noise or the lack thereof can help in diagnosing the problem.
- Does the solenoid click, but the starter does not turn? Does the starter turn, but not engage the flywheel? Is the starter sluggish?

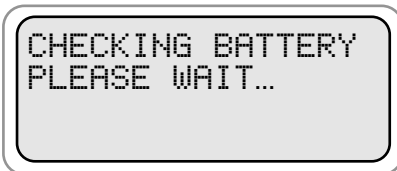
**Note:** A remote starter switch can be used to bypass the ignition switch and crank the engine from under the hood. This way the sounds of the starter can be heard.

## STARTER DRAW TEST

Press (N Esc.) to return to main menu. Select **Starter Test** then press (Y Enter).

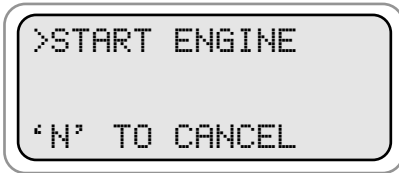


Use the (+Up) and (-Down) to move cursor to the desired test

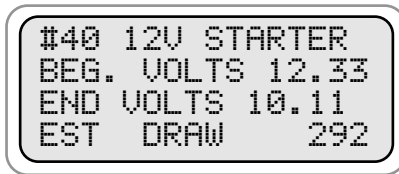


Press (Y Enter) and the BVA-300 does a preliminary check.

Wait for instructions before cranking engine.



After a few seconds the test result will appear.



Compare draw reading with manufactures specifications

If manufacturer's specifications are not available the chart below can be used as a general guideline. The amounts are in Amps.

4 Cyl Gas 120-250A	6 Cyl Gas Up to 250A	8 Cyl Gas Up to 250A
4 Cyl Dsl Up to 350A	6 Cyl Dsl Up to 450A	8 Cyl Dsl Up to 650A

**NOTE:** For Truck, bus, and other heavy-duty engines and starters, refer to manufacturer's specifications.

If the results are out of specification do the following:

- Inspect the connectors for excessive voltage drop.
- Repair or replace any defective cables or connectors.
- Retest the system.

If still out of specifications: **High** Amp reading may indicate engine is out of time or a faulty starter. Some possible causes are shorted windings, bent armature, broken housing or bad bearings. Repair or replace starter as needed.

## STARTER DRAW AND DIESEL ENGINES

There are a few points to consider in testing a starter on a diesel engine. The BVA-300 is designed to recognize any significant amount of draw; this includes glow plugs in small diesel engines. In heavy-duty applications consider computer and accessory draw.

- Make sure you start the engine quickly. The engine should be warm.
- Turn the ignition on and allow the glow plugs to heat up and click off before you run the Starter Draw Test.
- Repeat the test in different ways and compare results.

# 5

## ALTERNATOR OVERVIEW

This test measures the output of the alternator under load conditions. This information provides the basis for further charging system tests. It also detects the presence of an open or shorted diode that causes an output loss of several amps and can cause the failure of other diodes.

### Symptomatic Check before Proceeding:

- Battery should be in good condition and charged before testing the Alternator.
- Check warning light indications.
- Check belt condition and tension.
- Check all cables and connections.
- Check the battery for corrosion and dirty terminals.
- Does the battery have a low state of charge? (See section 2 and 3)
- Make sure all electrical items are off.
- Check for Alternator noise.

## ALTERNATOR TEST

**Note:** Battery should be in good condition and near full state of charge before proceeding with this test. Press (N Esc.) to return to main menu. Select **Alternator Test** then press (Y Enter).

```
BATTERY TEST
STARTER TEST
>ALTERNATOR TEST
OTHER
```

Use the (+Up and -Down) keys to move cursor to the desired test.

```
START ENGINE.

'N' TO CANCEL
```

Start engine.

```
>ALLOW VOLTAGE
TO STABILIZE
14.74V
'Y' TO CONTINUE.
```

Allow the voltage to stabilize until it stops rising. Press (Y Enter)

Allow the BVA-300 to finish the test (approximately 3 or 5 seconds).

```
TESTING ALTER.  
PLEASE WAIT..
```

Test result will appear. The following are examples.

```
#43 12V ALTER.  
GOOD REG. 14.13V  
GOOD DIODES  
OUTPUT OVER 50A.
```

Alternator has **GOOD** regulation  
and **GOOD** output.  
(See Note 2 below)

```
#43 12V ALTER.  
HIGH REG. 15.03V  
GOOD DIODES  
OUTPUT 20-50A.
```

High Regulation will damage the  
system. Replace or repair the Alternator.

```
#43 12V ALTER.  
LOW REG. 12.90V  
BAD DIODE  
LOW AMP OUTPUT
```

**NOTE 1:** If the LCD reads "LOW AMP OUTPUT" it is recommended that you run the test again with the engine at fast idle. If the LCD still reads LOW AMP OUTPUT turn on the accessories and select the VOLT METER test as show below and on page 18.

**NOTE 2:** Use the VOLT METER test as shown below and on page 18 to obtain the actual diode ripple. Typically a ripple above 50mV indicates a bad diode. If the system has a strong battery the ripple will be lower than if the system has a weak battery.

```
REVIEW/PRINT  
>VOLT METER  
DOWNLOAD/SETUP  
ABOUT
```

```
--VOLT METER--  
VOLTS: 12.94V  
RIPPLE 24.0mV
```

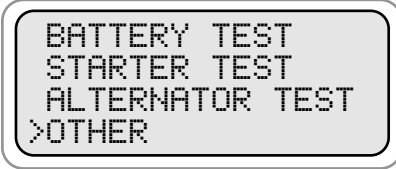
Press (Y Enter).

Run this test with the accessories on and the engine at fast idle. If the voltage drops below 13 volts the alternator does have **LOW OUTPUT**.

# 6

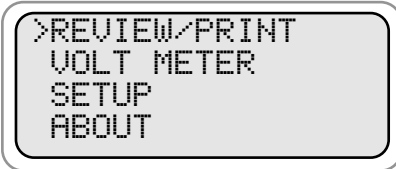
## OTHER MENU ITEMS

Press (N Esc.) to return to main menu.



Press the (+Up) or (-Down) key to select Other, then press (Y Enter).

## REVIEW TESTS



Press (Y Enter) to select Review/Print.

The last test will be displayed.



Press (+Up) or (-Down) key to select the desired test.

## OPTIONAL INFRARED PRINTER

The optional AC-22 printer. An invisible infrared beam links the BVA-300 to the printer from up to 40 ft away. No connection cords are needed. For more instructions on how to operate the printer consult the printer manual.

Printer Type ----- Thermal Printing  
Paper ---- 2.25 in x 80 ft. Roll Thermal Paper (included)  
Power ---- AC and Cigarette Lighter adapters (included)



## PRINTING TEST RESULTS

Point the BVA-300 in the direction of the AC-22 printer (in or out of the case) with the printer's IR receiver pointed in the direction of the BVA-300. Press (Print). You should be within 40 ft of the printer. Wait for the screen to clear before moving the BVA-300. It takes a few seconds to send all the test data. The BVA-300 also operates the AC-14 printer installed in Auto Meter's XTC-150 tester/charger or BVA-2000 heavy-duty tester/analyzer.

- Make sure the Infrared Printer is properly set up.
- After a test is made with the BVA-300 make sure the results are displayed on the LCD.
- Point the BVA-300 in the direction of the Infrared Printer (within 40 ft.)
- Press the <Print> key and the test results will be printed.
- Depending upon the test made the printer will sometimes yield more information than the LCD.
- **Multiple Test Printing:** Pressing the print button repeatedly (up to six times) will automatically print the test in review and previous tests.



## OTHER MENU (CONT.)

### VOLT METER

Unusual problems with a battery and the need to localize loss of current can be determined with the manual volt reading.

From the Other Menu select **Volt Meter**.

```
REVIEW/PRINT
>VOLT METER
  SETUP
  ABOUT
```

Press (Y Enter)

The following will be displayed.

```
--VOLT METER--
VOLTS: 12.24V
RIPPLE  00.0mV
```

Note: If the car is running and the clamps are attached to the battery a high ripple (over 50.0 mv) indicates bad diodes in the alternator.

### SETUP

From Other Menu select **SETUP**

```
>SET TEMPERATURE
  SCALE: F.
  USE +/-,
  'Y' TO SELECT.
```

You can select F for Fahrenheit or C for Celsius.

```
>DEFAULT BATTERY
  RATING: CCA
  USE +/-,
  'Y' TO SELECT.
```

You can select the default battery rating in: CCA, MCD, CA, EN, IEC, DIN, JIS, or NONE ("NONE" prompts for a rating each time a test is ran).

```
>SET DEFAULT CCA
  AS: EST. CCA
  USE +/-,
  'Y' TO SELECT.
```

You can also select the default rating to be the estimated rating from the preliminary check or a particular amount such as 550 CCA.

# PC INTERFACE

**1.** From the main menu select **Other** then **About**. The version will be displayed. Press the **Down (-)** key to get the download instruction screen. Using Auto Meter's optional adapter cord AC-12 insert the stereo plug into the jack on the BVA-300 (see page 6) and then plug the serial adapter into a free serial port on the rear of your computer.

**Note:** Most computers are configured with at least one serial port (identified as COM 1), and some have a second serial port, usually identified as (COM 2). Check your computer manual to locate and identify a serial port connector. Even if you have a physical COM port you need to make sure it is working properly before you proceed. Consult your computer manual. If your computer serial port is configured for 25 pin you will need to obtain an adapter from your computer store. If your computer does not have an available serial port and you're planning on using *Windows HYPER Terminal* as illustrated below, you will need to buy and install an adapter card with a serial port.

## USING WINDOWS 98/2000/NT/XP

**Note:** The BVA-300 will interface with any basic (ANSI) terminal emulation software. Most operating systems contain a program that will do this. Following are instructions for Windows 98. For other operating systems consult the Manual for that system.

## 2. Opening Windows HyperTerminal:

- Select Windows "Start"
- Then "Programs"
- Then "Accessories"
- Then "Communications"
- Then "Hyper Terminal"
- Double Click Hypetrm.exe Application
- Type in a name for your connection
- Select an icon for future identification
- Select OK
- Select the COM port number you have previously identified in step 1.
- Select OK and select the following from the pull down menus:

■ Bits per second	9600
■ Data bits	8
■ Parity	None
■ Stop Bits	1
■ Flow Control	Hardware
- Select OK



# DOWNLOAD TEST INFORMATION

## 3. PC Screen Menu

- If the BVA-300 is properly connected to your PC and the LCD shows "CONNECT ANALYZER TO A PC" the menu should automatically be displayed in Hyper Terminal.
- Press 1 to download the last 50 tests.  
To save the information displayed see "Capture text into Microsoft Excel." See BVA-300 test labels below for identification.
- Press Enter to return to Menu.
- Press Enter to return to Menu.
- Press 3 to Exit.



BVA-300  
Test Labels

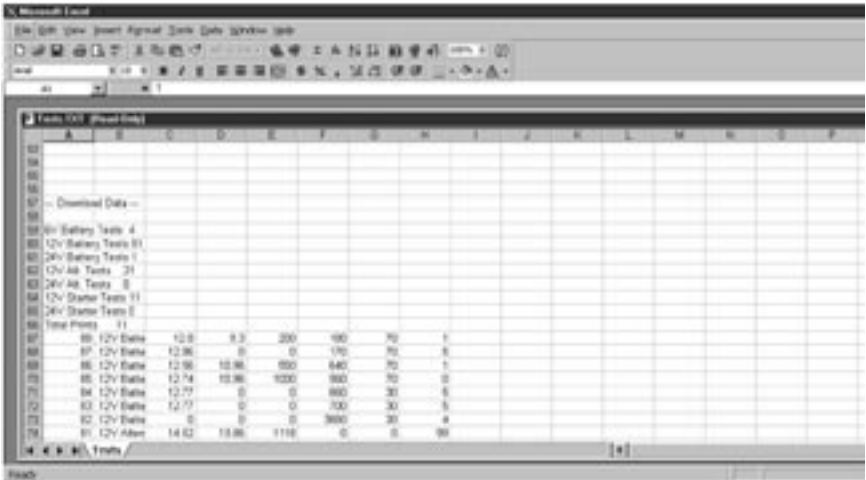
Battery	Test #	Test Type	Beginning Voltage	Loaded Voltage
Starter	Test #	Test Type	Beginning Voltage	Ending Voltage
Alternator	Test #	Test Type	Regulation Voltage	Loaded Voltage (12 V only)

# CAPTURING TEXT

## 4. Using Microsoft Excel

**Note:** For other software applications consult your software manual.

- Make sure menu is displayed as shown in illustration page 20 #3.
- Select "Capture Text" in the Transfer Menu.
- Type in **c:\my documents\download.txt** and then select Start.
- Press "1" to download. When finished select "Capture Text" again from the Transfer Menu then select "Stop".
- Launch Microsoft Excel and select "Open File".
- Under "Files of Type" at the bottom of the open file window select All Files (\*.\*)).
- Highlight your **download.txt** file then select "Open".
- Select "Delimited" and start at row 1 then "Next"
- Select "Comma" then "Next"
- Under Column Date Format select "General" then "Finish"



- After the file is loaded you can delete unwanted rows and format columns as desired. The following are labels for identifying the 8 columns of information.

Rated CCA	Final Est. CCA	TEMP	Condition: 0 = BAD 1 = GOOD	3 = GOOD NEEDS CHARGE 4 = CHARGE AND RETEST 5 = CONTINUE TESTING 6 = MARGINAL
Est. Current (12 V only)	N/A	N/A	N/A	
mV Ripple * 100	N/A	N/A	N/A	

# NOTES

# LIMITED WARRANTY

## **12 MONTHS FROM DATE OF PURCHASE- CABLES 90 DAYS**

The manufacturer warrants to the consumer that this product will be free from defects in material or workmanship for a period of twelve (12) months from the date of original purchase.

Products that fail within this 12 month warranty period will be repaired or replaced at the manufacturer's option to the consumer, when determined by the manufacturer that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of parts and the necessary labor by the manufacturer to effect the repair or replacement of the product. In no event shall the manufacturer be responsible for special, incidental or consequential damages or costs incurred due to the failure of this product.

Improper use, accident, water damage, abuse, unauthorized repairs or alterations voids this warranty. The manufacturer disclaims any liability or consequential damages due to breach of any written or implied warranty on its test equipment.

## **WARRANTY AND SERVICE INFORMATION**

Warranty claims to the manufacturer's service department must be transportation prepaid and accompanied by a dated proof of purchase. This warranty applies only to the original purchaser and is non-transferable. Freight damage incurred during return shipments is not covered under this warranty. It is the responsibility of the shipper (the customer returning the Test Equipment) to package the tester properly to prevent any damage during return shipment. Repair costs for such damages will be charged back to shipper (customer returning the Test Equipment). Protect the product by shipping in original carton or add plenty of over-pack cushioning such as crumpled up newspaper.



## ***How to use this manual if viewed in full screen format.***

- ***Click on this page or any page being viewed and you will return to the Table of Contents hyperlinks.***
- ***You can also use your left arrow to navigate back and your right arrow to navigate forward.***
- ***Press Ctrl P to print. Be sure to select desired pages or print all.***
- ***To return to this page navigate to last page.***
- ***Press ESC to Exit full view.***



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