

INSTRUCTION MANUAL



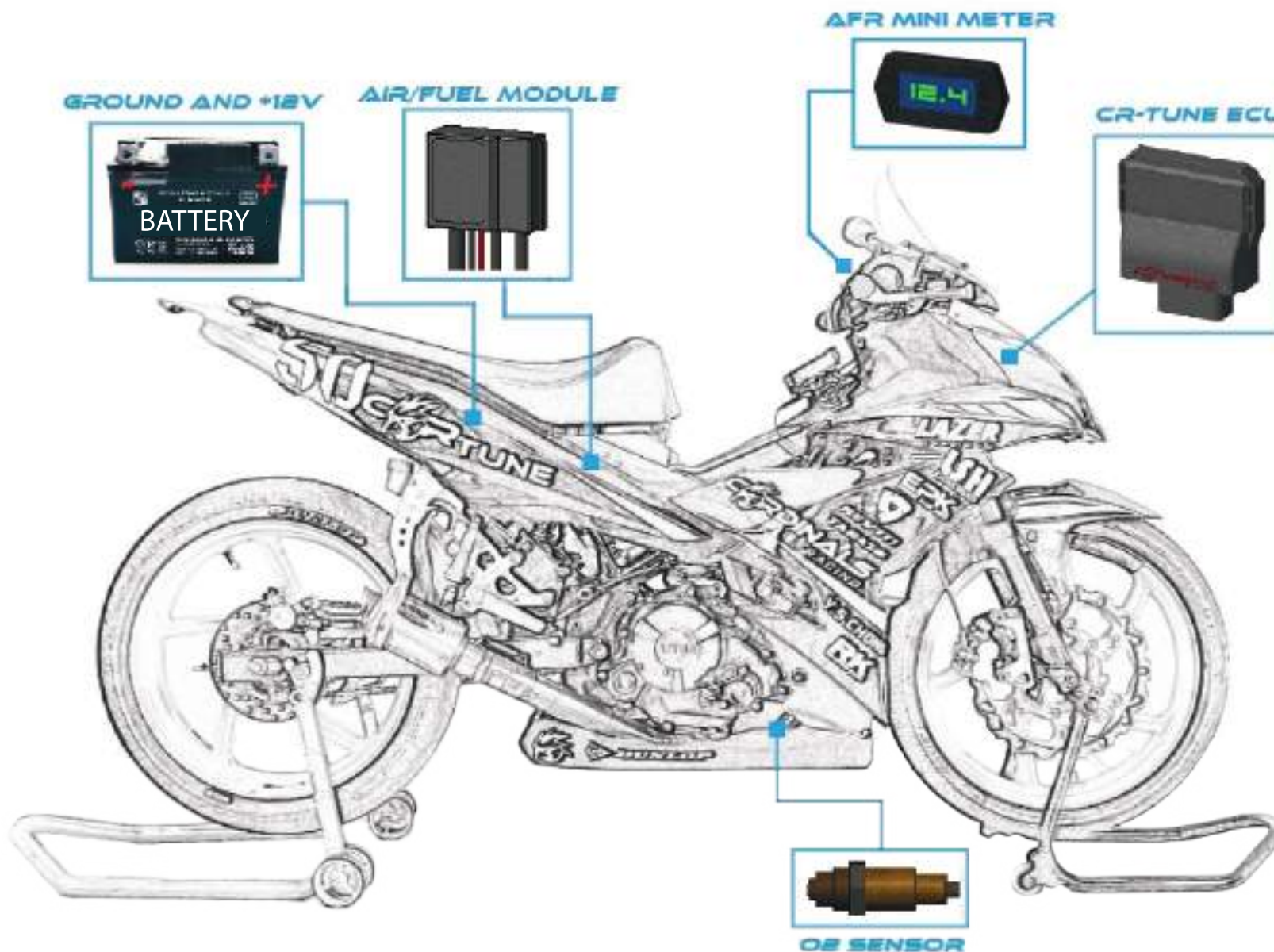
ELECTRONIC CONTROL UNIT

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POWER BY CARDINALS RACING
MALAYSIA



INSTALLATION LOCATION



Procedure of Tuning



Open the “Cardinals Tuner”



Switch on ignition



Open the tuning MAP(.car)



Connect to computer



Disconnect
computer



Save to preserve the tuning as a MAP



Read the tuning MAP from ECU



Flash the tuning MAP into ECU



Start tuning



All settings have been completed



Flash the tuning MAP into ECU

Software Description



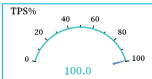
Brief Steps of procedures.

1. Open the Cardinals Tuner Software.
2. Insert the bike key and switch on the ignition.
3. Click  button to choose the correct Tuning Map according to the type of bike.
4. Click  button to check the status of connection,  this icon will prompt once your bike is successfully connected with the devices.
5. Click  button to save the original Tuning Map.
6. Click  button to read all the data and transmit.
7. Click  button to flash original or modified Tuning Map into the Electronic Control Unit (ECU). **(Caution! After flashing, the engine will stop running.)**
8. After setting has been completed. Click  button to flash one more time into the Electronic Control Unit (ECU). **(Caution! After flashing, the engine will stop running.)**





1. Operational Instruction for original Tuning Map

- 1.1. First, connect the Cardinals Tuner software to your devices with the calibration cable provided.
- 1.2. Insert the bike key to turn on the ignition. Click the SAVE icon above and select TUNING MAP according to your bike type.
- 1.3. To check the status of connection, please click the LINK  above. After successfully connecting, this symbol  will appear.
- 1.4. Before starting the engine, please make sure to **fully twist the throttle and check the status of throttle position sensor has reached the maximum figure of 100%** . If it is not, kindly search for the TPS Zero Setting under the settings page, and click the  button.
- 1.5. Please SAVE the Original TUNING MAP (EXP: Save as Original.doc) before proceeding with any adjustment to avoid the changes of data in the original map during flash in.
- 1.6. After adjustments have been made, please SAVE the NEW TUNING MAP. And then click the FLASH button above to transmit new data into the Electronic Control Unit (ECU).



2. Operational Instruction for Original Tuning Map from bike

2.1. To read and adjust the Original Tuning Map from the bike, please make sure the bike is successfully connected to the software and transmit the data accordingly.

2.2. Before flashing into the Electronic Control Unit (ECU), please ensure that all the data are correct.
*(EXP: Save as Modified.doc)

Software Description



A Voltage 0

This column showed Voltage. The electric power supply of the bike must reach a **minimum** of 12 volts in order to operate the Cardinals Tuner Software. If there is insufficient power, it can directly affect the accuracy and operation of the software setting.

B EG_Temp 0

This column shows the Temperature of Engine or Temperature of Engine Oil. The water temperature is recommended to be set at 85°C or +/- 5 Celsius. **Please note that** improper water temperature will affect the setting of fuel volume supply.

C Air_Temp 0

This column showed the Temperature of Air, room temperature is the key point to determine the thickness of oil. **Please maintain** the room temperature between 34°C to 36°C and please note that room temperature may vary due to different countries and environments. Users must adjust accordingly.

Software Description

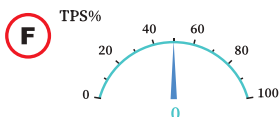


D A/F 0

This column shows the Air Fuel Ratio. **The recommended ratio** is between 12.3 to 12.8. A ratio of above 12.8 means the petrol ratio is too lean. Below the ratio 12.3 means the petrol ratio is too rich.

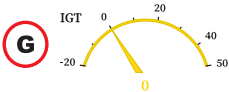
E Injector(ms) 0

This column shows the fuel injection volume. The volume of fuel injection is calculated by millisecond and it has been fixed in the Electronic Control Unit; **adjustment is not necessary**.



This meter shows the Throttle Position Sensor. Throttle position sensor will auto synchronize to the angle of rotation.

Software Description

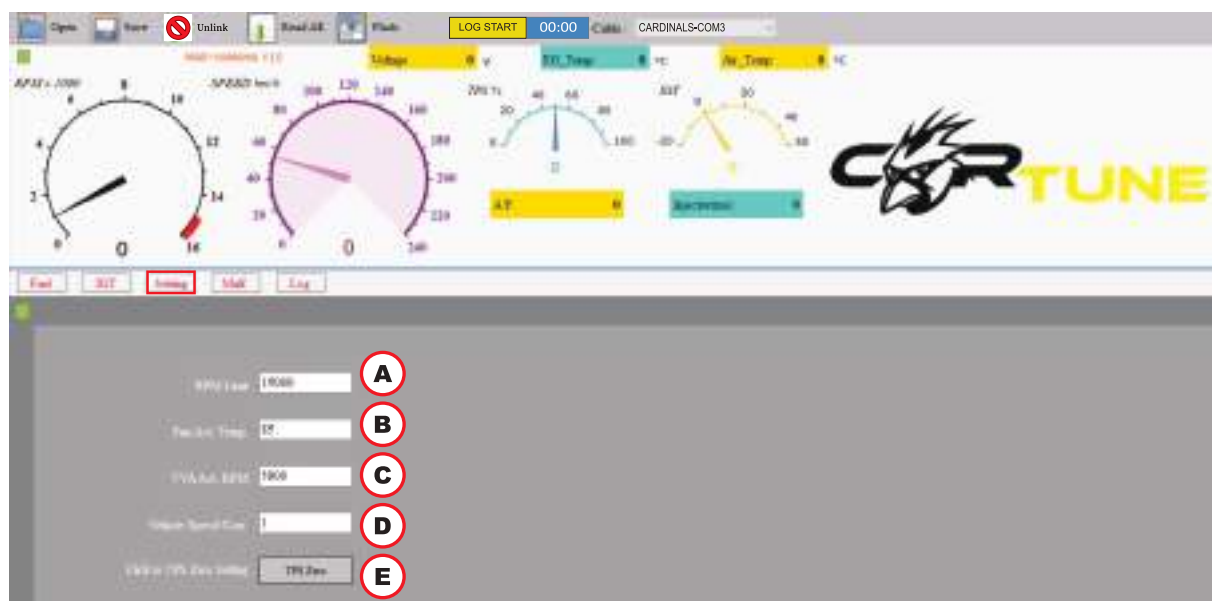


This meter shows the electrode power supply. It will show the ignition timing after starting the engine. If the ignition timing does not meet the user's expectation, **please adjust accordingly** via ignition setting.

***Caution!** If this icon  emerge, it indicates an error or malfunction such as abnormal vibration on the engine or crankshaft, or improper installation and damage to other accessories. Please check on the **Malf** setting immediately.



Other Setting



Other Setting

Clicking on **Setting** will lead you to the above pages.

This column **A** shows the RPM (Revolution Per Minute) limit. User may adjust the limit **according to their own need**.

This column **B** shows the Coolant Actual Temperature. The **recommended temperature is 85 Celsius or +/- 5 Celsius**. Users may adjust accordingly.

This column **C** showed Variable Valve Actuation Activation RPM level. This function mainly for bikes with VVA engines. Users may adjust VVA Activation RPM accordingly. Changes of this function are **unnecessary** for bikes without VVA.

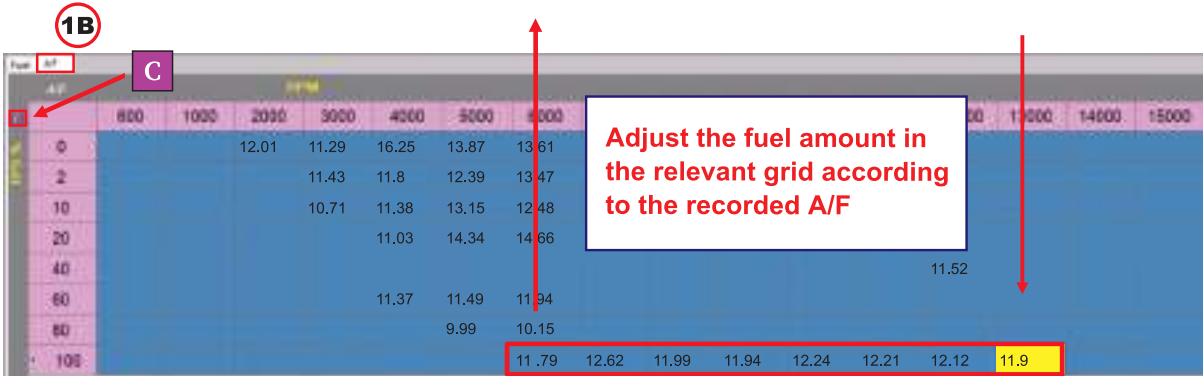
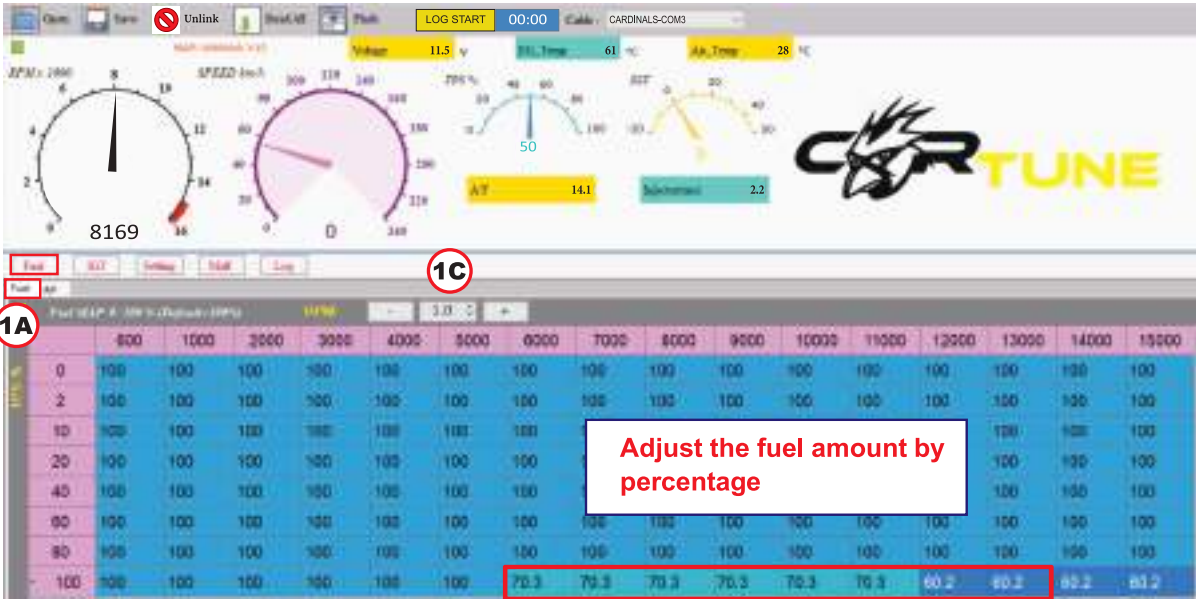
Other Setting



This column **D** showed Bike Speed Correction. The coefficient in the Electronic Control Unit (ECU) set as 1. Please take note, the method of adjustment is based on different bike models. Calibration of speed is allowed if the bike's meter is originally read from ECU and the coefficient shown on the meter **might not be accurate** due to different ECU. User may decide to choose either to synchronize the original meter or the navigation (GPS) system speed to make adjustment. If the setting showed 1, the meter of speed will be 100km/h. Variation is according to a factor of **0.5%**. Example: when the coefficient is 1.05%, the meter will indicate the speed of 105km/h. When the user lowers down to 0.95%, the meter will indicate the speed of 95km/h. Therefore, users must **adjust accurately**.

This column **E** shows the Setting of Throttle Position Sensor (TPS). It is very important for the user to make sure the TPS is enabled in the required condition every time before engine start and after connecting to Cardinals Tuner Software. TPS zero setting can be ignored if the bike has reached the maximum figure of **100%**. If it is not, **please click** TPS Zero , twist the throttle fully as to allow the ECU to read all the data and wait for 5 to 10 seconds until the red light TPS Zero goes off. In case the above steps are repeated a few times and still unable to reach the target result, please check the TPS and throttle body immediately.

Fuel Tuning



Fuel Tuning

Click the **Fuel** button below, and it will show the Fuel Volume Chart.

1. All the numbers in the Fuel Volume Chart are calculated by percentages. **Please note that**, the numbers of adjustment are between 0-200% and the **maximum number can reach 200% ONLY**. 100 are fixed in the existing chart and each 100 carries 50% volume of fuel.



Fuel Tuning Description

- 2. User may find 1C columns to **adjust** the number in the existing fuel map, which will make it easier for users to reach their desired Air-Fuel Ratio.
- 3. To adjust the 1C number, users can click the plus minus button on the left and the right side of the 1C button to adjust the amount of fuel volume.
- 4. If the user wishes to change the fuel amount in the fuel Map, please click one of the columns below and press the plus minus button on the left and the right side of the 1C button. The data will be **saved** and transferred to the Electronic Control Unit (ECU) **automatically**.

AF	800	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000
0	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5				
2		17.5	17.5	17.5	17.5						17.5	17.5				
10			17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5				
20			17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5				
40			17.5	17.5	17.5							17.5				
60			17.5	17.5	17.5											
80					17.5	17.5	17.5	17.5	17.5							
100					17.5	17.5	17.5	17.5	17.5							

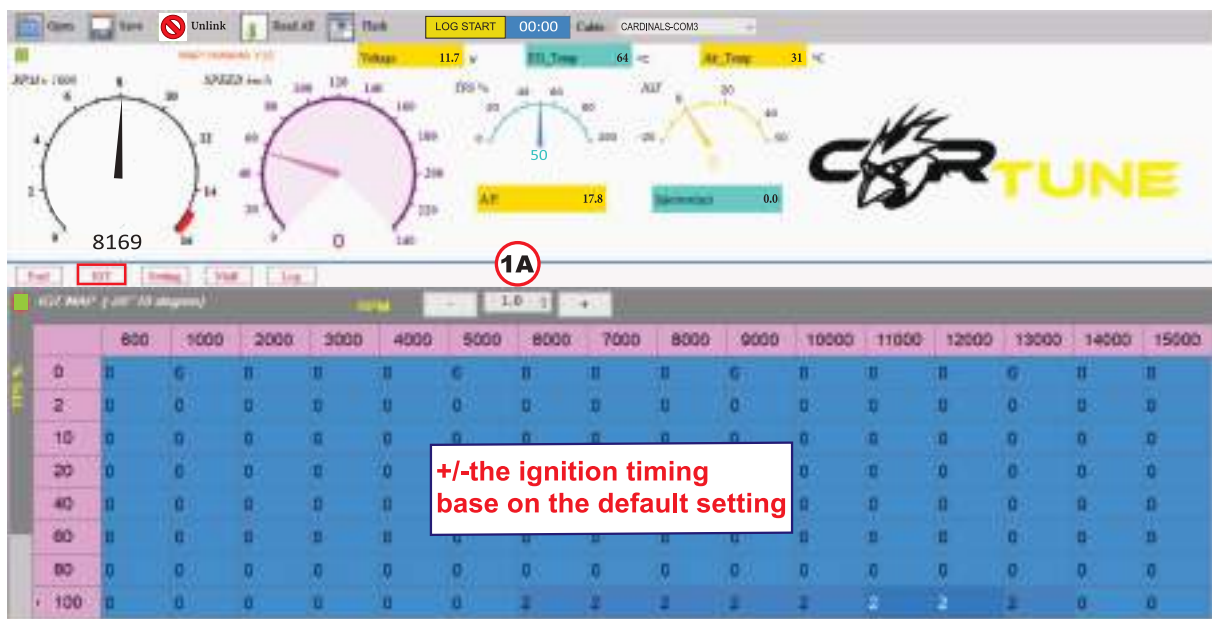
- 5. User may click the 1B button on the top left corner of the Fuel Map to find the Air-Fuel Ratio Chart.
- 6. **Please take note**, if the A/F chart figure appears to be an **abnormal number** (Example:17.5) or cannot be read, **please check** the socket is it correctly installed or any malfunction of the Air Fuel Module as well as the sufficient of the voltage at once.

Fuel Tuning Description



7. Whenever an abnormal situation appeared. Please be advised that users may **constantly crosscheck** between both fuel and air-fuel ratio chart to achieve the user's targeted result easily.
8. If the numbers in the chart are confusing, users may always use the **C symbol** on the left to **delete** or **refresh** the data.

Ignition Timing Tuning



Ignition Timing Tuning

This column **IGT** shows the Ignition Timing.

1. Click the ignition button to show the ignition map. If the user wishes to adjust the ignition revolution per minute, please find the **1A** button in the ignition map. Please take note that the **maximum number for adjustment is 20** and the **minimum is 1**.

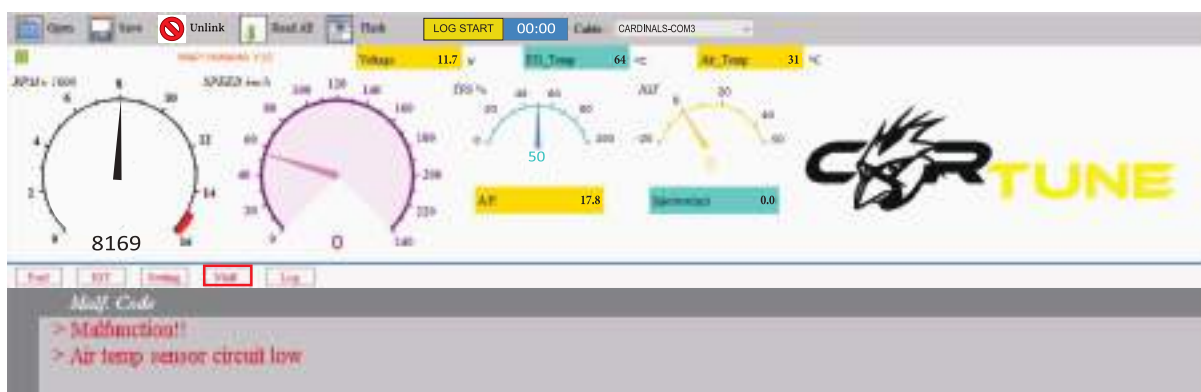
Ignition Timing Tuning



2. CR Tune has added 15% of electrode timing as compared with the Original Electronic Control Unit (ECU). There is number 0 shown in the ignition map, **each 0 carries 15%** of the electrode timing. To adjust, User can click on any of the columns in the map and the plus minus function beside the **1A** button. Again, the **highest adjustment is up to 10** and the **lowest can be negative 20 ONLY**.
3. **Please note that**, the air-fuel ratio might vary due to adjustment. We would strongly suggest that users verify all data once again.



Malfunction



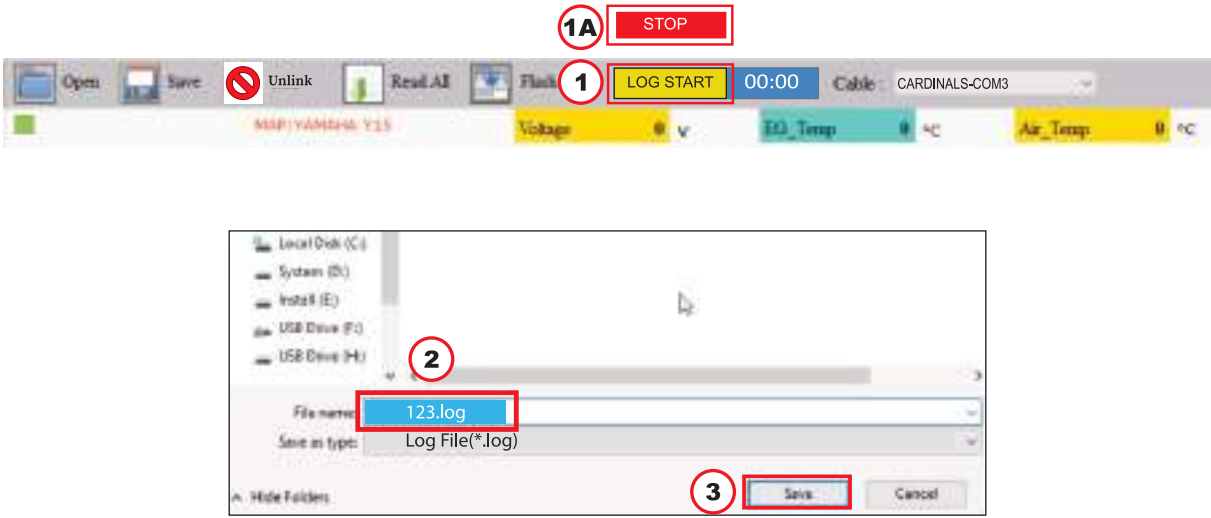
Malfunction

This column **Malf** shows Malfunction, it will appear as a malfunction notification.

1. If there is a malfunctioning accessories or the sockets are improperly installed, example: Injector, Throttle Position Sensor, Fuel Pump, Plug Coil or abnormal vibration on engine, etc. It will appear in the page after clicking the malfunction button.
2. **Please replace** and **repair immediately** whenever a failure message shows up and re-connect to Cardinals Tuner Software. The system will **refresh** automatically.
3. If no malfunction is detected, the system will not indicate.



Start Data Logging

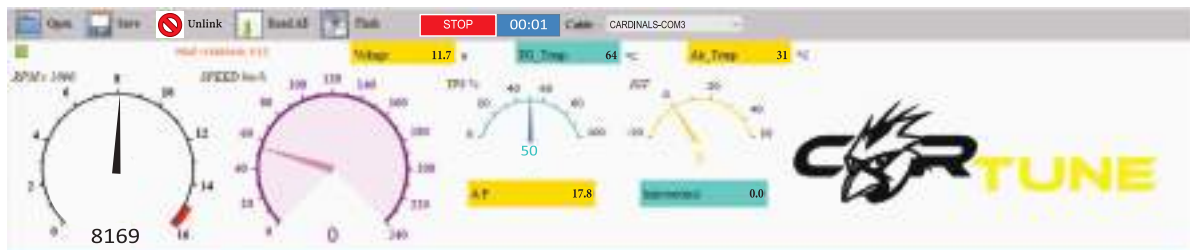


Start Data Logging

1. This column **LOG START** shows the log of the analysed data.
2. The “SAVE” window will prompt out after clicking ①. Enter model or name of the file in the column ②. Press ③ to save.
3. Cardinals Tuner Software is able to log analysed data, such as fuel volume, ignition supply, air-fuel ratio, etc.
4. After the process has completed. Click button ①A to stop logging.



Open the Log Data



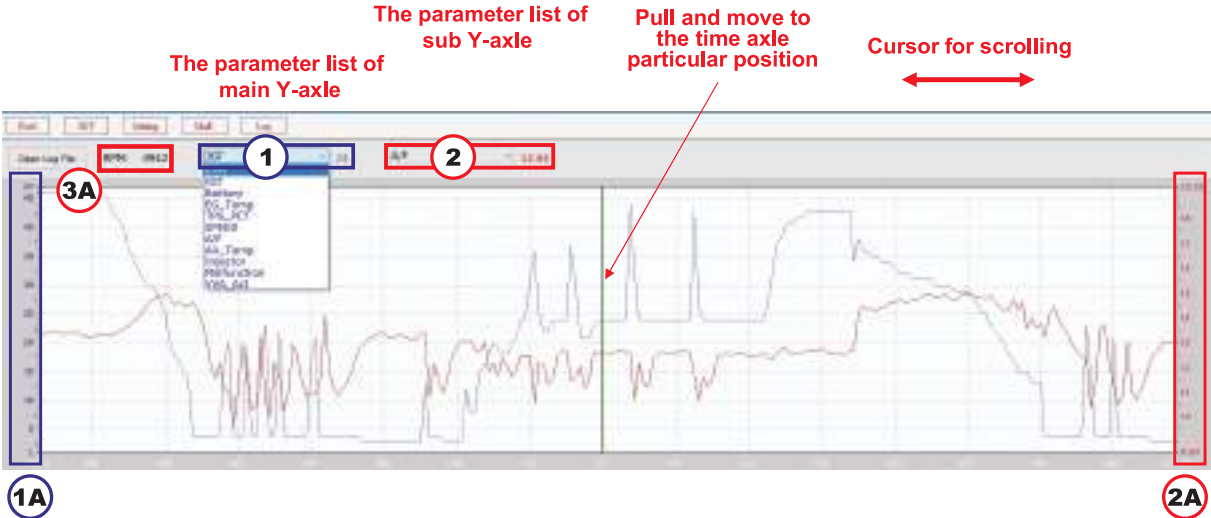
Open the Log File

1. This column **Log** display all the analysed data.
2. Click **Log** to enter the analysis window. Click **Open Log File** on top left corner, and user may select which analysed data to be read.

(Please refer to next page)



Analyse Log File



Analyse the Log File

3A column shows RPM, and is unable to select and change because it has been fixed in the Electronic Control Unit (ECU).

There are two buttons on top of the analysis window: Button **1** and Button **2**. The user may click and select the analysis data that the user wants to refer to.

The relevant data will appear on the Main Y-axis as well on the left side corner **1A** below after clicking the Button **1**.

The relevant data will appear on the Sub Y-axis as well on the right-side corner **2A** below after clicking the Button **2**. Please take note that the user may choose to review other data by clicking the drop down arrow on the left side of the Button **2**.

Users can use the **cursor for scrolling the time axle** (Green) for moving and zoom in to have better glance.

