This information is intended to help MS3 AccessPORT owners and ATR users understand the differences in ECU behavior between the two MS3 vehicles that we support. The below details also explain how the initial OTS AccessPORT calibrations will be structured.

Gen1 = 2007-2009 MS3
Gen2 = 2010+ MS3 Thus far, this is only valid for the 2010 MS3. We have not tested on the 2011 MS3 enough to know how it behaves and the 2012 does not exist so this just pertains to the 2010 MS3.

Hardware Differences = Both vehicles appear to have very similar hardware, boost control configuration, etc. but the calibration of these vehicles is entirely different due to the differing ECU behavior (detailed below).

Boost Control = Both vehicles are set up to manage boost by targeting load values. This form of boost control tends to create boost spikes and gives the vehicle a bit of a touchy throttle (some like this, some don't). Thus far we are using the custom AccessTUNER pressure-based boost control logic that we recently implemented to create all OTS calibrations for all 2010+ MS3s because this helps eliminate boost spikes and can keep the boost levels within the capabilities of the stock CDFP for all Stage1 (S1) calibrations. For this reason, the S1+Intake (and S1+Intake+TIH) calibrations will likely perform very similar through the low/mid RPM ranges on a chassis dyno, but will likely make additional power at high RPM where the stock intake system is creating a restriction.

Fueling = Both vehicles work generally the same using a MAF sensor to measure air mass for fueling calculations. Both ECUs have higher resolution tables for Closed-Loop (CL) fueling targets, then switch to more simple RPM-based fueling tables for Wide Open Throttle (WOT) fueling targets. Calibrating the MAF sensor is the most critical thing to to on both of these vehicles in order to allow for consistent fueling under CL and Open-Loop (OL) conditions.

The Gen2 platforms appear to have very different logic when it comes to fueling during boost spool up. The Gen2 platform demonstrates a very different response when DI Fuel Pressre drops. As DI Fuel Pressure drops below ~1600psi on the Gen2 platform, the ECU will immediately increase fueling by increasing the Injector Pulse Width (IPW)...which puts increased demands on the fueling system further dropping the DI Fuel Pressure. The additional fuel is a good safety measure, but this behavior makes it so Stage1 (S1) calibrations will be calibrated to stay within the capacity of the stock Camshaft Driven Fuel Pump (CDFP) and not calibrated to their full performance potential. Yes, a S1 vehicle with a upgraded CDFP will likely be able to make more power because more boost can be safely generated and higher DI Fuel Pressure can be targeted. This also means that no Stage2 (S2) calibrations will be created using the stock CDFP unless users want to have boost limited to ~14psi.

Due to this new ECU logic...no aggressive AccessPORT OTS calibration can be run without the installation of a quality aftermarket CDFP (Camshaft Driven Fuel Pump). The S1 calibrations will perform better than stock and will likely have less reports of Knock Retard (KR), but to experience the full potential of the S1 hardware, an upgraded CDFP is recommended.

Any vehicle making over ~330 WHP will need to also have the in-tank feeder fuel pump upgraded to keep up with the aftermarket CDFP. Fuel supply is only as much as is greatest restriction point...which is the stock in-tank fuel pump at this time.

Every test vehicle that was running a quality CDFP has not exhibited this over fueling issue. The performance of the vehicle will not be at its full potential if you try to run an OTS calibration that keeps

boost low enough to allow the stock CDFP to keep up with fueling demands. As mentioned above, the ECU appears to be calibrated to increase the fuel injector pulse width once it sees DI Fuel Pressure drop below ~1600psi. When this occurs, the ECU will run the engine with excessive fuel hindering torque production.

As mentioned, for those that have a stock CDFP, we are going to need to release calibrations that keep the turbo boost within the fueling capacity of the stock CDFP. The car will not be slow, but it will not be accelerating at its full potential unless the engine has the hardware necessary (high quality CDFP) to support a higher performance calibration.

We understand that this may be sad news for some of you. We are not trying to force you to purchase more hardware, but the data is telling us that this is how upgrades need to proceed for the 2010 MS3.

Knock Retard (KR) = Both vehicles behave very similar with their knock feedback system. The reports of KR for the 2010 MS3 decrement in lesser values (.001 vs .35 of the previous MS3 models). Both vehicle add fuel immediately when KR is reported. Since the decrements for KR are smaller for the Gen2 ECUs, the additional fueling given to the engine under these conditions is also less.

Ignition Advance = Both vehicles have higher resolution tables for ignition controls, although the Gen2 ECU has slightly more resolution in the ignition advance tables and the factory ignition curves are much more aggressive. These aggressive settings further stress the fueling system as they respond to Knock Retard values.

The maximum ignition advance tables are much higher as well.

Variable Valve Timing (VVT) = The Gen2 VVT has very different settings for the partial throttle areas.

Things to note...as with previous MS models, running with a good intake and TIH allows the turbo to spike more easily. Running a catless exhaust in addition creates severe boost spikes as well as over boost conditions. This new logic, as described above, runs the cars richer than desired when the DI Fuel Pressure drops so you can have higher boost an less KR, but also less torque production due to the excessive fuel that is injected at lower pressures.

Overall, the ECUs are very similar, but behave very differently for some critical features.

What values should I log with my AccessPORT?
Actual AFR (AFR)
Boost (PSI)
Calculated Load (%)
DI Fuel Press. (PSI)
Knock Retard (°)
Long Term FT (%)
Mass Airflow (g/s)
RPM (RPM)
Short Term FT (%)
Spark Adv. (°)
Throttle Position (%)

Vehicle Speed (mph)
Wastegate Duty (%)

How do I know that my calibration is performing as expected?
Generally speaking, you will want to let off the throttle if you see that your:
- LTFT values are exceeding +/-8% while at WOT,
- if their target boost is more that 1.5psi higher than targeted,
- if the DI Fuel Pressure drops below 1400psi while at WOT,
- or if Knock Retard values are consistent throughout the run at WOT. If you see, hear, or feal anything that you do not like while running an AccessPORT calibration.

We've been asked by several people to help direct them with the most beneficial upgrade path. Below are our initial findings that we will continue to modify as evidence comes in and the data is verified.

As far as the most beneficial (greatest bang-for-the-buck) upgrade path; the data is telling us that the following is ideal for the 2010+ MS3 platform:
1) AccessPORT + free flowing intake system. The stock ignition advance settings are a little aggressive, the stock calibration tends to create boost spikes, runs a bit lean on spool up (a bit lean for the DI Fuel Pressure this car runs), the throttle response is not very linear, etc. We know the stock intake is very restrictive (too small of a filter and air box for a FI application), relieving inlets restrictions helps the turbo/engine breath better and respond quicker.
2) CDFP upgrade + Turbo Inlet Hose (TIH). This allows slightly higher boost to be targeted and allows for the fueling capacity to keep up with the fueling demands. The stock CDFP can only keep up when 18psi or even less boost is targeted.
3) COBB DP or free flow exhaust system + upgraded BOV. If this path is chosen, keeping the stock 3-way catalyst is ideal and replacing only one catalyst with a test pipe and CBE will sufficiently increase VE. The increased exhaust flow will move the detonation threshold up and creates enough VE to allow for slightly higher boost targets. The stock BOV can hold well up to about 18.5psi, but not much above that and it tends to bleed off air throughout the RPM range during pulls. You can also upgrade the CBE exhaust when you do the downpipe installation for an ideal exhaust gas pressure relief.
4) TMIC upgrade (FMIC upgrade for upgraded turbo) + modified fueling system. The stock TMIC is the most effective configuration that we've seen to date. How Mazda plumbs the TMIC ducting from the front of the car (high pressure area) through the hood is very effective on the road, but the additional core size is very helpful at exchanging heat at the higher boost levels on the stock turbo. You can also install a FMIC to further prevent the heat soaking that a TMIC will see. With a higher capacity fuel system, you will be able to further benefit from higher base DI Fuel Pressure. With a fuel feed line that has a slightly larger orifice and with a safety relief valve that releases above 2000+psi, the fueling system capacity is increases by about 10% (which is very helpful) and with the higher pressure, the cooling effect of the fuel injection is increased.
5) Upgraded turbo, at this point in time, the stock turbo is working at is maximum and you can see this through the WGDC values that you log through the AccessPORT. The WGDC values will likely be at or above 90% from the mid RPM range to redline...letting you know that the stock turbo is spinning its head off. To help increase turbo life, you can target lower boost levels where the WGDC is around 80% by redline.
6) Upgraded exhaust manifold (EXM). We suggest this after the turbo upgrade because the stock exhaust manifold design is the limiting flow variables at this point. This helps relieve additional exhaust gas back pressure from the engine and rids the engine of the poor OEM EXM design. You can

upgrade the EXM before the turbo, but it will require a full re-tune of the boost control system.

Does this make sense?

COBB Calibration Team.