

# LH Replacement ECU User Manual

*17 March 2013*

Prototype Version

*Francois Louw*

## Table of Contents

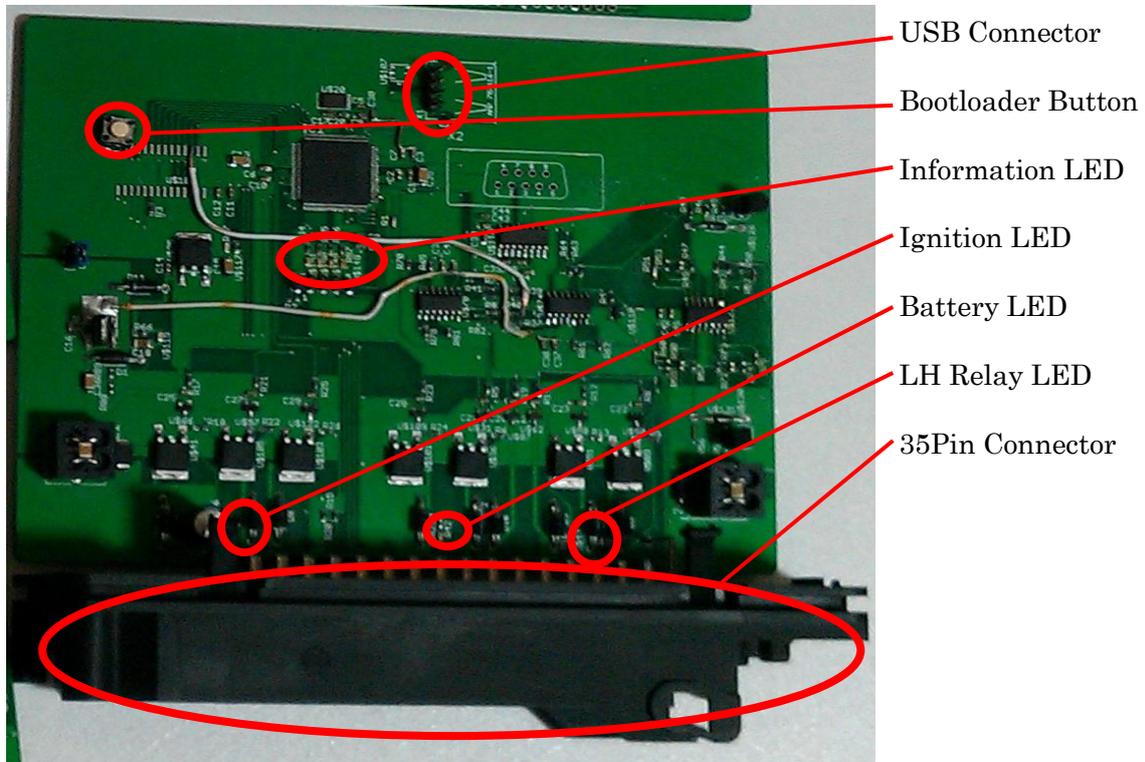
---

Board Description .....	4
USB Connector .....	4
Bootloader Button .....	4
Information LED .....	4
Ignition LED .....	4
Battery LED .....	5
LH Relay LED .....	5
Bootloader Mode.....	5
Bootloader Software .....	5
Entering Bootloader Mode.....	5
Troubleshooting .....	6
No device found.....	6
Verification Failed .....	7
After update ECU stuck in Bootloader mode .....	7
Interface Software.....	7
Drivers.....	7
Software .....	8
Communication.....	8
Read Data from File .....	9
Save Data to File .....	9
Read Data from ECU.....	9
Send All Data to ECU.....	9
Save Data on ECU .....	9
Automatically Update Changes.....	9

COM1-COM9.....	10
Connect.....	10
Disconnect .....	10
Connection Timeout.....	10
Update Speed .....	10
Automatic reconnect.....	10
Troubleshooting .....	12
My COM port number changes.....	12
My COM port number is bigger than 9.....	12
There is no COM port.....	12
Using Interface Software.....	12
Basic Usage.....	12
Loading Fuel Map.....	13

## Board Description

The following is a list of the input and outputs of the LH Replacement ECU.



### USB Connector

The USB connector is used to interface with the Bootloader software and the Interface software.

### Bootloader Button

This button is used to enter the Bootloader mode of the ECU. This is used to update the firmware of the unit. The engine will not inject when in this mode and is only used to update the firmware.

### Information LED

4 LEDs are used to indicate the state of the engine and in what mode the ECU is operating.

### Ignition LED

This LED is on when there is power when the Ignition is switched on.

## Battery LED

This LED is on when the battery is connected.

## LH Relay LED

This LED indicates the state of the LH Relay. If the LED is on then the LH Relay is functioning and there is power on the injectors and the fuel pump.

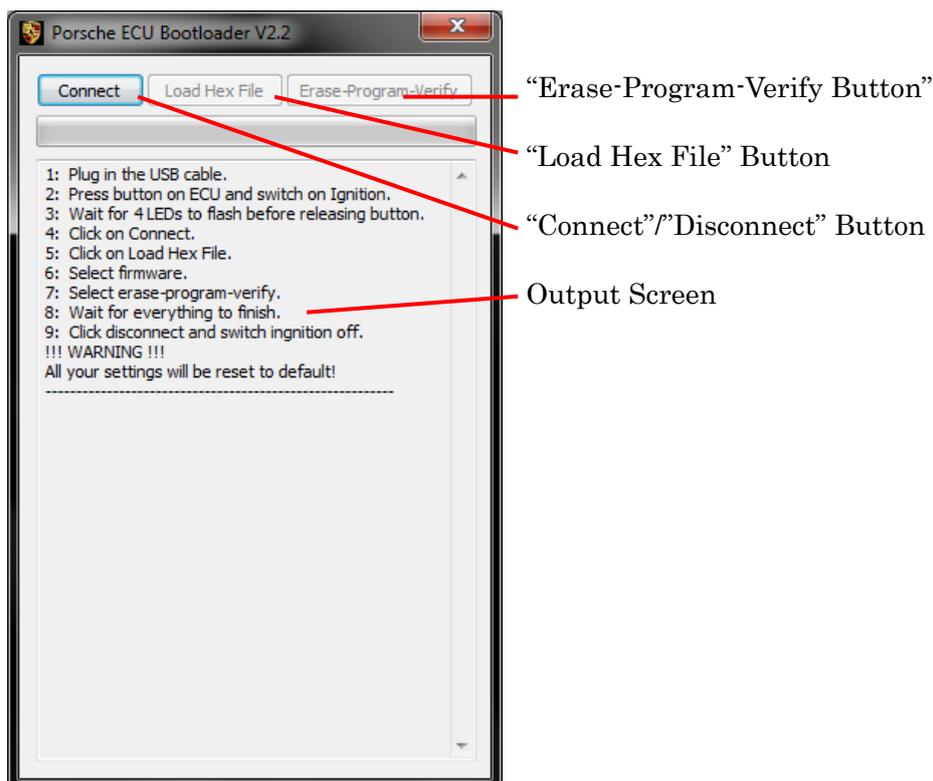
## Bootloader Mode

---

Use this mode to update the firmware.

**IMPORTANT: When updating firmware all settings and fuel maps will be lost. Backup the data with the Interface Software first before updating firmware.**

## Bootloader Software



## Entering Bootloader Mode

Ensure that the ignition is switched off, and the 35Pin connector is plugged in, the USB is plugged into a compatible computer and that there is power on the battery.

1. Switch Ignition Off.

2. Press and hold the Bootloader button.
3. While holding the Bootloader button switch ignition on.
4. Wait for all 4 Information LEDs to flash simultaneously.
5. **If the LEDs do not flash then the system is not in Bootloader mode. Try again from step 1.**
6. Ensure that the USB cable is connected.
7. Launch the Bootloader Windows software.
8. Windows will detect new hardware and no drivers are necessary.
9. In the Bootloader software click on the “Connect” button.
10. When the device has successfully connected, click on the “Load Hex File” button.
11. Select the new firmware and click on “Open” in the file dialog box.
12. Click on “Erase-Program-Verify” button to start the firmware updating procedure.  
This will take approximately a minute to finish.
13. Ensure that “Verification Successful” is shown in the output window.
14. Click on “Disconnect”.
15. Switch ignition off.

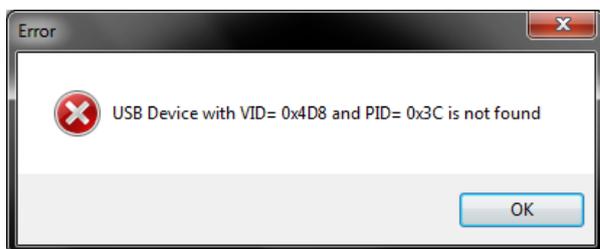
Your ECU firmware is now updated and the car can be used as normal. It is recommended at this point to use the Interface software to update the fuel map and the saved settings.

**NOTE: Make sure the correct version of the Interface Software is used with the new firmware. Updates to the firmware can lead to incompatibilities with previous interface software.**

## Troubleshooting

Common problems and solutions are given here.

### No device found



This error is caused when the Bootloader cannot communicate with the ECU. Check the following:

- The ECU 35Pin connector is firmly plugged in.
- Ignition is on.
- The 4 information LEDs flash.
- USB is firmly connected.
- USB Cable is functioning.
- In Windows Device Manager under “Human Interface Devices” there is a “USB Input Device” with Vendor ID 0x04D8 and Device ID 0x0x003C.

## Verification Failed

This is when an error occurred while programming the device. Ensure that you are using a valid firmware image and that the image is not corrupt.

## After update ECU stuck in Bootloader mode

After a firmware update when switching ignition on without pressing the Bootloader button, all 4 LEDs flash and cannot start the car. This is caused by an invalid firmware update. Update the firmware again; ensuring that the correct firmware for the ECU board revision is used.

## Interface Software

---

The Windows Interface software will be discussed in this chapter.

**NOTE:** Ensure that you are using the correct version of the Interface software with the current firmware of the ECU.

### Drivers

The ECU requires drivers to be installed the first time it is plugged into a computer. Currently only Windows drivers are supported. Windows XP/Vista/7/8 is supported in both 32bit and 64bit.

The ECU will create a USB to Serial interface on the computer. A new “USB Communication Port (COM?)” will be created after the drivers are installed. Please take note of the COM port number as this will be needed in the Interface software configuration settings.

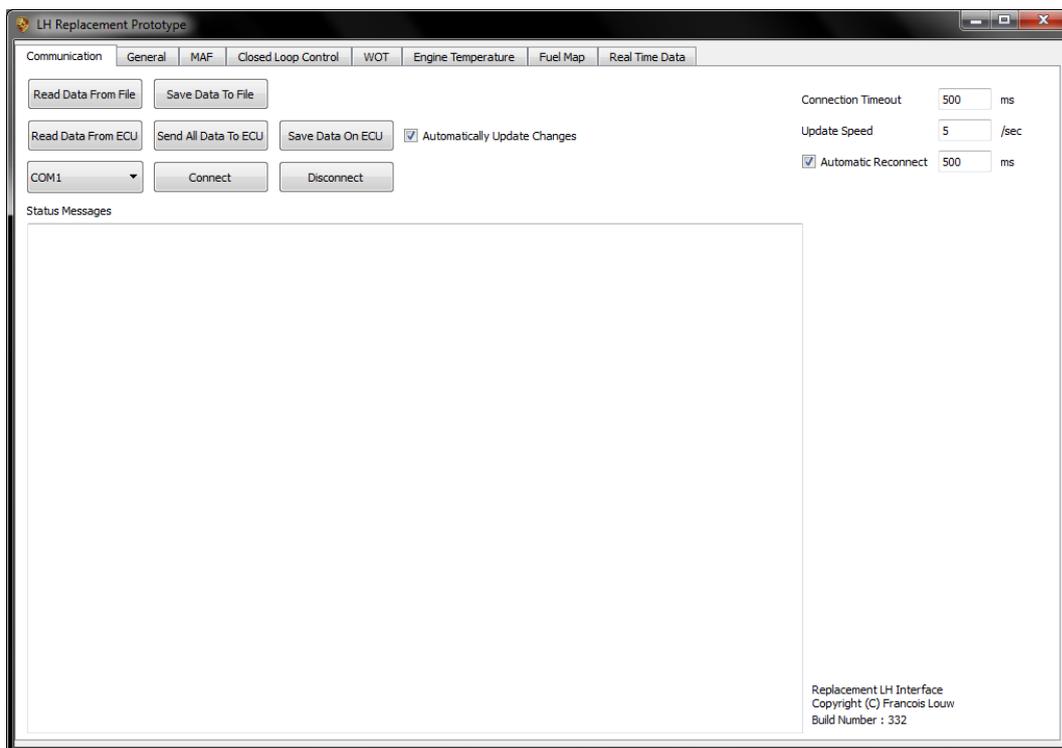
## Software

The Interface software is divided in the following sections:

1. Communication.
2. General.
3. MAF.
4. Closed Loop Control.
5. WOT.
6. Engine Temperature.
7. Fuel Map.
8. Real Time Data.

## Communication

This screen is used to configure how the Interface software communicates with the ECU.



The following buttons and text fields are described.

## Read Data from File

This loads saved data from a file. Use this to load data from a fuel map into the interface software. When the data is read it is **not** transmitted to the ECU but is only displayed in the Interface software.

## Save Data to File

This button is used to save the contents of the Interface software to a data file that can be later used to upload to the ECU. This data is the current data that is displayed in the Interface software and may be out of date of the actual values in the ECU.

## Read Data from ECU

This reads the current set of data from the ECU. This will read the complete map of the ECU and display it in the Interface software.

## Send All Data to ECU

This button transmits all the data in the Interface software to the ECU. Use this after loading data from a file to update the ECU values. This takes a few seconds to update the data

## Save Data on ECU

All the changes that are made to the ECU are only temporary and will be lost when the Ignition is turned off. By clicking on this button the current values **in the ECU** will be saved to non-volatile memory. The next time the ignition is switched on these values will be used.

## Automatically Update Changes

When this option is selected changes made by the user will be sent to the ECU automatically. This will **not** send changes made when loading a file from disk, only changes made manually.

## COM1-COM9

Use this to select the appropriate COM port. The ECU uses a USB to serial interface and when plugged in a serial port will be available. Check in Windows Device Manager what the COM port number is and select the correct one here.

## Connect

Use this button to establish a connection to the ECU. This connection will depend on the connection settings. When a valid connection is made and the Automatic Reconnect option is selected then the Interface software will reconnect every time the ignition is switched off and on. It is not necessary to click on reconnect every time.

## Disconnect

This disconnects the Interface software from the ECU and stops automatically trying to reconnect if selected.

## Connection Timeout

This value is the time in milliseconds that the connection will timeout if no data is received. The interface software attempts to keep an active connection but when no response is received in the given time then the connection will be terminated. If the “Automatically Reconnect” option is selected the Interface software will attempt to make a connection again.

## Update Speed

This is the speed at which the Interface software updates the real time data. A value greater than 20 can result in lag on the bus and will degrade performance.

## Automatic reconnect

When this option is selected the Interface software will attempt to reconnect once an active connection was made. The time interval can be changed but it is recommended to keep it at 500ms. This will only reconnect once a valid connection has been made before

and will stop once the Disconnect button has been pressed. This option can be deactivated.

## Status Messages

This text box will provide information on communication between the Interface software and the ECU. Errors, Information and warning messages will be displayed here.

When connecting to an ECU the current firmware build number is displayed. This can be used to verify that firmware updating was successful.

## General

General settings of the ECU map is adjusted here

## MAF

The Mass Air Flow settings are adjusted here

## Closed Loop Control

**IMPORTANT! Do NOT enable the Closed Loop Control setting!!! This is still highly unstable and in beta phase and will probably result in flooding the engine almost instantaneously!!!**

## WOT

Wide Open Throttle enrichment settings can be found here.

## Engine Temperature

Engine Temperature enrichment map is adjusted here. Currently the ECU is not calibrated correctly.

## Fuel Map

Fuel Map adjustments are done here. If automatic updates are selected then after changing a value it will automatically be sent to the ECU. **NOTE: You cannot change a value currently being used by the ECU.** The current value being used is colored in red.

## Real Time Data

This tab shows the Real Time Data currently read from the ECU.

## Troubleshooting

Common problems and solutions will be discussed here

### COM port number changes

Every time the ECU is plugged into a different USB port on the computer a new COM port will be assigned. To keep the COM port number the same, use the same USB port. In Windows Device Manager the COM port number can be changed if needed.

### COM port number is bigger than 9

Currently only up to port COM9 is supported. Please change the COM port number in Windows Device Manager

### There is no COM port

Make sure of the following

- The ECU 35Pin connector is firmly plugged in.
- Ignition is on.
- USB is firmly connected.
- USB Cable is functioning.
- Drivers are installed for the device.
- There are no interference on the USB Cable (Cable does not go close to Injector wires or wires directly connected to the Alternator).

## Using Interface Software

How-to use the software

### Basic Usage

The following steps are a basic guide on how to use the system.

1. Plug USB in computer and start the car
2. Connect with Interface software
3. Click on “Read Data From ECU”
4. View Real Time Data
5. Modify fuel map and other settings
6. Click “Send All Data To ECU” to ensure that the ECU has all the information
7. Click “Save Data On ECU” to save the mapping on non-volatile memory

There are limits on the amount of times that data can be saved on the ECU. It is advisable to only save the data to non-volatile memory after all the necessary changes are made.

## Loading Fuel Map

These steps assume that you have received a new fuel map from someone or have an old map that you want to re-upload on the ECU.

1. Plug USB into Computer
2. Switch Ignition On. **Do not start the car**
3. Connect with Interface software
4. Click “Read Data from File” and open the file
5. Click on “Send All Data to ECU”
6. Click on “Save Data on ECU”
7. Ignition off.

The car can now be used normally and the map should be saved on the ECU non-volatile memory.