Battery Performance Analyser

BPA 11

User's Manual

Version: 11.03.25

Table of Contents

1.0 - Introduction

1.1-The Product:

This battery analyser utilises the latest methods in battery testing technology. It is microprocessor controlled which can test the battery condition as it is without the need of fully charging it before test. Its electronic circuitry consumes very little current during testing hence it can be repeated numerous times without worry of draining the battery and its results are highly accurate. It takes less than 5 seconds for it to obtain the full analysis of tested battery.

The benefits of this battery analyser are:

- Intelligent: It detects and removes surface charge if any before proceeding to perform tests for better results.
- Consistent and repeatable test results
- Never discharges or drain the battery during testing.
- Able to test condition of discharged or weak batteries.
- Provides unique indication of battery conditions such as:

    1. Keying in of actual battery rating (CCA, DIN, EN, IEC, JIS) before test for better accuracy.
    2. Battery state of charge: Digital display in Volts.
    3. Test results : Either Good or Replace
    4. Battery cell resistance measurement : Display in mΩ
    5. Battery Life Expectancy: Display in percentage (%).

- Safety: It does not create spark during clamping to the battery while performing tests.
- It is maintenance free and does not require internal batteries to operate.

The testing 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. In event that you need assistance, there is a 

key. It will display information about each function when selected.

1.2 Specifications:

Operating Voltage:	9V ~ 15V DC (max)
Suitable Battery Type:	All types of 12 Volts Automotive Batteries.
Analysing Capacity (Amps):	CCA: 100 ~ 1700 Amps IEC: 100 ~ 1700 Amps JIS#: 100 ~ 1700 Amps EN: 100 ~ 1000 Amps DIN: 100 ~ 1000 Amps
Battery analysing time:	Less than 5 seconds.
Results Display:	Battery Condition: Good or Replace Battery Volts: Digital display Cell Resistance: mΩ Life: %
Testing Leads:	480mm
Weight:	320 grams
Dimensions (L x W x H):	180 x 80 x 25 mm

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

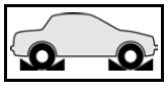
Fuel and battery vapors are highly flammable.
DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.

⚠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

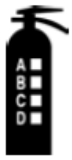
Engine parts become very hot when engine is running. To prevent severe burns, avoid contact with hot engine parts.

⚠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 eyewear (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), or 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 Analyser

4.1 – BPA 11 Unit

Figure 1

4.2 - Keypad Functions:

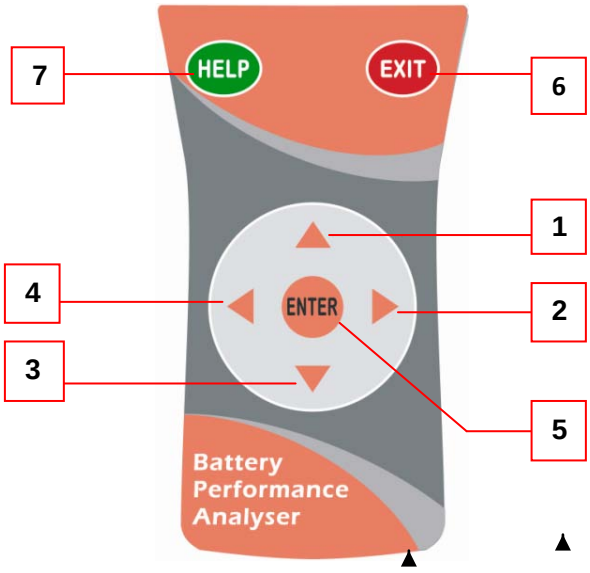

Figure 2

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. From the menu you can select the item that you need and it will explain its functions in detail.

5.0 – Help Key

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

press HELP key anytime during the wakeup screen as shown below (Fig.3):

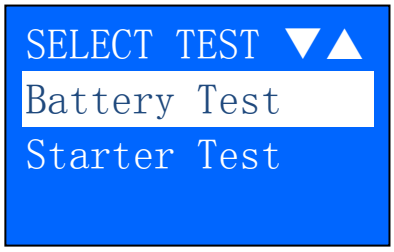

Figure 3

Once this key is pressed, the display will show (Fig. 4) as below:

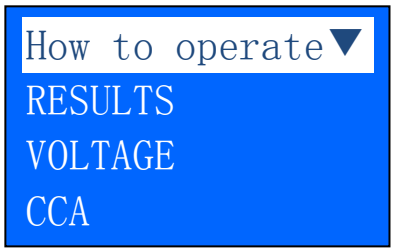

Figure 4

To scroll down to the item and so forth, press key will proceed to next item "RESULTS" as shown (Fig.5). below:

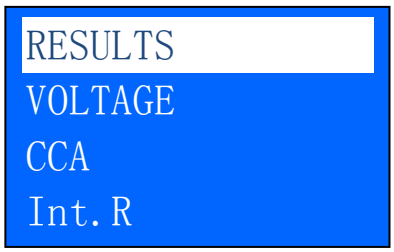

Figure 5

To exit this function, just press EXIT key will return to the main screen (Fig.3)

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

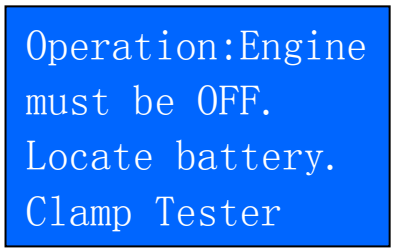

Figure 6

Press ▼ key will scroll down to the next sentence to continue reading the text (Fig. 7, 8 & 9) below.

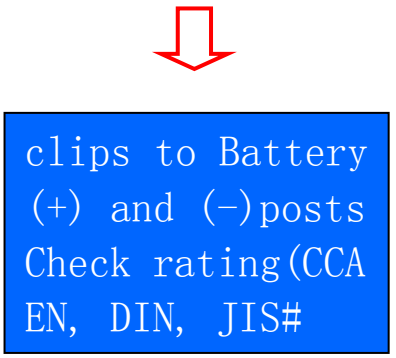

Figure 7

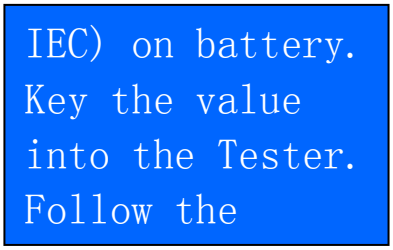

Figure 8

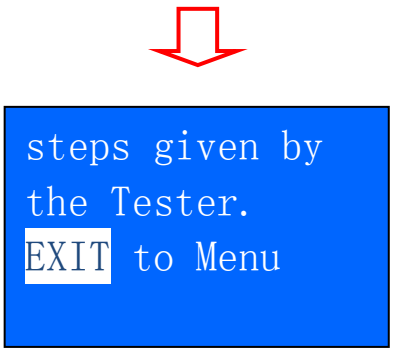

Figure 9

To quit, press EXIT key anytime will go back to the main menus (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).

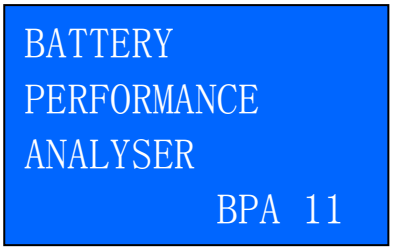

Figure 10

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

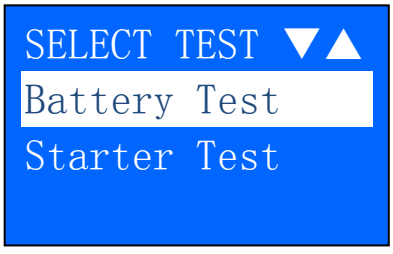

Figure 11

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3. Press ENTER 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. 12) below.

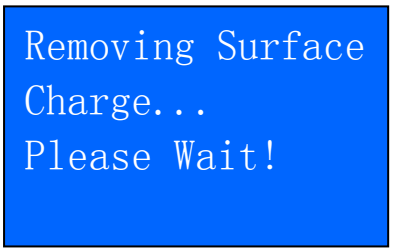


Figure 12

4. If the surface charge is too great for the analyser to handle, it will prompt you with the instructions as shown: (Fig. 13) below.

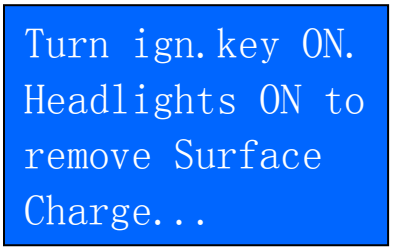


Figure 13

5. Wait until the surface charge removal had completed, the analyser will advise as follows: see (Fig.14) and then press ENTER key.

Figure 14

6. If there is no surface charge present, then it will straight away enter into "Select Input" menu screen as shown in Fig. 15

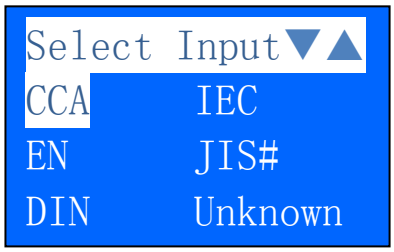
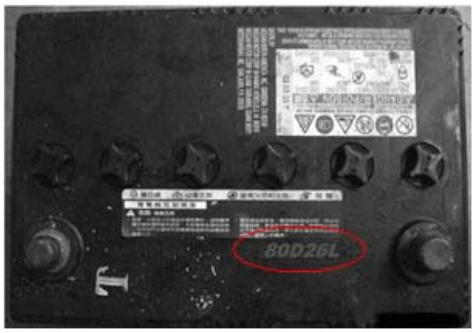
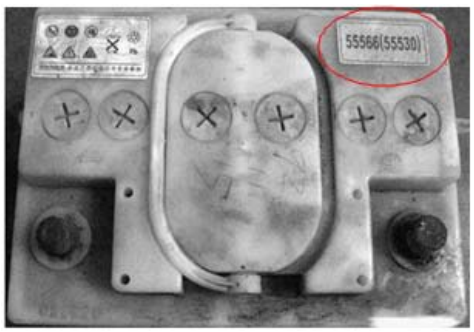
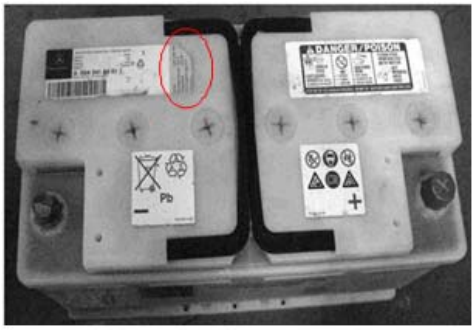


Figure 15

7. 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:







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If it is selected under JIS # (Japanese Industrial Standard) then the display will prompt you as shown (Fig.16) below.

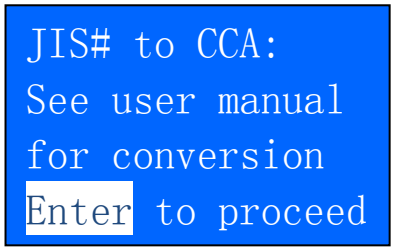

Figure 16

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 23 & 24 (See example Fig.17 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 17

Press ENTER key and the display will show: (Fig.18) below:

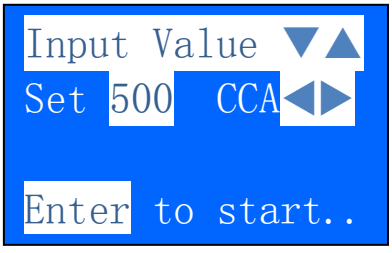

Figure 18

9. Referring to the Table list (Fig.16) under 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

10. To enter the value 630, press ▶ key will increase the original value of 500 (Fig.18) 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. 19)

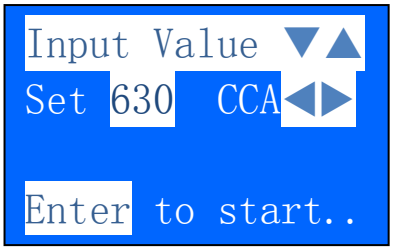

Figure 19

11. Once the CCA rating of the battery is confirmed, press ENTER key will start the testing process. Refer to the display below (Fig. 20).

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Figure 20

12. For less than 5 seconds, the results of the testing will be displayed on the LCD screen. (Fig. 21)

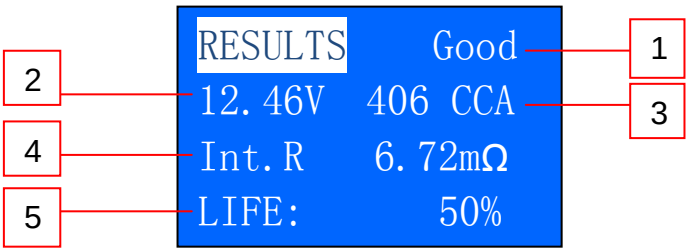

Figure 21

Interpretations of the above results basing on Fig. 21:

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.

2. **Voltage :** **12.46V**
   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):** **406 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.

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°F/-18°C while maintaining 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°F/ -18°C.

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

4. **Int. R (Internal Resistance):** **6.72mΩ**
   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:** **50 %**
   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.

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- **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.22)

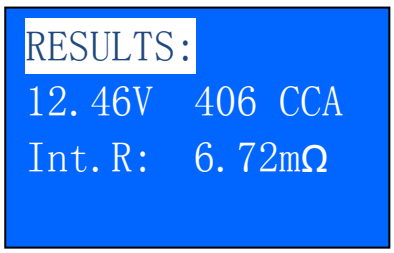

Figure 22

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.23) as shown if its voltage falls below the normal 12 volts and a buzzing sound is heard.

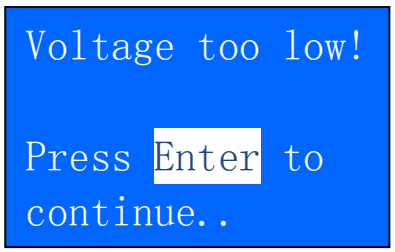

Figure 23

Press ENTER key to continue and the display will show: (Fig.24)

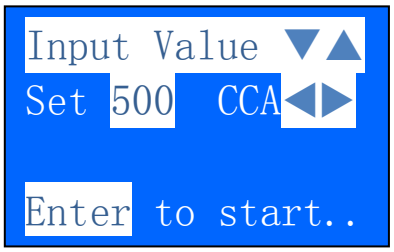

Figure 24

Check the battery ratings and enter it as described in step 10 and 11 (page 18) and the results will show as an example below: (Fig. 25).

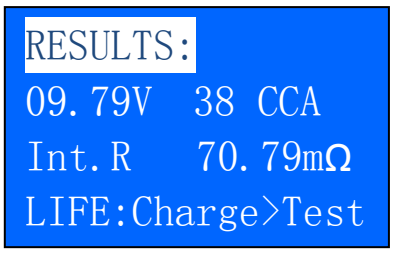

Figure 25

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.

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13. Pressing the EXIT key at any moment will exit and return back to the main 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			46B26R	NS60	360		
26A17L		200			46B26L		360		
26A19R	12N24-4	200	220	264	46B26RS		360		
26A19L	12N24-3	200	220	264	46B26LS		360		
28A19R	NT50-N24	250			48D26R	N50	280	360	420
28A19L	NT50-N24L	250			48D26L	N50L	280	360	420
32A19R	NX60-N24	270	295		50B24L	NT80-S6L	390		
32A19L	NX60-N24L	270	295		50B24R	NT80-S6	390		
26A17R		200			50D20R		310	380	480
26B17L		200			50D20L		310	380	480
28B17R		245			50D23R	85BR60K	500		
28B17L		245			50D23L	85B60K	500		
28B19R	NS40S	245			50D26R	50D20R		370	
28B19L	NS40LS	245			50D26L	50D20L		370	
32B20R	NS40	270			55B24R	NX100-S6	435	420	500
32B20L	NS40L	270			55B24L	NX100-S6L	435	420	500
32C24R	N40	240	325	400	55B24RS	NT80-S6S	430	420	500
32C24L	N40L	240	325	400	55B24LS	NT80-S6LS	430	420	500
34B17R		280			55D23R		355	480	500
34B17L		280			55D23L		355	480	500
34B19R	NS40ZA	270	325	400	55D26L	N50ZL	350	440	525
34B19L	NS40ZAL	270	325	400	55D26R	N50Z	350	440	525
34B19RS	NS40ZAS	270	325	400	60D23R		520		
34B19LS	NS40ZALS	270	325	400	60D23L		520		
36B20R	NS40Z	275	300	360	65D23R		420	540	580
36B20L	NS40ZL	275	300	360	65D23L		420	540	580
36B20RS	NS40ZS	275	300	360	65D26R	NS70	415	520	625
36B20LS	NS40ZLS	275	300	360	65D26R	NS70L	415	520	625
38B20R	NX60-N24	330	340	410	65D31R	N70	390	520	630
38B20RS	NT60-N24S	330	340	410	65D31L	N70L	390	520	630
38B20L	NX60-24L	330	340	410	70D23R	35-60	490	540	580
38B20LS	NX60-24LS	330	340	410	70D23L	25-60	490	540	580
40B20L		330			75D23R		500	520	580
40B20R		330			75D23L		500	520	580
42B20L		330			75D26R	F100-5	490		
42B20RS		330			75D26L	F100-5L	490		
42B20LS		330			75D31R	N70Z	450	540	735
46B24L	NS60L	325	360	420	75D31L	N70ZL	450	540	725
46B24R	NS60	325	369	420	80D23R		580		
46B24RS	NS60S	325	360	420	80D23L		580		

Battery Model (JIS#)		CCA Rating			Battery Model (JIS#)		CCA Rating		
NEW	OLD	WET	MF	CMF SMF	NEW	OLD	WET	MF	CMF SMF
80D26R	NX110-5	580	580	630	130F51L		800		
80D26L	NX110-5L	580	580	630	145F51R	NS150	780	920	
85B60K				500	145F51L	NS150L	780	920	
85BR60K				500	145G51R	N150	780	900	1100
95D31R	NX120-7	620	660	850	150F51R	NT200-12	640		
95D31L	NX120-7L	620	660	850	150F51L	NT200-12L	640		
95E41R	N100	515	640	770	165G51R	NS200	935	980	
95E41L	N100L	515	640	770	165G51L	NS200L	935	980	
105E41R	N100Z	580	720	880	170F51R	NX250-12	1045		
105E41L	N100ZL	580	720	880	170F51L	NX250-12L	1045		
105F51R	N100Z	580			180G51R	NT250-15	1090		
105F51	N100ZL	580			180G51L	NT250-15L	1090		
115E41R	NS120	650	800	960	195G51R	NX300-51	1145		
115E41L	NS120L	650	800	960	195G51L	NX300-51L	1145		
115F51R	N120	650	800	960	190H52R	N200	925	1100	1300
115F51L	N120L	650	800	960	190H52L	N200L	925	1100	1300
130E41R	NX200-10	800			245H52R	NX400-20	1530	1250	
130E41L	NX200-10L	800			245H52L	NX400-20L	1530	1250	
130F51R		800			180G51L	NT250-15L	1090		

7.2 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

7.3 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

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			

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7.4 Rough CCA Guide

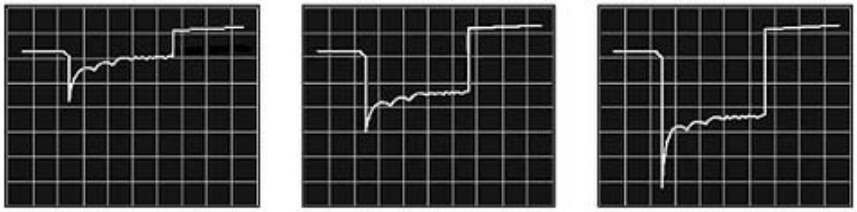
Given below is a rough CCA ratings guide for any unknown battery model basing on the capacity of the vehicle:

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 – 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.

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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.

8.1– 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 26).

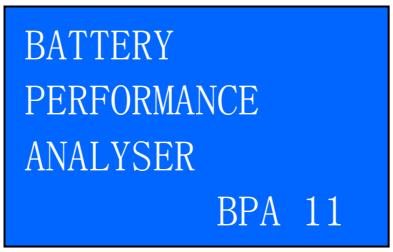

Figure 26

3. From the main MENU, select 'Starter Test' by scrolling down using ▼ key. (Fig.27)

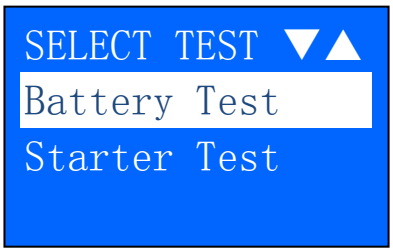

Figure 27

4. Press ENTER key to continue and the display will show: (Fig.28)

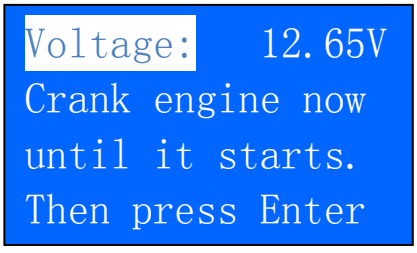

Figure 28

5. 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 29):

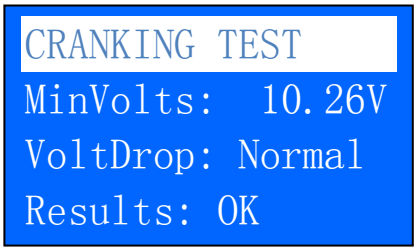

Figure 29

6. If the voltage drop is too great during the cranking, the tested results will display as follows (Figure 30) and will prompt you to check the starter system.

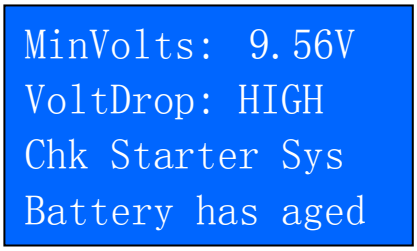

Figure 30

7. During cranking when it detects that there is no drop in voltage, it will display the following screen (Figure 31).

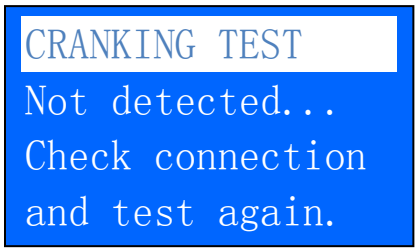

Figure 31

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

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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.

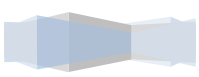
9.0 – Warranty Information

9.1 – 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.

9.2 - 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.