

Delicious Tuning's

Guide to Datalogging and Review

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What is a data log, and why you should do it?

A datalog is a snapshot of your engine's vitals over time. As tuners, we use data logs as a reference point to review the vehicle health and you can too. Capturing a proper datalog is a critical step in reviewing/diagnosing the data logs the vehicle, as a log has the potential to show you exactly what the engine is doing, whether healthy or not. Conversely, a poorly done log can be useless or counterproductive.

For most applications that can be purchased through our website, the provided file is a simple Stage1, Stage 2 or Stage 3 (Flex Fuel), ready to run, with no additional reviews by the tuner. We do suggest you review the logs yourself so you have a basic understanding of what your engine is doing and know how to further diagnose issues with the vehicle, if something is not quite correct. If you do see something out of spec you are more than welcome to call or email.

If you would prefer to have a professional tuner review / customize your tune based on the logs provided please contact Delicious Tuning's sales department for more details and to schedule a day / time to do so. This is an additional charge that can be purchased through additional service works or as a custom e-tune.

Notes for certain tunes:

- **All Vehicles** - AC and Defrost should both be switched off and that you are running on pump gas (ex. 91 or 93 octane; 95 or 98 RON), not E85 (if you have a Flex Fuel tune).
- **FA20 (DIT WRX)** - Every time a reflash/reset of the ECU is completed the FA20 engine does a diagnostic sweep of the AVCS system and Front O2 sensor. This can take up to about 3 minutes to complete, during this time it is recommended to not drive hard on the vehicle. After this is completed it has learned the set points and will remember it every time you start the car thereafter.

Setting up a Datalog Parameters

To create a data log, you must select the parameters listed below in your Accessport. For further detailed instructions please review the Cobb Tuning V3 (or V2) Data Logging PDF.

Subaru Logging Parameters

- A/F Correction 1
- A/F Learning 1
- A/F Sensor 1 Ratio
- AVCS Exhaust Right
- AVCS Intake Right
- Accelerator Position
- Barometric Pressure
- Boost
- Calculated Load
- Coolant Temp
- Dynamic Advance Multiplier
- Engine Speed (or RPM)
- Ethanol Concentration RAW (Flex Fuel Only)
- Fine Knock Learning
- Feedback Knock Correction
- Fuel Pump Duty
- Fuel Rail Pressure (FA Engine Only)
- Fuel Pressure RAW (Flex Fuel Only)
- Fuel Pressure Differential Actual (EJ Engine Only)
- Ignition Timing
- Intake Air Temp (or Intake Air Temp Chosen Source)
- Injector Duty
- Manifold Abs Pressure (or Boost)
- Mass Airflow Voltage
- Oil Temperature (FA Engine Only)
- Requested Torque
- SD Mode Airflow
- SI Drive Mode (if available)
- SNS Volts Rear O2
- TGV MAP Ratio
- TGV Volts Left
- TGV Volts Right
- Throttle Position
- Wastegate Duty

Driving Conditions to Datalog Parameters

Logging Driving Conditions – Review With Supplied Guides

1. First Log Set

- Log, idle when warm for about 30 seconds.
- Log, cruising around at steady states for about 1 minute. (Set the cruise control if possible)
- Log, partial throttle, into say 5 pounds of boost
- Review logs, if everything looks good proceed to step 2

2. Second Log Set

- Log, partial throttle, into about 15-20 pounds of boost
- Review logs, if everything looks good proceed to step 3

3. Third Log Set

- Log, full throttle pulls from 2k-Redline
- Review logs, if everything looks good you are all set

Reviewing the Data Logs

This may seem like a daunting task but with some patience and a little education you can review the logs quickly and know what to look for; we will review some of the key items to look over for each vehicle platform. This is by no means all you need to know but this is more of a glimpse of the key points to review and as a way of diagnosing any potential faults with the vehicle's past, present or future.

Quick Notes ("To Be Expected")

- A car after starting will potentially have a higher MAP value (closer to 0.5), due to how the ECU performs its cold start routine. This is to be expected.
- Fuel trims on the EJ/FA platform may deviate quite a bit during the first 15 minute cold start log. This is to be expected while in cold start mode.
- The fuel trims will not activate immediately after starting a car because the ECU is waiting for the sensor to fully warm up. This is to be expected.
- A car off throttle and above 1500 RPM's will deactivate the injectors and cause the car to run lean (above 1.0 lambda). This is to be expected.

Reference Tables

<u>Lambda</u>	<u>AFR</u>	<u>Condition</u>	<u>BAR</u>	<u>PSI (abs.)</u>	<u>PSI (rel.)</u>
1.36	20.0	Lean	4.0	58.68	44.01
1.29	19.0		3.5	51.35	36.68
1.22	18.0		3.0	44.01	29.34
1.16	17.0		2.5	36.68	22.01
1.09	16.0		2.0	29.34	14.67
1.02	15.0		1.9	27.87	13.20
1.00	14.7	Stoich	1.8	26.41	11.74
0.99	14.5		1.7	24.94	10.27
0.95	14.0		1.6	23.47	8.80
0.92	13.5		1.5	22.01	7.34
0.88	13.0		1.4	20.54	5.87
0.85	12.5		1.3	19.07	4.40
0.82	12.0		1.2	17.60	2.93
0.80	11.8		1.1	16.14	1.47
0.79	11.6		1.0	14.67	0.00
0.78	11.4		0.9	13.20	-1.47
0.76	11.2		0.8	11.74	-2.93
0.75	11.0		0.7	10.27	-4.40
0.73	10.8		0.6	8.80	-5.87
0.72	10.6		0.5	7.34	-7.34
0.71	10.4		0.4	5.87	-8.80
0.69	10.2		0.3	4.40	-10.27
0.68	10.0		0.2	2.93	-11.74
0.65	9.5	Rich	0.1	1.47	-13.20

Subaru STI and WRX (2004+ STI, 2006+ WRX, 2008-2011 FXT, 2005-2009 LGT)

1. *A/F Correction #1 and A/F Learning #1 (Short Term, Long Term)*
 - a. These are the fuel trims to correct for a stoic metric ratio. While at idle, during a cold start they will swing up and down a bit but overall they should hover between +/- 10% from zero.
 - i. Correction +25% / -25%: This means the ECU cannot correct the trims any further and the car is running a bit lean / rich respectively. This can be caused by the following.
 1. There is a vacuum leak in your system, check all vacuum lines in the system and anywhere that a vacuum leak may occur.
 2. It may also be caused by a poorly functioning MAF (mass air flow) or MAP (manifold air pressure) sensor.
 - a. The MAF sensor may be dirty or the O-Ring for the MAF sensor may not be sealing correctly.
 - b. The MAP sensor may not be working correctly and may need to be replaced.
2. *Manifold Air Pressure Sensor (quick check)*
 - a. MAP values should be close to the atmospheric pressure rated in BAR while the car is in the ON position and not running.
 - i. A value outside of this range could note an incorrect MAP sensor has been installed or the MAP sensor itself has failed.
 1. We usually only see the larger 3 and 4 BAR MAP sensors fail, whereas the smaller ones seem to be pretty robust.
 - b. While at idle the value should be reading about ~0.3 to ~0.4 depending on coolant temperature, altitude or if there is an extra load on the engine, such as A/C, head lights, defroster, etc....
 - i. A reading closer to 1.0 could note a small vacuum leak or possibly a weak engine with low compression.
3. *Dynamic Advance Multiplier (quick check)*
 - a. This single number offers a pretty good glimpse into how the engine is performing and if some adjustments need to be done to help mitigate knock correction.
 - i. Ideally you want to see a value of 1.0 all the time, but the ECU makes adjustments from time to time and you could see it drop and come back to 1.0 (especially on the FA20 platform). This is OK, but ideally we want it to stay at 1.0.
 - ii. A value continuously below 1.0 and we would suggest checking the following.
 1. Fuel, brand and octane/RON value being used.
 2. Make sure the spark plugs and coil packs are fairly new (fewer than 60K miles) especially for FI applications.
4. *Fine Knock Learning / Feedback Knock (Knock or any Ignition Correction)*
 - a. These are the real time and learned ignition correction values used by the ECU to adjust the timing to protect the engine from serious knock events that can lead to engine failure.
 - i. As recommended by multiple professional tuning companies, such as Cobb and EcuTeK, a value of -2.81 or lower (closer to 0.00) is to be considered OK and expected across nearly all Subaru platforms throughout a log (but not continuous).
 - ii. Large events above -4 are to be considered high and we recommend you contact your tuner immediately to help diagnose the issue your vehicle may be having. Such causes could be from:
 1. Faulty coil packs (they wear out with age and miles).
 2. Old or incorrectly gapped spark plugs
 3. Incorrect or bad fuel octane/RON

4. Failing or leaking injectors
5. Poor ground in the engine bay
6. Over boosting, etc...

5. *Flex Fuel Ethanol Content (quick check)*

- a. Pump gas (not E85, E98, E100) mixtures from most gas stations around the world will usually always show some sort of ethanol content reading when plugged in and working correctly.
 - i. North America, South America (except Brazil), Europe, Middle East, Australia, China, Japan usually sees about 5-15% on pump gas.
 - ii. High altitude locations can see 0% during certain times of the year, such as in Colorado, USA.
 - iii. Brazil on average will be about 27% ethanol from the local pumps.
 - iv. South Africa will be usually 0% from the local pumps but there is a good supply of ethanol options for making more power.
- b. Ethanol gas (E85), can legally range between 51% and well into the 80% mark as mandated by the US Federal government at any pump in the US, any time of year.
 - i. Do not be surprised if you see E51% at one pump and E85% at another. It is completely possible and we have seen it.