Battery Starter Alternator Analyser T5

Version A1607

Introduction

This Battery Starter Alternator Analyser had revolutionised its display format and is first in the world to equip with full graphics display on its operation. With its simplicity of the graphics display, step by step instructions were clearly understood universally without any language barrier. This analyser is able to test all 12V Car Batteries, Motorcycle Batteries, Starters and the Alternator charging conditions.

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

1. ***Battery Test:***

   - Analyses battery condition using microprocessor controlled testing methods without the need of fully charging it before test.
   - Consume very little current during testing, hence the test can be repeated numerous times without any worry on battery drainage and results are highly accurate.
   - Extremely safe as there is no sparks created during clamping and full analysed result takes less than 7 seconds to obtain.

2. ***Starter Test:***

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

3. Alternator and Diode Ripple Test:

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

After the test, the current results will be stored in the analyser memory for further reference. The analyser also equipped with an USB port to connect to the PC for storage of results or have the result printed from the PC linked printer.

Specifications

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

Safety Precautions

- When the engine is running, it emits exhaust gas which 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 object 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 if comes in contact between power source and ground.

- Always have a fire extinguisher readily available and easily accessible in the workshop.

Working with Batteries

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 covered 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, cause sparks or flames due to the explosive gases will be released while charging the battery.

Preparing for Test

1. The Analyser operates from 9V ~ 15V DC and should not be tested on 24V directly as this will cause damage the unit. For 2 x 12V 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 can commence.

3. 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.

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.

Automotive Batteries Test

Performing Battery Test whilst batter still in the car:

Vehicle that was running has to have its engine OFF first followed by switch 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.

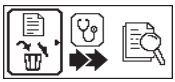
Car engine and any accessory loads must be **OFF** during the test in order to obtain accurate result. When attaching the analyser clips, ensure the battery posts were not oxidized or badly corroded and clean them first before clamping. Do not clamp onto the steel bolts directly which will provide inaccurate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

Testing on stand-alone Automotive Batteries:

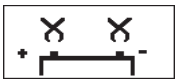
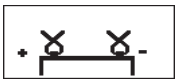
Clean the battery posts with a wire brush prior to testing. For side post batteries, install stud adaptors. Avoid using steel bolts for better results.

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.1 and 2).

Fig.1 

 Fig.2

2. If any of the Analyser clip was not properly clamped to the battery contact, the display will flash alternatively between Fig.3 and 4. In such event, unclamp and clamp the clips again on the battery posts to ensure the contacts are good before conducting a test.

Fig.3 
 Fig.4

3. Menu screen as shown in Fig.5 below will be displayed if there is no problem on the contacts between the battery and the Analyser.

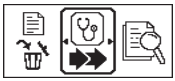


Fig.5

4. Fig.5 allows the selection of choice from the Menu by pressing ◄ or ► key and press the key.

New: Clear Memory

Selecting this item allow the Analyser to clear the previous results stored in the memory to start a new test.

Repeat or Continue Test

Selecting this option allows the continuation or updates of the last test carried out on the same car.

For example:

If Battery Test was carried out previously and user wish to do Starter or Alternator Test on the same car, selecting this option allow the analyser to update the results for each test in its memory and can be retrieved for review later.

View Test Results from the memory

This option allows user to review the previous test results stored in its memory. The display shown as per Fig.6, 7, 8, 9& 10 below depended on the type of test the user had done earlier.

Note: If user had selected [New: Clear Memory] earlier without any testing, there will be no results stored in the analyser's memory. Therefore, the LCD display will remain as it is as there is nothing to view

Fig.6

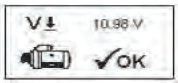


Fig.7

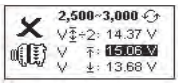


Fig.8

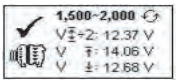


Fig.9

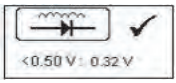


Fig.10

5. User can begin testing by selecting  or  by pressing ◄ or ► key followed by ⏎ key. The user will see the display (Fig.11) below after the selection.

Fig.11

Selecting  allows the user to test Car Battery (up to 2000A), Starter and Alternator, where as selecting  allows testing of Motorcycle Battery (up to 600A) only.

6. When the user has selected  , the display will change to the MENU with options shown inFig.12 below:

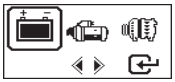
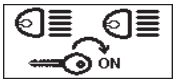


Fig.12

Select  for battery test followed by ⏎ key.

7. If the Analyser has detected any surface charge in the battery, it will prompt to turn the ignition key ON and to switch on the headlights (Fig.13) in order to discharge the battery. When discharging surface charge was completed, next display (Fig.14) will show to indicate that ignition and headlights are to be turned OFF. Press ⏎ to continue.

Fig.13 

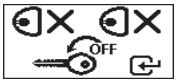


Fig.14

8. Next it will prompt the user to select the types of batteries (Fig.15).

Fig.15

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

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

9. Before selecting the ratings 'CCA, SAE, EN, IEC, DIN, CA /MCA and JIS#' from the menu, please check the battery specification value. The specification value can be obtained from the battery labels as some examples shown below:

10. With the rating selection, the analyser screen will display as per Fig.16 below:

Fig.16

11. 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

12. 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**

13. 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.17 below.

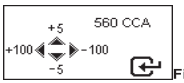


Fig.17

14. Once the CCA rating of the battery was input, press key to start the testing process. Refer to the display Fig.18 below.

Fig.18

15. The results of the test will be displayed on the screen (Fig.19) within 7 seconds.

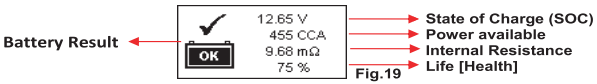


Fig.19

16. The analyser will take surrounding temperature into consideration and prompt for temperature input shown in Fig.20 below when it detected marginal (SOC below 75%) battery condition:

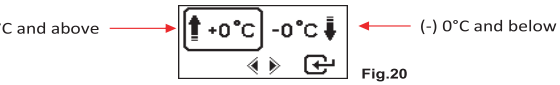


Fig.20

The user has to select the surrounding temperature when working with the battery. If the surrounding temperature is 15°C, select  followed by  . The results will show on the LCD display.

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

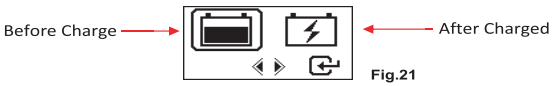


Fig.21

Motorcycle Battery Test

For testing of 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.22 below, select  for Motorcycle Battery test (Fig.23).

Fig.22 Fig.23

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

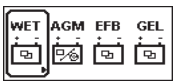


Fig.24

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, refer to the Battery rating chart (as shown in the example Fig.25 below) provided in separate copies with the analyser for the values to be keyed in.

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

Fig.25

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

Fig.26

5. 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.27 below.

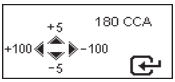


Fig.27

6. Once the CCA rating of the battery was input, press ⏎ key to start the testing process. Refer to the display Fig.28 below.

Fig.28

7. The results of the test will be displayed on the screen (Fig.29) within 7 seconds.

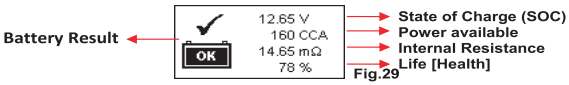


Fig.29

Interpretation of Results

1. 

The battery is in good condition.

2. 

The battery is weak, need to be replaced with a good one.

3. 

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

4. 
Low SOC (State of Charge), the battery needs to recharge first and then test again to confirm the actual results.

5. Basing on the example given in Fig.29, the final results can be explained as follows:

   Volts: 12.65V (State of Charge [SOC])

   The volts here indicated the State of Charge (SOC) of the tested battery which is 12.65V during open circuit condition. [Above 80% SOC for AGM batteries by referring to the table below]

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

6. **Power available: 160 CCA**

   This indicates that the battery tested has a capacity of 160 CCA power available. CCA ratings has been used here, therefore the tested result shown is in CCA. If other rating (DIN, SAE, JIS, IEC, CA, or EN) were selected, the analyser will base on the respective rating to calculate and show the results in that selected rating.

   Please take Note:

   This output value (160 CCA) is related to the actual power available in the battery in relation to that battery's rating (210 CCA). On average, a new battery's CCA as measured by this analyser will read 10-15 % higher than its stated rating.

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

From the above example, a 210 CCA rated battery measuring 160 CCA available power does not mean that the battery would pass a CCA test at 190 CCA. The available power reading shows that the battery is not able to perform up to its rated ability (210 CCA).

In comparison to another battery when fully charged, the 210 CCA battery measuring 160 CCA is no stronger than a 100 CCA battery showing 100 CCA available power when fully charged.

The available power number is meant for comparison to its own rating. In fact, in this example the 210 CCA battery is failing to perform to its rating, while the 100 CCA battery is still working.

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

It measures the discharge load, in amps, that a battery can supply for 30 seconds at 0°F/-18°C while maintaining a voltage of 1.2 volts per cell (7.2 volts per battery) or higher.

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

The above methods also hold for DIN, IEC, JIS, EN1, EN2, CA and MCA basing on its individual ratings.

7. **Internal Resistance:** **14.65mΩ**

   In normal condition, the internal resistance of the automotive battery should fall between the ranges of **2.0mΩ ~ 15.0mΩ**to be considered as good. Anything value above 15.0mΩindicate that its internal plates has been aged or sulphated.

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

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

8. **LIFE: 78 %(Health)**

   This is an indication of the battery life expectancy [Health] in percentage.

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

- **CCA (Cold Cranking Amps) – most commonly used Standard.**

  CCA is a rating used in the battery industry to rate a battery's ability to start an engine in cold temperatures. This rating is the number of amperes that a new fully charged battery can delivery at 0°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 Electrotechnical Commission) Standard.**

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

- **EN 1 (European Norms) Standard.**

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

- **EN 2 (European Norms) Standard.**

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

- **JIS# (Japanese Industrial Standard)**

  JIS # amperes' rating is based on Ampere Hours and is calculated using 20 hours rating. In this manual, it is using CCA ratings reference table list provided basing on the JIS model number.

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

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

- **CA (Cranking Amperes) / MCA (Marine Cranking Amperes) Rating.**

  This rating is the number of amperes that a new fully charged battery can delivery at 32°F (0°C) for 30 seconds, while maintaining a voltage of at least 7.2 Volts for a 12V battery during cranking.

- **?? (Unknown)**

  If the user is not sure which ratings (CCA, EN, IEC, JIS or DIN) the battery is based on, select this setting to measure the battery's Voltage (State of Charge), CCA and the Internal Resistance (m Ohm) only.

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

Fig.30

To determine the condition of the tested Deep Cycle Batteries, refer to the **Voltage** 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 15mΩ* readings to be considered as a good battery.

1. Batteries that had been left idle for long periods of time can still be tested with this analyser. To perform the test, just clamp the analyser clips onto the battery terminals and it will display the screen (Fig.31) as shown if its voltage falls below the normal 12.0 volts.

   Note: Any battery whose voltage falls below 10.6V will be considered a shorted battery.

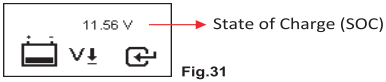


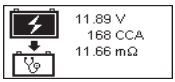
Fig.31

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

Fig.32

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

Fig.33



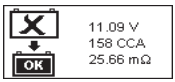


Fig.34

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

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

4. Pressing the key at any moment to exit and return to the main menu screen (Fig.22).

Starter Test

This test is only available for option. It actually checks the cranking effectiveness of the battery during starting of the vehicle and also its starter condition.

1. With the engine OFF, place the vehicle transmission in NEUTRAL for Manual or PARK for Automatic and apply the parking brake.
2. Connect the Analyser to the battery terminals and the display will light up as shown below.

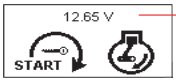
Wake up screen

Select Continue test and press key

Fig.35

3. From the MENU (Fig.35), select  by pressing left using ► key followed by ↵ key.

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

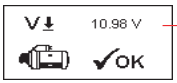


State of Charge before cranking

Fig.36

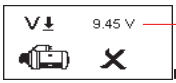
Note: ***In event that the user did not crank the engine while on this screen, the starter test will terminate after 30 seconds and return to the display menu.***

5. Now switch the ignition key to ON and start cranking the engine until it start. As soon as the engine starts, the results will automatically display as shown in examples below:



Normal Drop Voltage

Fig.37



High voltage drop Less than 9.6V

Fig.38

6. Pressing the  key to exit and return to the main menu.

Alternator Test

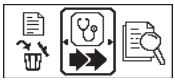
Alternator test is available only in  option. This is to check the MAX & MIN charging voltages output of the alternator at 3000 RPM without load and 2000 RPM with load. The user can determine the alternator's condition with reference to the vehicle's Service Manual with this test.

No load testing at 3,000 RPM

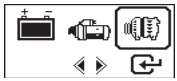
1. With the engine OFF, place the vehicle transmission in NEUTRAL for Manual or PARK for Automatic and apply the parking brake.

2. Attach the Analyser clips onto the battery terminal posts to power up the LCD display with the screens as shown below:

Wake up screen



Select Continue test and press ↵ key



Select Alternator Test and press key ↵

3. After select  followed by ↵ key. The display screen will show as per Fig.39 below:

Start engine and keep it running

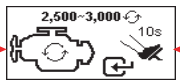


Fig.39

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

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 display will show. (See Fig.40).

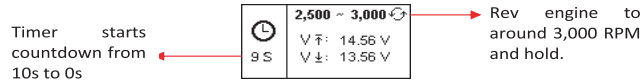


Fig.40

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

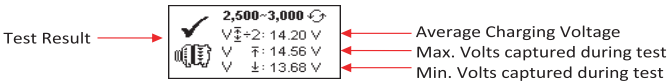


Fig.41

With the captured values, evaluation 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 not less than 13.3V** (min voltage at 3,000 RPM).

6. If either maximum or minimum charging volts were not within the voltage range limits, the result will highlight as described example below (Fig.42&43). The analyser will prompt the user to check the alternator system for the fault.

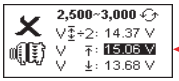


Fig.42

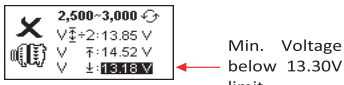


Fig.43

Testing with electrical load at 2,000 RPM

With more electrical accessories, such as lights, rear demister, heater, car stereos, etc. were used; the electro-motive force (Volts) decreases and this allows more current (Amps) from the alternator to flow into the battery to compensate for the added load. This test is to check the alternator's behaviour during loading.

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

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

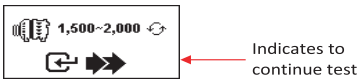


Fig.44

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

Indicates that all electrical loads (Head lights – High & Low, Radio, Heater, etc.) to be switched ON.

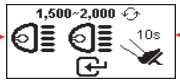


Fig.45

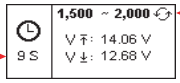
Rev engine to around 2,000 RPM and hold on for 10 seconds. (Refer countdown timer on next display)

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

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

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

Timer starts countdown from 10s to 0s

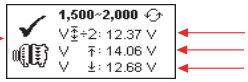


Rev engine around 2,000 RPM and hold.

Fig.46

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

Test Result



Average Charging Voltage
Max. Volts should exceed 13.5V Min.
Volts should exceed 12.5V

Fig.47

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

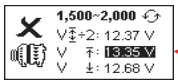


Fig. 48

Max. Voltage less than 13.50 V limit

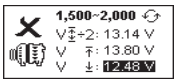


Fig. 49

Min. Voltage less than 12.50 V limit

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 0.5V limit. Normally if one of the diodes is faulty, the AC ripple will produce higher than the accepted 0.5V limit.

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

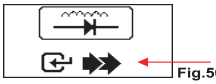


Fig.50

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

Fig.51

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

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

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

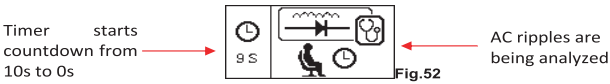


Fig.52

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

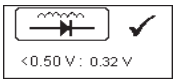


Fig.53

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

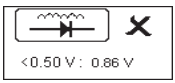


Fig.54

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

View Test Results

To view the results of the last test, the T5 has to be connected to an external 12V DC power source by either clamping its clips directly to a 12Volt car battery or connected to a PC via the USB port.

Fig.55

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

Fig.56

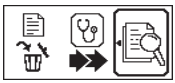


Fig.57

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

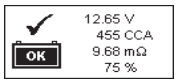


Fig.58

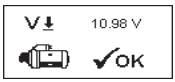


Fig.59

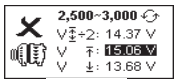


Fig.60

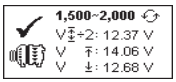


Fig.61

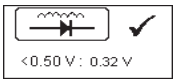


Fig.62

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

Note: The results stored will be based on the latest test. If user had selected [New: Clear Memory] and earlier and did not conduct any test thereafter, there will be no results stored in the memory thus will not result in any change to the LCD display as there is no result to review.

Setting PC link with Analyser

The analyser is also designed to link with PC for data storage and printout through PC connected printer. To do so, the driver and the software provided have to be installed to the PC in order to operate.

Installing the 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.

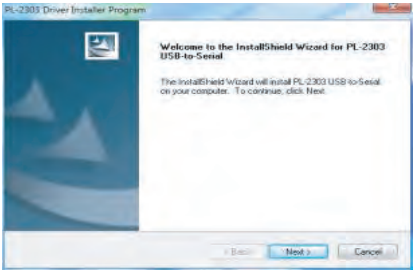
To rectify this problem, please uninstall the previously installed driver and then reinstall back with the correct steps as described below if the user have made the above mentioned mistake.

Step 1. You can install the T10 T5 Software & Driver as provided.

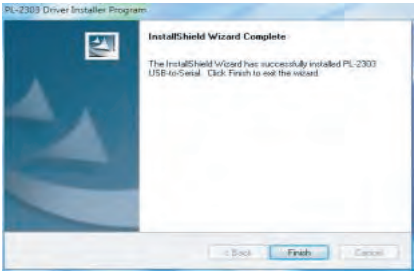
First click to open the folder:  T10 T5 Software & Driver

The user will find the following files: 

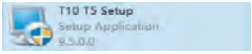
Step 2. Double click on the icon  to start the installation process. Example shown below is based on Windows 7 operating system.



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 below.



Step 3. Next open this folder again:  T10 T5 Software & Driver

Look for the program icon: 

Double click on the icon to initiate the installation with the display shown below:

Click on “OK” 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 connect the Analyser to any USB port of the PC to power up the Analyser. Thereafter, link up the analyser to the PC with the following procedures:

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

Fig.63

Fig.64

2. Press key will allow the test results to be displayed as example shown (Fig.65).

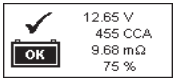


Fig.65

3. Press key on the keypad and display will show as per Fig.66 below. This means that the Analyser is ready to link up.

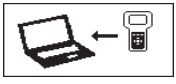


Fig.66

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:

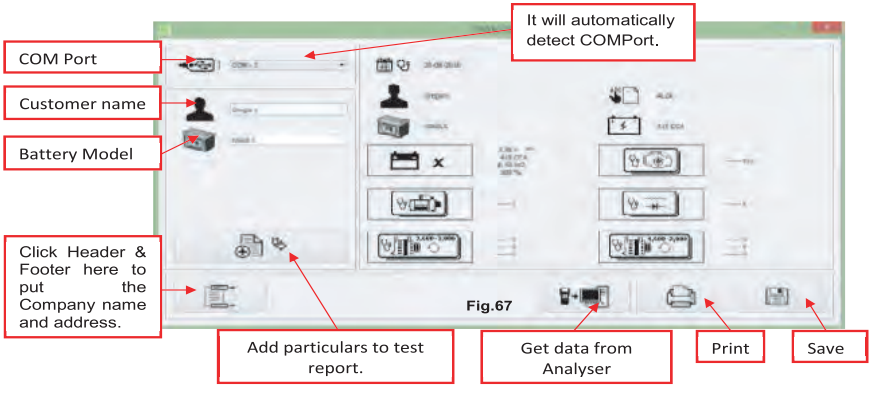


Fig.67

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

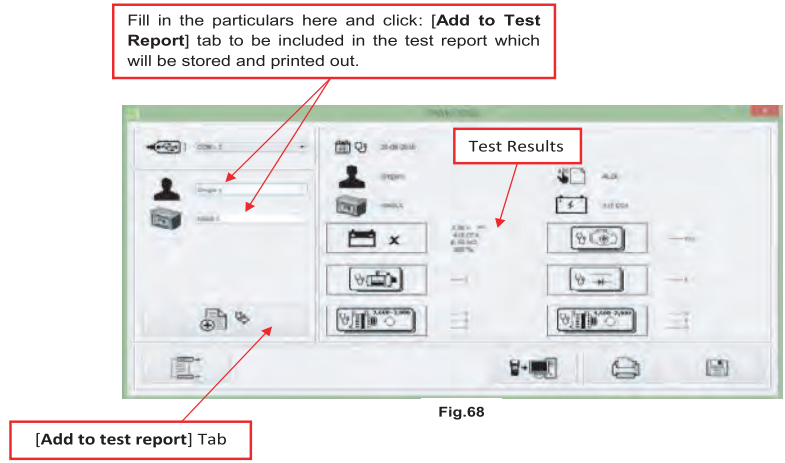


Fig.68

If there is no communication, a message text box will appear as per Fig.69below.

Fig.69

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

If the above fails again, then try connecting the Analyser to another USB port and repeating Step 4 and 5 again.

Printing Results from PC Printer

While on this page (Fig.68), 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 (refer to Fig.70) and click [Print] tab to print.

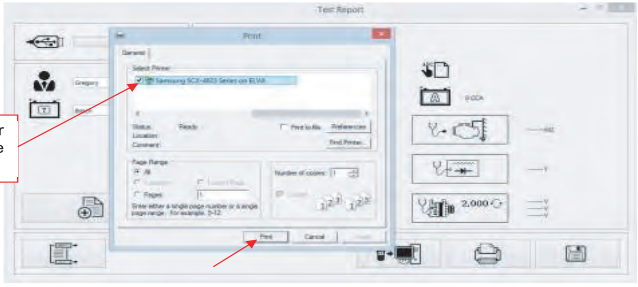


Fig.70

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 and right click, display shows as in Fig. A.

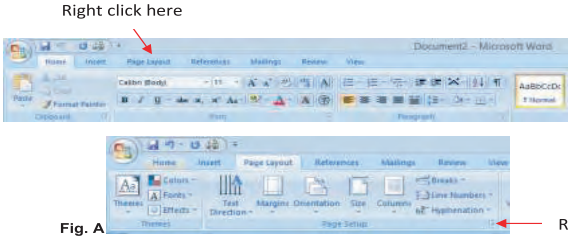


Fig. A

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

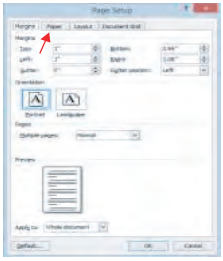


Fig. B

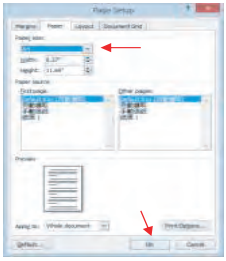


Fig. C

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

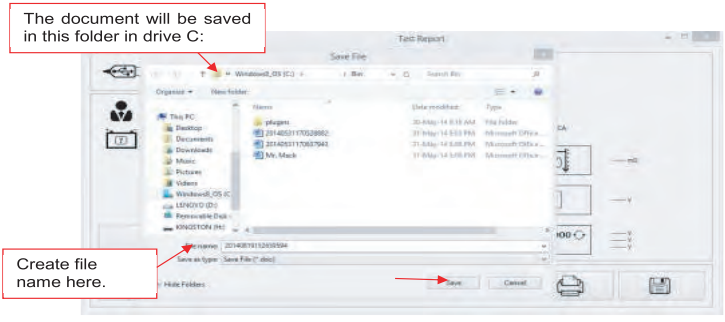


Fig.71

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

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.

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.