

The Quick Guide To Subaru Tuning with the UTEC

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The Ginge's UTEC tuning experience
As of 12/02/2004





Hello from Sarah and Mick



Updates

- 09/07/2003 – Initial Version
- 02/26/2004 – Added information on 4.1 firmware release
- 03/22/2004 – Started Adding notes pages!
- 12/02/2004 – Clean up and added some additional information (Trip to the UK and back)

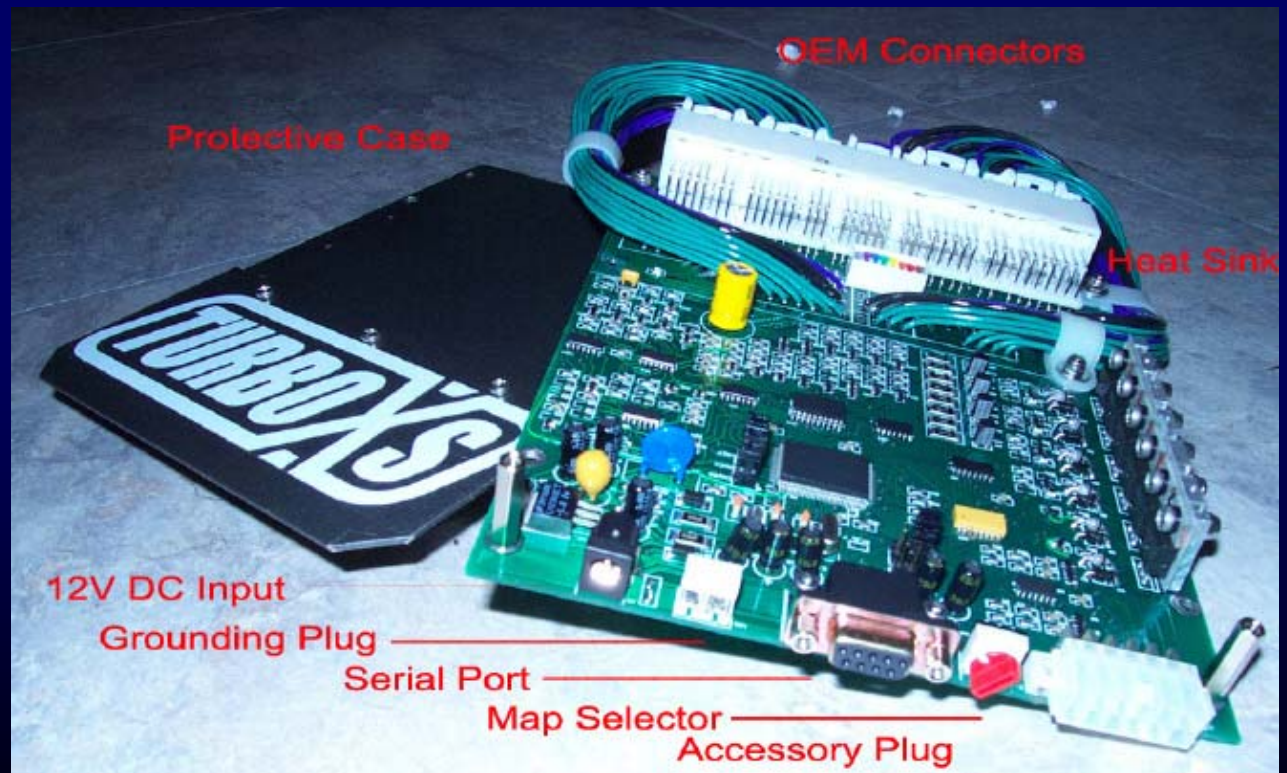
The UTEC



User Tunable Engine Computer

Override control of:

- Fueling
- Timing
- Boost



Expectations

- What you are going to learn
 - ✓ The basics required to tune with the UTEC
- What you are **NOT** going to learn
 - Real WRX tuning!
- **Caution:** This will be enough information to destroy your WRX!
- **** READ THE UTEC USER MANUAL ****
 - This quick guide does not replace it

READ THE UTEC USERS MANUAL

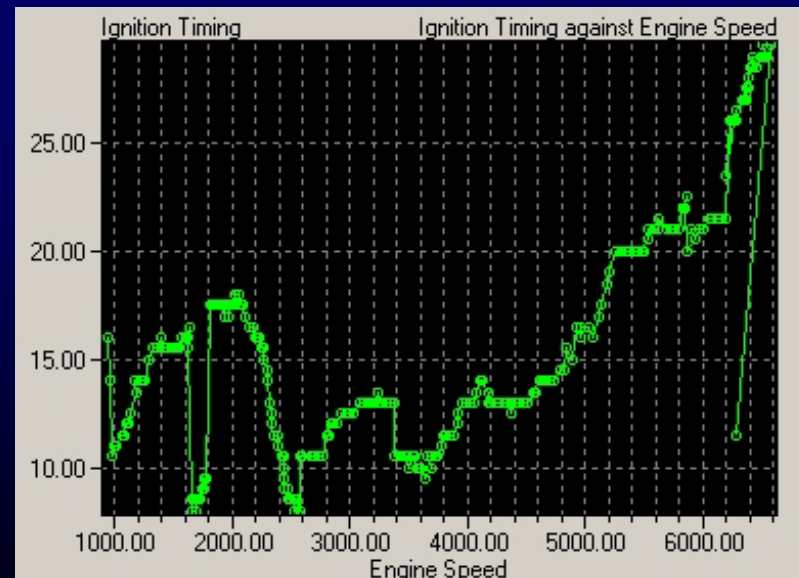
Just in case you did not read the last bullet on the previous page

Agenda

- UTEC Overview
- Basic WRX Tuning theory
- UTEC Control and TPS Calibration
- UTEC and knock
- Map Tuning
 - Fuel – 0% tuning and Open Loop Fueling
 - Timing, Boost, Parameters
- Logging
- Spare Solenoid Usage
- Handy software applications
- FAQ's

UTEC Overview

- How does the UTEC enable more Horse Power?
 - Increases/decreases fuel
 - Advances/retards timing
 - Control over boost pressure



Basic WRX Tuning theory

Increases HP

Negative Effects

Modify Fuel

(Less Fuel to air ratio)

Higher EGT's

More prone to knock

Advance timing

(Fuel ignited earlier)

More prone to knock

Higher Boost

(Higher boost PSI)

Higher EGT's

More prone to knock

UTEC Control

- **Fuel**
 - Based on Throttle position, TPS, versus (RPM or MAP)
- **Timing**
 - Based on Throttle position, TPS, versus (RPM or MAP)
- 0% column applies to all RPM's below TPS cross over point
 - Past cross over point 10%-100% columns represent MAP as set in the **SPECIAL CONSTANTS**
 - **Below Cross over it's TPS**
- **Boost**
 - Based on Throttle position versus RPM

TPS Calibration

- Why?
 - Enables correct load point selection based on TPS
- How?
 - Modify values in **SPECIAL CONSTANTS** menu
 1. Turn on Car, do **NOT** start car
 - Using Logger 4
 - Record TPS (T0)
 - Full depress throttle, record TPS (T1)
 2. $\text{Min TPS} = T0 / 51$
 3. $\text{Max TPS} = T1 / 51$



TIP: Seeing
just over
100% is OK

If TPS never reads 100% you will never reach the 100% load column
And TPS/RPM to RPM/MAP cross over point will be incorrect!

UTEC and Knock

- UTEC only **corrects** knock when it is in control of timing:
 - $TPS > \text{Crossover}$
- Timing retarded by 2 degrees for 100 crank cycles
 - Continues to retard timing until knock is no longer detected
- Very sensitive
 - Which is a good thing!!



Knock/Detonation is the spontaneous combustion of the end-gas (remaining fuel/air mixture) in the chamber. This occurs after the spark.

Map Tuning

Fuel

Timing

Boost

Parameters

Fuel Tuning

Information applicable to classic
MAF modification in 3.1 and 4.1
mode and Open Loop Fueling mode

Know your MAP based load points

- Settings found in **SPECIAL CONSTANTS** menu
 - Defined as
 - Min PSI (0 default)
 - Max PSI (18 default)

Load Column	Min PSI	Max PSI
10%	0.0	2.0
20%	2.0	4.0
30%	4.0	6.0
40%	6.0	8.0
50%	8.0	10.0
60%	10.0	12.0
70%	12.0	14.0
80%	14.0	16.0
90%	16.0	18.0
100%	18.0	18+



Modify Max PSI setting to your desired PSI
This will effect your fuel tuning

Caution When Fuel Tuning

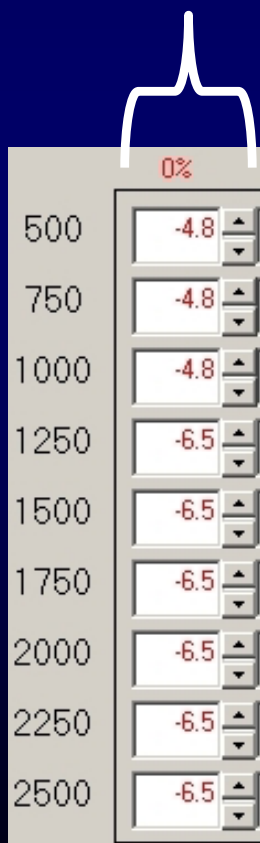


If in doubt go RICH
(But not too rich as that will cause misfire)

- Stock O2 sensor is wideband but it's not recommended to tune against it under WOT
 - Do not use the WOT AFR reading to tune!
 - Even when UTEC log reads rich, AFR maybe as high as 12.5:1 (Far too lean without water injection)
- Lean AFR's lead to high EGT's and possible engine damage
- Tune fuel using a real wideband O2 sensor

Tuning the 0% column for NON-stock injectors

0% column applies to all RPM's below TPS crossover

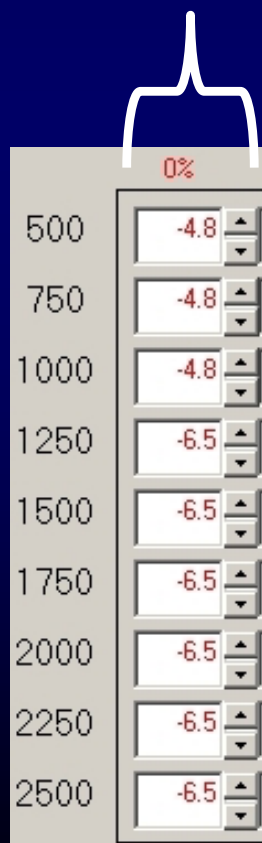


Do This First

- If you have larger than stock injectors you should tune your 0% column using an OBDII Scanner
- Effects ECU's Long Term and Short Term trim values
 - Typical Stage4 map yields LT values from **+20 to -20%**
 - Fine to be within **-7% to +7%** (I think that -7% to 0 is better)
- **This is not required if you're still using the stock injectors**
- Add/remove a percentage of MAF to get the trims in line.

Tuning the 0% column for NON-stock injectors – Open loop fueling

0% column applies to all RPM's below TPS crossover



	0%
500	-4.8
750	-4.8
1000	-4.8
1250	-6.5
1500	-6.5
1750	-6.5
2000	-6.5
2250	-6.5
2500	-6.5

Do This First

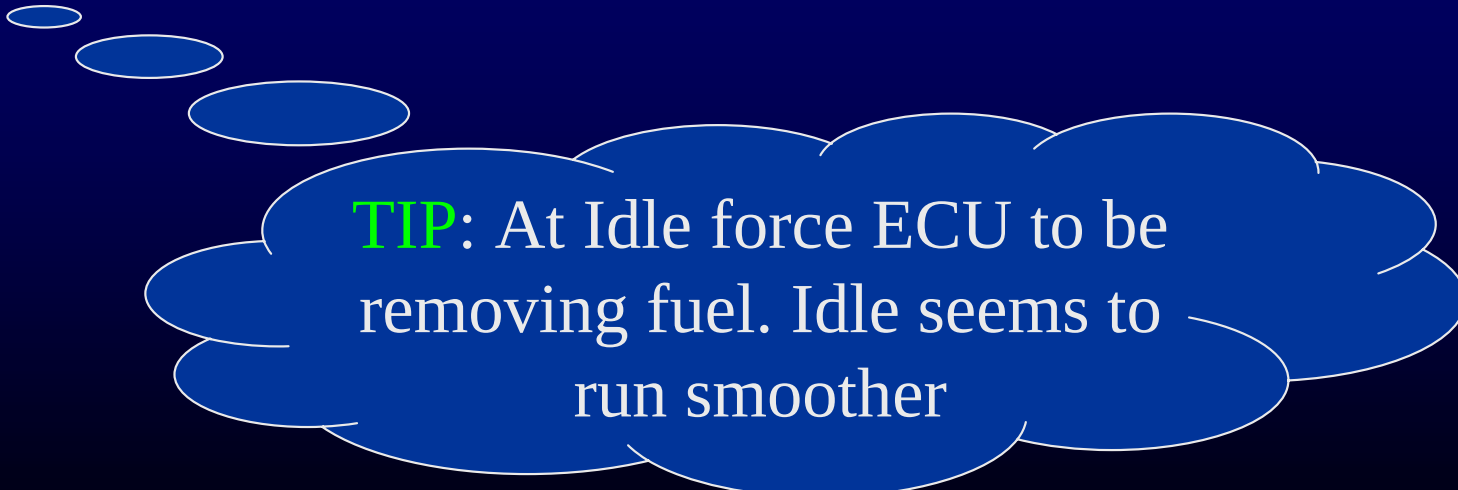
- When using open loop fueling the UTEC automatically does 0% fueling compensation.
- The value used is calculated from the difference between the Stock injector size and the UTEC injector size
- The larger the difference the more modification is done.
- Follow the attached notes to work out how to really do it.

Tuning the 0% column – Simple Tuning Procedure #1

- Warm the car up
- Reset the ECU
- While in neutral
 - Rev car from idle to 5000+ RPM while logging LT and ST
 - Adjust 0% to add/remove fuel where needed
 - If LT and ST show positive, ADD fuel
 - If LT and ST show negative, REMOVE fuel
 - Reset ECU and Repeat
 - Do this until LT and ST read close to 0

Tuning the 0% column – Simple Tuning Procedure #2

- Go drive the car while logging LT and ST
 - Under load fuel conditions are different
- Again adjust 0% column to try and get LT and ST as close to 0 as possible
 - It's never going to be perfect, but it should be close



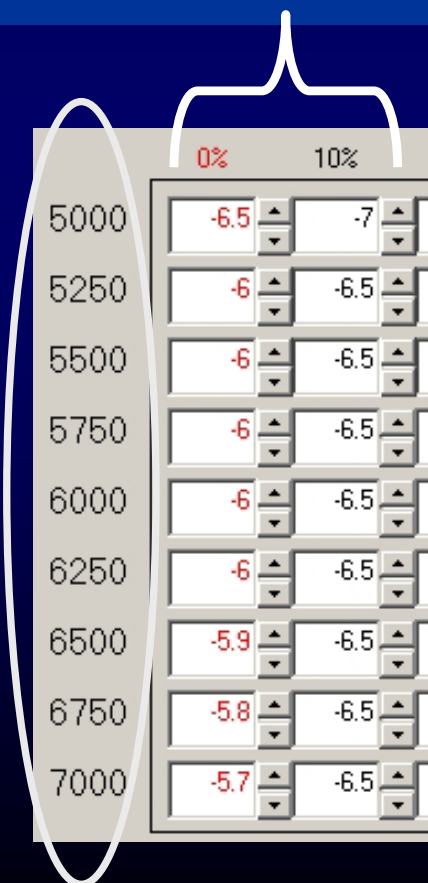
TIP: At Idle force ECU to be removing fuel. Idle seems to run smoother

Delta Dash Log of 0% Tune



Knock after shift (fuel correction)

Add some fuel in these areas to minimize knock after shift



- Knock after shift is usually down to two things
 - #1 Lean conditions just after shift
 - #2 Large jump in timing just after shift
- Adding fuel at 5000+ RPM's in the lower boost range can minimize this effect
- Having timing values down in the lower columns also helps

Fuel Tuning

OPEN LOOP FUELING Mode

Fuel Map Tuning

0% column applies to all RPM's below TPS cross over point

Past cross over point, Throttle > 25%, load is represented by Mass Absolute Pressure, MAP as defined in the **SPECIAL CONSTANTS**



	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
750	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1000	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1250	-6.5	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1500	-6.5	-8	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1750	-6.5	-7.5	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
2000	-6.5	-7	-6.6	-6.4	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7
2250	-6.5	-7	-7	-6.4	-5.7	-5.7	-5.7	-5.7	-5.7	-5.4	-5.4
2500	-6.5	-7	-7	-6.4	-6.4	-5.7	-5.7	-5.7	-5.7	-4.9	-4.9

Fuel Tuning Table

- More positive numbers represent more fuel
 - A value of 2 is more fuel than an value of 1
 - A value of -6 is less fuel than a value of -5
 - Get the drift.....



❖ You are modifying the Mass Air Flow, MAF, voltage reading by a percentage

❖ Applies to both classic and open loop fueling modes

Fuel Tuning > TPS crossover

Fueling for Rapid Spool Up

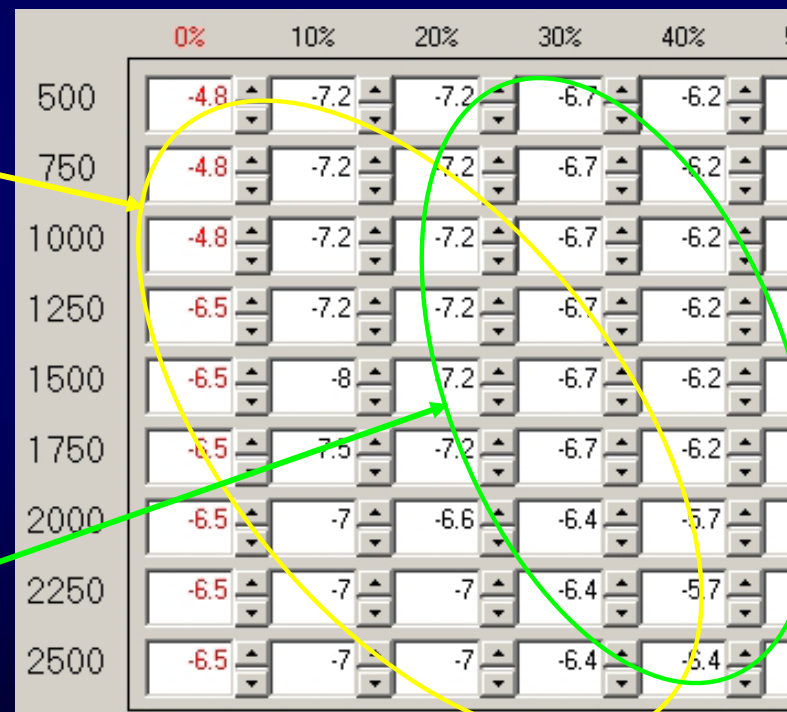
Always use a Wideband O2 sensor to tune your fuel values!

Over TPS crossover - UTEC load swaps to MAP

➤ Keep Low RPM and Low Boost Fuel values on the leaner side

➤ This creates *HOTTER* EGT's which helps the turbo spool quicker

➤ Richen up fuel at mid RPM and mid boost (Safer for your WRX if you don't have water injection)



➤ My AFR target was 12.5:1 up until 2750 RPM

Fueling Part 2

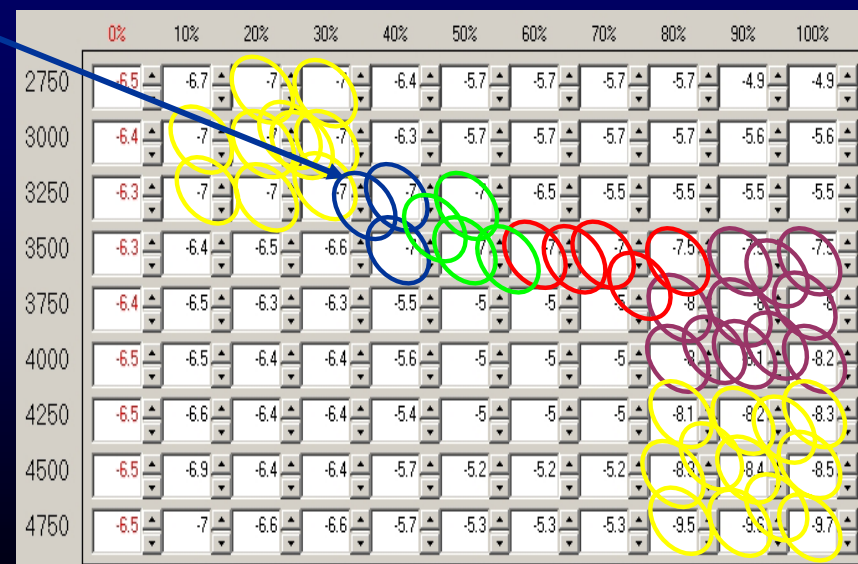
Always use a Wideband O2 sensor to tune your fuel values!

AFR data is coming
from Wideband
Not shown.

Much easier with a TXS "Tuna",
AFR data right in the log file

RPM	MAP	MAF	TPS	Load	Knock	Ign#1	Inj#1	Mod	Mod	Boost	Mod
	psig	V	%	Site	Count	deg	duty	Ign	Fuel	(CL)	MAF
								deg	%		V
3115	+6.1	3.1	104	40	00	+19.0	24.0	+22.0	-7.5	320.00	2.9
3150	+7.0	3.2	104	40	00	+18.1	25.0	+22.0	-7.5	320.00	2.9
3202	+8.0	3.2	105	50	00	+15.8	28.0	+18.9	-7.5	320.00	3.1
3353	+9.0	3.4	105	50	00	+14.4	30.0	+19.0	-7.5	320.00	3.1
3436	+10.4	3.4	105	60	00	+12.6	33.0	+18.0	-7.5	320.00	3.3
3523	+12.1	3.5	105	70	00	+10.5	38.0	+17.0	-7.5	320.00	3.3
3654	+13.5	3.8	104	80	00	+9.4	43.0	+17.0	-8.1	320.00	3.4
3741	+15.3	3.8	105	90	00	+9.2	50.0	+17.1	-8.5	320.00	3.4
3858	+17.0	3.6	104	100	00	+10.1	51.0	+17.4	-8.5	320.00	3.6

- Log to correlate AFR/RPM/MAP data back to UTEC load column reference
- Adjust column to meet target AFR
- My AFR target was 11.5:1



Knock correction and Fuel Tuning

- Add fuel to correct knock conditions
 - WRX typical problem areas
 - Around 4000 RPM
 - Around 5500 RPM
- Stage4 Map example
 - Rich around 4000 RPM

3750	-5.5	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
4000	-5.5	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2
4250	-5.5	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2
4500	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5
4750	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5

Caution: Too much fuel will lead to misfire

Fuel Tuning

New in 4.1 - Open Loop Fueling
Mode

Why Open Loop Fueling

- Eliminates the delay in transitioning from closed to open loop fuel control in the stock ECU.
 - Big issue with the 2004+ WRX ECU.
- Enables Programmable Rev limit
- Enables injector scaling
 - Eases fuel tuning when larger than stock injectors are installed
 - Do not use scaling with a classic style fuel map.

What is Open Loop Fueling?

UTEC MAF BASED FUELING

Full fuel control, not an offset of the ECU fueling

No longer have to worry about effects of the Long Term Fuel Trim value

CONSISTENT FUELING, no more long term trim offset



- ❖ MAF base fueling
- ❖ UTEC calculates injector duty cycle based on MAF/RPM
- ❖ UTEC is in full control of fueling



Turning on Open Loop Fueling

- Requires 4.1 or above firmware
 - To enable:
 - Enter the Open Loop Fueling menu option
 - Turn on Open Loop Fueling. **Change to be 1**
 - On by default in 4.2c and above
 - New base maps from TurboXS are tuned for OLF

<u>PARAMETERS</u>			<u>OPEN LOOP FUELLING TURBOXS UTEC (Version 3.2a) (c) 2003</u>		
PARAMETER		RANGE	VALUE		
Open Loop Fuelling (OFF = 0, ON = 1)		(0 or 1) :	0		
Injector Flow (cc per min)		(300 to 1000) :	420		
Rev Limiter (x100)		(30 to 80) :	73		

Screen parameters may have changed a little since this screen shot was taken

Default OLF Operation

- If injector flow has not been adjusted then classic style Fuel Maps are compatible when Open Loop Fueling is enabled
 - Fueling will be much more consistent
 - Default cross over into OLF is 25% TPS
 - Resolves 2004 WRX closed/open transition issues

UtecEdit v1.0

File View Edit Help

General Fuel Map Timing Map Boost Map

rpm/load	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	-5	-6	-6	-6	-6	-6	-6	-5.9	-5.8	-5.8	-6
750	-5	-6	-6	-6	-6	-6	-6	-5.9	-5.8	-5.8	-6
1000	-5	-6	-6	-6	-6	-6	-6	-5.9	-5.8	-5.8	-6
1250	-6.5	-6	-6	-6	-6	-6	-6	-5.9	-5.8	-5.8	-6
1500	-6.5	-6	-6	-6	-6	-6	-6	-5.9	-5.8	-5.8	-6
1750	-6.5	-6	-6	-6	-6	-6	-6.1	-6	-5.9	-5.9	-6.1
2000	-6.5	-6	-6	-6	-6	-6.1	-6.2	-6.1	-6	-6	-6.2
2250	-6.5	-6	-6	-6	-6.1	-6.1	-6.2	-6.2	-6.1	-6.1	-6.3
2500	-6.5	-6.1	-6.1	-6.1	-6.1	-6.2	-6.2	-6.2	-6.2	-6.2	-6.4
2750	-6.5	-6.1	-6.1	-6.1	-6.2	-6.3	-6.3	-6.2	-6.2	-6.2	-6.5
3000	-6.5	-6.2	-6.2	-6.2	-6.2	-6.3	-6.3	-6.3	-6.2	-6.2	-6.5
3250	-6.5	-6.3	-6.3	-6.3	-6.4	-6.4	-6.4	-6.3	-6.3	-6.4	-6.6
3500	-6.5	-6.4	-6.5	-6.5	-6.5	-6.5	-6.5	-6.4	-6.4	-6.4	-6.7
3750	-6.5	-6.4	-6.5	-6.5	-6.5	-6.6	-6.6	-6.5	-6.5	-6.5	-6.8
4000	-6.5	-6.4	-6.5	-6.5	-6.5	-6.6	-6.6	-6.6	-6.5	-6.6	-6.9
4250	-6.5	-6.4	-6.5	-6.5	-6.5	-6.6	-6.6	-6.6	-6.6	-6.7	-7.1
4500	-6.5	-6.4	-6.5	-6.5	-6.5	-6.6	-6.7	-6.7	-6.8	-7	-7.4

❖ You may have to re-tune some of your lower load point

❖ Why? Because before this you may have never been running through these lower load points

Changing Injector Flow Scaling

- Requires 4.1 or above firmware
 - To enable:
 - Enter the OLF menu option
 - Modify Injector Flow:
 - Supports 300 to 1000 flow rate
 - 500 – 560 seems to work for STi Injectors
 - When a Stock style air box is used!

UTEC generates AFR curve based on MAF/RPM and scaling factor

PARAMETERS		
OPEN LOOP FUELLING TURBOXS UTEC (Version 3.2a) (c) 2003		
PARAMETER	RANGE	VALUE
Open Loop Fuelling (OFF = 0, ON = 1)	(0 or 1) :	0
Injector Flow (cc per min)	(300 to 1000) :	420 ←
Rev Limiter (x100)	(30 to 80) :	73

Modified Stock Injector Flow Scaling



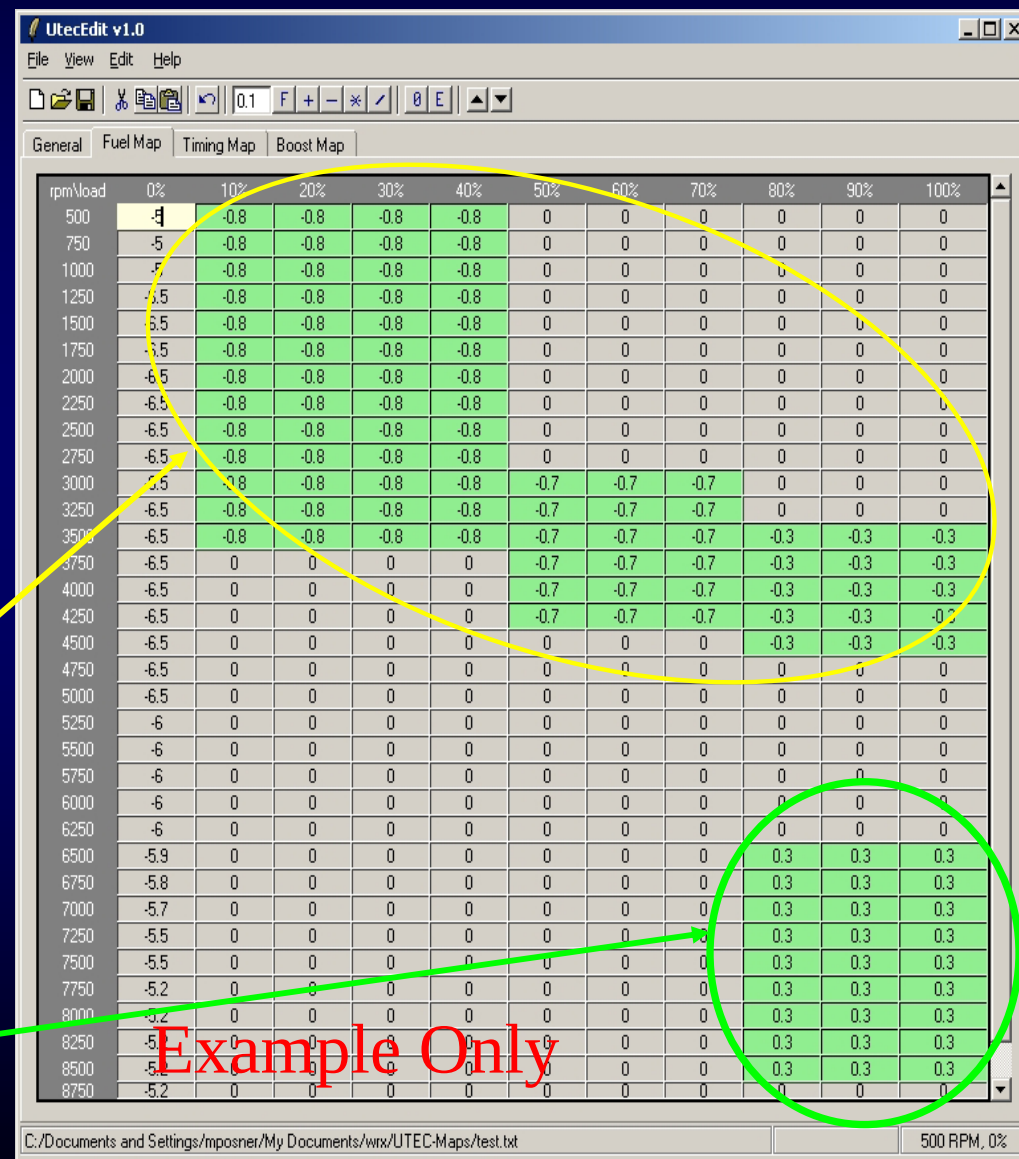
- Start with a low value
 - The injectors may flow 740cc but do they match your MAF readings
 - You maybe flowing more air! BigMaf for example
 - Start with injector flow set at 700 (guess)
 - Increase this value while monitoring AFR curve with wideband O2 sensor
 - Fine tune AFR curve using a map overlay
 - Next page ☺

Modifying Scaled OLF AFR Curve

- Fine tune AFR curve by adjusting fuel map in standard fashion.

- Minus fuel to lean sections of curve

- Add fuel to richen sections of curve



Programmable Rev Limit

- Now UTEC controls fueling, it can also control rev limit – **Way cool 😊**
- **Warning:** Unless you have strengthened internals changing rev limit could cause serious engine damage

<u>PARAMETERS</u>			<u>OPEN LOOP FUELLING TURBOXS UTEC (Version 3.2a) (c) 2003</u>	
PARAMETER	RANGE	VALUE		
Open Loop Fuelling (OFF = 0, ON = 1)	(0 or 1) :	0		
Injector Flow (cc per min)	(300 to 1000) :	420		
Rev Limiter (x100)	(30 to 80) :	73		

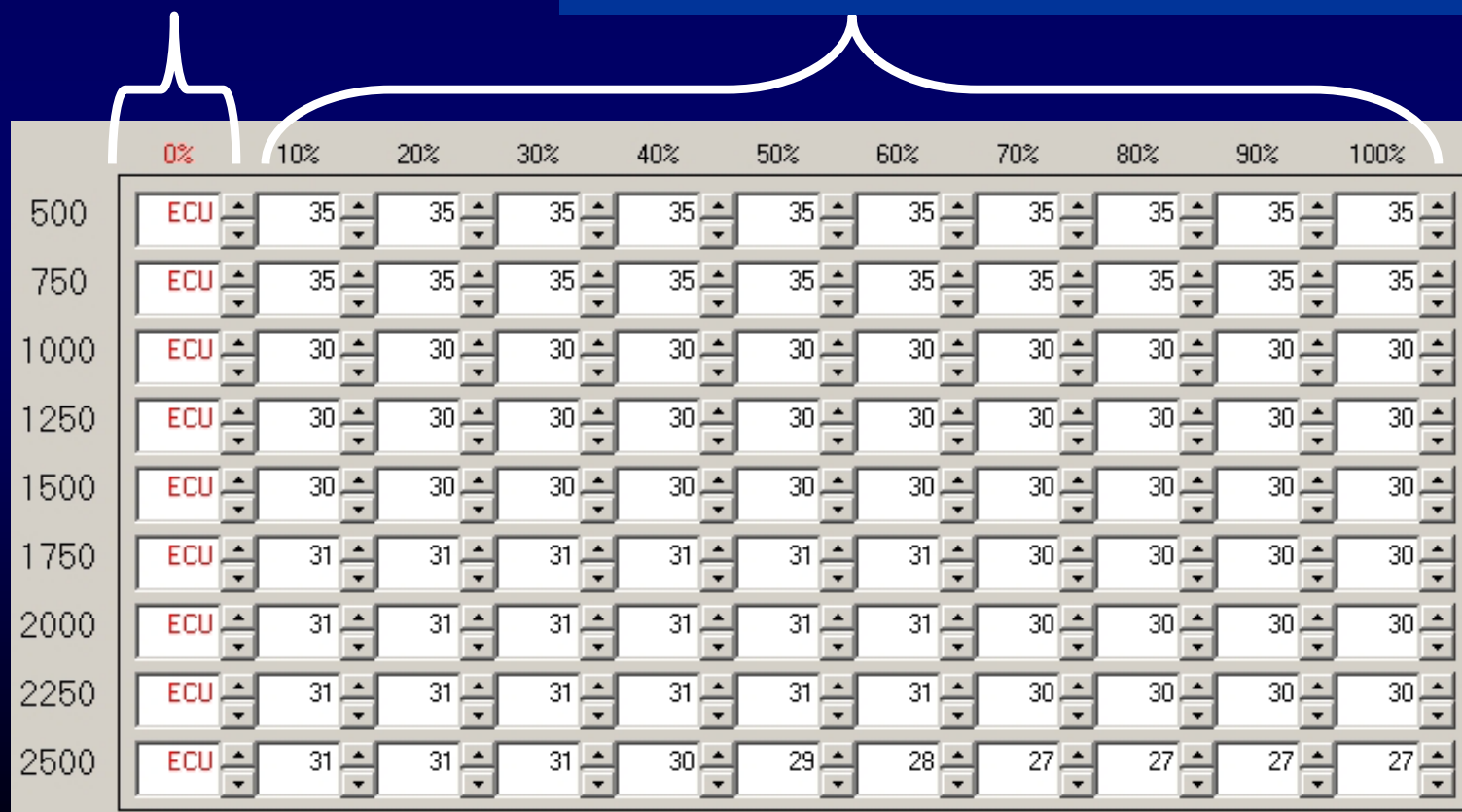
Timing Tuning

Timing ninja fu

Timing Map Tuning

0% column applies to all RPM's below TPS cross over point

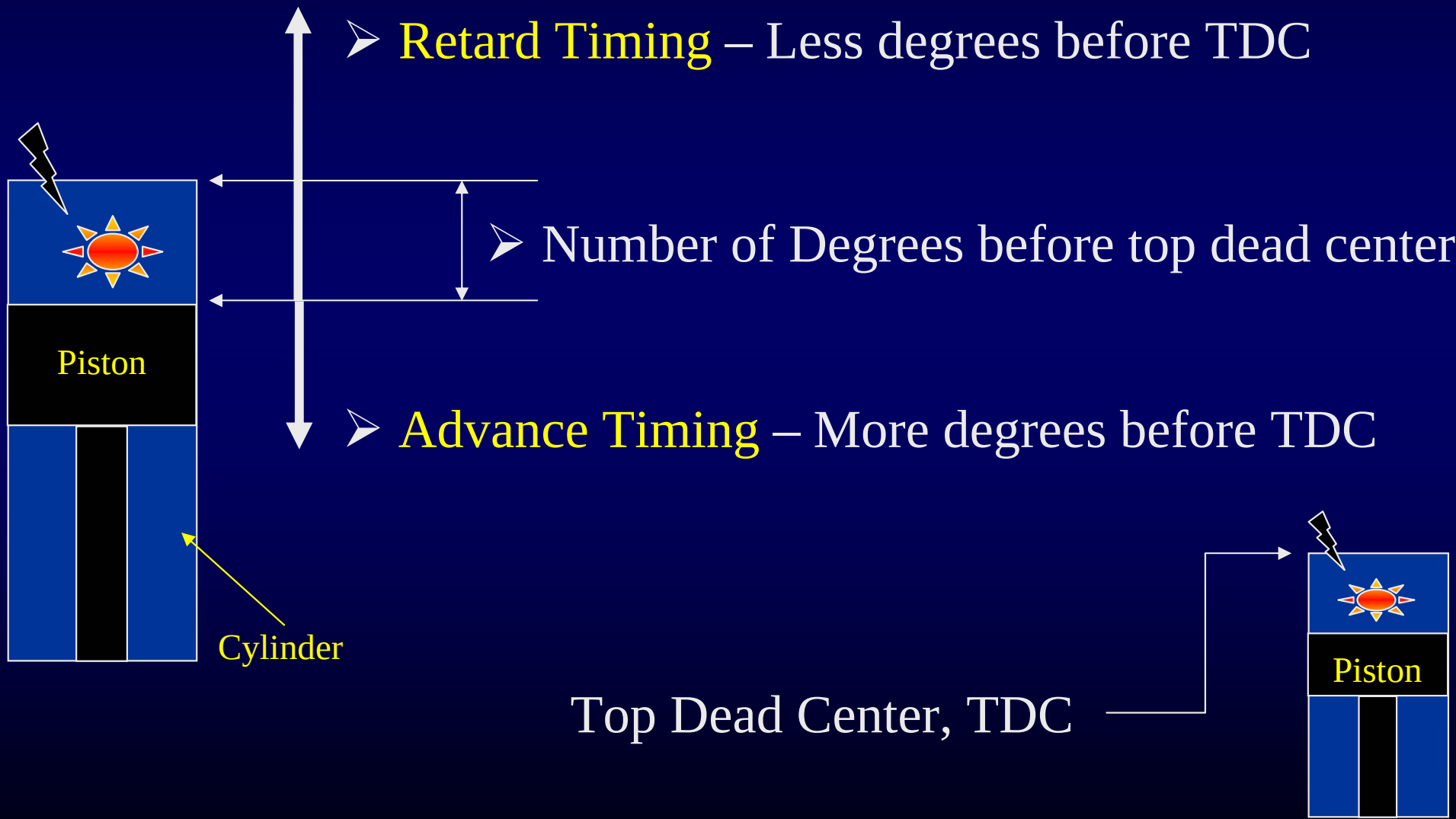
Past cross over point, Throttle load is represented by Mass Absolute Pressure, MAP as defined in the **SPECIAL CONSTANTS**



The table below represents a timing map for an engine. The rows represent engine speed in RPM (500 to 2500), and the columns represent throttle position in percent (0% to 100%). Each cell contains a value and a small ECU icon with up/down arrows. A bracket above the 0% column indicates it applies to all RPMs below the TPS crossover point. Another bracket above the 10% to 100% columns indicates they apply past the crossover point, where the values represent Mass Absolute Pressure (MAP).

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	ECU	35	35	35	35	35	35	35	35	35	35
750	ECU	35	35	35	35	35	35	35	35	35	35
1000	ECU	30	30	30	30	30	30	30	30	30	30
1250	ECU	30	30	30	30	30	30	30	30	30	30
1500	ECU	30	30	30	30	30	30	30	30	30	30
1750	ECU	31	31	31	31	31	31	30	30	30	30
2000	ECU	31	31	31	31	31	31	30	30	30	30
2250	ECU	31	31	31	31	31	31	30	30	30	30
2500	ECU	31	31	31	30	29	28	27	27	27	27

Timing Advance / Retard



Effects of timing adjustment

Advance Timing

Spark ignites air/fuel mix **MORE** degrees before top dead center

More Power

Lower EGT's

More prone to knock

More Torque

Higher EGT's

Less prone to knock

Retard Timing

Spark ignites air/fuel mix **LESS** degrees before top dead center

Timing Adjustment

- **Issue:** Default maps don't have timing down in the 10-60% columns – Can cause knock when control passes from ECU to UTEC and back. Needed for cars with BigMAF
- **Resolution:** Move timing values into those area
 - **LEAVE** lower RPM 0% under ECU control

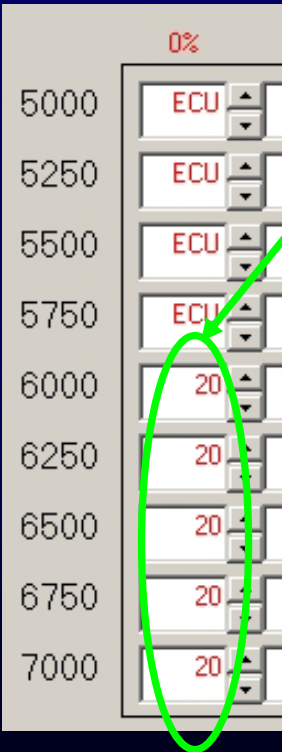
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	ECU	35	35	35	35	35	35	35	35	35	35
750	ECU	35	35	35	35	35	35	35	35	35	35
1000	ECU	30	30	30	30	30	30	30	30	30	30
1250	ECU	30	30	30	30	30	30	30	30	30	30
1500	ECU	30	30	30	30	30	30	30	30	30	30
1750	ECU	31	31	31	31	31	31	30	30	30	30
2000	ECU	31	31	31	31	31	31	30	30	30	30
2250	ECU	31	31	31	31	31	31	30	30	30	30
2500	ECU	31	31	31	30	29	28	27	27	27	27

Smooth transitions in timing minimizes the chance of knock

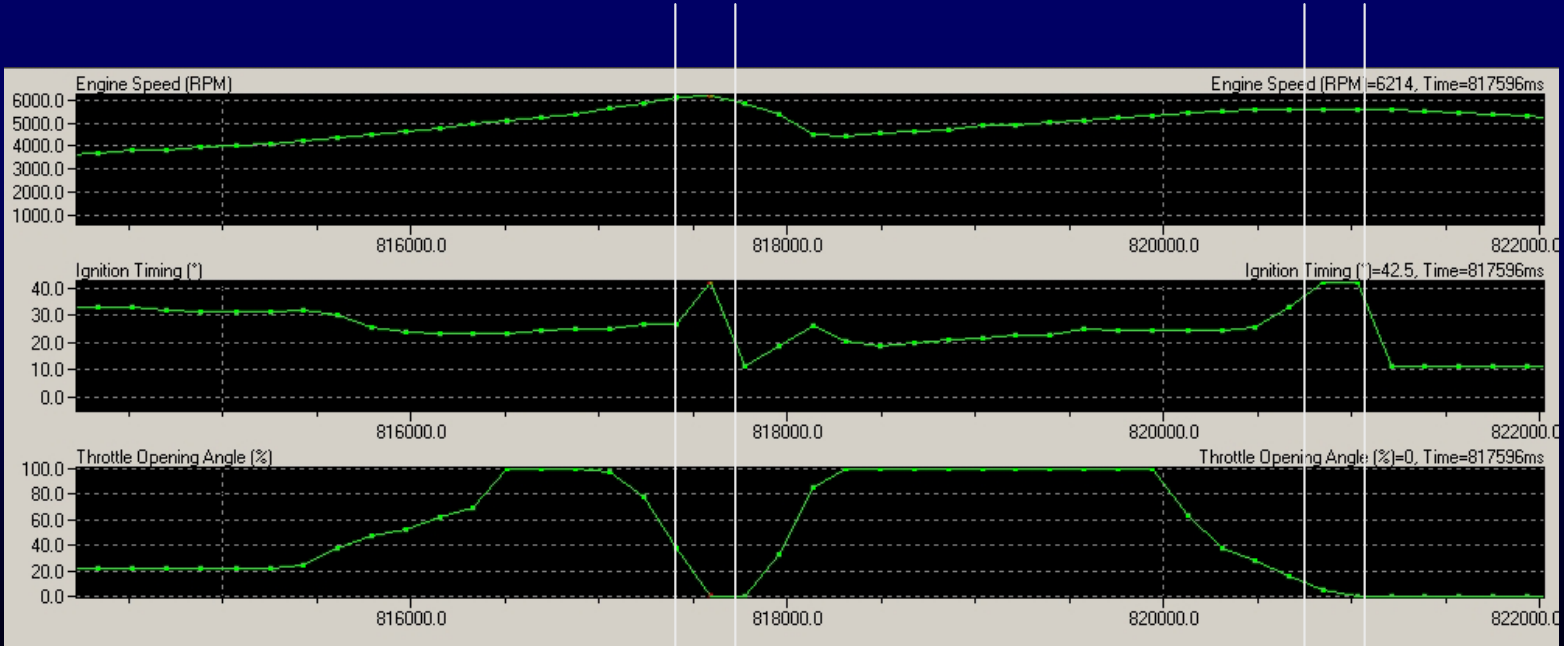
Try to limit steps in timing to less than 3 degrees

Knock after shift (timing correction)

Use conservative timing values in upper 0% column to minimize the chance of knock after shift



ECU runs huge timing advance after high RPM shift.
This can cause knock after shift conditions



Too much advance!

- 🧨 Too much advance leads to **KNOCK** and engine destruction!
- 🧨 At redline, too much advance means very high cylinder pressure
 - 🧨 **BANG – Dead WRX**
- 🧨 At a point, more advance does not yield more power
 - At that point more advance just takes you closer to knock
 - Back timing off 1-2-3 points to create a safe map
 - Saw this on the dyno

80%	90%	100%
35	35	35
35	35	35

Timing Low Down

- Retarding ignition would increase EGT's thus help spool up
 - ✗ Negatives: Loss of power because of reduced timing
 - ✓ BETTER: Advance timing at the low RPM's
 - ✓ More advance means more power

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	ECU	35	35	35	35	35	35	35	35	35	35
750	ECU	35	35	35	35	35	35	35	35	35	35
1000	ECU	30	30	30	30	30	30	30	30	30	30
1250	ECU	30	30	30	30	30	30	30	30	30	30
1500	ECU	30	30	30	30	30	30	30	30	30	30
1750	ECU	27	27	27	27	27	27	27	27	27	27
2000	ECU	25	25	25	25	25	25	25	25	25	25

Timing Values Mid to Top End

➤ Watch for knock in the mid rpm range

➤ Minimal advance here is good 😊

➤ After 3750 RPM's start ramping timing up

➤ 22 – 26 degrees of advance should be safe at redline

➤ Smooth Transitions, steps of 1-3 are best

🔴 Watch for **KNOCK** !

🔴 If you get knock, back off the timing 1-2-3 degrees at LEAST

	70%	80%	90%	100%
2750	23	23	22	22
3000	21	20	19	18
3250	18	18	18	18
3500	17	16	16	16
3750	16	16	16	16
4000	17	17	17	17
4250	19	19	19	19
4500	20	20	20	20
4750	21	21	21	21

	90%	100%
5000	21	21
5250	22	22
5500	23	23
5750	23	23
6000	24	24
6250	25	25
6500	25	25
6750	27	27
7000	28	28

UTEC Boost Controller Setup

Boost Map Tuning

Boost Control is
TPS/RPM based

TPS

RPM

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2750	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3000	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3250	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3500	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3750	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
4000	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
4250	ECU	ECU	ECU	ECU	ECU	ECU	230	250	270	290	310
4500	ECU	ECU	ECU	ECU	ECU	ECU	230	250	270	290	310
4750	ECU	ECU	ECU	ECU	ECU	ECU	230	250	270	290	310

Open Loop / Closed Loop Boost Control

- Open Loop (Default)
 - UTEC map sets boost solenoid duty cycle

	60%	70%	80%	90%	100%
ECU	▲▼	43.4 ▲▼	43.4 ▲▼	43.4 ▲▼	43.4 ▲▼
ECU	▲▼	43.4 ▲▼	43.4 ▲▼	43.4 ▲▼	43.4 ▲▼
ECU	▲▼	43.5 ▲▼	43.5 ▲▼	43.5 ▲▼	43.5 ▲▼

- Closed Loop
 - UTEC map defines target boost unit, UTEC automatically changes solenoid duty cycle to hit boost target

	60%	70%	80%	90%	100%
215 ▲▼	215 ▲▼	235 ▲▼	255 ▲▼	275 ▲▼	295 ▲▼
215 ▲▼	215 ▲▼	235 ▲▼	255 ▲▼	275 ▲▼	295 ▲▼
215 ▲▼	215 ▲▼	235 ▲▼	255 ▲▼	275 ▲▼	295 ▲▼

Open loop control

- I just stuck with the TurboXS map until closed loop was introduced
 - Used bleed valve to set max boost value

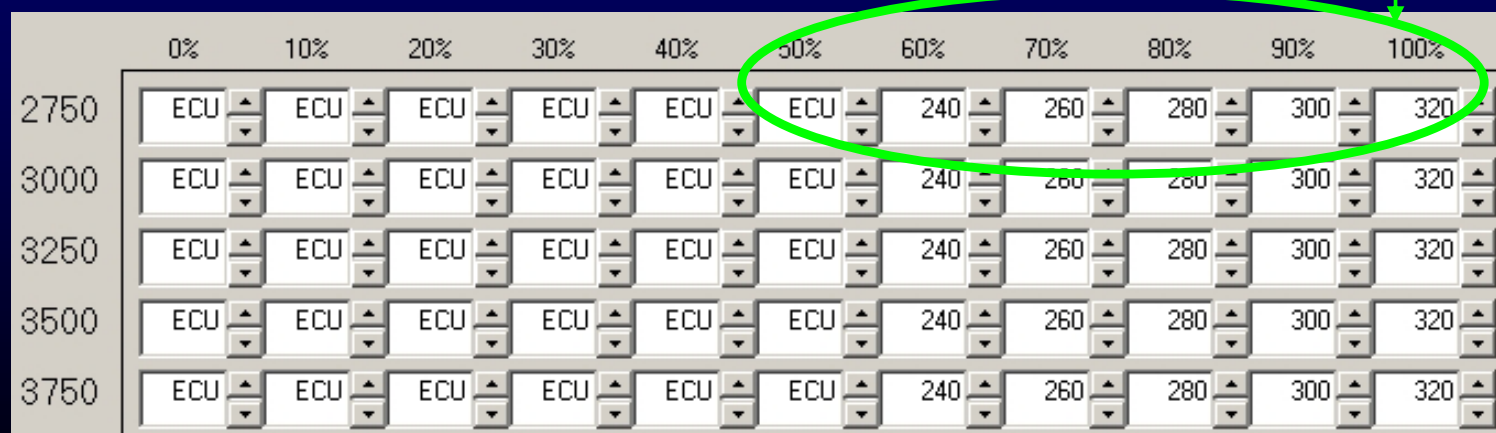
Sorry No More Information Available

Closed Loop Control

✳ Change Control mode in SPECIAL CONSTANTS (To 0)

- Start with low numbers and work up
 - Bleed valve effects max boost (set at open 2-3 turns and forget)
 - Boost Gain value effects max boost
 - 45-50 seems to work best
 - Effects boost ramp as well

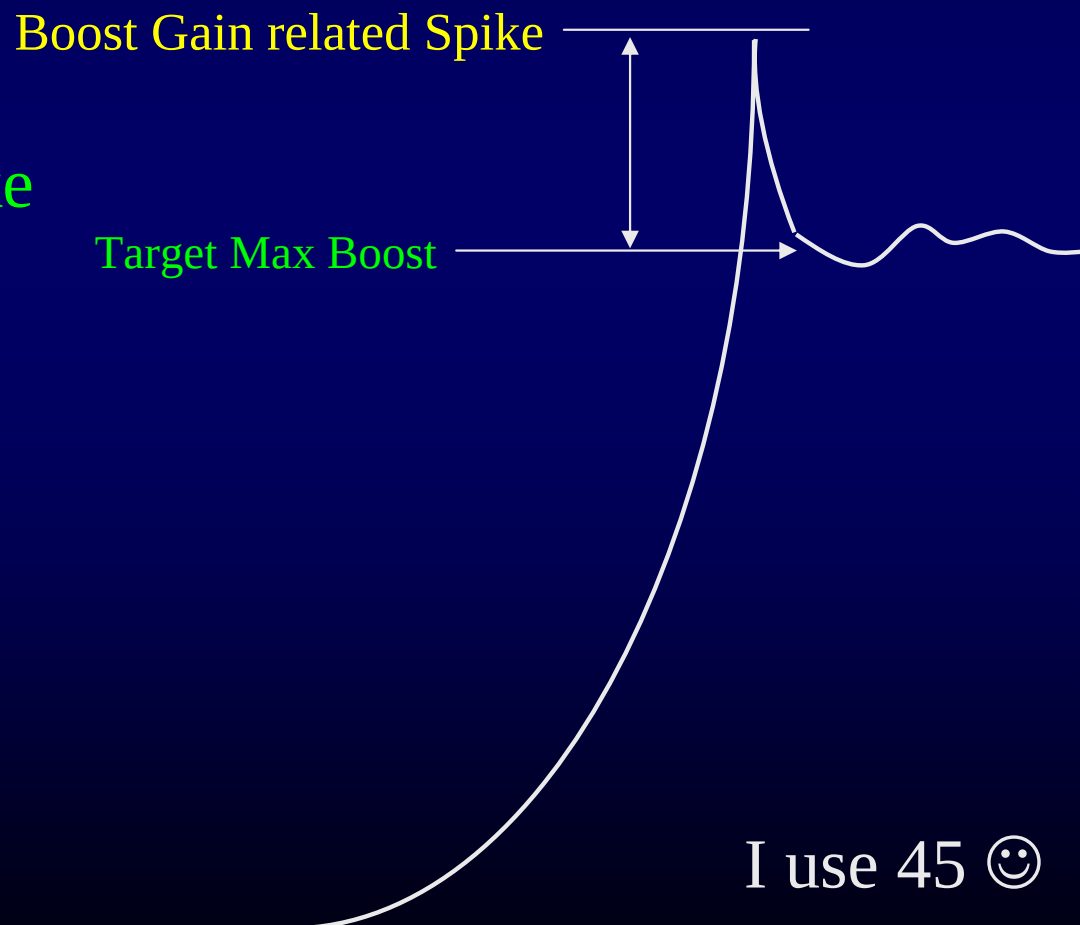
Ramp up the boost, this will make part throttle control feel smooth



	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2750	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3000	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3250	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3500	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320
3750	ECU	ECU	ECU	ECU	ECU	ECU	240	260	280	300	320

Closed Loop Boost Gain

- Lower Boost Gain Values =
 - Quicker Boost Ramp up
 - Bigger boost spike
 - 45 can yield ~1 psi spike
- Higher Boost Gain Values =
 - Slower Boost Ramp up
 - Smaller boost spikes
 - 50 yields ~0 psi spike
- **Caution:** Boost Gain effects
MAX boost value



UTEC Parameters

- Split into three sections
 - User
 - Tuner
 - Special
 - Open Loop Fueling
- It's best to read the UTEC users manual to understand these. They are fully explained in the manual.

Logging

- Log 1 seems to be the best for daily logging

Boost PSI

Actual MAF Volts

UTEC Load Column
Look at RPM / Load Column

Got any Knock

AFR Ignore

ECU Timing

Injector Duty Cycle

UTEC controlled timing

Fuel modify %

Boost Open/Closed loop setting

UTEC modified MAF Volts

RPM

RPM	MAP psig	MAF V	TPS %	Load Site	Knock Count	AFR	Ign#1 deg	Inj#1 duty	Mod Ign deg	Mod Fuel %	Boost (CL)	Mod MAF V
3479	+10.0	3.5	105	60	00	rich	+15.1	33.0	+18.0	-7.5	320.00	3.3
3534	+11.4	3.6	104	70	00	rich	+13.3	37.0	+17.0	-7.5	320.00	3.4
3615	+13.3	3.6	104	80	00	rich	+11.4	42.0	+17.0	-7.5	320.00	3.5
3732	+15.1	3.9	104	90	00	rich	+10.3	50.0	+17.0	-8.3	320.00	3.3
3880	+16.5	3.7	105	90	00	rich	+11.6	51.0	+17.4	-8.5	320.00	3.5
3926	+18.0	3.8	103	100	00	rich	+12.1	52.0	+17.7	-8.5	320.00	3.3
4110	+18.8	3.9	103	100	00	rich	+12.7	56.0	+18.2	-8.6	320.00	3.6
4161	+19.0	4.0	103	100	00	rich	+12.2	57.0	+18.7	-8.6	320.00	3.5

PDXTuning PDXTuning PDXTuning PDXTuning PDXTuning PDXTuning PDXTuning PDXTuning PDXTuning

Log Debugging

Always look at the values that lead up to the knock event

Boost, Timing, Fuel

Too much
Boost ?

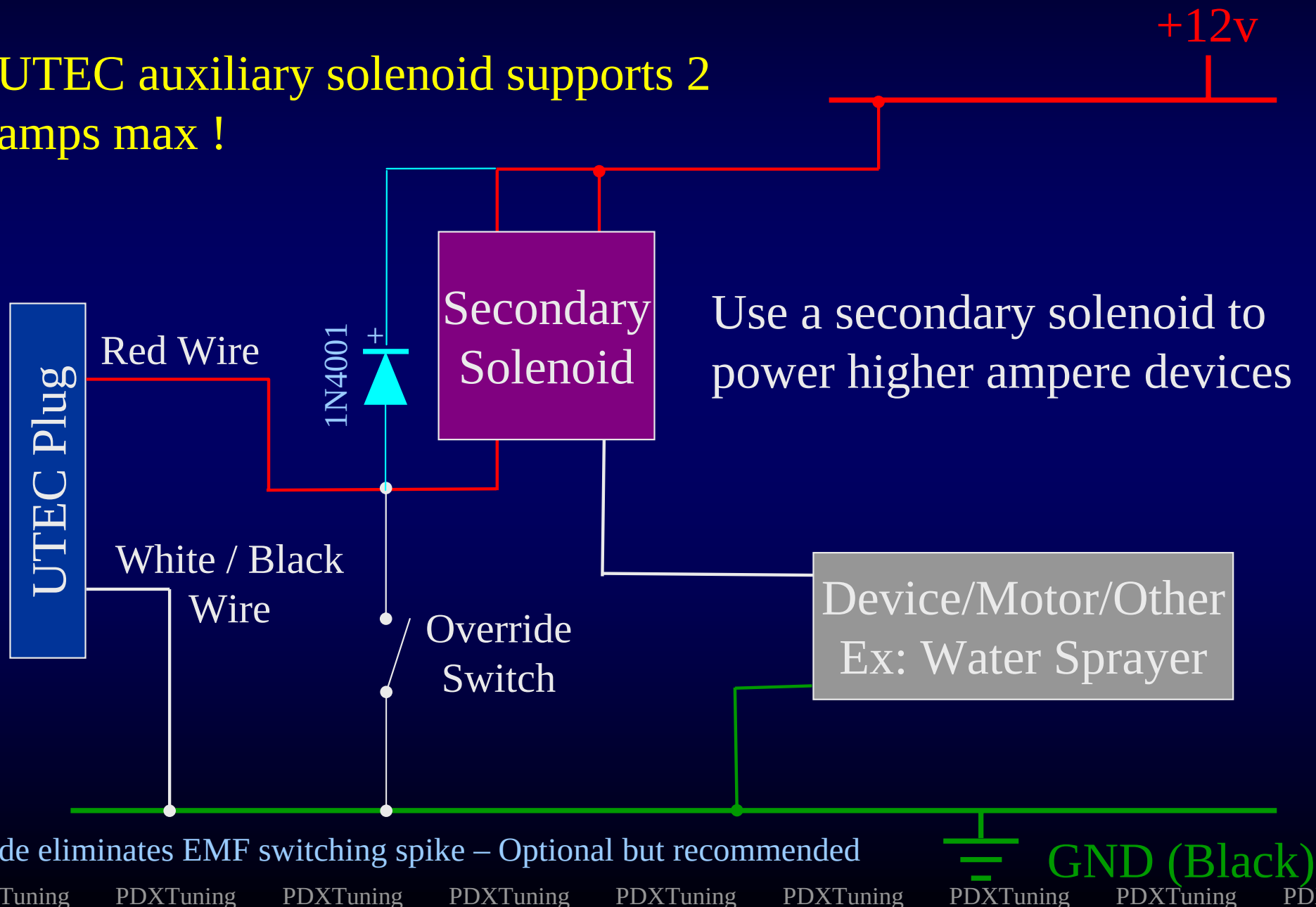
UTEC running too much timing
advance? The ECU did not want to run
that much timing

Too Lean ?

4060	+18.4	3.7	103	100	00	rich	+12.4	55.0	+18.5	-8.6	320.00	3.5
4214	+18.6	3.8	103	100	00	rich	+12.2	56.0	+18.8	-8.6	320.00	3.7
4284	+18.8	3.8	104	100	00	rich	+12.2	59.0	+19.8	-8.6	310.00	3.6
4368	+19.0	4.0	103	100	03	rich	+10.4	60.0	+12.0	-8.9	310.00	3.7
4444	+19.0	3.9	103	100	00	rich	+10.2	62.0	+12.8	-9.9	310.00	3.6
4572	+19.2	4.0	103	100	00	rich	+11.0	63.0	+13.0	-9.3	310.00	3.6
4721	+19.0	4.1	103	100	00	rich	+11.3	63.0	+13.0	-9.7	310.00	3.6

Spare Solenoid Usage

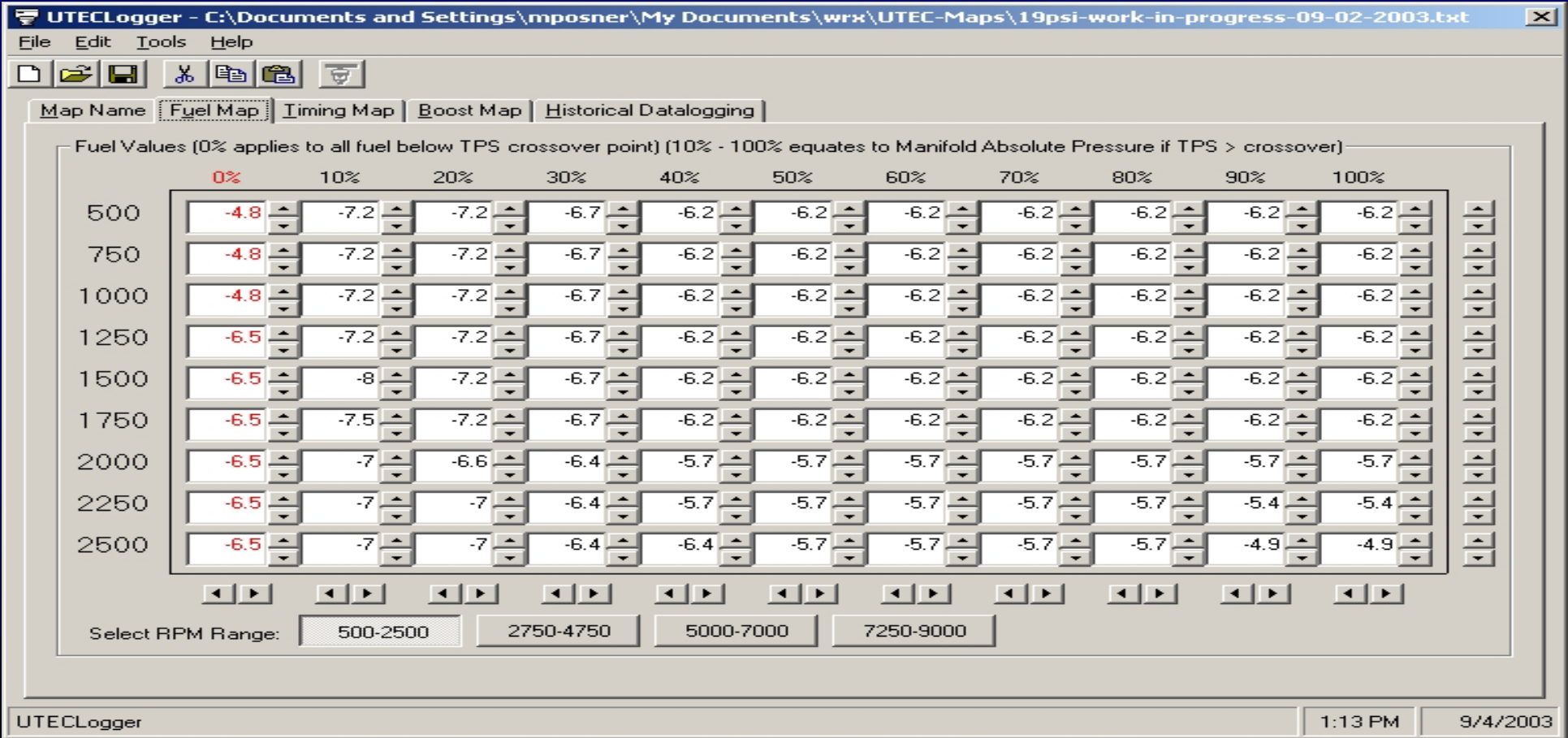
UTEC auxiliary solenoid supports 2
amps max !



Handy UTEC Utilities



UTECLogger (Free/Pay) – Found on <http://www.wrxhackers.com>
 Create / Edit UTEC maps, can connect to UTEC in real time.



Other Handy UTEC Utilities

- Log-Template.xlt
 - Excel Spread sheet that converts log file to graph format
- AutoLogger
 - Automatic logging with some other cool features.
- UTECEdit
 - Another great UTEC map creation tool
 - (I use this one ☺)

FAQ's

- Do I have to use the UTEC boost controller?
 - No, UTEC can be used to control only timing and fuel while something else, MBC, AVCR controls boost
- Should I calibrate the MAP?
 - Yes, but I didn't
- My TPS never reads 100% is that ok?
 - No, calibrate it

FAQ's

- Should I use launch control?
 - Risky but fun, it's your car you make the decision
- How much boost should I run?
 - Use TurboXS recommendation as a guide

RPM/Stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 4 FMIC
4000	16.1psi	16.5psi	17psi	17.5psi	18psi
5500	15psi	15psi	15.5psi	17.5psi	18psi
6000	12.5psi	12.5psi	12.5psi	16.5psi	17.5psi
7000	12 psi	12psi	12.5psi	16.5psi	17psi

FAQ's

- Why do I get knock with the TurboXS supplied maps?
 - TurboXS maps are usually tuned for 94 octane petrol, maybe your on 91/92 octane petrol
 - Use Octane challenged map or increase the octane content of your petrol
 - I find Toluene works very well
- What's the nearest planet to the sun
 - Mercury

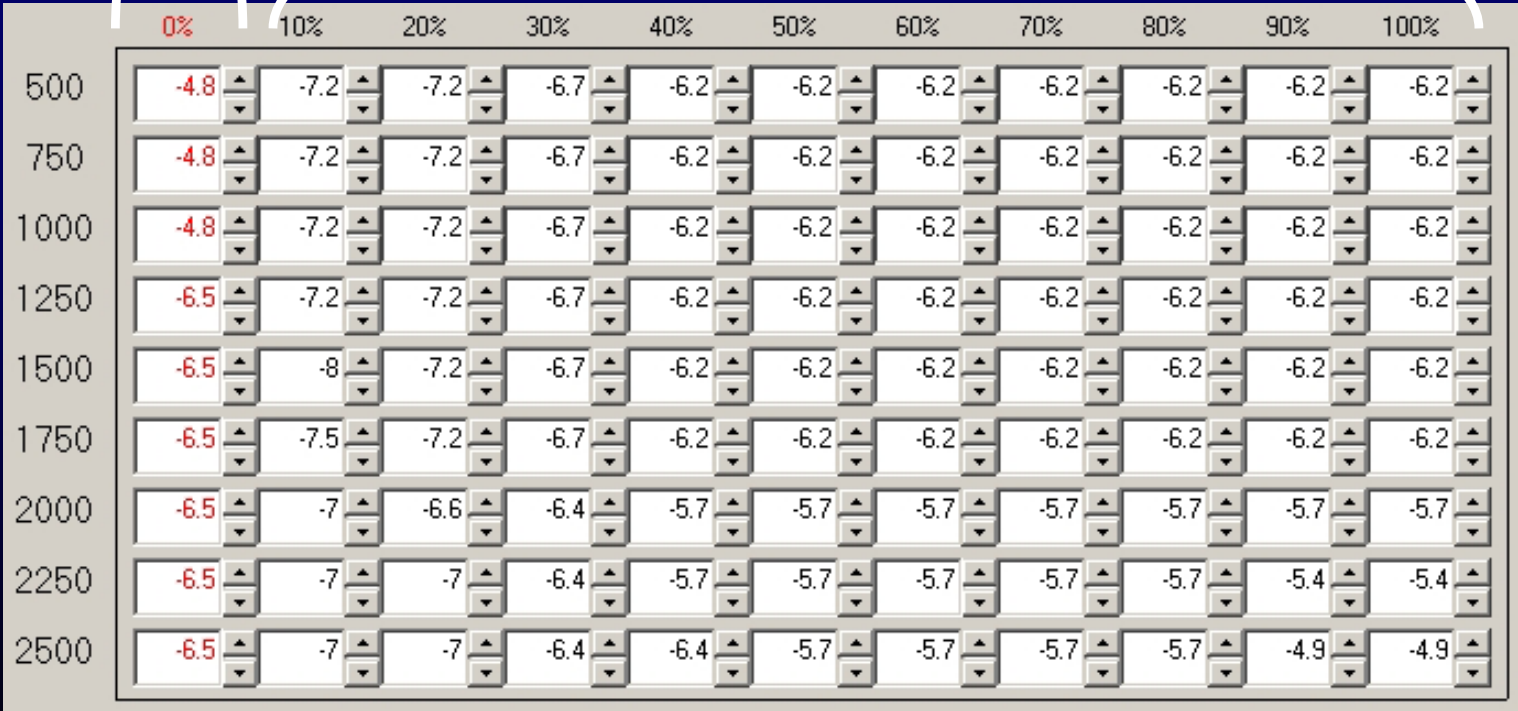
Backup Information – Classic Fuel Tuning

Classic Mode Fuel Tuning
NOT Applicable to OPEN LOOP
FUELING Mode

Fuel Map Tuning – 3.1 Default

0% column applies to all RPM's below TPS cross over point (60% by default)

Past cross over point, Throttle > 60%, load is represented by Mass Absolute Pressure, MAP as defined in the **SPECIAL CONSTANTS**



The image shows a fuel map tuning grid with two callout boxes. The first callout box points to the 0% column, stating that it applies to all RPMs below the TPS crossover point (60% by default). The second callout box points to the 60% column and all columns to its right, stating that past the crossover point, throttle > 60%, load is represented by Mass Absolute Pressure (MAP) as defined in the SPECIAL CONSTANTS. The grid itself has columns for throttle percentages from 0% to 100% and rows for RPMs from 500 to 2500. Each cell contains a numerical value and a small up/down arrow icon.

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
500	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
750	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1000	-4.8	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1250	-6.5	-7.2	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1500	-6.5	-8	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
1750	-6.5	-7.5	-7.2	-6.7	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
2000	-6.5	-7	-6.6	-6.4	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7
2250	-6.5	-7	-7	-6.4	-5.7	-5.7	-5.7	-5.7	-5.7	-5.4	-5.4
2500	-6.5	-7	-7	-6.4	-6.4	-5.7	-5.7	-5.7	-5.7	-4.9	-4.9

Fuel Tuning

- More positive numbers represent more fuel
 - A value of 2 represents more fuel than an value of 1
 - A value of -5 represents more fuel than a value of -6



❖ You are **NOT** modifying injector duty cycle! 

❖ You are modifying the Mass Air Flow, MAF, voltage reading by a percentage

Theory behind MAF based fuel modification

- Fools the ECU/(UTEC when in OLF control)
 - A reduction in MAF voltage fools the ECU/UTEC in thinking that less air is flowing into the engine thus less fuel is required
 - Injectors duty cycle is reduced
 - An increase in MAF voltage fools the ECU/UTEC in thinking that more air is flowing into the engine thus more fuel is required
 - Injector duty cycle is increased

Why Tune the 0% is using classic fueling mode

- Long Term Trim value used in **ECU Open Loop** (ECU open loop not UTEC) fuel control
 - Long term value will effect your >63% TPS fuel values
 - If Long Term is not stable, your >63% TPS AFR will never be stable.
 - Maybe too rich or maybe too **LEAN**
- **Short Term** always goes to 0 over 63% TPS

The End

Thank you