

KRAFTWERK®

FAVORITE TOOLS SINCE 1979

Instruction Manual

Battery electrical system analyser

Art. 31140-T10

EN



Introduction

This battery system analyser is a full graphic display tester with a touchpad. With its simplicity of the graphics display, and step by step instructions, testing is easily understood.

This tester is equipped with an internal printer and can be printed individually after each test. It can store up to 70 test results. The test results can also be recalled and viewed from its memory after completion. If needed, the results can be transferred and stored in the computer via an USB cable link. This can be done only with the battery analyser software installed on your computer.

The battery analyser only operates on all 12 V batteries and is able to perform four tests namely:

1. Battery Test:

- Analyses the battery condition using microprocessor controlled testing methods without the need of fully charging the battery before test.
- Consumes very little current during testing, hence the test can be repeated numerous times without battery drainage and therefore results are highly accurate.
- Extremely safe as there is no sparks created during clamping and full analysed result takes less than 8 seconds to obtain.
- Temperature compensation on end results.
- Powered up by testing battery or any external DC source ranging from 9 V to 15 V. The analyser is meant to be operated on 12 V flooded lead acid, sealed lead acid, and VRLA, EFB (Start/Stop) and AGM batteries. No maintenance is required during its lifetime service.

2. Grounding Test:

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

3. Starter Test:

- Checks the cranking effectiveness of the battery for indication on when the battery may fail to crank, based on voltage profiles with results and recommendations displayed.

4. Alternator Tests (with diode ripple test):

- These tests check the alternator charging conditions without load at 3,000 RPM, with load at 2,000 RPM and the diodes ripple volts with results and recommendations display after each test. This test determines whether the alternator is performing properly.

Specifications

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

Analysing Capacity (Amps):

Automotive Batteries:	CCA/SAE: 100 A ~ 2000 A	EN: 100 A ~ 2000 A
	CA/MCA: 100 A ~ 2000 A	IEC: 100 A ~ 2000 A
	DIN: 100 A ~ 2000 A	JIS#: 100 A ~ 2000 A
Motorcycle Batteries:	CCA/SAE: 40 A ~ 600 A	EN: 40 A ~ 600 A
	CA/MCA: 40 A ~ 600 A	IEC: 40 A ~ 600 A
	DIN: 40 A ~ 600 A	JIS#: 40 A ~ 600 A

DC Voltage Accuracy:	± 1% Reading
Battery Analysing Time:	Less than 8 seconds
Maximum key-in Characters:	17 Characters
Safety:	Reverse polarity protected Analyser will not power ON
Internal Memory Storage:	Store up to 70 test results
PC Communication:	Through USB port
Printer:	Built-in
Printer Head:	Thermo unit
Paper Width:	57.5 mm ± 0.5 mm
Paper Roll Diameter:	Max.45 mm O.D
Printing Speed:	50 mm/sec
Working Temperature:	0°C (32°F) ~ 50°C (122°F)
Working Humidity:	10 ~ 80 %

Safety precautions

- Exhaust gas of running engines contain toxic and poisonous gases. Always operate the vehicle in a well-ventilated area. These gases are hazardous and may lead to death if inhaled.
- To protect the user's eyes from propellant objects such as caustic liquids, always wear safety eye protection.
- Fuel and battery vapours are highly flammable. **DO NOT SMOKE NEAR THE VEHICLE DURING TESTING.**
- When engine is running, moving 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 troubleshooting, always make sure the parking brakes is firmly engaged. Put the transmission in park (automatic transmission) or neutral (manual transmission).
- Always block the drive wheels. Never leave the vehicle unattended during testing.
- Do not place any tool on vehicle battery. This may short the terminals causing harm to personnel, tools and/or the battery.
- Do not wear loose clothing or jewellery while working on engine. Loose clothing can get caught by moving parts while jewellery can conduct current and can cause severe burns in contact between power source and ground.
- Always have a fire extinguisher available and easily accessible in the workshop. Lead-acid batteries contain a sulphuric acid electrolyte, a highly corrosive liquid which produce gases when recharged and explode if ignited which could cause severe injuries. When working with batteries, make sure that the working environment is well-ventilated, remove any jewellery, watch and wear protective eyewear (safety glasses), clothing, and exercise caution.

Do not allow battery electrolyte to mix with salt water. Even small amount of this combination will produce chlorine gas that can be fatal when inhaled.

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 as a filter for the electrical system.
- Unfiltered [pulsating DC] electricity can damage expensive electronic components, e.g., emissions computer, radio, charging system and etc.
- Turn off all electrical switches and components; turn off the ignition before disconnecting the battery.
- For non-sealed batteries, check the electrolyte level and make sure the electrolyte covered the plates and is not frozen before recharging (especially during winters).
- Do not add distilled water if the electrolyte covers the plates due to the electrolyte may get warm and expand during the recharging process. Recheck the level after recharging has been completed.
- Do NOT smoke, sparks or flames due to the explosive gases will be released while charging the battery.

Preparing for Test:

1. The analyser operates from 9 V ~ 15 V DC and should not be tested on 24 V directly as this will damage the unit. For 2 x 12 V batteries (in series or parallel), disconnect the connections and test the battery individually.
2. Battery that just completed charging contains surface charge. These surface charge need to be discharged by turning ON the head lights for 3-5 minutes before testing.
3. Always attach 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.
4. Do not attach the analyser clips directly onto the steel bolt used to tighten the battery terminal posts; this will give inaccurate readings or inconsistent results. (Note: This also applies to all other battery testing methods.)
5. When conducting testing with the battery still installed to the car, make sure the engine, accessories and load are OFF. Please also close all doors and the trunk lid.
6. Inspect the battery for cracks or broken casing. Do not use the analyser on the battery if the battery is found to be 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. However, please exercise with care and do not overfill the battery.
8. If it is necessary to remove the battery from the vehicle, ALWAYS remove the negative terminal from the battery first and ensure all accessories are OFF to prevent any arcing from taking place.

Initial Setup

Printer paper installation:

Open the printer cover by flipping the catch on the bottom left of the printer case (Fig.1). Pull the flipped catch upwards to open the lip. Place the thermo paper roll into the slot with the paper edge facing up (Fig.2). Make sure the paper is about 1.0 inch (25.4 mm) out when the printer cover is closed.

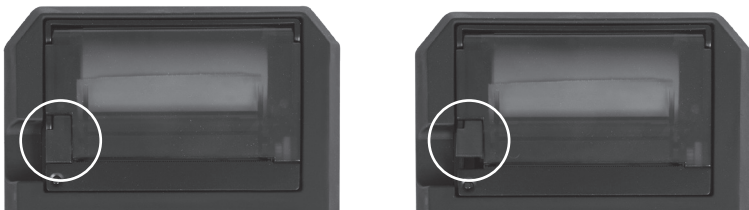


Fig.1

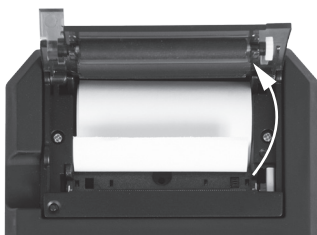


Fig.2

Setting of Date and Time

The date and time on the analyser were set in the factory during production. Due to the differences time zone across the globe, the user may need to set according to their local date & time. This can be done by completing the following steps:

1. Power up the analyser by hooking up to the battery, the screen will light up and the display will show as follows:



Fig.3

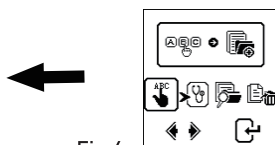


Fig.4

2. While still in this display (Fig.3), press the  key and hold for 3 seconds until a beep sound occurs, this indicates entering into the program. The display will change and show as in Fig.5 below.

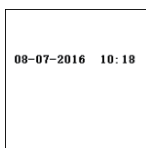







Fig.5

3. Use  key to move backward or  key to move forward,  key to increase the number and  key to decrease it. When completed, press  key to return to the main menu.

Key Tone Switch:

Whenever a key is pressed, a beeping sound can be heard to indicate keys have been triggered. This sound can be switched ON or OFF by completing the following steps: Disconnect the Analyser from the battery and power it up again.

Press  key, hold for 3 seconds until a beep sound can be heard which indicates the change has taken place.

Thereafter, pressing any key will be left mute. To enable the sound, do the same steps as mentioned above to activate the sound.

Automotive Battery Test

Performing Battery Test whilst it is still in the car:

Vehicle that was running has to have its engine OFF first followed by switching ON the headlights for 30 seconds to remove any surface charge. After the headlights had been switched OFF, let the battery rest for at least 1 minute to recover before testing.

Car engine and any accessory loads must be OFF during the test in order to obtain accurate result. When attaching the analyser clips, ensure the battery posts were not oxidized or badly corroded and clean them first before clamping. Do not clamp onto the steel bolts directly which will provide inaccurate and inconsistent results.

Testing on stand-alone Automotive Batteries:

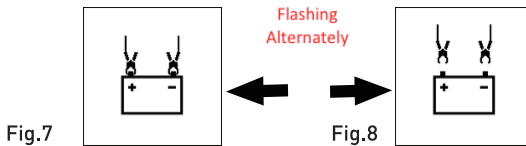
Clean the battery posts with a wire brush prior to testing. For side post batteries, install stud adaptors. Avoid using steel bolts for better results.

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.6).

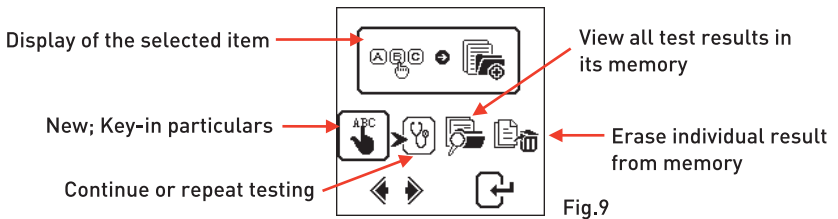


Fig.6

2. If any of the analyser clip was not properly clamped to the battery contact, the display will flash alternately between Fig.7 and 8. In such event, unclamp and clamp the clips again on the battery posts to ensure the contacts are good before conducting a test.



3. Menu screen as shown in Fig.9 below will be displayed if there is no problem on the contacts between the battery and the analyser



4. Here in this display, the user can select the choice which test to conduct from the menu:

New: Key-in Particulars:



The analyser will always begin in this mode. Once entered, the display will show (Fig.10) as below:

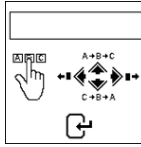


Fig.10

To allow key-in of particulars (e.g. VIN, vehicle registration numbers/ battery model/ testing date/ customer's name/ reference numbers and etc.) of not more than 17 characters. Press ▲ key to scroll up the alphabet A,B,C~Z and numbers 1,2,3~0 while ▼ key to scroll down from Z,Y,X~A or 0,9,8~1 to select. Press ► key will move one space to the right while ◀ key will move one space backwards for editing purposes. Press ↻ key to confirm.

Note: If there are no particulars input and user pressed ↻ key straight away to continue, the test results will not be saved in its memory.

Continue or repeat test:



Selecting this option allows the user to continue or repeat the last test on the same car from where the user had stopped without having to key-in any particulars again. The test will update the results in its memory.

For example:

If the user had done battery test and later wish to do alternator test or grounding test on the same car, just select this option to update the results of each test in its memory. The result can be retrieved for review later or to be printed out.

View Test Results from Memory



Here it will let the user to view all the test results stored in its memory. Once entered, the display will show (Fig.11) a list of particulars which the user had entered during the test. Press ▲ key to scroll upwards and ▼ key to scroll downwards to select. During scrolling, the highlighted bar will move up and down to the selected particulars.



Fig.11

Press ◀ or ► key to move to the previous or next page respectively. Once selection confirmed, press the ↻ to view the result:

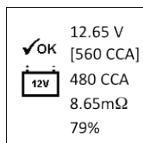


Fig.12

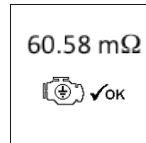


Fig.13

Erase Individual Result from Memory:





When this option is selected, it allows the user to erase the selected result individually from the memory. Once entered, the display will show as Fig.14 below, a list of the particulars that the user had previously entered.



Fig.14

Press ▲ or ▼ key to scroll upwards or downwards to select. During scrolling, the highlighted bar will move up and down to the selected particulars.
 Press ◀ or ▶ key to move to the previous or next page respectively. Once selection confirmed, press the ↻ to view the result. Press ↻ key again one more time will erase the results. This action allows the user a second chance before the erasure takes place.

CONTINUE FROM STEP 3 ABOVE:

5. After the user has made his choice, he can begin testing by selecting  or  to proceed to the display Fig.15.

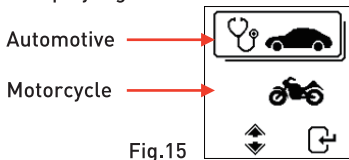





Fig.15

Selecting  will allow the user to test car Batteries (up to 2000A) whereas  will only test Motorcycle Batteries (up to 600A) only.
 If the user has selected ,  the display will change to the MENU with options shown in Fig.16 below.

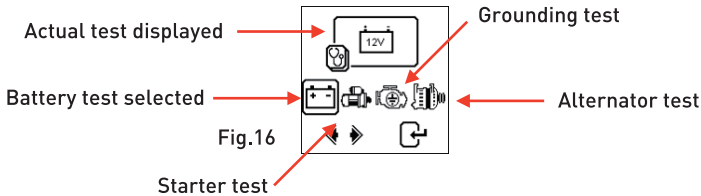


Fig.16

6. If the tester detected that the battery has surface charge it will prompt the user to turn the ignition key to ON and switch on the headlights (Fig.17) to discharge the battery until it has reached the next display that shows turn ignition OFF and headlights OFF (Fig.18) as display shown below and press to continue.

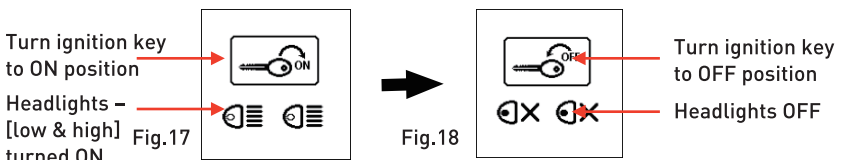


Fig.18

7. Next it will prompt the user to select the types of batteries (Fig.19).

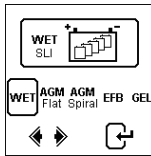


Fig.19

WET will test normal flooded types like Wet Low Maintenance (Lead [Pb] / Calcium [Ca]) or Wet Standard (Lead [Pb] / Lead [Pb]) Batteries.

AGM FLAT will test Wet (MF) Maintenance Free (Calcium [Ca] / Calcium [Ca]), AGM flat plates Batteries.

AGM SPIRAL tests (Calcium [Ca] / Calcium [Ca]) spiral wound AGM Batteries.

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

GEL will test Gel Cell VRLA Batteries with units of measurement in (CCA) Cold Cranking Amps.

- 8. 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:



- 9. With the rating selection, the analyser screen will display as per Fig.20 below.

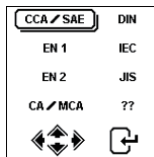


Fig.20

When rating JIS# (Japanese Industrial Standard) was selected, please refer to the conversion chart provided with the package for the CCA ratings of the battery.

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

- 10. User can also base on the engine capacity of the vehicle to estimated CCA value as below. However, using such method does not provide accurate battery's life percentage (%) as compare to the actual battery rating due to the estimated CCA value.

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

11. To adjust the CCA value, press ◀ or ▶ key will increase or decrease the value by 100 while ▲ or ▼ key will increase or decrease the value by 5 as shown in Fig.21 below.

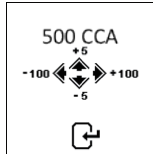


Fig.21

12. Once the CCA rating of the battery was put in, press ↻ key to start the testing process. Refer to the display Fig.22 below

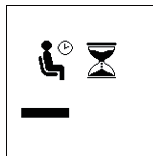


Fig.22

13. In less than 8 seconds, the results of the test will be displayed on the LCD screen (Fig.23) if the battery condition is very good (e.g. having more than 75% Life).

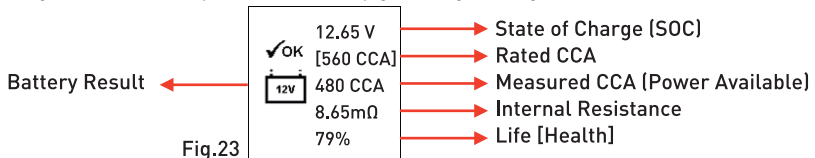


Fig.23

14. The analyser will take outside temperature into consideration and prompt for temperature input shown in Fig.24 below when it detected marginal (SOC below 75%) battery condition:

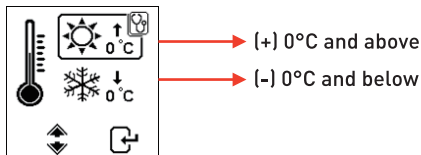


Fig.24

The user has to select the outside temperature when working with the battery. If the outside temperature is 15°C, select ☀️ ↑ 0°C followed by ↻ key. The results will show on the LCD display.

15. Sometimes the analyser will ask whether the battery has been charged before or after testing. (Fig.25) Selecting "Before charge" or "After charge" will determine its final test results.

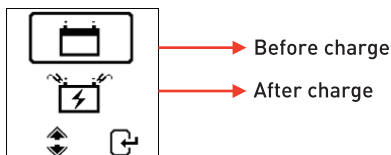



Fig.25

16. To print out the results, press  key on the analyser to commence printing.

Motorcycle Battery Test:

For testing motorcycle batteries, it is advisable 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 analyser’s clamps may not be able to clip properly due to lack of space at its terminals thereby may give inaccurate test results.

1. While on the main menu as shown in Fig.26 below, select  for motorcycle battery test.

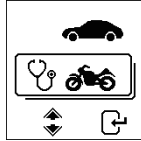


Fig.26

2. Press  key and the screen will show as Fig.27 below:

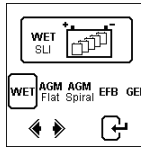


Fig.27

3. Before selecting [WET] or [AGM] and the ratings 'CCA, SAE, EN, IEC, DIN, CA and JIS#' from the menu, please check the battery model. This can be obtained from 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.28 below) provided in separate copies with the tester when 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.28

4. Once the battery type [SLI (WET)] or [AGM] has been selected, it will proceed to the display as shown below (Fig.29):

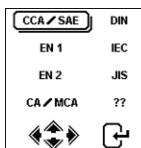


Fig.29

5. To adjust the CCA value, press ◀ or ▶ key will decrease or increase the value by 100 while ▲ or ▼ key will increase or decrease the value by 5 as shown in Fig.30 below.

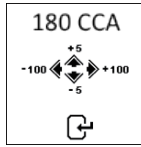



Fig.30

Once the CCA rating of the battery was put in, press  key to start the testing process. Refer to the display Fig.31 below.

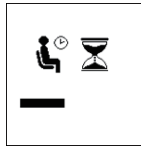


Fig.31

6. The results of the test will be displayed on the screen (Fig.32) within 8 seconds

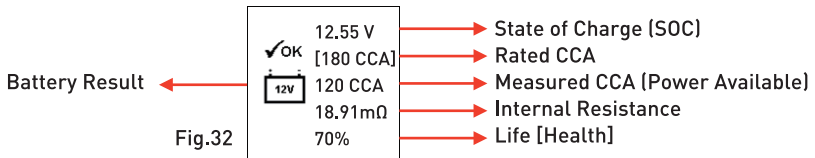






Fig.32

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

Interpretation of Results:

1.  The battery is in good condition.
2.  The battery is OK but needs to be charge first in order to have optimum performance.
3.  The battery is weak, needs to be replaced.
4.  Low SOC (State of Charge), the battery needs to recharge first and then test again to confirm the actual results.

Volts: 12.55 V (State of Charge [SOC])

12.55 V indicates the State of Charge (SOC) during open circuit condition. [By referring to the table below, this battery is above 50% SOC]

State of Charge(SOC)	WET /SLI	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

Battery Rating: 180 CCA

The battery capacity rated output is normally stated on the label for car batteries (either in CCA, EN, DIN, JIS, etc.). For batteries with model numbers, please refer the charts provided with the analyser.

Power available: 120 CCA

It means that the tested battery has a capacity of 120 CCA power available. CCA ratings has been used here, therefore the tested result is in CCA. If other ratings (DIN, SAE, JIS, IEC, CA, or EN) were selected, it will base on the respective rating to calculate.

Please take note:

This output value (120 CCA) is related to the actual power available in the battery in relation to the battery's rating (180 CCA). On average, a new battery's CCA 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 180 CCA rated battery measuring 120 CCA available power does not mean that the battery would pass a CCA test at 120 CCA. The available power reading shows that the battery is not able to perform up to its rated ability (180 CCA).

In comparison to another battery when fully charged, the 180 CCA battery measuring 120 CCA is not 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 180 CCA battery was failing to perform to its rating, while the 100 CCA battery is still working.

Basing on the Society of Automotive Engineers (SAE) in America, 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.

Internal Resistance: 18.91 mΩ

In normal condition, the internal resistance of the motorcycle battery between 5.0 mΩ ~ 45.0 mΩ can be considered as good. Anything above 45.0 mΩ resistance indicates that its internal plates have been aged or sulphated.

For car batteries, its internal resistance of 2.0 mΩ ~ 15.0 mΩ is considered to be good due to high CCA value they have.

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

LIFE: 75% (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 deliver at 0°F (-18°C) for 30 seconds, while maintaining a voltage of at least 7.2 Volts for a 12 V 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 Electrotechnical Commission) Standard**

IEC amperes rating requires that at 0°F (-18°C), the number of amperes that the 12 V 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°F (-18°C), the number of amperes that the 12 V 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°F (-18°C), the number of amperes that the 12 V 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°F (-18°C), the 12 V 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 deliver at 32°F (0°C) for 30 seconds, while maintaining a voltage of at least 7.2 Volts for a 12 V battery during cranking.

- **?? (Unknown)**

If the user is 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 (mΩ) only.

This selection can also be used to test 12 V - Deep Cycle Batteries. An example of the results display is shown in Fig.33 below.

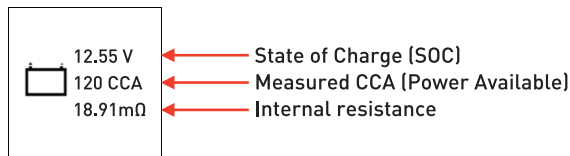
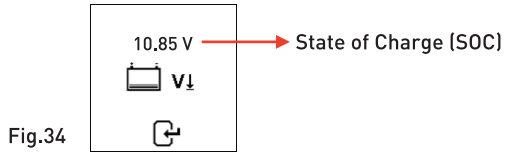


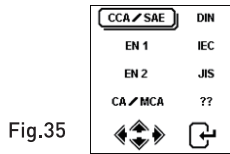
Fig.33

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

- 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.34) as shown if its voltage falls below the normal 12.0 volts.
Note: Any battery whose voltage falls below 10.6 V will be considered a shorted battery.



- Press key to continue and the display will show: (Fig.35)



- Check the battery ratings and enter it as described earlier and the results will show as an example below: (Fig. 36 and Fig.37)

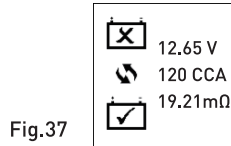
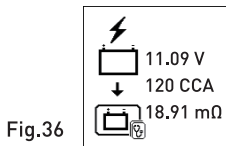


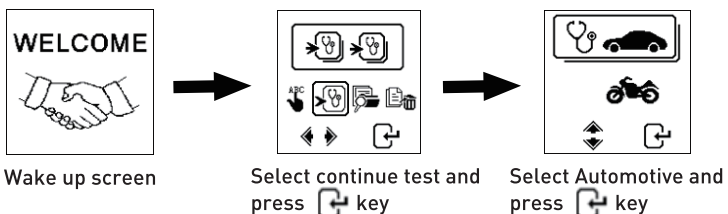
Fig.36 - Results shown [Recharge and test again], it indicated that the battery has to be fully charged first before repeating the test. Reason: State of Charge: 11.09 V is too low.
Fig.37 - Results shown [To replace], this meant that the battery need to be replaced as its internal plate resistance [Int. R] 19.21 mΩ is higher than 15 mΩ limit.

- Pressing the key at any moment will exit and return back to the main menu screen (Fig.27)

Starter Test

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

- Engine OFF, place the vehicle transmission in NEUTRAL and apply the parking brake.
- Connect the tester to the battery terminals and the displays will light up as shown below.



From the main menu (Fig.38), select  by scrolling right using ► key

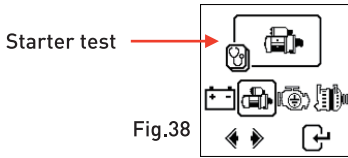

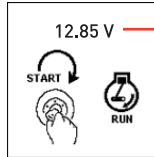


Fig.38

Press  key to continue and the display will show:



State of charge voltage before cranking

Fig.39

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

3. Now switch the ignition key to ON and start cranking the engine. As soon as the engine starts, the results will automatically display as shown in examples below (Fig.40&41):

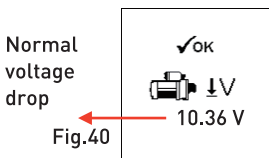


Fig.40

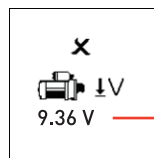



Fig.41

High voltage drop
Less than 9.6 V

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

Pressing the  key will exit and return back to the main menu screen (Fig. 38)

Alternator Test

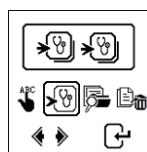
This test is available only in  test. It is to check the MAX & MIN charging voltages output of the alternator at 3000 RPM without load and 2000 RPM with all loads ON. The user can determine the alternator's condition with reference to the vehicle's service manual with this test.


No load testing at 3,000 RPM

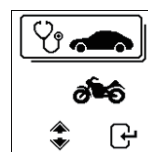
1. Engine OFF, place the vehicle transmission in NEUTRAL and apply the parking brake.
2. Attach the analyser clips onto the battery terminal posts to power up the LCD display screens as shown below:



Wake up screen



Select continue test and press  key



Select Automotive and press  key

3. From the main menu (Fig.42), select  by scrolling right using ► key

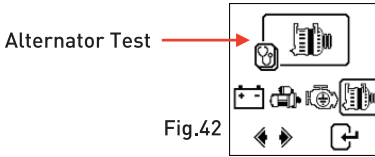



Fig.42

4. Start the engine if it is not running and maintain at idling condition. Make sure the air condition is OFF. Press  key to continue and the display will show: (Fig.43)

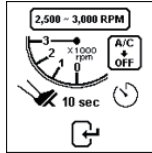



Fig.43

5. Then rev the engine to around 3,000 RPM and hold at this speed. Press  key to continue and display will show. (See Fig. 44).

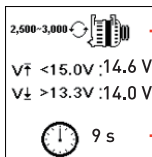


Fig.44

Rev engine around 2,500 to 3,000 rpm and hold at this speed.

Timer starts countdown from 10 s to 0 s

6. While still holding around 3,000 RPM, the timer will start to countdown from 10 s to 0 s. As soon as it reaches 0s, the results will automatically display as example shown below (Fig.45).

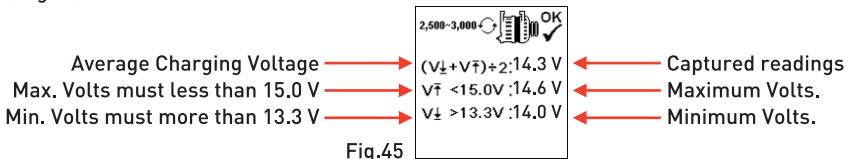


Fig.45

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

7. If either minimum or maximum charging volts are not within the voltage range limits then it will display one of the screens as below (Fig.46 & 47) and it will highlight the inaccurate value of the charging system.

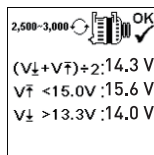
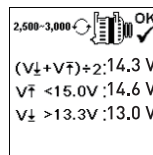


Fig.46

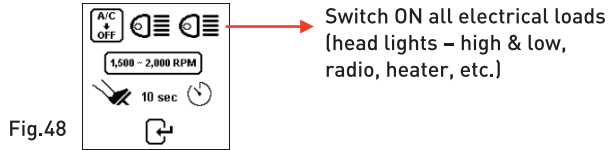


or Fig.47

Testing with electrical load at 2,000 RPM

As soon as more electrical loads, such as lights, rear demister, heater, car stereos, etc. are used, voltage will decrease and this will allow more amperage from the alternator to flow into the battery to compensate the added load. This test is to check the alternator's behaviour during loading.

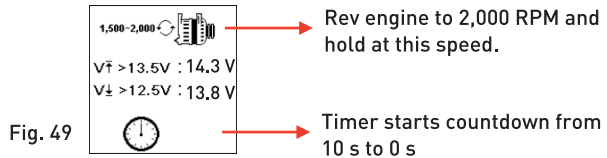
Continue from the previous test (either Fig.45, 46 or 47); the analyser will automatically proceed to load test at 1,500 to 2,000 rpm as shown in Fig.48 below.



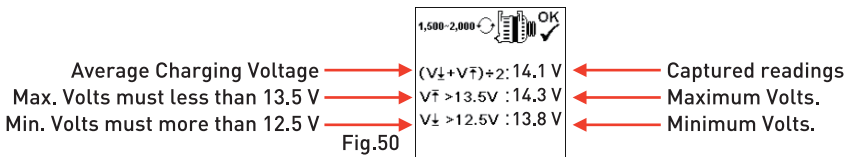
Switch ON all electrical loads (head lights, radio, rear demister, heater, etc.).

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

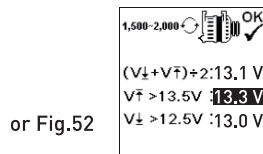
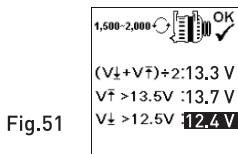
8. Press key and the display will change to as shown in Fig.49 below. Rev the engine up around 1,500 to 2,000 RPM by referring to the dashboard meter maintain the engine speed as shown in the example: (Fig.49)



Wait for the countdown from 10 s to 0 s. As soon as it reaches 0 s, the results will automatically display as example shown below (Fig.50).



9. If either minimum or maximum charging volts are not within the voltage range limits then it will display one of the screens as below (Fig.51 & 52) and it will highlight the inaccurate value of the charging system for the fault.



Testing diode ripple at idling speed with electrical load ON

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

10. Continue from the previous test (either Fig. 50, 51 or 52); the analyser will automatically proceed to diode ripple test. The display will show as below (Fig.53).

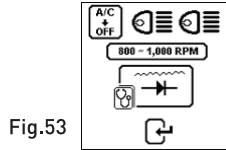



Fig.53

11. While the engine is still running, make sure the air condition is OFF and the headlights (low and high beams) are switched ON. Press  key to continue and the display will change to (Fig.54) as shown below:

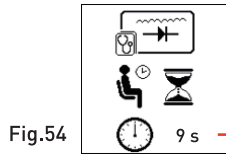


Fig.54

Timer starts countdown from 10 s to 0 s

12. Wait for the countdown from 10 to 0. As soon as it reaches 0, the results will automatically display as example (Fig.55) shown below.

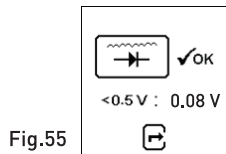


Fig.55

13. If the ripple voltage is above 0.5V then it will display (Fig.56) as below:

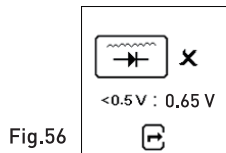



Fig.56

14. To printout the results, just press  key on the analyser, the printer will start printing.

15. Pressing the  key will exit and return back to the main menu screen (Fig.42)

Grounding Test

This test is only available in  test only.

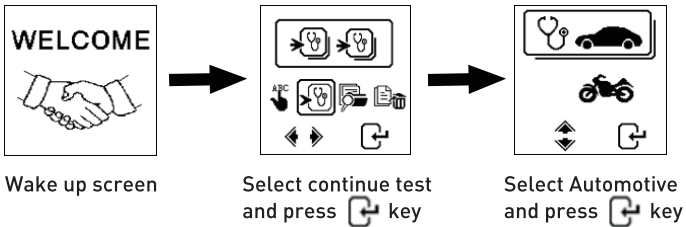
The engine body and the vehicle chassis are always connected to the battery negative terminal to provide the electrical return path (grounding) for all the electrical components. Due to the surrounding environmental effect, the surface contacts of these joints or

connections of these circuits are exposed to oxidation and corrosion which can lead to high resistance. One typical example is the connection at the battery terminal where oxidation and corrosion take place very often. If these contacts are not good it can cause electrical problems.

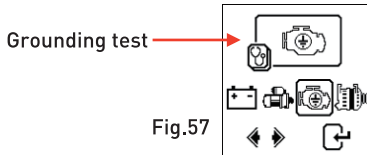
To check the grounding condition, this analyser will measure the resistance from the engine body contact to the battery terminal then it will display the results and the recommendations.

Start Testing

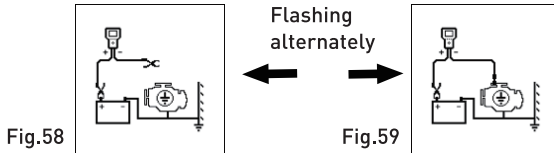
1. Make sure that the engine is switched OFF. Attach the clips onto the battery terminal posts and the analyser will power up and lights up the LCD display screen as shown below.



2. From the main MENU, select  by scrolling right using ► key to go to screen Fig.57.

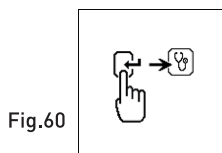


Press [Continue] key to continue and the display will show: (Fig.58 & 59)



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

3. As soon as the BLACK tester clip is attached to the engine body, the display will show: (Fig.60) which means that the user needs to press [Continue] key to continue.



4. When key is pressed, it will start analysing and the display will change to the screen (Fig.61) below:

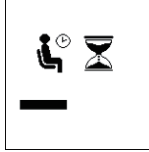


Fig.61

5. Once it has finished analysing, it will prompt the user with instructions (Fig. 62 & 63) stating that the user should unclamp the black tester clip from the engine or chassis body and transfer to the battery negative [-] terminal within 15 seconds time limit or the testing procedure has to be repeated again as the gathered data will be lost.

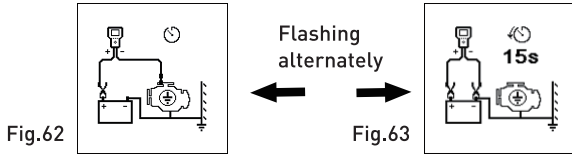


Fig.62

Fig.63

6. Once the black clip is clamped onto the battery [-] terminal, the analyser display will light up as shown. (Fig.64)

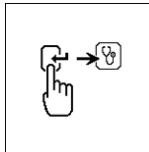


Fig.64


7. Now the user needs to press  key to proceed and the display will show as follows (Fig.65).



Fig.65

- If the measured resistance reading is within limits, then it will display as follows (Fig.66)

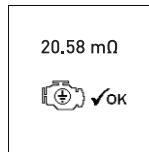


Fig.66

8. If the measured resistance reading exceeds the limits, then it will display the screen as follows (Fig. 67).

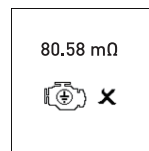
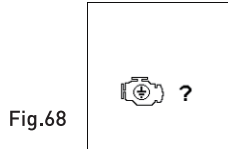


Fig.67

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.

9. If the user did not follow the right procedures during the testing, it will display the results as follows (Fig.68) below:



10. To printout the results, just press  key on the analyser, the printer will start printing.

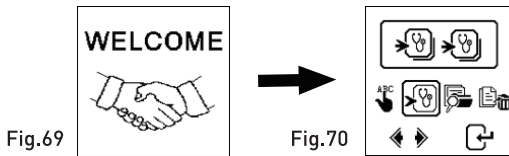
11. To exit the program, pressing the  key at any moment will exit and return back to the main menu screen (Fig.57).




View Test Results from memory:

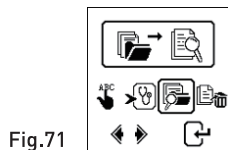
To view the all the test results, the analyser have to be connected to an external power source by either clamping its clips directly to a 12 Volt car battery or connected to a PC via the USB port using an USB cable.



1. Once powered up, the wakeup screen will display as follows: (Fig.69& 70)




1. Select View Test Report from memory by scrolling the  key to  and press . See display below (Fig.71):



2. Once  key is pressed, the display will show as follows (Fig. 72):



Fig. 72

Select the particulars that the user had keyed in earlier from the list by scrolling the highlighted bar up or down when pressing ▲ or ▼ key. If the particular is not in the list which the user is looking for, go to the next page by pressing ◀ or ▶ key. Once the user has found the correct entry, press  key to confirm. The display will show the results stored from its memory as example shown below:

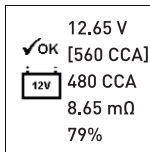


Fig.73

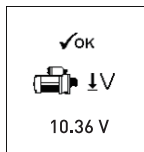


Fig.74

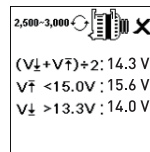


Fig.75

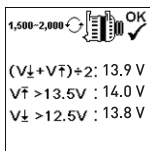


Fig.76

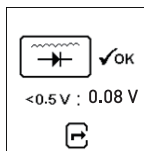


Fig.77

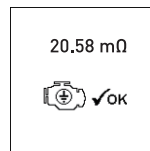



Fig.78

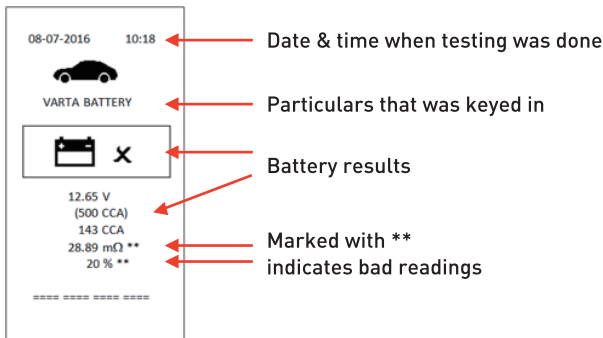
Printout Stored Test Results:

Important:


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

Printings of the stored test results can be done while in this view test results from stored memory (Fig.73 ~ 78). To print out, just press  key on the analyser, the printer will start printing.

An example of the printout as shown in Fig.79 below:



Note: To printout on normal computer printer, it has to be connected to the PC with the analyser software installed. (See print results from PC Printer – Page 32).

To exit the program, pressing the  key at any moment will exit and return back to the main menu screen (Fig.72).

Personal Computer (PC) Link:

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


Installing Driver

Important Note:

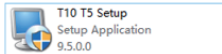
Do not connect the analyser to the PC via USB port before installing the driver. Otherwise the computer could not detect the proper driver for the analyser and the installed driver will fail to work.


To rectify this problem, please uninstall the previously installed driver and then reinstall with the correct steps as described below if the user have made the above mentioned mistake.

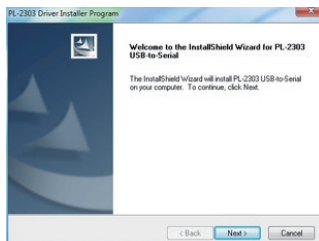
Step 1. You can install the T10 software & driver as provided.

First click to open the folder:  T10 software & driver

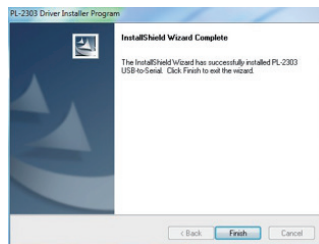
You will find the following files:



Step 2. Double click on the icon  to start the installation process. Example shown below is based on Windows 7 operating system.

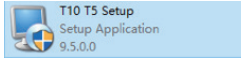


As instructed, click [Next>] to start the installation of the driver on the PC. Once the installation is completed, it will prompt the user to click [Finish] to exit as shown.



Step 3. Next open this folder again:  T10 software & driver

Look for the program icon:




Then double click to open the program. See examples below:



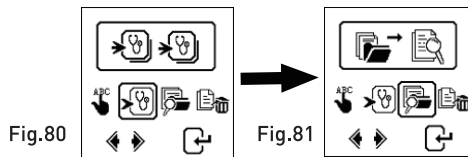
Click on "Install" tab to allow the software to commence the installation process. A few seconds later, the display shows that the installation has been completed. Click "OK" tab to exit as below showed.



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

Step 4. Now plug the analyser into any of the PC USB port and try to link up the analyser with the PC by the following procedures:

1. Go to the main menu (Fig.80), select view test results (Fig.81) as shown below:




While in display (Fig.82), select which results the user need to view by scrolling up or down with ▼ or ▲ key and press  key to get into the test result display as example shown (Fig.83).



Fig.82

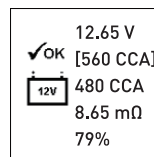


Fig.83

Press USB key on the keypad will display (Fig.84) as shown below:

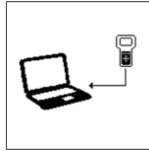
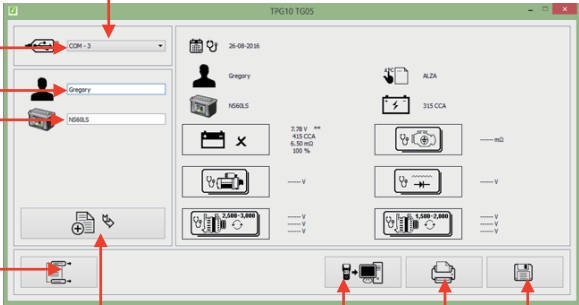


Fig.84

The analyser will remain in this screen while connected to the PC. Do not press any keys as the analyser is already communicating with the PC.

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

It will automatically detect COM port.



COM Port → COM-3

Customer name → Gregory

Battery brand or rodel → H565LS


Click header & footer here to put company name and address.

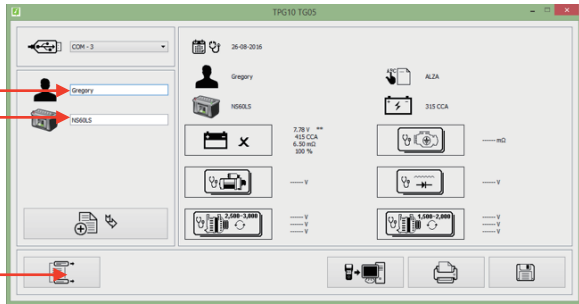
Add the above particulars to test report.

Transfer data from analyser

Print

Save

1. To confirm whether if communication is established; click on  [Get data from analyser] tab to retrieve the last test result. See example below.



You can type in the particulars here.

Click here to include the above particulars in the results.

2. If there is no communication, a message text box will appear as per Fig.85

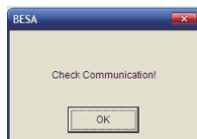




Fig.85

In this case, unplug the analyser 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  tab to see whether the Last Test Result will appear (as displayed in Step 5).

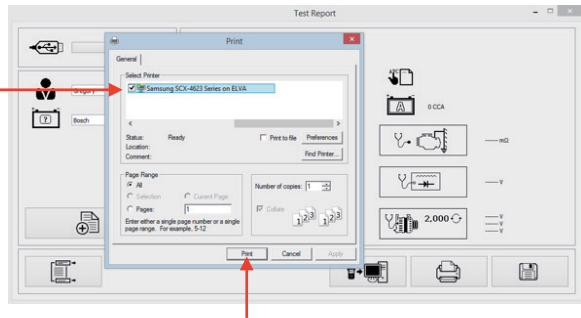
If the above fails again, try connecting the analyser another USB port and repeating step 4 and 5 again.

Printing Results from PC Printer:

If the user wishes to print the results, make sure that the printer is connected to the computer.

Click on  tab and the text box will appear. Select the right printer and click [Print] tab to print.

Select the printer connected to the computer here.



Saving Results:

Note: The results will be saved in MS Office Word document format. The user needs to set the paper size to A4 if not the printout and the stored results page will not be in A4 size. Other paper size settings may affect the layout of the printed results because of the graphics involved.

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

Right click here

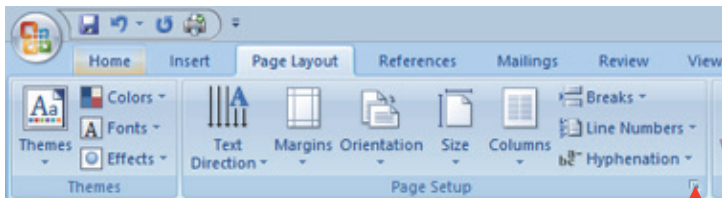
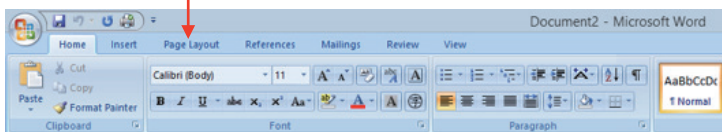


Fig. A

Right click here


On [Page Layout], right click on  sign (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

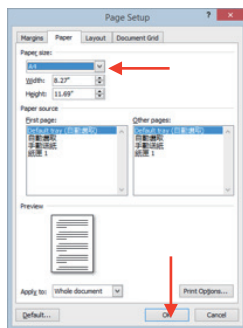

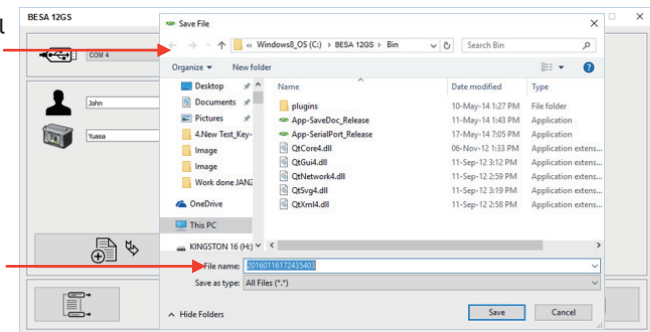


Fig. C

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

The document will be saved in this folder in drive C:



Create File name here

Erase All Stored Results in the Memory:





This function allows the user to erase all the results stored in its memory and start a new list after the user had backup all the stored results to the PC. To access this function, select  and press  key, the display will show as Fig.86below:



Fig.86



Fig.87

Press and hold  and  keys together, a few seconds later the display will change to (Fig.88) as shown below and that completes the process.

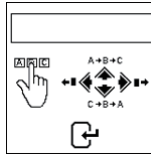


Fig.88

Warning: Performing the above procedures will erase off all the records from the tester.

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 dependent on the user following the normal practices and procedures outline in this manual.

Warranty Information

LIMITATIONS OF WARRANTY

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.

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.

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.



Waste electrical products should not be disposed of together with household waste. Please recycle where designated facilities exist. Check with your local authority or retailer for recycling advice.



- The battery must be removed from the appliance before it is scrapped.
- The appliance must be disconnected from the main power supply when removing the battery.
- The battery must be disposed of safely.

WARRANTY

We do not take responsibility for any damage caused by misuse or any use that is not in compliance with the safety standards described herein.

CUSTOMER SERVICES

Contact your local importer of your specialized dealer to obtain address of our service department.

**FROM DATE OF PURCHASE RECEIPT
2 YEAR GUARANTEE
ON MATERIAL OR PRODUCTION DEFECTS**

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