Instructions for the MS Labs Basic MS2 ECU

1. Download TunerStudio from tunerstudio.com and install. Forget anything you may have read about MegaTune or EasyTherm, it will not work with this ECU.
2. Download the drivers for your USB adapter and install.
3. 90-93 1.6 (US; 94-97 EU 1.6 as well) only: **VERY IMPORTANT!!!!!** Remove the 10A "ST SIGN" from the engine bay fuse box. If you do not do this, the ECU will be damaged and you will not be able to start the car!!! If you do NOT have a variable TPS, you should also disconnect your stock TPS from the car. The ECU will not be damaged if you don't, however it will appear as if the ECU is not working at all. You will need to fit a variable TPS to take full advantage of this ECU. A typical and budget TPS is the Wells type 201.
4. Remove the stock ECU
5. Run a vacuum line from the intake manifold, just after the throttle body, to the ECU (the connection is under the DB37 socket). If you don't do this, the car may not start at all, or may shoot black smoke out of the exhaust.
6. Connect the ECU to the stock harness.
7. If you want to use a GM IAT sensor, it must now be wired in.
    - On the 99-05 (Non-MSM), simply replace the stock air temperature sensor found on the air filter box with the GM sensor. There is no polarity on the wires.
    - On the MSM, the GM sensor replaces the stock air sensor that is on the TB elbow.
    - On the US 90-93 1.6L (and European 94-97 1.6L), the GM sensor replaces the sensor that is inside the AFM (Air Flow Meter). Disconnect the AFM, and pull back the rubber boot of the AFM's connector. You should see 7 wires on it. The GM IAT connects to the red/green and black/green wires. No polarity.
    - On the 94-97 1.8L, the GM sensor replaces the sensor that is inside the MAF (Mass Air Flow) sensor. Disconnect the MAF, and pull back the rubber boot of the MAF's connector. You should see 5 wires on it. The GM IAT connects to the red/black and black/green wires. No polarity.
8. Switch the ignition to ON, do NOT start the car yet. When you switch the ignition to ON, you should hear the fuel pump priming for 2 seconds. If you do not year the fuel pump priming, and your car is a JDM/Eunos, I may have included three connectors on the harness adapter that have purple wires on them. Two of the connectors are male, the third connector is female. Switch the female connector from the one of the males to the other, and try again.
9. Connect the USB cable to the PC. Windows should detect and install your cable.
10. After the device has been installed successfully, open the Device Manager (Control Panel -> System -> Hardware -> Device Manager) and click "Ports" to

see which COM port it is under (usually between COM1 and COM10).

11. Save the attached .ini file on your Desktop.
12. We are ready to connect to the ECU. Run TunerStudio.
13. Click File -> New Project
14. Give your project a name - anything will do.
15. Under ECU definition, click "Other" and browse to the file you saved on
16. your desktop (the one attached in this email)
17. Click Next
18. Select:
    - Oxygen Sensor: Wideband / AFR
    - Temperature display: Celcius/Farenheit (whatever works for you)
    - Megasquirt / Microsquirt selection: Microsquirt module / MSPNP/DIYPNP
    - CAN COMMANDS: Deactivated
    - EXPANDED CLT TEMP: Activated
    - CAN COMMANDS: Deactivated
    - EGTFULL: Deactivated
    - USE CRC DATA CHECK: Deactivated
19. Click Next
20. Under Port, select the COM port you found the USB cable to be under (ie probably COM1 through 10)
21. Click "Test Port" - you should get "Successfull". If not, try with other ports until you succeed.
22. Click Next.
23. Select the gauge style you want
24. Click Finish
25. You should see the gauges and you should be in Online mode.
26. Calibrate your TPS (if you have a variable TPS): Tools -> Calibrate TPS. Do not press the throttle at all, and click the top "Get Current". Then press the throttle fully, and click the bottom "Get Current" button. The click Close. Now when you slowly press the throttle, the "Throttle Position" indication should slowly go from 0% to 100%.
27. 90-97 cars must ABSOLUTELY set their base timing with a timing light!!! 99-05 cars will have a 0.5-2 degrees variance - you can drive the car in low/medium revs/loads and you shouldn't have a problem, however you should still set the base timing.
28. There are 5 wires on the back connector (depending on your request):
    - White/red – Fused 12V supply for your wideband
    - Black/Yellow - Wideband heater ground (LC-1; normal ground for any other wideband or accessory)
    - Black/Green - System ground (LC-1 ONLY) or sensor ground
    - Yellow - Wideband input. Connect this to your wideband analog output
    - Green (optional) - Boost control output. Connect this to a boost control valve. The other wire of the boost control valve needs to be connected to a switched and fused 12V source. A 5A fuse is recommended.

- **Setting the base timing:**

    1. Run TunerStudio and open your project
    2. Make sure you are in Online mode
    3. Go to Basic Setup -> More Ignition Settings
    4. Set "Fixed Advance" to "Fixed Timing"
    5. Set "Timing for Fixed Advanced" to "10".
    6. Click Burn (if running, the engine may die at this point)
    7. Switch the ignition off and on again.
    8. Start the car
    9. The crank pulley on the 99-05 has two marks on it. The left mark should align with the "10" sign just behing the pulley, while the right mark should align with the "T" mark behind the pulley. On the 90-97, there is only one mark, which should align with the “10” mark.
    10. Go to Tools -> Trigger Wizard
    11. Press the "-" and "+" buttons until both marks on the pulley are properly aligned. On the 90-97, there is only mark, so that should align with “10”.
    12. Press Burn when you are done. The engine may die.
    13. Go to Basic Setup -> More Ignition Settings
    14. Set "Fixed Advance" back to "Use Table" and click Burn
    15. Switch the ignition off and on again - this is very important, if you don't do it, the car will not start.
    16. Start the car - the base timing is now set properly!

You are now ready to start the car and tune!

- **Basic considerations for autotune (“VE Analyze Live” aka VEAL)**
    - Don't let VEAL autotune your idle – in most cases you will get a hunting (oscillating) idle as if your car has aggressive cams. To fix this, go to “VE Analyze Live” → Advanced Settings ->Min RPM and set it to 1500rpm.
    - VEAL also likes to pull fuel on the very low load areas and as a result, after autotuning for a while the car may hesisate at very low loads. To fix this, go to “VE Analyze Live” → Advanced Settings ->Min fuelload and set it to 30kPa.
    - For the first 20 minutes of autotuning, set “Cell Change Resistance” to “Easy” to get some quick results. Then set it back to “Normal”.
    - As you go along and you are happy with the results, increase the Resistance setting above even more.
    - To get good results with VEAL, you need to drive VERY smoothly, as if you were driving on ice. This means very smooth transitions on the throttle.
    - Make sure you sweep all areas of the fuel map by setting a fuel load target (adjust your right foot on the throttle so the fuel load remains constant while driving) then sweep through the entire RPM range up to the rev limiter. For example, try to achieve a constant 50% fuel load with the throttle while the RPMs increase. Repeat as many times needed for this particular fuel load target.
    - Start from 40% and increase the fuel load target by 10% each time, until your maximum achievable fuel load has been reached.
    - If you can't reach the rev limiter with very low fuel loads (ie 40%, 50%), use a lower

gear (1st, 2nd, etc).

- Keep your eye on the AFR gauge – if it is too lean (especially under load) step off the throttle and add some fuel manually to the map before proceeding any further!
- Make sure “Update Controller” is enabled.
- Click “Burn” every 5 minutes to make sure you don't lose any progress if your laptop dies of battery or crashes, etc