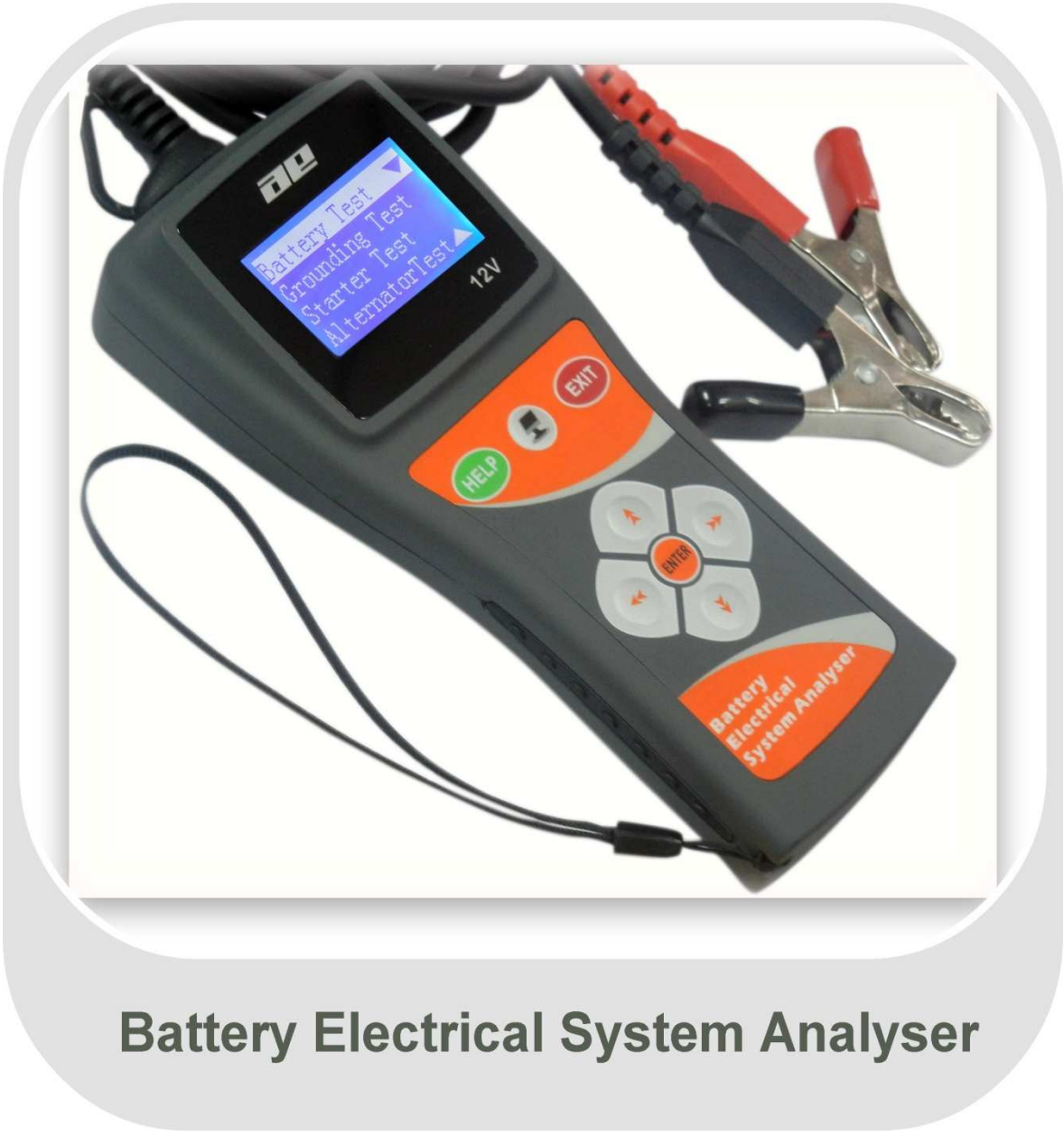
# BESA 11

## User's Manual




## Battery Electrical System Analyser

*Version 11.10*

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# 1.0 - Introduction

## 1.1-The Product:


As we all know battery plays a very important role in a vehicle by providing power to all the electrical components and also the initial power to get the engine started. Once the engine runs, the alternator will take over and at the same time it charges the battery. In order these power systems to perform efficiently at all times, they need to be checked regularly during service and maintenance of the vehicle.

For quick and convenient way of checking the condition of these power systems, this Battery Electrical System Analyser is designed to perform the following tasks:

**1. Battery Test:**

- Analyses the battery condition using microprocessor controlled testing methods without the need of fully charging it before test.
- The unit consumes very little current during testing hence the test can be repeated numerous times without worry of draining the battery and its results are highly accurate.
- Extremely safe as it does not create any sparks during clamp on and it takes less than 5 seconds to obtain the full analysed results of tested battery.



**2. Grounding Test:**

- Analyses the condition of the electrical return circuit contacts resistance which were connected to the engine or chassis body from the battery terminal with results and recommendations display after test.

### 3. Starter Test:

- Checks the cranking effectiveness of the battery to predict when the battery will fail to crank a vehicle basing on voltage profiles with results and recommendations display.

### 4. Alternator Test:

- This test checks the alternator charging condition during load at 2,000 RPM and without load at 3,000 RPM with results and recommendations display after each test.

This Analyser is maintenance free and does not require internal batteries. It powers up when connected to the battery posts during testing or through an external 12 Volts DC source for later review of the test results.

The operation is fast and simple. When hooked up to the battery posts, the displayed instructions on the screen will lead you through and a warning tone to caution you to perform the correct steps. In event that you need assistance, there is a HELP key. It will display information about each function when selected.

Its result is consistent and repeatable and can be performed numerous times without heating up the unit. It is very safe as it does not create any sparks when connected to the battery terminals during testing on the vehicle.

After the test, the results will be stored in its memory and can be reviewed again later and it is equipped with an USB port to be connected to the PC to store the results or have it printed out from normal computer printer.

## 1.2 Specifications:

| | | | | |
|---|---|---|---|---|
| Operating Voltage: | 9V ~ 15V DC (max) | | | |
| Analysing Capacity (Amps): | CCA: | 100 ~ 1700 | EN: | 100 ~ 1000 |
| | IEC: | 100 ~ 1700 | DIN: | 100 ~ 1000 |
| | JIS#: | 100 ~ 1700 | | |
| Battery analysing time: | Less than 5 seconds. | | | |
| Operating Voltage: | 12V DC | | | |
| Dimensions: | 181 x 110 x 90 mm | | | |

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# 2.0 Safety Measures:

For safety reasons, read this manual thoroughly before operating the Tool.

Always refer to and follow the safety instructions and testing procedures provided by the car or equipment manufacturer. The safety messages presented below and throughout this user's manual are reminders to the operator to exercise extreme care when using this test instrument.

## *2.1 Safety Precautions:*

⚠DANGER

**When the engine is running, it produces carbon monoxide, a toxic and poisonous gas. Always operate the vehicle in a well ventilated area. Do not breathe exhaust gases – they are hazardous that can lead to death.**

⚠CAUTION

**To protect your eyes from propellant object such as caustic liquids, always wear safety eye protection.**

⚠DANGER

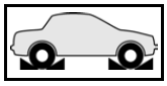
**Fuel and battery vapors are highly flammable.**
**DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.**

⚠CAUTION

**When engine is running, many parts (such as pulleys, coolant fan, belts, etc) turn at high speed. To avoid serious injury, always be alert and keep a safe distance from these parts.**


⚠WARNING

**Before starting the engine for testing or trouble shooting, always make sure the parking brakes is firmly engaged. Put the transmission in Park (automatic transmission) and Neutral (manual transmission).**



⚠WARNING

**Always block the drive wheels.**
**Never leave vehicle unattended while testing.**

⚠CAUTION

**Never lay tools on vehicle battery. You may short the terminals together causing harm to yourself, the tools or the battery.**

⚠CAUTION

**Engine parts become very hot when engine is running. To prevent severe burns, avoid contact with hot engine parts.**

⚠WARNING

**Do not wear loose clothing or jewelry while working on engine. Loose clothing can get caught in fan, pulleys, belts, etc. Jewelry can conduct current and can cause severe burns if comes in contact between power source and ground.**

⚠CAUTION

**When the engine is running, be cautious when working around the ignition coil, distributor cap, ignition wires and spark plugs. They are HIGH VOLTAGE components that can cause electrical Shock.**


IMPORTANT

**Always keep a fire extinguisher readily available and easily accessible in the workshop.**

## 2.2 Other Precautions:

- This battery analyser is meant for testing of 12 Volts batteries only.
- Its operating voltage is from 9V ~ 15V DC and should not be tested on 24V directly. It will cause damage the unit. For 12V x 2 batteries (in series or parallel), disconnect the connections and test them individually.
- Battery that has just been charged by the charger contains surface charge and it should be discharged by turning ON the Head lights for 3~5 minutes before testing.
- Always attached the analyser clips on the lead side of the battery terminal posts during testing so that it has a good contact. This will provide better and accurate results.
- Do not attach the analyser clips directly onto the steel bolt that tightened to the battery terminal posts; this may give inaccurate readings or inconsistent results. (Note: This also applies to all other battery testing methods.)
- If the battery terminal posts were oxidised or badly corroded and the connections were bad, the analyser will prompt you to check the connections. In this case, clean the terminal posts and performs testing directly on the terminal posts it-self.
- During testing on the battery whist it is still in the car, make sure the engine is OFF.
- Do not store the analyser near high humidity or temperature area. Exposing to extreme temperatures will cause damage to the unit.

## 3.0 Working with Batteries

CAUTION

Lead-acid batteries contain a sulfuric acid electrolyte, which is a highly corrosive poison and will produce gasses when recharged and explode if ignited. It can hurt you badly.

When working with batteries, make sure you have plenty of ventilation, remove your hand jewelry, watch and wear protective eyewear (safety glasses), clothing, and exercise caution.

Do not allow battery electrolyte to mix with salt water. Even small quantities of this combination will produce chlorine gas that can KILL you!

Whenever possible, please follow the manufacturer's instructions for testing, jumping, installing, charging and equalising batteries.


- Never disconnect a battery cable from a vehicle with the engine running because the battery acts like a filter for the electrical system.

  Unfiltered [pulsating DC] electricity can damage expensive electronic components, e.g., emissions computer, radio, charging system, etc.

  Turn off all electrical switches and components; turn off the ignition before disconnecting the battery.

- For non-sealed batteries, check the electrolyte level. Make sure it is covering the plates, and it is not frozen before starting to recharge (especially during winters).

- Do not add distilled water if the electrolyte is covering the top of the plates because during the recharging process, it will warm and expand. After recharging has been completed, recheck the level.

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- Reinstall the vent caps BEFORE recharging, recharge ONLY in well-ventilated areas, and wear protective eye ware (safety goggle) .

  Do NOT smoke or cause sparks or flames while the battery is being recharged because batteries give off explosive gasses.

- If your battery is an AGM or a sealed flooded type, do NOT recharge with current ABOVE 12% of the battery's RC rating (or 20% of the ampere-hour rating).

  Gel cells should be charged over a 20-hour period and never over the manufacturer's recommended level or over 14.1 VDC.

- Follow the battery and charger manufacturer's procedures for connecting and disconnecting cables and other steps to minimize the possibility of an explosion or incorrectly charging the battery.

  You should turn the charger OFF before connecting or disconnecting cables to a battery.

  Do not wiggle the cable clamps while the battery is recharging, because a spark might occur, and this could cause an explosion. Good ventilation or a fan is recommended to disperse the gasses created by the recharging process.

- If a battery becomes hot, over 110°F (43.3°C), o r violent gassing or spewing of electrolyte occurs, turn the charger off temporarily or reduce the charging rate.

- When charging the battery in the car with an external MANUAL charger, make sure that it will not damage the vehicle's electrical system or components with high voltages.

  Even if this is a remote possibility, it is best to disconnect the vehicle's battery cables from the battery BEFORE connecting the charger.

# 4.0 - The Battery Electrical System Analyser

## 4.1 – BESA 11


**Figure 1**

## 4.2 - Keypad Functions:

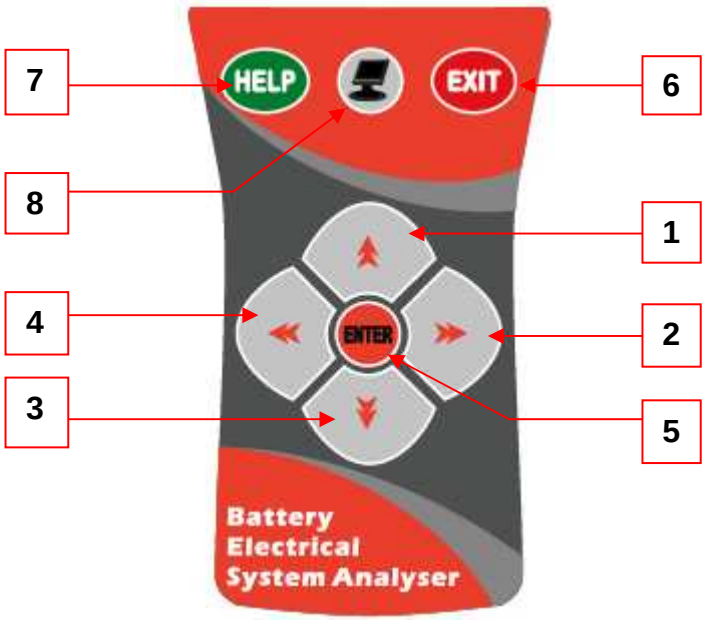


**Figure 2**

## 4.3 - Functions of Individual key:

1.  Use this key to scroll up to the next item OR when it is in the keying-in Battery Ratings values mode, press this key once will increase the value by step of 5 units.

2.  Use this key to shift the selection tab to the right item OR when it is in the keying-in Battery Ratings values mode, press this key once will increase the value by step of 100 units.

3.  Use this key to scroll down to the next item OR when it is in the keying-in Battery Ratings values mode, press this key once will decrease the value by step of 5 units.

4.  Use this key to shift the selection tab to the left item OR when it is in the keying-in Battery Ratings values mode, press this key once will decrease the value by step of 100 units.

5. 

Press this key will get into the selected function or proceed to the next step.

6. 

To EXIT the function, press this key once will return back to the previous screen.

7. 

This is the HELP key. Press this key will enter into the help menu and it will explain the functions of the item you have selected in detail.

8.  Press this key when the Analyser has connected to the computer to activate the communication which allows data retrieving and printing of the Last Tested Results.

## 5.0 – Help Key

This selection helps you to familiarise with the usage of the BESA 11 as well as explaining the various test functions and its results. To get into this function, just

Press HELP key at any one of the functions displayed on the menu screens as shown below (Fig.3 and Fig 4):

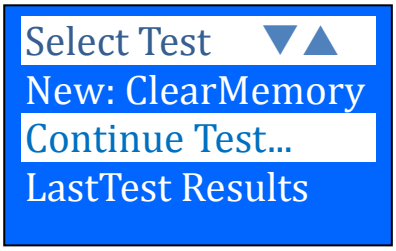


**Figure 3**

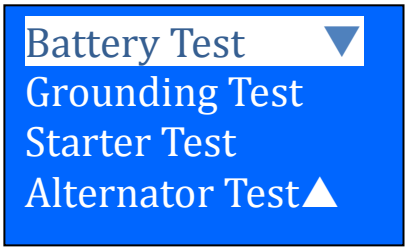


**Figure 4**

For Example:

If help is needed on "Battery Test", then press HELP key on this item and the display will change to as shown (Fig 5) .

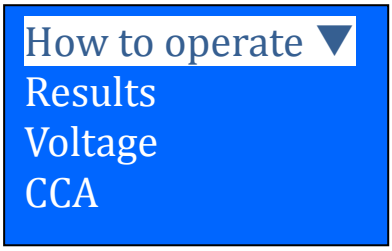


**Figure 5**

Pressing the key will scroll down to the next item " Results " (Fig 6) and so forth until it reaches "Life".

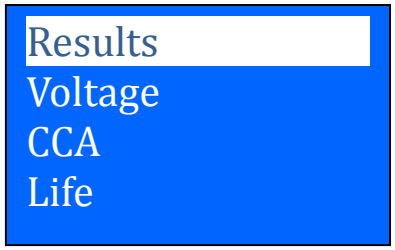


**Figure 6**

To see the help text, press HELP key again on the selected item and it will display on the screen.

If you need to quit, just press EXIT key will go back to the main menu (Fig. 4).

Let say if you need help on "How to operate"", press HELP key in this selection will get into the display as shown below:

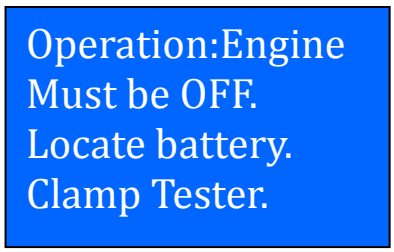


**Figure 7**

Press key will scroll down to the next page to continue reading the text (Fig. 8 and Fig 9) below.

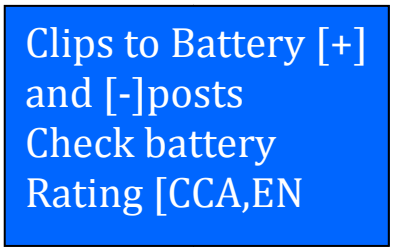


**Figure 8**

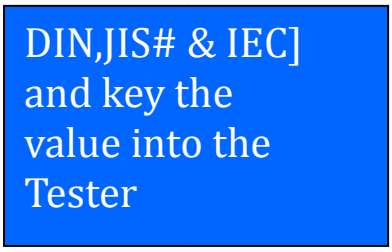


**Figure 9**

If you wish to continue help on rest of the item like "Results, Voltage, CCA, Life", press EXIT key anytime will go back to the main menus (Fig. 5). Here just select the item you want with key and then press HELP key will enter into the display screen with the explanation text.

To exit press EXIT key twice will go back to the main menu for you to begin testing. (Fig.4)

# 6.0 - Battery Test

## 6.1 – Start Testing

**Performing Battery Test whilst it is still in the car:**
Vehicle that was running has to have its engine OFF first and then switch ON the headlights for 30 seconds to remove the surface charge. After the headlights had switched OFF, let the battery rest for at least 1 minute to recover before testing commences.

The car engine and all other accessory loads must be **OFF** during test in order to have accurate results. When attaching the analyser clips, make sure that the battery posts were not oxidized or badly corroded. Clean them first before clamping to it. Do not clamp onto the steel bolts directly which may give inaccurate and inconsistent results.

**Testing on stand-alone batteries:**
Clean the battery posts with a wire brush prior testing. For side - post batteries, install stud adaptors. Do not use steel bolts for better results.

1. Attach the Analyser clips onto the battery terminal posts [Red to (+) and Black to (-)] the unit will power up and lights up the LCD display screen as shown (Fig.10).

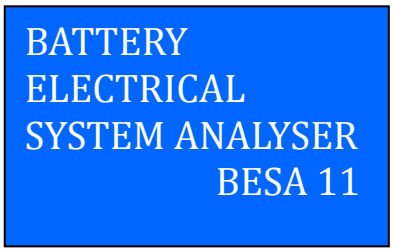


**Figure 10**

2. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 11)

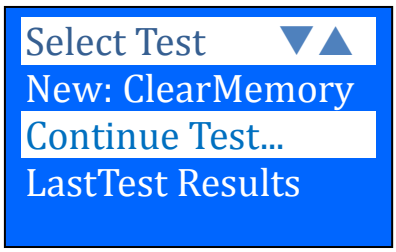


**Figure 11**

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Here, it will let you select your choice from the Menu:

**New: Clear Memory**
Selecting this item will allow the tester to clear the last tested results stored in its memory and begin a new test.

**Continue… Test**
Selecting this item will allow you to continue the last test on the same car from where you had stopped.

For example:
If you had done Battery Test and later you wish to do Alternator Test or Grounding Test on the same car, just select this item and it will update the results after each test in its memory so that it can be review later or to be printed out from the printer.

**Last Test Results**
Here it will let you review the test results of the last tested car. The results stored will always depends on the tests that you had done.

Use  or  keys to scroll for the pages during viewing.

Examples:

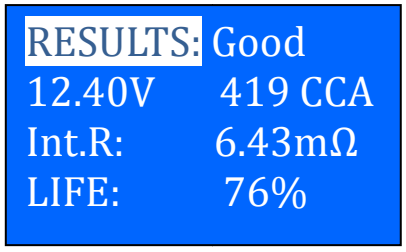


Figure 12

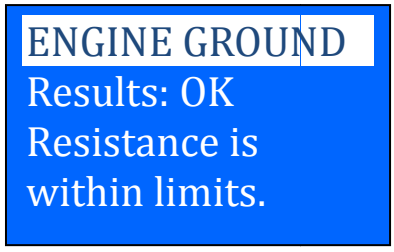


Figure 13

3. After you have made your choice, selecting "New: Clear Memory" or "Continue…Test" will proceed to the display below: (Fig. 14)

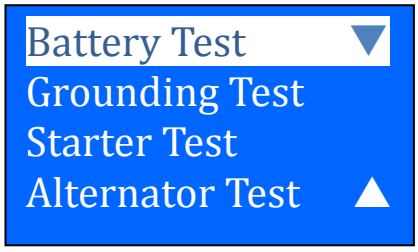


Figure 14

4. Pressing  key once will scroll down to the next item if there is a need to select it.

5. As an example (Fig.14) the selected item was on "Battery Test" and it is being highlighted.

6. Press 

key will proceed to do the battery testing and if it has detected any surface charge on the battery, it will start to remove and a message is shown (Fig. 15) below.

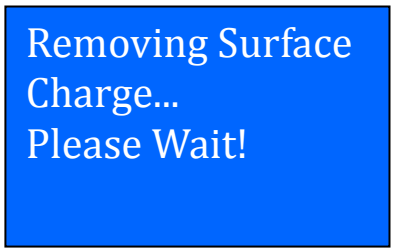


**Figure 15**

7. If the surface charge is too great for the analyser to handle, it will prompt you with the instructions as shown: (Fig. 16) below.

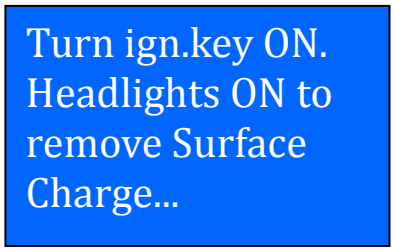


**Figure 16**

8. Wait until the surface charge removal had completed, the analyser will advise as follows: (Fig.17) and then press 

key.


**Figure 17**

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9. If there is no surface charge present, then it will straight away enter into "Select Rating" menu screen as shown in Fig. 18

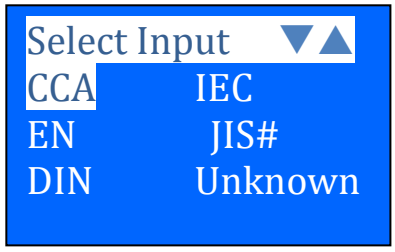
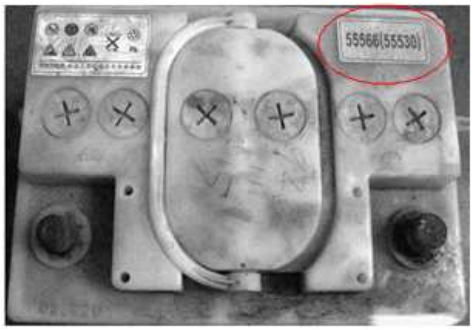


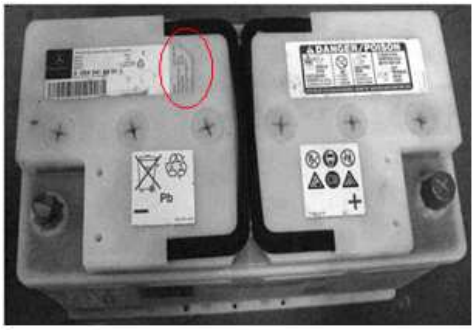

**Figure 18**

10. Before selecting the ratings 'CCA, EN, IEC, DIN and JIS #' from the menu, check the battery specification value. This value can be checked on the battery labels as some of the examples shown below:









If it is selected under JIS # (Japanese Industrial Standard) then the display will prompt you as shown (Fig.19) below.

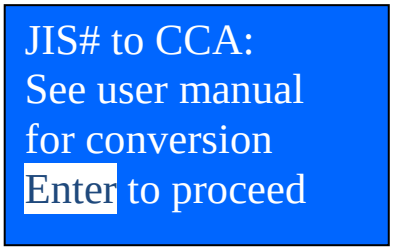



**Figure 19**

Refer to the battery model (example: 80D26L or NX110-5L) on the Cold Cranking Amps (CCA) Table list supplied separately or from this manual on page 24 & 25 (See example Fig.20 below.)

| Battery Model (JIS#) | | CCA | | | Battery Model (JIS#) | | CCA | | |
|---|---|---|---|---|---|---|---|---|---|
| NEW | OLD | WET | MF | CMF SMF | NEW | OLD | WET | MF | CMF SMF |
| 50D20R | | 310 | 380 | 480 | 80D26L | NX110-5L | 580 | 580 | 630 |
| 50D20L | | 310 | 380 | 480 | 85B60K | | | | 500 |
| 50D23R | 85BR60K | 500 | | | 85BR60K | | | | 500 |
| 50D23L | 85B60K | 500 | | | 95D31R | NX120-7 | 620 | 660 | 850 |
| 50D24R | NT80-S6 | 390 | | | 95D31L | NX120-7L | 620 | 660 | 850 |
| 50B24L | NT80-S6L | 390 | | | 95E41R | N100 | 515 | 640 | 770 |
| 50D26R | 50D20R | | 370 | | 95E41L | N100L | 515 | 640 | 770 |

**Figure 20**

Press 

key and the display will show: (Fig.21) below:

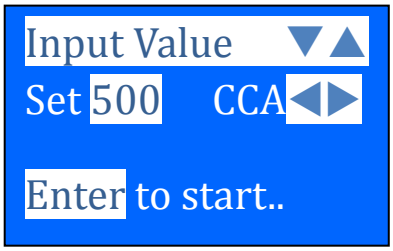



**Figure 21**

11. Referring to the Table list (Fig.20) basing on 80D26L, check the battery type: WET, MF, Sealed MF or Closed MF (CMF) as each category has different CCA ratings. For instance, if the battery is a Sealed MF (CMF) then it is rated at 630 CCA.

***Note:*** *WET - Wet Cell Type*
*MF - Maintenance Free Type*
*SMF- Closed or Sealed Maintenance Free*

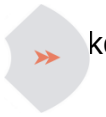
12. To enter the value 630, press  key will increase the original value of 500 (Fig.21) by step of 100 units to 600. Likewise use  key to increase the last two digits (00) to 30 by step of 5 units for each pressing. (Fig. 22)


**Figure 22**

13. Once the CCA rating of the battery is confirmed, press  key will start the testing process. Refer to the display below (Fig. 23).

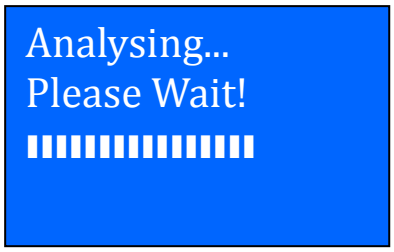



**Figure 23**

14. For less than 5 seconds, the results of the testing will be displayed on the LCD screen. (Fig. 24)

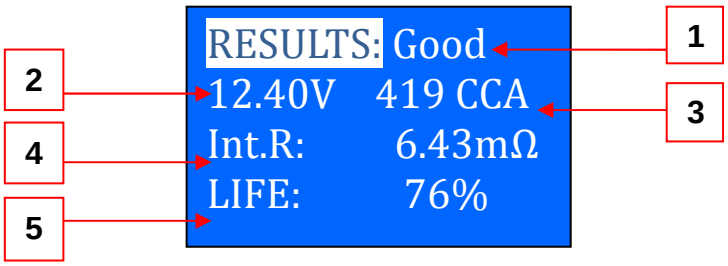



**Figure 24**

***Interpretations of the above results:***

1. **RESULTS:** **Good**
   A very straight forward display of the final results basing on the evaluation of the tested condition. 'Good' indicates the battery in good condition. 'Replace' indicates that the battery needs to be replaced. If not, the battery will fail anytime without any warning.

2. **Voltage :** **12.40V**
   This indicates the tested battery voltage (12.46V). It depends on the state of charge on the battery:

   | | | |
   |---|---|---|
   | 100% fully charged | - | 13.20V |
   | 90% charged | - | 12.90V |
   | 75% charged | - | 12.45V |

3. **CCA (Cold Cranking Amps):** **419 CCA**
   CCA ratings has been used here, therefore the tested result is in 406 CCA. If other rating (DIN or JIS, or IEC, or EN) were selected, it will base on the respective rating to calculate and show the results in that selected rating.

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## *Please take Note:*

***This output value (406 CCA) is related to the actual power available in the battery in relation to that battery's rating (630 CCA). On average, a new battery's CCA as measured by this tester will read 10-15 % higher than its stated rating.***

***As the battery ages, the CCA number measured by this tester will decrease so it reads near its rating. While this value is not the same as a CCA test, it is the best available measurement for showing a battery's current condition in relation to its rating.***

***From the above example, a 630 CCA rated battery measuring 406 CCA available power does not mean that the battery would pass a CCA test at 406 CCA. The available power reading shows that the battery is not able to perform up to its rated ability (630 CCA).***

***In comparison to another battery when fully charged, the 630 CCA battery measuring 406 CCA is no stronger than a 400 CCA battery showing 400 CCA available power when fully charged.***

***The available power number is meant for comparison to its own rating. In fact, in this example the 630 CCA battery is failing to perform to its rating, while the 400 CCA battery is still working.***

***Basing on SAE, CCA test is a manufacturing process control test applicable only on new, fully charged batteries. It does not produce an actual value, but is a PASS / FAIL test.***

***It measures the discharge load, in amps, that a battery can supply for 30 seconds at 0℉/-18℃ while maintainin g a voltage of 1.2 volts per cell (7.2 volts per battery) or higher.***

***Thus, the CCA test shows the minimum power requirement for the battery as rated, which means a battery rated at 400 CCA must measure 7.2 volts or above for 30 seconds when a load of 400 amps is applied at 0℉/ -18℃.***

***The above methods also hold for DIN, IEC, JIS, EN basing on its individual ratings.***

4. **Int. R (Internal Resistance):** **6.43mΩ**
In normal condition, the internal resistance should fall between 2.0 mΩ ~ 15.0 mΩ. As a matter of fact, the higher the battery CCA readings obtained the lower the internal resistance should be.

5. **LIFE:** **76 %**
This is an indication of the battery life expectancy in percentage. If the life falls below 45 %, the RESULT will display "Replace" and it is time to change to a new battery.

***Explanation of the following terms used as shown on the LCD display:***

- **CCA (Cold Cranking Amps) – most commonly used Standard.**
  *CCA is a rating used in the battery industry to rate a battery's ability to start an engine in cold temperatures. This rating is the number of amperes that a new fully charged battery can delivery at 0℉ (-18℃) for 30 seconds, while maintaining a voltage of at least 7.2 Volts for a 12V battery.*

  *The bigger the CCA will have the greater starting power of the battery.*

- **IEC (International Electro-technical Commission) Standard.**
  *IEC amperes rating require that at 0℉ (-18℃), the number of amperes that the 12V battery can deliver while maintaining a voltage of at least of 8.4 Volts for 60 seconds during cranking.*

- **EN (European Norms) Standard**
  *EN amperes rating require that at 0℉ (-18℃), the number of ampere that the 12V battery can deliver while maintaining a voltage of at least 6.0 Volts for 180 seconds during cranking.*

- **JIS# (Japanese Industrial Standard)**
  *JIS # amperes' rating is based on Ampere Hours and is calculated using 20 hours rating. In this manual, it is using CCA ratings reference table list provided basing on the JIS model number (See page 24 & 25).*

- **DIN (Deutsches Institut für Normung)** - German Institute for Standardization.
  *Basing on DIN , the rating requires that at 0℉ (-18℃), the 12V battery is able to deliver the number of amperes while maintaining a voltage of at least of 9.0 Volts for 30 seconds and 8.0 Volts for 150 seconds during cranking.*

- **Unknown**
  *If you are not sure which ratings (CCA, EN, IEC, JIS or DIN) that the battery is based on then choose this setting. It will show the battery's Voltage, CCA and the Internal Resistance (mΩ) only. This selection can also be used to test 12V - Deep Cycle Batteries.*

*An example of the results display is shown below: (Fig.25)*

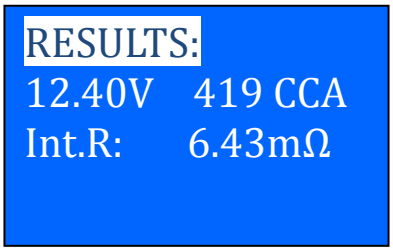


**Figure 25**

To determine the condition of the tested Deep Cycle Batteries, refer the **Voltage** reading (*should not fall below 12.6V when fully charged*) and the Internal Resistance [**Int.R**] (*should not more 15mΩ*) readings.

Batteries that had been left idle for long periods can still be tested with this analyser. To perform the test, just clamp the analyser clips onto the battery terminals and it will display the screen (Fig.26) as shown if its voltage falls below the normal 12 volts and a buzzing sound is heard.

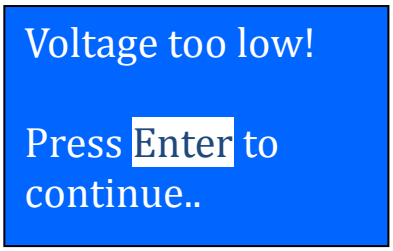


**Figure 26**

Press 

key to continue and the display will show: (Fig.27)

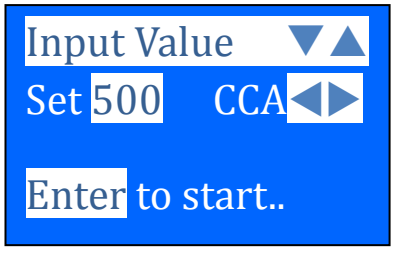


**Figure 27**

Check the battery ratings and enter it as described in step 10 and 11 (page 17~19) and the results will show as an example below: (Fig. 28)

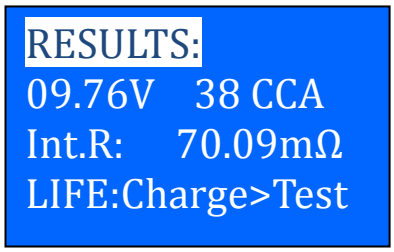


**Figure 28**

You will notice that there is no indication of message (Good or Replace) on the RESULTS instead on LIFE; it indicates "Charge > Test". It means that the battery has to be fully charged and repeat the test again.

15. Pressing the EXIT key at any moment will exit and return back to the previous screen.

## *7.0 – Battery Ratings Charts*

### *7.1 Japanese Industrial Standard (JIS#) CCA Ratings*

| Battery Model (JIS#) | | CCA Rating | | | Battery Model (JIS#) | | CCA Rating | | |
|---|---|---|---|---|---|---|---|---|---|
| NEW | OLD | WET | MF | CMF SMF | NEW | OLD | WET | MF | CMF SMF |
| 26A17R | | 200 | | | 34B17L | | 280 | | |
| 26A17L | | 200 | | | 34B19R | NS40ZA | 270 | 325 | 400 |
| 26A19R | 12N24-4 | 200 | 220 | 264 | 34B19L | NS40ZAL | 270 | 325 | 400 |
| 26A19L | 12N24-3 | 200 | 220 | 264 | 34B19RS | NS40ZAS | 270 | 325 | 400 |
| 28A19R | NT50-N24 | 250 | | | 34B19LS | NS40ZALS | 270 | 325 | 400 |
| 28A19L | NT50-N24L | 250 | | | 36B20R | NS40Z | 275 | 300 | 360 |
| 32A19R | NX60-N24 | 270 | 295 | | 36B20L | NS40ZL | 275 | 300 | 360 |
| 32A19L | NX60-N24L | 270 | 295 | | 36B20RS | NS40ZS | 275 | 300 | 360 |
| 26A17R | | 200 | | | 36B20LS | NS40ZLS | 275 | 300 | 360 |
| 26B17L | | 200 | | | 38B20R | NX60-N24 | 330 | 340 | 410 |
| 28B17R | | 245 | | | 38B20RS | NT60-N24S | 330 | 340 | 410 |
| 28B17L | | 245 | | | 38B20L | NX60-24L | 330 | 340 | 410 |
| 28B19R | NS40S | 245 | | | 38B20LS | NX60-24LS | 330 | 340 | 410 |
| 28B19L | NS40LS | 245 | | | 40B20L | | 330 | | |
| 32B20R | NS40 | 270 | | | 40B20R | | 330 | | |
| 32B20L | NS40L | 270 | | | 42B20L | | 330 | | |
| 32C24R | N40 | 240 | 325 | 400 | 42B20RS | | 330 | | |
| 32C24L | N40L | 240 | 325 | 400 | 42B20LS | | 330 | | |
| 34B17R | | 280 | | | 46B24L | NS60L | 325 | 360 | 420 |
| | | | | | | | | | |

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| Battery Model (JIS#) | | CCA Ratings | | | Battery Model (JIS#) | | CCA Ratings | | |
|---|---|---|---|---|---|---|---|---|---|
| NEW | OLD | WET | MF | CMF SMF | NEW | OLD | WET | MF | CMF SMF |
| 46B24R | NS60 | 325 | 369 | 420 | 75D31L | N70ZL | 450 | 540 | 725 |
| 46B24RS | NS60S | 325 | 360 | 420 | 80D23R | | 580 | | |
| 46B24LS | NS60LS | 325 | 360 | 420 | 80D23L | | 580 | | |
| 46B26R | NS60 | 360 | | | 80D26R | NX110-5 | 580 | 580 | 630 |
| 46B26L | | 360 | | | 80D26L | NX110-5L | 580 | 580 | 630 |
| 46B26RS | | 360 | | | 85B60K | | | | 500 |
| 46B26LS | | 360 | | | 85BR60K | | | | 500 |
| 48D26R | N50 | 280 | 360 | 420 | 95D31R | NX120-7 | 620 | 660 | 850 |
| 48D26L | N50L | 280 | 360 | 420 | 95D31L | NX120-7L | 620 | 660 | 850 |
| 50B24L | NT80-S6L | 390 | | | 95E41R | N100 | 515 | 640 | 770 |
| 50B24R | NT80-S6 | 390 | | | 95E41L | N100L | 515 | 640 | 770 |
| 50D20R | | 310 | 380 | 480 | 105E41R | N100Z | 580 | 720 | 880 |
| 50D20L | | 310 | 380 | 480 | 105E41L | N100ZL | 580 | 720 | 880 |
| 50D23R | 85BR60K | 500 | | | 105F51R | N100Z | 580 | | |
| 50D23L | 85B60K | 500 | | | 105F51 | N100ZL | 580 | | |
| 50D26R | 50D20R | | 370 | | 115E41R | NS120 | 650 | 800 | 960 |
| 50D26L | 50D20L | | 370 | | 115E41L | NS120L | 650 | 800 | 960 |
| 55B24R | NX100-S6 | 435 | 420 | 500 | 115F51R | N120 | 650 | 800 | 960 |
| 55B24L | NX100-S6L | 435 | 420 | 500 | 115F51L | N120L | 650 | 800 | 960 |
| 55B24RS | NT80-S6S | 430 | 420 | 500 | 130E41R | NX200-10 | 800 | | |
| 55B24LS | NT80-S6LS | 430 | 420 | 500 | 130E41L | NX200-10L | 800 | | |
| 55D23R | | 355 | 480 | 500 | 130F51R | | 800 | | |
| 55D23L | | 355 | 480 | 500 | 130F51L | | 800 | | |
| 55D26L | N50ZL | 350 | 440 | 525 | 145F51R | NS150 | 780 | 920 | |
| 55D26R | N50Z | 350 | 440 | 525 | 145F51L | NS150L | 780 | 920 | |
| 60D23R | | 520 | | | 145G51R | N150 | 780 | 900 | 1100 |
| 60D23L | | 520 | | | 150F51R | NT200-12 | 640 | | |
| 65D23R | | 420 | 540 | 580 | 150F51L | NT200-12L | 640 | | |
| 65D23L | | 420 | 540 | 580 | 165G51R | NS200 | 935 | 980 | |
| 65D26R | NS70 | 415 | 520 | 625 | 165G51L | NS200L | 935 | 980 | |
| 65D26R | NS70L | 415 | 520 | 625 | 170F51R | NX250-12 | 1045 | | |
| 65D31R | N70 | 390 | 520 | 630 | 170F51L | NX250-12L | 1045 | | |
| 65D31L | N70L | 390 | 520 | 630 | 180G51R | NT250-15 | 1090 | | |
| 70D23R | 35-60 | 490 | 540 | 580 | 180G51L | NT250-15L | 1090 | | |
| 70D23L | 25-60 | 490 | 540 | 580 | 195G51R | NX300-51 | 1145 | | |
| 75D23R | | 500 | 520 | 580 | 195G51L | NX300-51L | 1145 | | |
| 75D23L | | 500 | 520 | 580 | 190H52R | N200 | 925 | 1100 | 1300 |
| 75D26R | F100-5 | 490 | | | 190H52L | N200L | 925 | 1100 | 1300 |
| 75D26L | F100-5L | 490 | | | 245H52R | NX400-20 | 1530 | 1250 | |
| 75D31R | N70Z | 450 | 540 | 735 | 245H52L | NX400-20L | 1530 | 1250 | |

## 7.2 DIN & EN Standards Rating Chart

| Battery Model No. | Amps | | Battery Model No. | Amps | |
|---|---|---|---|---|---|
| | DIN | EN | | DIN | EN |
| 52805 | 180 | 240 | 55057 | 320 | 540 |
| 52815 | 180 | 240 | 55068 | 220 | 390 |
| 53517 | 175 | 300 | 55069 | 220 | 390 |
| 53520 | 150 | 240 | 55218 | 255 | 420 |
| 53521 | 150 | 240 | 55414 | 265 | 450 |
| 53522 | 150 | 240 | 55415 | 265 | 450 |
| 53621 | 175 | 300 | 55421 | 265 | 450 |
| 53624 | 175 | 300 | 55422 | 265 | 450 |
| 53625 | 175 | 300 | 55423 | 300 | 510 |
| 53638 | 175 | 300 | 55427 | 300 | 510 |
| 53646 | 175 | 300 | 55428 | 300 | 510 |
| 53653 | 175 | 300 | 55457 | 265 | 450 |
| 53836 | 175 | 300 | 55529 | 220 | 360 |
| 53890 | 175 | 300 | 55530 | 255 | 420 |
| 54038 | 175 | 300 | 55531 | 255 | 420 |
| 54039 | 175 | 300 | 55545 | 255 | 420 |
| 54232 | 175 | 300 | 55548 | 255 | 420 |
| 54312 | 210 | 360 | 55552 | 255 | 420 |
| 54313 | 220 | 330 | 55559 | 255 | 420 |
| 54317 | 210 | 360 | 55559L | 255 | 420 |
| 54324 | 220 | 330 | 55563 | 255 | 420 |
| 54434 | 210 | 360 | 55564 | 255 | 420 |
| 54437 | 210 | 360 | 55565 | 255 | 420 |
| 54449 | 210 | 360 | 55565L | 255 | 420 |
| 54459 | 210 | 360 | 55566 | 265 | 450 |
| 54459L | 210 | 360 | 55567 | 255 | 420 |
| 54464 | 220 | 330 | 55811 | 360 | 540 |
| 54465 | 210 | 360 | 56012 | 230 | 420 |
| 54466 | 210 | 360 | 56048 | 250 | 390 |
| 54469 | 210 | 360 | 56049 | 250 | 390 |
| 54519 | 210 | 360 | 56068 | 250 | 390 |
| 54523 | 220 | 300 | 56069 | 250 | 390 |
| 54524 | 220 | 300 | 56073 | 250 | 390 |
| 54533 | 210 | 360 | 56077 | 300 | 510 |
| 54537 | 190 | 300 | 56091 | 360 | 540 |
| 54545 | 190 | 300 | 56092 | 300 | 510 |
| 54551 | 220 | 300 | 56111 | 300 | 540 |
| 54577 | 220 | 300 | 56216 | 300 | 510 |
| 54578 | 220 | 300 | 56218 | 300 | 510 |
| 54579 | 220 | 300 | 56219 | 300 | 510 |
| 54580 | 220 | 300 | 56220 | 280 | 510 |
| 54584 | 220 | 300 | 56225 | 300 | 510 |
| 54590 | 210 | 330 | 56311 | 300 | 510 |
| 54612 | 210 | 360 | 56312 | 300 | 510 |
| 54801 | 190 | 300 | 56318 | 300 | 510 |
| 54827 | 240 | 360 | 56322 | 300 | 510 |
| 55040 | 265 | 450 | 56323 | 300 | 510 |
| 55041 | 220 | 360 | 56420 | 300 | 510 |
| 55042 | 220 | 360 | 56530 | 300 | 510 |
| 55044 | 265 | 450 | 56618 | 300 | 510 |
| 55046 | 300 | 510 | 56619 | 300 | 510 |
| 55048 | 300 | 540 | 56620 | 300 | 510 |
| 55056 | 320 | 540 | 56633 | 300 | 510 |

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| Battery Model No. | Amps | | Battery Model No. | Amps | |
|---|---|---|---|---|---|
| | DIN | EN | | DIN | EN |
| 56638 | 300 | 510 | 60026 | 440 | 720 |
| 56641 | 300 | 510 | 60038 | 500 | 760 |
| 55647 | 300 | 510 | 60044 | 500 | 760 |
| 56821 | 315 | 540 | 60527 | 410 | 680 |
| 56820 | 315 | 540 | 60528 | 410 | 680 |
| 56828 | 315 | 540 | 61017 | 400 | 680 |
| 57024 | 315 | 540 | 61018 | 400 | 680 |
| 57029 | 315 | 540 | 61023 | 450 | 760 |
| 57113 | 400 | 680 | 61047 | 450 | 760 |
| 57114 | 400 | 680 | 61048 | 450 | 760 |
| 57217 | 420 | 720 | 62034 | 420 | 680 |
| 57218 | 420 | 720 | 62038 | 420 | 680 |
| 57219 | 420 | 720 | 62045 | 420 | 680 |
| 57220 | 420 | 720 | 62529 | 450 | 760 |
| 57230 | 380 | 640 | 63013 | 470 | 680 |
| 57412 | 400 | 680 | 63545 | 420 | 680 |
| 57412L | 400 | 680 | 63549 | 420 | 680 |
| 57413 | 400 | 680 | 64020 | 325 | 550 |
| 57512 | 350 | 570 | 64028 | 520 | 760 |
| 57513 | 350 | 570 | 64035 | 520 | 760 |
| 57531 | 350 | 570 | 64036 | 460 | 760 |
| 58424 | 450 | 760 | 64317 | 540 | 900 |
| 58513 | 320 | 540 | 64318 | 540 | 900 |
| 58514 | 320 | 540 | 64323 | 540 | 900 |
| 58515 | 450 | 760 | 65513 | 540 | 900 |
| 58521 | 320 | 540 | 65514 | 570 | 900 |
| 58522 | 320 | 540 | 65515 | 570 | 900 |
| 58527 | 395 | 640 | 67043 | 600 | 1000 |
| 58811 | 440 | 720 | 67045 | 600 | 1000 |
| 58815 | 395 | 640 | 68021 | 570 | 950 |
| 58820 | 395 | 640 | 68032 | 600 | 1000 |
| 58821 | 395 | 640 | 68034 | 600 | 1000 |
| 58827 | 400 | 640 | 68040 | 570 | 950 |
| 58833 | 400 | 680 | 70027 | 630 | 1050 |
| 58838 | 400 | 680 | 70029 | 630 | 1050 |
| 59017 | 360 | 600 | 70036 | 570 | 950 |
| 59018 | 360 | 600 | 70038 | 630 | 1050 |
| 59040 | 360 | 600 | 71014 | 700 | 1150 |
| 59215 | 450 | 760 | 71015 | 700 | 1150 |
| 59218 | 290 | 480 | 72512 | 680 | 1150 |
| 59219 | 290 | 480 | 73011 | 740 | 1200 |
| 59226 | 450 | 760 | 88038 | 175 | 300 |
| 59514 | 320 | 540 | 88046 | 210 | 360 |
| 59518 | 395 | 640 | 88056 | 265 | 450 |
| 59519 | 395 | 640 | 88066 | 300 | 510 |
| 59615 | 360 | 600 | 88156 | 320 | 540 |
| 59616 | 360 | 600 | 88074 | 400 | 680 |
| 60018 | 250 | 410 | 88092 | 400 | 680 |
| 60019 | 250 | 410 | | | |

## 7.3 YUASA Battery Rating Chart

| Battery Model No. | CCA | Battery Model No. | CCA |
|---|---|---|---|
| 24-500 | 500 | 75A-72 | 630 |
| 34-6MF | 500 | 75-660 | 660 |
| 34-60 | 525 | 78A-72 | 670 |
| 34-610MF | 610 | 78-710 | 710 |
| 34-710 | 710 | GR40R-MF | 700 |
| 35-580 | 580 | GR40R-CMF | 820 |
| 41-580 | 580 | GTH40 | 277 |
| 55D23R | 522 | GTH40L | 276 |
| 58-6MF | 530 | GTH40S | 275 |
| 58-60 | 525 | GT50L | 356 |
| 58-530 | 530 | GTH55DL | 356 |
| 65-70 | 700 | GTH60L | 325 |
| 65-730 | 730 | GTH60DL | 325 |
| 65-900 | 850 | GTH75DL | 520 |
| 74-60 | 525 | GTH75DR | 521 |
| 75-6MF | 615 | GR96R-MF | 500 |
| 75-72 | 500 | GR96R-CMF | 580 |

## 7.4 Rough CCA Guide

Given below is a rough CCA ratings guide for any unknown battery model basing on the capacity of the vehicle:

| *Vehicle Capacity* | *Approximate Battery CCA Rating* |
|---|---|
| **1200 ~ 1600 cc** | 350 CCA |
| **1600 ~ 2000 cc** | 500 CCA |
| **2000 ~ 3000 cc** | 650 CCA |
| **3000 cc and above** | 750 CCA |
| **M. Benz over 3000 cc** | 760 CCA |

# 8.0 – Grounding Test

The engine body and the vehicle chassis are always connected to the battery negative terminal to provide the electrical return path (grounding) for all the electrical components. Due to the surrounding environmental effect, the surface contacts of these joints or connections of these circuits will subject to oxidation and corrosion in a matter of time rendering them to have high resistance in it. One typical example is the connection at the battery terminals where oxidation and corrosion takes place very often. If these contacts were no good then it will pose a lot of electrical problems to the vehicle.

To check the grounding condition, this Analyser will measure the resistance from the engine body contact to the battery terminal then it will display the results and the recommendations.

## 8.1 – Start Testing

1. Make sure that the engine is switched OFF. Attach the clips onto the battery terminal posts and the analyser will power up and lights up the LCD display screen as shown (Fig.29).

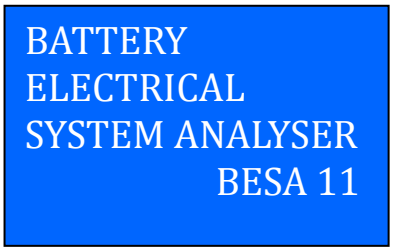


**Figure 29**

2. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 30)

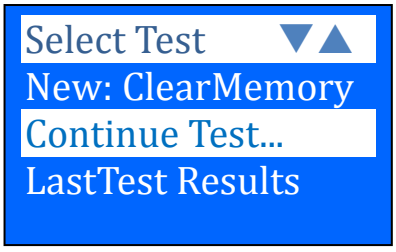


**Figure 30**

3. After you have made your choice, selecting "New: Clear Memory" or

"Continue…Test" will proceed to the display below: (Fig. 31)

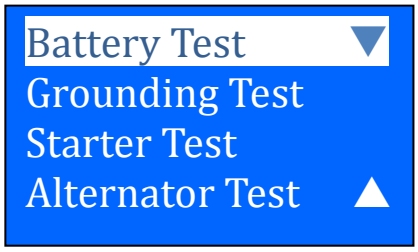


**Figure 31**

4. Pressing  key once will scroll down to the 'Grounding Test' (Fig.32)

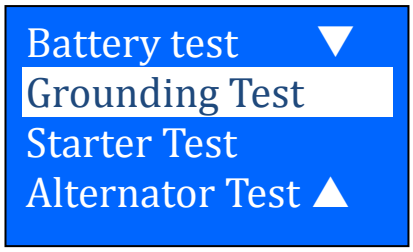


**Figure 32**

5. Press 

key will proceed to the display as follows: (Fig. 33)

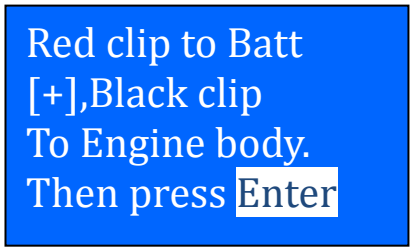


**Figure 33**

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6. Now transfer the BLACK tester clip from the battery [-] terminal to a suitable position on the engine or chassis body leaving the RED clip still attached to the battery [+] terminal.

7. Press ENTER key again and it will starts analyzing (Fig. 34)

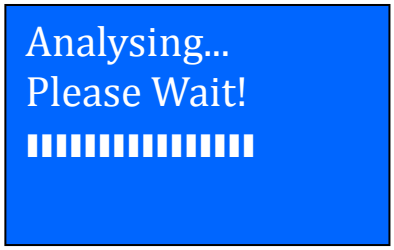


**Figure 34**

8. Once it has finished analysing, it will prompt you with an instruction (Fig. 35) stating that you have should unclamp the Black tester clip from the engine or chassis body and transfer to the battery negative [-] terminal within 20 seconds time limit if not the testing procedure has to be repeated again as the gathered data will be lost.

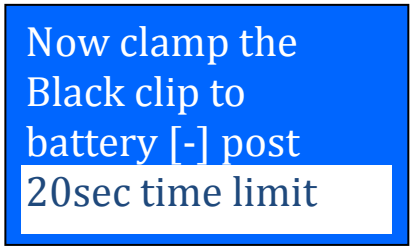


**Figure 35**

9. Once the Black clip is clamped onto the battery [-] terminal, the Analyser display will light up as shown. (Fig. 36)

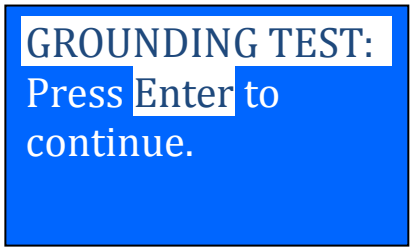


**Figure 36**

10. Now you need to press ENTER key to proceed and the display will show as follows (Figure 37).

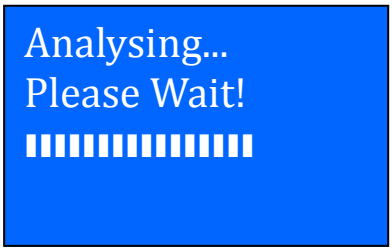


**Figure 37**

10. If the measured resistance reading is within limits, then it will display as follows (Fig. 38)

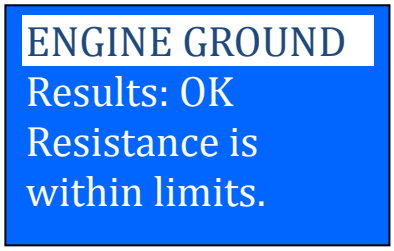


**Figure 38**

11. If the measured resistance reading has gone beyond the limits, then it will display the screen as follows (Fig. 39).

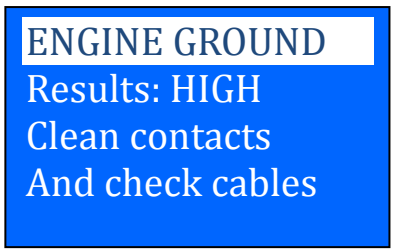


**Figure 39**

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***Note:***

*The above indicates that the ground contact from the engine body to the battery is bad. Check for rusted or corroded point of contacts. If found, dismantle it for cleaning or replace before fixing back. Repeat the test again after fixing.*

*Another thing is that if you suspect that the result is in question, you may conduct the test with the Black clip clamp at different location.*

12. If you did not follow the right procedures during the testing, it will display the results as follows (Fig. 40) below:

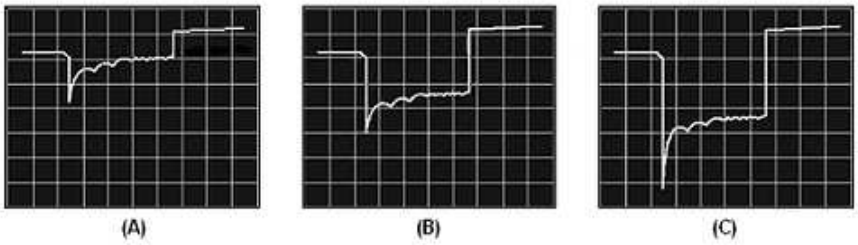

**Figure 40**

13. To exit the program, pressing the EXIT key at any moment will exit and return back to the main menu screen (Fig.30).

# 9.0 – Starter Test

This test actually checks the cranking effectiveness of the battery and also can predicts when the battery will fail to crank a vehicle.

This Analyser is designed to address the weakness of conventional testers with its cranking power measurements. Simply connect the analyzer to the battery in the vehicle and start the engine!




To understand the working principle of the tests, let's look at the wave form displays taken during the cranking tests with an oscilloscope.

Figure (A) above shows the voltage profile of a healthy battery during the cranking of an engine. The graph starts off at the battery's nominal voltage, and a voltage drop is detected when the vehicle is cranked. The voltage recovers to the battery's nominal voltage and eventually rises to approximately 14.4 V when the alternator starts charging the battery.

For Figure (B) where a typical 2 year-old battery, you noticed the difference in the voltage drop which indicates that it is weaker but still usable.

Whereas Figure (C) represents a very weak battery that can barely crank a car and is due to fail in the very near future.

As voltage profiles can indicate the relative ability of the tested battery in starting an engine, so there is no need for knowledge on the starter motor requirement or the battery's rating and size.

BESA11 will capture the highest voltage drop and calculate the final results which should not be lower than 9.6V average during cranking and computes the result after the test.

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## 9.1– Begin Testing

1. With engine OFF, place the vehicle transmission in NEUTRAL for Manual and PARK for Automatic then apply the parking brake.

2. Connect the analyser to the battery terminals and the display will light up as shown (Fig 41).

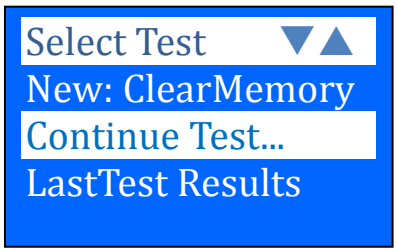


**Figure 41**

3. After you have made your choice, selecting either "New: Clear Memory" or "Continue…Test" will proceed to the display below: (Fig. 42)

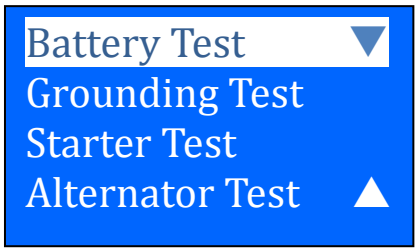


**Figure 42**

4. From the main MENU, select 'Starter Test' by scrolling down using key. (Fig.43)

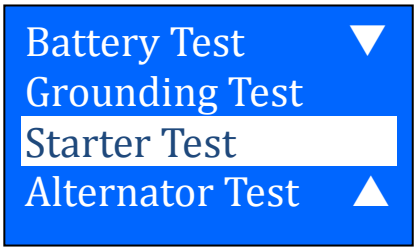


**Figure 43**

2. Press ENTER key to continue and the display will show: (Fig.44)

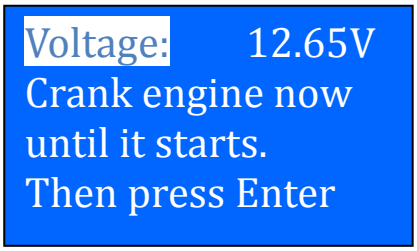


**Figure 44**

3. Switch the ignition key to ON and start cranking the engine until it starts. Immediately after that press ENTER key and the results will show as follows (Figure 45):

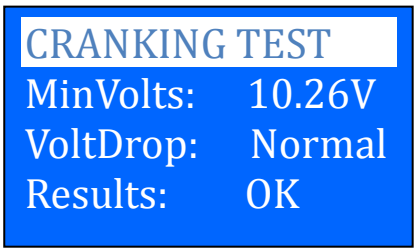


**Figure 45**

4. If the voltage drop is too great during the cranking, the tested results will display as follows (Figure 46) and will prompt you to check the starter system.

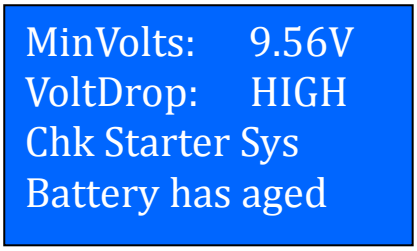


**Figure 46**

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5. During cranking when it detects that there is no drop in voltage, it will display the following screen (Figure 47).

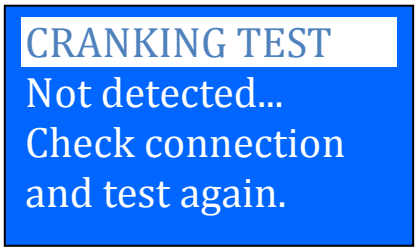
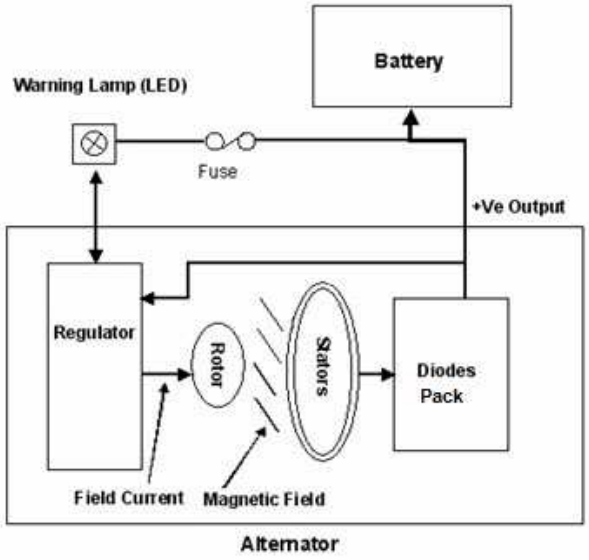



**Figure 47**

6. Pressing the EXIT key at any moment will exit and return back to the previous screen.

# 10.0 – Alternator Test

An alternator is the device used to produce the electricity the car needs to run and to keep the battery charged. The alternator uses the principle of electromagnetic induction to produce voltage and current. The four main parts of the alternator are the Rotor, Stator, Diode Pack, Voltage Regulator and an Ammeter or Indicator Light to inform the driver of any problems. All of these parts must be in good working order for the alternator to do its job.




The Rotor is a coil of wire wound around an iron core. The Rotor rotates as the alternator shaft rotates and current passes through brushes. The Rotor winding passes the Field current. This causes the Rotor to produce a magnetic field. So basically the Rotor is a rotating electro magnet.

The Stator is a set of three windings fixed to the case of the alternator and these windings are static i.e. they don't rotate. As the Rotor rotates its magnetic field "cuts" each Stator winding in turn, this induces a current in each winding. The outputs from the Stator windings are 120 degrees apart and are alternating current (AC).

But vehicles run on DC current, so we need something that will convert the AC current to DC current. This is the job of the diode pack. A diode is an electrical one-way check valve that will let current flow in only one direction. The typical diode pack uses four diodes to accomplish this. AC current is feed in on one side of the diode pack and DC current comes out the other side. The diode pack here will rectify the alternating 3 phases from the Stators and combine them into a single Direct Current which also works the dash ammeter or indicator light.

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Now that we have a DC current that the vehicle can use, we need a way to control that current. That is the job of the voltage regulator. As the name implies, it regulates the voltage going to the battery. It does this by turning current to the field (stator) terminal of the alternator on and off.

If the battery voltage goes below 13.5 volts, the voltage regulator sends current to the field terminal and allows the alternator to start charging. Current will then flow into the battery and bring it up to full charge.

If the voltage goes above 15.0 volts, the voltage regulator shuts off the current to the field terminal and keeps the battery from overcharging and cooking itself. This is how the voltage regulator controls the alternator output.

When you first start your vehicle, the alternator needs some current to start working. The voltage regulator supplies this current from the battery to the field (stator) terminal of the alternator to get it started.

The state of charge of the battery controls amperage output of the alternator. When the battery has a full charge, the electro-motive force of the voltage lowers the amperage to almost zero. As the battery charge wears down, the electro-motive force is not enough to stop the amperage, so it flows into the battery and charges it again.

## *10.1 – Start Testing*

This test is to check the MAX and MIN charging voltages output of the alternator at 3000 RPM without load and 2000 RPM with all loads ON. With this test you can determine the alternator's condition when in reference with the vehicle's Service Manual.

### No load testing at 3,000 RPM

1. With engine OFF, place the vehicle transmission in NEUTRAL for Manual and PARK for Automatic and apply the parking brake.

2. Attach the Analyser clips onto the battery terminal posts and it will power up and lights up the LCD display screen as shown (Fig.48)


**Figure 48**

3. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 49)

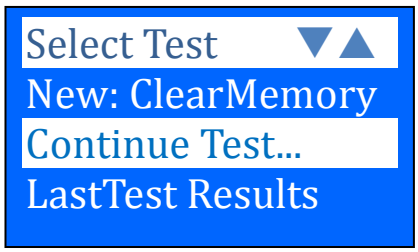


**Figure 49**

4. After you have made your choice, selecting either "New: Clear Memory" or "Continue…Test" will proceed to the display below: (Fig. 50)

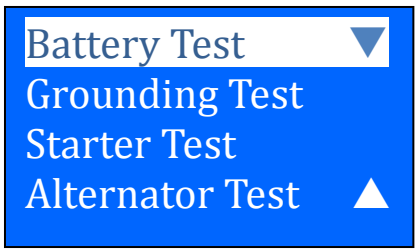


**Figure 50**

Pressing  key to scroll down to the 'Alternator Test' (Fig.51)

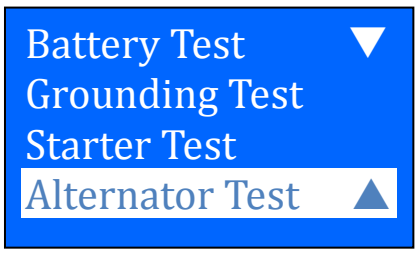


**Figure 51**

5. Press 

key to continue and the display will show: (Fig.52)

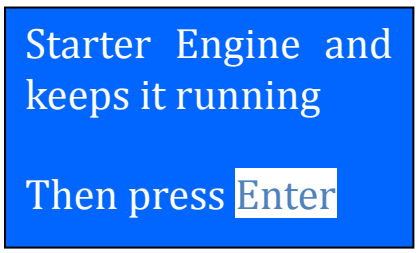


**Figure 52**

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Start the engine and then press ENTER key again and the screen will prompt you as shown below (Fig. 53).

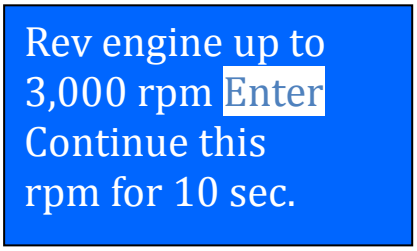


**Figure 53**

Make sure that all loads (lights, air-condition, etc) are OFF.
Rev the engine up to **3,000 ~ 3,500 RPM** by referring to the dashboard meter, then press ENTER key and maintain it for about 10 seconds and release the pedal. The maximum and minimum voltages values will be captured.

After that press ENTER key again and it show as below (Fig 54.)

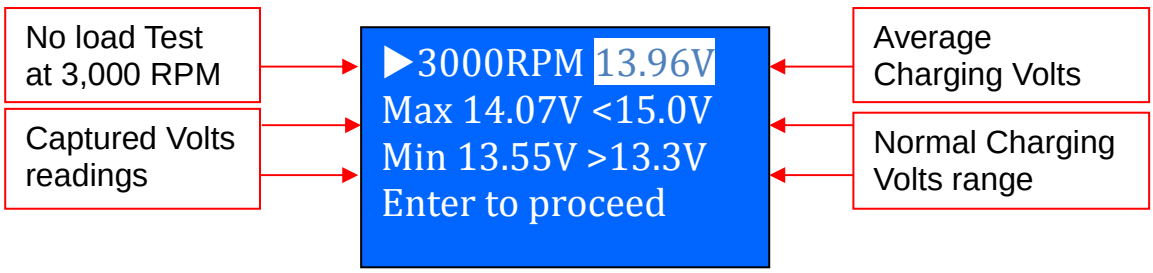


**Figure 54**



With the captured readings, analysis can done by referring to the limits as indicated that **MAX voltage should not exceed 15.0V** (max. voltage at 3,000 RPM) and **MIN voltage should be more than 13.3V** (min voltage during idling speed).

6. Press ENTER key will show the results of the test (Figure 55):

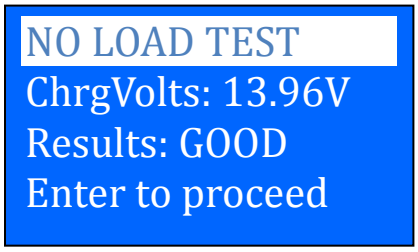


**Figure 55**

7. If either minimum or maximum charging volts are not within the voltage range limits then it will display one of the screen as below (Figures 56 & 57) and it will prompt you to check the charging system for the fault.

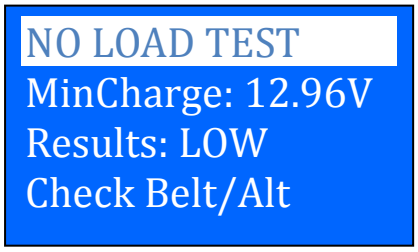


**Figure 56**

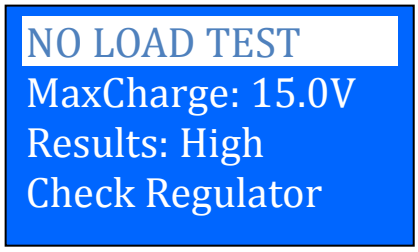


**Figure 57**

## Testing with load at 2,000 RPM

As more electrical accessories, such as lights, heater, air condition, car stereos, etc. were used; the electro-motive force decreases and this will allow more amperage from the alternator to flow into the battery to compensate for the added load. This test is to check the alternator's behavior during loading.

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8. Continue from the previous test (either Fig. 55, 56 or 57); proceed to the next step by pressing ENTER key will enter to the display as follows. (Fig.58)

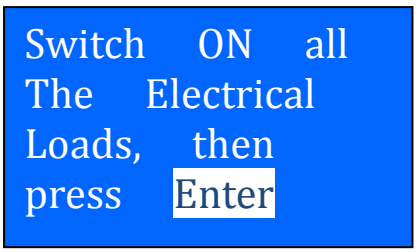


**Figure 58**

Now, switch ON all loads (Head Lights, Radio, Air-condition, Heater, etc) and press ENTER enter key will display: (Fig.59)

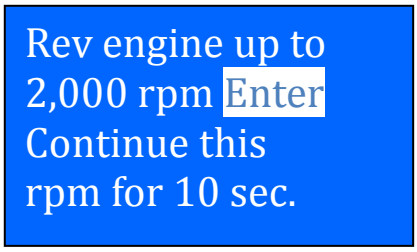


**Figure 59**

Make sure that all electrical loads (lights, air-condition, etc) are ON. Rev the engine up to **2,000 ~ 2,500 RPM** by referring to the dashboard meter, then press ENTER key and maintain it for about 10 seconds and release the pedal. The maximum and minimum voltages values will be captured.

After that press ENTER key again and it show as below (Fig 60.)

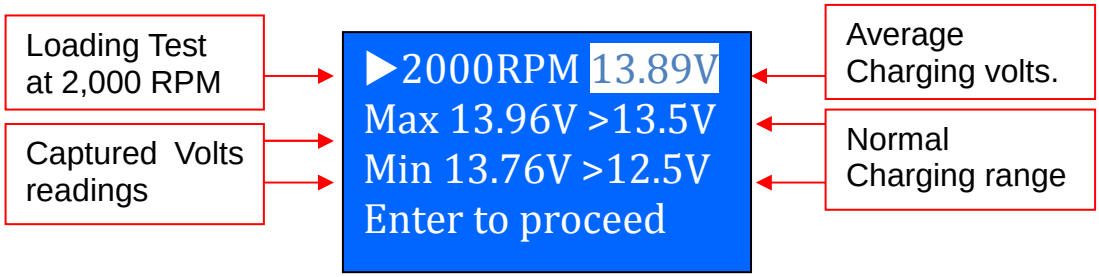


**Figure 60**

With the captured readings, analysis can done by referring to the limits as indicated that **MAX voltage should exceed 13.5V** (max. voltage at 2,000 RPM) and **MIN voltage should be more than 12.5V** (min voltage during idling speed).

9. Press ENTER key will proceed to show the results of the test:

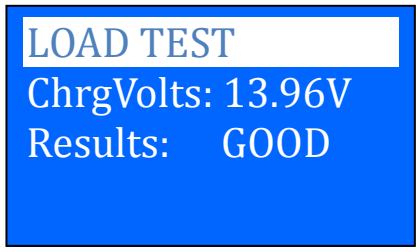


**Figure 61**

If either minimum or maximum charging volts are not within the voltage range limits then it will display one of the screen as below (Figures 62& 63) and it will prompt you to check the alternator system for the fault.

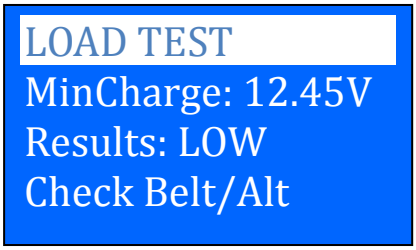


**Figure 62**

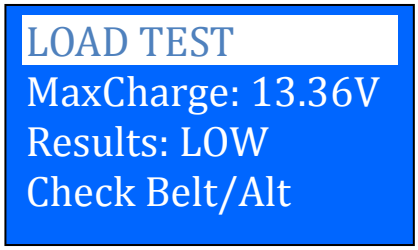


**Figure 63**

10. To exit the program, pressing the EXIT key at any moment will exit and return back to the previous screen.

# 11.0 – View Last Test Results

To view the results of the last test, the BESA 11 has to be connected to an external power source by either clamping its clips directly to a 12Volt car battery or connected to a PC via the USB port.

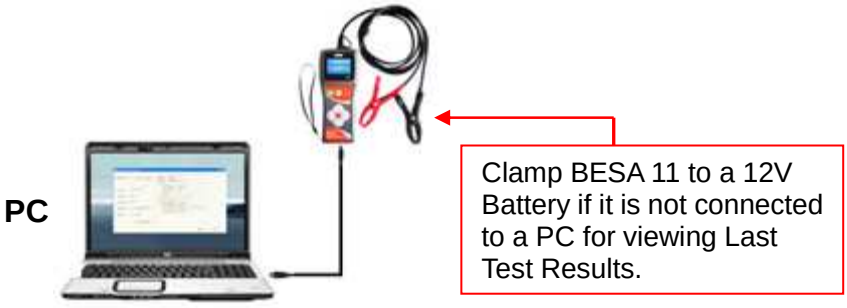


**Figure 64**

1. Once power up, the wakeup screen will display as follows:

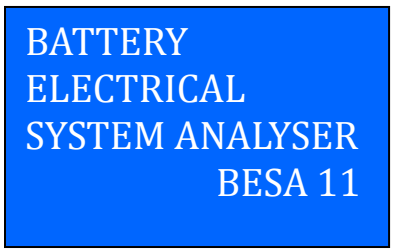


**Figure 65**

2. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 66)

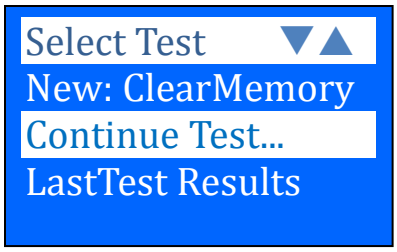


**Figure 66**

3. Pressing  key once will scroll down to the 'Last Test Results' Fig. 67 below.

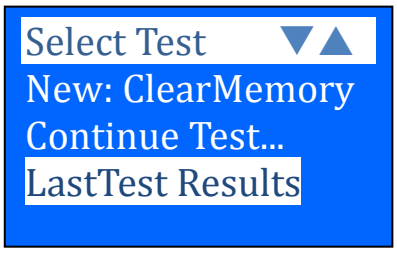


**Figure 67**

4. Press 

key will proceed to display the last test results depending the type of test you had performed earlier. (Fig. 68)

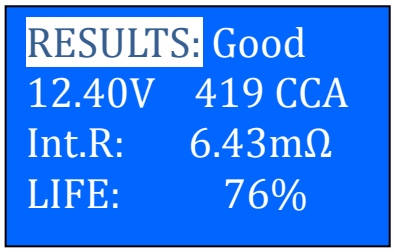


**Figure 68**

5. To view the next page, press  or  key to get to the page you want.

Some examples below are: (Figs. 69, 70, 71 & 72)

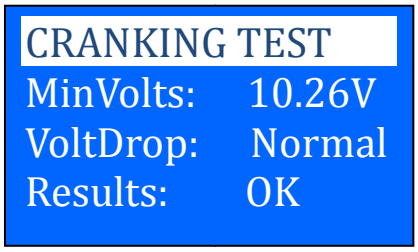


**Figure 69**

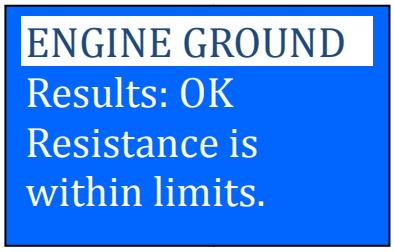


**Figure 70**

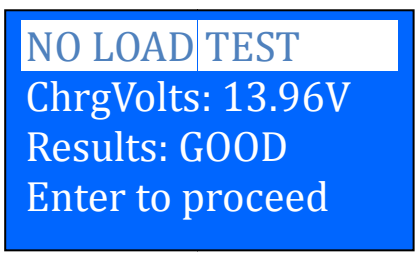


**Figure 71**

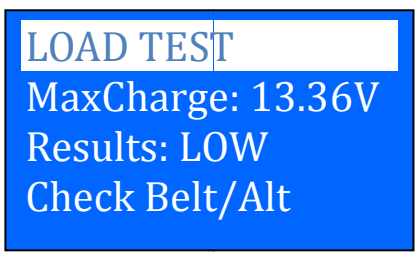


**Figure 72**

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# 12.0 –Setting up the PC ready for BESA 11

## 12.1 - Installing Driver.

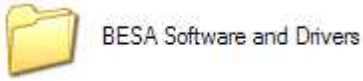
*Important Note:*
*Before you start to install the driver, please do not plug BESA 11 into the computer's USB port or else the installation will fail and the computer cannot detect the proper driver for BESA 11 when connected.*

*If you have made an error and wish to install the driver the second time, you need to uninstall the previously installed driver first before starting to reinstall again. This time make sure that BESA 11 is not plugged in.*

**Step 1.** You can download the BESA Software and Driver from our website:
http://www.aetool.com/upload/BESA%20Software%20and%20Drivers.rar

First unzip the folder:


Once unzipped, double left click on the file icon to open the folder:




You will find the following files:



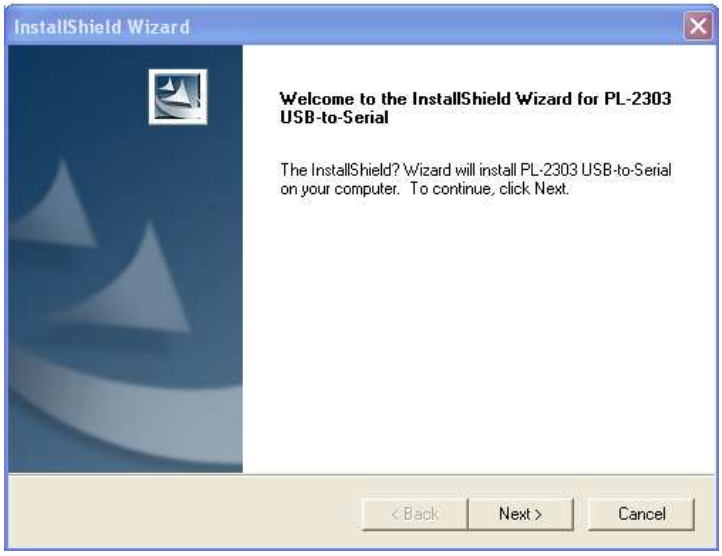




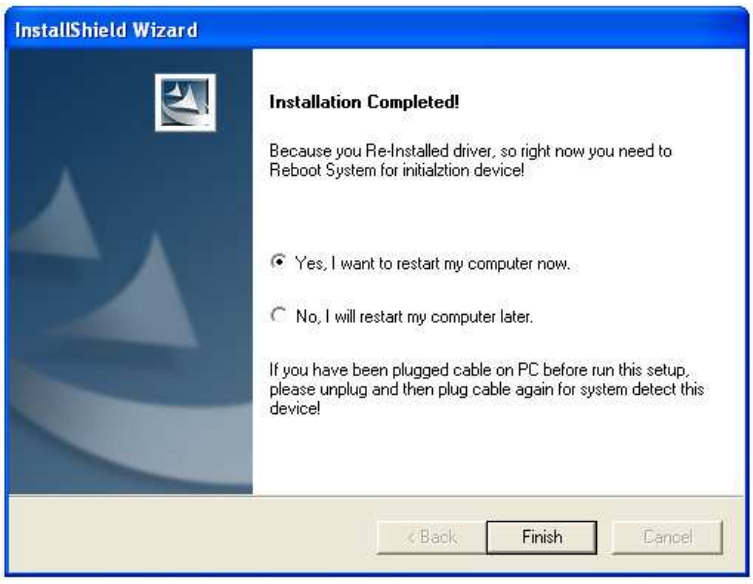
**Step 2.** Select the appropriate Driver Installer for your computer's operating system. If the operating system is Window 7, then select BESA Win 7 Driver Installer; Vista will select Vista Driver Installer and same as it goes for others.

Referring to XP operating system, an example is given below:

Double click on the XP Driver icon and installation will start automatically.




As instructed, click [Next>] tab the program will continue to install the driver on the computer. Once it had finished, it will prompt you as shown below. Click [Finish] tab will restart your computer.




**Step 3.** Once the computer has restarted, plug BESA 11 on to any one of the USB port and the computer will start to locate the driver and it will pop up a message box as shown below.

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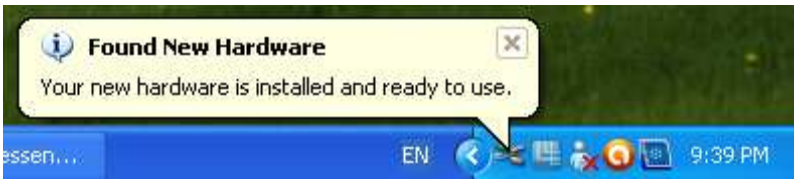
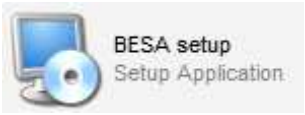
Wait for awhile, a different message box will appear stating that the hardware is installed and ready to use.

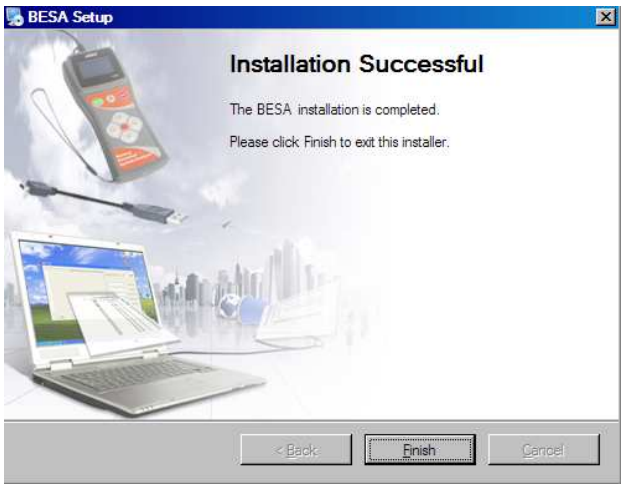



**Step 4.** Next go back to this folder and open it:  BESA Software and Drivers

Double click on this icon: 


The software will start to install and will prompt you all the way.


Click "Next" tab to continue the installation until the software is successfully installed. (See example below:) Click [Finish] to exit.



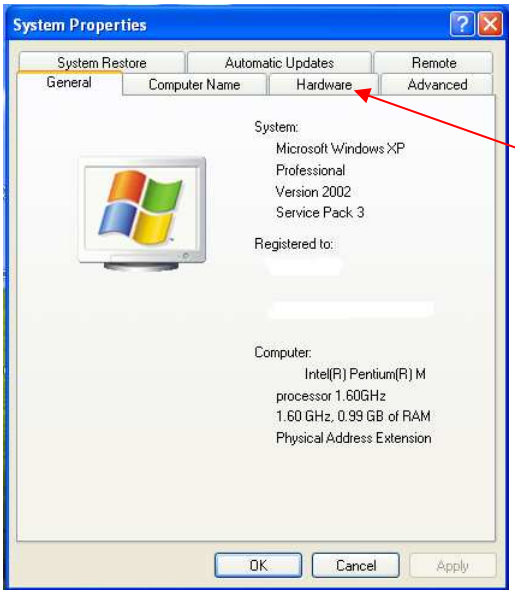
Once the software has been installed, the icon 

will appear on the desktop.

**Step 5.** Still at the desktop, look for 

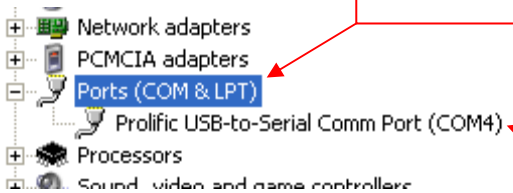
right click on the icon. A task box will pop up. If you do not find this icon on the desktop, then click on [Start] tab at the left hand corner of the screen, the task box will appear. Go to [My Computer] tab, right click to open message box.

Go to [Properties] and left click on it. The System Properties window will display.




Go to [Hardware] tab; left click to open the page.

Go to [Device Manager], left click again to open up the page.




Look for Ports (COM&LPT), and double left click to extend.

Take note of the COM port number. It is different with every computer.

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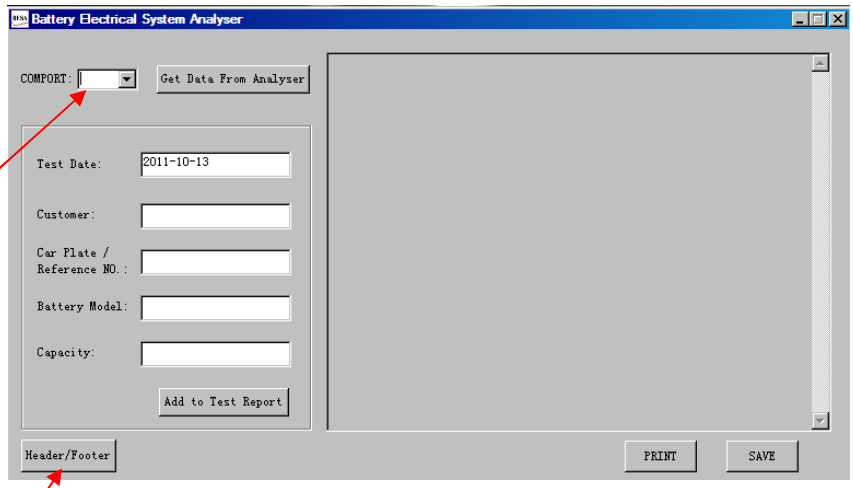
**Step 6.** Back to desktop, open BESA 11 program by left click on the icon and the display page will show as follows:

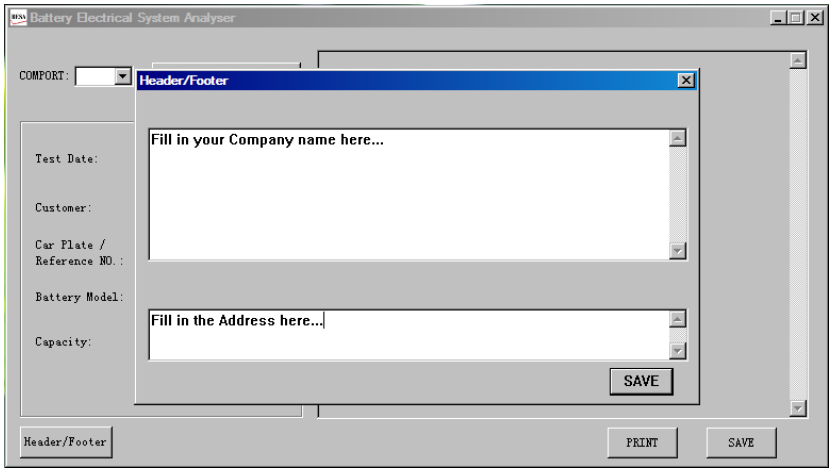

This COM port number should be the same as listed on the Device Manager (refer Step 5)

If you find that this field is blank, unplug the BESA 11 and plug back again. The COM with a number will appear.




Click here to include your Company name and address.

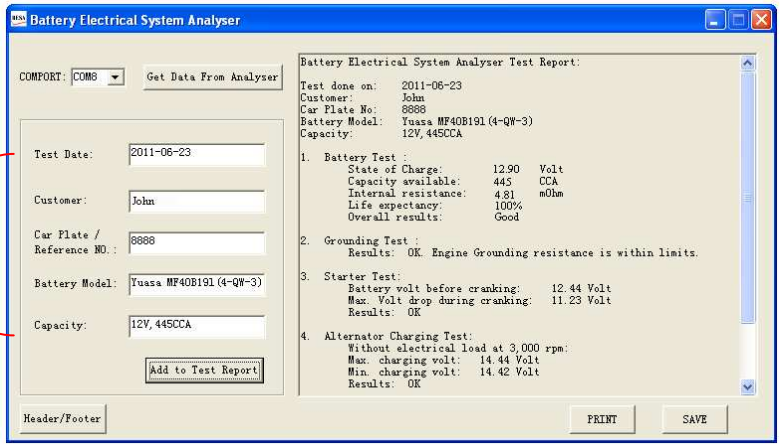
**Step 7.** To include your Company name and address in the printout, you must click [Header/Footer] tab to open the window and then fill the particulars as seen below:






**Step 8.** Press the communication key  on the BESA 11 unit to log onto the computer. To confirm the whether there is communication; click on [Get Data From Analyser] tab and the Last Test Result will appear. See example below.

Fill in the particulars here and then click [Add to Test Report] tab to be included in the test report.




If there is no communication, a message text box will appear like below.

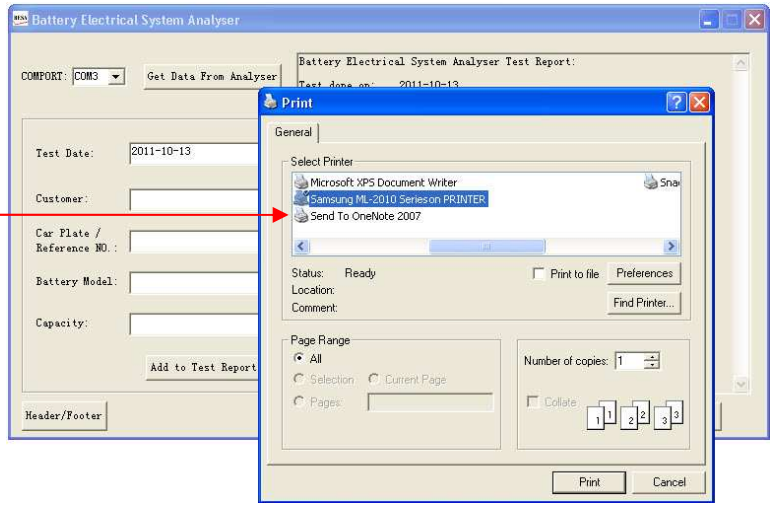
.


In this case press  key at BESA 11 unit again.

## 12.2 Printing Results:

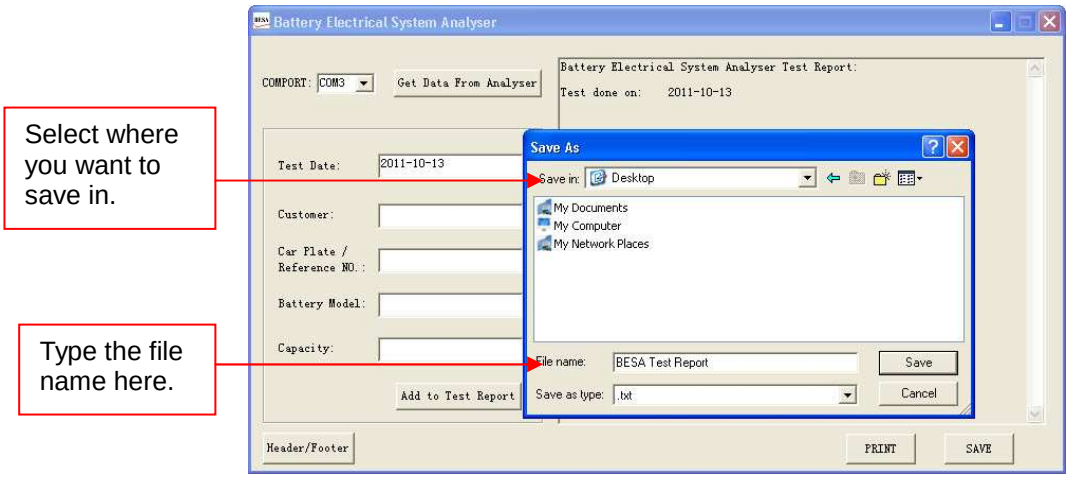
While on this page, if you wish to print out the results, make sure that your printer is connected to the computer. Click on [PRINT] tab and a text box will appear. Select the right printer and click [Print] tab to print.

Select the printer which is connected to your computer here.



## 12.3 Saving Results:

If you wish to save the results from this page, then click on [SAVE] tab. A message box will appear. Type in the file name and click [Save] tab.




# *Disclaimer*

All information, illustrations, and specifications contained in this user manual are based on the latest information available at the time of printing. The right is reserved to make any changes at any time without obligation to notify any person or organization of such revisions or changes.

Furthermore, the manufacturer or its sales agents are not liable for errors contained herein or for incidental or consequential damages (including lost profits) in connection with the furnishing, performance or use of this material.



This user manual tells how to use and perform the required procedures on vehicles. Safe and effective use of this Analyser is very much dependant on the user following the normal practices and procedures outline in this manual.

# 13.0 – Warranty Information

## 13.1 – Limited Warranty

This limited warranty cover defects in materials and workmanship for a period of twelve (12) months which begins from the date the product is purchased by the end user and is subjected to the following terms and conditions:

1. Within the warranty period, the manufacturer will repair or replace, at their options, any defective parts and return to the owner in good working condition.

2. Any repaired or replaced parts will be warranted for the balance of the original warranty or three months (3) months from the date of repair, whichever is longer.

3. This warranty only extends to the first owner and not assignable or transferable to any subsequent owner.

4. Cost of delivery charges incurred for the repair of the product to and from the manufacturer will be borne by the owner.

5. This limited warranty covers only those defects that arises as a result of normal use and does not cover those that arises as a result of:

   - Unauthorized modifications and repair.
   - Improper operation or misuse.
   - Accident or neglect such as dropping the unit onto hard surfaces.
   - Contact with water, rain or extreme humidity.
   - Contact with extreme heat.
   - Cables that have broken, bent contact pins or subject to extreme stress or wear.
   - Physical damage to the product surface including scratches, cracks or other damage to the display screen or other externally exposed parts.

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## 13.2 - Limitations of Warranty

Other than the foregoing limited warranty, the manufacturer does not make any other warranty or condition of any kind, whether express or implied.

Any implied warranty of merchantability, or fitness for use shall be limited to the duration of the foregoing limited warranty.

Otherwise, the foregoing limited warranty is the owner's sole and exclusive remedy and is in lieu of all other warranties whether express or implied.

The manufacturer or any of its exclusive sales agents shall not be liable for any consequential or incidental damages or losses arising of the loss of uses of this product.

All warranty information, product features and specifications are subjected to change without prior notice.