Application Note:
Using EcuFlash and Tactrix OpenPort with LogWorks

Important Disclaimer

This application note describes some of the basics of using an Innovate LC-1 (or LM-1), Innovate LogWorks software, the Tactrix OpenPort cable, and the EcuFlash software (available as part of the OpenECU project. By installing the software, you understand that Innovate is NOT responsible for the OpenECU project, for EcuFlash, or for any other 3rd party product. Most importantly, you agree that you are tuning your car at your own risk. Data logging is generally very safe. Re-flashing, while powerful, can render your ECU non functional. Follow all directions, read, think, and don't blame us if you corrupt your ROM or destroy your engine.

Introduction

Using an Innovate wideband (LC-1 or LM-1) with EcuFlash is easy and powerful. With the EcuFlash plugin for LogWorks, "channels" from your ECU (engine control unit) can be logged synchronously with channels from the Innovate modular tuning system (MTS). This can be as simple as 2 channels (i.e., air/fuel ratio plus RPM), or very complex (up to 32 channels maximum).

With the OpenPort bundle you can Datalog from OBD2 ISO 9141 (Chrysler, European, and Asian) vehicles. OBD2 (On Board Diagnostics, version 2) covers multiple protocols. ISO9141 is one of them.

The EcuFlash plugin appears to LogWorks as a "virtual device." This device generates packets of data 12 times per second, regardless of the speed of update from the ECU. Depending on your particular vehicle, you can expect to get various data rates from the ECU. The supported protocols are SSM (Subaru), MUT (Mitsubishi), and OBD2 (ISO 9141 and ISO-14230). With SSM and MUT, enhanced data rates are supported. With OBD2, depending on the vintage of the vehicle, and how many parameter IDs (PIDs) you are trying to log, data rates can be relatively slow.

It is also possible to reflash most popular late model Subaru and Mitsubishi cars (2001+), including WRX and Evo**.**

Basic Steps (Logging and Flashing)

The basic steps are:

1. Install the wideband and all of the software

    - Install the latest version of LogWorks from Innovate (www.tuneyourengine.com)
    - Follow the instructions in the LC1 manual for installing the WB02 sensor and controller
    - Install the latest version of EcuFlash (www.openecu.org), this will also install the latest drivers for you Tactrix OpenPort cable

2. Read the stock ROM off your car using EcuFlash and save to a safe place
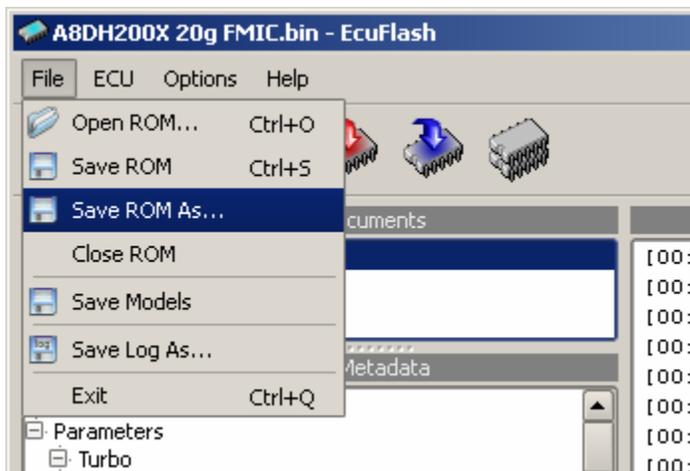
    - Attach the Tactrix OpenPort cable to your computer
    - Run EcuFlash
    - Attach the Tactrix cable to your vehicle's OBD-II port
    - Select the "Read from ECU" option from the "ECU" menu
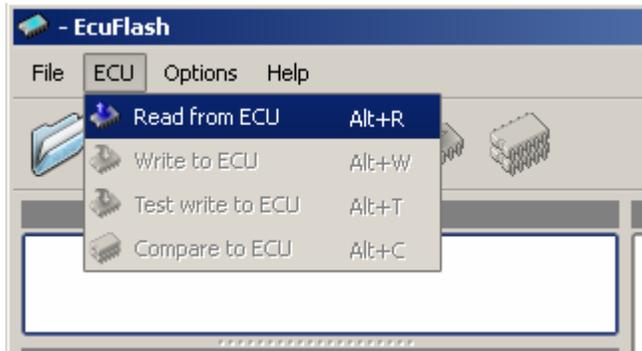
    - The select the appropriate vehicle type and 'Read', the follow the program prompts

3. Save a master copy of your ROM using the "Save ROM As…" option in the "File" menu

4. - It is **highly recommended** that you mark this file as "**Read Only**" and put a copy on a CD or another **safe** place
5. Save a working copy of your ROM using the "Save ROM As…" Option
6. Examine the tables and parameters accessible in your ROM using EcuFlash this will give you an idea of what parameters, in addition to AFR you want to log

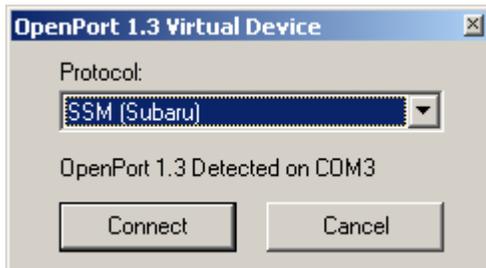**High Detonation Fuel B-A8DH200X 20g FMIC.bin**

Edit   Help

Engine Load (grams/cyl)

	0.35	0.55	0.70	0.87	1.00	1.15	1.25	1.35	1.45	1.60	1.70	1.80	2.00	2.20	2.50
800	14.70	14.70	14.70	14.70	14.70	14.70	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25
1200	14.70	14.70	14.70	14.70	14.70	14.70	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25	13.25
1600	14.70	14.70	14.70	14.70	14.70	14.70	14.70	13.25	12.80	12.80	12.80	12.80	12.80	12.80	12.80
2000	14.70	14.70	14.70	14.70	14.70	14.70	14.70	12.89	12.80	12.80	12.80	12.80	12.80	12.80	12.80
2400	14.70	14.70	14.70	14.70	14.70	14.70	13.84	12.80	12.46	12.38	12.22	12.14	12.06	11.98	11.83
2800	14.70	14.70	14.70	14.70	14.70	14.70	13.73	12.71	12.06	11.54	11.40	11.33	11.20	11.13	11.07
3200	14.70	14.70	14.70	14.70	14.70	14.70	13.63	12.63	11.98	11.40	10.94	10.81	10.63	10.51	10.34
3600	14.70	14.70	14.70	14.70	14.70	14.70	13.16	12.38	11.69	11.20	10.75	10.51	10.34	10.23	10.06
4000	14.70	14.70	14.70	14.70	14.04	12.98	12.46	12.06	11.54	11.07	10.75	10.45	10.28	10.12	10.01
4400	13.84	13.84	13.84	13.84	12.89	12.46	11.98	11.47	11.07	10.69	10.45	10.23	10.06	10.01	10.01
4800	13.84	13.84	13.63	12.71	12.46	11.69	11.33	11.00	10.88	10.63	10.40	10.17	10.06	10.01	10.01
5200	13.84	13.63	12.98	12.46	11.98	11.47	11.07	10.88	10.63	10.40	10.23	10.06	9.96	9.96	9.96
5600	13.84	13.16	12.54	11.98	11.47	11.07	10.75	10.51	10.34	10.01	9.96	9.96	9.96	9.96	9.96
6000	13.84	12.80	11.98	11.54	11.20	10.88	10.63	10.23	10.01	9.96	9.96	9.96	9.96	9.96	9.96
6400	13.63	12.38	11.61	11.47	11.20	10.75	10.34	10.12	9.96	9.96	9.96	9.96	9.96	9.96	9.96
6800	13.63	12.38	11.61	11.47	11.20	10.75	10.34	10.12	9.96	9.96	9.96	9.96	9.96	9.96	9.96
7200	13.63	12.38	11.61	11.47	11.20	10.75	10.34	10.12	9.96	9.96	9.96	9.96	9.96	9.96	9.96
7600	13.63	12.38	11.61	11.47	11.20	10.75	10.34	10.12	9.96	9.96	9.96	9.96	9.96	9.96	9.96

Engine Speed (RPM)

air/fuel ratio

7. Remove the Programming Jumper (if one was required in step 2) and start your vehicle.
8. Run the Tactrix Cable plug in for LogWorks from Programs \ LogWorks2 \ Extra Devices \ OpenPort 1.3
9. Select the appropriate protocol and Connect to your ECU

OpenPort 1.3 Virtual Device

Protocol:

SSM (Subaru)

OpenPort 1.3 Detected on COM3

[Connect]   [Cancel]

10. Select up to 10 ECU channels to log

OpenPort 1.3 Virtual Device

Selected Channels:

Engine Speed (RPM)
Engline Load (grams/cyl) (calculated)

[Add]   [Remove]

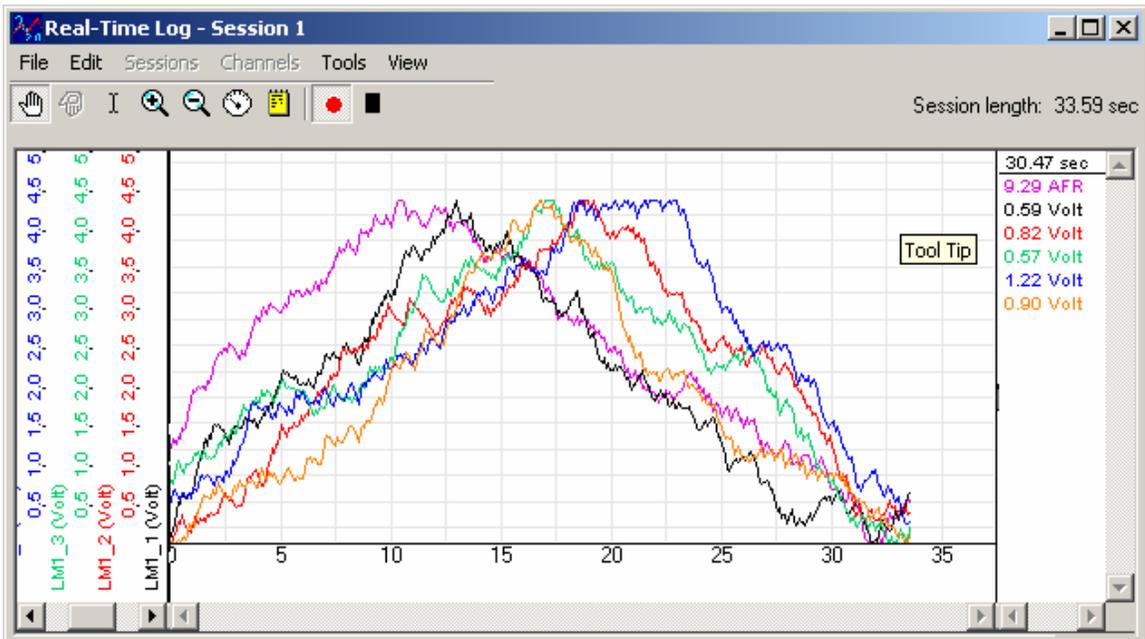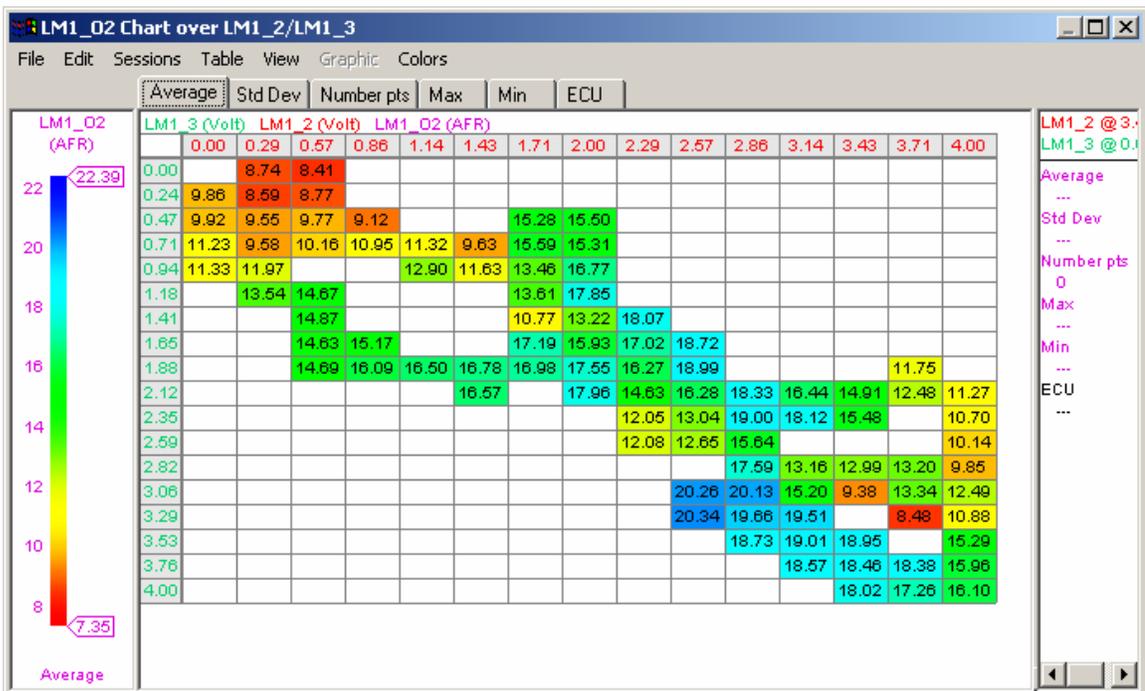[Disconnect]

11. Run LogWorks from Programs \ LogWorks2 \ LogWorks

12. Select the COM port to connect to your LC-1 (this is **not** the COM port assigned to the Tactrix cable)
13. Do real time logging per the LogWorks2 Manual

Real-Time Log - Session 1
File Edit Sessions Channels Tools View

Session length: 33.59 sec

30.47 sec
9.29 AFR
0.59 Volt
0.82 Volt
Tool Tip 0.57 Volt
1.22 Volt
0.90 Volt

LM1_3 (Volt)   LM1_2 (Volt)   LM1_1 (Volt)

14. Once you have collected data you can compare it to ECU programmed tables by selecting "New Chart from EcuFlash…" from the "View" menu

- Select your Working Rom (created in step 4)
- Select a table from the list
- Select LogWorks channels for X axis, Y axis, and data
- Generated chart will be aligned in ECU matching units
- Original ECU ROM data will be in a tab labeled "ECU"

LM1_O2 Chart over LM1_2/LM1_3
File Edit Sessions Table View Graphic Colors

Average | Std Dev | Number pts | Max | Min | ECU

LM1_O2 (AFR)

22.39 / 7.35 Average

LM1_3 (Volt)	0.00	0.29	0.57	0.86	1.14	1.43	1.71	2.00	2.29	2.57	2.86	3.14	3.43	3.71	4.00
0.00		8.74	8.41												
0.24	9.86	8.59	8.77												
0.47	9.92	9.55	9.77	9.12			15.28	15.50							
0.71	11.23	9.58	10.16	10.95	11.32	9.63	15.59	15.31							
0.94	11.33	11.97			12.90	11.63	13.46	16.77							
1.18		13.54	14.67				13.61	17.85							
1.41			14.87					10.77	13.22	18.07					
1.65			14.63	15.17			17.19	15.93	17.02	18.72					
1.88			14.69	16.09	16.50	16.78	16.98	17.55	16.27	18.99				11.75	
2.12						16.57		17.96	14.63	16.28	18.33	16.44	14.91	12.48	11.27
2.35									12.05	13.04	19.00	18.12	15.48		10.70
2.59									12.08	12.65	15.64				10.14
2.82											17.59	13.16	12.99	13.20	9.85
3.06										20.26	20.13	15.20	9.38	13.34	12.49
3.29										20.34	19.66	19.51	8.48		10.88
3.53											18.73	19.01	18.95		15.29
3.76												18.57	18.46	18.38	15.96
4.00													18.02	17.26	16.10

LM1_2 @ 3.
LM1_3 @ 0.

Average ---
Std Dev ---
Number pts 0
Max ---
Min ---
ECU ---

Average

15. Make and save changes to the ROM using EcuFlash

16. Flash the new ROM back to ECU with EcuFlash (note you must Disconnect the OpenPort virtual device from your ECU first)

   - Select "Test write to ECU" from the "ECU" menu (nothing will be written)
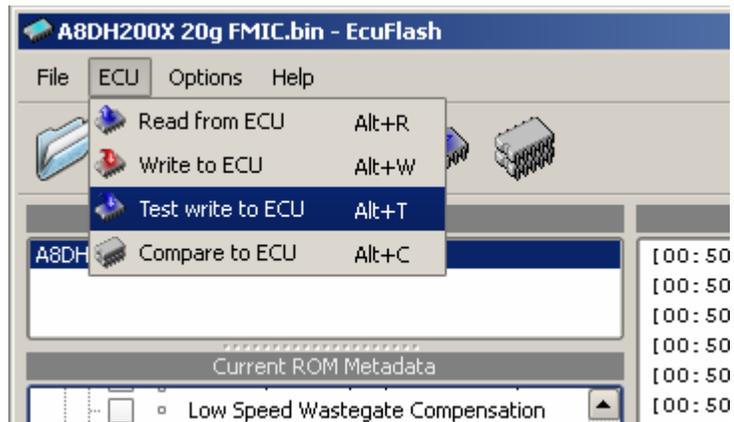
   - Once the test write has succeed, do a real write by selecting "Write to ECU" from the "ECU" menu

17. Repeat the process starting at 6 to confirm and/or improve your tune

For more information, visit http://www.innovatemotorsports.com/products/tactrix.php, or:

- http://forums.openecu.org/index.php
- http://www.osecuroms.org/
- http://www.enginuity.org/