ProECU Mazda DISI

Tuning Guide

2005-onward Model Year

v1.5

Contents

ECU Map Descriptions

3D Maps

Fuel Maps

NOTE: Shown in Live Data as AFR (or Lambda)

The fuel maps contain target AFR data, based on RPM and calculated engine load. When altering fuel maps, bear in mind that the AFRs are only theoretical, they are calculated AFR.

The ECU will generally strive to achieve a target AFR of 14.7 (or Lambda 1) during Closed Loop conditions (normally up to about 1 or 1.2 bar absolute pressure). Once above this Low Load – Closed Loop status the ECU will be in High Load without holding 14.7 (or Lambda) closed Loop control. Different and more favourable AFR targets can then be specified but take care as quality of the feedback control from the stock AF sensor is still not trustworthy , always use your own wideband sensor to verify any AFR readings. Changing something simple like Fuel pressure from say 3.0Bar to 4.0Bar would make the fuel table inaccurate, bear this in mind.

Ignition Maps

NOTE: Shown in Live Data as Ignition Timing degrees

These maps contain the ignition timing values, based on RPM and calculated engine load. Detonation should always be listened for, as the ECU will remove Ignition timing if detonation occurs. This is shown under Live Data in Ignition Degrees as the Knock Retard value.

The ECU has two defined Ignition zones, Low Load and High Load.

Low Load can generally be defined as light throttle up to around 1.2bar Absolute pressure, generally speaking in the Closed Loop AFR control with A/F Correction active.

High Load can generally be defined as over 40% throttle opening in Open Loop mode and over 1.2bar Absolute pressure (AF Correction not active).

Both Ignition maps should always be set the same. Map A is generally used but Map B can be used in other Engine Modes like Cold Start or Hot restart.

Maximum Allowed Ignition maps should not need to be altered.

Inlet VVT (MIVEC)

NOTE: Shown in Live Data as Intake VVT Angle

This map controls the angle of the intake cam (note that 1 degree at the camshaft is 2 degrees at the crankshaft). This number is in camshaft degrees before Top Dead Centre. Modifying the cam timing map can increase power and turbo response, but too much advance can significantly increase in cylinder pressures. This is dependent on Camshafts, Turbocharger and naturally any item which will change.

Desired Boost

Shows the target boost pressure to try and achieve for an Accel Pedal position.

NOTE: on Full Throttle the ECU will use the 2D ‘Full Load Desired Boost’ map.

The values are in Bar Absolute, so the standard 3 MPS ROM (LEJ) desires 2.07bar boost at 3000rpm and 75% Accel Pedal. Notice the boost drops at high RPM to help reduce Engine Torque before the Rev Limiter.

Wastegate Duty

This is the initial wastegate duty used by the ECU for an RPM and Throttle position. Raising the values too high will result in unstable and oscillating boost control. Holding around 90% wastegate duty at low RPM will help encourage turbo spool at low RPMs. Notice the wastegate duty drops at high RPM to help reduce Engine Torque before the Rev Limiter.

Boost Limits

The ECU will cut the Fuel Injector's if the Boost pressure (in Bar Absolute) exceeds the value in the Boost Limit table for a given atmospheric pressure.

The ECU will also cut the Fuel Injector's if the Engine Load exceeds the values in the Boost Limit – Engine Load table.

Desired Engine Load 1 - 3

NOTE: Shown in Live Data as Engine Load

Engine Torque (Airflow/Boost Pressure) is managed by the 'Desired Engine Load' maps. The desired Engine Load targets at light throttle are quite often much higher than can actually be achieved due to restricted Throttle Butterfly Angles calibrated in the Engine Load to Throttle Angle maps.

Engine Load to Throttle Angle

This is the maximum allowed Throttle Butterfly opening angle for a given Desired Engine Load (Airflow/Boost). The Throttle opening angle in this table can be reduced further by other maps like Desired Torque to throttle Angle or 2D Limiter maps.

Desired Torque to Throttle Angle

This is the maximum allowed Throttle Butterfly opening angle for a given current Engine Torque output. If Engine Torque is requested to be reduced for any reason (example Traction Control, ABS or Per Gear or Steering Angle Torque Reduction) then this table can reduce the Throttle opening Angle and therefore reduce Torque output.

Maximum Allowed Torque

The maximum allowed Torque angle for a given Accel pedal position.

2D Maps

Fuel Map – Full Load

This is the Full throttle desired AFR, changing the 3D Fuel maps will not affect the Full Throttle AFR target.

Desired Boost – Full Load

The Desired Boost target for full throttle, this is in bar Absolute. These values should always be set slightly higher than the values in the 3D Desired Boost map.

Turbo Dynamics

The Turbo Dynamics maps are used for 'boost' error compensation. These maps control the rate at which the wastegate duty cycle is altered (according to amount of error) in order to produce the desired level of boost. This map represents the actual change in duty cycle according to the amount of error.

Standard dynamics are set to take a large percentage of wastegate duty with only a small amount of boost error causing boost to drop very quickly. If you struggle with over boost and boost oscillations then we suggest you reduce the larger correction values in the map. This will stop the boost pressure from ‘surging’ either side of the target value.

Engine Load Limiter 1- 6

This is the maximum Allowed Engine Load (%). If you increase boost, airflow or torque values then theses 2D maps will cap the Engine Load and close the throttle.

MAF Scaling

This map converts the Mass Air Flow sensor voltage into Airflow in grams per second.

It can be used to recalibrate the Engine Load after an Induction kit has been fitted.

Idle Speed

These maps define the desired Idle Speed against coolant temp.

1D Maps - Data Values

Injector Scaling

Not needed due to the fact the MPS uses High Pressure Direct Injection.

Rev Limit

The Engine Speed at which the ECU will cut the Fuel Injectors

Additional Maps

Additional maps will be added as further testing and development is carried out.

These maps will be added, with relevant help files, to new versions as we release them.

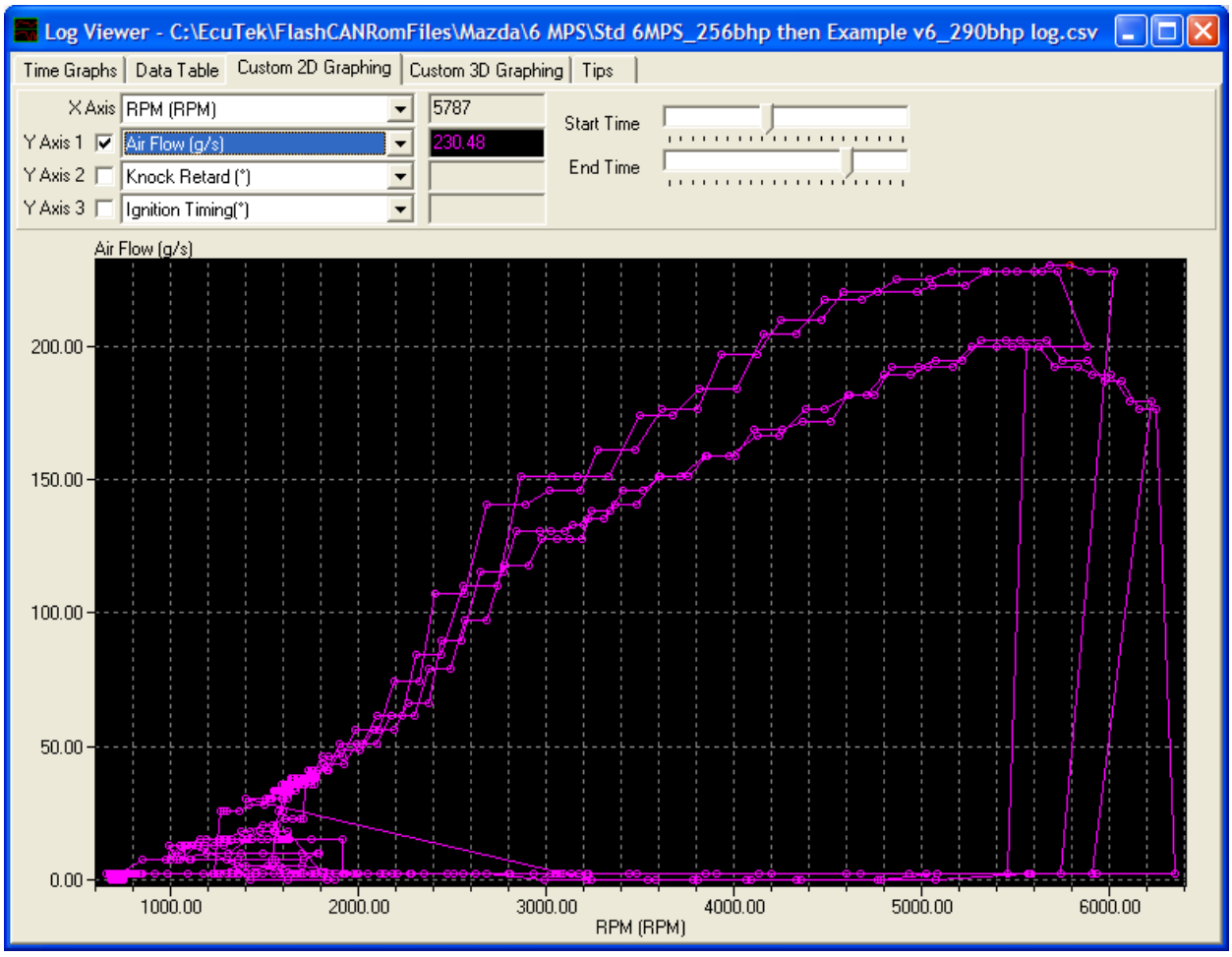
Please use the EcuTek Update regularly to receive new software versions with the updates help files.

HINTS and TIPS

- Make sure you have plenty of battery power before commencing ECU programming. ECU programming currently takes FULL laptop power for a few minutes.
- If a map is too big for the screen then use the CTRL-ALT-F (Fewer Significant points) to reduce the size of the values in the map and make the map smaller.
- Check and contribute to the EcuTek ProECU Forum, we can all share information that will increase our understanding of the factory ECU, this feedback will allow EcuTek to further develop and improve this new generation ProECU Mazda product
- Use the LOG TO FILE check box under the LIVE DATA tab to create LOG FILES you can view (or Drag and Drop) in ProECU or DeltaDash. This makes tuning much easier as you can see exactly where you are on the map by referencing RPM and True Engine Load values. Making and saving good log files can help fault find in the future on the same car or similar cars.

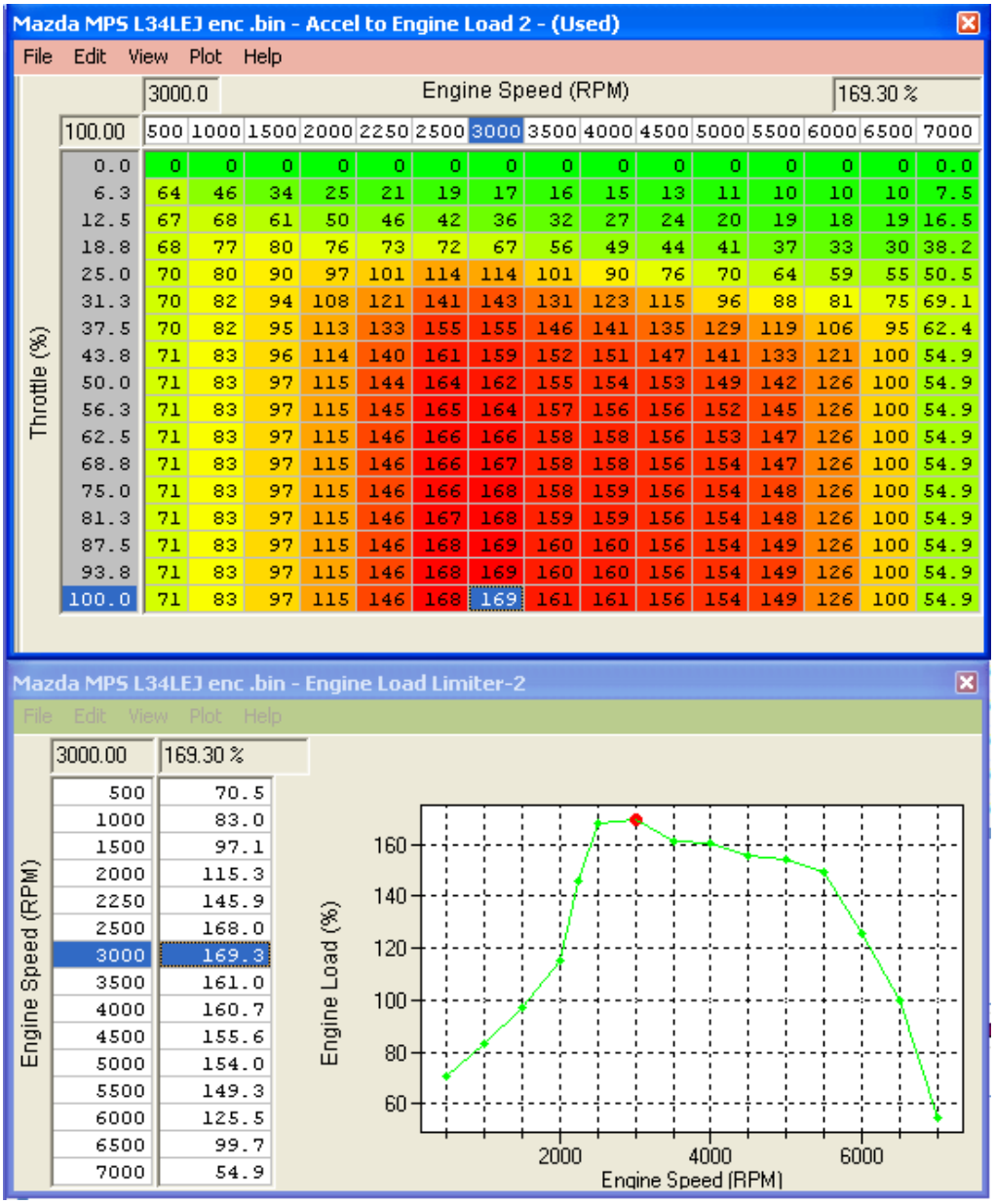
  EcuTeK provide Example log files than can be viewed in DeltaDash or Drag and Drop on to the latest Flash*** versions. This example log files can be found in your ROM folders. Please note that you cannot see the .csv log files if you are opening a ROM file using the File, Open ROM File menu.

  Use Windows Explorer (or My Computer) to explore the folders (C:\EcuTek\ProECURomFiles\Mazda) to see example log files. Here we can see a standard 6 MPS log combined with the Example ROM log. It is very easy to see the Increase in Boost pressure and Mass Airflow.



You can roughly work out your current Engine BHP by your MAXIMUM Mass Air Flow reading (in grams per second). The standard mass Air Flow on a 3 MPS is 215 g/s, 210*1.25 = 262BHP, our example ROM makes around 236 g/s so this is around 295 BHP. This simple multiplication can be used on all vehicles that can show Mass Air Flow, try it, it works every time (assuming you have a standard or stock air Intake). This is also an easy way to spot a contaminated MAF sensor (by comparing the MAP and MAF logs from other similar vehicles.

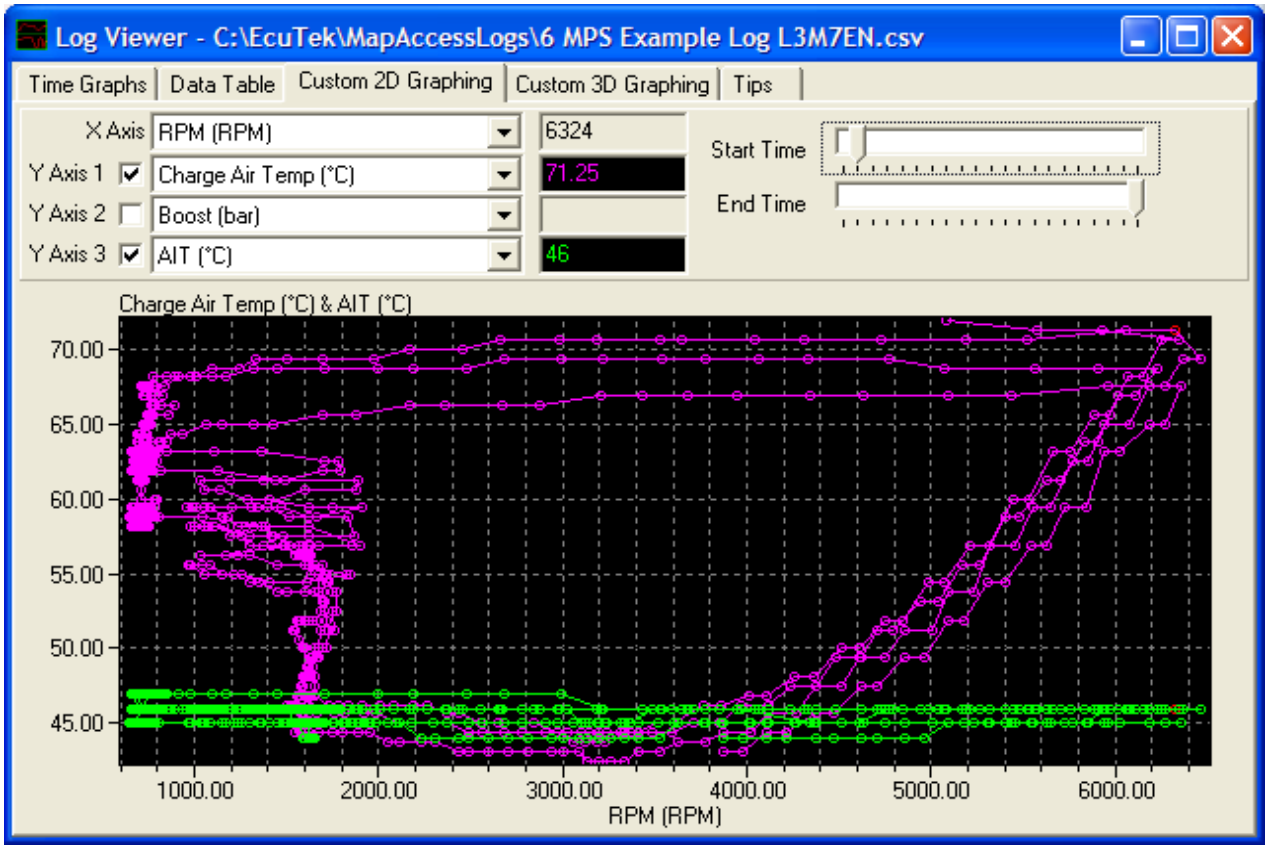
- Where multiple maps are shown (like 3D map called Desired Engine Load or Engine Load to Throttle Angle) you may find the ECU will swap between map 1 and 2. Map 3 normally has reduced values for a CEL condition. The ECU may swap between maps 1 and 2 for various reasons including Cold Start condition, EGR is active, TGV/Intake Runner Control is active, No VVT, High Altitude, Different Regions Calibrations etc. It is suggested that maps 1 and 2 are set the same and map 3 (CEL condition or Limp Mode) is left alone.
- Where multiple maps are available, ProECU shows which map is ‘normally’ used with a simple ‘-Used’ comment after the map description. It is still advised that all maps are set the same unless one map is clearly different and has been calibrated for a CEL condition.
- The standard 3MPS ROM files have been (kindly) scaled to around 200% Engine Load. So by just increasing the Desired Engine Load and Boost Pressure maps proportionally along with Boost Limits and Engine Load Limiters we can make pretty good tuning improvements.
- Make sure that your data logged Engine Load values do NOT exceed your 2D Torque Limit or 3D Maximum Allowed Engine Load. If Engine Load goes to high the ECU will start to close the throttle butterfly in an attempt to reduce the current engine torque.



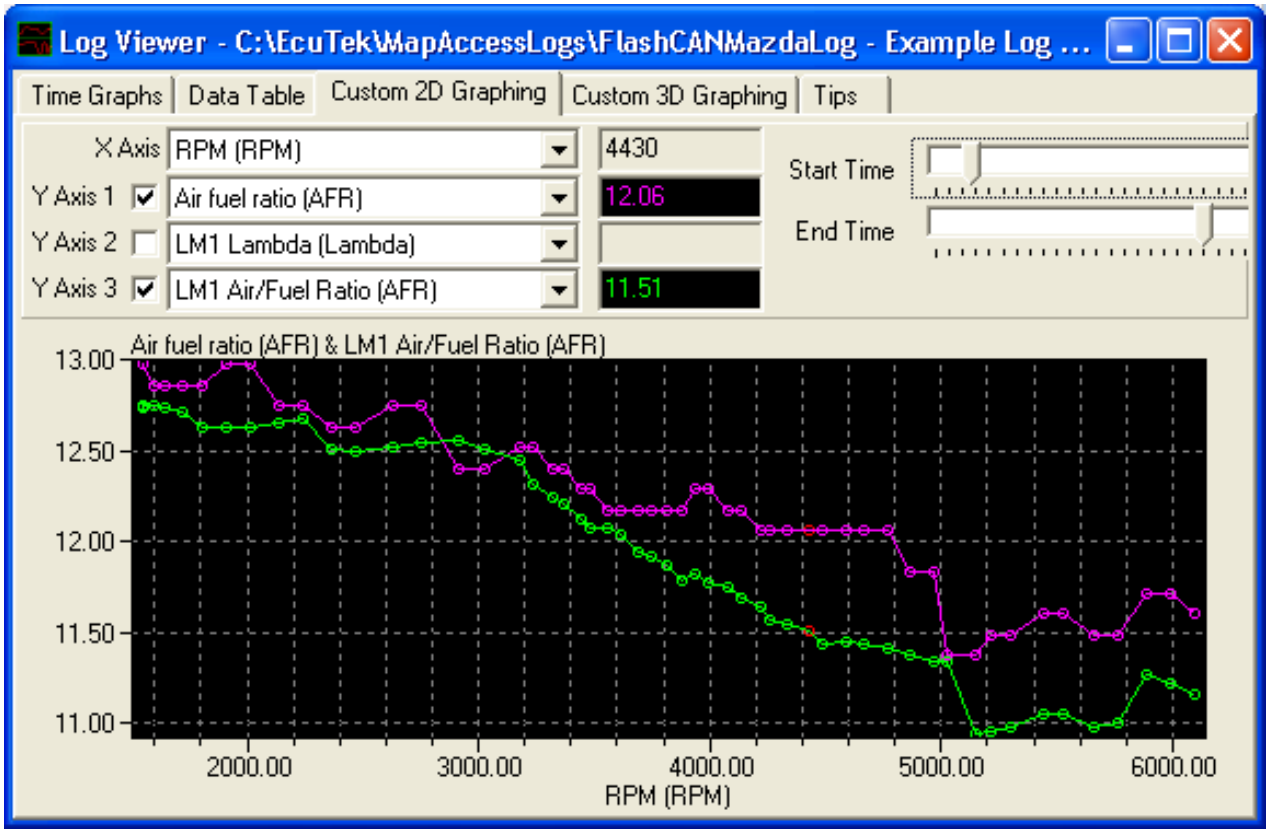
- Mazda uses the Throttle Butterfly as an Engine Torque Limiter. Mazda does not rely on Wastegate Duty only to reduce the Engine Torque (Airflow/Power) around peak torque when you lift from the Accel pedal.

  The main reason for this is the throttle butterfly angle has very little effect on reducing the actual Engine Torque at low engine RPM (Low Air Speed). The Throttle Butterfly on the standard ROM is only open around 60% of a potential 70% to 78%. Allowing the Throttle Butterfly to open further (by adjusting the Engine Load to Throttle Angle AND Desired Torque to Throttle) to its full 75+% does not increase Airflow, Boost Pressure or BHP!
- In the 'EcuTek Example ROMs' Folder we have modified the Engine Load to Throttle Angle AND Desired Torque to Throttle maps as we now want to achieve a full throttle butterfly opening with a fully depressed Accel pedal for our higher Engine Load (raised from 160% to 205%) and higher Boost Pressure (2.0bar to 2.3bar)
- Watch for heat soak during dyno testing, the top mount Intercooler sits directly on top of the engine so gets very hot during ECU programming, we suggest you leave the Dyno Fans on during ECU programming. Once the engine has been restarted after programming drive the car at 2500rpm and around 30bhp and monitor the Charge Air Temp, wait until its around 10-15deg above Intake Air Temp before attempting a dyno run. The top mount intercooler sits directly on top of the engine and Charge Air suffers on Dyno runs, especially the 6MPS that does not have a Subaru Style air scoop !!

This unrealistic rise in Charge Air Temp can cause knocking that will not occur on the road in real conditions so take care not to retard the Ignition too much or on road performance will suffer.



- AFR should always be checked with a wideband Lambda sensor. We suggest a target AFR of around 11.5:1 at peak torque (3500-4000rpm) dropping to around 11:1 by 6000rpm. The factory fitted wideband sensor should not be relied upon for open loop AFR tuning.
- You can see the difference in AFR readings (shown below). The LM1 shows a more accurate AFR reading and this was in a sample pipe in the exhaust tailpipe. You can also clearly see the Fuel Enrichment factor applied during knock at 5000RPM, this was basically due to high Charge Air Temp on the dyno. This did not occur on the road test afterwards.



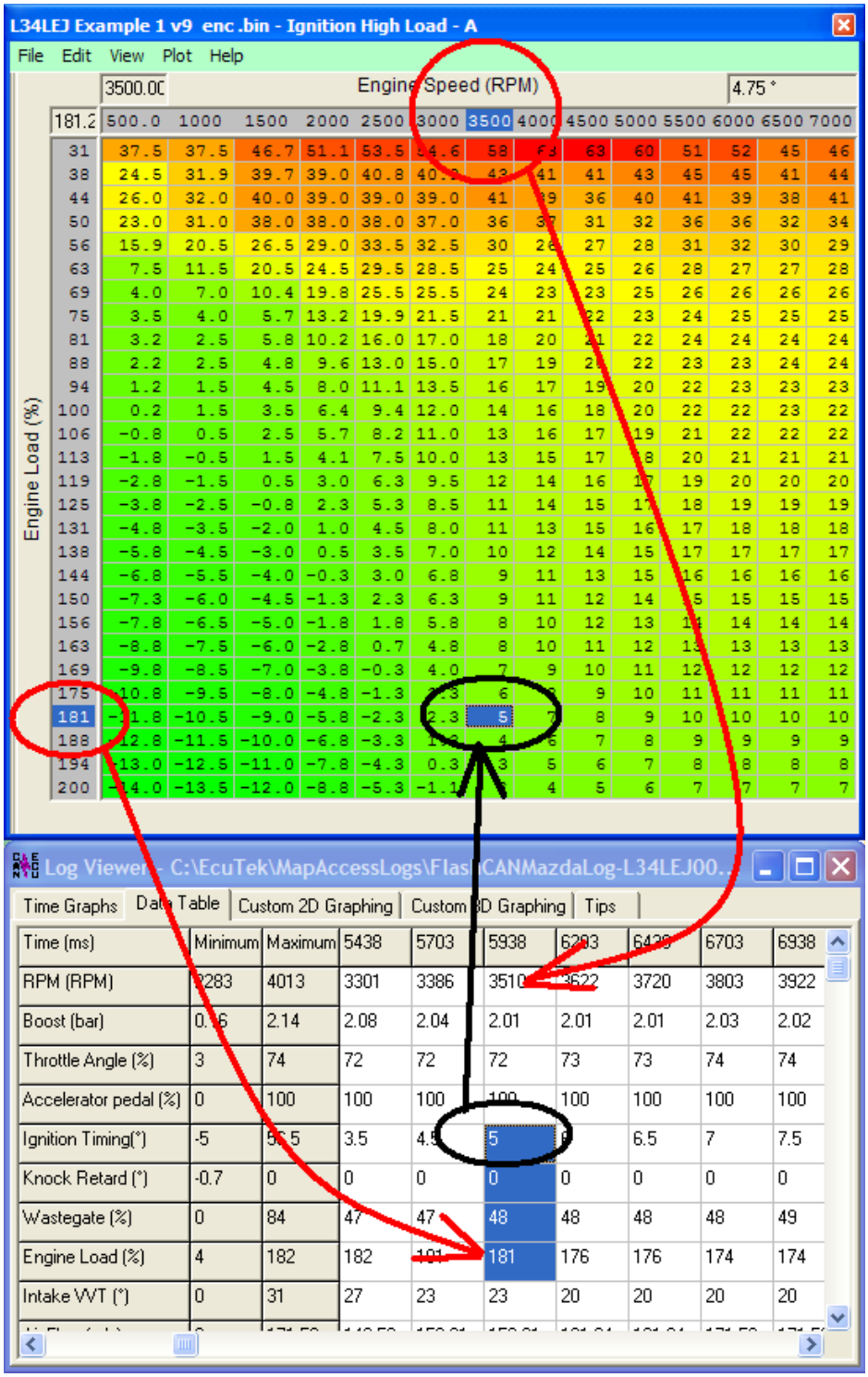
Ignition Control

It is advised to set both pairs of Ignition map the same if this is how the stock ROM is configured.

If Ignition maps ‘High Load - High Oct’ and ‘High Load - Low Oct’ are the same then keep them the same.

They may be different in some regions and Ignition maps labelled ‘Low Oct’ can actually be used as Base Ignition map climbing to the corresponding ‘High Oct’ map if no knocking occurs, so watch closely.

Always verify your Ignition timing shown in your log file against your Ignition Timing in your ROM as below:



If you have more Ignition timing than the ECU will actually use then it may be capped by the Maximum Allowed Ignition map, so even if you fill the High Load or Low Load Ignition maps with 45deg (for example only) then you will only seen whatever is in the Maximum Allowed Ignition map.

Detonation should be checked for using an Engine Knock listening device or a stethoscope, as the standard Knock Sensor may not actually detect all different knock frequencies on an engine with modified parts. The standard Knock Control does seem to work quite well and a generous amount of AFR Enrichment is also applied to help ‘quench’ any knock activity when it occurs.

It is not unusual to see active knock correction on the dyno especially in warmer climates.

Throttle and Torque Control

Primary Torque control is done using the Throttle Butterfly position.

The Mazda DISI uses the driver input (via the Accelerator pedal) to determine the required or desired Engine Torque for a current Throttle Angle and Engine Speed. The Throttle Butterfly is then driven open to the calibrated butterfly angle. Other factors can then limit the actual amount of butterfly opening angle. Maps which can effect or limit the Throttle Opening amount (therefore the airflow/torque restriction) are:

3D map: Maximum Allowed Torque

3D map: Desired Torque to Throttle Angle

3D map: Torque Reduction per Gear

3D map: Desired Engine Load

3D map: Engine Load to Throttle Angle

3D map: Engine Load Limit

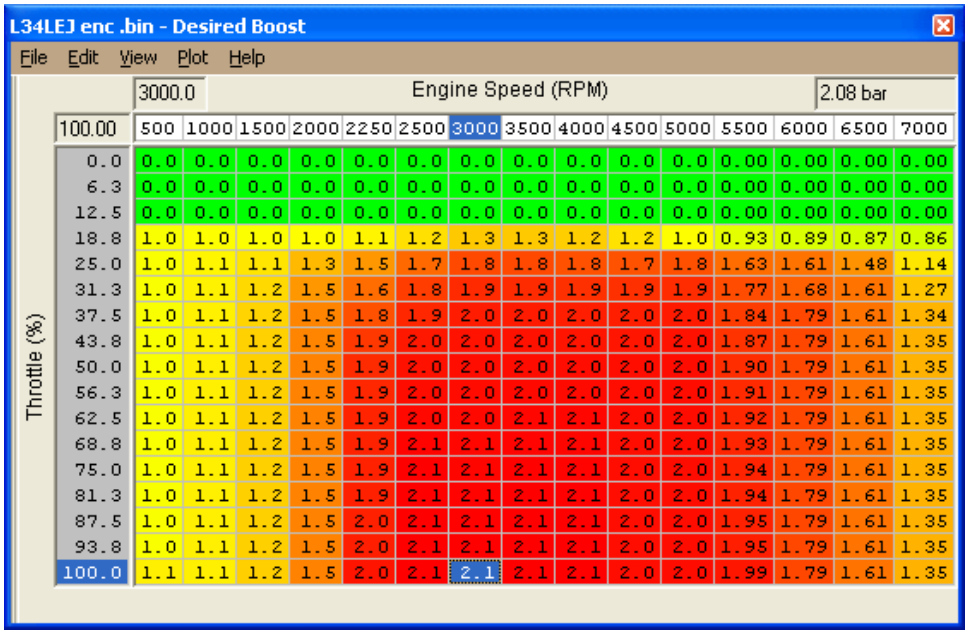
2D map: Engine Load Limiter 1-6

Take care when changing the 3D maps for Engine Load to Throttle Angle and Desired Torque to Throttle Angle, as they are carefully calibrated and big changes can destroy the drivability of the standard vehicle (especially the Front Wheel Drive 3MPS that struggles with wheel spin as a standard).

We suggest that you start with our 'Example ROM' which already has modified Torque to Throttle control and Desired Engine Load maps. Our modified Example maps work well and offer Increased Torque Output for a said Accel pedal position (allowing the throttle to open further). Further modifications to the example maps should not really be needed and risk drivability issues.

The standard 3MPS ROM does not fully open the throttle butterfly. If the Throttle control maps are modified to allow full Butterfly Opening no power increase will be seen or recorded. As below you can see the Maximum Desired Engine Load is 169% (around 2.08 bar boost absolute on the 3D Desired Boost map).

The 3 MPS has heavy Torque reduction in the first 4 gears due to wheel spin. Removing these limiters will produce lots of wheel spin, it's suggested that they are raised slightly but not completely removed. Mazda 6 can be raised as 4wheel drive provides ample traction.



100.00	500	1000	1500	2000	2250	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
18.8	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.2	1.2	1.0	0.93	0.89	0.87	0.86
25.0	1.0	1.1	1.1	1.3	1.5	1.7	1.8	1.8	1.8	1.7	1.8	1.63	1.61	1.48	1.14
31.3	1.0	1.1	1.2	1.5	1.6	1.8	1.9	1.9	1.9	1.9	1.9	1.77	1.68	1.61	1.27
37.5	1.0	1.1	1.2	1.5	1.8	1.9	2.0	2.0	2.0	2.0	2.0	1.84	1.79	1.61	1.34
43.8	1.0	1.1	1.2	1.5	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.87	1.79	1.61	1.35
50.0	1.0	1.1	1.2	1.5	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.90	1.79	1.61	1.35
56.3	1.0	1.1	1.2	1.5	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.91	1.79	1.61	1.35
62.5	1.0	1.1	1.2	1.5	1.9	2.0	2.0	2.1	2.1	2.0	2.0	1.92	1.79	1.61	1.35
68.8	1.0	1.1	1.2	1.5	1.9	2.1	2.1	2.1	2.1	2.0	2.0	1.93	1.79	1.61	1.35
75.0	1.0	1.1	1.2	1.5	1.9	2.1	2.1	2.1	2.1	2.0	2.0	1.94	1.79	1.61	1.35
81.3	1.0	1.1	1.2	1.5	1.9	2.1	2.1	2.1	2.1	2.0	2.0	1.94	1.79	1.61	1.35
87.5	1.0	1.1	1.2	1.5	2.0	2.1	2.1	2.1	2.1	2.0	2.0	1.95	1.79	1.61	1.35
93.8	1.0	1.1	1.2	1.5	2.0	2.1	2.1	2.1	2.1	2.0	2.0	1.95	1.79	1.61	1.35
100.0	1.1	1.1	1.2	1.5	2.0	2.1	2.1	2.1	2.1	2.0	2.0	1.99	1.79	1.61	1.35

L34LEJ enc .bin - Accel to Engine Load 2 - (Used)

File Edit View Plot Help

3000.0 | Engine Speed (RPM) | 169.30 %

Throttle (%) \ Engine Speed (RPM)	500	1000	1500	2000	2250	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	64	46	34	25	21	19	17	16	15	13	11	10	10	10	8
13	67	68	61	50	46	42	36	32	27	24	20	19	18	19	17
19	68	77	80	76	73	72	67	56	49	44	41	37	33	30	38
25	70	80	90	97	101	114	114	101	90	76	70	64	59	55	51
31	70	82	94	108	121	141	143	131	123	115	96	88	81	75	69
38	70	82	95	113	133	155	155	146	141	135	129	119	106	95	62
44	71	83	96	114	140	161	159	152	151	147	141	133	121	100	55
50	71	83	97	115	144	164	162	155	154	153	149	142	126	100	55
56	71	83	97	115	145	165	164	157	156	156	152	145	126	100	55
63	71	83	97	115	146	166	166	158	158	156	153	147	126	100	55
69	71	83	97	115	146	166	167	158	158	156	154	147	126	100	55
75	71	83	97	115	146	166	168	158	159	156	154	148	126	100	55
81	71	83	97	115	146	167	168	159	159	156	154	148	126	100	55
88	71	83	97	115	146	168	169	160	160	156	154	149	126	100	55
94	71	83	97	115	146	168	169	160	160	156	154	149	126	100	55
100	71	83	97	115	146	168	169	161	161	156	154	149	126	100	55

For a desired Engine Load of 169% the ECU will open the Throttle Butterfly to around 43% (look up from the 3D Engine Load to Throttle Angle map). This is assuming that the Maximum Allowed Torque value does not limit the throttle opening against the Desired Torque to Throttle Angle map)

L34LEJ enc .bin - Engine Load to Throttle Angle 2 - (Used)

File Edit View Plot Help

3000.0 | Engine Speed (RPM) | 43.20 %

Engine Load (%) \ Engine Speed (RPM)	500	1000	1500	2000	2250	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2
13	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4
19	2	3	3	3	3	3	3	3	3	3	3	4	4	5	5
25	2	4	4	4	5	5	5	5	4	5	5	6	6	7	6
31	2	4	5	6	6	7	6	6	6	7	7	7	8	8	8
38	3	5	6	7	8	8	8	8	8	8	8	9	10	10	10
44	3	5	7	10	10	10	10	9	9	10	10	10	11	11	10
50	3	6	8	11	11	12	11	11	11	11	12	12	12	13	12
56	3	6	10	13	13	13	13	12	12	12	13	13	14	14	14
63	5	7	12	14	15	15	14	13	13	13	15	14	15	15	17
69	7	9	14	16	16	16	16	14	14	15	15	16	16	16	19
75	18	11	16	18	18	18	17	15	15	16	16	17	18	20	23
81	60	22	19	19	19	18	17	16	16	17	17	18	20	22	24
88	60	60	20	21	20	20	18	17	17	18	19	20	21	22	27
94	60	60	24	22	21	21	18	18	18	18	20	21	23	24	27
100	60	60	36	25	23	22	19	19	19	20	22	23	25	27	27
106	60	60	70	27	25	23	20	20	20	22	23	25	27	30	27
113	60	60	70	32	28	24	20	21	22	24	25	27	30	30	27
119	60	60	70	50	31	24	22	23	25	26	28	31	36	30	27
125	60	60	70	80	35	25	23	26	28	29	31	37	53	30	27
131	60	60	70	80	40	25	25	32	33	32	35	45	56	30	27
138	60	60	70	80	45	26	30	35	37	39	43	49	60	30	27
144	60	60	70	80	50	30	32	37	39	43	46	52	60	30	27
150	60	60	70	80	70	32	33	40	41	44	48	61	60	30	27
156	60	60	70	80	80	36	35	43	45	47	54	70	60	30	27
163	60	60	70	80	80	40	36	49	53	54	66	70	60	30	27
169	60	60	70	80	80	44	43	80	80	80	80	70	60	30	27
175	60	60	70	80	80	62	63	80	80	80	80	70	60	30	27
181	60	60	70	80	80	80	80	80	80	80	80	70	60	30	27
188	60	60	70	80	80	80	80	80	80	80	80	70	60	30	27
194	60	60	70	80	80	80	80	80	80	80	80	70	60	30	27
200	60	60	70	80	80	80	80	80	80	80	80	70	60	30	27

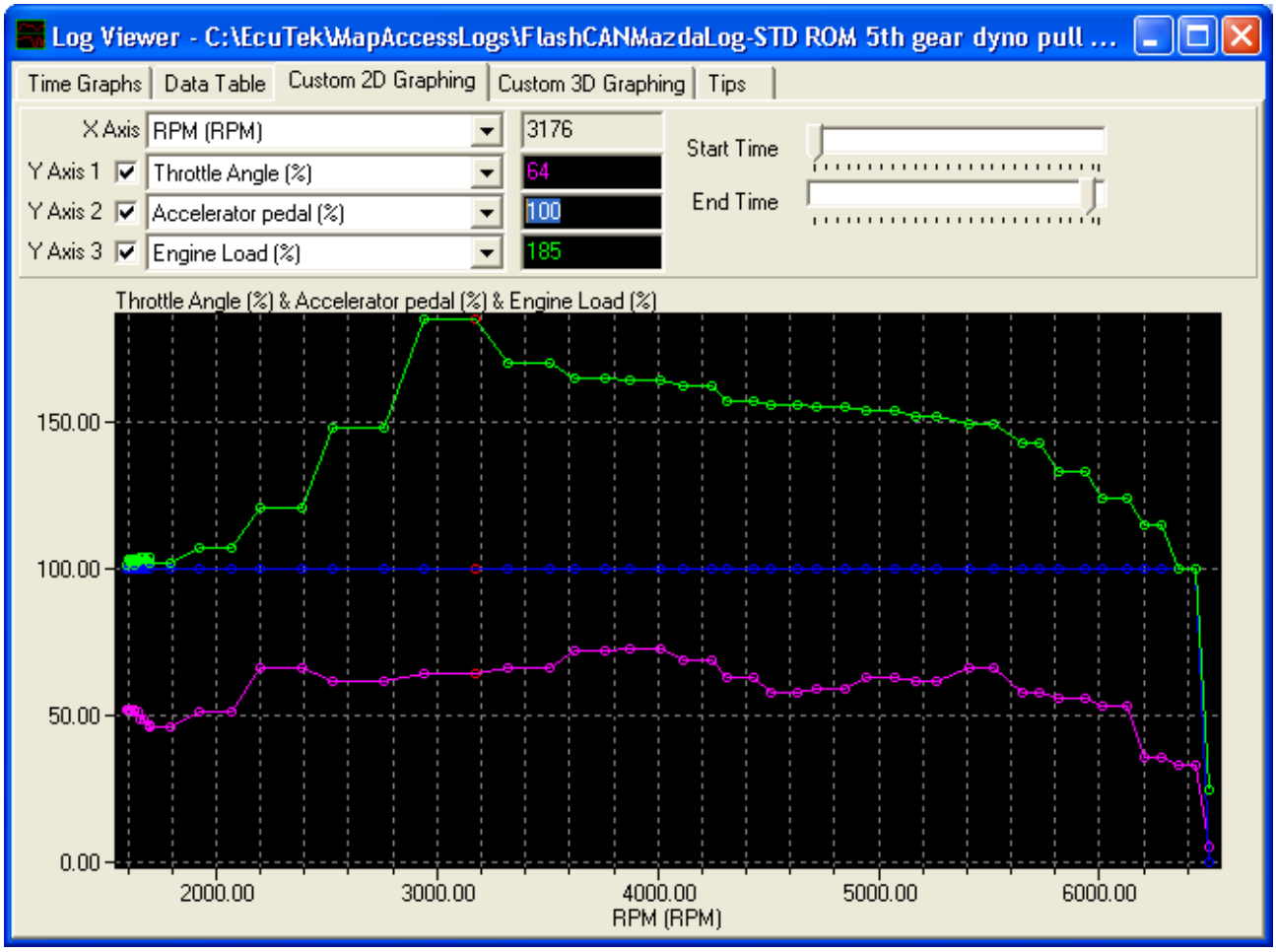
Boost Control

On Full Load the ECU uses a Full Throttle (W.O.T.) Target Boost map.

These values must be slightly higher than the 3D Desired Boost targets at 100% throttle or unstable boost will occur.

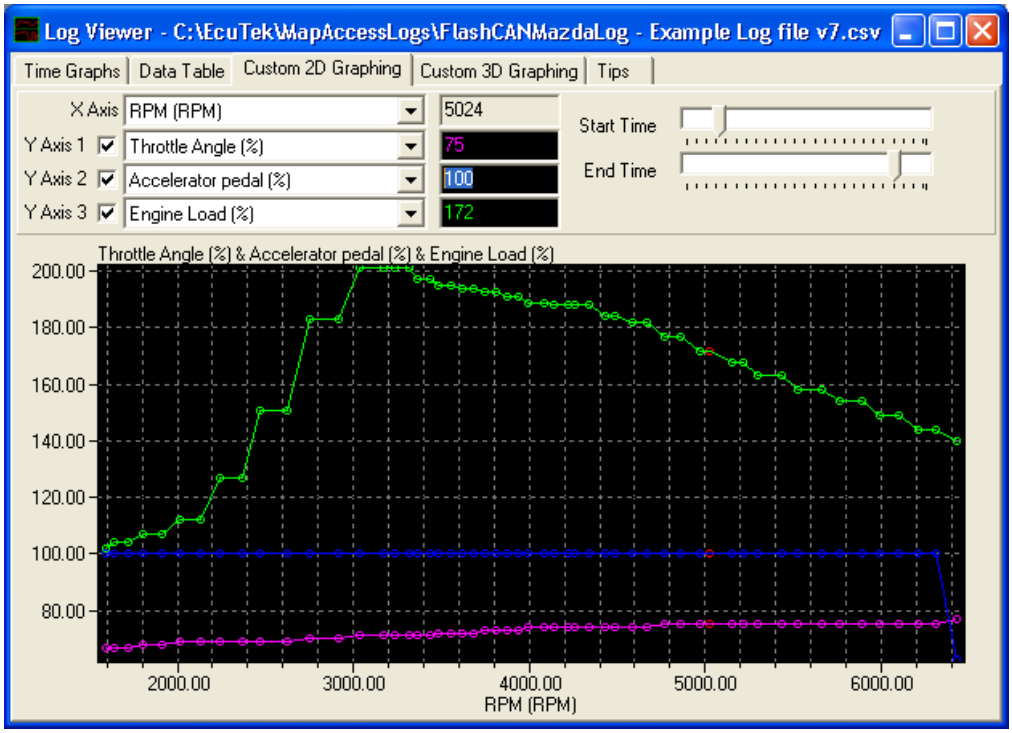
It is important to keep your wastegate duty values low, if your wastegate duty values are higher than the values the ECU actually needs to achieve a desired boost, then you will get unstable boost control. The unstable boost can easily be indentified in the log file as a zigzag wastegate duty action. In a simple form if you desired 2bar absolute and allow 80% wastegate duty but the ECU only uses 60% wastegate duty to make 2 bar absolute then you WILL get unstable boost. If you set the wastegate duty down to 40%, the ECU will increase the wastegate duty to around 60% using the Turbo Dynamics error compensation tables.

FACT: Just because the butterfly is only open 60% at 3000rpm does not mean the butterfly is 'limiting' engine torque output. By fully opening the throttle butterfly at peak torque (and low airspeed) on the standard vehicle produces no more torque than standard.



On a tuned ROM the restricted throttle opening WILL limit the engine torque output so our Example ROMs again have been carefully recalibrated through many hours of testing, so start with our Example Maps and modify further if needed.

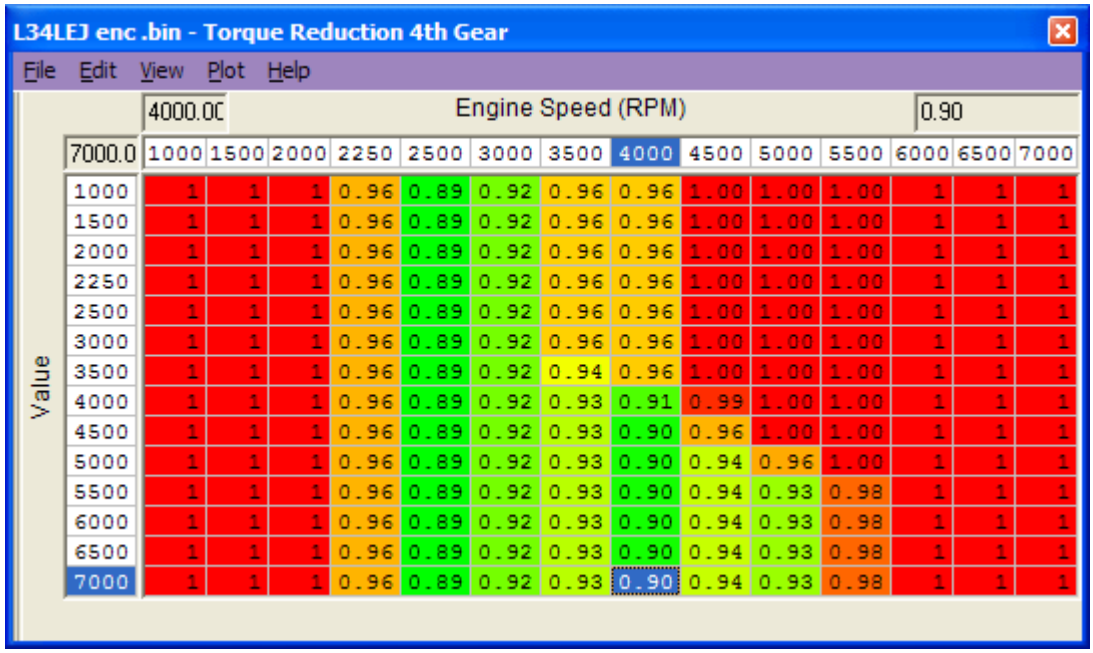
NOTE: Maximum Throttle Opening is 77%, which is also shown by the Mazda diagnostic tool. We never achieve FULL Throttle Opening around peak torque , it is quite normal to see around 70-77% as other factors are always trying to reduce the throttle Angle (like Air Temp, Charge Air Temp, Barometric pressure, Coolant temp etc)



Performance Testing

When performance testing the stock car remember there are Torque Reductions applied ‘Per Gear’.

As below there is a 10% reduction in 4th Gear and 20% in 3rd Gear.



7000.0	1000	1500	2000	2250	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
1000	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
1500	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
2000	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
2250	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
2500	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
3000	1	1	1	0.96	0.89	0.92	0.96	0.96	1.00	1.00	1.00	1	1	1
3500	1	1	1	0.96	0.89	0.92	0.94	0.96	1.00	1.00	1.00	1	1	1
4000	1	1	1	0.96	0.89	0.92	0.93	0.91	0.99	1.00	1.00	1	1	1
4500	1	1	1	0.96	0.89	0.92	0.93	0.90	0.96	1.00	1.00	1	1	1
5000	1	1	1	0.96	0.89	0.92	0.93	0.90	0.94	0.96	1.00	1	1	1
5500	1	1	1	0.96	0.89	0.92	0.93	0.90	0.94	0.93	0.98	1	1	1
6000	1	1	1	0.96	0.89	0.92	0.93	0.90	0.94	0.93	0.98	1	1	1
6500	1	1	1	0.96	0.89	0.92	0.93	0.90	0.94	0.93	0.98	1	1	1
7000	1	1	1	0.96	0.89	0.92	0.93	0.90	0.94	0.93	0.98	1	1	1

This can obviously make any Base test figures read lower than the factory quoted Power and Torque.

Mazda 3MPS is quoted at:
260PS (256bhp or 191Kw)
380NM Torque (280lbs.ft or 38.7kg)

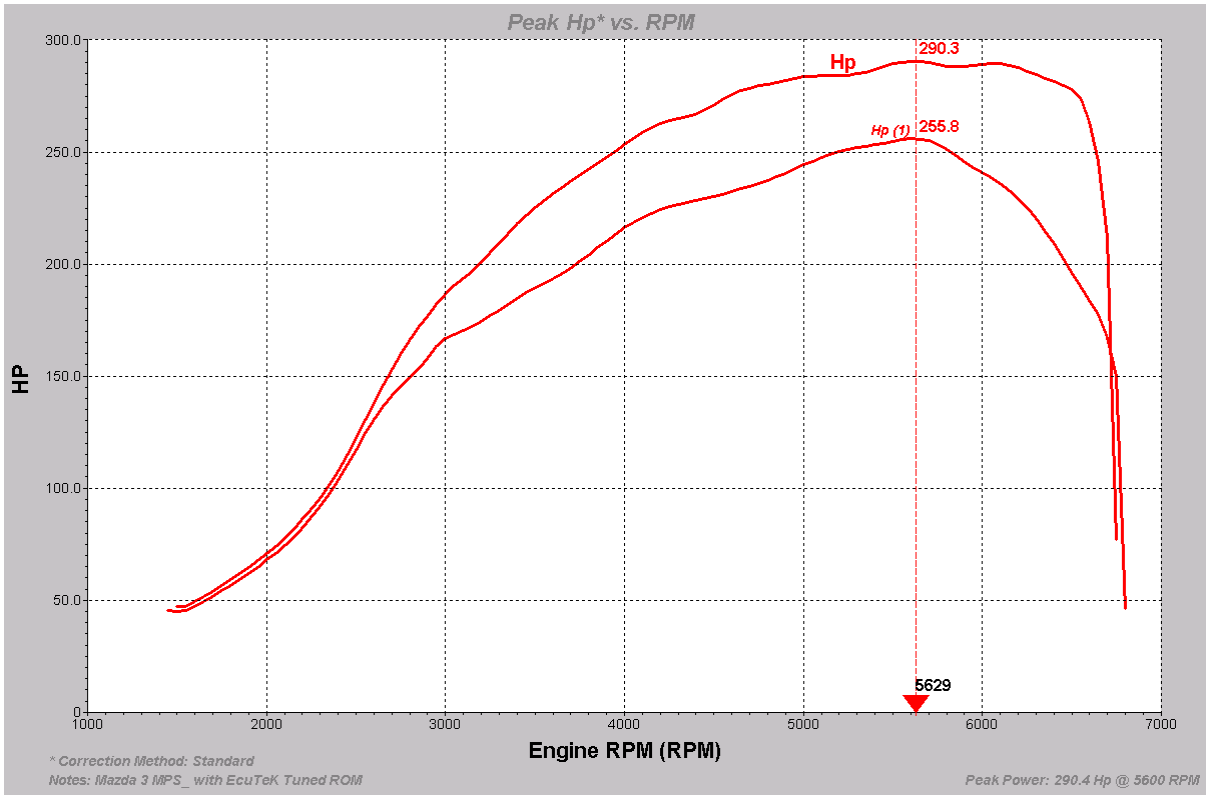
Some tuners may choose to take advantage of this factory Torque Reduction in the lower gears when tuning a customer’s vehicle.

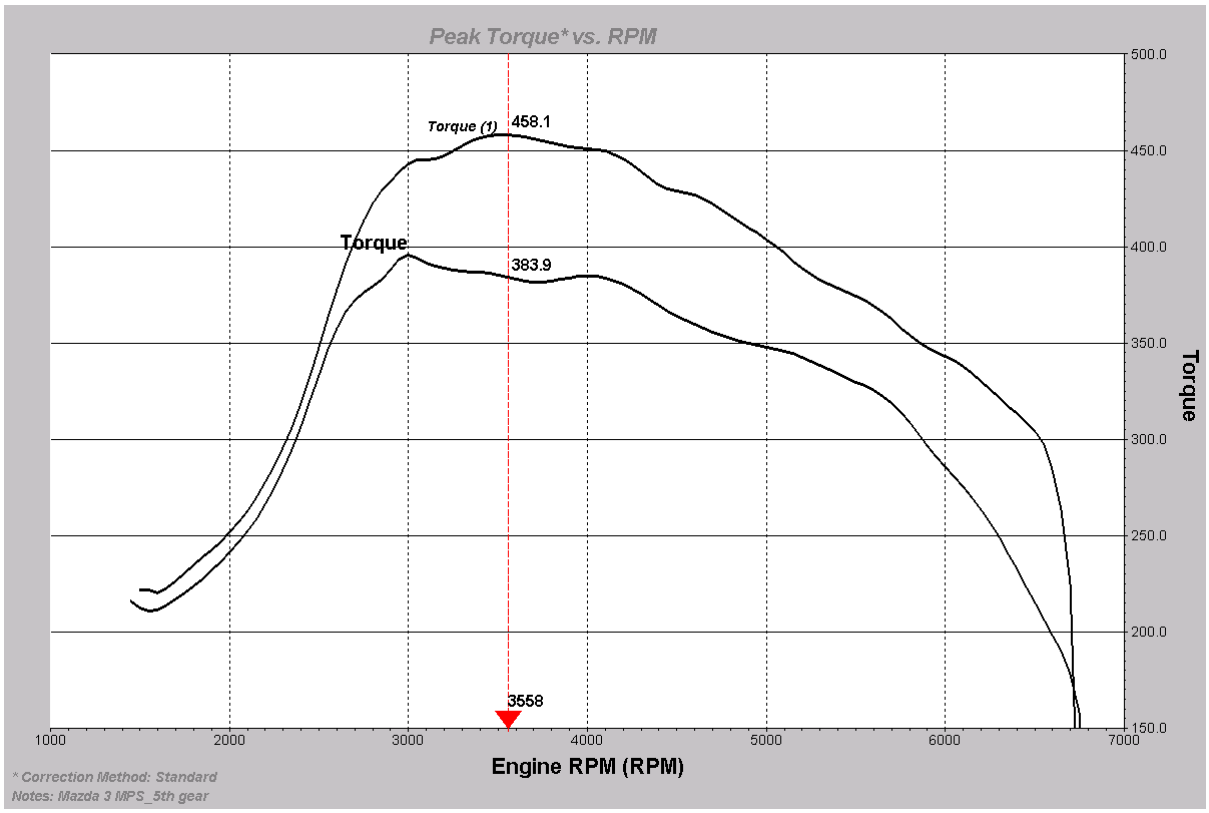
Providing ‘Before and After’ Power graph results where Dyno Testing is done in 3rd or 4th gear can show good gains once the ‘Per Gear’ Torque Reduction maps are raised

Please note: That if you disable the DSC system (Traction Control) for your performance testing, then ‘Per Gear’ Torque Reduction is no longer applied.

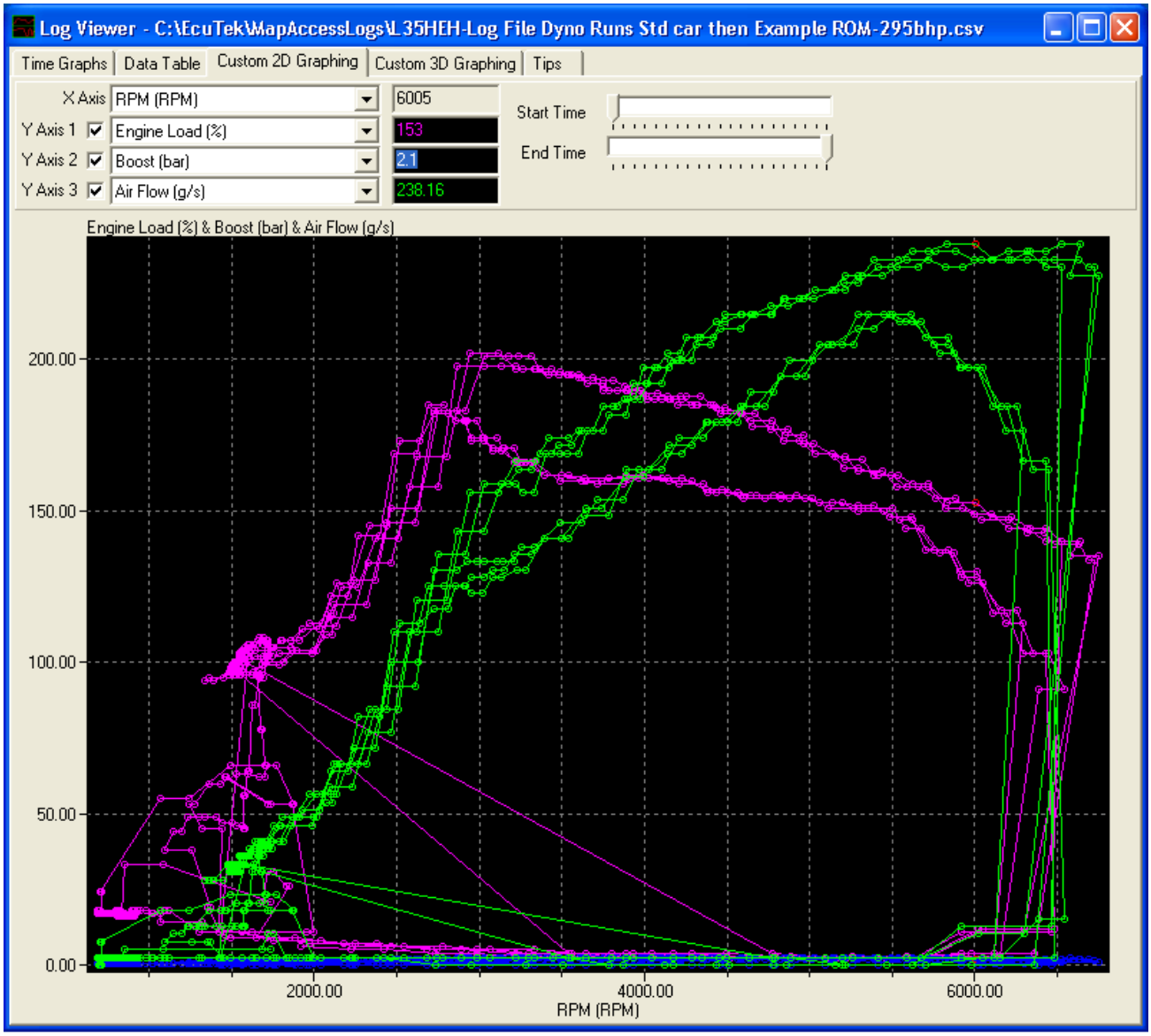
Typical Power Gains

Here as some example power gains that can be achieved:





The graph below shows Engine Load, Boost and Air Flow before and after tuning using EcuTek software:



Glossary

AFM
Air Flow Meter

AFR
Air Fuel Ratio

FMIC
Front Mounted Intercooler

ISS
Intercooler Spray System

MAF
Mass Air Flow (sensor)

MAP
Manifold Absolute Pressure (sensor)

MRP
Manifold Relative Pressure or boost pressure.

O2 Sensor
Lambda Sensor (oxygen sensor)

Calculated Air Flow
The air flow sensor voltage is not linearly related to the amount of air flow. The ECU uses a scaling map to translate the air flow sensor voltage into an air flow rate value i.e. calculated air flow.

Calculated Engine Load
The ECU calculates engine load based on calculated air flow divided by engine RPM. It is effectively how much air enters the engine on each revolution.