RSiAJP User Manual

1. English

1.1 Disclaimer

The author of the application will accept no liability whatsoever for any damage to the car, engine or ECU resulting from the use of the application. By running the application you accept full responsibility of any potential consequences.

1.2 Introduction

RSiAJP is an iOS application for TVR cars equipped with the S6 and V8 AJP engines and which connects to the MBE941 and MBE970 ECUs via a Serial-Bluetooth adapter in order to display real-time information from the ECU.

The application is compatible with all iPhones and iPads provided their iOS version is 10.3 as a minimum. The application is fixed to run in landscape mode.

Connection Schematic

2.1.1 Application features

There are two versions of the application. The lite version is limited in functionality but exists in order to enable you to try the application and Bluetooth connectivity prior to purchasing the full application.

2.1.1.1 RSiAJP Lite

RSiAJP Lite connects to the ECU just like the full version, it however only shows RPM data from the ECU along with your travelling speed calculated using the device's onboard GPS.

The lite version has the same screens as the full application, however other than the first one, all others show simulated data.

Feature list:
- Bluetooth
    - Automatic connection/reconnection
    - Manual disconnection/reconnection
- Status
    - Bluetooth connection status
    - ECU connection status
    - Simulation mode
- Display values
    - RPM
    - GPS Speed (in MPH or KPH)
- Settings
    - Enable metric speed indication
    - Choose or override auto-detection of engine type (V8 or S6)
    - Enable ECU simulation
    - Bluetooth adapter type selection
        - Arduino behaviour selection
    - Default email address to send logs to
    - Connected bluetooth device information
    - Download user manual
    - About the application

2.1.1.2 RSiAJP

The full version extends the RSiAJP Lite application and has no limitations and provides the same features as other TVR diagnostics applications including resetting the ECU's faults, adaptives, service interval and throttle. The display of adaptive maps is however not currently supported.

Feature list:
- Bluetooth
    - Automatic connection/reconnection
    - Manual disconnection/reconnection
- Status

- - Bluetooth connection status
    - ECU connection status
    - Simulation mode
- Start/Stop data logging
- Export via email
    - Data Log
- Display values
    - RPM
    - GPS Speed (in MPH or KPH)
    - Coolant temperature (Water temperature)
    - Battery voltage
    - Throttle pots
    - Lambda
    - Adaptives
    - Air temp
    - Oil Pressure (if available from ECU)
    - Barometric pressure
    - Live barometric sensor fault
    - Live battery fault
    - Live water temperature sensor fault
    - Live air temperature sensor fault
    - Live throttle potentiometer sensor faults (1 and 2)
    - Live lambda faults (1 and 2)
    - Live crank wiring switched fault
    - Live crank sensor signal fault
    - Live AFR fault (A and B)
    - Live fan status (1 and 2)
    - Live fuel pump status
    - Acceleration in G
    - Lateral G
    - Current time
    - Latitude
    - Longitude
    - Heading
    - Altitude
    - GPS Status
    - Vertical GPS accuracy
    - Horizontal GPS accuracy
    - Logged lambda faults (1 and 2)
    - Logged battery fault
    - Logged air temperature sensor fault
    - Logged throttle potentiometer fault (1 and 2)
    - Logged water temperature sensor fault
    - Logged barometric sensor fault
    - Ignition advance
    - Lambda control
    - Lambda 1 control
    - Lambda 2 control
    - Fuel Cut control

- o Water control
- o dThrottle control
- o dSpeed control
- o WarmUp timer control
- ECU Resets
  - o Reset adaptive maps
  - o Reset service interval
  - o Reset faults
  - o Reset Throttle (S6 only)
- Record live ECU and GPS data
- Settings
  - o Enable metric speed indication
  - o Enable remember last screen
  - o Enable swipe or tap to change screen
  - o Enable display oil pressure
  - o Choose or override auto-detection of engine type (V8 or S6)
  - o Enable ECU simulation
  - o Bluetooth adapter type selection
    - ▪ Arduino behaviour selection
  - o Default email address to send logs to
  - o Connected bluetooth device information
  - o Download user manual
  - o About the application

2.2 GPS behaviour and background modes

Location services are used as soon as the application is started, they are stopped when the application is backgrounded and restarted when the application is brought to the foreground.
However if data logging is enabled, the application will maintain location services while in the background.

2.3 Bluetooth behaviour and background modes

Upon startup, the application will automatically attempt to connect to the adapter, and will continue to do so until successful unless the simulation mode is selected.

When the application is sent to the background, the Bluetooth connection will be terminated until the application is brought to the foreground, except if data logging is enabled in which case the Bluetooth connection will be maintained while the application is running in the background.

2.4 Supported Bluetooth Adapters

Note: There may be other Serial-Bluetooth adapters available, however due to the nature of the Bluetooth connectivity, only supported adapters will work. Do not attempt to use another adapter, it is highly unlikely this will work.

2.4.1 US Converters BLE232 version 4.1

This device is available to purchase online from U.S. Converters LLC (http://www.usconverters.com/bluetooth-smart-ble-low-energy-serial-rs232)

- **Male-Male gender changer**
  A male-male DB9 gender changer may be required in order to connect the adapter to your ECU's serial port. The adapter has a female connector.

- **Configuration prior to use**
  Please configure your device as per the image below. The application sets up the device with the appropriate baud rates, etc… over Bluetooth upon connection.
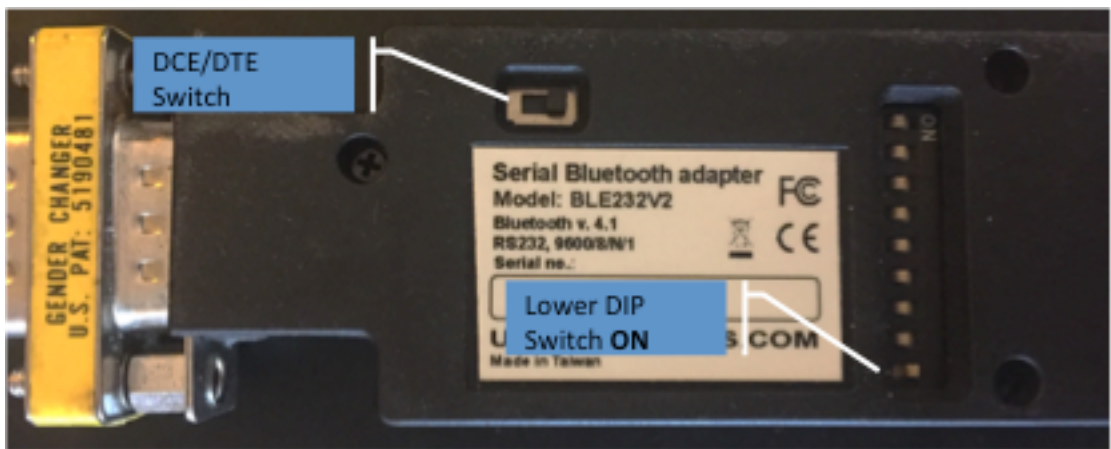
  The bottom DIP switch needs to be set to ON and the DCE/DTE switch to the right.

- **Powering the converter**
  The converter may be powered in *only* one of three ways:
  - USB Adapter: A mini USB socket on the side of the adapter enables it to be powered from a USB cigarette lighter outlet or portable USB battery pack through the supplied USB cable.
  - Directly through its power terminal: Alternatively, you may power the unit directly from the car's battery (ensure the supply is appropriately protected by a fuse) by connecting power wires to the screw terminal on the side of the adapter.
  - Via the serial port: Finally, power can be supplied through the serial port (+ on pin 9 and – on pin 5). However this would require modifying the car's wiring to suit and may create issues when connecting other serial devices to the ECU (computer, serial-USB adapter). *This isn't the recommended or preferred solution.*

2.4.2 Arduino project

Besides providing a Bluetooth-serial interface to the ECU, this Arduino project generates OBD-II compliant data for use by other data logging apps such as Harry Lap Timer.
(This project is still in development and testing at the time of writing)

3.1 Screens overview

3.1.1 Description of common screen elements

The annotated screen below describes the user interface in general, each screen will show specific data values, however the tool bar and indicators are common to all screens
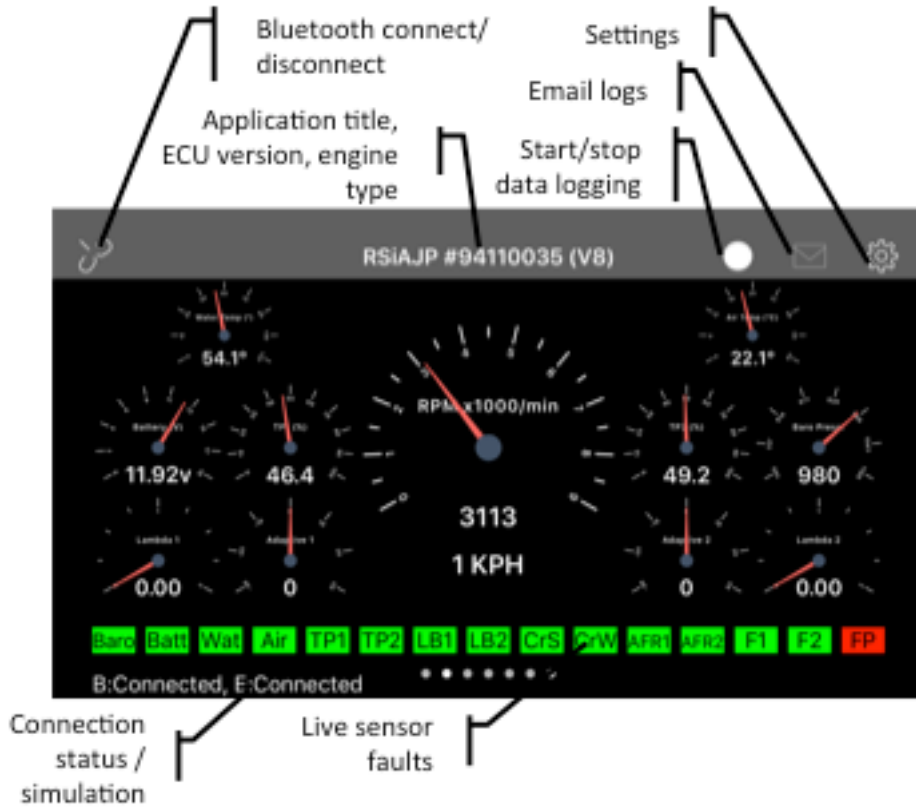
3.1.1.1 Bluetooth Connect/Disconnect

Applies to: Both application versions

When enabled, this button enables you to connect or disconnect the Bluetooth connection to the adapter.

3.1.1.2 Application title, ECU version and engine type

Applies to: Both application versions

This shows the application's title (RSiAJP-Lite or RSiAJP) along with the discovered ECU's version details and the currently selected engine type.
The application automatically attempts to identify the engine type (S6 or V8) using the ECU's version number, however this is not guaranteed to be reliable.
Should the engine type show an incorrect value (e.g. V8 for S6), or simply "Unknown", you can force the engine type in the application's settings.

3.1.1.3   Start/Stop data logging

Applies to: RSiAJP only

Touch the white button to start data logging. The button will turn red while logging is happening. Touch the red button to stop logging.
You may start and stop logging at any time, new logs will be added to older ones.

Data logging is dependent on a successful Bluetooth connection as well as a connection to the ECU, if either is unavailable, no data will be logged (not even GPS).

Note: Enabling data logging results in the application using Bluetooth and GPS when in background mode, this could have an impact on your device's battery usage.

3.1.1.4   Export Logs via Email

Applies to: Both application versions (only RSiAJP supports data logging export)

The email button enables itself as soon as the application detects there is data available in the data logs.

Touching the button will create an email with one attachment and prompt you to confirm the recipients before sending the email.

Once the email has been sent successfully, log data will be deleted from the application.

Note: a default recipient can be set in settings.

Privacy Note: The data log contains your location (GPS Coordinates) at the time of logging, you may wish to remove this data prior to sharing the file with anyone.

3.1.1.5   Settings

Applies to: Both application versions

This button opens the settings screen.

3.1.1.6   Connection status/simulation

Applies to: Both application versions

This area of the screen indicates the state of the Bluetooth and ecu connections, available states are:

Status	Description
Simulation	ECU data on screen is being simulated, the Bluetooth connection is automatically disabled in

Status	Description
	this mode
B:Scanning	Scanning for the Bluetooth adapter
B:Connected	Connected to Bluetooth
B:Connected (device)	Connected to the Bluetooth adapter
B:Connected (service)	Connected to the adapter's service
B:Connected (service info)	Connected to the adapter's info service
B:Connecting-Pause	Pause while attempting to connect
B:Connected, E:Connected	Bluetooth connection setup, data is being received from the ECU
B:Connected, E:Timeout	Bluetooth connection setup, no data received from the ECU
B:Disconnected	Disconnected from the Bluetooth adapter
B:Connection failed	An error occurred during the connection

3.1.1.7 Live sensor status

Applies to: RSiAJP only

This area of the screen indicates the state of the live sensor faults reported by the ECU, from left to right:

- Baro: Live barometric sensor fault
- Batt: Live battery fault
- Wat: Live water temperature sensor fault
- Air: Live air temperature sensor fault
- TP1: Live throttle potentiometer 1 sensor fault
- TP2: Live throttle potentiometer 2 sensor fault
- LB1: Live lambda 1357 fault
- LB2: Live lambda 2468 fault
- CrS: Live crank sensor signal fault
- CrW: Live crank wiring switched fault (red if wiring switched)
- AFR1: Live AFR A fault
- AFR2: Live AFR B fault
- F1: Live fan 1 status (Red if on, green if off)
- F2: Live fan 2 status (Red if on, green if off)
- FP: Live fuel pump status (Red if on, green if off)

Green indicates no fault, Red indicates a fault has been detected by the ECU.

Note: In the case of live fan and fuel pumps, Red indicates the fans or fuel pump are turned on (not a fault)

4.1.1 Settings

4.1.1.1 Metric speed indication

Applies to: Both versions

Changes the road speed gauges and text displays to KPH from MPH.

4.1.1.2 Remember last screen

Applies to: RSiAJP only

Returns to the last displayed screen when the application is restarted.

4.1.1.3 Choose to swipe or tap

Applies to: Both versions

Moving from screen to screen can be done either through a swipe (left to right or right to left), or by tapping the edge of the screen.
Note: The app must be restarted for the change to take effect.

4.1.1.4   Display oil pressure

Applies to: Both versions

Some ECUs make the engine oil pressure available as live data. You can enable this to appear in the displays if you wish.
Note: If the oil pressure remains at 0, it is very likely your ECU doesn't provide the data to the app.

4.1.1.5   Engine type

Applies to: Both versions

The application will attempt to automatically determine the type of engine the ECU is connected to (V8 or inline 6). This will appear in the title of the application (top of each screen). If the application shows "(Unknown)" it means it hasn't been able to make that determination, you may therefore want to set your engine type accordingly.
Note: There are no application behaviour differences should the engine type be different, it is purely a display item.

4.1.1.6   Simulate ECU

Applies to: Both versions

On the occasion that you'd like to demonstrate the application to a friend, but don't have access to your car, you may show off by enabling the simulation mode. This provides simulated cyclical data to the application, rather than data from the ECU.
Note: In the RSiAJP Lite version, all screens except the first show simulated data automatically, even if an ECU connection is present.

4.1.1.7   ECU adapter

Applies to: Both versions

This enables you to select which Bluetooth Low Energy adapter you would like the application to attempt to connect to. At the time of writing only the US Converters BLE232 v4.1 adapter is supported.

A project involving an Arduino based solution to replace the US Converters adapter is under way, this will enable additional facilities such as providing a data stream to Harry's Lap Timer, a popular iOS application for trackday enthusiasts. The data stream consists of RPM, Throttle Position, Water and Air

Temp so that it can be overlaid on top of videos recorded with the Lap Timer application.
Full support for this will be enabled in the RSiAJP application once the Arduino project is complete.

4.1.1.8 Logging – email address

Applies to: Both versions

After enabling data logging in the application, you may mail the logs from within the application. This field if completed will automatically be added to the TO: address of the email to save you typing it every time.

Note: Although this field is enabled in both versions, logging isn't available in RSiAJP Lite application, so completing this field in RSiAJP Lite will have no effect.

4.1.1.9 Bluetooth device info

Applies to: Both versions

When connected to a Bluetooth-Serial adapter device, this will show you the device's version number, firmware revision and Bluetooth mac address if available. This is for information purposes only, but may be useful when reporting bugs just in case your version/firmware revision has not been tested by the application developer.

4.1.1.10 Download and open PDF

Applies to: Both versions

Fetches this user guide from rsiajp.scullard.com and displays it in Safari. You may then open it in iBooks for future reference.
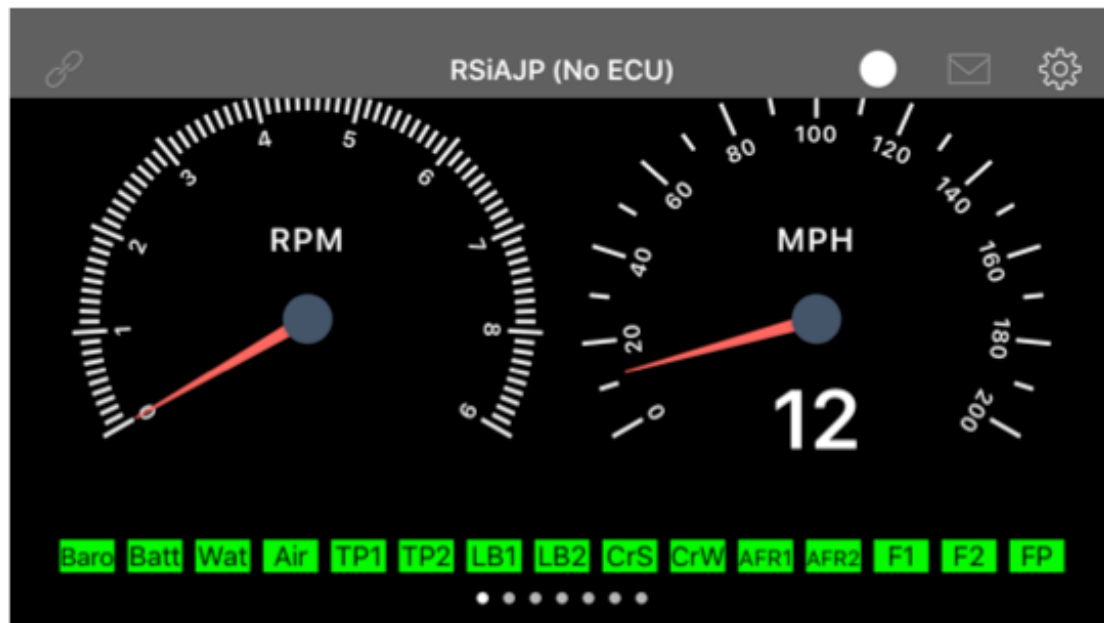
4.1.1.11 Version and acknowledgments

Applies to: Both versions

Self explanatory I'm sure you will agree.

5.1.1 Dashboard screens

5.1.1.1 Simple dashboard
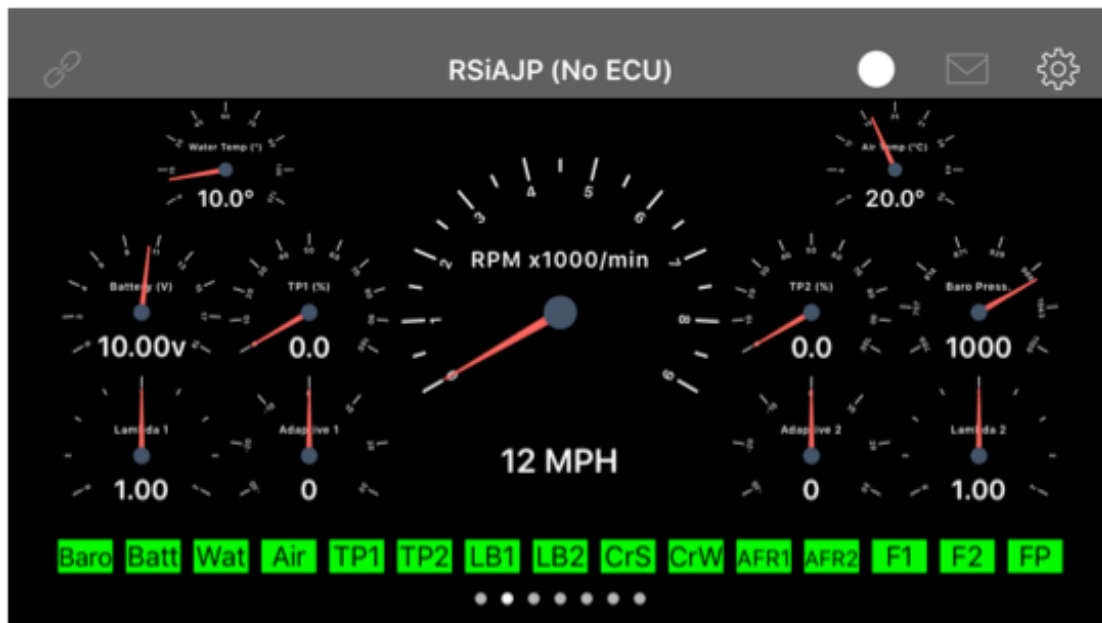*Applies to: Both versions*

Shows RPM, road speed and live faults when connected to the ECU.
Note: The faults display isn't available in RSiAJP Lite.
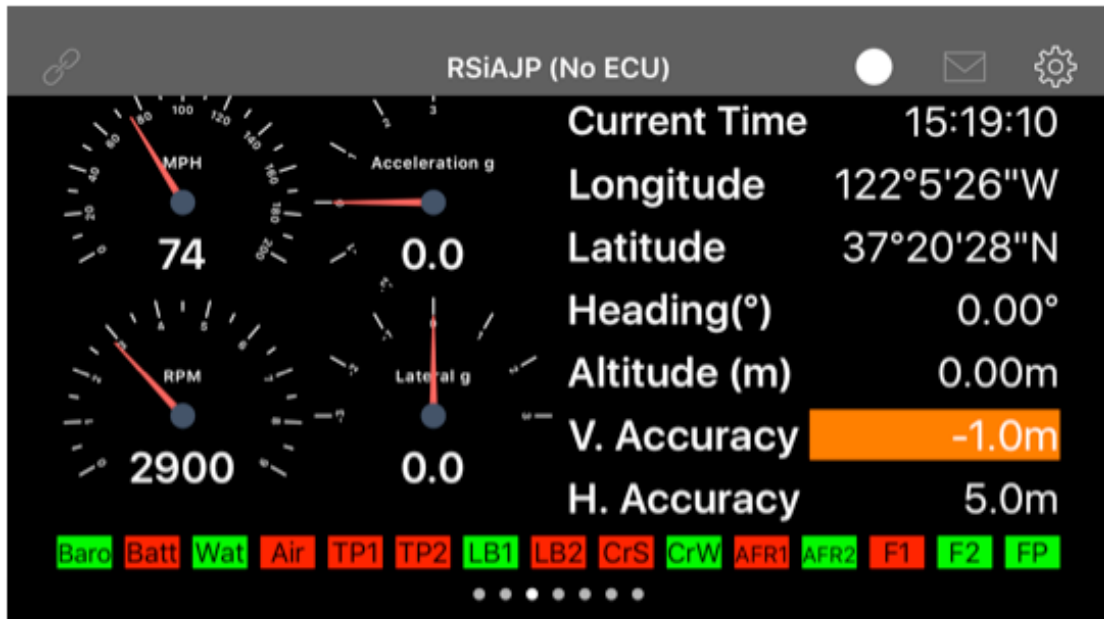
6.1.1.1 Engine operation overview
Applies to: Both versions (simulated in RSiAJP Lite)

A more complete set of data providing an overview of the engine's operating characteristics.

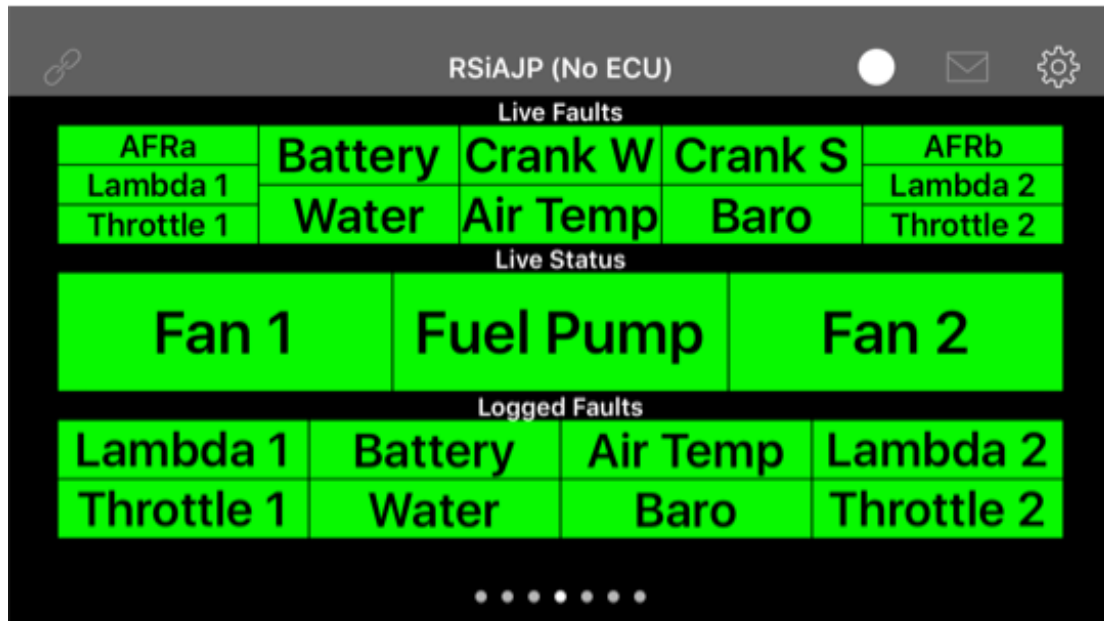### 7.1.1.1 Off road or Japanese dash
Applies to: Both versions (simulated in RSiAJP Lite)

Should you find yourself lost in the middle of nowhere, this screen provides a complete GPS fix, as well as G readings to check out your car's handling and acceleration.

8.1.1.1 Faults dashboard
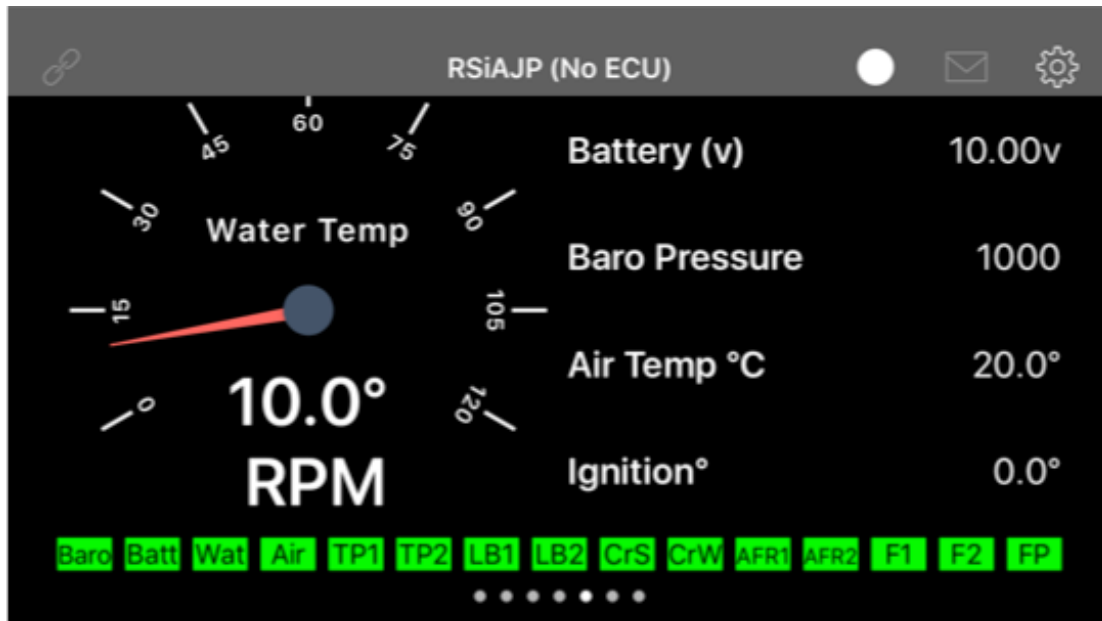*Applies to: Both versions (simulated in RSiAJP Lite)*

Live and logged faults at a glance, along with fans and fuel pump status.
Green indicates ok for faults, Red indicates a fault is present.

Red for fans or fuel pump indicate they are running.
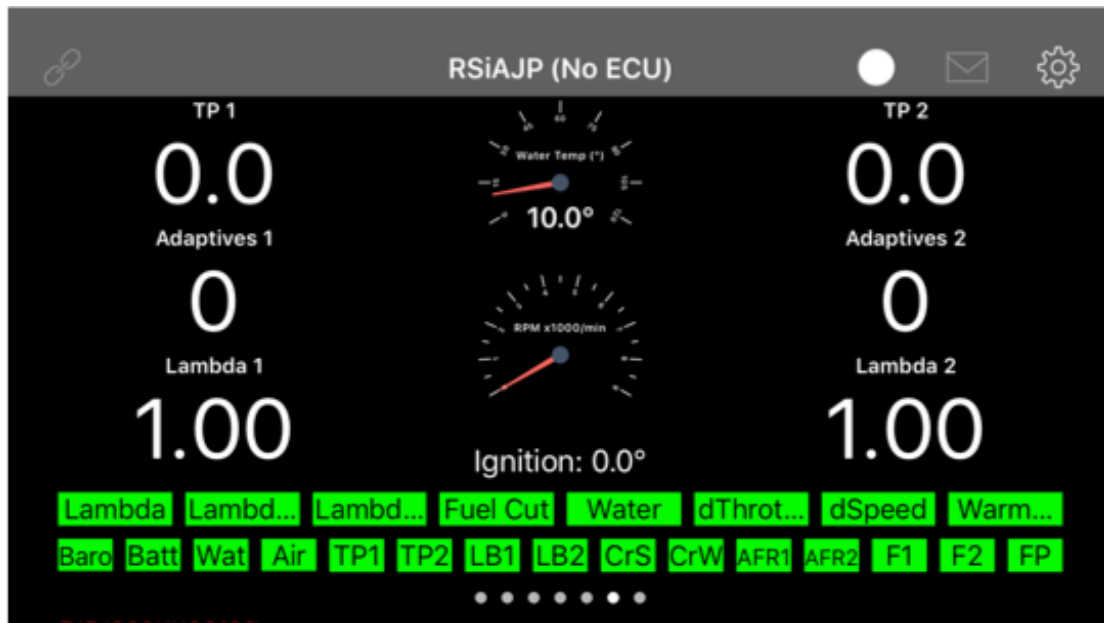
9.1.1.1 Temperatures dashboard
Applies to: Both versions (simulated in RSiAJP Lite)

Water and intake air temperatures, along with barometric pressure and ignition advance.

*Applies to: Both versions (simulated in RSiAJP Lite)*

This screen is particularly useful for setting up the throttle position sensors on the V8, providing all the inputs you need at a glance.

Note that in addition to faults at the bottom, a row of control indicators are also visible here. The control indicators show more insight into the ECU's decision making (from left to right):

Control Value	Meaning if red	Meaning if Green
Lambda control	Disabled	OK
Lambda 1 control	No Control	OK
Lambda 2 control	No Control	OK
Fuel Cut control	No Control	OK
Water control	No Control	OK
dThrottle control	No Control	OK
dSpeed control	No Control	OK
Warm up timer	No Control	OK

11.1.1.1 ECU resets

Applies to: Both versions (reset options visible but disabled in RSiAJP Lite)
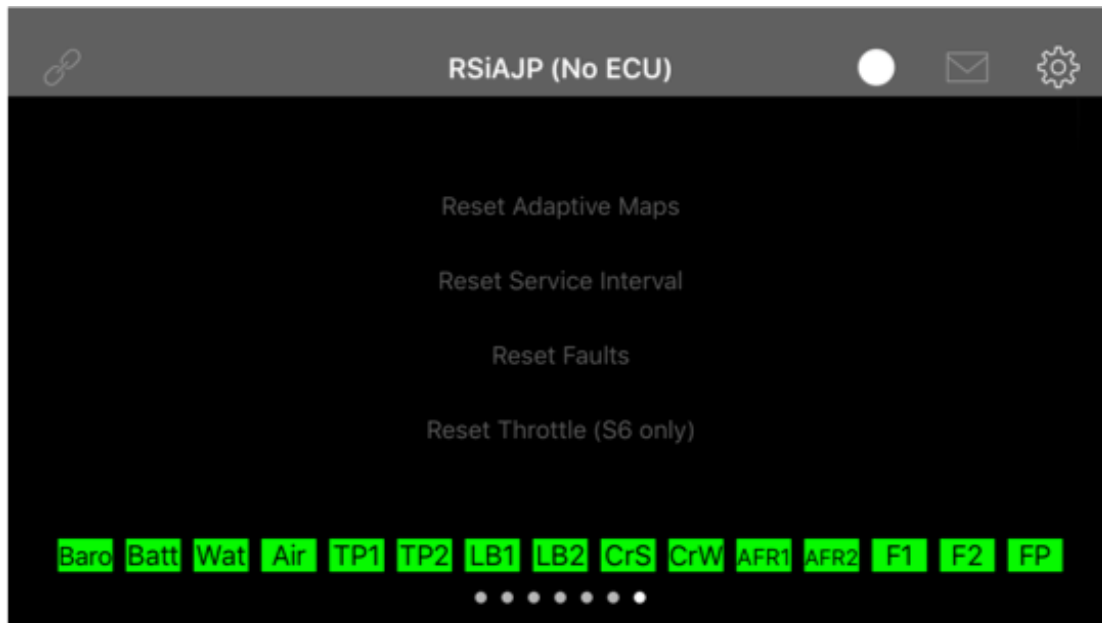
This screen enables you to reset various aspects of the ECU, all resets are disabled (grey) unless the application is connected to the ECU in which case the resets will appear in white.

- Reset adaptive maps: Resets the adaptive maps, forcing the ECU to recalculate them, particularly useful when setting up throttle position sensors
- Reset service interval: Resets the service interval
- Reset faults: Resets all logged faults
- Reset throttle: This only applies to the S6 engine and is used to make the ECU "learn" the closed values of throttle position sensors.