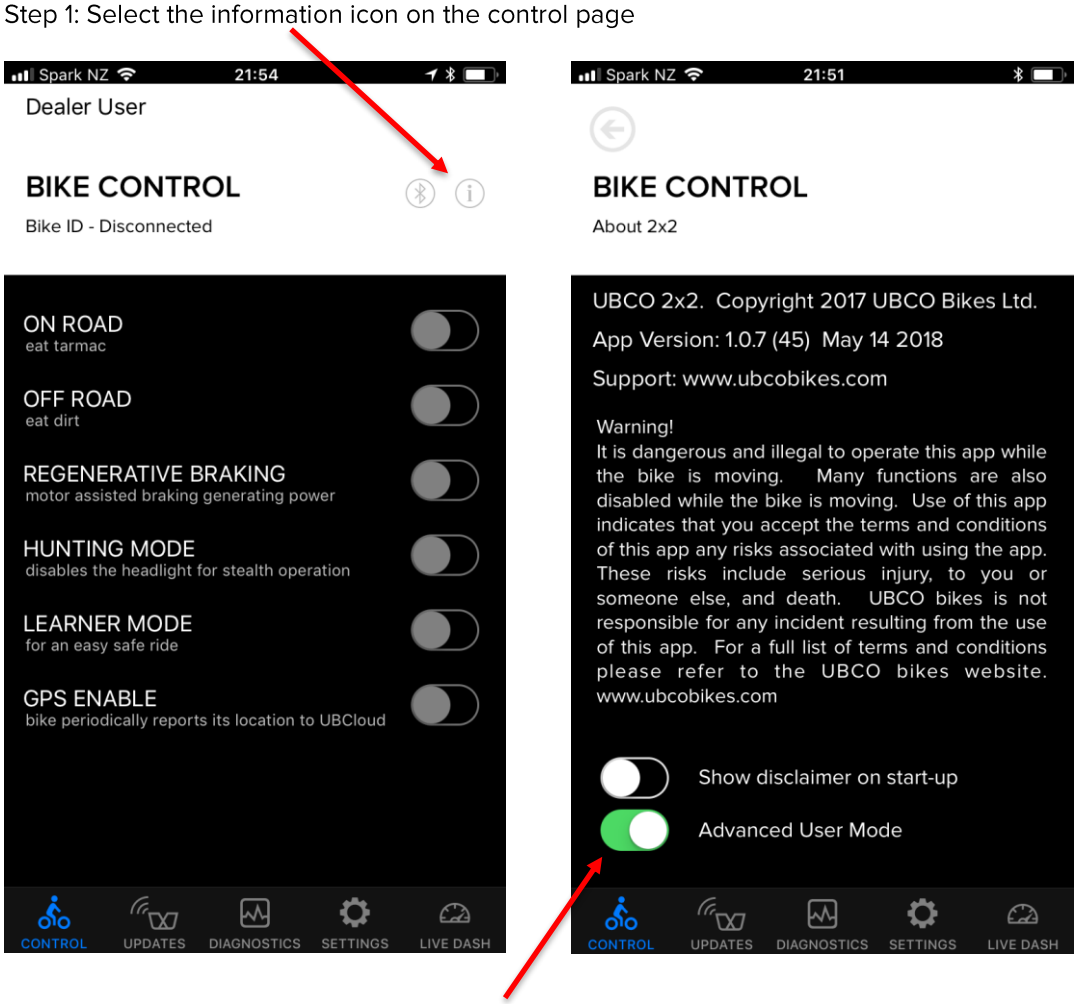
UBCO 2x2 2018 Advanced Diagnostics

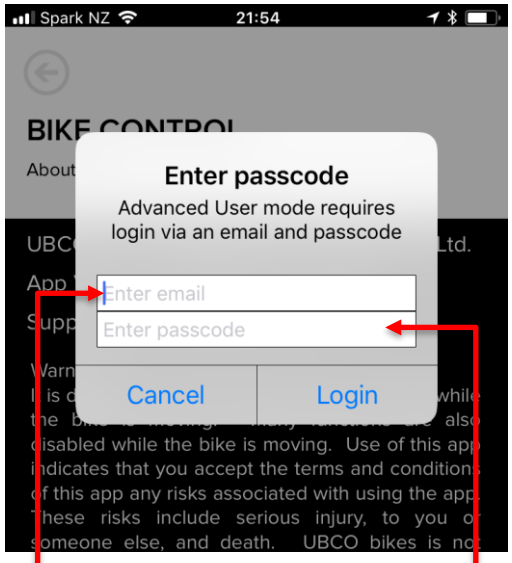
Contents

How to Select Advanced user mode

Step 1: Select the information icon on the control page



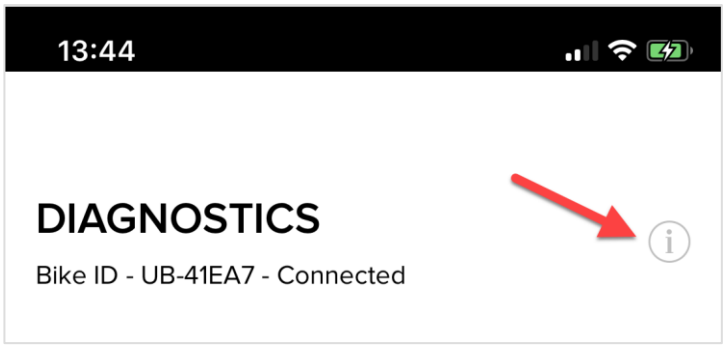
Step 2: Select the toggle “Advanced user mode”



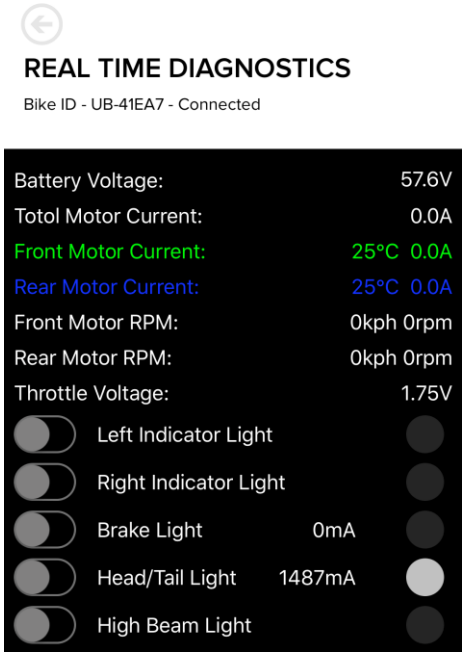
Step 3: Enter your “User ID” and “Passcode”

Real Time Diagnostics

The real-time diagnostics feature of the app (iOS only currently) allows users to interact with the bike at a raw functional level to assist with fault finding and/or log performance data. The Real Time Diagnostics menu is accessed by pressing the I button on the top left of the main diagnostics screen.



Real Time Data



The top section of advanced diagnostics allows real-time visualisation of selected bike parameters, and the ability to control bike parameters for testing.

Real Time Data

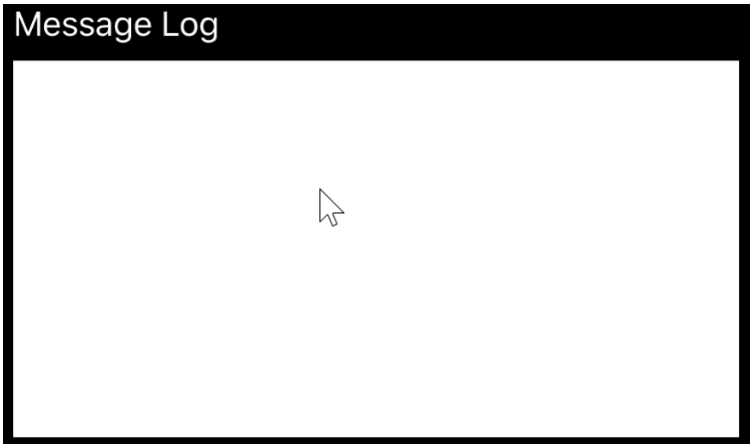
The real-time data section shows bike info in real time.
Battery voltage – The current battery voltage as measured by the ECU
Motor current. – The Total motor current is the addition of Front and Rear motor currents.
Motor RPM is the electrical revolutions per minute, along with the bike speed as calculated by the ECU.
Throttle voltage – This is the voltage from the throttle which is used to determine the amount of power to the motor.
The switches and indicator section allow the user to manually operate the lights using the switches on the left. The indicators on the right show the state that the ECU thinks the light is in.
For correct interpretation of the data on this screen, consider that the screen is part of the ECU. It sees/controls from the perspective of the ECU.

For further details on each parameter, see the Parameter Analysis section.

Note: Bike must be in ACC mode.
Example: Indicator left lamp has failed.
The user has been made aware of an Indicator fault by fault reading code C6 on the dash.
The user comes into the diagnostics data screen, and turns each Indicator switch to ON. The indicator status switched to ON and the Indicator lamps both turn on correctly. The fault is not in the wiring between the ECU and the Lamp.
The user switches on the Indicator switch to OFF.
The user then goes to the handlebar control pad and turns the Indicator on using the control pad. The Indicator does not turn on, and the diagnostic screen does not show the indicator is ON.
This concludes that the wiring from the handlebar control to the ECU is faulty, or there is a faulty handlebar control switch.
This process allows the user to diagnose the fault without experimental part replacement.

Log Screen

The log screen, shows logging messages from the ECU if available. The logging messages may detail fault or status information that is available. If everything is operating normally then it is normal for the user to never see any log messages.



Data Logging

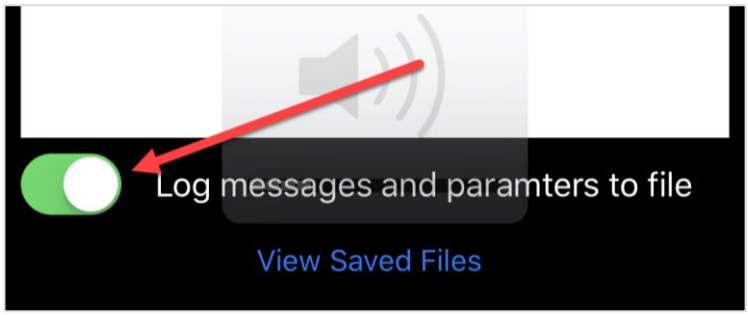
Users can log real time performance data from the 2x2 to a file using the data logging feature in real time diagnostics.
The following parameters are logged at 1 second intervals.

- Battery Voltage
- Total Motor Current
- Front Motor Current
- Rear Motor Current
- Front Motor RPM
- Rear Motor RPM
- Throttle Voltage (level)
- Status Flags
- Front Motor Temperature
- Rear Motor Temperature
- Front Motor Controller Faults
- Rear Motor Controller Faults
- Front Motor Controller Warnings
- Rear Motor Controller Warnings

The advanced diagnostics screen allows real time monitoring of bike parameters.

Enable/Disable Logging

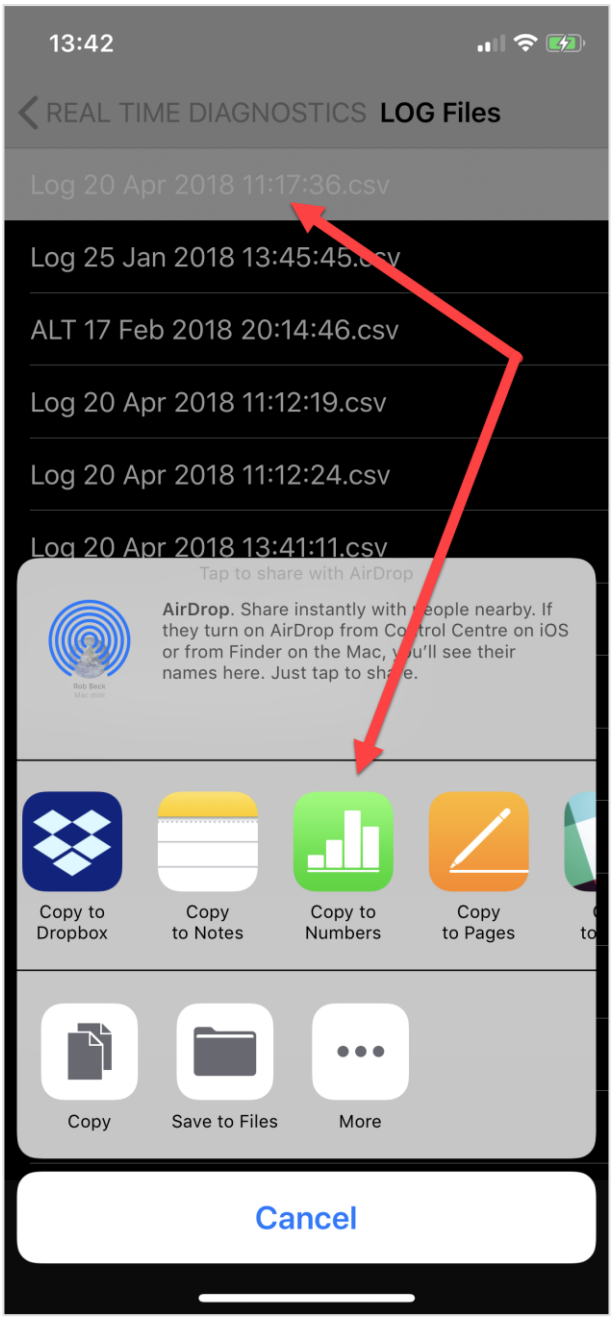
To log this data to a file, enable the Log to File switch. As soon as this switch is turned on, logging is started. To finish logging, set the switch to off.



To ensure that logging continues, keep this app page visible for the entire duration that logging is require. If the app or this page is closed, logging will be stopped.

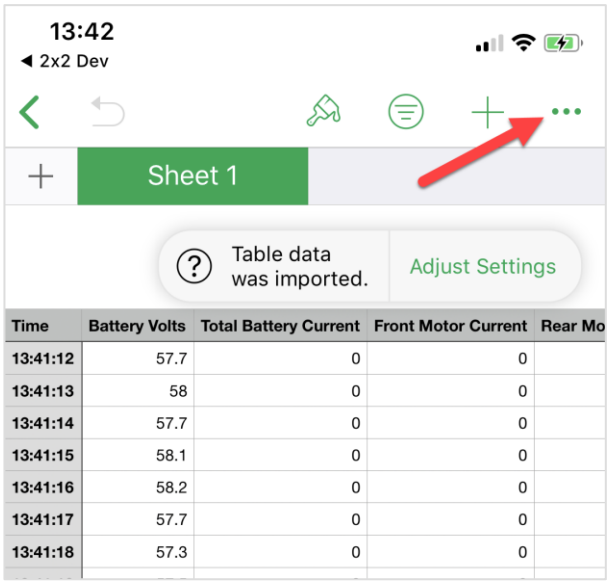
Exporting Logged Data

Once logging is complete, click the “View Saved Files” button to view all saved logs. Select the log required, and open in an app that supports the file format. Numbers is recommended.

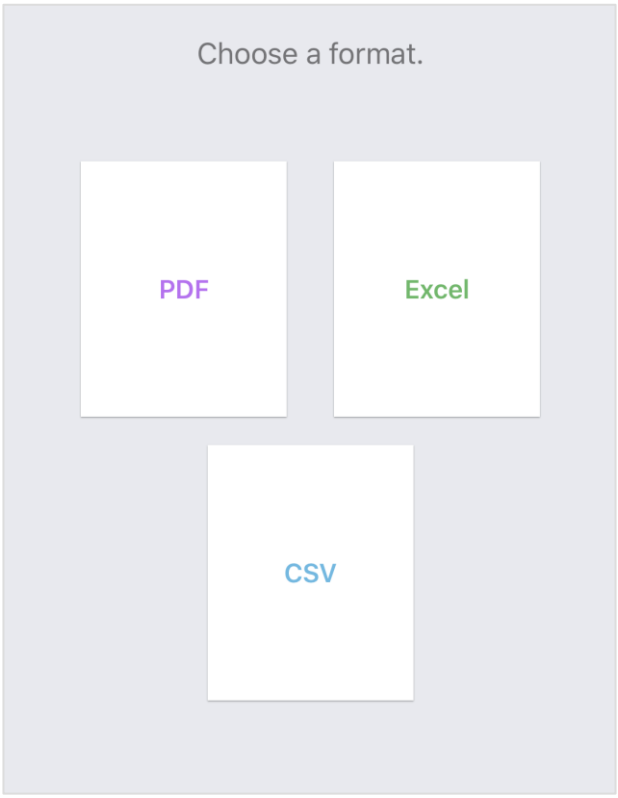


Once open in Numbers (or other app), users can view the data directly in Numbers, or export to email for off-device analysis.
In Numbers, to export, press the **...** button and select Export. Chose the desired file format, and then you will be presented with options of where to send. Select e-mail to e-mail the file.

Viewing Logged Data



Time	Battery Volts	Total Battery Current	Front Motor Current	Rear Mo
13:41:12	57.7	0	0	
13:41:13	58	0	0	
13:41:14	57.7	0	0	
13:41:15	58.1	0	0	
13:41:16	58.2	0	0	
13:41:17	57.7	0	0	
13:41:18	57.3	0	0	



Once the data is e-mailed open it up on destination device and analyse.

Parameter Analysis

Battery Voltage

The battery voltage is a real-time measurement of the current battery voltage. The battery voltage is averaged by the ECU and heavy loadings are not recorded currently. The battery voltage only shows the no-load voltage of the battery, which is used to determine actual battery capacity.

Total Motor Current

This is a measurement of the total motor current in Amps as an instantaneous measurement. The battery current will be positive when driving the motors and will go negative during regenerative braking.

Front/Rear Motor Current

Shows the current loading of each motor in Amps. Positive when driving and negative during regenerative braking.

Front/Rear Motor RPM

This is the mechanical RPM of the motor, and is directly proportional to the speed of the bike. To calculate the bike speed, use the following equation.
Speed(kph) = RPM / xxxxx

Throttle Voltage

The throttle uses a 0 to 5V signal to request power from the motors. This number shows the current voltage from the throttle. A faulty throttle will show a voltage outside the range of 0.8-4.2V.

Status Flags

The status flags are a hexadecimal number showing the state of the bike. This is a 32-bit number that can represent 32 independent states.
To analyse this number, convert the hex (0x) number into binary (0b) and then correlate the individual bits to their bit position to see what state is represented.
E.g., 0x00000031 = 0b00000000000000000000000000110001
In this case bit0 is 1 (lowest significant bit), and bit31 is 0 (highest significant bit).

Front/Rear Motor Temperature

This the is temperature of the motors in degrees Celsius. The temperatures are valid when the bike state is in RUN.

Front/Rear Motor Controller Faults

These are the faults reported by the controllers. See the UBCO fault diagnostics chart for analysis.

Front/Rear Motor Controller Warnings

These are the warnings reported by the controllers. See the UBCO fault diagnostics chart for analysis.