



EQP-114

Battery Electrical System Analyser

USER'S GUIDE



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1.0 Introduction

1.1 EQP-114 (Battery Electrical System Analyser):

The utilization of the latest advanced technologies in battery testing had enabled this Analyser to test batteries in any conditions. Testing procedures are made simple with quick, easy and repeatable results. Test Results can be printed directly on its' built in printer. It can store up to 250 test Results in its memory for future references and they can also be transferred and saved in the PC for records management via an USB port link.

The programs consist of:

1. Battery Test:

- Analyses the battery condition using microprocessor controlled testing methods without the need of fully charging it before test.
- The unit consumes very little current during testing hence the test can be repeated numerous times without worry of draining the battery and its results are highly accurate.
- Extremely safe as it does not create any sparks during clamp on and it takes less than 8 seconds to obtain the full analysed results of the battery being tested.

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. Charging Test:

- This test checks the alternator charging condition during electrical loading at 2,000 RPM and without load at 3,000 RPM. It also measured the diode ripple voltage during the test with results and recommendations displayed after each test.

4. Grounding Test:

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

1.2 Specifications:

Operating Voltage: 9V ~ 15V DC (max)

Safety: Built-in reverse polarity protection.

Analysing Capacity (Amps):

Automotive and Others:	CCA:	100A ~ 1700A	EN:	100A ~ 1000A
	IEC:	100A ~ 1700A	DIN:	100A ~ 1000A
	JIS#:	100A ~ 1700A	SAE:	100A ~ 1700A
	CA:	100A ~ 1700A		

Motorcycle Only:	CCA:	40A ~ 600A	EN:	40A ~ 600A
	IEC:	40A ~ 600A	DIN:	40A ~ 600A
	JIS#:	40A ~ 600A	SAE:	40A ~ 600A
	CA:	40A ~ 600A		

DC Volts Accuracy: $\pm 2\%$ Reading

Battery analysing time: Less than 8 seconds.

Language: Available in English only.

Memory: Stored up to 250 Test results.

PC connection: Through USB port.

Printer head: Thermo print head.

Paper width: 56.5mm \pm 0.5mm

Paper roll diameter: 40.0 mm O.D.

Printing speed: 50 mm per second.

Working temperature: 0°C ~ 50°C

Working Humidity: 10 % ~ 80 %

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 whilst 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



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 get warm and expand. After recharging has been completed, recheck the level.
- Reinstall the vent caps BEFORE recharging, recharge ONLY in well-ventilated areas, and wear protective goggles.

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 Volts DC.

- 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 43.3 °C (110 °F), 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.

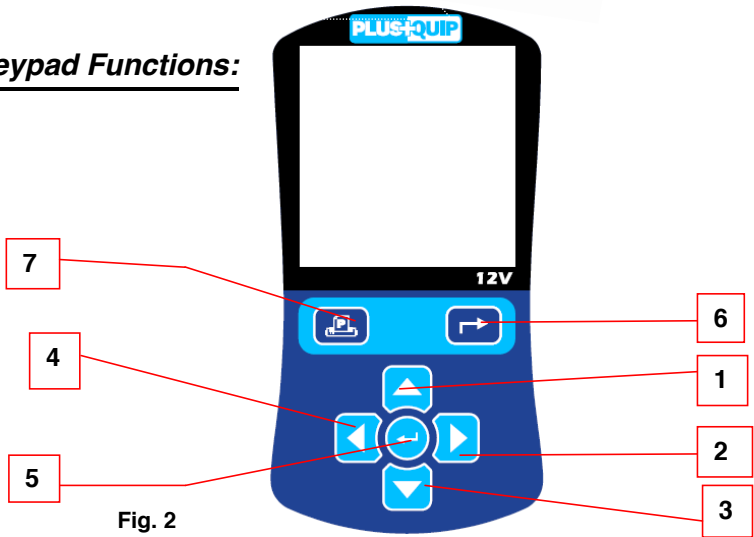
Even if this is a remote possibility, it is best to disconnect the vehicle's battery cables from the battery BEFORE connecting the charger.

4.0 The Battery Electrical System Analyser








4.1 EQP-114



4.2 Keypad Functions:



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 ENTER 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.  Press this key to print the all the Test results on the Printer after each test or from the Stored Results mode.

5.0 Initial Setup

5.1 Paper installation

Open the printer cover by pushing it upwards from the middle. Place the thermo paper roll into the slot with the paper edge facing up (Fig. 3a). Make sure the paper is about 20mm out when the printer cover is closed (Fig. 3b).


Fig. 3a



Fig. 3b



5.2 Setup Menu

To access into this function go to the main screen (Fig.4) as shown below, select Setup Menu (Fig. 5) and press  key.

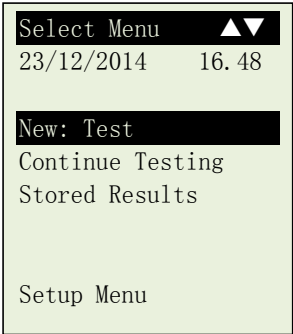


Fig.4

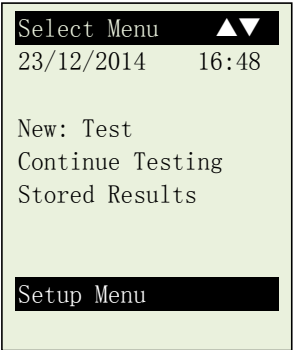


Fig.5

5.3 LCD Brightness

While you are in the [Setup Menu] display, select [LCD Brightness] from the menu (Fig. 6). Once entered, the display will show as in (Fig. 7).




To increase the contrast press  key and the bar graph will move forward. Likewise to decrease, press  key while in this screen.



Fig. 6



Fig.7

Once the LCD brightness has been confirmed, press  key to save and it will return back to the [Setup Menu] screen above.




5.4 Printer

Selecting this [Printer] mode (Fig. 8) will initiate printing of the results of the last tested vehicle that has been stored in the memory.



Fig. 8

5.5 Set Date and Time

The date and time on the Analysers were set in the Factory during production. Due to the differences of the Time zone in your Country, you may need to set according to your local date & time and this can be done by selecting [Set date & time] with  or  key and the press  and the display shows as in Fig.10 below.

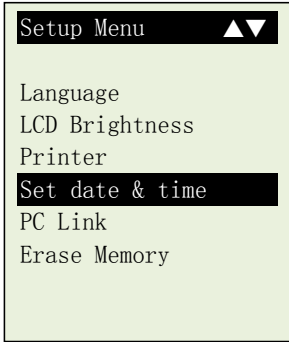


Fig. 9

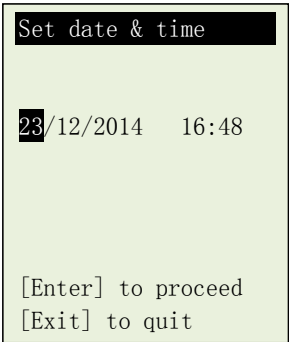






Fig. 10

Press  or  key to change the date and then press  to skip to the next. Do this for the rest like month, year and the time. When the setting is done, press  key to save.

5.6 PC Link



This PC Link mode is used when you wish to connect the EQP-114 to PC to print or store the results of the last tested vehicle. Once the tester is connected to the PC with the USB cable provided, select [PC Link] as in Fig. 11 with  key and press  key will show as in Fig. 12.




Fig. 11



Fig. 12

5.7 Erase Memory

This Analyser is able to save up to 250 test results in its memory. In event that you need to clear all the results in the memory to make for new ones after they had been backed up into the PC, then select this item [Erase Memory] and press  key to enter into it. Once entered, the display will show as in Fig.13 below:

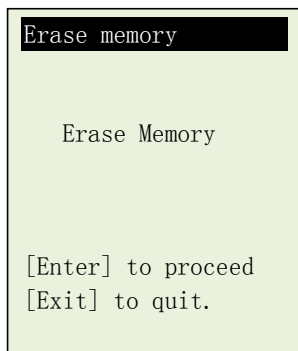


Fig. 13

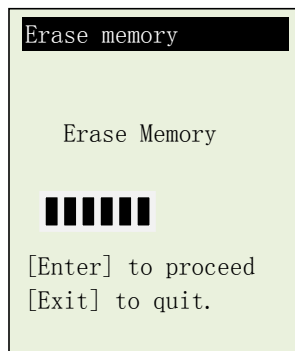



Fig. 14

To erase the memory, now press  key and it will proceed with the erasure as shown in Fig. 14 above. After completion, it will return to the setup menu (Fig.11)

6.0 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.

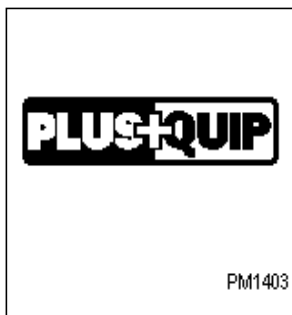
The car engine and all other accessory loads must be **OFF** during test in order to have accurate results. When attaching the analyser clips, make sure that the battery posts were not oxidised or badly corroded. Clean them first before clamping to it. Do not clamp onto the steel bolts directly which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

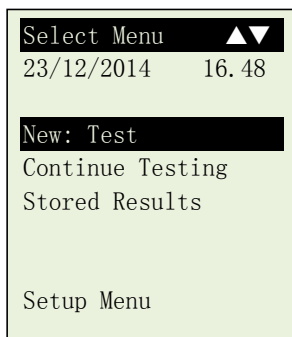
1. Attach the Analyser clips onto the battery terminal posts [Red to (+) and Black to (-)] the unit will power up and lights up the LCD display screen as shown (Fig.15).

Fig.15



2. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 16)

Fig.16



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

New Test

This function will allow you to key in the particulars (e.g. license plate numbers, names, etc) that you need before commencing the test. The particulars will be included in the test results when printed out from its printer. It also allows the test Results to be saved in its memory which can be called up for later viewing and printout.

Note: If you do not key in any particulars (e.g. license plate number, etc.) the results obtained saved as blank — in the memory.

Continue Testing



Selecting this item will allow you to continue the last test on the same car from where you had stopped and do not need to key the vehicle's particulars as it will update automatically.

For example:

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

Stored Results

The Analyser allows saving up to 250 tested Results in its memory. Access into this function will permit you to view the tests done previously and also able to print out a hardcopy of it whenever needed.

Use  or  keys to scroll for the pages during viewing.

Examples of the results:

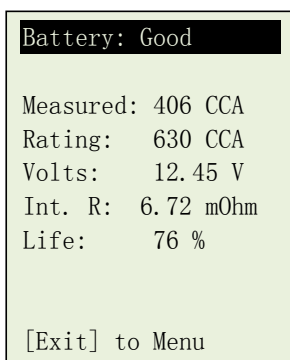


Fig.17

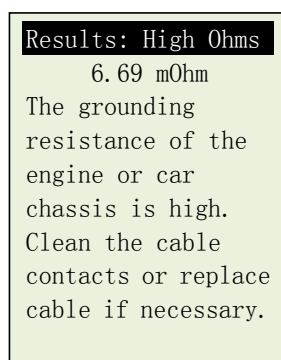


Fig. 18

6.1 Begin Battery Test

1. After you have made your choice, selecting "New Test" will proceed to the display below: (Fig. 19)

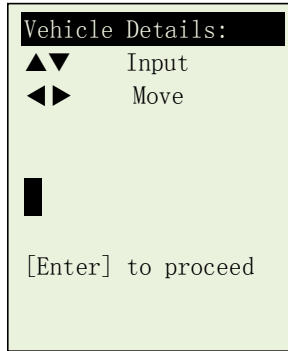







Fig.19

3. Here it lets you to key in the particulars (e.g. license plate number, etc.) that you need to be included into the test report when printed out after the test and it also serves as the name for the record to be saved in its memory for easy search.
4. To key in the alphabets or numbers, keep pressing  or  key to scroll from X,Y,Z,-,.,/,0,1,2,3,... in a loop sequence and stop it when found. Press  key to move to the next or  key to move backwards to continue the key in.

Note: If you do not input any particulars and straight away press  key to continue, then the test results obtained saved as blank — in the memory.

5. After completion of the input, press  key will proceed to the next display as shown in Fig. 20 below.

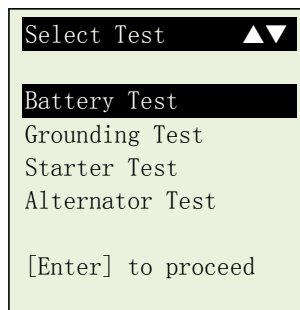
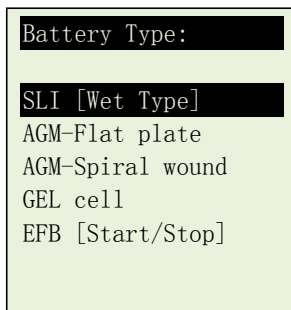


Fig.20

6. Select [Battery Test] and press  key. The display will change as seen on figure 21 below:

Fig.21


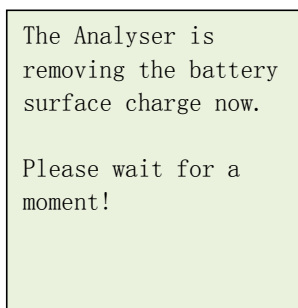
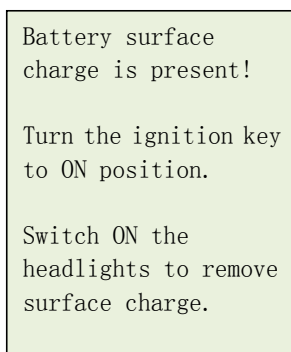
7. After you had made your choice, pressing  key will proceed to do the battery testing and if it has detected any surface charge on the battery, it will start to remove it and a message is shown (Fig. 22) below.

Fig. 22

8. If the surface charge is too great for the analyser to handle, it will prompt you with the instructions as shown: (Fig. 23) below and the beeper will sound continuously.

Fig. 23


9. Wait until the surface charge removal had completed, the analyser will advise as follows: (Fig.24) and then press  key.

Fig. 24

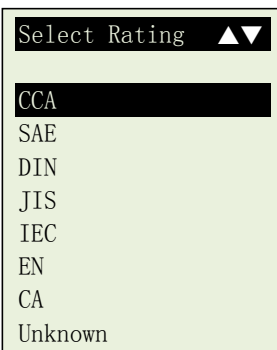
Battery surface
charge has been
removed.

Turn ignition key to
OFF position.

Switch OFF the
headlights and then
press [Enter].

10. If there is no surface charge present, then it will straight away enter into "Select Rating" menu screen as shown in Fig. 25

Fig. 25



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:





If it is selected under JIS # (Japanese Industrial Standard) then the display will prompt you as shown (Fig.26) below.

Figure 26

Please refer to the charts provided for converting JIS# to CCA ratings before keying in the values.

[Enter] to proceed

Refer to the battery model (example: 80D26L or NX110-5L) on the Cold Cranking Amps (CCA) Table list which is supplied separately. (See example Fig. 27 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 27

Press  key and the display will show: (Fig.28) below:

Figure 28

Input Battery Rating

Increase/decrease:

▲ Single digit ▼

◀ By hundredth ▶

500

 CCA

[Enter] to proceed.

12. Referring to the Table list (Fig.27) basing on 80D26L, check the battery type: WET, MF, Sealed MF or Closed MF (CMF) as each category has different CCA ratings. For instance, if the battery is a Sealed MF (CMF) then it is rated at 630 CCA.

Note:

<i>WET</i>	-	<i>Wet Cell Type</i>
<i>MF</i>	-	<i>Maintenance Free Type</i>
<i>SMF</i>	-	<i>Closed or Sealed Maintenance Free</i>



13. To enter the value 630, press  key will increase the original value of 100 (Fig.29) 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. (See Fig. 29)⏏

Fig. 29

Input Battery Rating

Increase/decrease:

▲ Single digit ▼

◀ By hundredths ▶

630

 CCA

[Enter] to proceed.


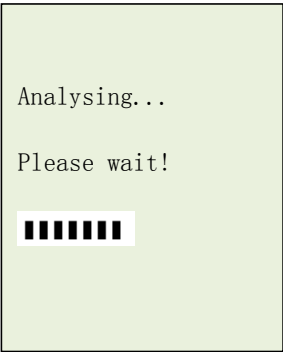
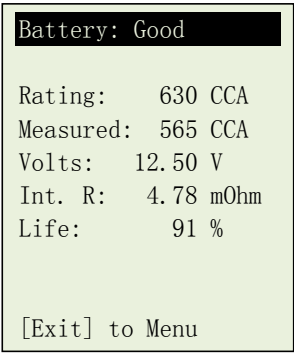
Once the CCA rating of the battery is confirmed, press  key will start the testing process. Refer to the display below (Fig. 30).

Fig. 30



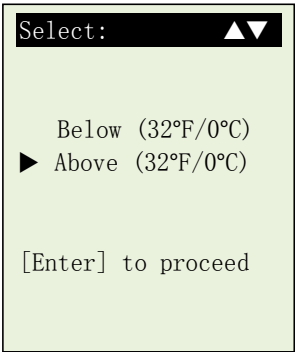
14. For less than 8 seconds, the results of the testing will be displayed on the LCD screen. (Fig. 31)



Fig. 31



15. This Analyser will also takes the temperature of the battery into consideration when it has detected that the battery condition is marginal (below 75%) and it will prompt you with the display as shown (Fig. 32) below:

Fig.32



16. Here it let you to select the surrounding temperature that you are working with the battery. If the surrounding temperature is for example 15°C, then select [Above (32°F/0°C)] by pressing  key and then press  key. Then the results will show on the LCD display.

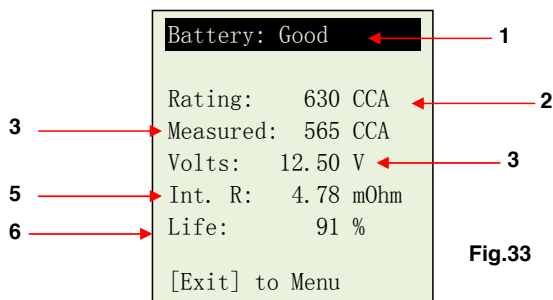


Fig.33

To print out the results, just press  key on the Analyser, the printer will start printing.

Interpretations of the above (Fig.33) results:

1. Battery: 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. 'OK-Recharge' means that the battery is OK but needs to recharge as its state of charge is low. 'Replace' indicates that the battery needs to be replaced. If not, the battery will fail anytime without any warning.

2. Rating: 630 CCA

The battery capacity rated output is normally stated on the label for car batteries. For other batteries, please refer the chart provided or check on information provided on the label.

3. Measured: 565 CCA

It means that the battery tested has a capacity of 565 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

4. Volts : 12.50V

The volts here indicated the State of Charge (SOC) of the tested battery which is 12.50V during open circuit condition. [Above 80% SOC for WET batteries by referring to the table below.]

SOC	WET	GEL	AGM
100 %	12.60V or higher	12.85V or higher	12.80V or higher
90 %	12.58 V	12.77 V	12.72 V
80 %	12.44 V	12.69 V	12.64 V
75 %	12.40 V	12.65 V	12.60 V
50 %	12.20 V	12.35 V	12.30 V

Please take Note:

This output value (565 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 565 CCA available power does not mean that the battery would pass a CCA test at 565 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 565 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.

5. Int. R (Internal Resistance): 4.78 mΩ

In normal condition, the internal resistance for car batteries, the internal resistance will be from 2.0 mΩ to 15.0 mΩ. As a matter of fact, the higher the battery CCA readings obtained the lower the internal resistance should be.

6. LIFE: 91 % (Health)

This is an indication of the battery life (State of Health) in percentage. If the life falls below 46%, 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 deliver at 0°F (-18°C) 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°F (-18°C), 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°F (-18°C), 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 29 & 30).

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

Basing on DIN , the rating requires that at 0°F (-18°C), 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) Rating.**

This rating is the number of amperes that a new fully charged battery can deliver 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.

Examples of the results display are shown below: (Figures 34 & 35)

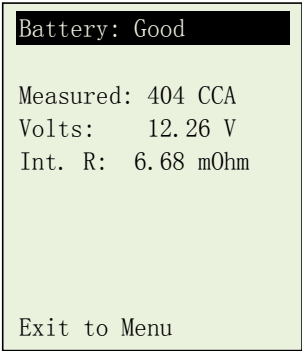


Fig.34

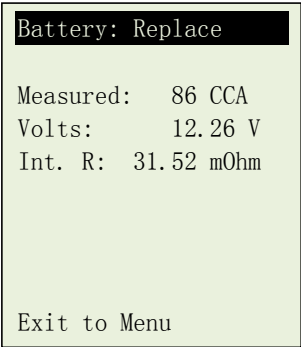


Fig.35

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 25 mOhm* 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.36) as shown if its voltage falls below the normal 12.0 volts.

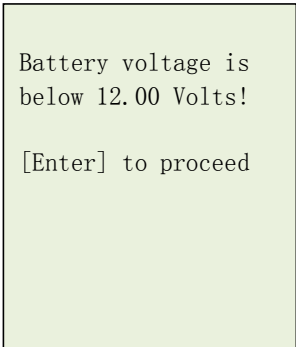



Fig.36

Press  key to continue and the display will show: (Fig.37)

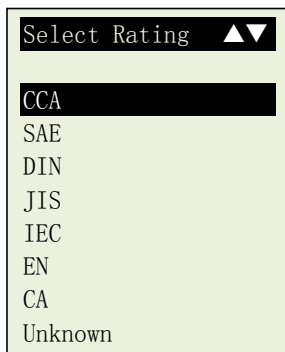


Fig.37

Check the battery ratings and enter it as described in steps 11 to 13 (page 19~20) and the results will show as an example below: (Fig. 38)

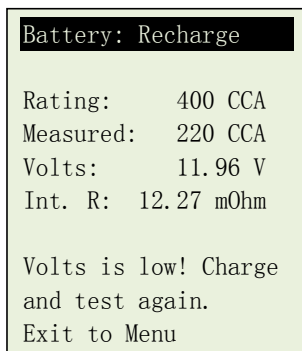



Fig.38

Fig.38 - Results shown [Recharge], it indicated that the battery has to be fully charged first before repeating the test.

15. Pressing the  key at any moment will exit and return back to the main menu screen (Fig.20).

7.0 Continue Testing

When this item is selected, it will allow you to select any one of the four tests namely: Battery test, Starter Test, Charging Test and Grounding Test:

7.1 Battery Test

Same as the previous battery test operations except that you do not require to key in any particulars as it will update the results with the current ones.

7.2 Starter Test

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 39) below:

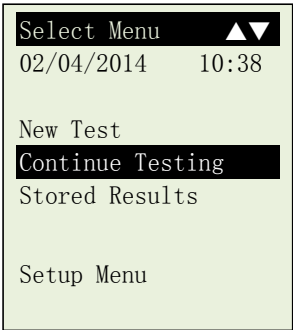


Fig.39

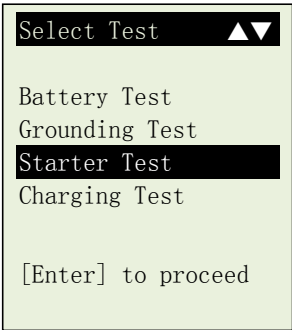


Fig.40

3. Select [Starter Test] and press  key will proceed to the next display as shown in Fig. 41 below.

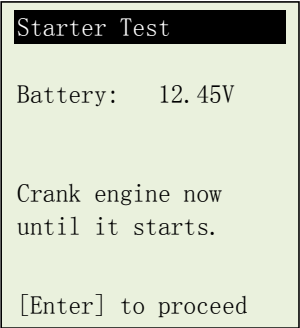


Fig.41


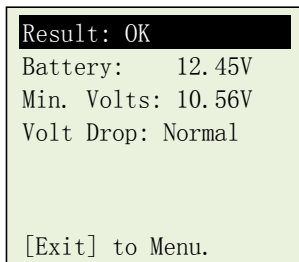
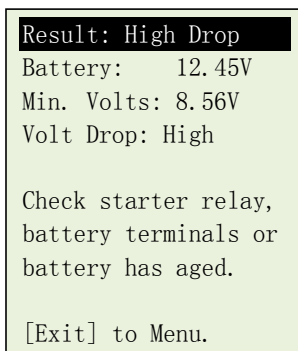
4. Switch the ignition key to ON and start cranking the engine until it starts. Immediately after that press  key and the results will show as follows (Fig. 42):

Fig.42

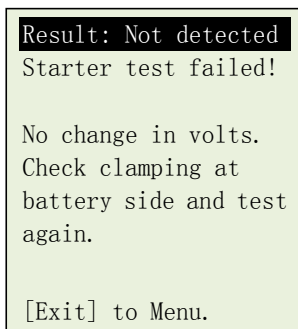
Result: OK
Battery: 12.45V
Min. Volts: 10.56V
Volt Drop: Normal
[Exit] to Menu.

5. If the voltage drop is too great during the cranking, the tested results will display as follows (Fig.43) and will prompt you to check the starter system.


Fig.43

Result: High Drop
Battery: 12.45V
Min. Volts: 8.56V
Volt Drop: High
Check starter relay,
battery terminals or
battery has aged.
[Exit] to Menu.

6. During cranking when it detects that there is no drop in voltage, it will display the following screen (Fig.44).

Fig.44


Result: Not detected
Starter test failed!
No change in volts.
Check clamping at
battery side and test
again.
[Exit] to Menu.

6. Pressing the  key at any moment will exit and return back to the menu screen. (Fig.40)

7.3 Alternator Test

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

Starts with No load testing at 3,000 RPM

1. With engine OFF, place the vehicle transmission in NEUTRAL for Manual and PARK for Automatic and apply the parking brake.
2. Attach the Analyser clips onto the battery terminal posts and it will power up and lights up the LCD display screen as shown (Fig.45). Press  key and the display will show as Fig. 46 below.

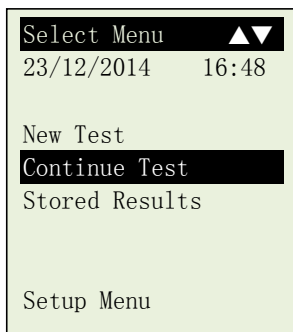


Fig.45

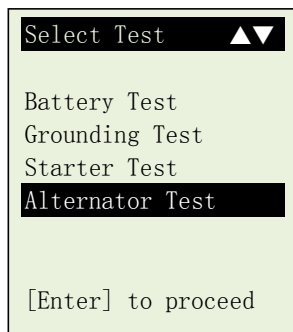


Fig.46

3. Select [Charging Test] and it will proceed to the display below: (Fig. 47)

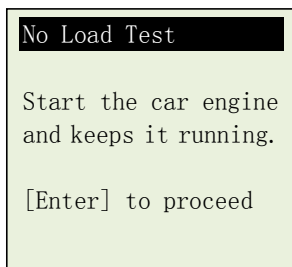
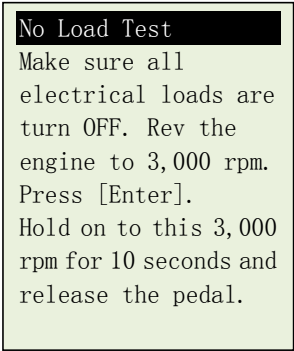




Fig.47

Start the engine and then press  key again and the screen will prompt you as shown below (Fig. 48).

Fig. 48



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

After that press  key again and it show as below (Fig. 49)

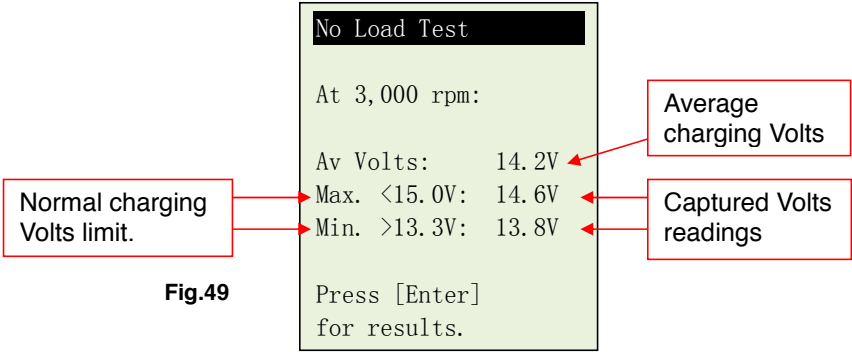


Fig.49

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


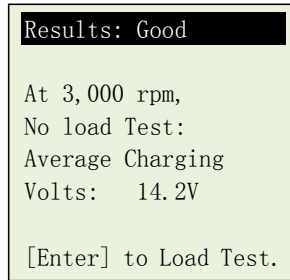
4. Press  key will show the results of the test (Fig.50):

Fig.50



5. If either minimum or maximum charging volts are not within the voltage range limits then it will display one of the screen as below (Fig.51 & 52) and it will prompt you to check the charging system for the fault.

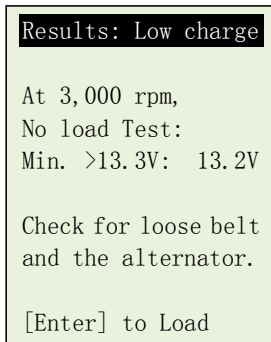


Fig.51

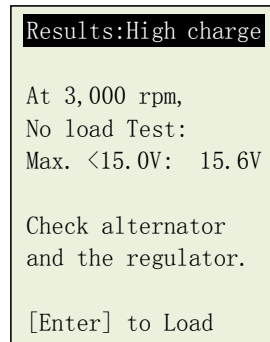



Fig.52

6. Just press  key if you need to printout the results.

Testing with electrical load at 2,000 RPM

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


7. Continue from the previous test (either Fig. 50, 51 or 52); proceed to the next step by pressing  key will enter to the display as follows. (Fig.53)


Fig.53

Loading Test

Switch ON all electrical loads.
Rev engine up to 2,000 rpm. Press [Enter]. Hold on to this 2,000 rpm for 10 seconds and release the pedal.

Follow the instructions; switch ON all electrical loads (Head Lights, Radio, Rear Demister, Heater, etc).

Note: Air-Conditioning (mostly mechanical load) should be OFF as it sometimes slows down the idling speed of certain cars while it is ON thereby affecting the idling speed charging results.

Rev the engine up to **2,000 ~ 2,500 RPM** by referring to the dashboard meter, then press  key and maintain the engine speed for about 10 seconds and release the pedal. The maximum and minimum voltages values will be captured. (Fig.54)

Normal charging Volts limit.

At 2,000 rpm:

Av. Volts: 13.3V

Max. >13.5V: 13.8V

Min. >12.5V: 12.8V

Press [Enter] for results.

Average charging volts.

Captured Volts readings

Fig. 54

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


After that press  key again and the results will be shown as below (Fig 55.)

Fig.55

```
Results: Good

At 2,000 rpm,
Loading Test:
Average Charging
Volts:    13.3V

[Enter] to proceed
```

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

Fig.56

```
Results: Low charge

At 2,000 rpm,
Loading Test:
>13.5V: Max. 13.3V

Check for loose belt
and the alternator.

[Enter] to proceed
```

Fig. 57

```
Results: Low charge

At 2,000 rpm,
Loading Test:
>12.5V: Min. 12.4V

Check for loose belt
and the alternator.

[Enter] to proceed
```



11. Just press  key if you need to printout the results.
12. Continue from the previous test (either Fig. 55, 56 or 57); proceed to the next step by pressing  key will enter to the display as follows. (Fig.58)

Fig. 58

```
Diode Ripple Test

Switch ON all
electrical loads.

Run engine up at
idling speed.

Press [Enter].
```


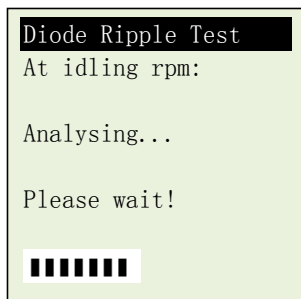
13. Make sure the electrical loads (Headlights, High lights, heaters, etc) are switched ON. [Important Note: Do not switch ON the Air Conditioner as it may affect the results]. Let the engine runs at idling speed. Do not Rev.
14. Then press  key to continue. The display will show: (Fig. 59)

Fig. 59



15. After analysing, the analyser will display the results Fig.60 or Fig.61 depending on the outcome.

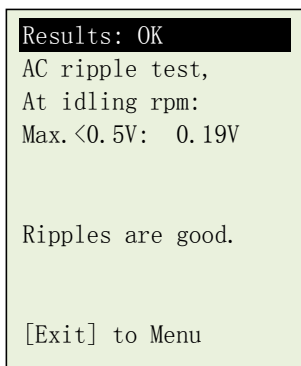


Fig. 60

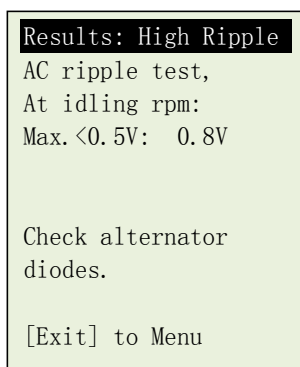




Fig. 61

16. Just press  key if you need to printout the results.
17. To exit the program, pressing the  key at any moment will exit and return back to the menu screen (Fig.46).

7.4 Grounding Test

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

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

Start Testing


- 1. With engine OFF, place the vehicle transmission in NEUTRAL for Manual and PARK for Automatic and apply the parking brake.
- 2. Attach the Analyser clips onto the battery terminal posts and it will power up and lights up the LCD display screen as shown (Fig.62). Press  key and the display will show as Fig. 63 below.

Fig.62

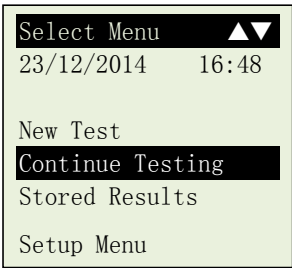
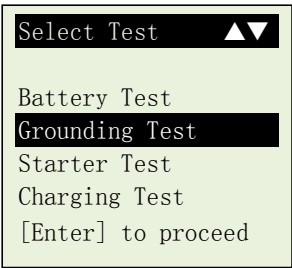
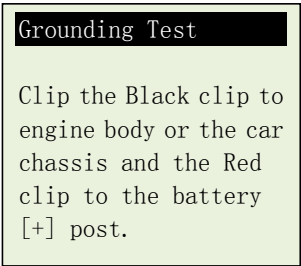


Fig.63



After completion of the input, press  key will proceed to the next display as shown in Fig. 64 below.

Fig.64




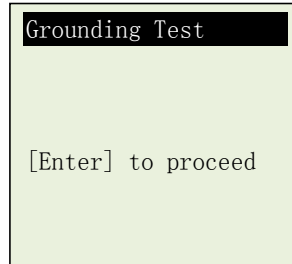
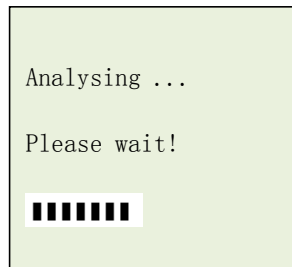
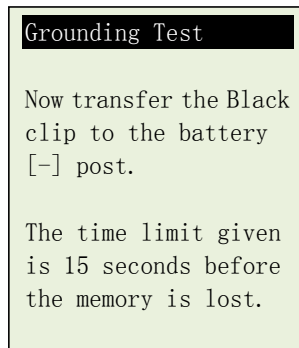
3. Follow the instructions given, transfer the BLACK tester clip from the battery [-] terminal to a suitable position on the engine or chassis body leaving the RED clip still attached to the battery [+] terminal.
4. After it has done, press  key to continue (Fig. 64).

Fig.64

5. The Analyser will start to measure (Fig.65).

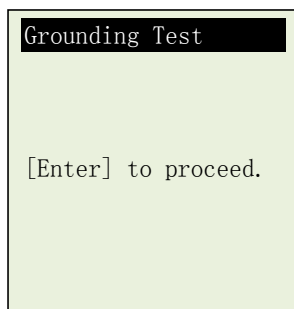
Fig.65

6. Once it has finished analysing, it will prompt you with an instruction (Fig. 66) stating that you have should unclamp the Black tester clip from the engine or chassis body and transfer to the battery negative [-] terminal within 15 seconds time limit if not the testing procedure has to be repeated again as the gathered data will be lost.

Fig.66

- Once the Black clip is clamped onto the battery [-] terminal, the Analyser display will light up as shown. (Fig. 67)

Fig.67




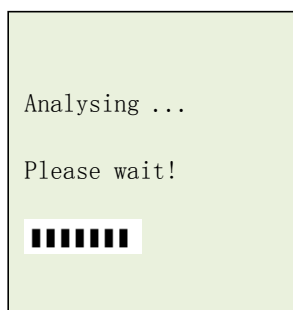
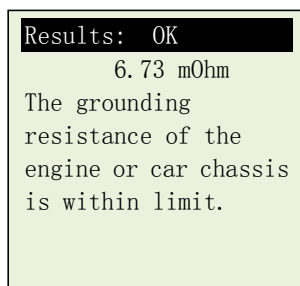
- Press  key as instructed and the display will show as follows (Fig. 68).

Fig.68



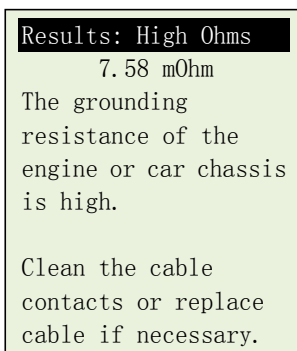
- If the measured resistance reading is within limits, then it will display as follows (Fig.69)

Fig.69



10. If the measured resistance reading has gone beyond the limits, then it will display the screen as follows (Fig. 70).

Fig.70

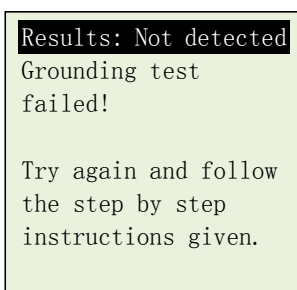




Note: The above indicates that the ground contact from the engine body to the battery is bad. Check for rusted or corroded point of contacts. If found, dismantle it for cleaning or replace before fixing back. Repeat the test again after fixing.

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

11. If you did not follow the right procedures during the testing, it will display the results as follows (Fig. 71) below:

Fig.71



12. Just press  key if you need to printout the results.
13. To exit the program, pressing the  key at any moment will exit and return back to the menu screen (Fig.63).

8.0 Stored Results

8.1 Recalling and viewing previous Test Results

To view the results of the last test, the EQP-114 has to be connected to an external power source by either clamping its clips directly to a 12Volt car battery or connected to a PC via the USB port.



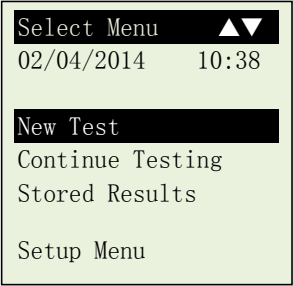
1. Once powered up, the wakeup screen will display as follows:

Fig.72



2. It will run through a self-test and when completed it displays the Main Menu as shown: (Fig. 73)

Fig.73




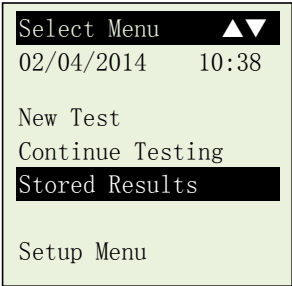
3. Pressing  key to scroll down to the [Stored Results] as shown in Fig. 74 below.

Fig.74




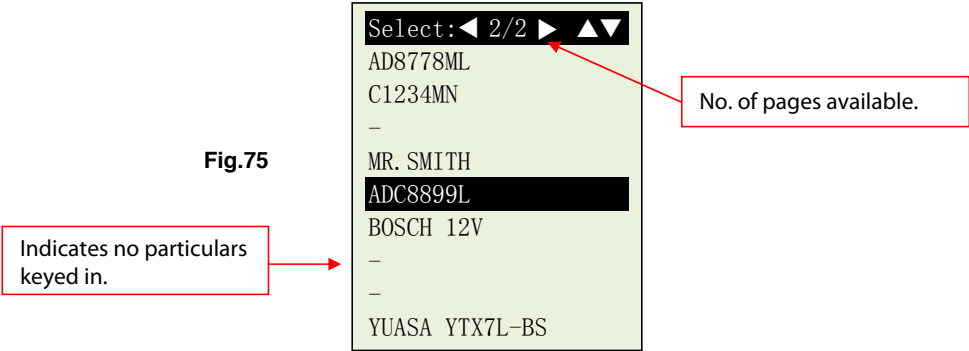
4. Press  key will proceed to the display on a list of the recorded names (particulars that was keyed in earlier) for you to select as an example shown below (Fig.75).

Fig.75






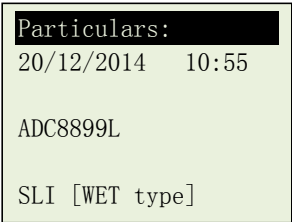
5. Select it by pressing  or  key. If you do not find then the press  key to go backwards to the previous page if it has two pages (Page 2 of 2 as shown in the example above Fig.75).
1. Once selected, the display will show the date with time and particulars that you have selected and keyed in during the test done. (Fig. 76).

Fig.76



Press  key will proceed to show the test results.

Some examples of the Results are shown below are: (Fig. 77 & 78)


Battery: Replace	
Rating:	500 CCA
Measured:	129 CCA
Volts:	12.85 V
Int. R:	20.91 mOhm
Life:	0 %

Fig.77

Result: High Drop	
Battery:	12.45V
Min. Volts:	8.56V
Volt Drop:	High
Check starter relay, battery terminals or battery has aged.	

Fig.78

9.0 Printing the Test Results from Stored Memory

To print out the previous results from its memory, select [Stored Results] from the menu. Access to the recorded names (example: Fig.75), select and press  key will display the results.

To print just press  key on the Analyser, the printer will start printing.

Important:

The Analyser has to be connected to a 12V battery in order to work with the mobile printer. This is because the printer needs higher Amps to operate which the PC USB output is unable to provide.

Note:

*To printout on PC printer, it has to be connected to the PC with **EQP-114** software installed. (See Print Results from PC Printer – Page 48).*

To exit the program, pressing the  key at any moment will exit and return back to the menu screen (Fig.74).

10.0 PC Link

The EQP-114 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.

10.1 Installing Driver.

Important Note:

*Before you start to install the driver, please do not plug the **EQP-114** into the computer's USB port or else the installation will fail and the computer cannot detect the proper driver for the **EQP-114** 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 the **EQP-114** is not plugged in.*

Step 1. You can install the driver by downloading it from our website:
<http://www.plusquip.com.au/products/test/eqp-114-battery-electrical-system-tester-printer/>

First click to open the folder:



EQP-114 NEW
File Folder

You will find the following files:

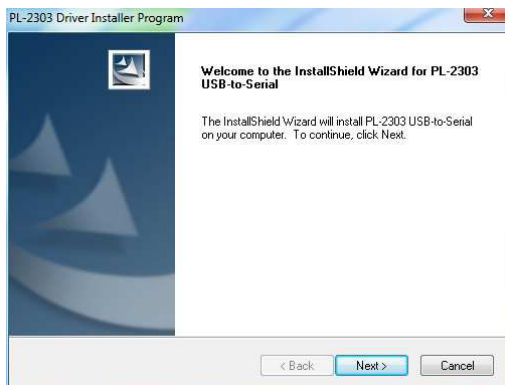


EQP-114 Setup
Setup Application
9.5.0.0

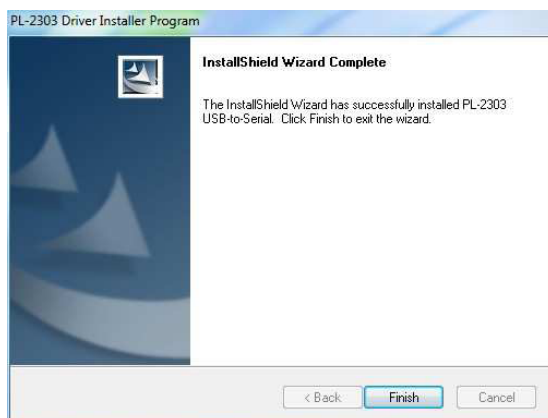


XP_Vista_7_8_10 Driver
Installer V.1.12.0
Setup.exe

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:



EQP-114 NEW
File Folder

Look for the program icon:



EQP-114 Setup
Setup Application
9.5.0.0

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



Click “Next” 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.

Step 5. On the PC, go to desktop display and look for



Left click on the icon to open the program and the display page will show as below:

TEST REPORT

COMPORT:

Language:

Test Date: 2016-09-24

Customer:

Car Plate / Reference NO.:

Battery Model:

Capacity:

Add To Test Report

Header/Footer

Get Date From Analyser

Print

Save As

Software will automatically detect COMPORT. If you find that this field is blank, unplug the EQP-114 USB Cable and plug it back in again. The COMPORT should now appear.

Click here to add your Company Name and Address details to the footer.

Step 6. Now link up the EQP-114 with PC by the following procedures:



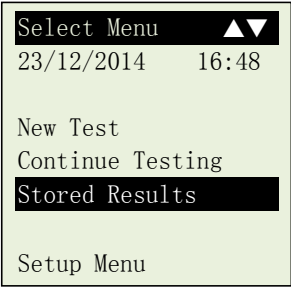
- 1. On the Main Menu page (Fig. 79) below, select [Stored Results] by pressing  key to highlight it and then press  key.

Fig.79






- 2. The display (Fig. 80) will show a list of the particulars that you had keyed in prior to the test. Select by scrolling  or  key and then press  key. The display will change to as shown in Fig.81.

Fig. 80

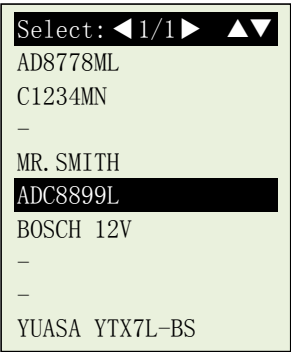
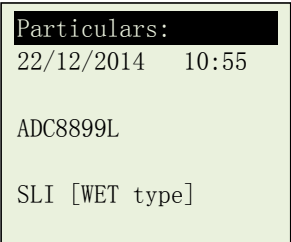





Fig.81



- While on this display (Fig.81) click on [Get Data from Analyser] tab on the PC and the Test Result will appear. See example below.

You can type in the particulars here and then click [Add to Test Report] tab to be included in the test report which will be stored and printed out if you wish.

- If you need to view another test result, press  key to go back to the display as shown in Fig.80.
- Select the next test Result and press  key, and as usual the display will go to the particulars screen (Fig.81). Now press  key again will display the results.
- ON the PC, click “Get Data from Analyser” tab and the results will be transferred to the PC.

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



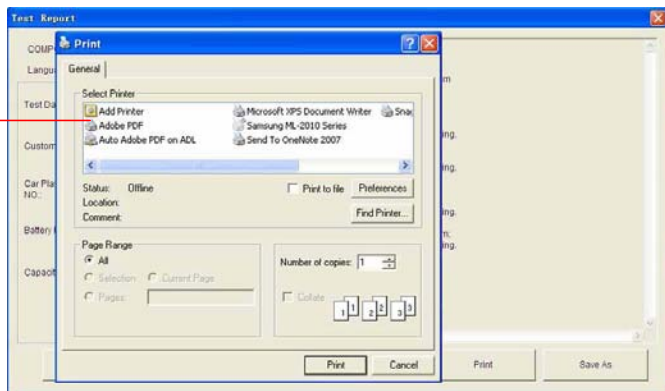
In this case, unplug the Analyzer from the PC and repeat Step 4 to Step 6. If problem persist, then select an alternate COMPORT individually from the dropdown list and click [Get Data from Analyser] tab to see whether the Last Test Result will appear (as displayed in Step 6 No.4).

If the above fails again, then try plugging the Analyzer to the PC's another USB port and repeating Step 4 to Step 6 again.

10.2 Printing Results from PC Printer:

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

Select the printer which is connected to your computer here.




10.3 Saving Results to PC:


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

Select where you want to save in.

Type the file name here.



After you had completed saving the first result and wish to save the next one, you should press  key on the Analyser to the display as

shown in Fig.80. Select the one on the list shown on the screen that you want and then press  key to proceed to the 'particulars' screen (Fig.81).

Again, you have to click "Get Data from Analyser" tab on the PC to transfer the results data to be saved.

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.

11.0 Warranty Information

11.1 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.

11.2 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.



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