BATTERY STARTER ALTERNATOR ANALYSER (BSA12G)
User Manual

Introduction

BSA12G-2 [Battery System Analyser] had revolutionised its display format and is the first in the world with fully graphics display on its operation. With its simplicity of the graphics display, step by step instructions were clearly understood universally without any language barrier. It is able to test all 12V Car Batteries, Motorcycle Batteries, Starters and the Alternator charging conditions.

With its microprocessor controlled testing, the results were accurate and repeatable. The operation is quick (less than 7 sec) and does not create sparks when clipped on or drain the battery during the test.

1. Battery Test:

- It 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 7 seconds to obtain the full analysed results of tested battery.

2. 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.

3. Alternator charging and Diode Ripple Test:

- This test checks the alternator charging condition without load at 3,000 RPM, during load at 2,000 RPM and also Diode AC ripple test with results displayed after each test.

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

Specifications:

Operating Voltage:	9V ~ 15V DC (max)			
Analysing Capacity (Amps):				
Automotive Batteries:	CCA:	100A ~ 2000A	EN1/EN2:	100A ~ 2000A
	IEC:	100A ~ 2000A	DIN:	100A ~ 2000A
	JIS#:	100A ~ 2000A	SAE:	100A ~ 2000A
	CA/MCA:	100A ~ 2000A		
Motorcycle Batteries:	CCA:	40A ~ 600A	EN1/EN2:	40A ~ 600A
	IEC:	40A ~ 600A	DIN:	40A ~ 600A
	JIS#:	40A ~ 600A	SAE:	40A ~ 600A
	CA/MCA:	40A ~ 600A		
DC Volts Accuracy:	± 1% Reading			
Battery analysing time:	Less than 7 seconds.			
Memory:	Only the last Test results will be stored.			
PC connection:	Through USB port.			
Working Temperature:	0ºC (32°F) ~ 50ºC (122ºF).			
Working Humidity:	10 ~ 80 %			

Safety precautions:

- 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.
- To protect your eyes from propellant object such as caustic liquids, always wear safety eye protection.
- Fuel and battery vapors are highly flammable. DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.
- 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.
- 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).
- Always block the drive wheels. Never leave vehicle unattended while testing.
- Never lay tools on vehicle battery. You may short the terminals together causing harm to yourself, the tools or the battery.
- 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.
- Always keep a fire extinguisher readily available and easily accessible in the workshop.

Working with Batteries:

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 equalizing 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 get warm and expand. After recharging has been completed, recheck the level.
- Do NOT smoke or cause sparks or flames while the battery is being recharged because batteries give off explosive gasses.

Preparing for Test:

1. The Analyser operates 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.

2. 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.

3. Always attached the tester 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.

4. 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.)

5. During testing on the battery whist it is still in the car, make sure the engine, all accessories and load are OFF. Close the trunk lid and all doors.

6. Inspect the battery for cracks or broken casing. Do not use the Tester if the battery is damaged.

7. If the battery is a WET type: non sealed maintenance free, top up the level as specified by the markings on the battery with distilled water. This will help to purge the gas from the cells. DO NOT OVERFILL.

8. If necessary to remove the battery from the vehicle to test, ALWAYS remove the negative terminal from the battery first. Make sure all accessories are OFF so that you do not cause any arcing.

Car Battery Test:

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 Automotive 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. Clamp the Analyser black clip to the battery negative terminal (-) and red clip to the battery positive terminal (+). The Analyser LCD will light up (Fig.1).

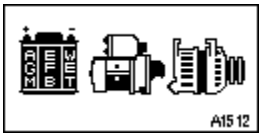


Fig.1

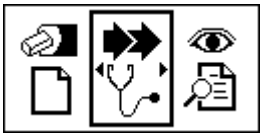


Fig.2

2. When one of the Analyser clamps to the battery contact is not good, it will prompt you as shown below (Fig 3 and 4 flashing alternately). In this case, unclamp and clamp the clips again on the battery posts. Here the Analyser will ensure that its contacts are good before conducting a test.

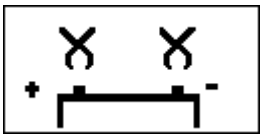


Fig.3

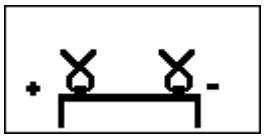


Fig.4

3. If the contacts between the battery and the Analyser have no problem, then the Menu screen will display as shown below:

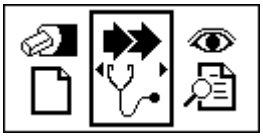


Fig.5

4. Here, it will let you select your choice from the Menu by pressing ◀ or ▶ key and then press ↵ key.

New: Clear Memory 

The Analyser will clear the previous all results store in the memory and start a fresh one.

Repeat or Continue Test: 

Selecting this item will allow you to continue or repeat the last test on the same car from where you had stopped and it will update the results after testing.

For example:
If you had done Battery Test and later, you wish to do Starter or Alternator Test on the same car, just select these items and it will update the results after each test in its memory and it can be retrieved for review later.

View Test Results from the memory: 

When you had selected and entered in this mode, it will let you view the previous test results stored in its memory. Once entered, the display will show as examples (Fig.6, 7, 8, 9 & 10) below depending on the type of test you had done earlier.

Note: If you had selected [New: Clear Memory] and pressed ↵ earlier and did not do any testing, there will be no results stored in the memory. So while you are in this mode, the LCD display will not change and remain as it is as there is nothing to view.

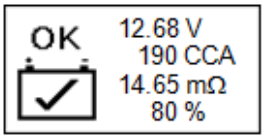


Fig.6

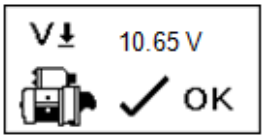


Fig.7

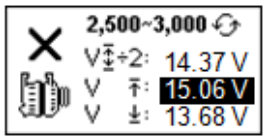


Fig.8

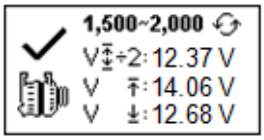


Fig.9

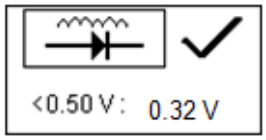


Fig.10

Continue from step 4:

5. After you have made your choice. you can begin testing by selecting  or  by pressing ◀ or ▶ key then ↵ key will proceed to the display below: (Fig.11)

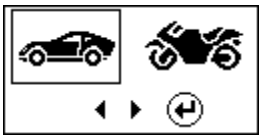


Fig.11

6 Selecting  will allow you to test Car Batteries (up to 2000A), Starters and Alternator whereas  will only test Motorcycle Batteries (up to 600A) only.

7. Once you had selected, example  the display will change to the MENU display as (Fig. 12) below:

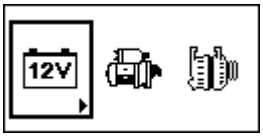


Fig.12

8. Select  for Battery test and then press ↵ key.

9. If the Analyser has detected any surface charge in the battery, it will prompt you to turn the ignition key to ON and switch on the headlights (Fig.13) to discharge the battery until it has reached to the next display that shows turn ignition OFF and headlights OFF (Fig.13) as display shown below and then press ↵ to continue.

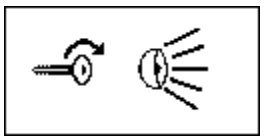


Fig.13

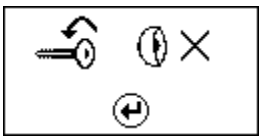


Fig.14

9. Next it will prompt you to select the types of batteries (Fig.15) below:

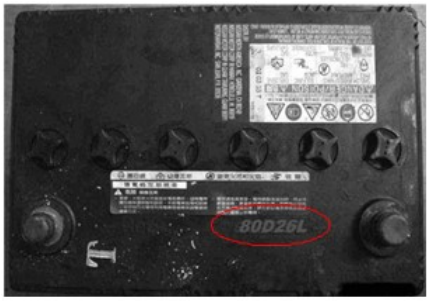
Fig.15

WET battery meant that it tests normal flooded types like Wet Low Maintenance (Lead [Pb] / Calcium [Ca]) or Wet Standard (Lead [Pb] / Lead [Pb]) Batteries.

EFB will test Enhanced Flooded Battery or commonly known as Start / Stop Battery.

AGM (Flat or Spiral) will test Wet (MF) Maintenance Free (Calcium [Ca] / Calcium [Ca]), AGM/Gel Cell VRLA (Calcium [Ca] / Calcium [Ca]) Batteries.

11. Before selecting the ratings 'CCA, SAE, EN, IEC, DIN, CA 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:



12. Once the selection has been done, it will proceed to the display as shown below (Fig.16):

Fig.16

13. If the rating is selected under JIS # (Japanese Industrial Standard) then you need to refer to the conversion chart provided separately with the Tester when purchased to convert to CCA ratings.

    Refer to the battery model (example: 80D26L or NX110-5L) on the Cold Cranking Amps (CCA), WET is 580 CCA and AGM is 630 CCA.

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

14. You can also use the rough CCA guide below, basing on the engine capacity of vehicle but the percentage (%) Life is not that precise as compare to the actual battery rating due to this rough estimation.

1000 – 1299 cc	**300 CCA**
1300 – 1599 cc	**400 CCA**
1600 – 1999 cc	**500 CCA**
2000 – 2999 cc	**700 CCA**
3000 – 3500 cc	**800 CCA**

15. To enter the value, press key ◄ ► will increase or decrease the original value shown on the display by 100 units .Likewise use ▲ ▼ key to increase or decrease the last two digits step of 5 units for each pressing (Fig.17).

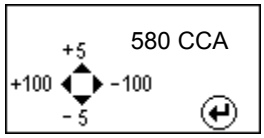


Fig.17

16. Once the Amps rating of the battery is confirmed, press ↵ key will start the testing process. Refer to the display below (Fig.18):

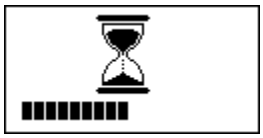


Fig.18

17. For less than 7 seconds, the results of the testing will be displayed on the LCD screen (Fig. 19).

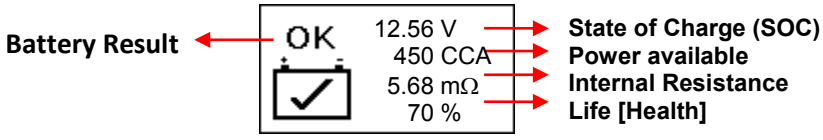


Fig.19

18. This Analyser will also take into consideration the temperature of the battery when it detects that the battery condition is marginal (SOC below 75%) and it will prompt you with the display as shown (Fig. 20) below:

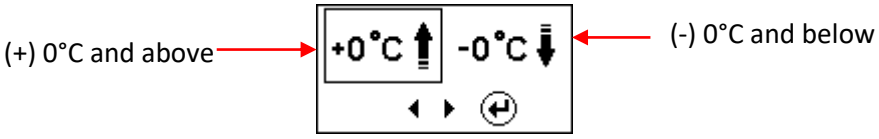


Fig. 20

Here it lets you to select the surrounding temperature that you are working with the battery. If the surrounding temperature is for example 15°C, then select 

and press ↵ . Then the results will show on the LCD display.

19. When the SOC (State of Charge) is low, the analyser will ask whether the battery condition is before charge or after charged (Fig. 21 below) before computing the final results.

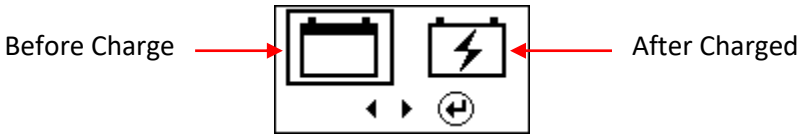


Fig.21

Motorcycle Battery Test

To test motorcycle batteries, it is better to test with the battery taken out from the motorcycle for better results. This is mainly due to the obstruction of the wires that are attached to the battery terminals and the tester clamps may not clip properly due to lack of space at its terminals thereby may cause false test results.

1. While on the main menu as shown Fig.22 below, select  for Motorcycle Battery test (Fig.23).

Fig.22

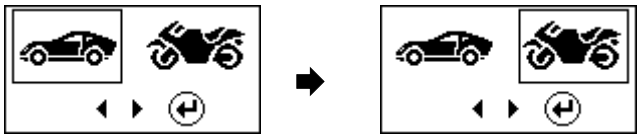
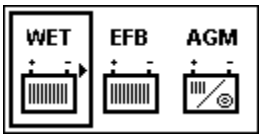


Fig.23

2. Press ↵ I the screen will show as Fig.24 below:

Fig.24



3. Before selecting whether [WET] or [AGM] and the ratings 'CCA, SAE, EN, IEC, DIN, CA and JIS #' from the menu, check the battery model. This can be checked on the battery labels as some of the examples shown below:

With the battery model in hand, refer to the Battery rating chart (as seen in this example Fig.25 below) provided in separate copies with the Tester during purchased to get values to be keyed in.

Battery Model	AH	CCA		Battery Model	AH	CCA	
		WET	AGM			WET	AGM
YT4L-4	3		50	YTZ12S-BS	11		210
YT7B-4	6.5		110	YTZ14S	11.2		230
YT7B-BS	6.5		110	YTZ14S-BS	11.2		230
YT9B-4	8		120				

Fig.25

Once the battery type [WET] or [AGM] is selected, it will proceed to the display as shown below (Fig.26):

Fig.26

4. Press ↵ and the display will show as in Fig.27. To enter the value, press key ◀▶ to increase or decrease the original value by 100. Likewise use ▲▼ key to increase or decrease the last two digits by 5.

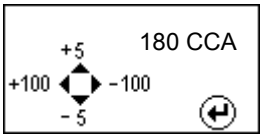


Fig.27

5. Once the Amps rating of the battery is confirmed press ↵ key and the test starts. Refer to the display below (Fig.28):

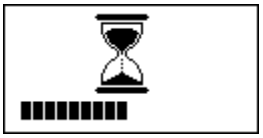


Fig.28

6. For less than 7 seconds, the results will be displayed on the LCD screen (Fig. 29)

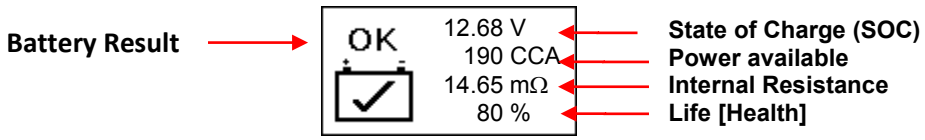
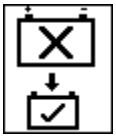


Fig.29

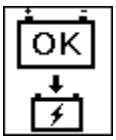
Interpretation of Results:

1. 

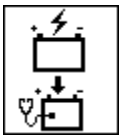
   The battery is in good condition.

2. 

   The battery is no good, need to be replaced with a good one.

3. 

   The battery is OK but need to charge first in order to have optimum performance.

4. 

   Low SOC (State of Charge), the battery needs to recharge first and then test again to confirm the actual results.

5. Basing on the above example (Fig.29), the Final results can be explained as follows:

   Volts: 12.68V (State of Charge [SOC])

   The volts here indicated the State of Charge (SOC) of the tested battery which is 12.68V during open circuit condition. [Above 80% SOC for AGM batteries by referring to the table below.]

   -

State Of Charge (SOC)	WET	AGM	GEL
100 %	12.60 V	12.80 V	12.85 V
90 %	12.58 V	12.72 V	12.77 V
80 %	12.44 V	12.64 V	12.69 V
75 %	12.40 V	12.60 V	12.65 V
50 %	12.20 V	12.30 V	12.35 V
25%	12.00 V	12.00 V	12.00 V
0%	11.80 V	11.80 V	11.80 V

6. **Power available: 190 CCA**

   It means that the battery tested has a capacity of 190 CCA power available. CCA ratings has been used here, therefore the tested result is in CCA and if other rating (DIN, SAE, JIS, IEC, CA, 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 (190 CCA) is related to the actual power available in the battery in relation to that battery's rating (210 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 210 CCA rated battery measuring 190 CCA available power does not mean that the battery would pass a CCA test at 190 CCA. The available power reading shows that the battery is not able to perform up to its rated ability (210 CCA).

In comparison to another battery when fully charged, the 210 CCA battery measuring 190 CCA is no stronger than a 100 CCA battery showing 100 CCA available power when fully charged.

The available power number is meant for comparison to its own rating. In fact, in this example the 210 CCA battery is failing to perform to its rating, while the 100 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, EN1, EN2, CA and MCA basing on its individual ratings.

7. **Internal Resistance:** **14.65mΩ**
In normal condition, the internal resistance of the automotive battery should fall between the range of **2.0 mΩ ~ 15.0 mΩ.** is considered good. Anything above 15.0 mΩ resistance shows that its internal plates has been aged or sulfated.

   For motorcycle batteries, its internal resistance of **5.0 mΩ ~ 45.0 mΩ** is considered good due to low CCA value it has.

   As a matter of fact, the higher the battery CCA readings obtained the lower the internal resistance should be.

8. **LIFE:** **80 %** **(Health)**
This is an indication of the battery life expectancy [Health] in percentage.

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 during cranking.

- **SAE (The Society of Automotive Engineers) Standard.**
  SAE has established Cold Cranking Amperes (CCA) rating for batteries as their standard. Therefore this rating is the same as CCA rating as mentioned above.

- **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 1 (European Norms) Standard.**
  EN 1 amperes rating require that at 0℉ (-18℃), the number of amperes that the 12V battery can deliver while maintaining a voltage of at least 7.5 Volts for 10 seconds discharged at the rated current, followed by 10 seconds rest, then it is discharged at 60% of the original current for further 73 seconds to give an equivalent total discharge time at the lower current of 90 seconds still maintaining 7.5 Volts.

- **EN 2 (European Norms) Standard.**
  EN 2 amperes rating require that at 0℉ (-18℃), the number of amperes that the 12V battery can deliver while maintaining a voltage of at least 7.5 Volts for 10 seconds discharged at the rated current, followed by 10 seconds rest, then it is discharged at 60% of the original current for further 133 seconds to give an equivalent total discharge time at the lower current of 150 seconds still maintaining 6.0 Volts.

- **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.

- **DIN (Deutsches Industrie Normen) Standard.**
  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.

- **CA (Cranking Amperes) / MCA (Marine Cranking Amperes) Rating.**
  This rating is the number of amperes that a new fully charged battery can delivery at 32°F (0°C) for 30 seconds, while maintaining a voltage of at least 7.2 Volts for a 12V battery 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 (State of Charge), CCA and the Internal Resistance (m Ohm) only.

  This selection can also be used to test 12V - Deep Cycle Batteries. An example of the results display is shown below: (Fig.30)

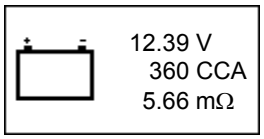


Fig.30

To determine the condition of the tested Deep Cycle Batteries, refer the **Volts** reading – State of Charge (*should not fall below 12.60V when fully charged for Lead Acid Batteries, 12.85V for Gel Batteries and 12.80V for AGM Batteries*) and the Internal Resistance [**Int. R**] of the tested battery should *not be more 15 mΩ* readings can be considered to be a good battery.

1. 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.31) as shown if its voltage falls below the normal 12.0 volts.

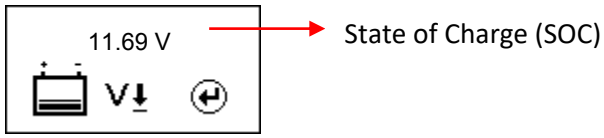


Fig.31

Press ↵ key to continue and the display will show: (Fig.32)

Fig.32

Check the battery ratings and enter it as described earlier and the results will show as an example below: (Fig. 33 and Fig.34)

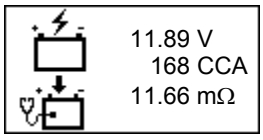


Fig.33

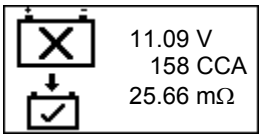


Fig.34

Fig.33 - Results shown [Recharge and test again], it indicated that the battery has to be fully charged first before repeating the test. Reason: State of Charge: 11.89V is too low.

For Fig.34 - Results shown [To replace], this meant that the battery need to be replaced as its internal plate resistance [**Int. R**] 25.66 mΩ is higher than 15 mΩ limit.

2. Pressing the ↱ key at any moment will exit and return back to the main menu screen (Fig.22)

Starter Test:

This test is only available in  mode and it actually checks the cranking effectiveness of the battery during starting and also the starter condition.

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.

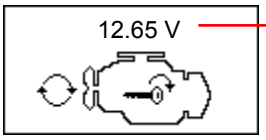
Wake up screen

Select Continue test and press ↵ key

Fig.35

3. From the MENU (Fig.35), select  by scrolling left using ▶ key and then press ↵ key.

4. The display will change to as shown (Fig.36)



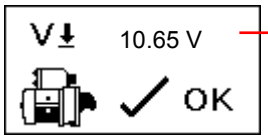
State of Charge before cranking

Fig.36

Note: In event that you did not crank the engine while on this screen, the starter test will terminate after 30 seconds and return to the display menu.

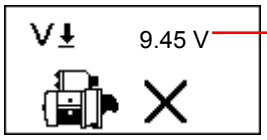
5. Now switch the ignition key to ON and start cranking the engine until it starts.

6. The results display will show as an example below:



Normal Drop Voltage

Fig.37



High voltage drop Less than 9.6V

Fig.38

7. Pressing the  key will exit and return back to the main menu display screen.

Alternator Test:

This test is only available in  mode. It 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 below:

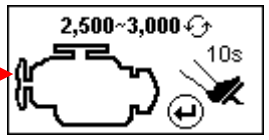
Wake up screen

Select Continue test and press ↵ key

Select Alternator Test and press ↵ key

3. After select  and press ↵ key. The display screen will show as Fig.39 below:

Start engine and keep it running

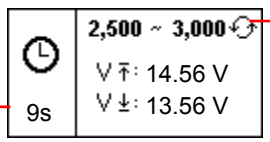


Rev engine to around 3,000 RPM and hold on for 10 seconds. (Refer countdown timer on next display.)

Fig.39

4. Start the engine if it is not running and keeps it running at idling speed. Press ↵ key to continue and display will show. (See Fig. 40).

Timer starts countdown from 10s to 0s



Rev engine around 3,000 RPM and hold at this speed.

Fig.40

5. Then rev the engine to around 3,000 RPM and hold at this speed, the timer shown on the display (Fig. 40) will start to countdown from 10s to 0s. As soon as it reaches zero second, the results will automatically display as example shown below (Fig.41).

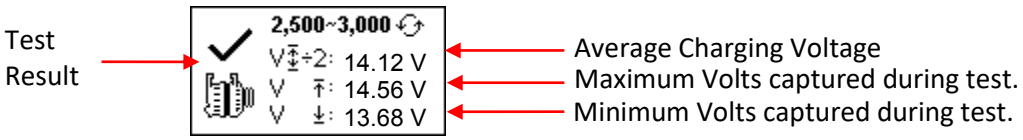


Fig.41

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 not less than 13.3V** (min voltage at 3,000 RPM).

6. If either minimum or maximum charging volts are not within the voltage range limits then it will highlight the result as shown on the examples below displays (Figures 42 & 43) and it will prompt you to check the alternator system for the fault.

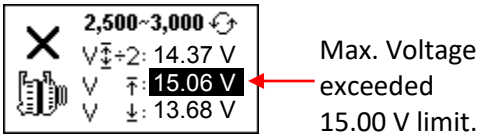


Fig.42

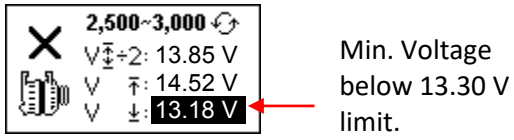


Fig.43

<u>Testing with electrical load at 2,000 RPM</u>

As more electrical accessories, such as lights, rear demister, heater, car stereos, etc. were used; the electro-motive force (Volts) decreases and this will allow more current (Amps) 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.

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

7. Continue from the previous test (either Fig. 41, 42 or 43); the display automatically switched to [**Electrical Load Test at 2,000 RPM**] as shown in Fig.44 below after 5 seconds to proceed the test.

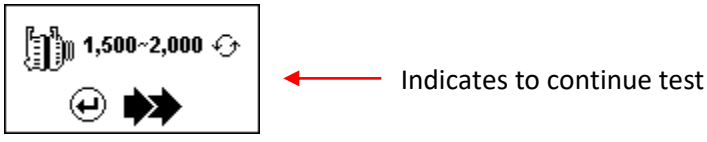


Fig.44

8. Press ↵ key to proceed and the display will change to as Fig. 45 below:

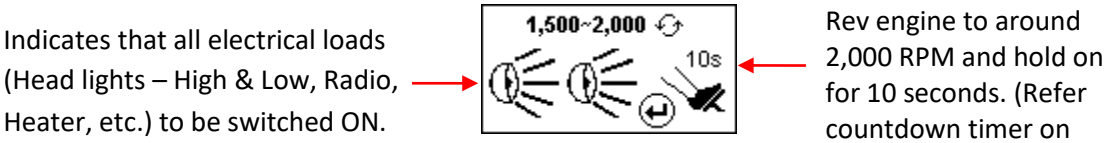


Fig.45

Switch ON all electrical loads (Head Lights, Radio, Rear Demister, Heater, etc.).

Note: Air-Condition (mostly mechanical load) should be switched OFF as it sometimes slowdown the idling speed while it is ON thereby affecting the charging results.

9. Press ↵ key to continue and display will show. (See Fig. 46).

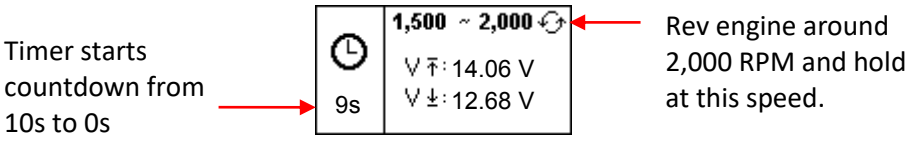


Fig. 46

10. Then rev the engine to around 2,000 RPM and hold at this speed, the timer shown on the display (Fig. 46) will start to countdown from 10s to 0s. As soon as it reaches zero second, the results will automatically display as example shown below (Fig.47).

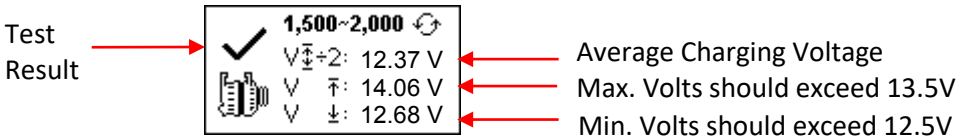


Fig. 47

11. If either minimum or maximum charging volts are not within the voltage range limits then it will highlight the result as shown on the examples below displays (Figures 48 & 49) and it will prompt you to check the alternator system for the fault.

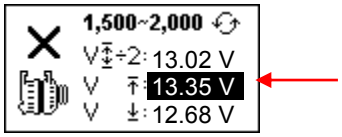


Fig. 48

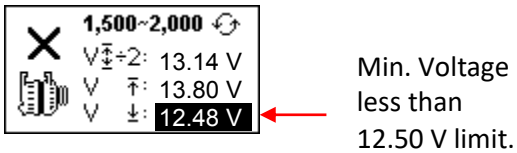


Fig. 49

<u>Testing diode ripple at idling speed with electrical load ON</u>

This test is to check the AC ripple of the alternator diodes whether it is within the 0.5V limit. Normally if one of the diodes is faulty, the AC ripple will produce higher than the accepted 0.5V limit.

12. Continue from the previous test (either Fig. 47, 48 or 49); the display automatically switched to [**Diode Ripple Test**] as shown in Fig.50 below after 5 seconds to proceed the test.

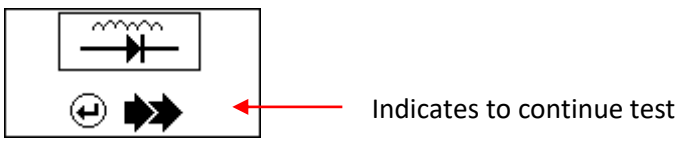


Fig.50

13. Press ↵ key to proceed and the display will change to as Fig. 51 below:

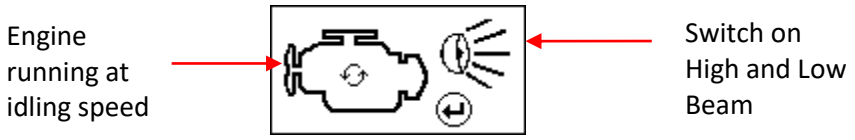


Fig. 51

Switch ON the Head Lights (Low and High beams) as an induced load.

Note: Air-Condition (mostly mechanical load) should be switched OFF as it sometimes slowdown the idling speed while it is ON thereby affecting the results.

14. Press ↵ key to continue and the display will change to (Fig.52) as shown below:

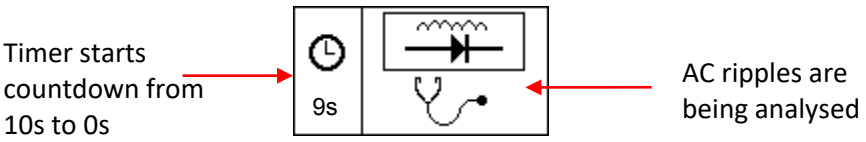


Fig. 52

15. The timer shown on the display (Fig.52) will start to countdown from 10s to 0s. As soon as it reaches zero second, the results will automatically display as example shown below (Fig.53).

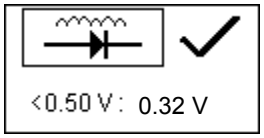


Fig.53

16. If the AC ripple voltage is more than 0.5V then it will display (Fig. 54) as below:

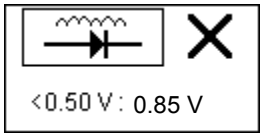


Fig. 54

17. Pressing the ↱ key will exit and return back to the Menu screen display.

View Test Results

To view the results of the last test, the BSA12G-2 has to be connected to an external 12V DC power source by either clamping its clips directly to a 12Volt car battery or connected to a PC via the USB port.

Fig. 55

1. Once power up, the wakeup screen will display as follows (Fig. 56 & 57):

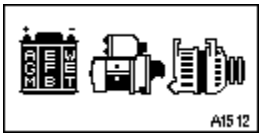


Fig. 56

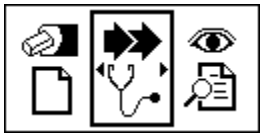


Fig. 57

2. Select View Test Results:  by pressing ▶ key and then ↵ key. The stored results will show as examples (Figs. 58,59,60,61 & 62) below:

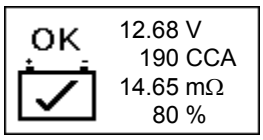


Fig. 58

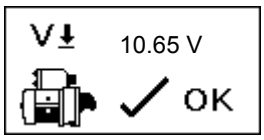


Fig. 59

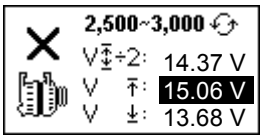


Fig. 60

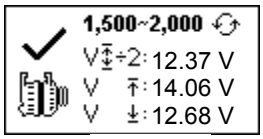


Fig. 61

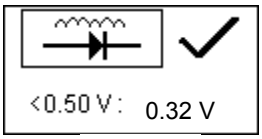


Fig. 62

3. To check what were the results stored in the memory, just press ▲ or ▼ key to scroll.

Note: The results stored were based on the last test as it always updates itself after each test. If you had selected [New: Clear Memory] and pressed ↵ earlier and did not conduct any testing, there will be no results stored in the memory. So while you are in this mode, the LCD display will not change and remain as it is as there is no result to view.

Setting PC link with Analyser

BSA12G-2 is also designed to link with PC for data storage and printout through PC printer. To do so, the PC has to install the driver and the software provided in order to operate.

Installing the Driver:

Important Note:

Before you start to install the driver, please do not plug BSA12G-2 into the computer's USB port or else the installation will fail and the computer cannot detect the proper driver for BSA12G-2 when connected.

If you have made the above 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 BSA12G-2 is not plugged in.

Step 1. You can install the driver from the CD provided or download it from our website:

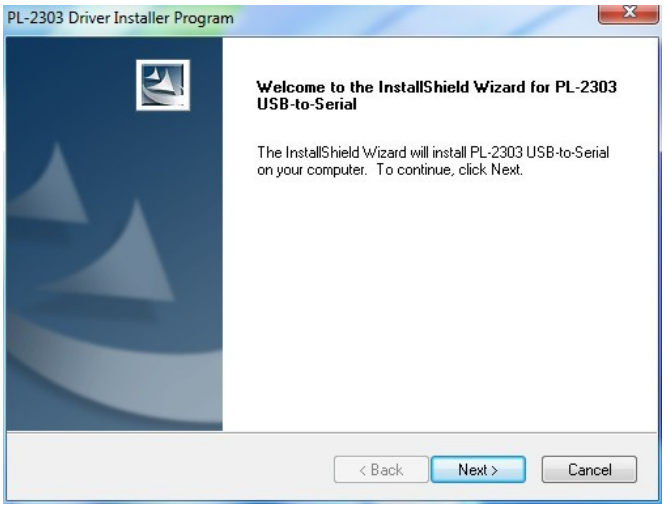
BESA-12G PC Link SW:
http://www.aetool.com/upload/BESA-12G%20PC%20Link%20Software.rar

USB Driver
http://www.aetool.com/upload/USB%20Driver%20for%20WinXP-%20Win10%20v1.12.0.zip

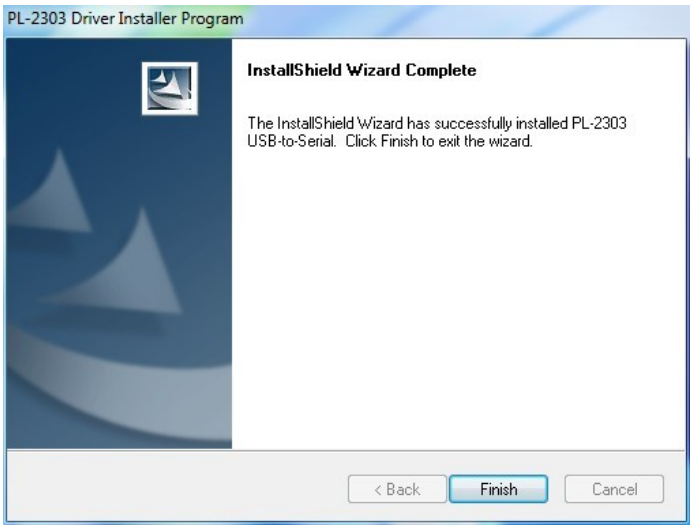
First click to open the folder:  BESA Software and Driver

You will find the following files:  BESA-12G Setup.exe  XP_Vista_7 USB Driver v1.10.0

Step 2. Double click on the icon  . The installation will start automatically. Typical example below is for Windows 7 operating system.



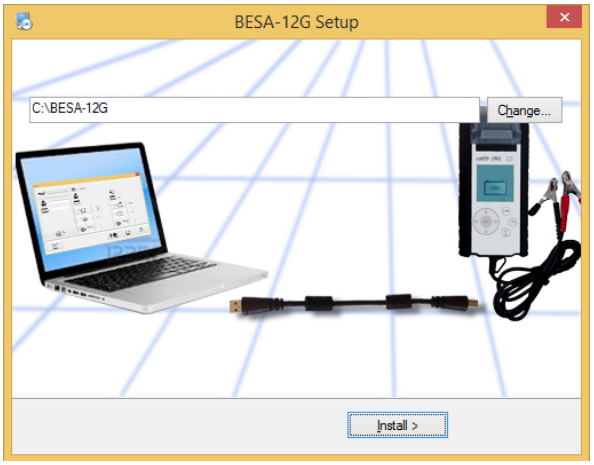
As instructed, click [Next>] tab the program will continue to install the driver on the computer. Once it had finished, it will prompt you as shown below. Click [Finish] tab to complete the installation.



Step 3. Next open this folder again:  BESA Software and Driver

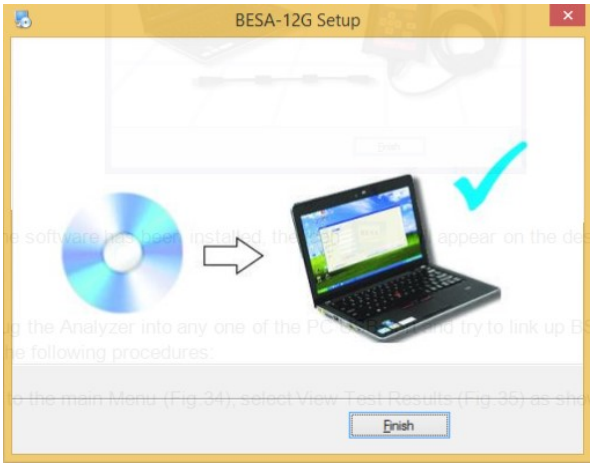
Look for the program icon (see below). 

Then double click it. The software will start to install and will prompt with the display below:



Click “Install” tab to continue the installation and the software will start to install.

. A few seconds later, the display will show as below that the installation has been completed and click “Finish” tab to exit.



Once the software has been installed, the icon  will appear on the desktop.

Step 4. Now plug the Analyzer into any one of the PC USB port and it will power up. Now try to link it up with the PC by the following procedures:

1. On this display shown below (Fig. 63), select [View Test Results]  by pressing ▶ key to display like (Fig.64).

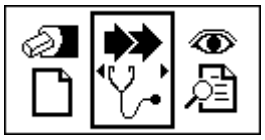


Fig. 63

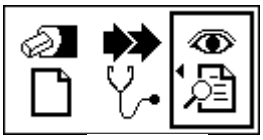


Fig. 64

2. Press  key will get into the test result display as example shown (Fig.65).

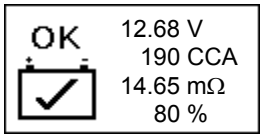


Fig. 65

3. Press  key on the keypad and the display will show as (Fig.66) below and the Analyser is ready for link up.

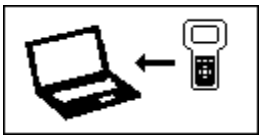


Fig. 66

Step 5. On the PC, go to desktop display and look for  icon. Left click on the icon to open the program and the display page will show as below:

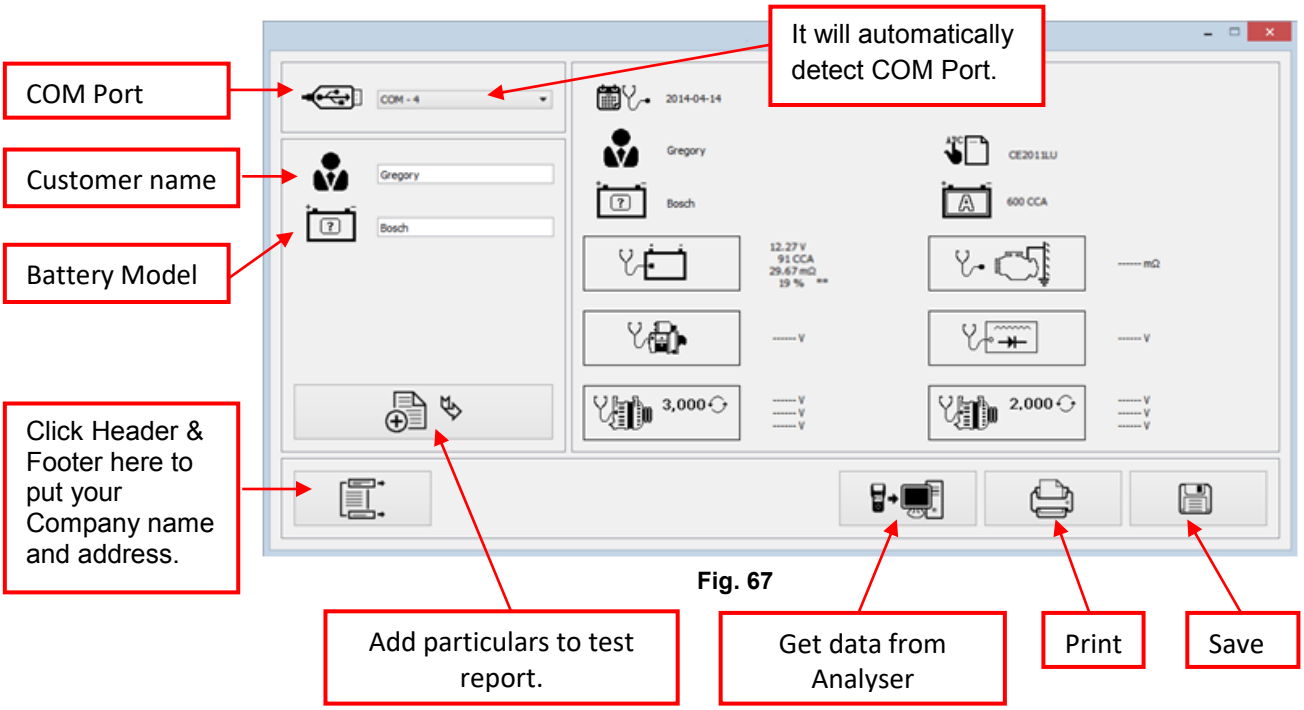


Fig. 67

1. To confirm whether there is communication; click on  [Get Data from Analyser] tab and the Last Test Result will appear. See example below.

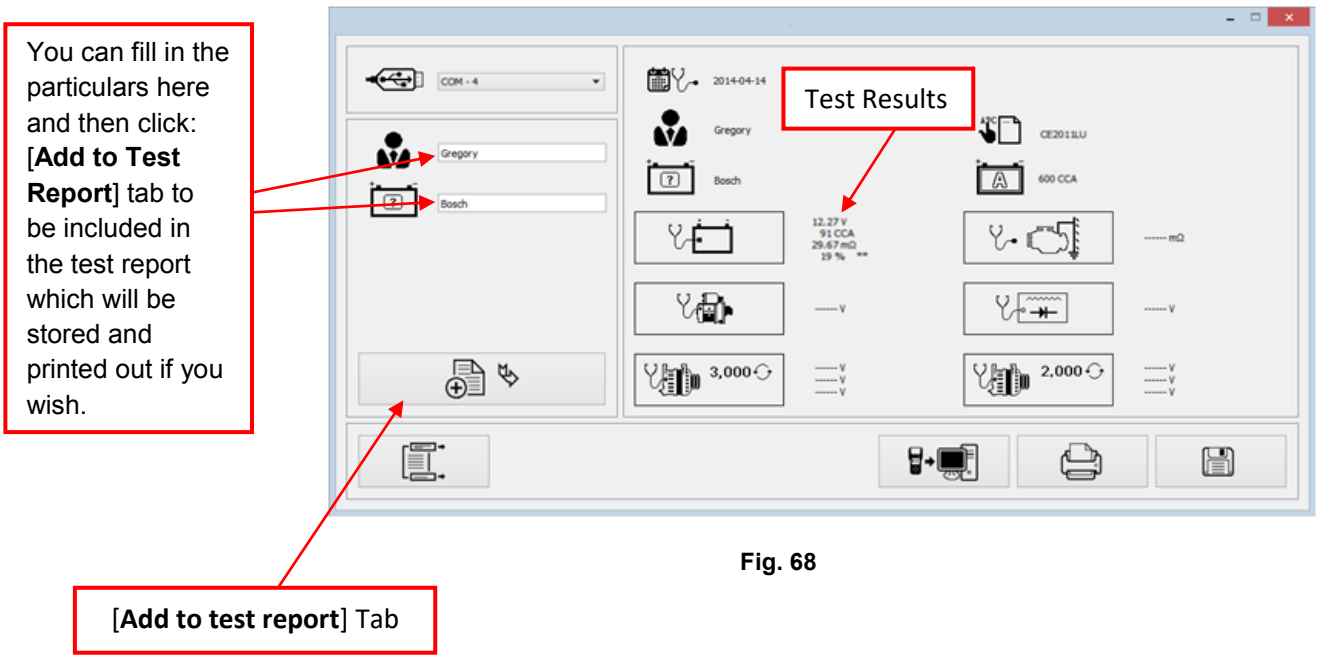


Fig. 68

If there is no communication, a message text box will appear (see Fig. 69 below)

.

Fig. 69

In this case, unplug the Analyzer from the PC and repeat Step 4 and Step 5. If problem persist, then select an alternate COMPORT individually from the dropdown list and click [Get Data from Analyser] tab to see whether the Last Test Result will appear (as displayed in Step 5).

If the above fails again, then try plugging the Analyzer to the PC's another USB port and repeating Step 4 and 5 again.

Printing Results from PC Printer:

While on this page (Fig.68), if you wish to print out the results, make sure that your printer is connected to the computer.

Click on  tab and a text box will appear. Select the right printer (refer Fig.70) and click [Print] tab to print.

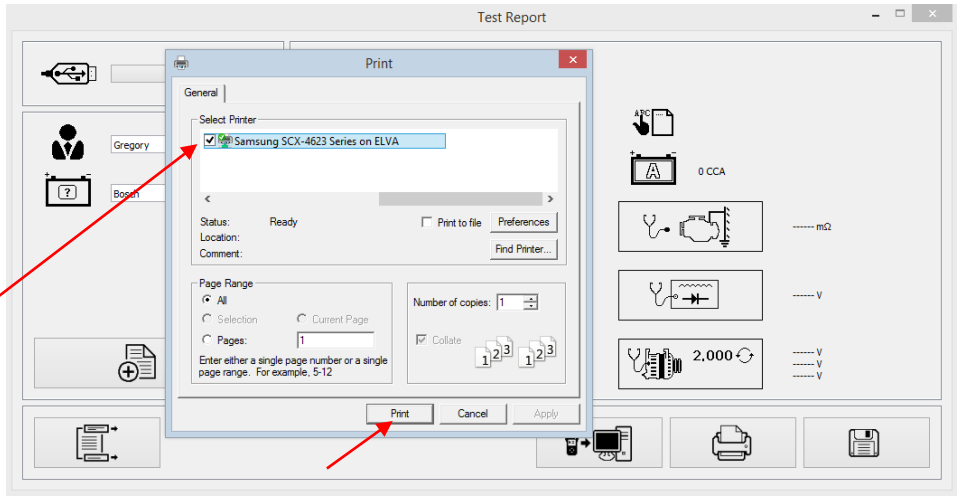


Fig. 70

Saving Results:

Note: The results will be saved in MS Office Word Document format. You need to set the paper size to A4 beforehand if not the printout and the stored results page will not be in A4 size. Otherwise with other paper size settings, they may affect the layout of the results when printed out because of the graphics involved.

To do so while in MS Office Word page, go to [Page Layout] tab and right click, display shows as in Fig. A.

Right click here

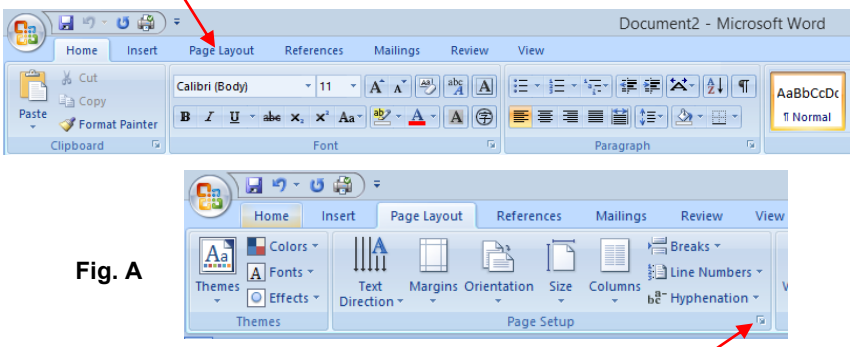


Fig. A

Right click here

On [Page Layout], right click on ↘ sign (see Fig. A) to show Page Setup dialogue box as shown (Fig. B) below. Then select [Paper] tab and browse [paper size] drop down menu for A4 click on it (Fig. C). Click [OK] to apply and confirm.

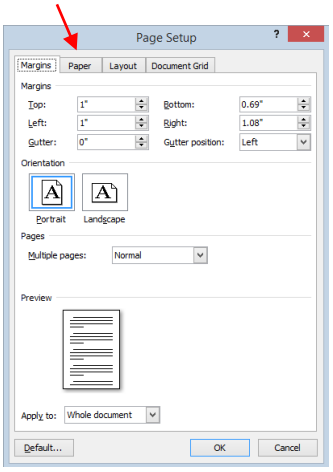


Fig. B

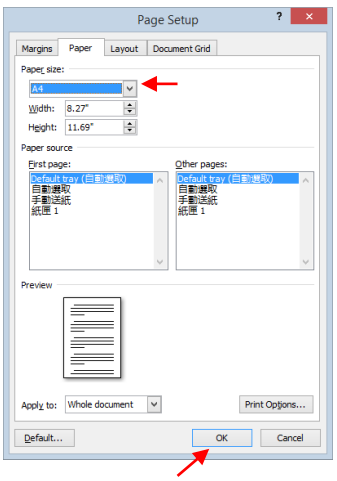


Fig. C

To the save results, click on tab. A message box (see Fig. 71 below) will appear. Create a file name and then click [Save] tab as shown below.

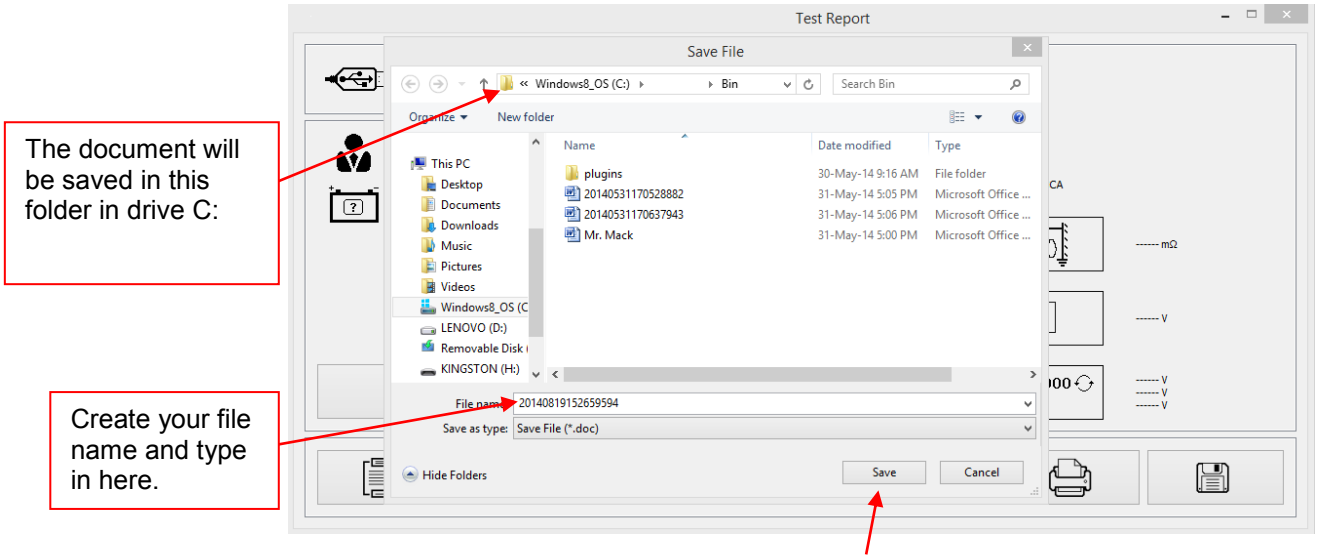


Fig. 71