Instruction Manual for M55 ECU

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Introduction:

The M55 ECU was developed for Audi 5 cylinder turbo charged engine (for example ABY or 3B engine) with single coil or distributor Ignition. The stock wiring harness and stock sensors can be used. The ECU comes with a mapping for not modified engine. The mapping can be tuned with the M55_6_4 Program. With this Program, you can easily tune up each engine. The ECU uses the MAP sensor and not the MAF as load signal.
Please read first the Manual and test the M55_6_4 Program before you connect the ECU. Wrong programming can destroy the engine. Check the injector size for your engine. If the injector size is too small, the engine runs to lean and can overheat. Too big injectors caused problem in idle mode. The ECU have an integrated electronic for Bosch LSU 4.2 wideband Lambda sensor. The connector for the wideband Lambda sensor is in front of the case.

The new M55_6_4 ECU can now also be used for 1-6 Cylinder turbo charged or naturally aspired Engine up to 18000 rpm.

Important: not use with

- Automatic gear
- E-Gas (under Development)
- Idle Stepper (under Development)
- networked ECU
- Low Impedance Injectors
- For direct control coils (optionally with 2 Ignitors)

Parts:

- ECU
- Program for Laptop / PC
- RS232 Cable
- Bosch Wideband O2 Sensor include Cable to ECU
- Cable for O2 Bosch Wideband sensor
- Exhaust temperature sensor

Optional:

- 5” or 7” Touchscreen LCD Display
- Adapter for USB Flash Drive

System Requirements:

- Pentium III with min. 600MHz or better for Windows 2000 / XP
- Pentium IV with min. 1.5GHz or better for Windows Vista
- Minimum 256MB RAM for Windows 2000 or Windows XP
- Minimum 512MB RAM for Windows Vista
- RS232 Interface or USB to serial Converter
- Monitor Resolution min. 800 x 600 or higher
- working with Mouse, Keyboard or Touch screen

Operating System:

- Windows 2000, Windows XP, Windows Vista, Win 7, Win 8
- Windows 98 and ME not supported

Software Installation:

The software is installed in the folder C:\M55_6. The path must not be altered since the software accesses this folder to store log Files. No entries are performed into the registry. If you delete M55_6 folder, the whole software will be deleted consequently.

Program:	M55_6_4.exe
MAP Files:	xxxx.map
Log Files:	'MAP Name'_xxx.log
Power Log Files:	'MAP Name'_xxx.plg
USB Log Files:	LOGxx.log
USB MAP File:	usb.map
Ini File:	M55.ini
DLL File:	Port.dll

Features of the M55 ECU:

- simple Installation
- use stock wiring harness and the stock sensors
- simple adaptation to each Audi 5 cylinders ABY and 3B turbo engine
- no MAF necessary
- sequential Injection
- single coil or distributor Ignition
- knock detection
- closed loop boost control
- closed loop O2 Controllers for Narrow & Wide Band Sensors
- Launch control
- Traction control
- Exhaust temperature
- additional correction MAP
- On-Board MAP Sensor for up to 326 kPa (higher pressure on demand)
- two mapping can be store
- data logging with Laptop or optional with USB flash drive
- Windows tuning software (2000, XP, Vista and Win7 compatible)

Additional Features M55_6 ECU:

- applicable for 1-6 Cylinder turbo charged or naturally aspired engine from V1.5
- alpha/n, MAF, LMM or MAP Load
- Distributor-, Wasted Spark or Single Coil Ignition
- 1 or 2 Knock Sensor
- Adaptable Trigger Signal
- additional PWM MAP
- 2 or 3 wire Idle Valve (no stepper)
- Internal batterie buffered clock
- Exhaust backpressure measure from V1.9

Mounting and Setup for Audi ABY engine:

Warning: The M55_6 ECU must mount in passengers' room.

Remove the stock ECU. Remove the stock O2 Sensor and build into Bosch O2 wideband sensor. Connect the cable from Wideband O2 Sensor to the RJ45 connector on the right side of M55 connector. Mount the hose to MAP sensor. Connect the wiring harness to M55 connector.

Connect the laptop to M55 ECU and switch on Ignition. After start the M55_6 Program, the ECU will send the actual mapping to laptop. Before starting the engine check all sensor data and calibrate TPS sensor (Idle = 0%, WOT = 100%). A wrong calibration of the sensors can lead to faulty-functions. Check the injector size and define Load and RPM Axis. The Load axis is defined in absolute Pressure. The RPM Axis can set to 250-8000 or 250 to 10000 RPM.

Attention: Change polarity from reference Mark Sensor.

Mounting and Setup for Audi 3B engine:

When use M55_6 ECU with Audi 3B engine and distributor Ignition you must change some Pin in the wiring Harness Connector (sea chapter connector pin assignment).

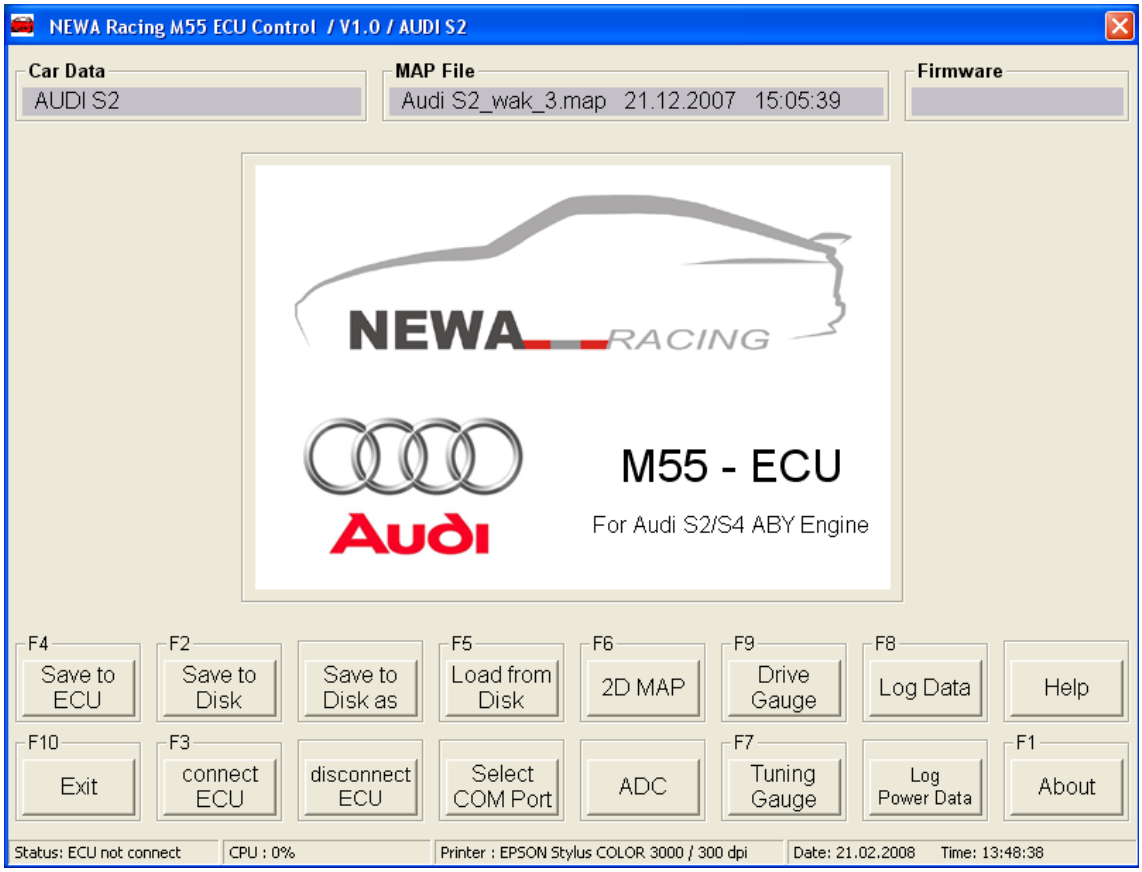
Attention: Change polarity from reference Mark Sensor.

We have tested the ECU with following Cars:

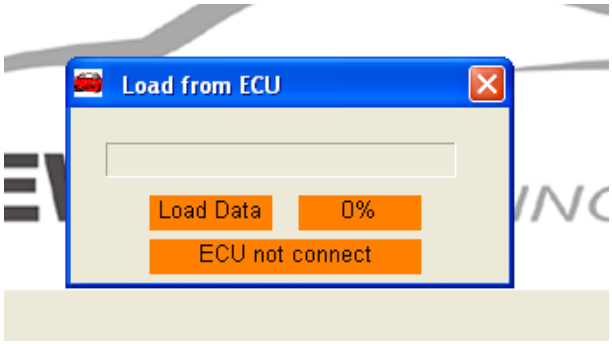
- Porsche 944 Turbo, MAP Load
- Porsche 964 C2, alpha/N
- Opel Calibra Turbo, MAP Load
- BMW M3 E30, alpha/n
- Audi S4 3B, MAP Load
- Audi S2/RS2 ABY, MAP Load

Main Window:

After starting M55_6 Program, the following Window will be shown.



Data Transfer from ECU to Laptop:

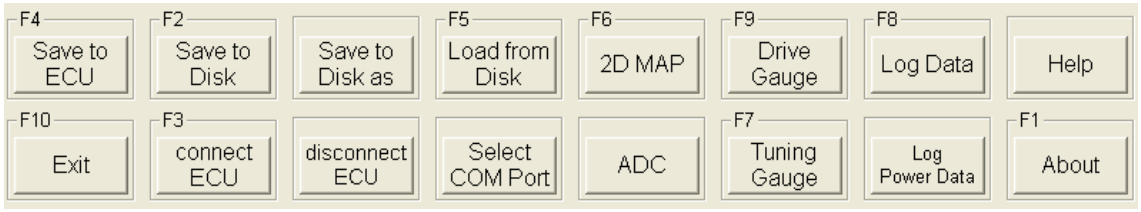


After starting the program, it will automatically try to connect with the ECU. Therefore, to make a connection possible, the ignition must be switched on and the RS232 cable must be connected to the laptop. If an ECU is recognized, all the data from the ECU will be sent to the PC. During this process, you must not start the engine. If no ECU is recognized the recently used data file will be loaded. If no connection to the ECU can be established, please check the correct COM Port setting

MAP Data:

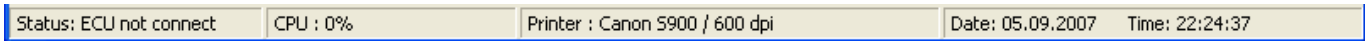
Car Data	Car Name (maximum 28 character)
MAP File	current MAP File with date (maximum 28 characters)
Firmware	With connected controller, the current firmware will be shown.

Start Window Panel:



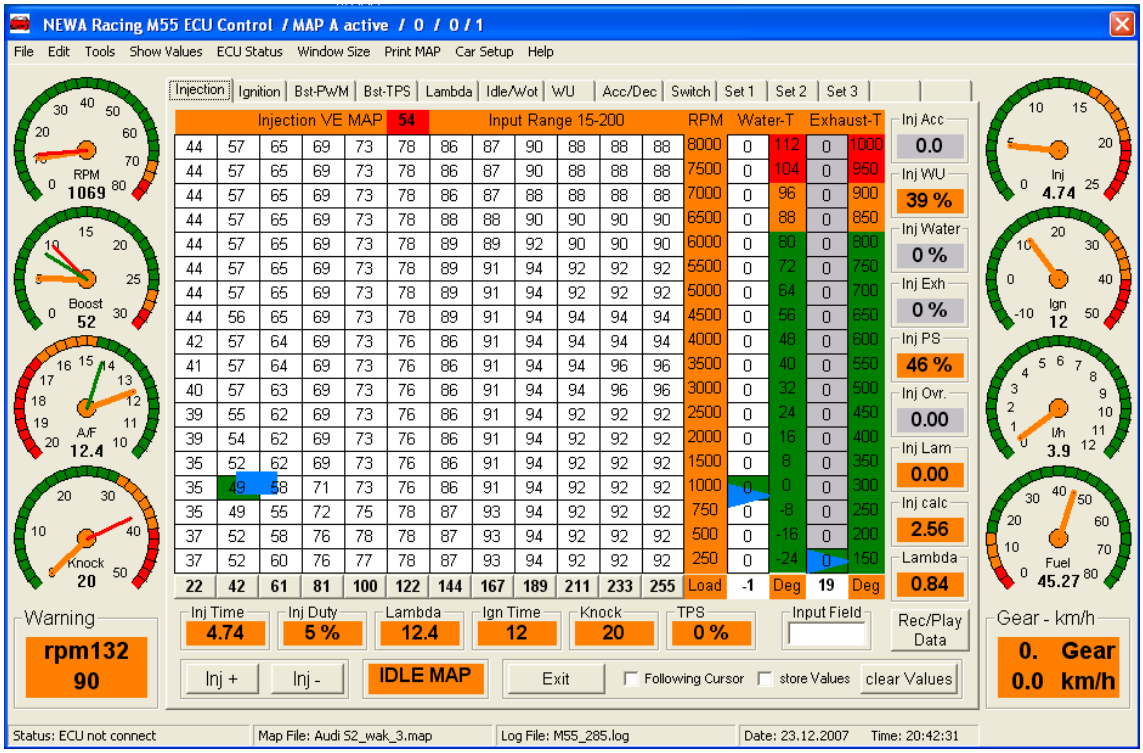
Save to ECU (F4)	sends the current MAP File to ECU
Save to Disk (F2)	overrides the current MAP File with new data
Save to Disk as	stores the current MAP File with new name
Load from Disk (F5)	loads MAP File from disk
2D MAP (F6)	opens MAP Window (Injection, Ignition ...)
Drive Gauge (F9)	opens Gauge Window
Log Data (F8)	opens Data Logging Window
Help	opens Help File
Exit (F10)	closes Program
connect to ECU	starts the communication with the ECU
disconnect ECU	closes the communication with the ECU
select COM Port	select COM Port (COM1, COM2, COM3)
ADC	shows ADC-Values from AD-Converter
Log Power Data	Window for Power and Acceleration measurement
About	shows current software version

Status-Line Main-Window:



Status	Indicates if ECU is connected
CPU	CPU utilization of the laptop or desktop should be maximum 50%
Printer	default Printer
Date	Date and Time

2D-MAP Window:



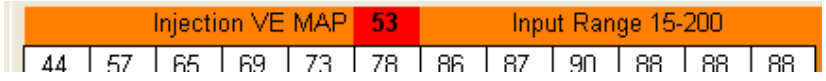
Press the ‘2D MAP’ button or alternatively the function key F6. Above window is shown.

In this window, you can find all relevant maps you need to make your engine running optimally. Important maps such as injection and ignition consist of 18 rows and 12 columns. Values between sampling nodes are shown as interpolated values. This allows you to tune your engine for maximum performance. Most maps consist of a Main-MAP (three-dimensional) and a Correction-MAP (two-dimensional)

MAP select:

Select MAP with the Mouse or holding the Ctrl key while pressing the ‘arrow right’ or ‘arrow left’ button to toggle between various maps.

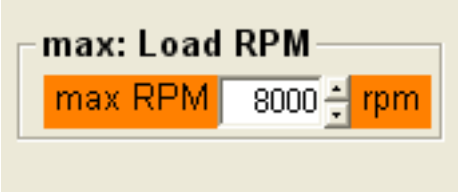
MAP Title:



Besides MAP title and Input range, the value in the red cell shows you the interpolated value for the ‘Injection VE MAP’

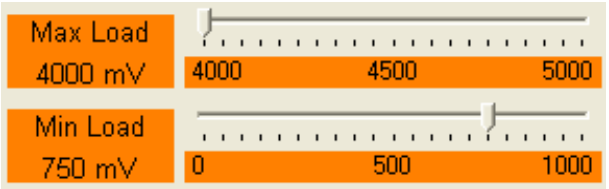
MAP Axis:

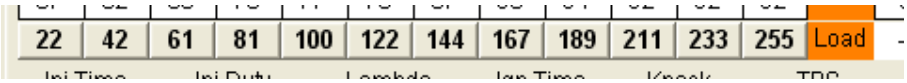
The RPM axis covers a range of 250 - 8000 rpm, 250 - 10000 rpm or 500 - 12000 rpm. The adjustment of the RPM axis is performed under the tab ‘Switch’.

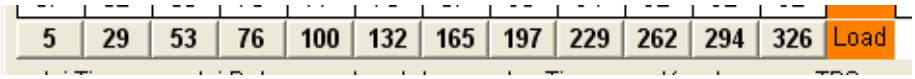


The load axis may be adjusted in the area of 209 – 250 kPa. Under tab ‘Set 1’ and with the functions ‘Max Load’ and ‘Min Load’ the load axis can be stretched or compressed and therefore be adapted perfectly to the engine. Set the maximum and minimum so that the whole map from the engine can be used.
If you use MAF or TPS as load signal, the load axis is 0-100%.

Adjust Load Axis:



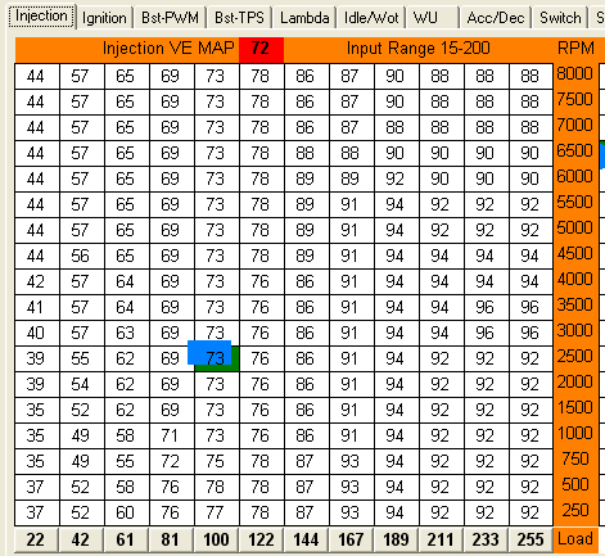


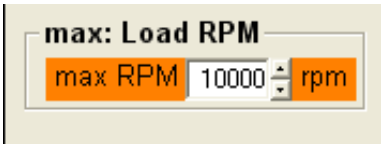


With ‘Max Load’, you can set the maximum MAP pressure and with ‘Min Load’ the minimum MAP pressure. The maximum MAP pressure should be set slightly higher than the maximum desired boost pressure. The value of 100 kPa (ambient pressure) remains in the same column and cannot be changed.

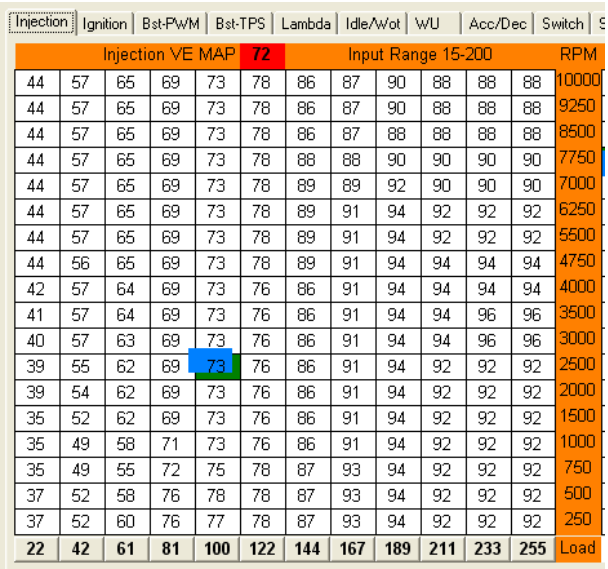
RPM Axis:

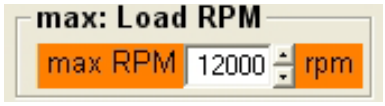
max. 8000 rpm



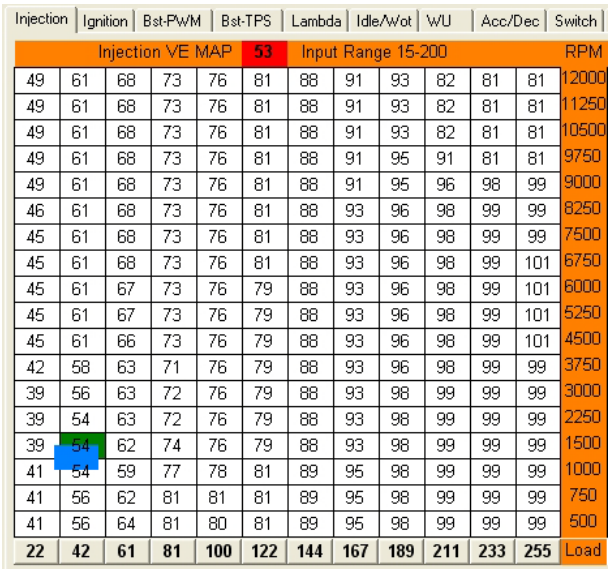


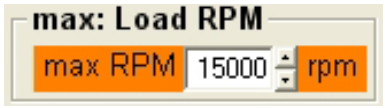
max. 10000 rpm



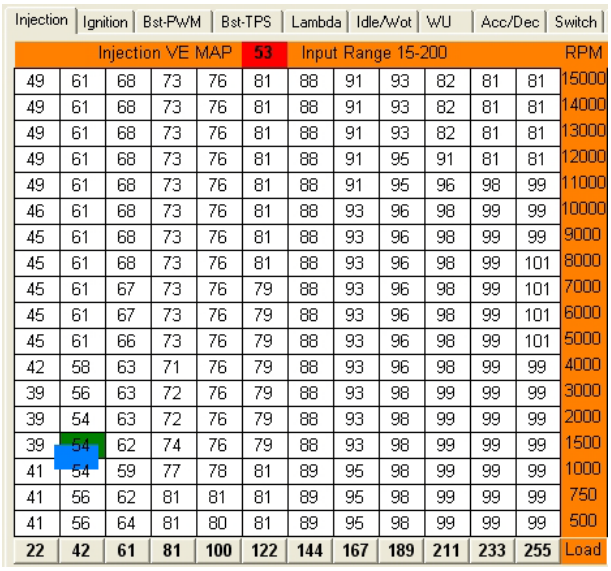


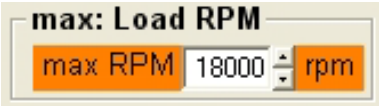
max. 12000 rpm



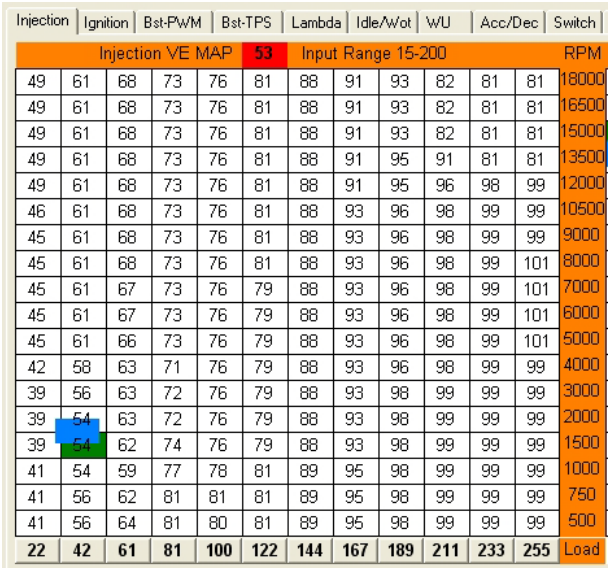


max. 15000 rpm



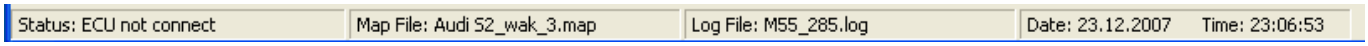


max. 18000 rpm



Attention: Before start engine, define first Load and RPM Axis.

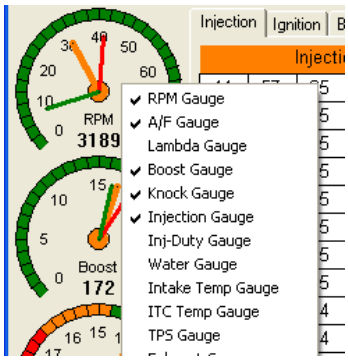
Status-Line 2D-MAP:



Status	indicates if the ECU is connected
Map File	shows the current MAP File
Log File	shows the current Log File
Date	shows Date and Time

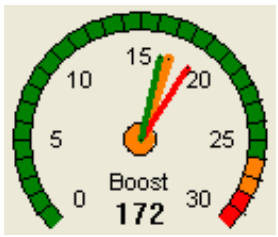
Select Gauge:

Depending on window size, you can show four or eight gauges.



The gauges can freely be defined. Move the mouse on the desired gauge and press the right mouse button. The desired gauge can now be selected from the list. All currently selected instruments are marked with a tick.
After restarting the program, the gauge will be reset to default.

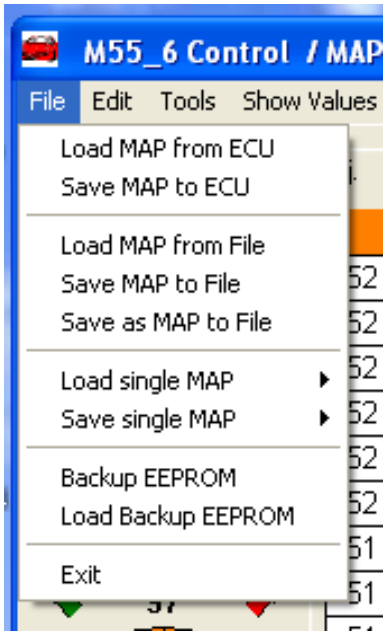
Gauge-Pointer:



- Orange Pointer : current Value
- Green Pointer : target Value
- Red Pointer : peak Value

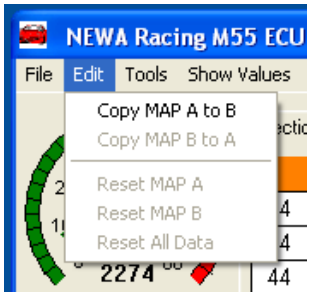
Menus:

Menu File:



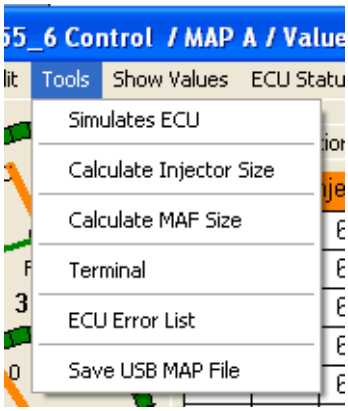
Load MAP from ECU	loads MAP from ECU
Save MAP to ECU	sends current MAP to ECU
Load MAP from File	load MAP from File
Save MAP to File	stores current MAP to File
Save as MAP to File	stores current MAP with new name
Load single MAP	Load a single MAP For Example: Injection MAP
Save single MAP	Save a single MAP For Example: Injection MAP
Backup EEPROM	backups current MAP to Backup EEPROM
Load Backup EEPROM	reads backup MAP from EEPROM

Menu Edit:

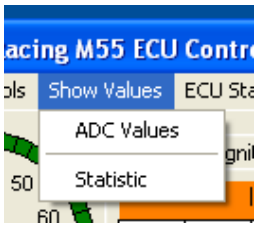


Copy MAP A to B	copies MAP A to MAP B

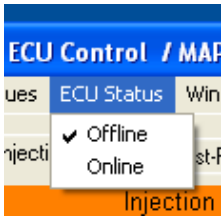
Menu Tools:

	Simulates ECU Calculate Injector Size Calculate MAF Size Terminal ECU Error List Save USB MAP File	changes values without ECU check Injector Size for your engine check MAF Size for your engine Terminal switch to transparent mode show Errorlist from ECU makes MAP File for Flash Drive

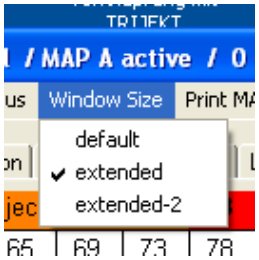
Menu Show Values:

	ADC Values Satistic	shows ADC-Values from AD-Converter opens statistic Window

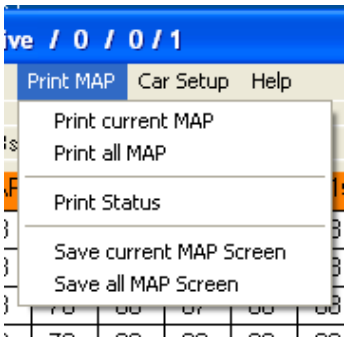
Menu ECU Status:

	Offline Online	ends communication with ECU starts communication with ECU

Menu Window Size:

	default extended extended-2	For Display resolution 800x600 For Display resolution 1024x768 For Display resolution 1280x1024

Menu Print MAP:

	Print current MAP Print all MAP Save current MAP Save all MAP Screen	prints current MAP to default printer prints all MAP to default printer saves current MAP do disk as picture saves all MAP to disk as picture

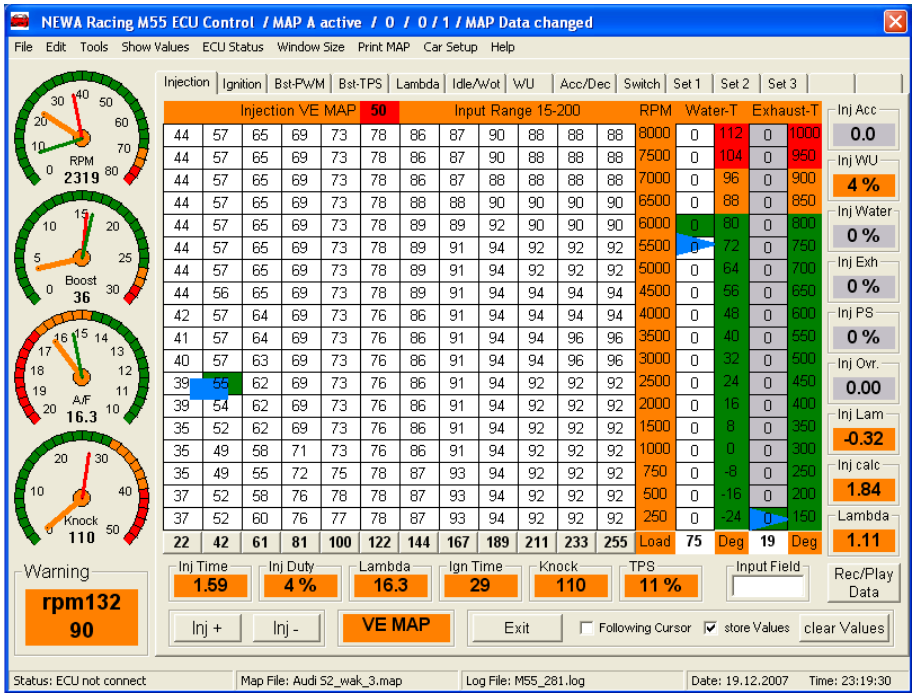
Menu Car Setup

	Car Data	enter Car Data

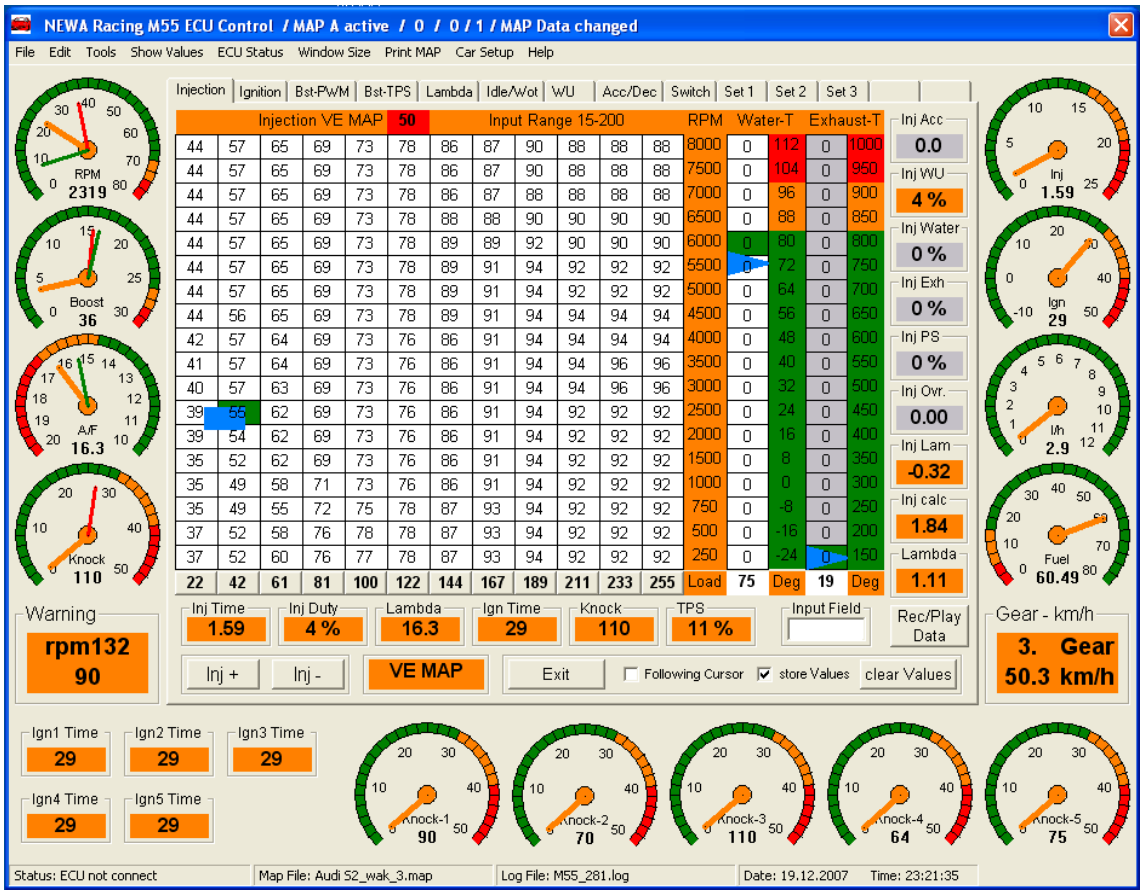
Menu Help

	About Help	about Software Version and PC data online Help

Window default:



Window extended-2:



Depending on screen resolution, you can change the window size.

MAP Cursor:

Injection VE MAP					71	Input Range 15-200						RPM	Water-T		Exhaust-T	
44	57	65	69	73	78	86	87	90	88	88	88	8000	0	112	0	1000
44	57	65	69	73	78	86	87	90	88	88	88	7500	0	104	0	950
44	57	65	69	73	78	86	87	88	88	88	88	7000	0	96	0	900
44	57	65	69	73	78	88	88	90	90	90	90	6500	0	88	0	850
44	57	65	69	73	78	89	89	92	90	90	90	6000	0	80	0	800
44	57	65	69	73	78	89	91	94	92	92	92	5500	0	72	0	750
44	57	65	69	73	78	89	91	94	92	92	92	5000	0	64	0	700
44	56	65	69	73	78	89	91	94	94	94	94	4500	0	56	0	650
42	57	64	69	73	76	86	91	*95	94	94	94	4000	0	48	0	600
41	57	64	69	73	76	86	91	94	94	96	96	3500	0	40	0	550
40	57	63	69	73	76	86	91	94	94	96	96	3000	0	32	0	500
39	55	62	69	73	76	86	91	94	92	92	92	2500	0	24	0	450
39	54	62	69	73	76	86	91	94	92	92	92	2000	0	16	0	400
35	52	62	69	73	76	86	91	94	92	92	92	1500	0	8	0	350
35	49	58	71	73	76	86	91	94	92	92	92	1000	0	0	0	300
35	49	55	72	75	78	87	93	94	92	92	92	750	0	-8	0	250
37	52	58	76	78	78	87	93	94	92	92	92	500	0	-16	0	200
37	52	60	76	77	78	87	93	94	92	92	92	250	0	-24	0	150
22	42	61	81	100	122	144	167	189	211	233	255	Load	39	Deg	19	Deg

Digital Cursor: (green)

Show current cell.

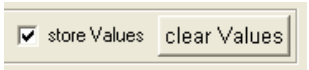
Analog Cursor: (blue)

Shows current interpolate Value

Marker Cursor: (red)

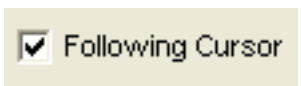
If you want to change one or several values in the MAP, you must first mark (highlight) one or more cells. All marked cells get colored in red. Write a new value into the input field and press Enter to confirm; alternatively press key + or key – for incrementally changing the values in red marked cells. If you have changed a value, the cell gets colored in yellow and flagged by a star. Each value change is immediately sent to ECU. Saving the MAP to disk, all yellow marked cells will be re-colored in white.

Store Values: (light-blue)



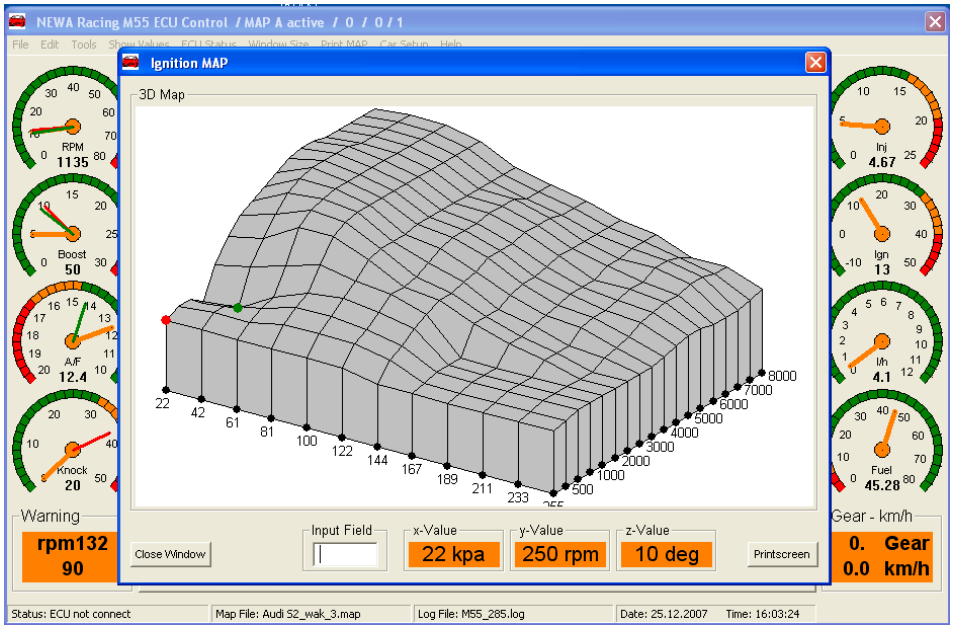
After ticking the checkbox ‘store Values’, all used cells get the color light-blue. After pressing the button ‘clear Values’, the color re-changes from light-blue to white.

Following Cursor: (orange)



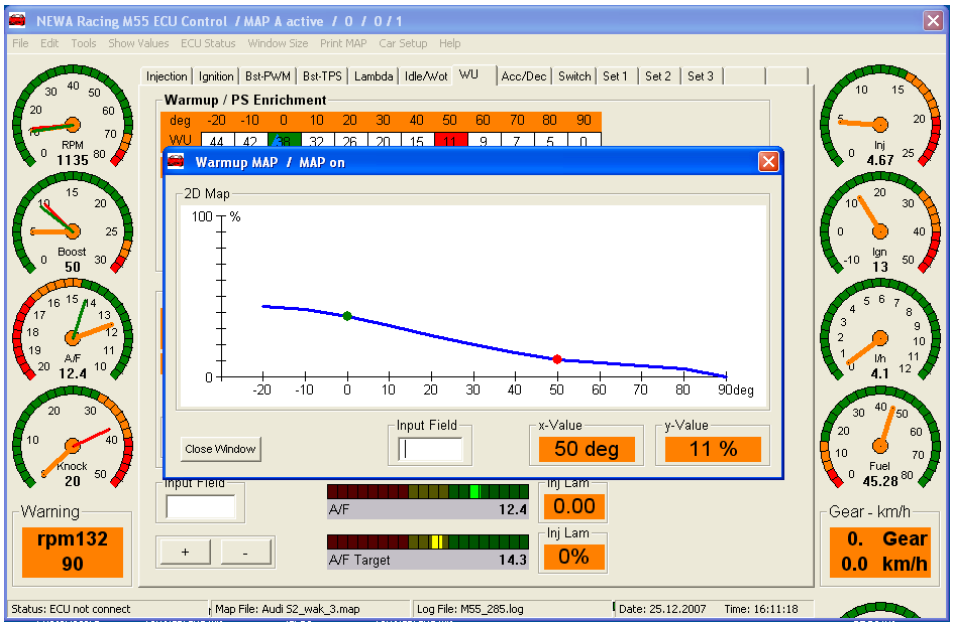
After ticking the checkbox ‘Following Cursor’, the green Cursor (digital Cursor) changes to the color orange. With this setting, it is not necessary to mark a cell for modifying it. By simply entering a value into the input field or press key + or key -, the orange cell gets modified.

3D Graphic:



Pressing the key combination ‘shift g’ shows a 3D visualisation of the current MAP. With this presentation you can immediately check whether holes or peaks are present in your MAP. The 3D graphics can be moved with ‘shift-arrow’ or turned with ‘CTRL-arrow’. The green dot indicates the current engine load. You can move the red dot with the arrow keys and you can change values with + or – keys or write a value to the Input field and press Enter. After pressing the button ‘Printscreen’, the current 3D-Map will be sent to the default printer.

2D Graphic:



By pressing the key ‘g’, the currently highlighted map is displayed as a 2D graphics. At one glance you can see whether discontinuities in the map occur. With the arrow keys, you can move the red dot. With the key + and key - the value increases or decreases; alternative enter a value into input field and confirm with ‘Enter’.

Different MAP:

3D – MAP:
- Injection MAP
- Ignition MAP
- Boost PWM MAP
- Boost TPS MAP
- Lambda Target MAP
- AUX1 PWM MAP
- AUX2 PWM MAP

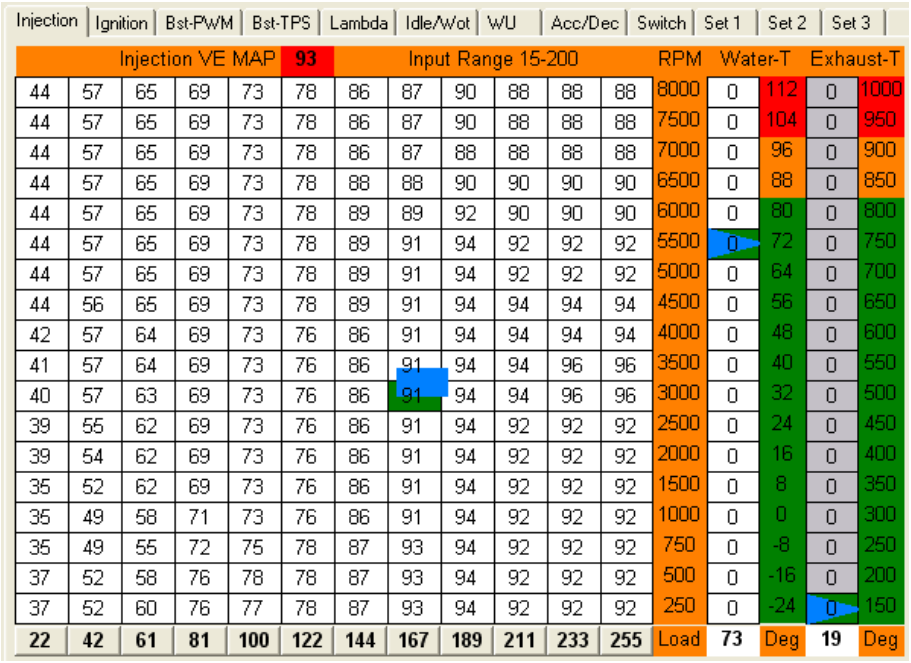
2D – MAP:
- WOT MAP
- Idle MAP
- Crank MAP
- Injection Angle MAP
- Warm-up - MAP
- Post start - MAP
- Idle RPM MAP
- Idle PWM MAP
- Acceleration Enrichment MAP
- Cold Acceleration Enrichment MAP
- Boost Output Voltage MAP
- Exhaust backpressure MAP V1.9

2D – Correction MAP for Injection:
- Water -Temperature MAP
- Exhaust -Temperature MAP

2D – Correction MAP for Ignition:
- Water-Temperature MAP
- Boost MAP
- Inlet -Temperature MAP

2D – Correction MAP for Boost TPS MAP:
- Water -Temperature MAP
- Intake -Temperature MAP

Injection MAP:



Injection | Ignition | Bst-PWM | Bst-TPS | Lambda | Idle/Wot | WU | Acc/Dec | Switch | Set 1 | Set 2 | Set 3

Injection VE MAP 93						Input Range 15-200						RPM	Water-T		Exhaust-T	
44	57	65	69	73	78	86	87	90	88	88	88	8000	0	112	0	1000
44	57	65	69	73	78	86	87	90	88	88	88	7500	0	104	0	950
44	57	65	69	73	78	86	87	88	88	88	88	7000	0	96	0	900
44	57	65	69	73	78	88	88	90	90	90	90	6500	0	88	0	850
44	57	65	69	73	78	89	89	92	90	90	90	6000	0	80	0	800
44	57	65	69	73	78	89	91	94	92	92	92	5500	0	72	0	750
44	57	65	69	73	78	89	91	94	92	92	92	5000	0	64	0	700
44	56	65	69	73	78	89	91	94	94	94	94	4500	0	56	0	650
42	57	64	69	73	76	86	91	94	94	94	94	4000	0	48	0	600
41	57	64	69	73	76	86	91	94	94	96	96	3500	0	40	0	550
40	57	63	69	73	76	86	91	94	94	96	96	3000	0	32	0	500
39	55	62	69	73	76	86	91	94	92	92	92	2500	0	24	0	450
39	54	62	69	73	76	86	91	94	92	92	92	2000	0	16	0	400
35	52	62	69	73	76	86	91	94	92	92	92	1500	0	8	0	350
35	49	58	71	73	76	86	91	94	92	92	92	1000	0	0	0	300
35	49	55	72	75	78	87	93	94	92	92	92	750	0	-8	0	250
37	52	58	76	78	78	87	93	94	92	92	92	500	0	-16	0	200
37	52	60	76	77	78	87	93	94	92	92	92	250	0	-24	0	150
22	**42**	**61**	**81**	**100**	**122**	**144**	**167**	**189**	**211**	**233**	**255**	Load	**73**	Deg	**19**	Deg

The Injection-Window shows you all relevant data for the Injection time. The load-axis (in the above example 22 - 255kPA) is horizontal and the rpm-axis (250 - 8000 rpm) vertical. The load-axis and the rpm-axis are the same for all maps. The digital cursor (green) and the analogue cursor (blue) show you the current load of the engine. The program interpolates between the cells. The interpolated value is beside the title 'Injection VE MAP' shown (in the above example, the value is 93). The value in the table is a correction value and not the current injection time. The input value must be between 15 and 200. If the value is essentially under 50 with small load-signal or under full-load essentially over 100, then the Injector size or cylinder size does not agree with your input.

Correction-MAP 'Water Temperature':
The values in the Injection MAP can be corrected as a function of the water temperature. The current values correspond to percentages.

Note: Do not use this map for engine warm up.

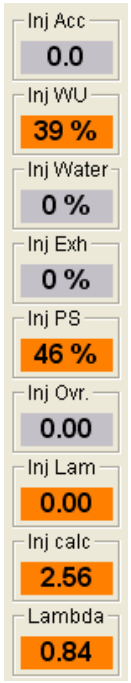
Correction-MAP 'Exhaust Temperature':
The values in the Injection MAP can be corrected as a function of the exhaust temperature.

Note: the exhaust temperature must not exceed 950 degrees Celsius. By increasing the Injection time, you can reduce the exhaust temperature. The current values correspond to percentages.

Note: Active MAPs show a white background colour, inactive MAPs have a grey background colour.

Composition of Injection Time:

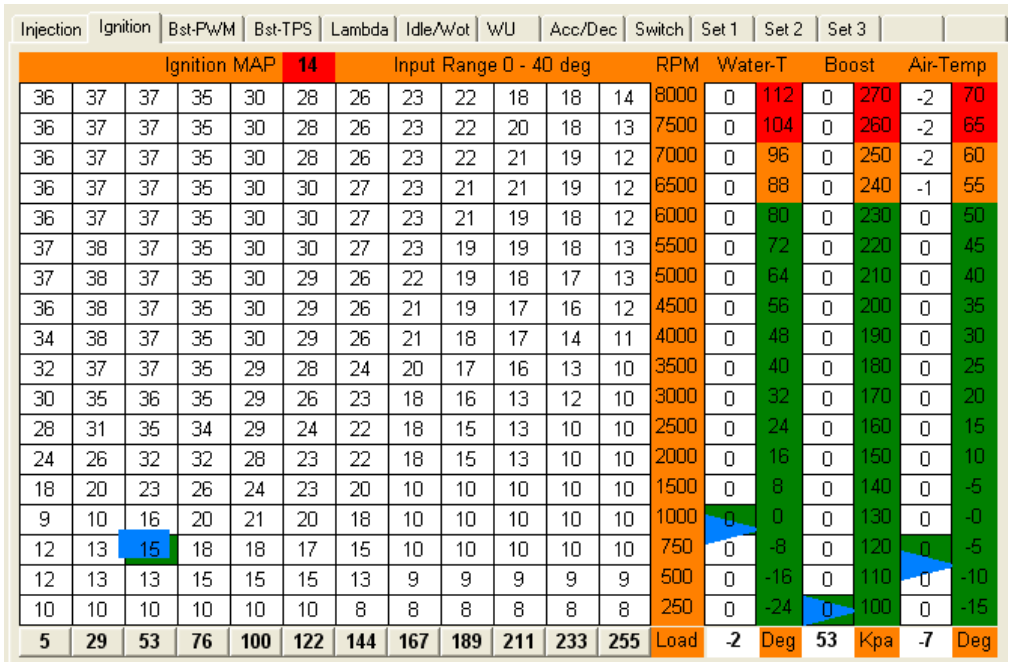
The injection time is calculated from the following values:
Engine displacement, MAP pressure, intake temperature, injector size and the VE value from Injection MAP.

	Inj Acc	Acceleration Enrichment Value
	Inj WU	Cold Acceleration Enrichment Value
	Inj Water	correction in dependence on the water temperature
	Inj Exh	correction in dependence on the exhaust temperature
	Inj PS	Post start correction
	Inj Ovr.	Overall correction
	Inj Lambda	Lambda correction Value
	Inj calc	calculate Injection Value
	Lambda	Lambda Value

I It is important to have the right size of the fuel injectors. Under full load the value ‘inj Duty’ 85% should not be exceed, because between 85% and 100% the injectors do not work properly. Too big injectors can cause problems in idle mode while the injection time is very short. The injector resistance must be higher than 10 Ohm. It is possible to mount two injectors with min. 15 Ohm at one output channel.
For tuning the Injection MAP, switch off the Lambda control. Tune the Injection MAP in partial load and in idle mode about 5% too rich.

Attention: A lean MAP can destroy your engine because of overheating. The exhaust temperature sould be not higher then 950 degree.

Ignition MAP:



Injection | Ignition | Bst-PWM | Bst-TPS | Lambda | Idle/Wot | WU | Acc/Dec | Switch | Set 1 | Set 2 | Set 3

Ignition MAP 14						Input Range 0 - 40 deg						RPM	Water-T		Boost		Air-Temp	
36	37	37	35	30	28	26	23	22	18	18	14	8000	0	112	0	270	-2	70
36	37	37	35	30	28	26	23	22	20	18	13	7500	0	104	0	260	-2	65
36	37	37	35	30	28	26	23	22	21	19	12	7000	0	96	0	250	-2	60
36	37	37	35	30	30	27	23	21	21	19	12	6500	0	88	0	240	-1	55
36	37	37	35	30	30	27	23	21	19	18	12	6000	0	80	0	230	0	50
37	38	37	35	30	30	27	23	19	19	18	13	5500	0	72	0	220	0	45
37	38	37	35	30	29	26	22	19	18	17	13	5000	0	64	0	210	0	40
36	38	37	35	30	29	26	21	19	17	16	12	4500	0	56	0	200	0	35
34	38	37	35	30	29	26	21	18	17	14	11	4000	0	48	0	190	0	30
32	37	37	35	29	28	24	20	17	16	13	10	3500	0	40	0	180	0	25
30	35	36	35	29	26	23	18	16	13	12	10	3000	0	32	0	170	0	20
28	31	35	34	29	24	22	18	15	13	10	10	2500	0	24	0	160	0	15
24	26	32	32	28	23	22	18	15	13	10	10	2000	0	16	0	150	0	10
18	20	23	26	24	23	20	10	10	10	10	10	1500	0	8	0	140	0	-5
9	10	16	20	21	20	18	10	10	10	10	10	1000	0	0	0	130	0	-0
12	13	15	18	18	17	15	10	10	10	10	10	750	0	-8	0	120	0	-5
12	13	13	15	15	15	13	9	9	9	9	9	500	0	-16	0	110	0	-10
10	10	10	10	10	10	8	8	8	8	8	8	250	0	-24	0	100	0	-15
5	**29**	**53**	**76**	**100**	**122**	**144**	**167**	**189**	**211**	**233**	**255**	Load	-2	Deg	53	Kpa	-7	Deg

The Ignition-Window shows all relevant data for the ignition timing. The current values correspond to the ignition timing in degrees before BTDC. The program interpolates between the cells. The interpolated value is shown (in the above example, the value is 14) beside the title ‘Ignition MAP’. The load and RPM Axis correspond to the Injection MAP. The Ignition MAP can be corrected as a function of the water temperature, the Boost and the intake air temperature. While adjusting the Ignition timing under higher load check the knock signal.

Correction-MAP ‘Water Temperature’:
The Ignition Timing can be corrected as a function of the water temperature.

Corrections MAP ‘Boost’:
The Ignition Timing can be corrected as a function of the Boost.

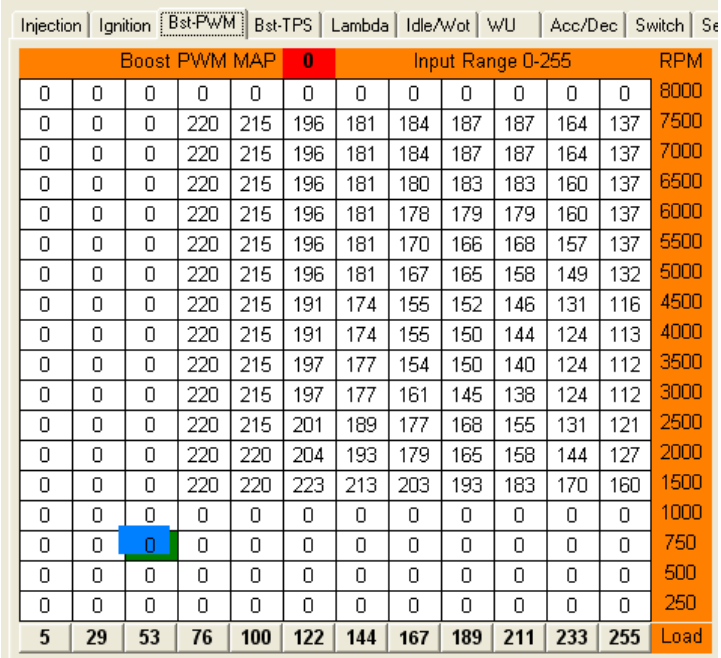
Correction MAP Intake ‘Temperature’:
The Ignition Timing can be corrected as a function of the intake temperature.

Composition of Ignition Timing:

Rev Limiter (ign rev), Ignition correction in dependence of Water temperature, Intake temperature and Boost (Ign Water, Ign Boost, Ign Air), Ignition correction Fuel Cut (Ign Dec) and Ignition correction from Launch control and Traction Control (Ign Launch, Ign Spin).

Attention: Too much Ignition timing before BDTC can destroy the engine.

Boost PWM MAP:



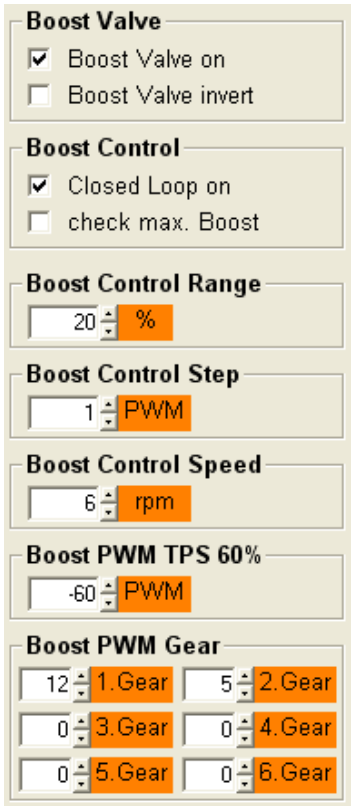
The Boost PWM MAP inserts the start value for the Boost Valve. For adjusting the Boost PWM MAP, switch off the Boost Control. The input value is between 0 (minimum Boost) and 255 (maximum Boost). Adjust the MAP in such way that the Boost initially is a little bit too low. If you have adjusted the MAP then switch on the Boost Control.

Note: Start with low Values and increase step by step.

Composition of Boost PWM Value:

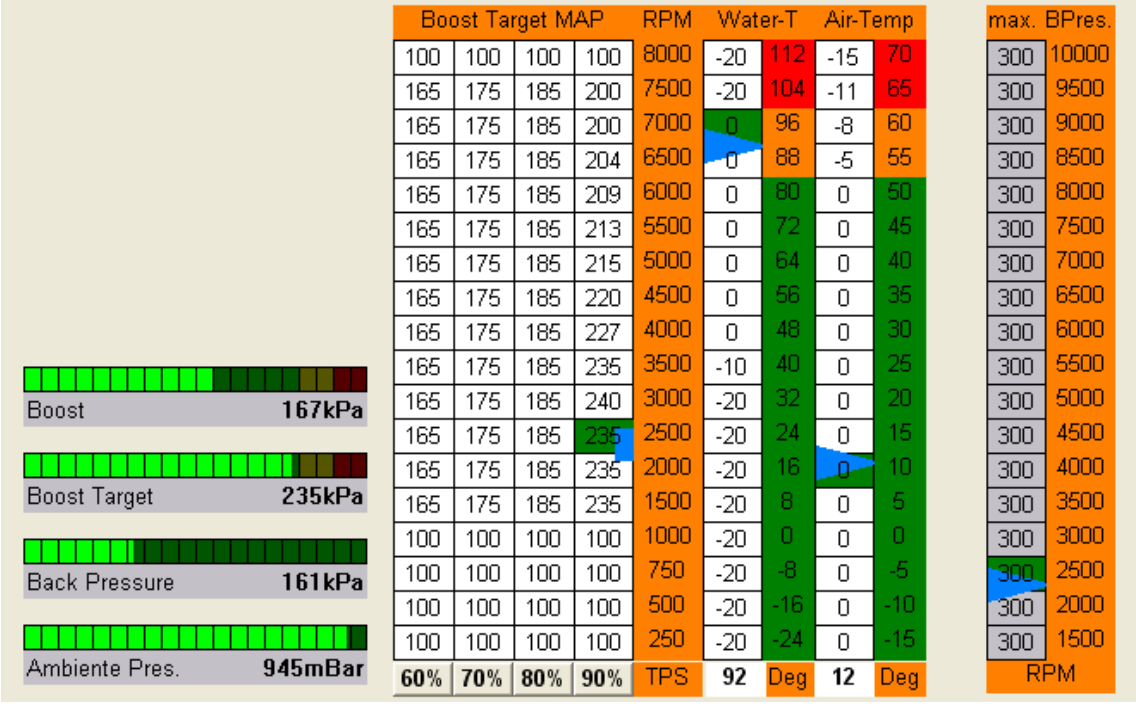
PWM out	PWM output Value include all corrections
PWM MAP	interpolated PWM Value from PWM MAP
Boost	actual Boost Pressure absolute
Target Boost	Target Boost
max Boost	maximum Boost Pressure
TPS	TPS Value in percent

Boost Control:



Boost Valve on:	activates Boost Valve
Boost Valve invert:	inverts Boost Valve
closed Loop on:	activate Boost Control
check max Boost:	activate maximum Boost control
Boost Control Range:	Boost Control Range
Boost Control Step:	Boost Control Step
Boost Control Speed:	Boost Control Speed
Boost PWM TPS 60%:	PWM decreasing for TPS smaller than 60%
Boost PWM Gear:	PWM correction for each gear

Boost TPS MAP:



Boost Target MAP				RPM	Water-T		Air-Temp		max. BPres.
100	100	100	100	8000	-20	112	-15	70	300 10000
165	175	185	200	7500	-20	104	-11	65	300 9500
165	175	185	200	7000	0	96	-8	60	300 9000
165	175	185	204	6500	0	88	-5	55	300 8500
165	175	185	209	6000	0	80	0	50	300 8000
165	175	185	213	5500	0	72	0	45	300 7500
165	175	185	215	5000	0	64	0	40	300 7000
165	175	185	220	4500	0	56	0	35	300 6500
165	175	185	227	4000	0	48	0	30	300 6000
165	175	185	235	3500	-10	40	0	25	300 5500
165	175	185	240	3000	-20	32	0	20	300 5000
165	175	185	235	2500	-20	24	0	15	300 4500
165	175	185	235	2000	-20	16	0	10	300 4000
165	175	185	235	1500	-20	8	0	5	300 3500
100	100	100	100	1000	-20	0	0	0	300 3000
100	100	100	100	750	-20	-8	0	-5	300 2500
100	100	100	100	500	-20	-16	0	-10	300 2000
100	100	100	100	250	-20	-24	0	-15	300 1500

Adjust the Boost Target Value in dependence to the TPS and rpm. The input value is in kPa absolute. Correct the Target Value in dependence the water and intake temperature. The correction Value is also in kPa absolute.

Attention: Too much Boost Pressure can destroy the engine.

Correction-MAP ‘Water Temperature’:
The Boost can be corrected as a function of the water temperature.

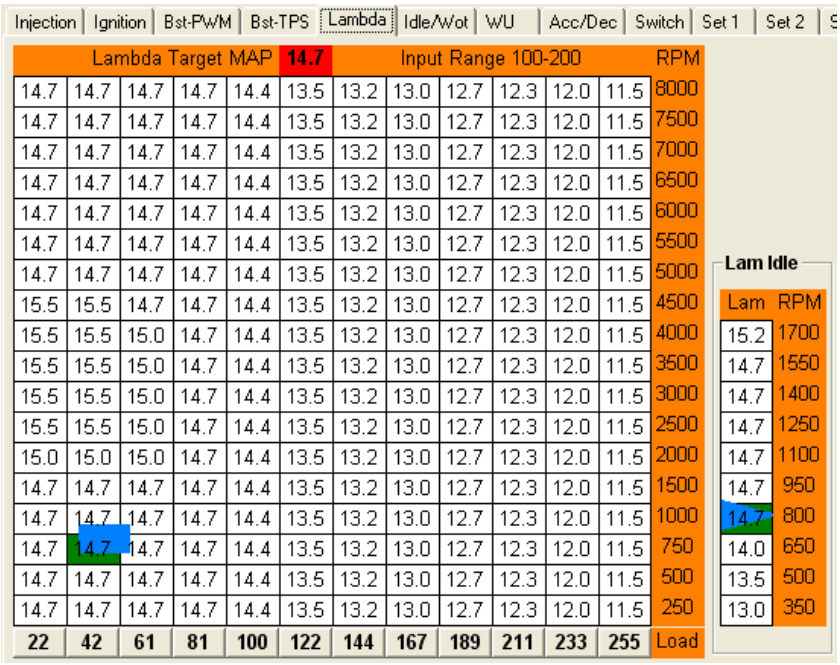
Corrections MAP ‘Air Temperature’:
The Boost can be corrected as a function of the intake temperature.

Correction MAP ‘Exhaust Backpressure’:
The Boost can be corrected as a function of the exhaust backpressure.

Total amount of target Boost pressure:

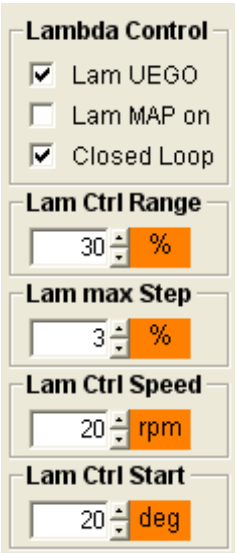
Boost	actual Boost
Boost MAP	Target Boost
Boost Wat	Correction Value from Water temperature
Boost Air	Correction Value from Inlet Air temperature
PWM out	actual PWM-Value for Boost Value (0 – 255)
PWM MAP	PWM-Value from PWM-MAP
TPS	TPS Value in percent

Lambda Target MAP:



Adjust the Lambda Target Value as a function of the load and rpm in the Lambda Target MAP. The Lambda Target Value is used from the Lambda Control. The MAP is only active with an active UEGO sensor. Under light load the Value is 14.7 and under full Load the Value is about 11.5 to 12.5 (depending on the Exhaust temperature)

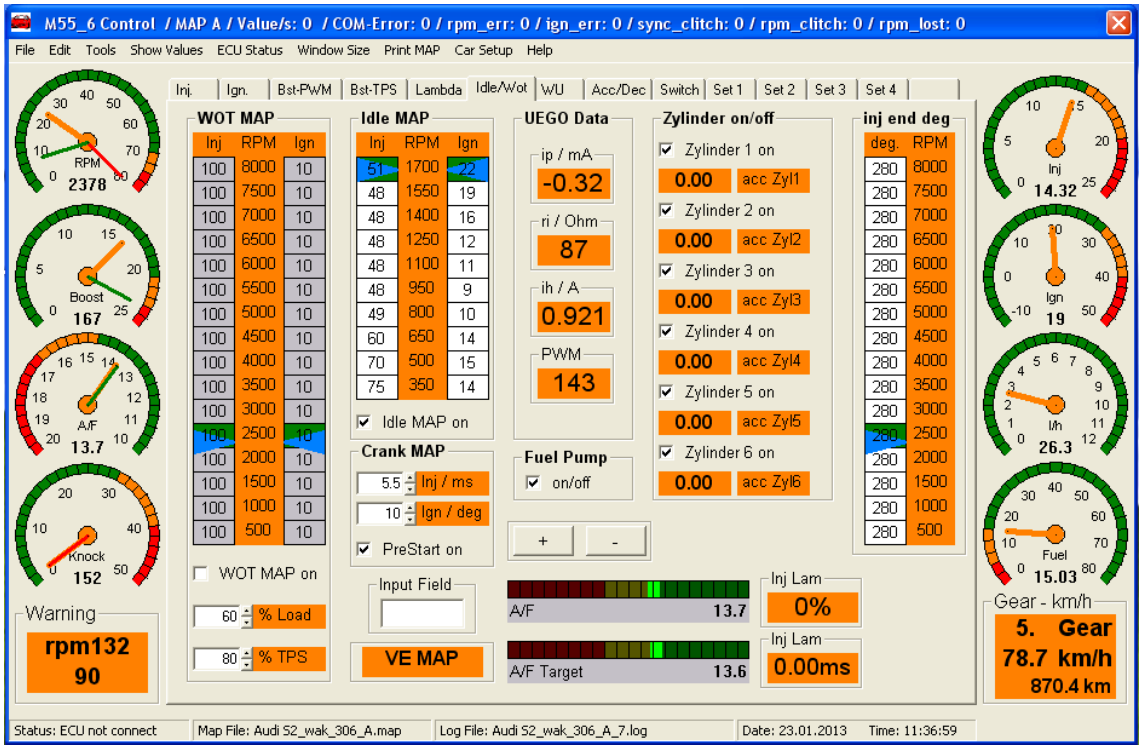
Lambda Control:



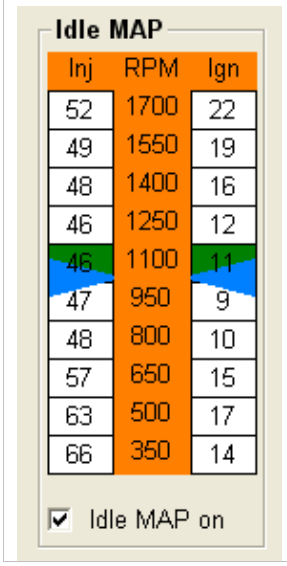
Lam UEGO	activates Wideband Lambda Sensor
Closed Loop	activates Lambda Control
Lam Ctrl Range	maximum range for Lambda Control
Lam Ctrl. Step	maximum Step for Lambda Control
Lam Ctrl. Speed	Lambda Control Speed
Lam Ctrl Start	Lambda Control Start

The Lambda Control starts about 30 sec after start Engine.

Idle-WOT MAP:



Idle MAP:

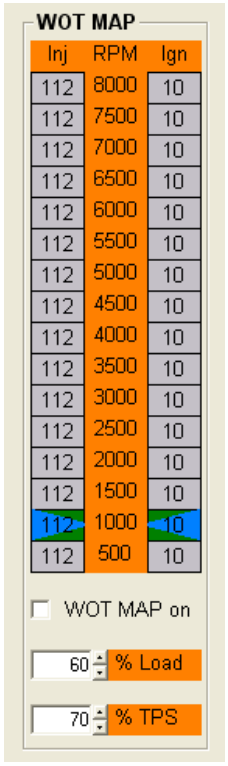


With an activated Idle MAP, the Idle MAP is used in Idle Mode. With this MAP, the engine runs more stable in Idle Mode. Before adjusting the Idle MAP, it is important to warm-up the Engine. For lower rpm, give more fuel and ignition.
If the Engine changes from Idle MAP to VE MAP, it is important that the values are not too different. Adjust Idle MAP and check injection and ignition time. Press the TPS a little bit so that the MAP change from Idle to VE MAP and check injection and ignition time again. If the differences are too big, correct the VE MAP.

The Idle MAP is activated when following points occur:

- rpm smaller than 2000 rpm
- TPS is lower ‘TPS Idle’ (look at Switch Window) or Idle Switch is active
- Intake pressure smaller ‘MAP Idle’ (look at Switch-Window)

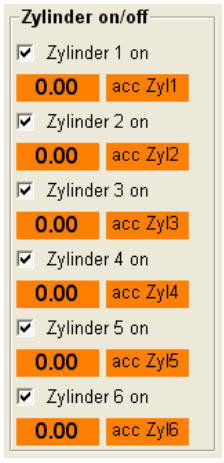
WOT MAP: (not use)



The WOT MAP is active when Load and TPS value is higher than adjusted. (Please not activate WOT MAP)

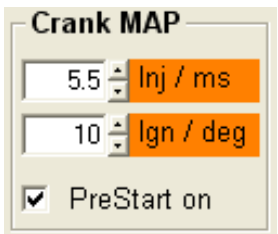
Attention:
The value '% Load' and '% TPS' is used for lambda control.
If load and TPS Value is higher, then the Lambda Control is switch off.

Zylinder on/off:



For test, you can switch on/off each cylinder. After restart the ECU, all cylinders are switch on.

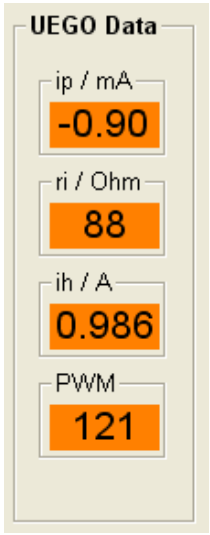
Crank MAP:



During cranking the engine, the injection time and ignition timing is used from the Crank MAP. The injection timing is corrected from the warm-up MAP.

PreStart on: Try to start engine after first CAM Signal.

UEGO Data:

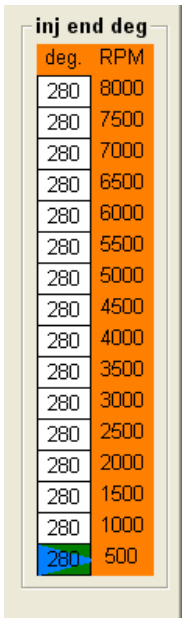


Show Data from Wideband Lambda Sensor

- ip : measure current (0 mA = Lambda 1)
- ri : resistance from Sensor
- ih : Heather current
- PWM : PWM Value from Heather (0 – 255)

If lambda sensor is cold (ri = 600 Ohm) the warm-up time is about 30 sec. to get a correct lambda Value. If ‘ip’ is greater than 0 the A/F is to lean and if the ‘ip’ is lower than 0 the A/F is to reach. In free air, the ‘ip’ is about 2.5mA.

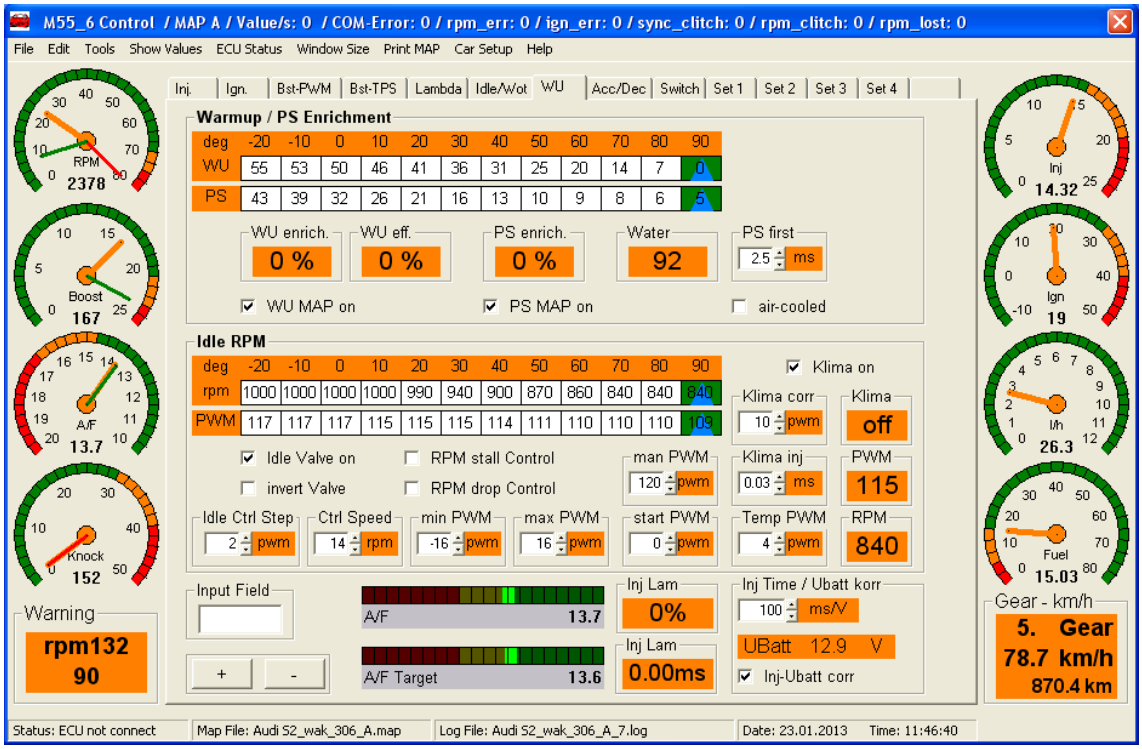
Injection Angle MAP:



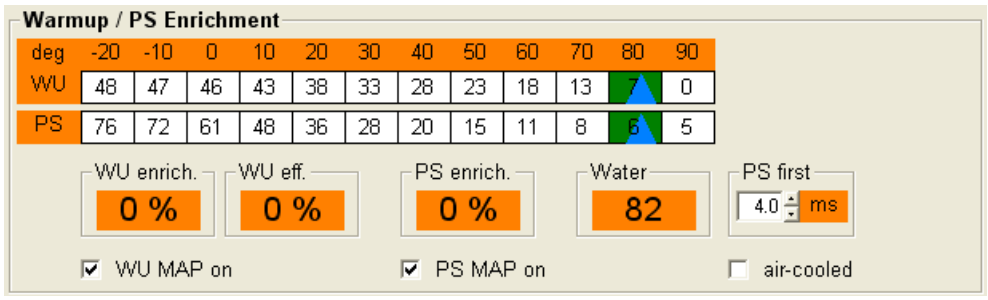
This MAP adjusts the injection end timing in degree after BDTC.

Switch off the Fuelpump. After restart, the ECU the Fuelpump is switch on.

Warmup - Idle RPM MAP:

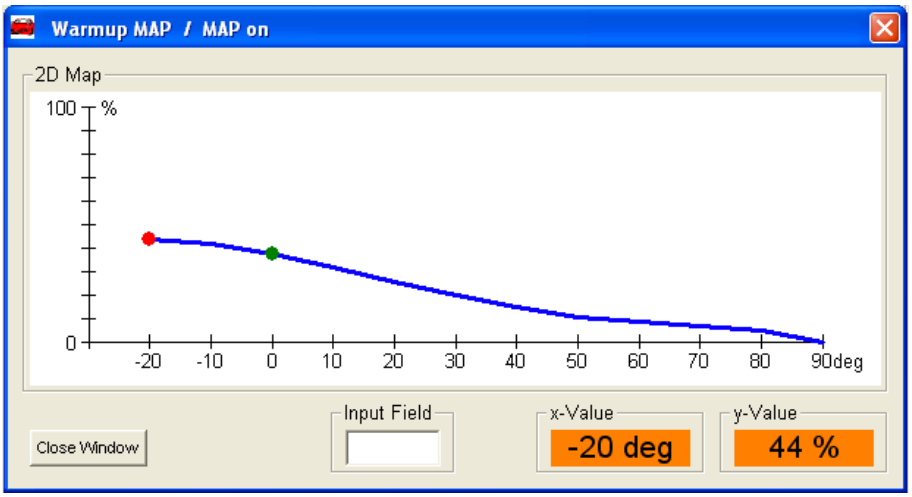


Warm-up MAP:



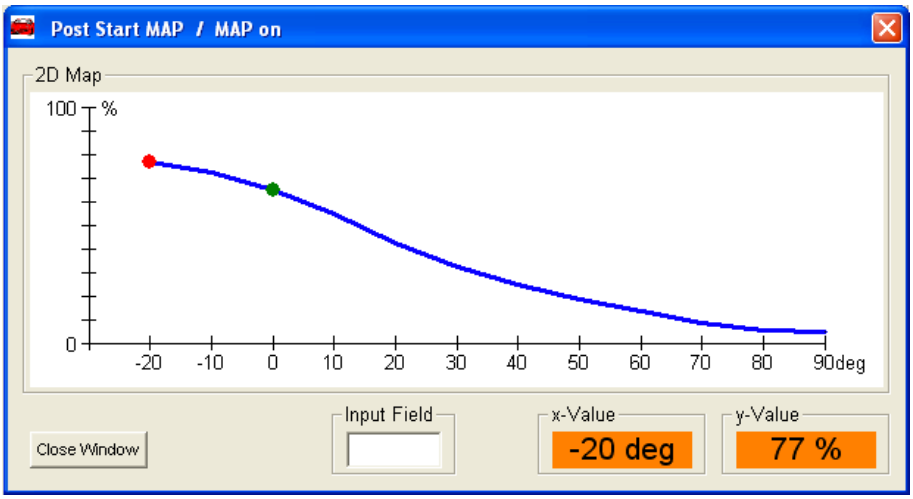
The Warm-up MAP enriches the fuel as a function of the water temperature. A cold engine uses more fuel for the first minutes. After 5 Minutes the fuel enrichment goes to zero. The input value is in percent. For higher rpm and load the enrichment is automatically reduced. ‘WU eff’ shows you the effective warm up in percent.
Before adjusting the warm-up MAP, it is important to adjust the Idle MAP with the warm engine. When adjusting the warm-up MAP, switch off Lambda Control. Adjust the MAP about 5% too rich.

2D Map for Warm-up MAP:

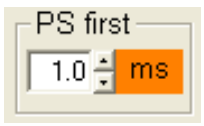


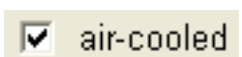
The green cursor shows you the current water temperature. By pressing the arrow keys right or left, you can move the red cursor. By pressing arrow keys up or down, you can decrease or increase the value in the MAP.

Post Start MAP:

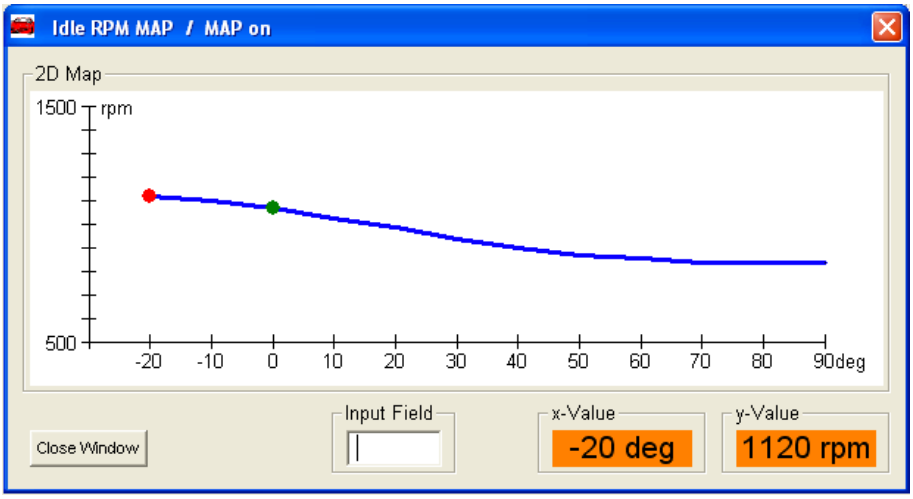


The Post Start Map is used for the first 30-60sec after starting the engine. In this time, the engine needs additional Fuel.

	Additional Fuel fort he first 10 sec.

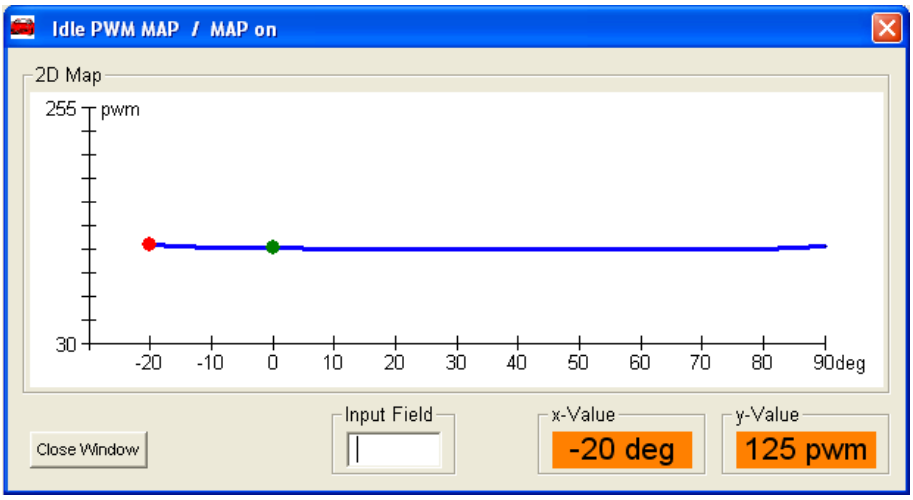
	Switch between water colled Engine (-20-90 Grad) or Air-cooled Engine (-30-135 Grad).

Idle RPM MAP:



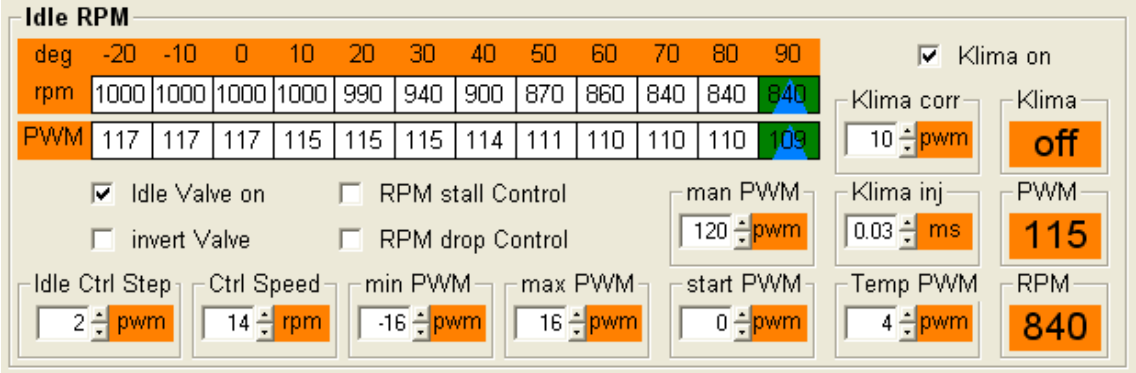
The Idle RPM MAP adjusts the Idle RPM as a function of the water temperature. For stable Idle RPM and charging the Battery, increase the Idle RPM at low water temperature.

Idle-PWM MAP:



This MAP defines the start Value for Idle Valve as a function of the water temperature. If the Idle Mode is active, this value is used for setting the Idle Valve. Adjust this Value slightly higher than required, it will automatically be adjusted. If you switch off the Idle Valve, you can set the Idle Valve manually with ‘man PWM’.

Parameter Idle Control:



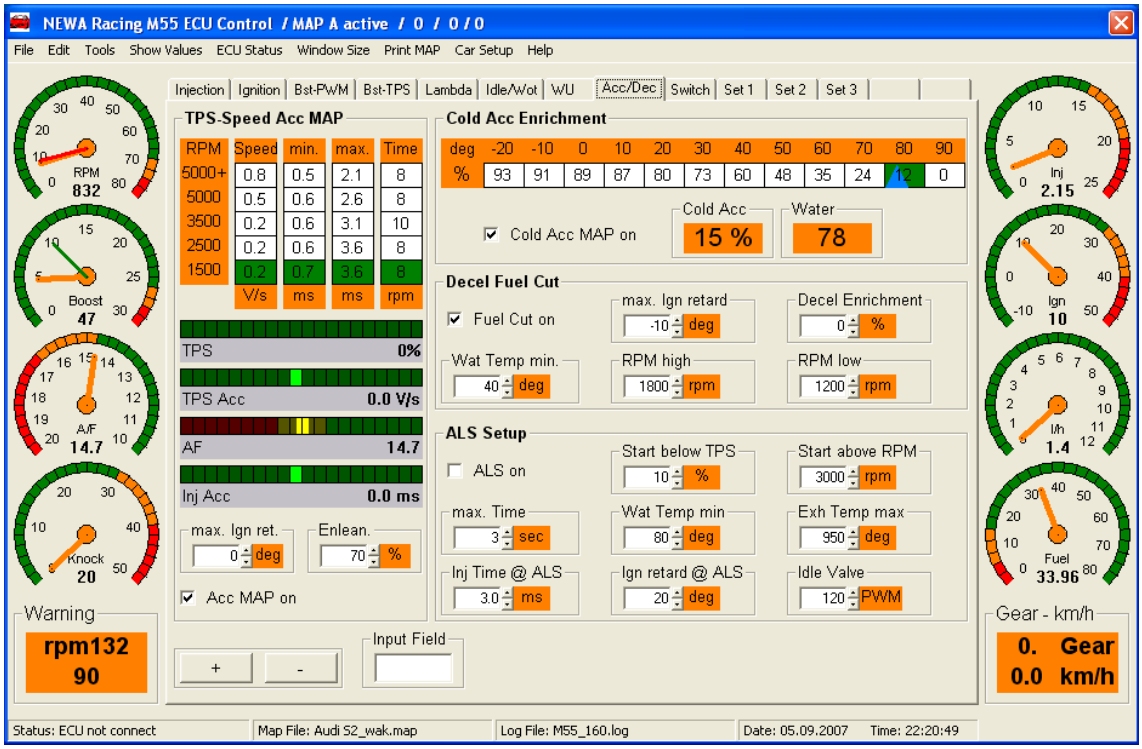
The range for the PWM value is between 60 (close) and 255 (open)

Idle Valve on	activates Idle Valve
Idle Valve invert	inverts Idle Valve
Idle Ctrl Step	min. Step for Idle PWM
Ctrl Speed	controls Speed for Idle Valve
min PWM	maximum decrease from the PWM MAP
max PWM	maximum increase from the PWM MAP
man PWM	fixes PWM to this Value if Idle Valve is switched off
Temp PWM	correction Value in dependence the intake temperature
Klima on	switches on compressor for Air-condition
Klima corr	increases PWM-Value when compressor is switch on
Klima inj	Additional Fuel if compressor is switch on.
Start PWM	Additional PWM-Value at start Engine

Switch Air-condition Compressor on and off to adjust the *Klima corr* and *Klima inj* Value.

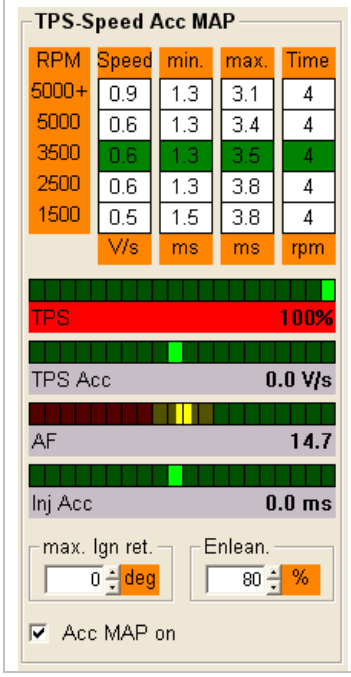
	Adjust the Injection time as funktion of the Batterie Voltage.

Acceleration Enrichment MAP – Fuel-Cut



TPS – ACC MAP:

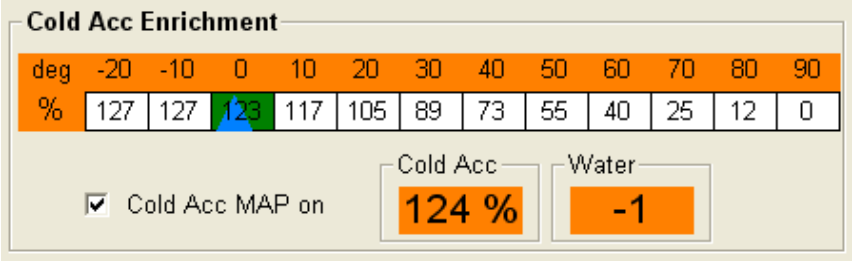
While pressing the TPS, the engine needs additional Fuel for a short Time. With the ACC MAP, you can adjust the additional Fuel in dependence to the TPS speed and rpm.



Speed:	starts ACC when TPS speed is higher
min:	min. adds Fuel for low TPS speed
max:	maximum additional Fuel for high TPS speed
Time:	Time for additional Fuel in rpm
max. Ign ret.	Ignition retard during ACC (normally Zero)
Enlean.	enleanment in percent during depress TPS
Acc MAP on:	activates ACC MAP

During ACC enrich the Lambda Control is switched off.

Cold Acc Enrichment MAP:



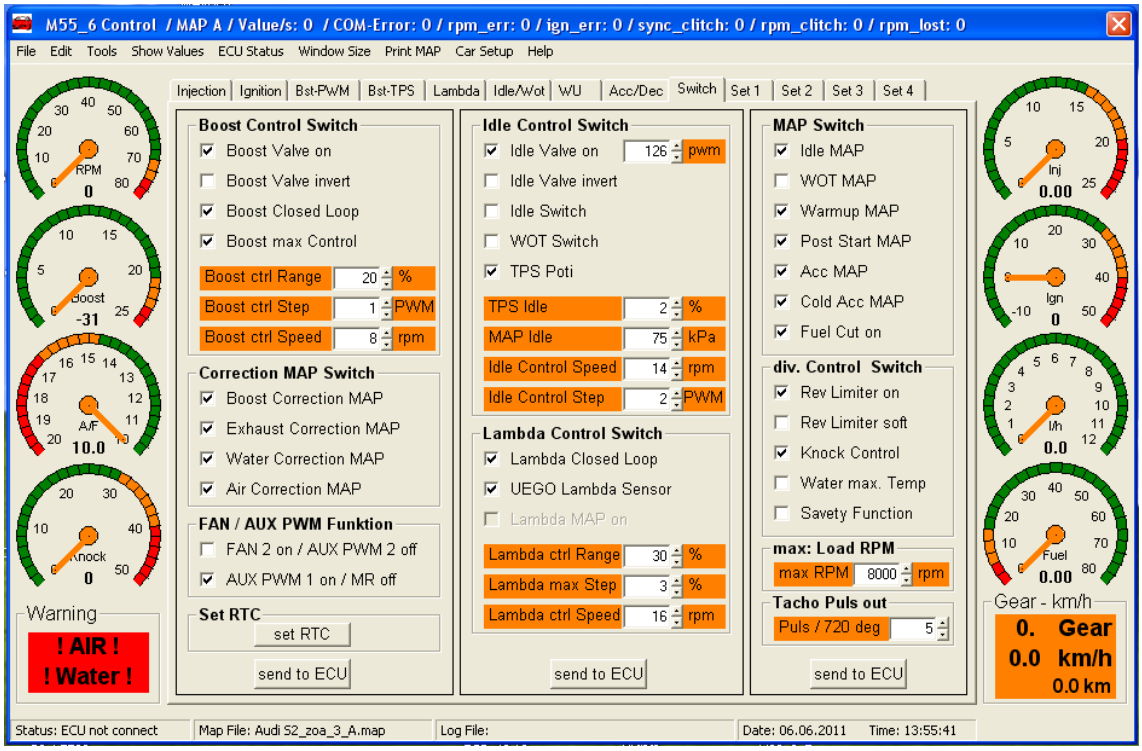
Additional enrichment in dependence to the water temperature

Deceleration Fuel Cut:

If TPS is 0% and rpm is much higher than idle rpm the engine needs no Fuel. With this function, you can adjust the Fuel cut. The Fuel cut start if TPS is 0% and rpm is higher ‘RPM high’ and the Fuel cut turn off when rpm is lower ‘RPM low’ or rpm falls to fast.

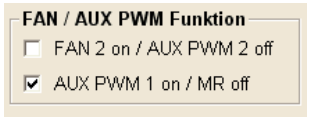
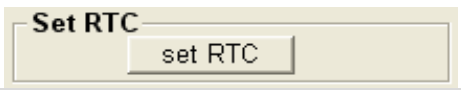
Fuel Cut on	activates Fuel Cut
max Ign retard	maximum ignition retard if Fuel Cut is active
Decel Enrichment	enrichment after Fuel Cut (normally zero)
Wat Temp min	min. water temperature to activate Fuel Cut
RPM high	min. RPM to activate Fuel Cut
RPM low	min. RPM to deactivate Fuel Cut
FC start after	Fuel cut start after xxx ms

Switch Function:

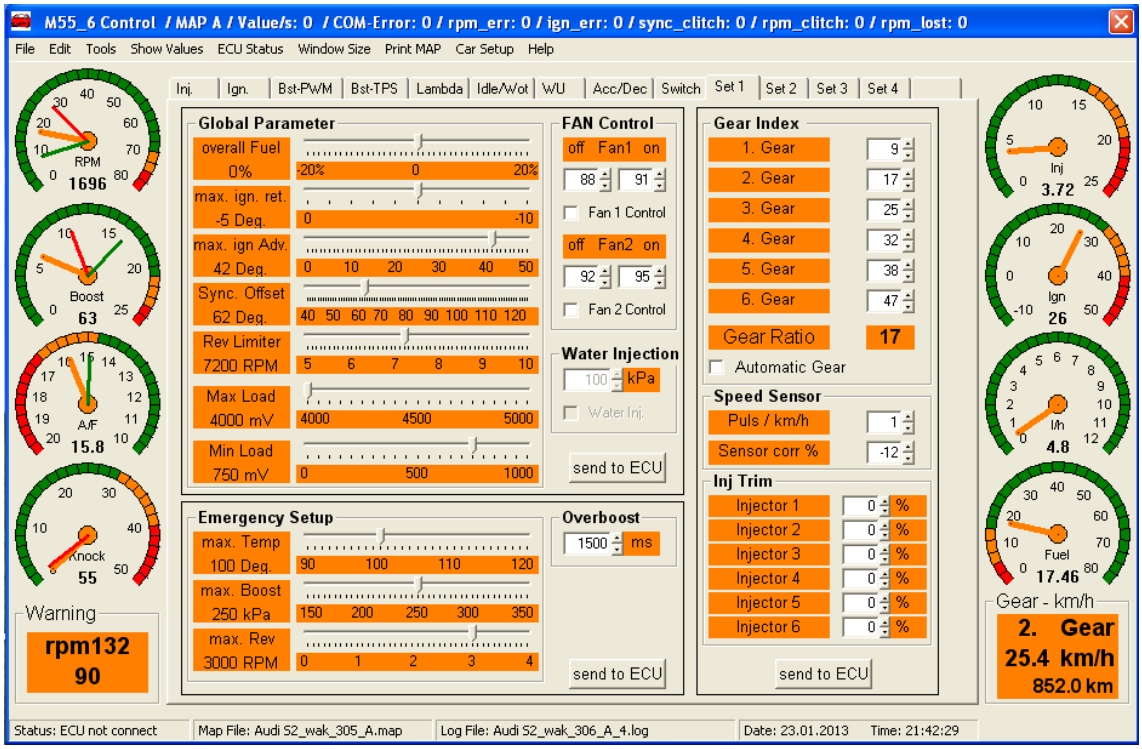


This shows you the summary of the maps and functions, which are enabled or disabled.

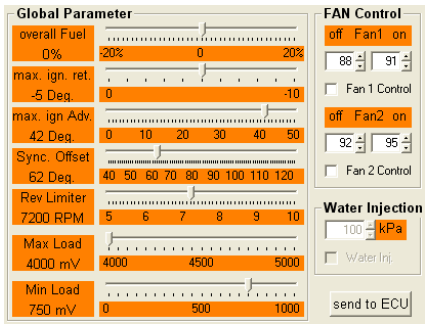
Note: Activated MAP have white Background color.
Not activated MAP has grey Background color.

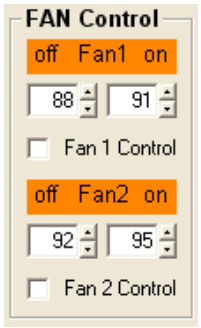
	Pin 8 from DB9 connector is FAN2 or AUX PWM2 Pin 54 from 55pol connector is AUX PWM1 or Main Relais
	Set the signal for the Tachometer. Normaly the Tachometer need the same pulse count like cylinder number. However, when you use a 4-cylinder Tachometer with a 5-cylinder engine you can adjust the signal.
	set RTC: Set the ECU clock to PC/Notebook time

Setup 1:



Global Parameter:





overalls fuel correction in percent

maximum Ignition Timing after BTDC

maximum Ignition Timing before BTDC

reference Mark Sensor angle before BTDC

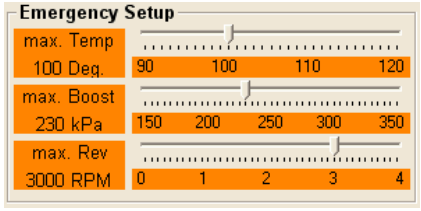
rev Limiter

maximum Voltage for 100% Load

min. Voltage for 0% Load

on/off Temperature for FAN1/FAN2 if connected

Emergency Setup:



maximum water temperature allowed

maximum boost pressure allowed

maximum rpm when Water temperature is too high

Max. time for exceeding Boost Pressure

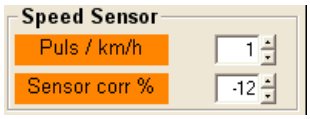
Gear Index:

Detect the inserted Gear based on speed and rpm. Drive with each gear under light load and read out the value indicated in the field ‘gear ratio’ Enter this value into the specific gear field for each gear.

Note: for use this Function a Speed Sensor must be connect to the ECU

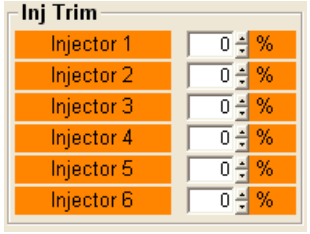
Note: Car with 3B engine has no Speed Sensor connection to ECU. Connect the Speed Sensor to PIN 50 from ECU

Speed Sensor:



Adjust speed sensor (normally 1 Pulse / kmh)
Speed sensor calibration in percent

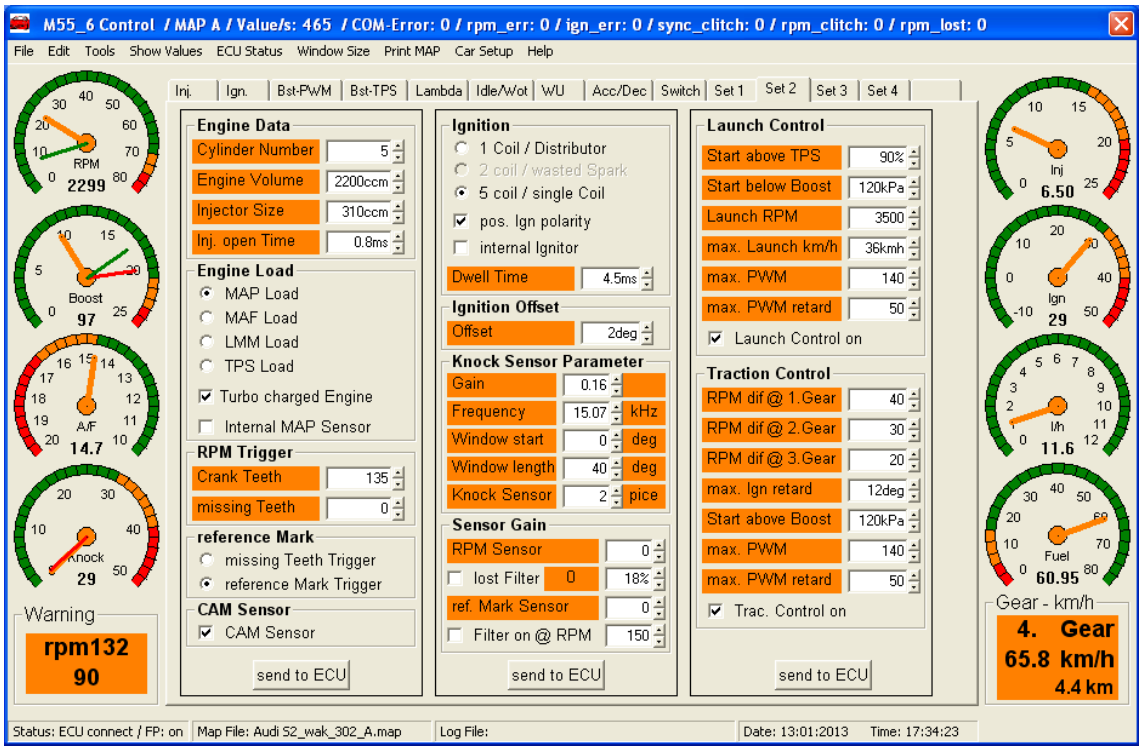
Inj Trim:



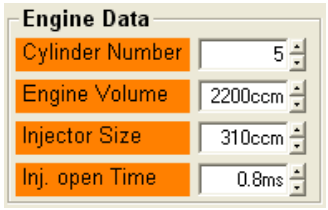
After measuring the Injectors, they can individually be corrected.

Note: After changing a Value, press ‘send to ECU’ Button

Setup 2:

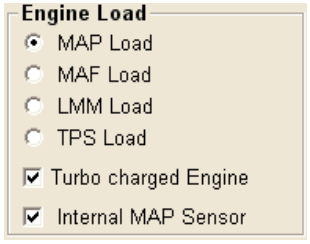


Engine Data:



Cylinder Number (1-6)
Engine displacement in ccm
Injector Size in ccm (cubic centimeters per minute)
Injector opens time in ms

Engine Load: (only MAP Load is allowed)

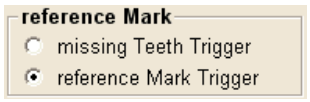


Load Signal is intake pressure	(Turbo or NA Engine)
Load Signal is MAF	(Turbo or NA Engine)
Load Signal is LMM	(NA Engine)
Load Signal is TPS	(NA Engine)
Turbo or naturally aspired Engine	
internal boost sensor	(max. 320kPa)

RPM Trigger:

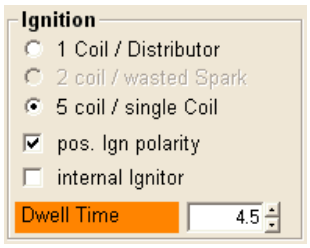
Number of teeth (including potential missing teeth)
Missing teeth (Motronic Trigger, for example 60-2)

Reference Mark:



Missing Teeth as Reference Mark
Additional Sensor as Reference Mark

Ignition:



Distributor Ignition (Audi S2/S4 3B)
Wasted Spark Ignition (only for 4 or 6 Cylinder possible)
Single Coil Ignition (Audi S2/RS2/S4 ABY)
Ignition Pulse polarity

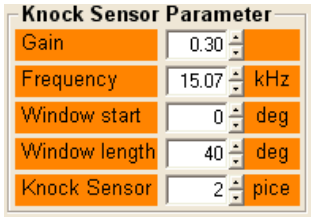
Dwell Time in ms

Use Ignition output 1 for Distributor Ignition

Use Ignition output 1 and 2 for wasted Spark Ignition for 4 Cylinder Engine.
Use Ignition output 1, 2, 3 for wasted Spark Ignition for 6 Cylinder Engine

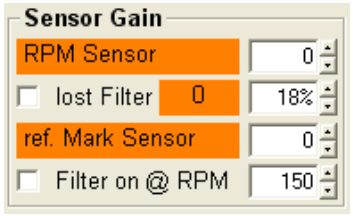
For single Coil Ignition use Ignition output 1-6 for 1-6 Cylinder Engine.

Knock Sensor Parameter:



Gain for Knock signal
Average frequency of Knock filter
Knock Window start
Knock Window length
Knock Sensor count

Sensor Gain:

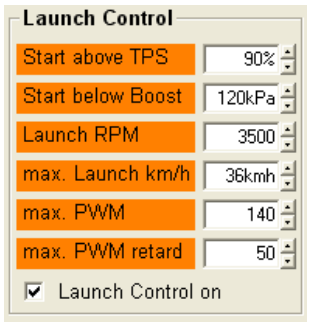


Gain for RPM Sensor. 0 = max, 3 = min
Filter for RPM Sensor (not for missing Teeth Trigger)
Gain for Reference Mark Sensor. 0 = max, 3 = min
Reference Mark Sensor Filter

Use this Function only if you have Problem with RPM or Reference Mark Sensor Signal.

Launch Control:

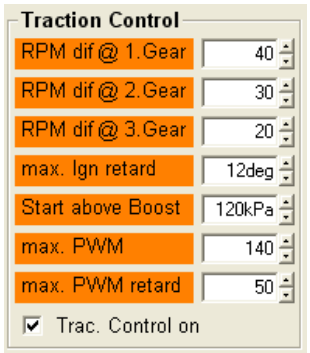
Starts the car with WOT and the engine rev with Launch RPM. The boost during Launch is reduced and the ignition retarded. If the boost is higher than Launch Boost or if the speed is higher than launch speed the Launch Control is switched off.



start Launch Control above TPS Value l
start Launch Control below Boost Value
rev Limiter for Launch Control
maximum Speed for Launch control
maximum PWM Value for Boost Valve
maximum retard PWM-Value for Boost Valve

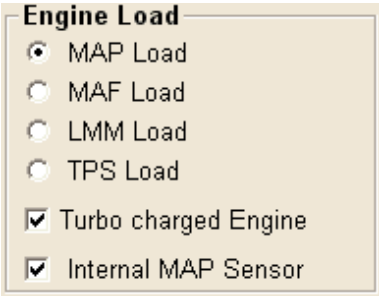
Traction Control:

The Traction Control reduces the Boost Pressure and retards Ignition Timing when rpm is rising too fast.



Trigger point for start Traction Control in 1.Gear
Trigger point for start Traction Control in 2.Gear
Trigger point for start Traction Control in 3.Gear
maximum retard Ignition time
start Traction Control when Boost is higher
maximum PWM Value for Boost Valve
maximum PWM Value retard for Boost Valve

MAP Sensor as Load (for Turbo and NA Engine):

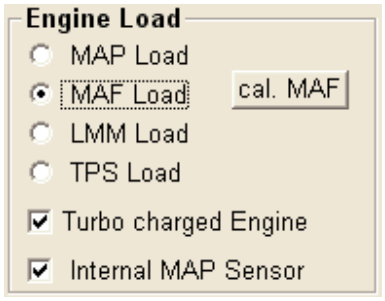


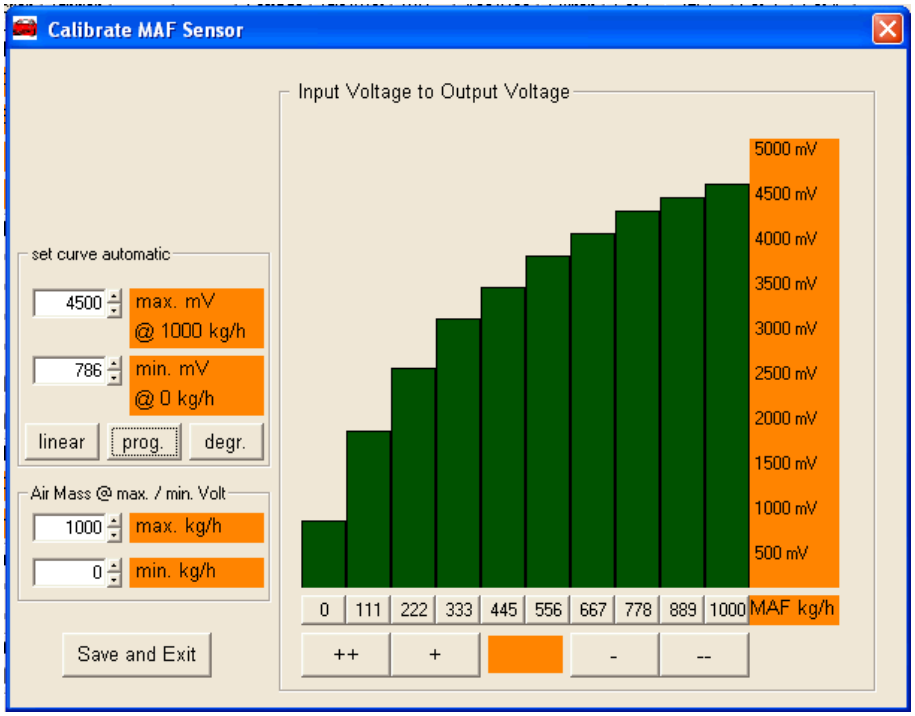
The easiest way is using the MAP sensor as a load signal.
With help of the intake pressure, the engine volume and the flow amount of the injection valves it is possible to compute the injection time, which in turn gets corrected with the intake air temperature.
If the data have been properly defined, then the VE values showing up in the Injection MAP amount to a value of approx. 100 for the highest torque. If this value substantially deviates, it means that the cubic capacity or the flow amount of the injectors have been wrongly determined or have been entered incorrectly.
In idle mode the VE value should be approx. 40-60.
In case of installed camshafts with very strong overlapping, there may arise problems with the idle tuning.
The internal sensor MAP is suitable up to 320kPa. By changing the intake, the exhaust or the turbocharger the injection MAP must be checked and verified.
You can use either an internal or an externally installed MAP sensor. The external MAP sensor connects to PIN 9 in the 55-pole connector.

Importantly: The Boost sensor must be protected with a filter.

The Boost sensor should be checked from time to time. Switch on the ignition and connect the laptop. The pressure indicated should amount on 400 m of sea level approx. 96kPa.

MAF as Load Signal (for Turbo and NA Engine):





Attention: Use only Hot-film air-mass meter then the ECU has no burnout Function.

After selecting the air-mass flow metre as a load signal, you can see the Button Cal. MAF. Pressing the Button opens the Calibrate MAF sensor dialogue. Because the output voltage of the air-mass metre is not linearly linked to the air-mass, a calibration of the bend is required.

The measurement range of the air-mass metre must be wide enough. A too narrow range of air-mass metre can destroy the engine. The engine then runs too lean.

Example:
A 3 litre normally aspired engine needs at 6000rpm about 650 kg/h.

1: Set maximum and minimum values of the air-mass metre
2: Set the maximum and minimum voltage
3: Calibrate output voltage to air-mass

Different pre-programmed calibration curves can be set by pressing the buttons *linearly, progr, or degr*. The curves are bent progressively or digressively by repeatedly pressing the buttons *progr or degr*.
If no suitable curve can be found for the desired air-mass metre, the values can be set individually.

Mark with the right mouse click the desired basic value. The value changes now the colour from dark green to light green. When pressing the cursor up down the value changes up or down. The first and the last bar cannot be changed. The more accurately you calibrate the curve the faster the right injection time is found for every load. As a consequence only small changes will then be required in the Injection MAP. Press the Save button and exit the dialogue to send the data to ECU. Corrections for air temperature and air pressure are automatically handled by the air-mass metre.

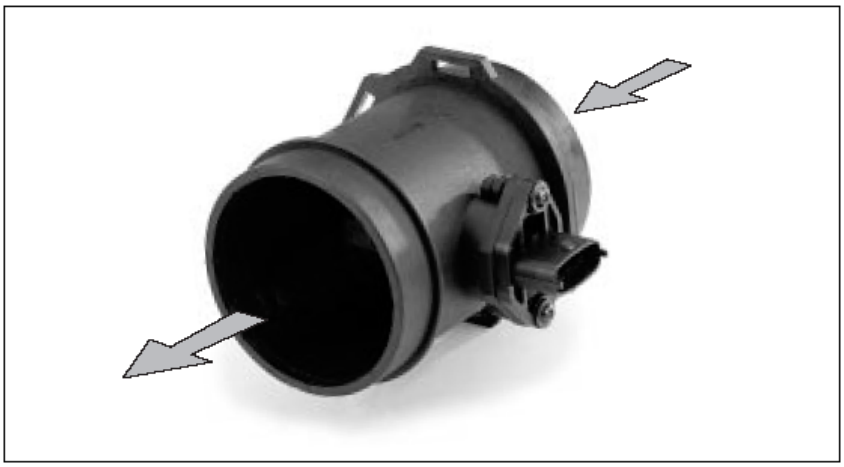
Example: Hot-film air-mass meter from Bosch:

Hot-film air-mass meter, Type HFM 5

Measurement of air-mass throughflow up to 1000 kg/h

Q_m / U

- Compact design.
- Low weight.
- Rapid response.
- Low power input.
- Return-flow detection.



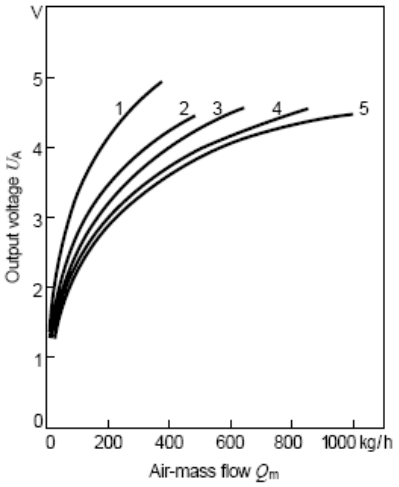
Output voltage $U_A = f(Q_m)$ of the air-mass meter

Part number	0 280 217 123	0 280 218 019	0 280 217 531	0 280 218 008	0 280 002 421
Characteristic curve	1	2	3	4	5
Q_m/kg/h	U_A/V	U_A/V	U_A/V	U_A/V	U_A/V
8	1.4837	1.2390	–	–	–
10	1.5819	1.3644	1.2695	–	–
15	1.7898	1.5241	1.4060	1.3395	1.2315
30	2.2739	1.8748	1.7100	1.6251	1.4758
60	2.8868	2.3710	2.1563	2.0109	1.8310
120	3.6255	2.9998	2.7522	2.5564	2.3074
250	4.4727	3.7494	3.5070	3.2655	2.9212
370	4.9406	4.1695	3.9393	3.6717	3.2874
480	–	4.4578	4.2349	3.9490	3.5461
640	–	–	4.5669	4.2600	3.8432
850	–	–	–	4.5727	4.1499
1000	–	–	–	–	4.3312

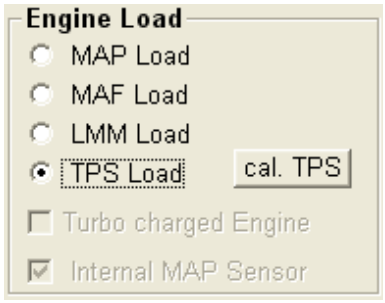
Temperature-dependence $R_\vartheta = f(\vartheta)$ of the temperature sensor

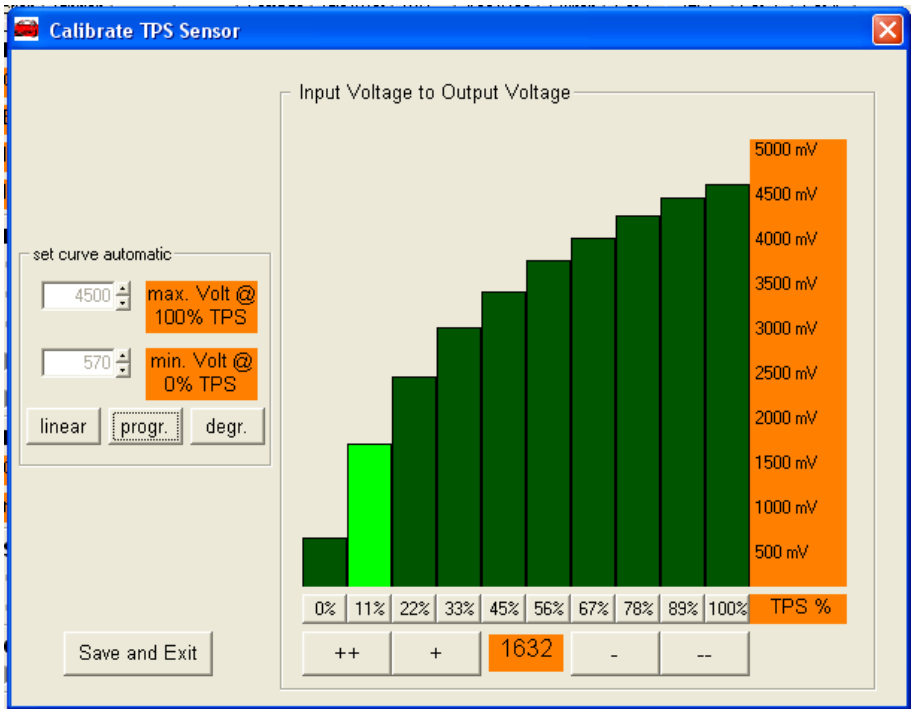
Temperature ϑ	°C	–40	–30	–20	–10	±0	10	20	30	40
Resistance R_ϑ	kΩ	39.26	22.96	13.85	8.609	5.499	3.604	2.420	1.662	1.166
Temperature ϑ	°C	50	60	70	80	90	100	110	120	130
Resistance R_ϑ	Ω	835	609	452	340	261	202	159	127	102

Air-mass meter output voltage.



TPS as Load Signal (only for NA Engine): (alpha-n)





Use this mode only for naturally-aspirated engines without throttle body to measure the intake pressure or without air-mass meter to measure the air-mass.

Calibrate TPS similar to the procedure described for the air-mass meter. The minimum voltage is given from the TPS Idle position and the maximum Voltage is given from the TPS WOT position. Press the Save and Exit button, exit the dialogue to send the data to the ECU.

In alpha-n mode, you must set the Injection time in ms in each cell of the Injection MAP.

Important: Only for naturally-aspirated engine.

Different RPM Sensors:

The RPM Sensor is mostly an inductive Sensor with 2 wires. The output Signal from the Sensor is a sine wave Signal. The ECU checks for rising Edge and trigger then at the next zero crossing Edge.
The CAM Sensor is mostly a Hall Sensor with 3 wires. The Voltage at the Hall Sensor is 5 Volt. At the reference position the voltage at the Hall Sensor change to 0 Volt.

Case 1:
Missing Teeth Wheel with inductive Sensor. For Example 60-2 Wheel like Motronic Trigger.

Case 2:
Wheel without missing Teeth with additional reference Mark Sensor like BMW M3 E30.

Case 3:
Missing Teeth Wheel with inductive Sensor and CAM Sensor.

Case 4:
Wheel without missing Teeth with additional reference Mark Sensor and CAM Sensor like Audi S2.

Different Ignition:

	Case 1	Case 2	Case 3	Case 4
Distributor Ignition	X	X	X	X
Wasted Spark	X	X	X	X
Single Coil Ignition	-	-	X	X
Sequential Injection	-	-	X	X

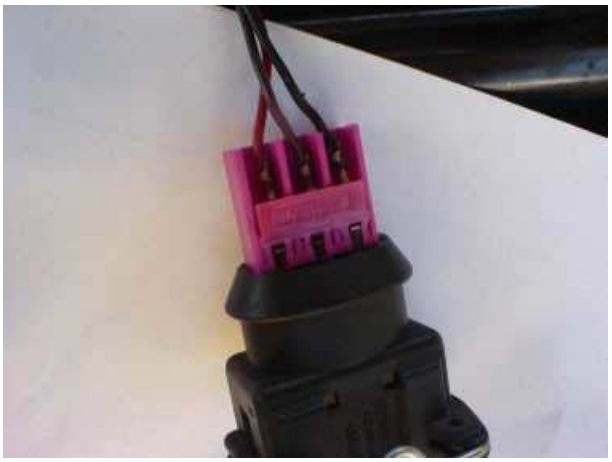
The reference Mark should be about 60 deg BTDC.

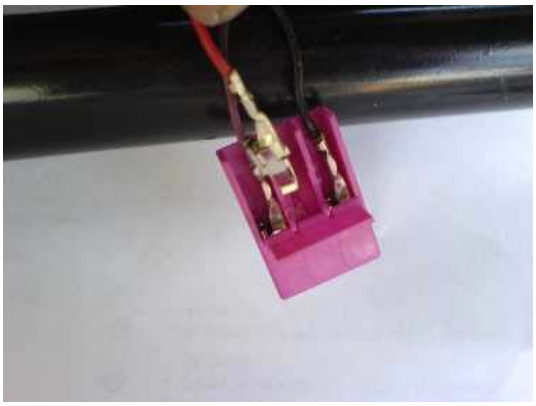
Different Tooth Wheel:

Teeth / Missing Teeth	**0**	**1**	**2**
135 (Audi 5 Zyl, 62 deg)	X	X	X
132 (Porsche 944T, 58 deg)	X	X	X
116 (BMW M3 E30, 100 deg)	X	X	X
60 (Porsche 964, 84 deg) 60 (Opel Calibra Turbo, 120 deg)	X	X	X
48	X	X	X
36	X	X	X
30	X	X	X
24	X	X	-
18	X	X	-
15	X	X	-
12	X	X	-

Polarity reference Mark Sensor:

For Audi S2/S4/RS2 you must change polarity from reference Mark Sensor. The brown colour and the red colour Cable must be changed for correct Function.

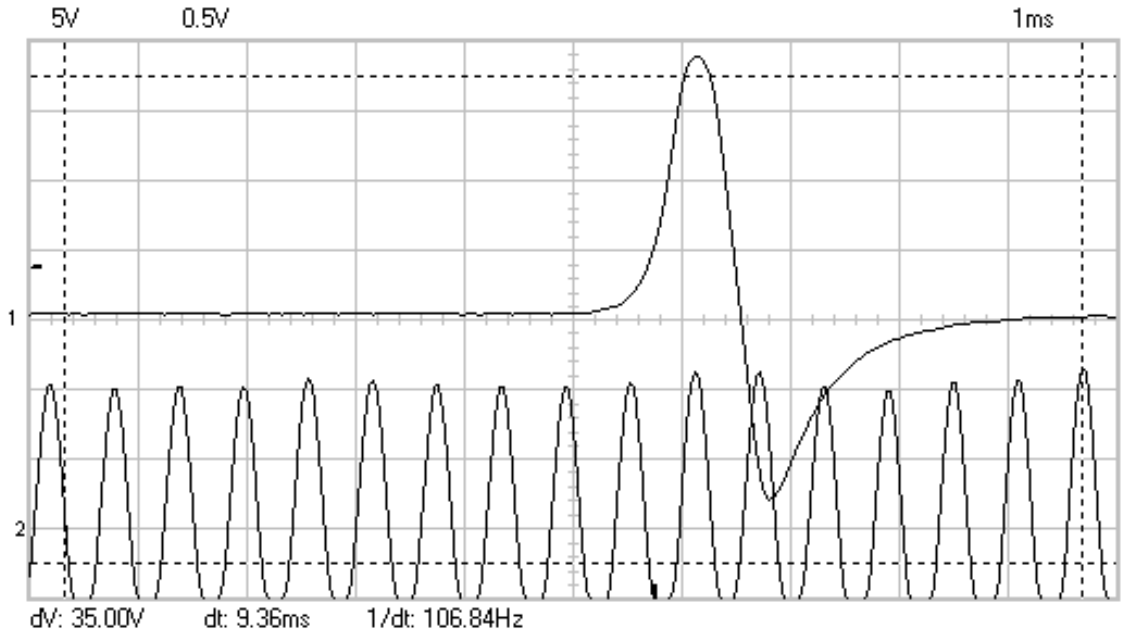




While start Engine, the rpm132 Value must be 90. If the Value is not 90, the injection and the ignition will be switched off. The Flywheel has 135 teeth per revolution. This indicates 270 pulses for 720 deg. This Value is internal divided by 3. Therefore, the rpm132 Value must be 90.

With correct function show the rpm132 signal a value of 90. This value is calculated from 135 teeth per crankshaft rotation. For a power stroke of 720 degrees one value of 270 proves. This value is divided inside by 3. As long as the indicated value 90 does not amount the injection and ignition is not activated.

This example shows you a correct reference Mark and RPM signal. The reference Mark signal must first go high. This is the reason to change Polarity in the reference Mark sensor connector for Audi S2/RS2/S4.



The oscilloscope picture shows a correct signal from reference mark sensor and RPM sensor. The signal from reference mark sensor must go first high before crossing the zero line. The reference mark sensor and the RPM sensor should not cross the Zero line at the same Time. Otherwise change polarity from RPM Sensor.

Note: If any errors from reference mark sensor, CAM sensor or RPM sensor have been detected the injection and ignition will be switched off.

Reference Mark Signal:

Polarity correct

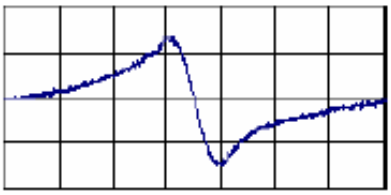


Figure 3: Reluctor Waveform (correct)

Polarity not correct

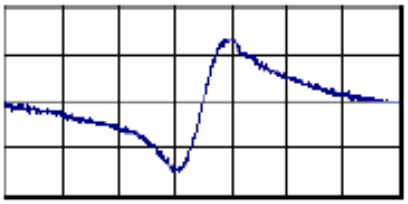
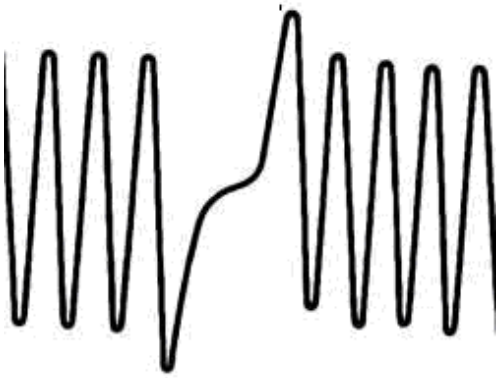


Figure 4: Reluctor Waveform (inverted, incorrect)

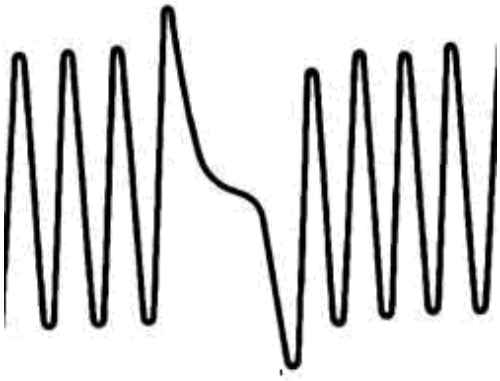
The Signal sould be about 1Vpp.

Signal from Crank Sensor with missing Tooth:

Correct polarity for reference Mark signal

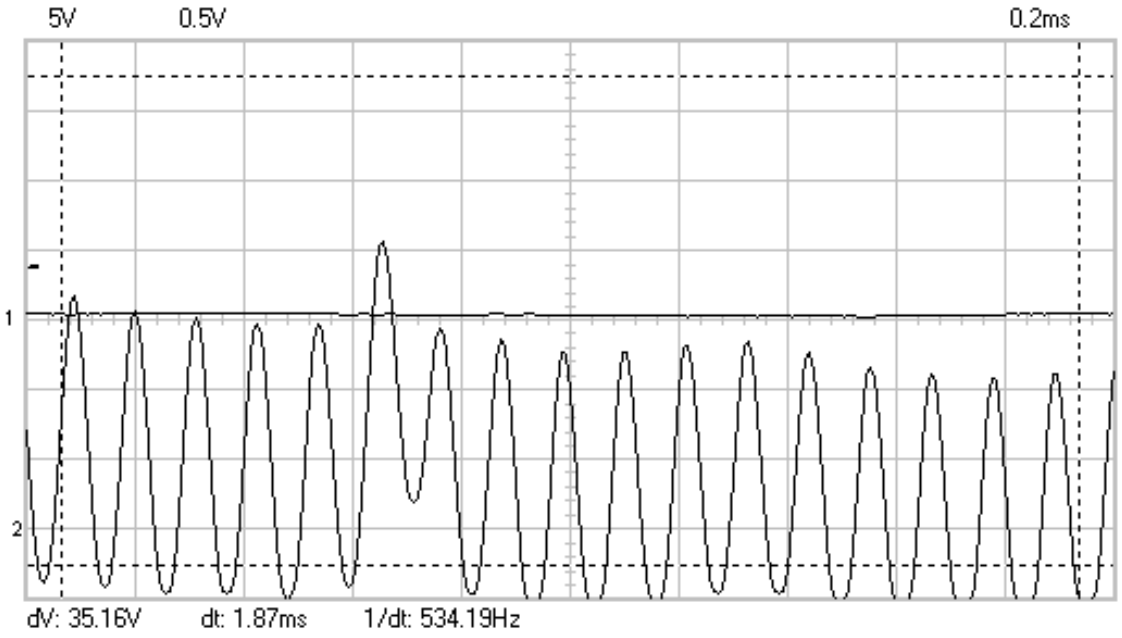


Wrong polarity for reference Mark signal



The signal must be about 1Vpp.

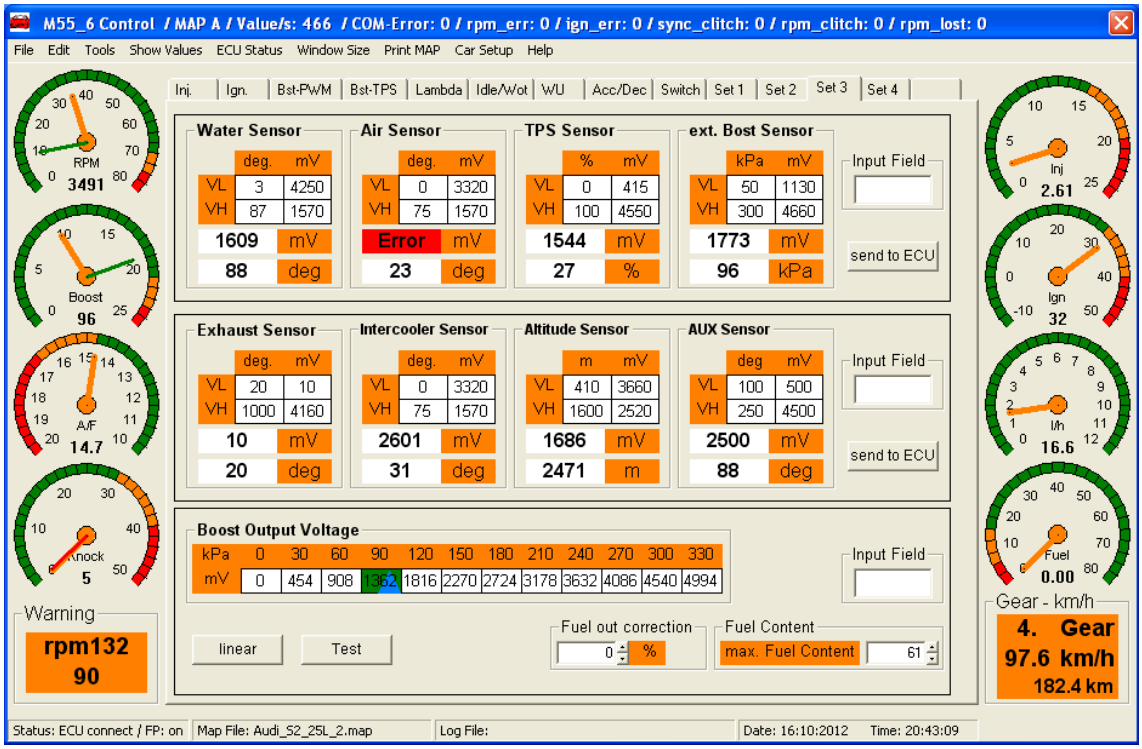
Wrong Tooth at Flywheel:



This picture shows you a flywheel with a wrong tooth. This error causes a problem at higher rpm, when the signal is not crossing the Zero line.

If you have any error from reference Mark - CAM or RPM Sensor the Engine does not start or have misfire on higher rpm.

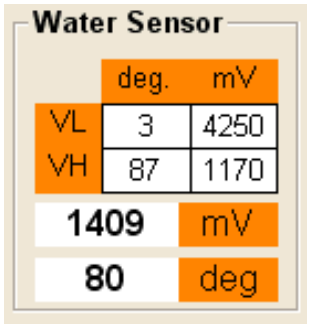
Setup 3:



Calibrate Sensors:

For proper operation, it is important that all sensors have been calibrated. Two points per sensor, as far as possible apart, will be measured.

For example, measure voltage for water temperature sensor at 0 degree (Ice Water) Celsius and 100 degree (cooking Water) Celsius.



VL: lower Sensor Value
(for example 4250 mV at 3 deg Water Temperature)

VH: higher Sensor Value
(for example 1170 mV at 87 deg Water Temperature)

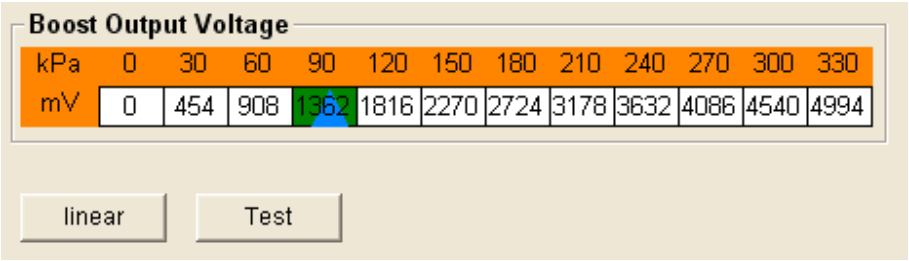
Messen Sie die zwei Eckpunkte indem Sie den Sensor in Eiswasser und kochende Wasser halten und mit einem Thermometer überprüfen.

For Example TPS Sensor:

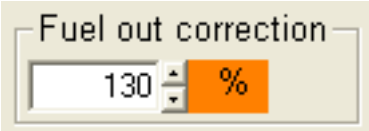
Read voltage at Idle (0%) and voltage at WOT (100%) and write the voltage in the MAP

Note: **After changing a Value press ‘send to ECU’ Button**

Boost Output Voltage MAP:



At Pin 32 of the 55-pin connector, the boost pressure is given analogously (0-5V). You can connect a Boost Gauge at this Pin for monitoring the boost from the engine. With the boost output voltage map you can calibrate the output voltage for the boost gauge. Mark a cell in the MAP with the mouse and press the Test button. Check the displayed value on the boost gauge. If the value is not the same as in the MAP you must increase or decrease the MAP Value.

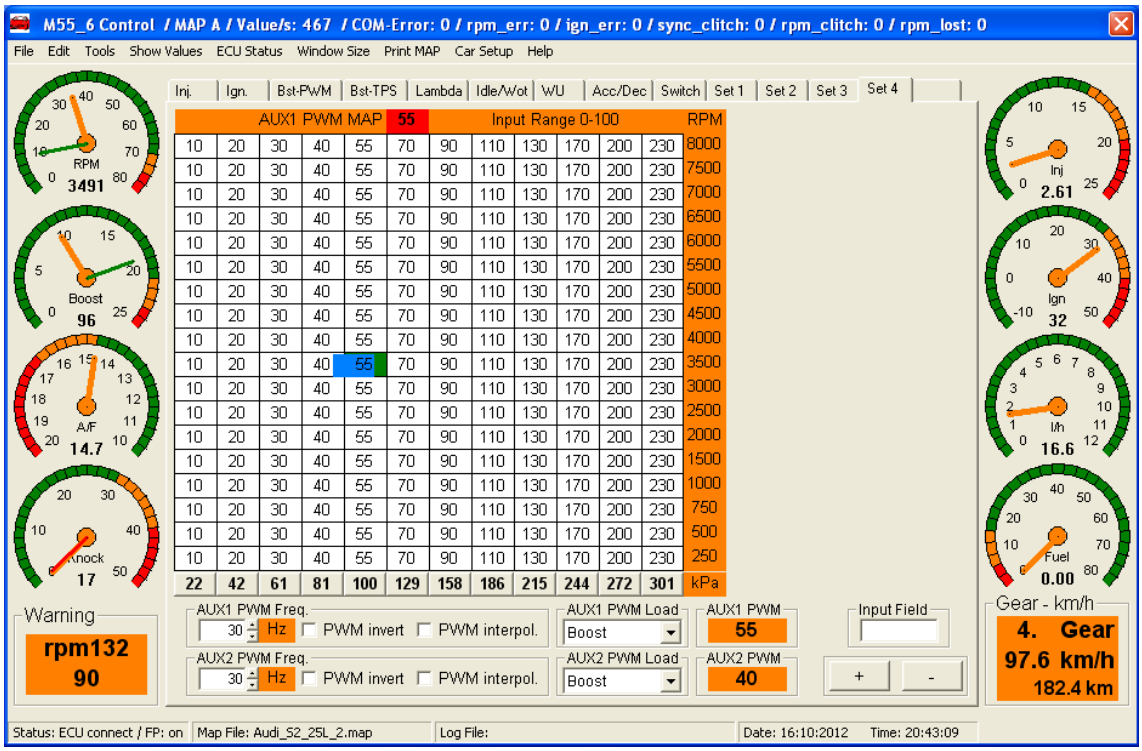


Adjust the Fuel Out signal. For no correction set to 100%

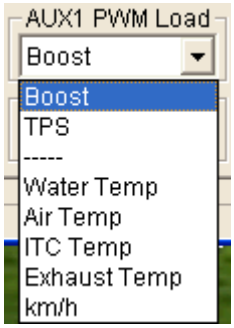
Set the Fuel Content

Setup 4:

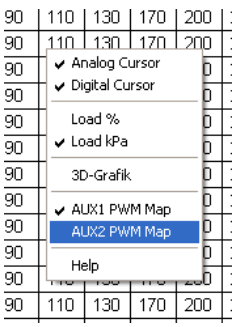
AUX PWM MAP: (Version 1.5 and higher)



Attention: The output AUX1 PWM and AUX2 PWM must activate in Switch Panel.



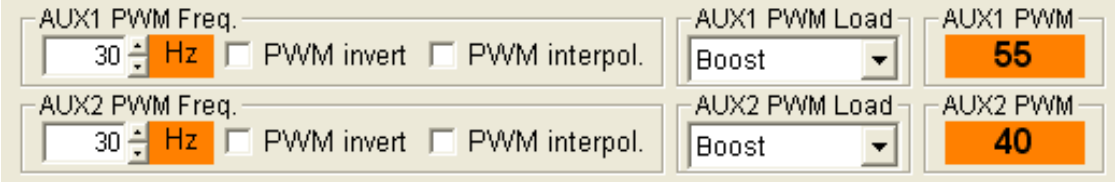
Two AUX PWM MAP are available. The Frequency can be set between 12-150Hz. The PWM Value can be changed between 0-255 (8 Bit). You can select between different Load Values like Boost, Tps… At the Output Pin, you can connect Valves. The maximum Load at the output is 1A.



Change between AUX1 and AUX2 MAP.

Press the right mouse button and select between AUX1 PWM MAP and AUX2 PWM MAP.

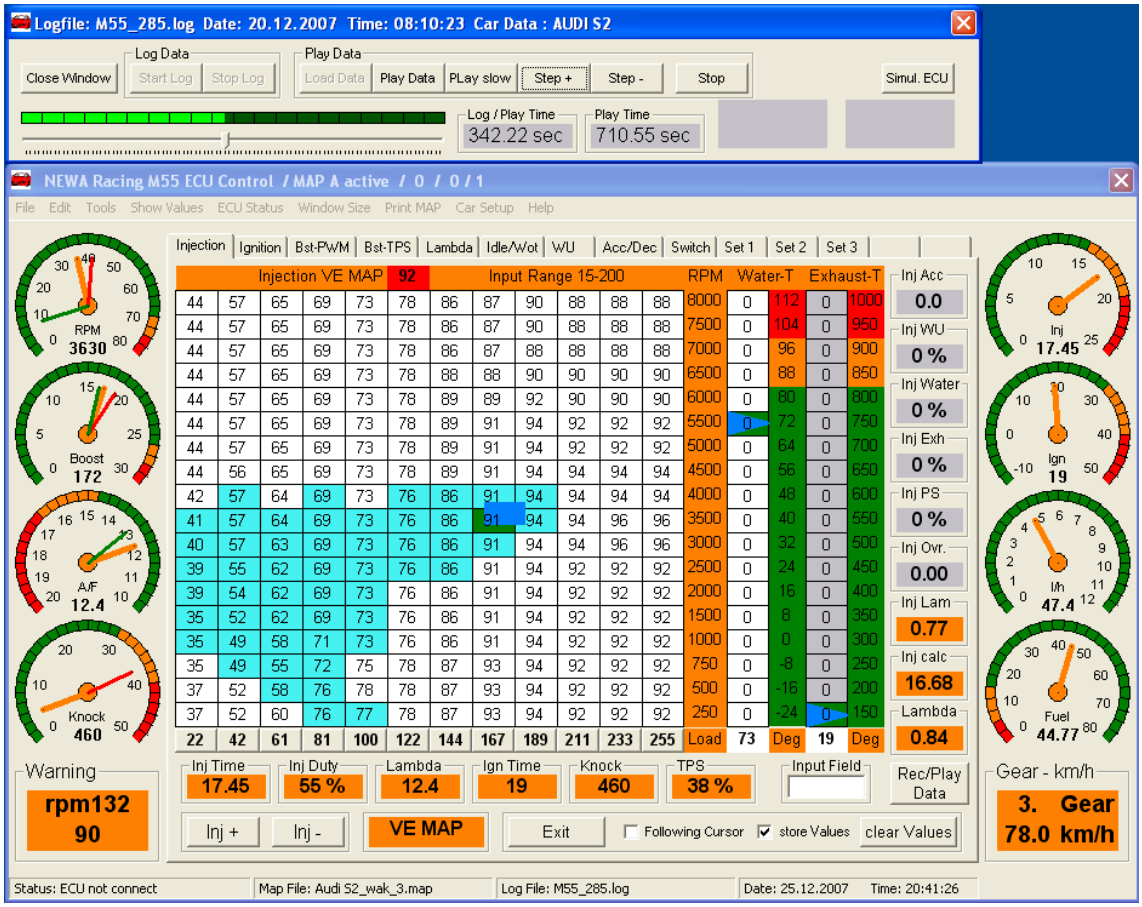
Adjust AUX1 und AUX2 PWM:



1: The PWM Frequency can be changed between 12-150Hz.
2: Invert the output signal.
3: Interpolate between Cells on/off.
4: Change Load signal
5: Current output value.

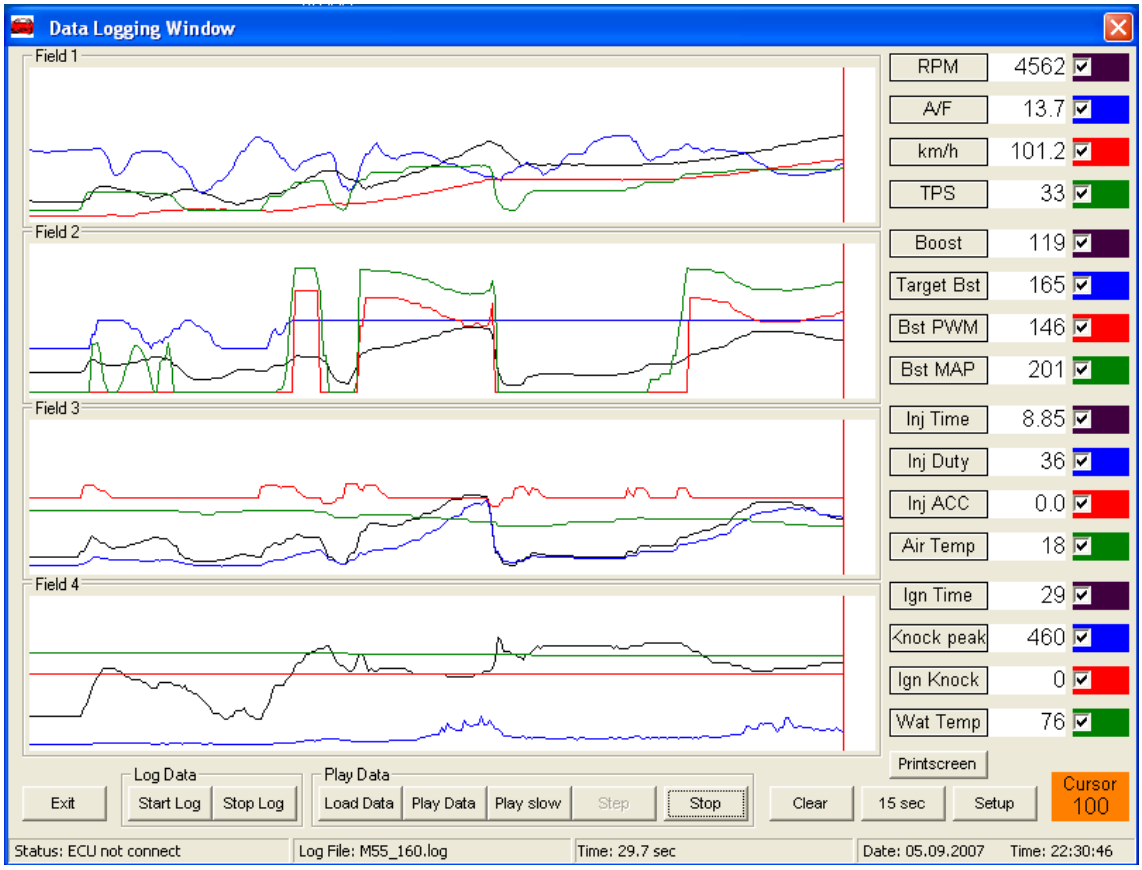
If you need a switch Function, set PWM interpol to off. If the Value in the cell is 0 the Output Signal is off and when the Value in the cell is 255 the Output signal is on.

Record – Play Data:



After pressing the ‘Rec/Play’ Button, the control window of the data recording opens. The data recording starts after pressing the ‘Start Log’ button. After you press the ‘Stop Log’ key data recording stopped and stored automatically the file on the disk. All data files are automatically numbered and get the filename mapname_xx.log. All Log Files are stored in the M55_6 folder. The ECU sends all-important data 10 times per second to the Laptop. After a test drive, you can analyze the data in real time or step-by-step. First load a data file and then press ‘Play Data’ Button. During the play of the Data, you can switch between the different MAP. If ‘store Values’ is activated, all cells get light blue colour which are passed from cursor. Therefore, you can see which cells are used during the Test run.

Data recording in graphic form:



In this Windows, you can record and play the data in graphic form. The data recording starts after pressing the ‘Start Log’ button. After you press the ‘Stop Log’ key data recording stopped and store automatically the file on disk. All data files are automatically numbered and have the filename Mapname_xx.log. All Log Files are stored in the M55_6 Folder. The ECU sends all-important data 10 times per second to the Laptop. After a test drive, you can analyze the data in real time or step-by-step. First load a data file and then press ‘Play Data’ Button. It is possible to show 16 different data at the same time. You can define which data you will see. Press for example the rpm Button and then select a Value. On the right side, you can see the numeric Value on cursor position.

Log Data:

Start Log	starts Data Logging
Stop Log	stops Data Logging and store Data to Disk

Play Data:

Load Data	loads Data from Disk
Play Data / Pause	plays Data in real Time
Play slow	plays Data in slow Motion
Step	plays Data Step by Step
Stop	stops play Data
Clear	clears Window
15 sec	Window length is 15sec or 30 sec

M55 ECU with USB Flash Drive Data Recording:

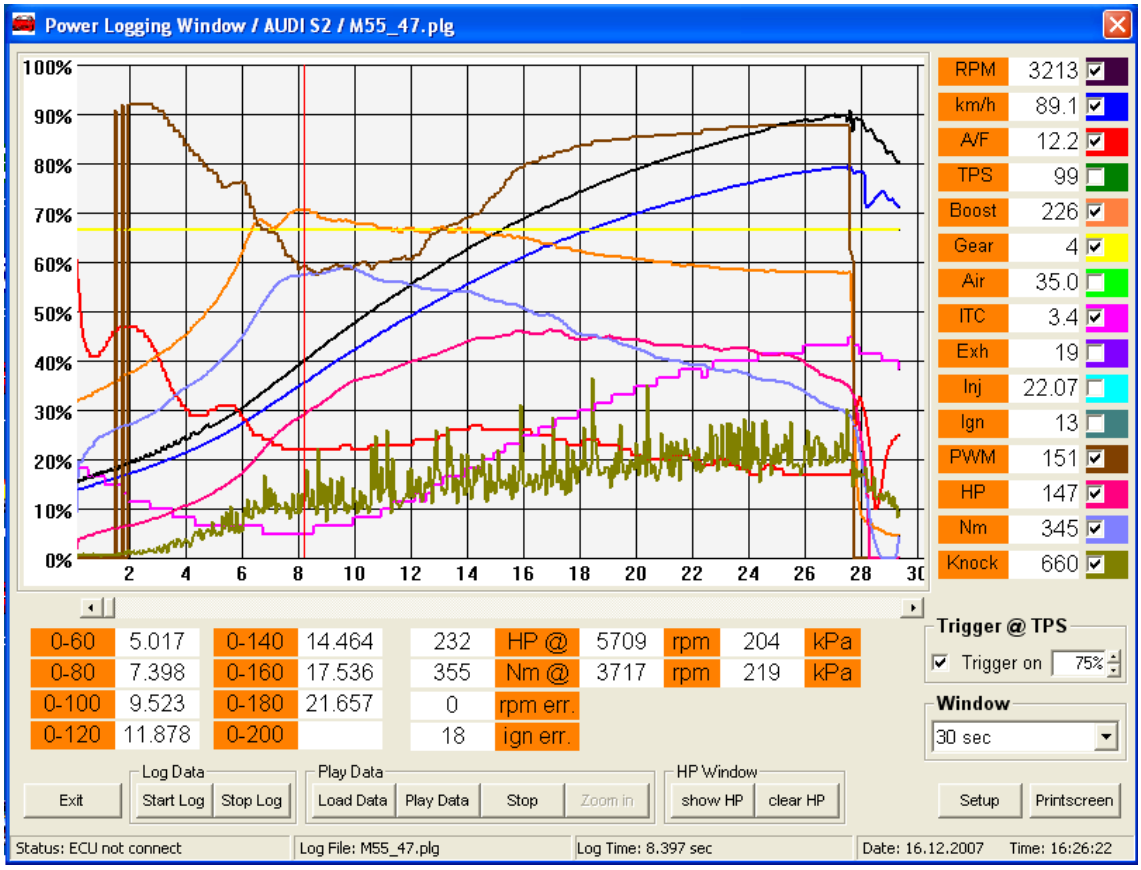
Data logging to USB Flash Drive:

The ECU has an optional output for an external Flash Drive adapter. The connector for the Flash Drive adapter is on the backside of the ECU. This connector is only for the Flash Drive adapter. Use for Data Recording a fast USB Stick. With a quick USB Stick up to nine measurements per second can be recorded. A slow USB Sick can only make about six measurements per second. The data logging starts, when you connect the USB Stick to the Flash Drive adapter and the data logging stops when you switch off the Ignition. If you remove the USB Stick during the engine is running you will lose all data.
The Data Files where automatically numbered while saving and getting the name LOGxx.log (xx is a number between 0-65535). The data should not be manipulated because otherwise the file is no longer available. The MAP File from the ECU must be saved to the Laptop before. The MAP file from the ECU, which has been used during the data recording, is not on the USB stick.

Load MAP File from USB Flash Drive:

It is possible to load a MAP file from USB stick. You must first generate the File usb.map in the menu Tools. Load the file usb.map to the USB stick and connect the stick with the USB Flash Drive adapter. Switch on Ignition and wait 15 sec. After this, the new MAP file will be loaded to the ECU. Do not start the engine in this 15 sec. After 15 sec, remove the USB stick and delete the usb.map file before using USB stick for data logging.

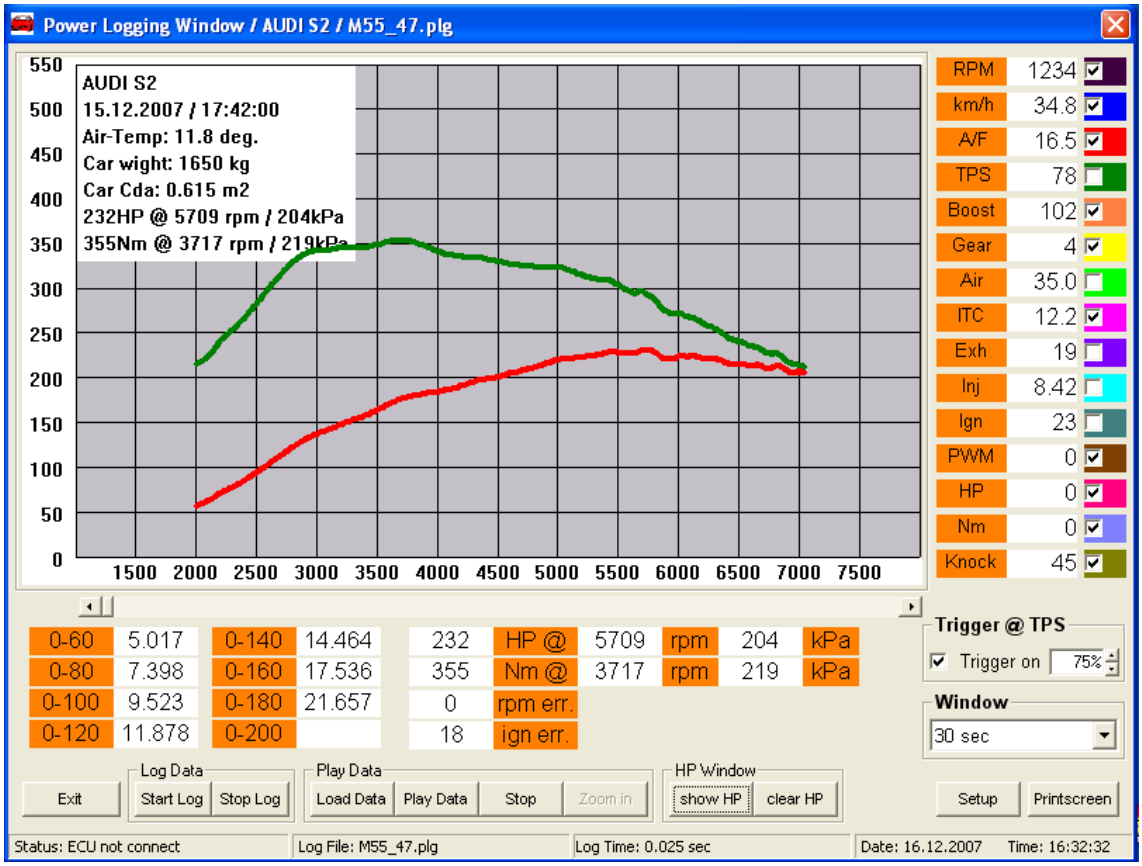
Performance Measurement:



With this Program you can make performance measurements of your engine. It is important to set the correct weight and Cda-Value for your car. The output power is measured from acceleration, weight, rolling resistance and Cda-Value. This gives you the rear Wheel Power and not the Engine Power. The rear Wheel Power is about 85% of the Engine Power.
You must make the performance measurement on a straight street. Press ‘Start Log’ Button and drive the car with about 1500 rpm in 3. Gear or higher. Press TPS to 100% and wait until rev limiter is started. When you press ‘Stop Log’, the data file will be stored to disk. The extension from the data file is mapname_xx.plg. Now you can load the Data file and press ‘Play Data’ Button for analyzing the data. Move the Mouse and press the left Mouse Button over the graphic and you can see the numerical value on the right site. The resolution for the data is 25ms. When you press ‘show-HP’ Button after playing the data, you get the performance chart from your Car.

Note: For a correct result, it is important to adjust the speed sensor and set the correct weight and Cda Value from your car.

Performance Chart:



After playing a performance data file, you can press ‘show-HP’ Button. The result is a performance chart from your engine.

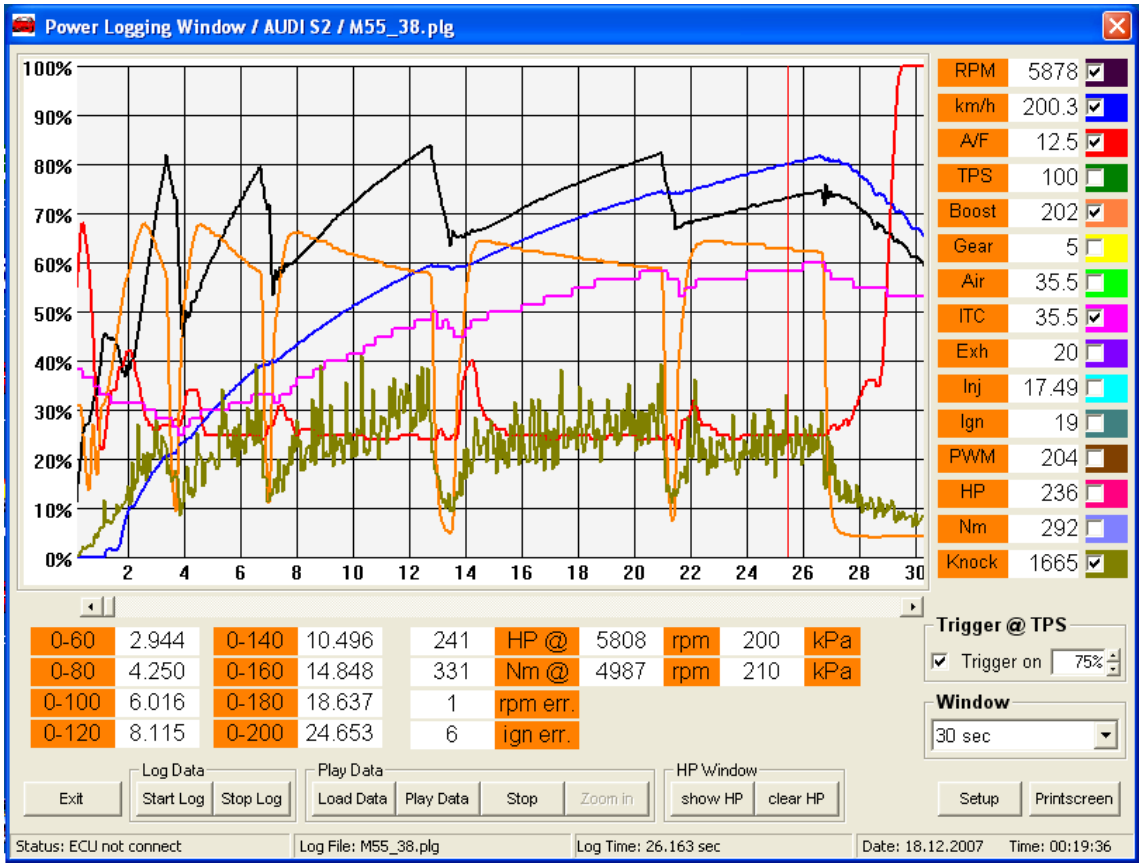
Red Line: Output Power
Green Line: Torque in Nm

The Car from the example chart has after correction the output power and torque about 270 HP and about 415 Nm.

You can see also the Boost at maximum Power and Boost at maximum Torque.

Check following points for a correct result:
1: straight-line street
2: min. 3. Gear or higher
3: set correct car weight in Menu ‘Car Data’
4: set correct Cda-Value in Menu ‘Car Data’
5: adjust the speed sensor in ‘Setup1’

Acceleration Measurement:



With the Performance Measurement Program, you can also make an acceleration chart from your Car. Press ‘Start Log’ Button and press TPS for a short moment to 100% to start the acceleration measurement. Then launch the Car and drive each Gear to maximum rpm. Press ‘Stop Log’ Button to store the data file to disk. After loading data file, you can play and analyze the Data during acceleration.

Note: adjust the speed sensor to get a correct result.

MAP A, MAP B:

It is possible to store two Mapping (MAP A and MAP B)

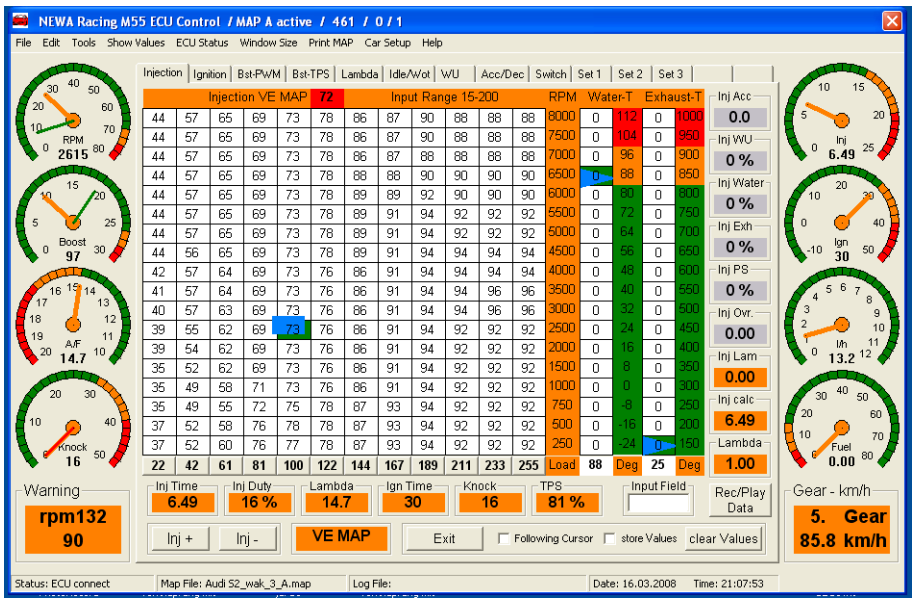
The following maps can be in MAP A and MAP B separately changed:

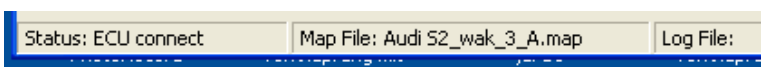
- Injection MAP
- Ignition MAP
- Boost-PWM-MAP
- Boost-TPS-MAP
- Lambda Target MAP
- WOT MAP

The other MAP (for example warm up MAP) are the same in MAP A and MAP B. Switch to MAP A if you change for example the warm up MAP. If MAP A is active, the Background Color from the MAP is white and if MAP B is active, the background color from the MAP is yellow. Save MAP A and MAP B with a different Name to Disk.

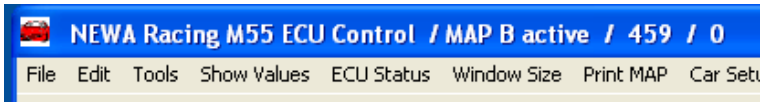
Mount a Switch between PIN 5 and PIN 9 at the nine PIN Sub-D connector.
If the switch is open, MAP A is active and if the switch is close MAP B is active.

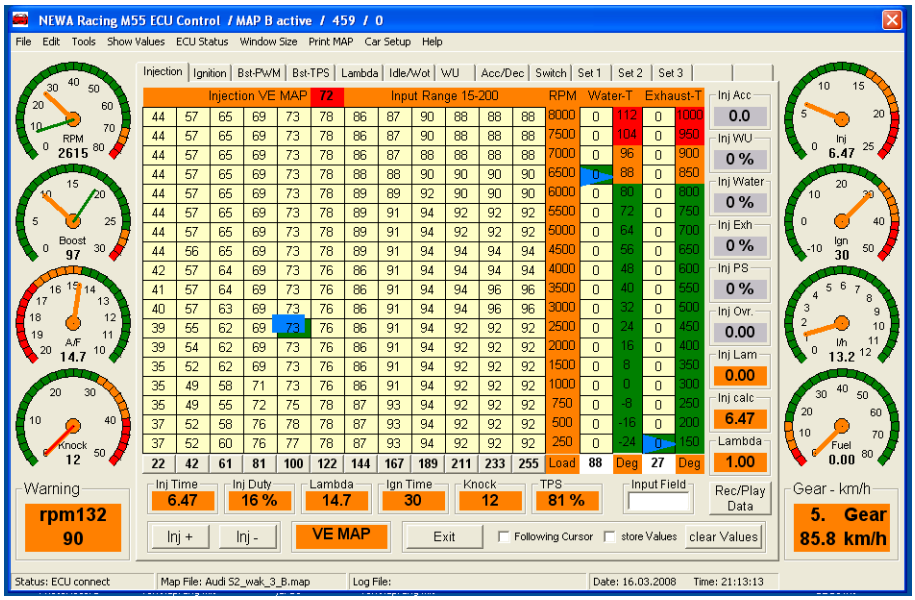
Example for MAP A:

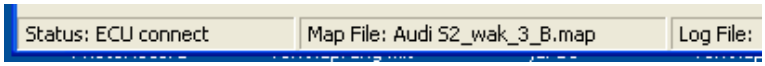




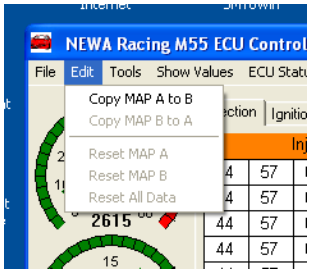
Example for MAP B:







Copy MAP A to MAP B:

	Copy MAP A to MAP B. After this get MAP B the same Name then MAP A. Switch to MAP B and save the MAP B with new Name to HDD.

Sequence of tuning the engine:

- Connect ECU to wiring harness
- Change polarity of reference Mark Sensor
- Connect cable to Laptop
- Switch on ignition
- Start M55_6 program
- Check Sensor adjustment, calibrate TPS Sensor
- Set engine displacement
- Define load and rpm axis.
- Adjust injector size
- Start engine and warm-up in idle mode
- Switch off lambda control
- Adjust Idle MAP (about 5% to reach)
- Adjust Injection MAP (about 5% to reach at part load)
- Adjust Ignition MAP
- Adjust Boost PWM and Boost TPS MAP

Turbocharger:

The turbocharger must be adapted on the desired performance. To high rpm can destroy the Turbocharger. If the exhaust backpressure between the Turbocharger and the engine is too high, the output power from the engine is not optimally. The difference between exhaust backpressure and boost should be smaller than 0.5 bar. The maximum exhaust temperature should be smaller than 950 deg Celsius. The stock Turbocharger from the Audi S2 is good enough for about 280HP and the stock Turbocharger from the Audi RS2 for about 350HP

Intake and Exhaust:

For high output power you must modify the intake and exhaust System. Also important is an efficient Intercooler. The intake air temperature should not higher then 50-60 deg Celsius.

Important: The ECU cannot make better mechanics from the engine.

Injector Size:

The following table shows you the correct injector size for your engine.
This table is for a 5-cylinder turbo charged engine.

Use only high impedance Injectors. You can mount up to two high impedance Injectors at the same output.

Output Power (HP)	**ccm**
300	360
350	430
400	490
450	550
500	620
550	680
600	730

Gauge Window

The Gauge Window is like a Dashboard. You can define the different Gauge. Press the right Mouse Button to the Gauge witch you want change and select a Gauge.

Port Configuration 55-pol M55_6 ECU:

PIN 1:	Ignition Cylinder 1 (optional with Ignitor)	Digital 5V
PIN 2:	Ignition Cylinder 2 (optional with Ignitor)	Digital 5V
PIN 3:	Fuel Pump Relay	max. 1A pull down
PIN 4:	Idle Valve+	PWM 100Hz max. 1A
PIN 5:	Purge Valve	PWM 10 Hz
PIN 6:	Klima Compressor on/off	Digital 5V
PIN 7:	NC (MAF Signal)	
PIN 8:	CAM Sensor (Hall sensor)	Digital 5 V
PIN 9:	Altitude Signal	Analog 0 – 5V
PIN 10:	GND	
PIN 11:	Knock Sensor 1 (Cylinder 1-3)	
PIN 12:	5V out	max. 200mA
PIN 13:	AUX-2 PWM	
PIN 14:	GND	
PIN 15:	Injector Cylinder 6	max. 2.5 A pull down
PIN 16:	Injector Cylinder 5	max. 2.5 A pull down
PIN 17:	Injector Cylinder 2	max. 2.5 A pull down
PIN 18:	12V from Battery (Klemme 30)	
PIN 19:	GND	
PIN 20:	Ignition Cylinder 4	Digital 5V
PIN 21:	Ignition Cylinder 5	Digital 5V
PIN 22:	TPS-2 for E-GAS (optional)	
PIN 23:	Ignition Cylinder 3	Digital 5V
PIN 24:	GND	
PIN 25:	NC (MAF burnout)	
PIN 26:	GND	
PIN 27:	12V from Ignition on (Klemme 15)	
PIN 28:	Lambda EGO	Analog 0 – 1 V
PIN 29:	Knock Sensor 2 (Cylinder 4-5)	
PIN 30:	Knock sensor GND	
PIN 31:	Fuel Consumption Gauge Signal	Digital 12V
PIN 32:	Boost Gauge Signal (optional)	Analog 0 - 5V
PIN 33:	Wastegate Valve	PWM 30Hz
PIN 34:	Injector Cylinder 3	max. 2.5 A pull down
PIN 35:	Injector Cylinder 4	max. 2.5 A pull down
PIN 36:	Injector Cylinder 1	max. 2.5 A pull down
PIN 37:	NC	
PIN 38:	E-Gas Engine- (optional)	PWM max. 5A
PIN 39:	E-Gas Engine+ (optional)	PWM max. 5A
PIN 40:	Tacho out signal	Digital 12 V
PIN 41:	Klima Signal Input	Digital 5V
PIN 42:	Ignition Cylinder 6	Digital 5V
PIN 43:	IDLE Valve-	PWM 100Hz max. 1A
PIN 44:	Intake Temperature	Analog 0 – 5V
PIN 45:	Water Temperature	Analog 0 – 5V
PIN 46:	CAM 2 Sensor (optional)	
PIN 47:	reference Mark Sensor (Inductive, 62 Grad before BTDC)	Sinus Pulse
PIN 48:	GND Sensor	
PIN 49:	RPM Sensor (Inductive, 135 Pulse / rpm)	Sinus Signal
PIN 50:	Speed Sensor (1Hz / kmh)	Digital 5V
PIN 51:	EGAS-2 Potentiometer (optional)	
PIN 52:	Idle Switch from TPS	Digital
PIN 53:	TPS Signal	Analog 0 – 5V
PIN 54:	AUX-1 PWM	
PIN 55:	EGAS-1 Potentiometer (optional)	

Port Configuration 55-pol Audi S2/RS2/S4 ABY Version:

PIN 1:	Ignition Cylinder 1	Digital 5V
PIN 2:	Ignition Cylinder 2	Digital 5V
PIN 3:	Fuel Pump Relay	max. 1A pull down
PIN 4:	Idle Valve	PWM 100Hz
PIN 5:	Purge Valve	PWM 10 Hz
PIN 6:	Klima Compressor on/off	Digital 5V
PIN 7:	NC (MAF Signal)	
PIN 8:	CAM Sensor (Hall sensor)	Digital 5 V
PIN 9:	Altitude Signal	Analog 0 – 5V
PIN 10:	GND	
PIN 11:	Knock Sensor 1 (Cylinder 1-3)	
PIN 12:	5V out	max. 200mA
PIN 13:	AUX-2 PWM	
PIN 14:	GND	
PIN 15:	NC	
PIN 16:	Injector Cylinder 5	max. 2.5 A pull down
PIN 17:	Injector Cylinder 2	max. 2.5 A pull down
PIN 18:	12V from Battery (Klemme 30)	
PIN 19:	GND	
PIN 20:	Ignition Cylinder 4	Digital 5V
PIN 21:	Ignition Cylinder 5	Digital 5V
PIN 22:	NC	
PIN 23:	Ignition Cylinder 3	Digital 5V
PIN 24:	GND	
PIN 25:	NC (MAF burnout)	
PIN 26:	GND	
PIN 27:	12V from Ignition on (Klemme 15)	
PIN 28:	Lambda EGO	Analog 0 – 1 V
PIN 29:	Knock Sensor 2 (Cylinder 4-5)	
PIN 30:	Knock sensor GND	
PIN 31:	Fuel Consumption Gauge Signal	Digital 12V
PIN 32:	Boost Gauge Signal (optional)	Analog 0 - 5V
PIN 33:	Wastegate Valve	PWM 30Hz
PIN 34:	Injector Cylinder 3	max. 2.5 A pull down
PIN 35:	Injector Cylinder 4	max. 2.5 A pull down
PIN 36:	Injector Cylinder 1	max. 2.5 A pull down
PIN 37:	NC	
PIN 38:	NC	
PIN 39:	NC	
PIN 40:	Tacho out signal	Digital 12 V
PIN 41:	Klima Signal Input	Digital 5V
PIN 42:	NC	
PIN 43:	NC	
PIN 44:	Intake Temperature	Analog 0 – 5V
PIN 45:	Water Temperature	Analog 0 – 5V
PIN 46:	NC	
PIN 47:	reference Mark Sensor (Inductive, 62 Grad before BTDC)	Sinus Pulse
PIN 48:	GND Sensor	
PIN 49:	RPM Sensor (Inductive, 135 Pulse / rpm)	Sinus Signal
PIN 50:	Speed Sensor (1Hz / kmh)	Digital 5V
PIN 51:	NC	
PIN 52:	Idle Switch from TPS	Digital
PIN 53:	TPS Signal	Analog 0 – 5V
PIN 54:	NC	
PIN 55:	NC	

Port Configuration 55-pol Audi S2/S4 3B Version:

PIN 1:	Ignition Cylinder 1-5	Digital 5V
PIN 2:	NC	
PIN 3:	Fuel Pump Relay	max. 1A pull down
PIN 4:	Idle Valve+	PWM 100Hz
PIN 5:	Purge Valve	PWM 10 Hz
PIN 6:	Tacho out Signal	Digital 12V
PIN 7:	NC (MAF Signal)	
PIN 8:	CAM Sensor (Hall Sensor)	Digital 5 V
PIN 9:	NC	
PIN 10:	GND	
PIN 11:	Knock Sensor 1 (Cylinder 1-3)	
PIN 12:	5V out	max. 200mA
PIN 13:	NC	
PIN 14:	GND	
PIN 15:	Injector Cylinder 3	max. 2.5 A pull down
PIN 16:	Injector Cylinder 2	max. 2.5 A pull down
PIN 17:	Injector Cylinder 1	max. 2.5 A pull down
PIN 18:	12V from Battery (Klemme 30)	
PIN 19:	GND	
PIN 20:	NC	
PIN 21:	NC	
PIN 22:	NC	
PIN 23:	Wastegate Valve	PWM 30Hz
PIN 24:	GND	
PIN 25:	NC (MAF Burnout)	
PIN 26:	GND	
PIN 27:	12V from Ignition (Klemme 15)	
PIN 28:	Lambda EGO	Analog 0 - 1 V
PIN 29:	Knock Sensor 2 (Cylinder 4-5)	
PIN 30:	Knock Sensor GND	
PIN 31:	Boost Gauge Signal (optional)	Analog 0 - 5V
PIN 32:	Fuel Consumption Signal for Gauge	Digital 12V
PIN 33:	NC	
PIN 34:	Injector Cylinder 5	max. 2.5 A pull down
PIN 35:	Injector Cylinder 4	max. 2.5 A pull down
PIN 36:	NC	
PIN 37:	NC	
PIN 38:	NC	
PIN 39:	NC	
PIN 40:	Klima Signal Output	Digital 5 V
PIN 41:	Klima Signal Input	Digital 5V
PIN 42:	NC	
PIN 43:	NC	
PIN 44:	Intake Temperature	Analog 0 - 5V
PIN 45:	Water Temperature	Analog 0 - 5V
PIN 46:	Altitude Signal	Analog 0 - 5V
PIN 47:	RPM sensor (inductive, 135 Pulse / rpm)	Sinus Signal
PIN 48:	GND Sensor	
PIN 49:	reference Mark Sensor (Inductive, 62 Grad before BTDC)	Sinus Pulse
PIN 50:	Speed Sensor (1Hz / km/h)	Digital 5V
PIN 51:	NC	
PIN 52:	Idle Switch from TPS	Digital
PIN 53:	TPS Signal	Analog 0 – 5V
PIN 54:	NC	
PIN 55:	NC	

Port Configuration 55-pol Opel Calibra Turbo:

PIN 1:	Ignition 1-4	Digital 5V
PIN 2:	*1. Gear Switch	
PIN 3:	Fuel Pump Relais	max. 1A pull down
PIN 4:	Idle Valve+l	PWM 100Hz
PIN 5:	Purge Valve	PWM 10 Hz
PIN 6:	NC	
PIN 7:	NC (MAF Signal)	
PIN 8:	CAM Sensor (Hallgeber)	Digital 5 V
PIN 9:	Speed Sensor	Digital 5V
PIN 10:	GND	
PIN 11:	Knock Sensor (Zylinder 1-4)	
PIN 12:	5V out	max. 200mA
PIN 13:	NC	
PIN 14:	GND	
PIN 15:	NC	
PIN 16:	Injection Cylinder 3	max. 2.5 A pull down
PIN 17:	Injection Cylinder 1	max. 2.5 A pull down
PIN 18:	12V Dauerplus (Klemme 30)	
PIN 19:	GND	
PIN 20:	NC	
PIN 21:	Wastegate Valve	PWM 30Hz max. 1A pull down
PIN 22:	*ECU err.	
PIN 23:	NC	
PIN 24:	GND	
PIN 25:	NC (MAF burnout)	
PIN 26:	GND	
PIN 27:	12V (Klemme 15)	
PIN 28:	*Lambda EGO	Analog 0 - 1 V
PIN 29:	NC	
PIN 30:	Knock Sensor GND	
PIN 31:	*Hot Start Valvel	
PIN 32:	Fuel out	Digital 12V
PIN 33:	NC	
PIN 34:	Injection Cylinder 2	max. 2.5 A pull down
PIN 35:	Injection Cylinder 4	max. 2.5 A pull down
PIN 36:	FP Relais Spule 2	
PIN 37:	NC	
PIN 38:	NC	
PIN 39:	NC	
PIN 40:	Air Condition Signal out	Digital 5 V
PIN 41:	Air Condition Signal in	Digital 5V
PIN 42:	NC	
PIN 43:	Tacho out	Digital 12V
PIN 44:	Intake temperature sensor	Analog 0 - 5V
PIN 45:	Water temperature sensor	Analog 0 - 5V
PIN 46:	NC	
PIN 47:	NC	
PIN 48:	GND Sensor	
PIN 49:	Crank Sensor 60-2, 125 Grad vor OT	Sinus Puls
PIN 50:	NC	
PIN 51:	NC	
PIN 52:	NC	
PIN 53:	TPS Potentiometer	Analog 0 – 5V
PIN 54:	NC	
PIN 55:	NC	

*not use

Port Configuration 55-pol Porsche 964 C2/4:

PIN 1:	Ignition 1-6	Digital 5V
PIN 2:	GND	
PIN 3:	Fule Pump Relais	max. 1A pull down
PIN 4:	Idle Valve+l	PWM 100Hz
PIN 5:	Purge Valve	PWM 10 Hz
PIN 6:	Tacho out	Digital 12V
PIN 7:	NC (LMM Signal)	
PIN 8:	CAM Sensor (Hallgeber)	Digital 5 V
PIN 9:	NC	
PIN 10:	NC	
PIN 11:	Knock Sensor 1 (Zylinder 1,2,3)	
PIN 12:	5V out	max. 200mA
PIN 13:	NC	
PIN 14:	GND	
PIN 15:	Injection Cylinder 3	max. 2.5 A pull down
PIN 16:	Injection Cylinder 6	max. 2.5 A pull down
PIN 17:	Injection Cylinder 1	max. 2.5 A pull down
PIN 18:	12V from Battery (Klemme 30)	
PIN 19:	GND	
PIN 20:	NC	
PIN 21:	NC	
PIN 22:	*ECU error	
PIN 23:	Butterfly Valve	max. 1 A pull down
PIN 24:	GND	
PIN 25:	NC	
PIN 26:	GND	
PIN 27:	NC	
PIN 28:	*Lambda EGO	Analog 0 - 1 V
PIN 29:	Knock Sensor 2 (Zylinder 4,5,6)	
PIN 30:	Knock sensor GND	
PIN 31:	5V CAMl Sensor	
PIN 32:	Fuel out	Digital 12V
PIN 33:	Injection Cylinder 5	max. 2.5 A pull down
PIN 34:	Injection Cylinder 4	max. 2.5 A pull down
PIN 35:	Injection Cylinder 2	max. 2.5 A pull down
PIN 36:	NC	
PIN 37:	12V Ign (Klemme 15)	
PIN 38:	NC	
PIN 39:	NC	
PIN 40:	Air Condition Signal out	Digital 5 V
PIN 41:	Air Condition Signal out	Digital 5V
PIN 42:	NC	
PIN 43:	NC	
PIN 44:	Intake temperature	Analog 0 - 5V
PIN 45:	Engine temperature	Analog 0 - 5V
PIN 46:	*Altitude Sensor	Analog 0 - 5V
PIN 47:	Crank Sensor+ 60-2, 84Grad vor OT	Analog Sinus
PIN 48:	Crank Sensor-	
PIN 49:	NC	
PIN 50:	Air Condition Signal in	
PIN 51:	NC	
PIN 52:	NC	
PIN 53:	NC	
PIN 54:	NC	
PIN 55:	NC	

Attention: You must mount a TPS Potentiometer.

*not use

Port Configuration Porsche 944 Turbo :

DME:

PIN 1: Ignition 1-4
PIN 2: Idle Switch
PIN 3: *WOT Signal in
PIN 4: 12V Ign (Klemme 15)
PIN 5: GND Sensor
PIN 6: GND LLM
PIN 7: *LLM Signal
PIN 8: Crank Sensor -
PIN 9: 5V out
PIN 10: *MAP select
PIN 11: *Fuel out
PIN 12: *Test connector
PIN 13: NTC Water
PIN 14: Injection 3,4
PIN 15: Injection 1,2
PIN 16: GND
PIN 17: GND
PIN 18: *12V from DME Relais
PIN 19: GND
PIN 20: Fuel Pump relais
PIN 21: Tacho out
PIN 22: NTC Intake temperature
PIN 23: GND Sensor
PIN 24: Lambda snsor EGO
PIN 25: Reference Mark Sensor +
PIN 26: Reference Mark Sensor –
PIN 27: Crank Sensor +
PIN 28: GND
PIN 29: *Air Condition Signal
PIN 30: *Altitude sensor
PIN 31: *Triggersignal für KR
PIN 32: *Triggersignal von KR
PIN 33: Idle Valve +
PIN 34: Idle Valve –
PIN 35: *12V from DME Relais

Reference mark sensor : 58 Grad BTDC
Crank Teeth : 132

*not use

KLR:

PIN 1: *Diagnose
PIN 2: Wastgate Valve
PIN 3: *LED
PIN 4: NC
PIN 5: Boost out
PIN 6: 12V Battery (Klemme30)
PIN 7: NC
PIN 8: NC
PIN 9: *Ignition Signal in
PIN 10: GND
PIN 11: GND
PIN 12: GND Sensor
PIN 13: Knock sensor
PIN 14: GND
PIN 15: *Knock yes/no
PIN 16: *Ignition Signal out
PIN 17: NC
PIN 18: *WOT Signal out
PIN 19: NC
PIN 20: GND
PIN 21: 5V out for TPS
PIN 22: TPS Potentiometer
PIN 23: GND TPS
PIN 24: *Triggersignal from DME
PIN 25: NC

Port Configuration BMW M3 E30:

Motronic:

PIN 1: Ignition 1-4
PIN 2: Idle Switch
PIN 3: *WOT Switch
PIN 4: 12V Ign.
PIN 5: GND Sensor
PIN 6: GND LLM
PIN 7: *LLM Signal
PIN 8: Crank Sensor -
PIN 9: 5V out
PIN 10: *MAP select
PIN 11: Fuel out
PIN 12: *Diagnose
PIN 13: NTC Water
PIN 14: Injection 1,2
PIN 15: Injection 3,4
PIN 16: GND
PIN 17: GND
PIN 18: *12V from DME Relais
PIN 19: GND
PIN 20: Fuel Pump Relais
PIN 21: Tacho out
PIN 22: NTC Air
PIN 23: GND Sensor
PIN 24: *Lambda Sensor EGO
PIN 25: Reference Mark Sensor +
PIN 26: Reference Mark Sensor –
PIN 27: Crank Sensor +
PIN 28: NC
PIN 29: *Air Condition Signal
PIN 30: *Altitude Sensor
PIN 31: Purge Relais
PIN 32: NC
PIN 33: Idle Valve +
PIN 34: Idle Valve –
PIN 35: 12V from DME Relais

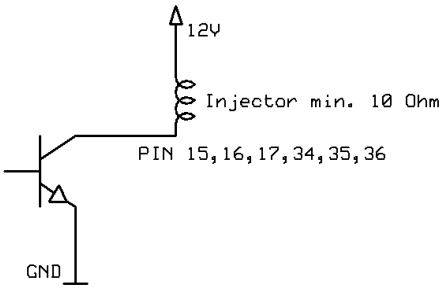
Attention: mount a TPS Potentiometer.

Reference Mark Sensor : 100 deg BDTC
Crank Teeth : 116

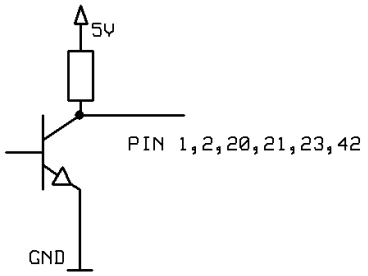
Input and Output Description:

PIN 27:	12 Volt from Ignition.
PIN 18:	permanent connect to Batterie (must connect)
PIN 14, 24:	GND for Ignition and Injectors. Use 2.5 mm2 cable to connect to engine.
PIN 10, 19:	GND, use 1.5 mm2 to connect to Chassis.
PIN 30, 48, 26:	GND for Sensors, TPS, Air, Water, Knock, MAF

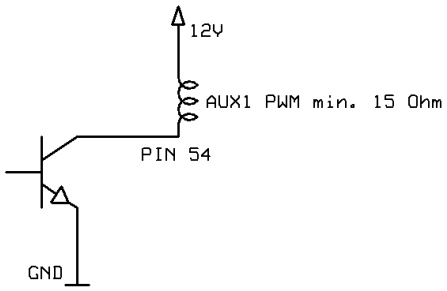
PIN 15, 16, 17, 34, 35, 36 Injector Outputs

	6 high impedance Injector Outputs up to 2.5A.

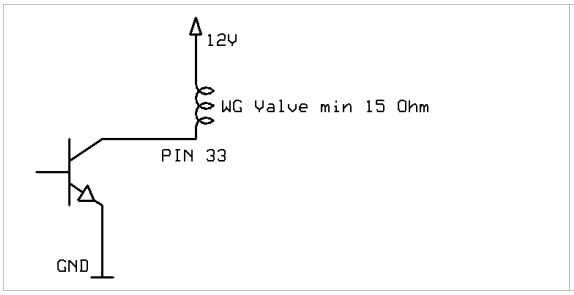
PIN 1, 2, 20, 21, 23, 42 Ignition Outputs

	6 Ignition Outputs up to 50mA. Not connect coils direct to this output. Optional: 2 internal Ignitor at Pin 1 and 2 for driving coils directly.

PIN 54 AUX1 PWM Output

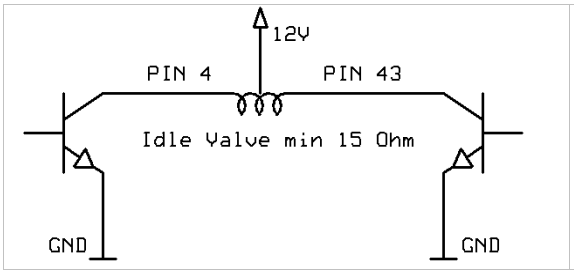
	AUX1 PWM output up to 1A.

PIN 33 Wastegate Output



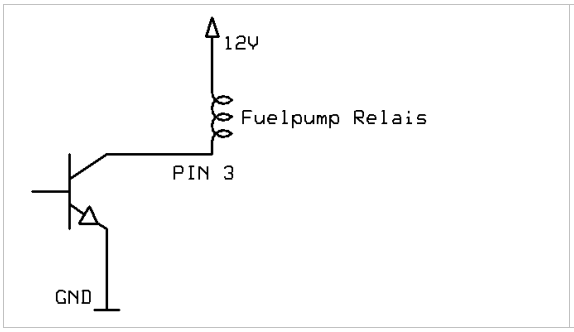
Wastegate output up to 1A.

PIN 4, 43 Idle Valve Output



Idle Valve Output for 2 or 3 wire Idle Valve up to 1A.

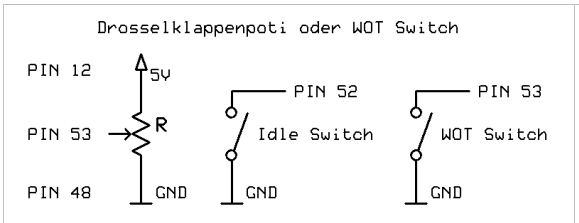
PIN 3 Fuelpump Relais Output



Fuelpump Relais Output up to 1A.

After activate Ignition the FP runs for about 3sec.
If the engine rpm is lower then 100rpm the output switch off after about 3sec.

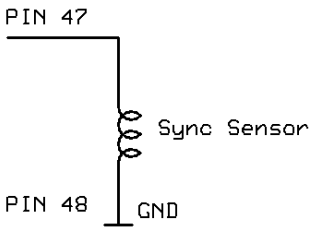
PIN 52, 53 TPS and Idleswitch Input



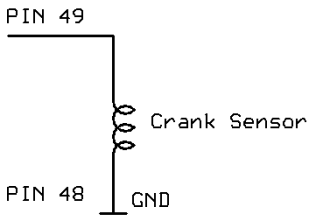
TPS and Idleswitch Input

WOT Switch only use with LMM

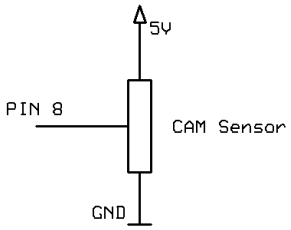
PIN 47 Reference Mark Sensor Input

	Inductive reference Mark Sensor Input Important : check Signal Polarity

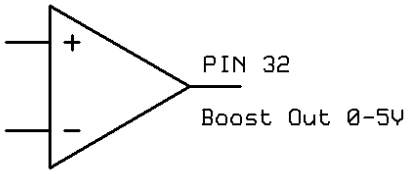
PIN 49 RPM Sensor Input

	Inductive RPM Sensor Input Important : check Signal Polarity

PIN 8 CAM Sensor Input

	CAM Hall Sensor Input

PIN 32 Boost DAC Output

	12Bit Boost DAC 0-5V Output

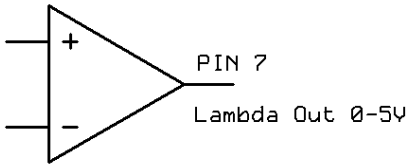
Port Configuration 8-pol RJ45 Connector (front side):

PIN 1: Lambda sensor Heather +
PIN 2: Lambda sensor Heather +
PIN 3: Lambda sensor Heather –
PIN 4: Lambda sensor Heather –
PIN 5: Lambda sensor Virtual Ground
PIN 6: Lambda sensor Vs
PIN 7: Lambda sensor Ip
PIN 8: Lambda sensor Ia

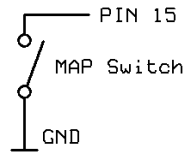
Port Configuration Sub D Connector: (optional)

PIN 1:	Exhaust temperature Sensor Type K+	
PIN 2:	Intake temperature second Sensor	
PIN 3:	FAN 1	max. 1A pull down
PIN 4:	Schaltlampe	max. 1A pull down
PIN 5:	MAP Switch	
PIN 6:	ECU Error	max. 1A pull down
PIN 7:	ext. UEGO Input	
PIN 8:	FAN 2	max. 1A pull down
PIN 9:	GND	

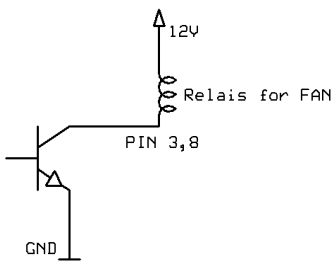
PIN 7 Lambda DAC Output:

	Output for 12Bit Lambda DAC 0-5V 0V equal A/F 10.0 5V equal A/F 20.0

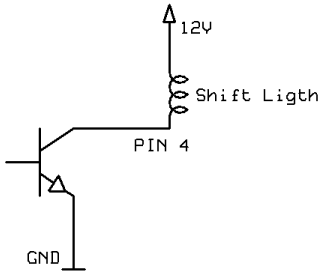
PIN 5 MAP Switch Input

	MAP Switch Input Switch open MAP A Switch closed MAP B

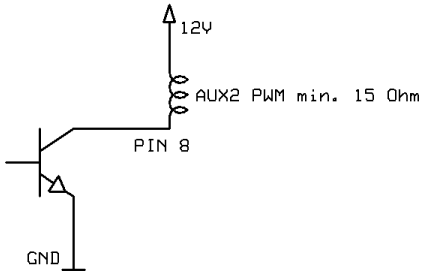
PIN 3, 8 Fan1 and Fan2 Output

	2 Output for FAN 1 and FAN 2 Relais Important: use PIN 8 for FAN 2 or AUX2 PWM

PIN 4 Shift Ligth Output

	Shift Ligth Output up to 1A. If rpm is about 400rpm before rev limiter the Output is low

PIN 8 AUX2 PWM Output

	AUX2 PWM output up to 1A. Important: use PIN 8 for FAN 2 or AUX2 PWM

Connector at Rear Side:

At the rear side, you can find the connector for the optional Touchscreen Display und USB Data record.

Specifications:

Voltage range / Power consumption:

6.5 – 16V / 250 – 400mA / about 3.5 W (without Sensors and Injectors)

Resolution:

- Injection Time: 0.02ms, maximum Injection Time 25ms
- Ignition Timing : 1 Grad
- Dwell Time : 2 – 8 ms, 0.1ms Step
- Analog Input : 0 – 5 V with 12Bit Resolution
- RPM Range : 0-8000 / 0-10000 / 0-12000 / 0-15000 / 0-18000

Communication, Data Logging:

- RS232 : TXD, RXD, GND, 115000 Baud
- Data Logging : sends all important Data 10 Times per Second
- Power Mode : sends all important Data 40 Times per Second

Internal Sensor:

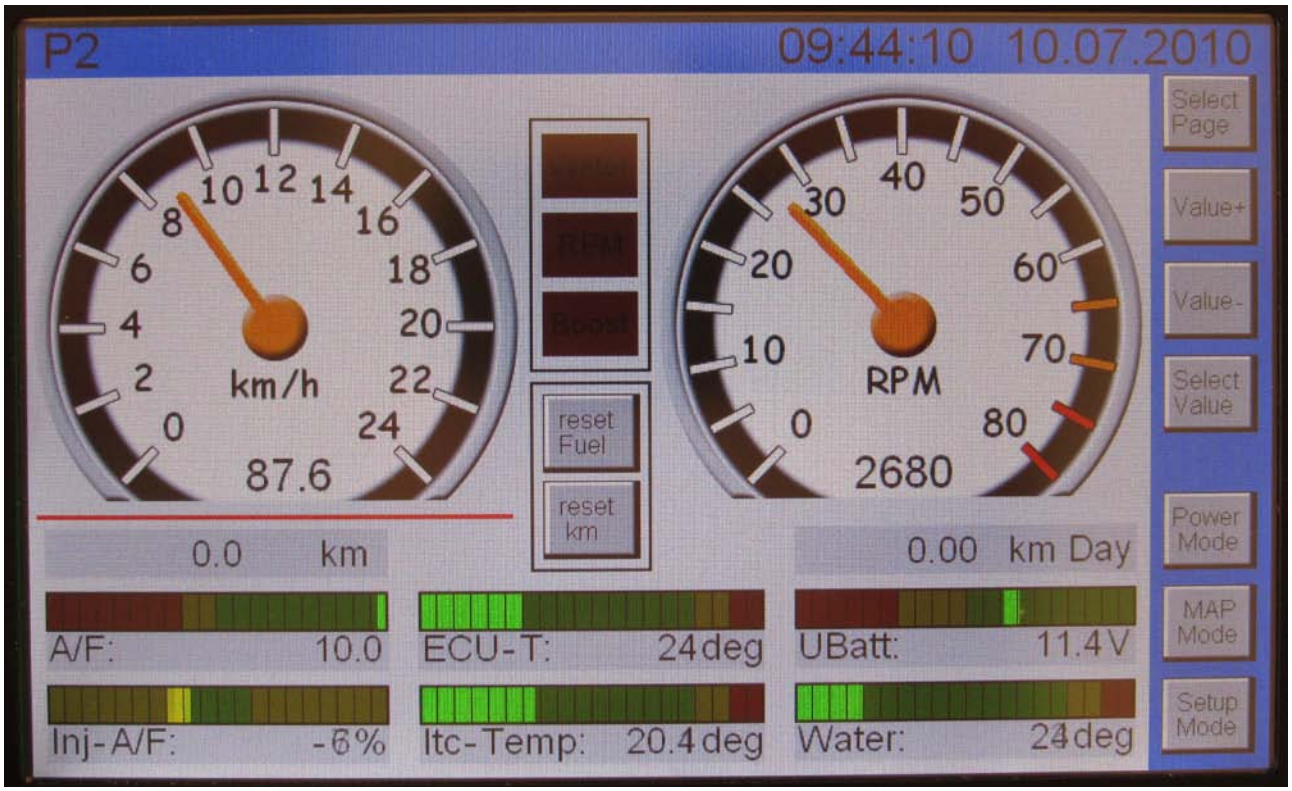
- MAP Sensor: maximum 326kPa absolute (higher pressure on demand)

5”/7” Color Touchscreen Display (optional):

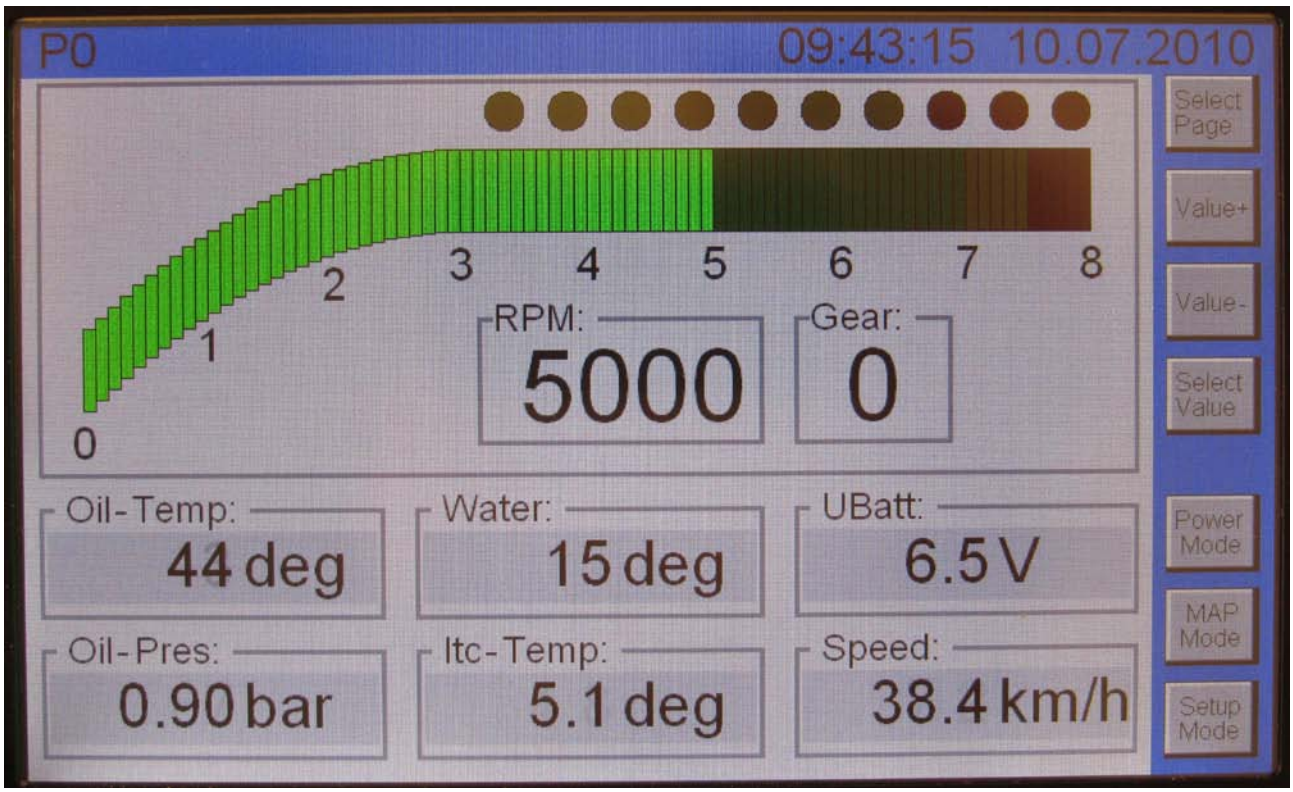
Also available is a 5” or 7“ Touchscreen Display. The Display resolution is 800x480 pixels. The Display can connect to ECU V1.4 and higher. Up to 8 Values can display at same time. The update rate from the displayed values is 10 time per sec.

7” Color Touchscreen display:

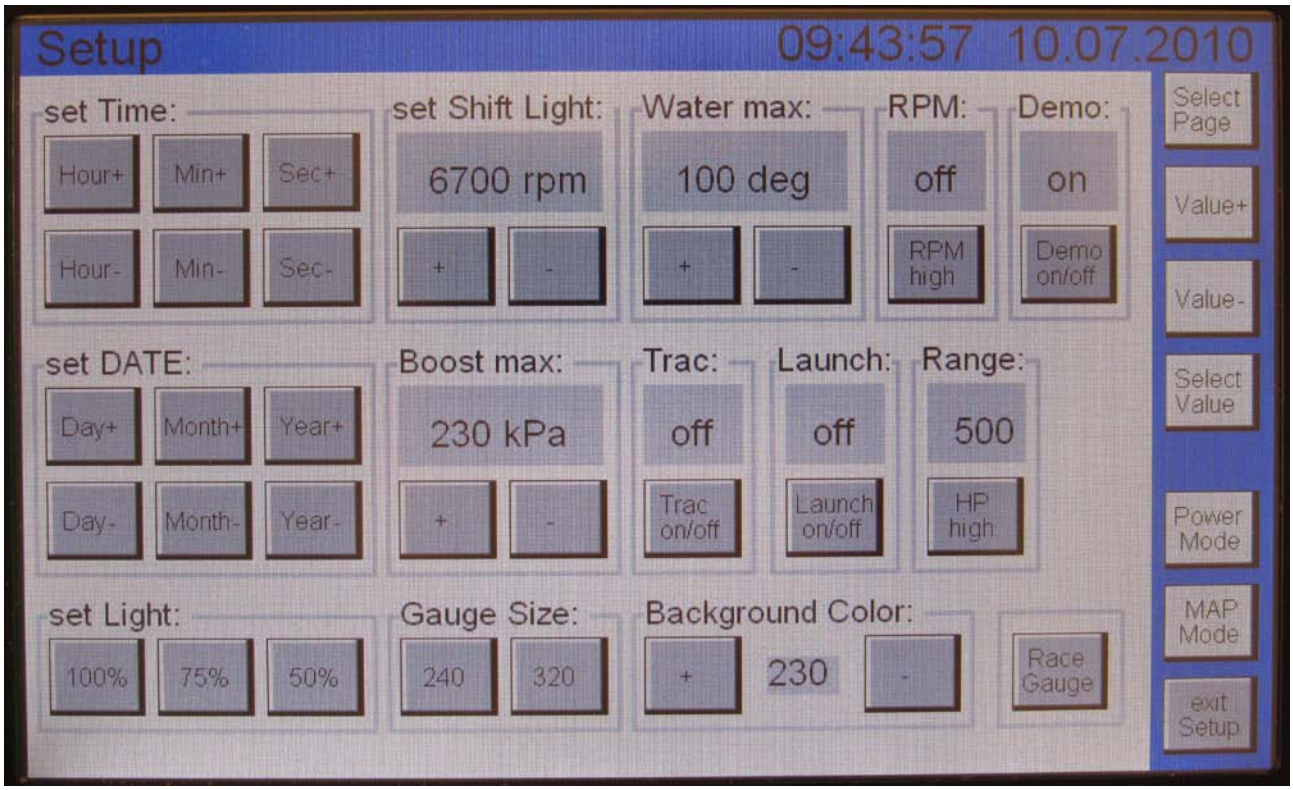
Streetgauge:



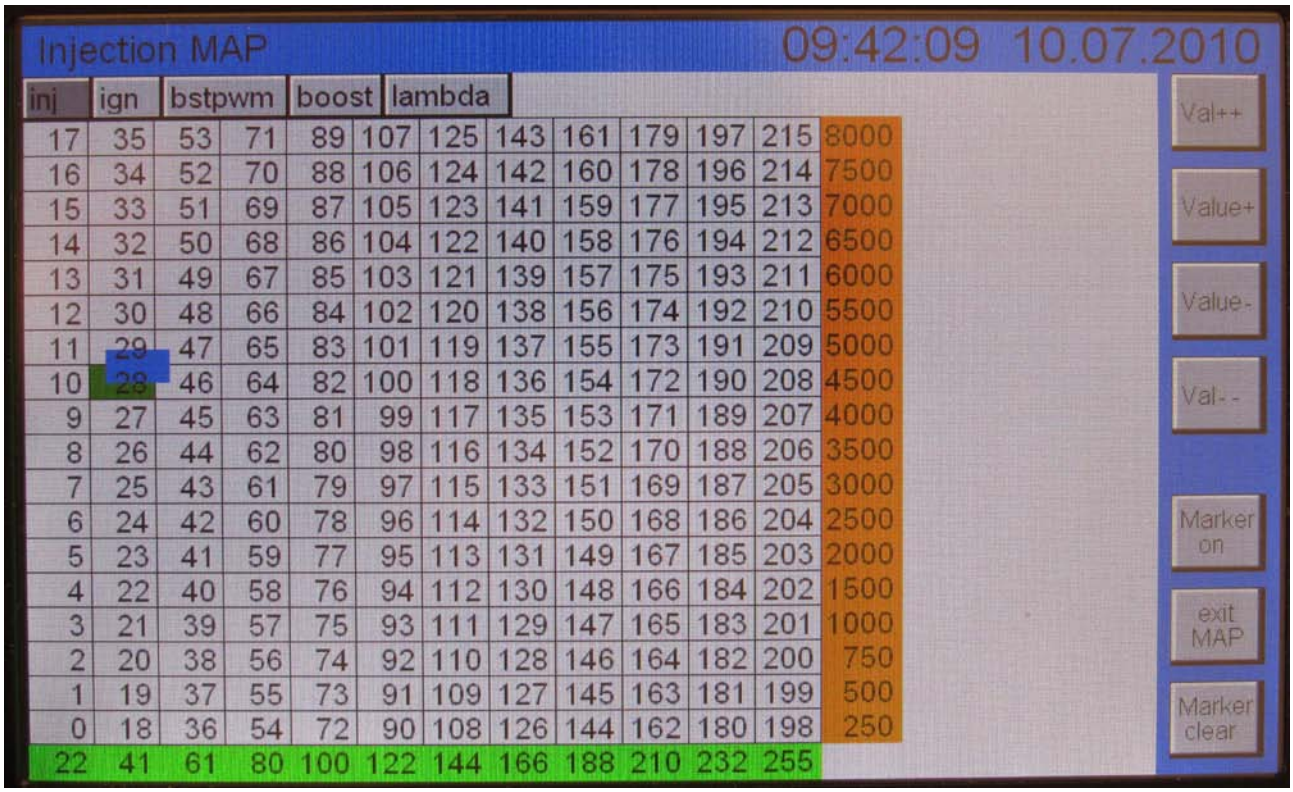
Racegauge:



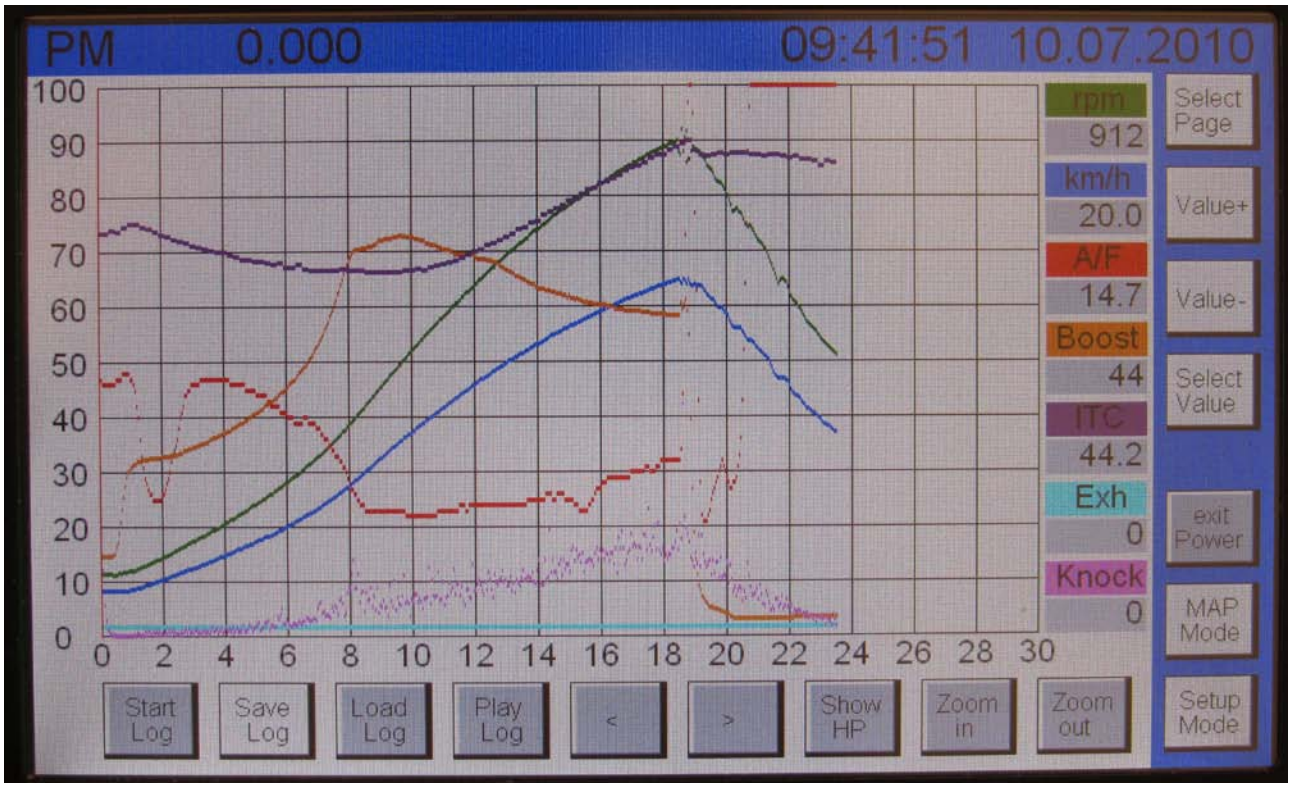
Setup:



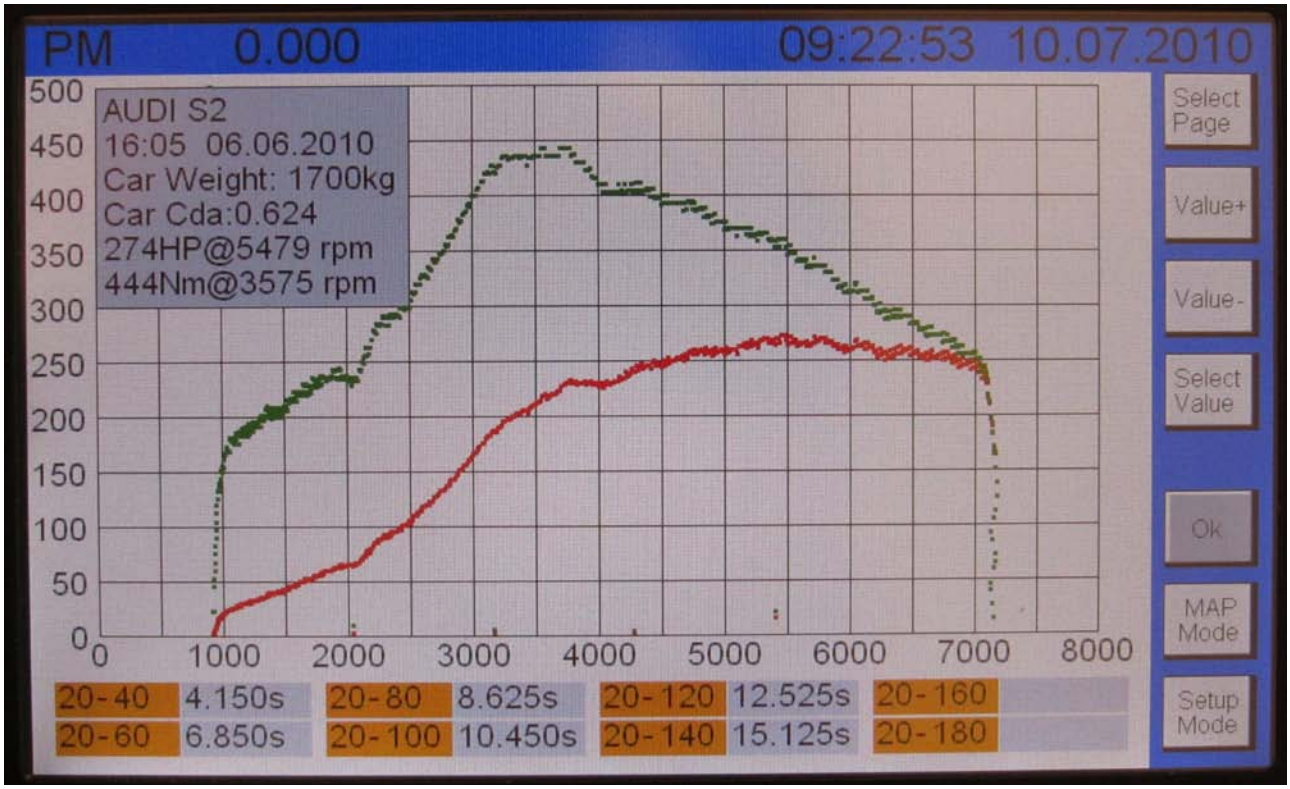
Mapmode:



Powermode:



Power Chart:

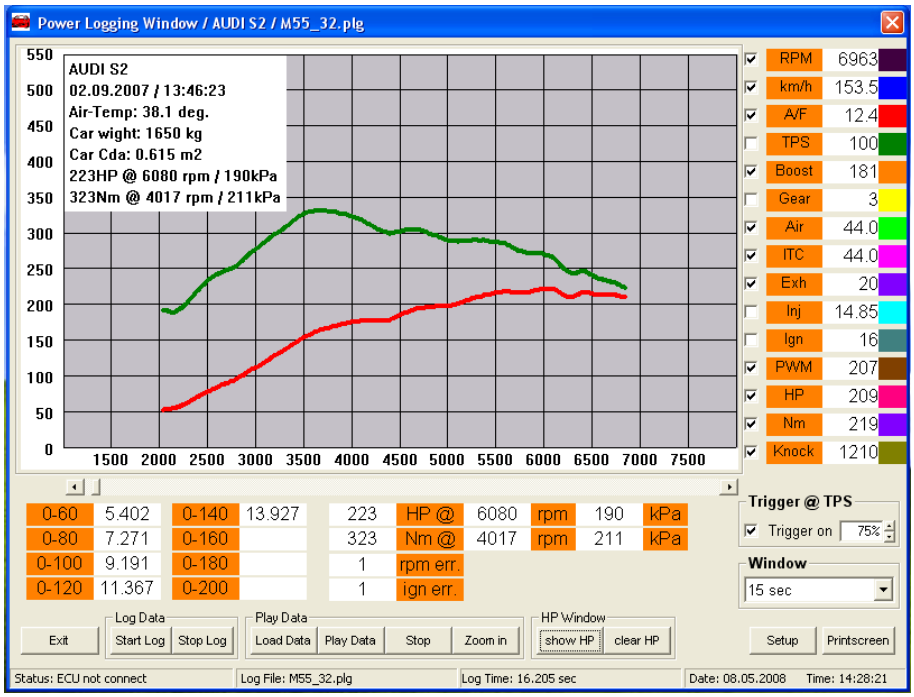


Conversion Table A/F Value – Lambda Value:

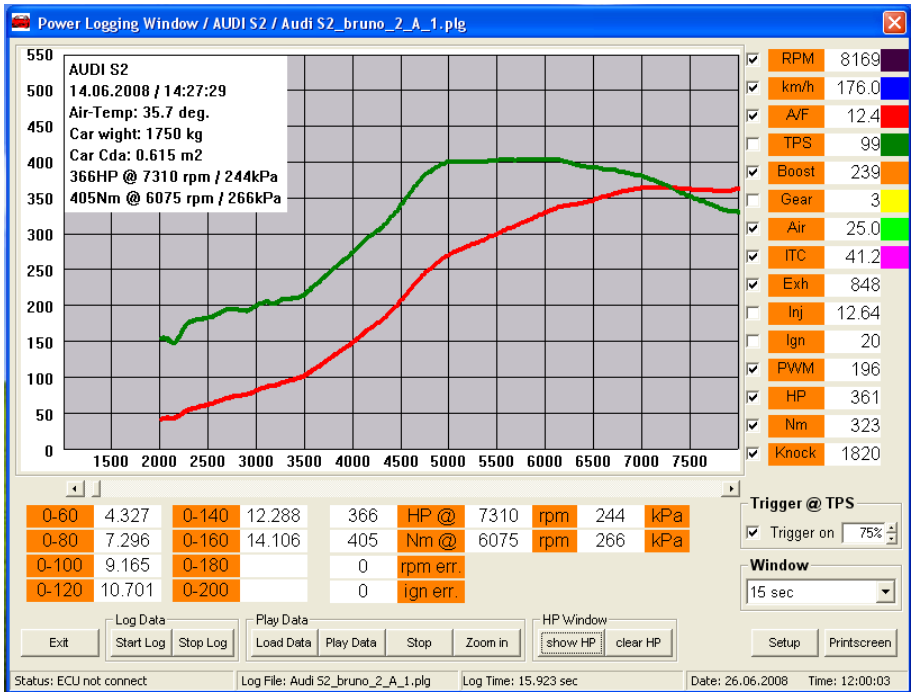
A/F Wert	Lambda value
10.0	0.68
10.5	0.71
11.0	0.75
11.5	0.78
12.0	0.81
12.5	0.85
13.0	0.88
13.5	0.91
14.0	0.95
14.7	1.0
15.0	1.02
15.5	1.05
16.0	1.09
16.5	1.12
17.0	1.15
17.5	1.19
18.0	1.22
18.5	1.25
19.0	1.29
19.5	1.32
20.0	1.36

Performance comparison:

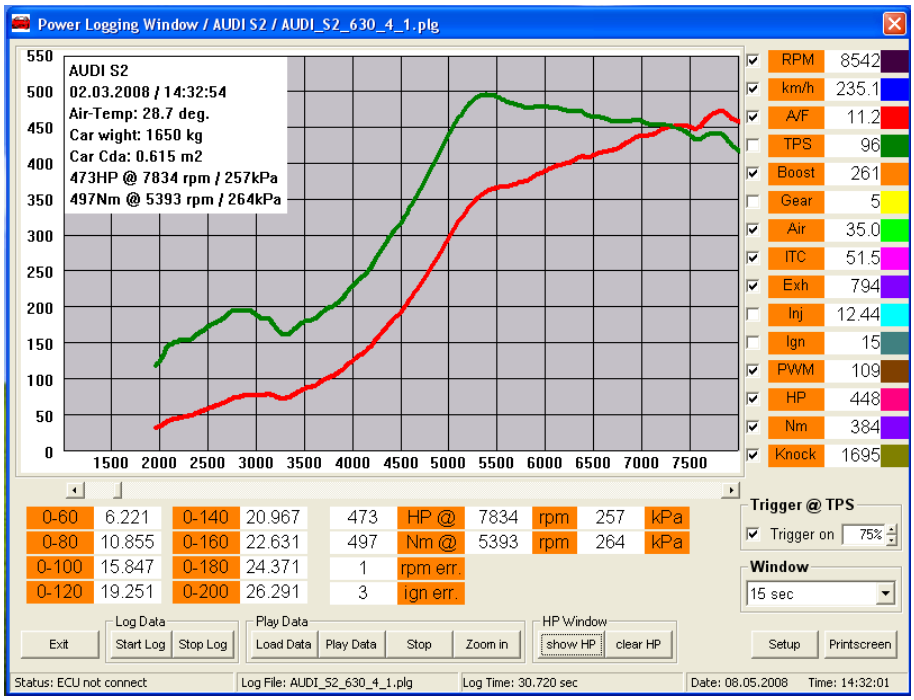
Audi S2 Avant 2.2L stock Engine: ca. 265PS / 380Nm measured in 3.Gear



Audi RS2 Avant 2.2L, Turbo mod.: ca. 430PS / 475Nm measured in 3.Gear



Audi S2 2.2L Coupe, heavy modified Engine: ca. 560PS / 580Nm measured in 5.Gear



Audi S2 2.5L Coupe, heavy modified Engine: ca. 505PS / 645Nm measured in 4.Gear