

EDC-15



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Introduction:

The EDC15 is a much used ECU in "semi-modern" diesel cars like golf 4 TDI from 2000 on. It is used in much more cars, but in the example's i give i used a 150hp golf 4 TDI. Winols is used to change the maps. Some EDC15 ecu's do have more software banks, in my case there were 2 banks of software. There is only one of the two active at a moment but i decided to change both banks. Some ecu's have even 3 or 4 banks. So just to be sure, change all banks exact the same (Winols will do this automatically).

Map explanations:

The different maps of the EDC-15 can be grouped in 2 groups. The fuel related maps and the turbo related maps. As the name says the fuel related maps control the quantity of injected fuel, and the turbo maps control the turbo pressure. All examples in this document are taken from an original VW Golf IV TDI PD 150hp.

Fuel related maps:

- Drivers Wish
- Torque limiter
- Smoke limiter
- Duration map
- (EGR map) not really a fuel map, but have to put it somewhere.

Turbo related maps:

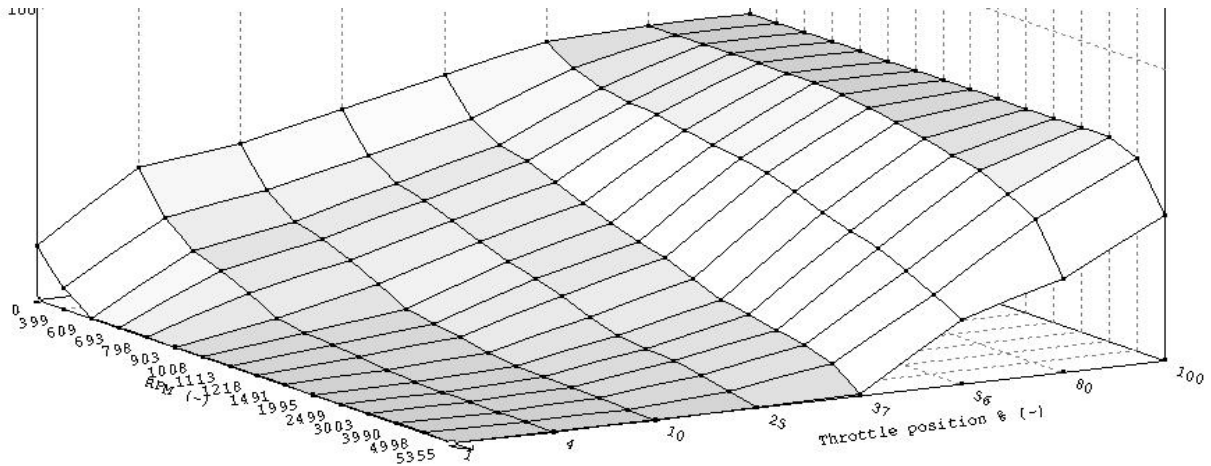
- Turbo map
- N75 map
- Boost limiter map
- Single value boost limiter

Fuel related maps

1. Drivers wish Map:

General:

This map shows the required injected quantity diesel into the engine depending on the RPM and the Throttle position. The output of this map is injected quantity (IQ) in mg diesel/stroke.



Picture 1.1: 3D view of the drivers wish map.

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

The 'Properties of...' dialog box for the 'Drivers wish' map. It contains the following fields and options:

- Map properties:** X-Axis, Y-Axis, 3d (selected)
- Description:** Injected quantity
- Unit:** -
- Id:** -
- Name:** Drivers wish
- Start address:** 4D20E
- Column x rows:** 8 x 16
- Values:** 16 Bit (LoHi)
- Number format:** Decimal (Base 10 System)
- ☐ Reciprocal
- ☐ Difference
- ☐ Sign
- ☐ Percent
- ☐ Original values
- ☐ No factor / offset
- Organization:** Twodimensional
- Factor & Offset:** 0.010000, 0.000000, Bar, °C, 1
- Precision:** 0.000000
- Buttons:** OK, Cancel, Help

Picture 1.2: The factor and offset from the map drivers wish

Properties of...

Map properties | **X-Axis** | Y-Axis | 3d

Description: Throttle position %

Unit: -

Data source: Eprom

Start address: 4D1FE From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: COBA

Factor & Offset: 0.010000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 1.3: The properties of the X axis of the map drivers wish

Properties of...

Map properties | **X-Axis** | **Y-Axis** | 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 4D1DA From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

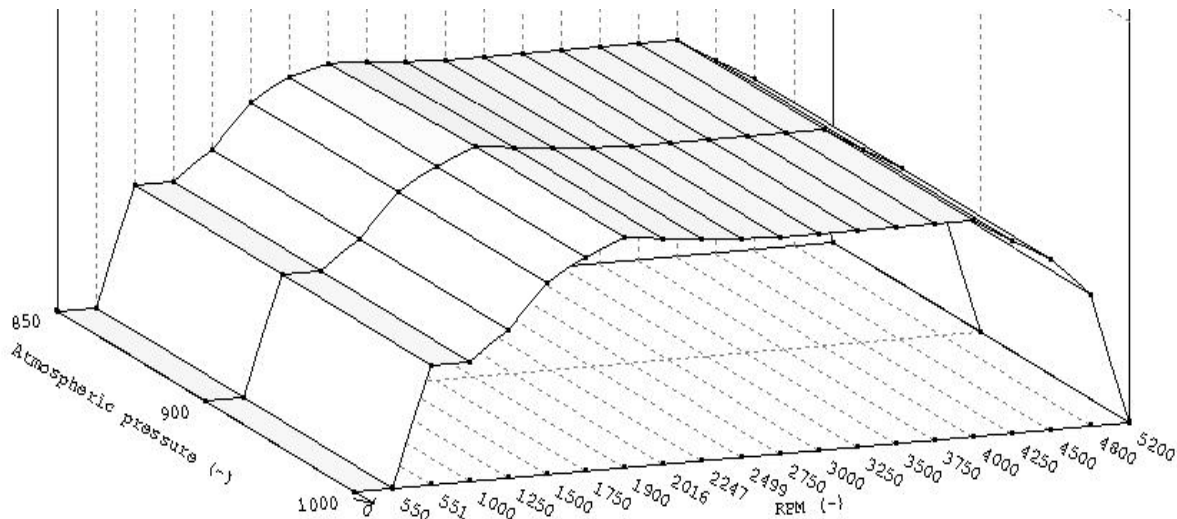
OK Cancel Help

Picture 1.4: The properties of the Y axis of the map drivers wish

2. Torque limiter:

General:

This map limits the torque of the engine based on RPM and atmospheric pressure. The output of this map is also mg diesel / stroke.



Picture 2.1: 3D view of the Torque limiter

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

The screenshot shows a 'Properties of...' dialog box with the following fields and options:

- Map properties: X-Axis, Y-Axis, 3d (selected)
- Description: [Empty text box]
- Unit: [Empty text box] Id: [Empty text box]
- Name: Torque limiter
- Start address: 4D8D4
- Column x rows: 21 x 3
- Values: 16 Bit (LoHi)
- Number format: Decimal (Base 10 System)
- ☐ Reciprocal ☐ Difference
- ☐ Sign ☐ Percent
- ☐ Original values ☐ No factor / offset
- Organization: Twodimensional
- Factor & Offset: 0.010000 0.000000 Bar °C 1
- Precision: 0.000000 % f(x) [Dropdown arrow]
- Buttons: OK, Cancel, Help

Picture 2.2: The factor and offset from the Torque limiter

Properties of...

Map properties | **X-Axis** | Y-Axis | 3d

Description: RPM

Unit: .

Data source: Eprom

Start address: 4D8AA From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 2.3: The properties of the X axis of the Torque limiter

Properties of...

Map properties | X-Axis | **Y-Axis** | 3d

Description: Atmospheric pressure

Unit: .

Data source: Eprom

Start address: 4D8A0 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: C030

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

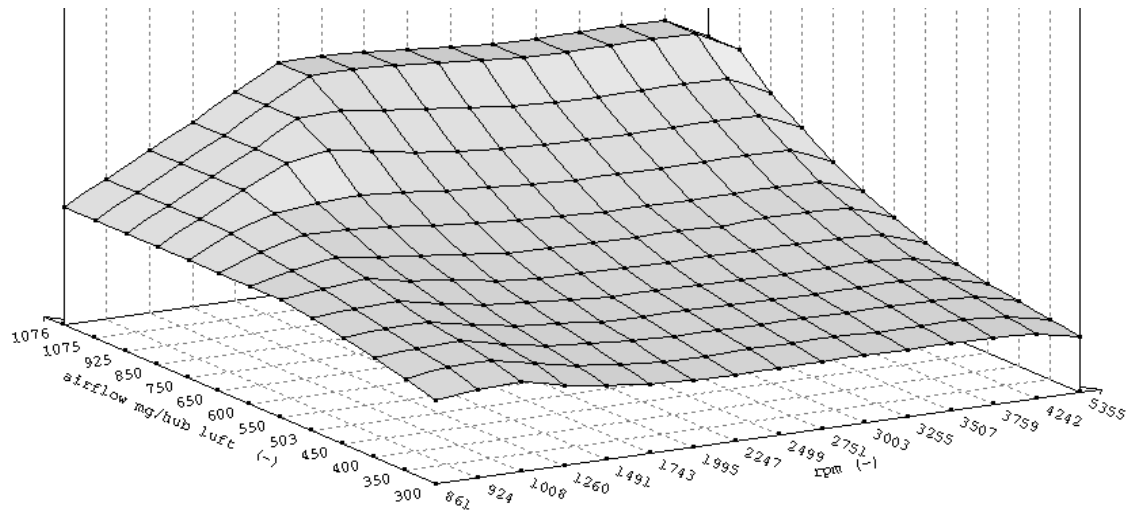
OK Cancel Help

Picture 2.4: The properties of the Y axis of the Torque limiter

3. Smoke limiter:

General:

This map limits the injected quantity based on RPM and inlet air. So if the drivers wish is 50mg, and there is only enough air to burn 45mg diesel, it won't inject 50mg but limit injection at 45mg/stroke.



Picture 3.1: 3D view of the Smoke limiter

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

The 'Properties of...' dialog box displays the configuration for the 'Smoke map'. The 'Map properties' tab is active, showing the following settings:

- Description: injected quantity in mg
- Unit: -
- Id: -
- Name: Smoke map
- Start address: 4DBF6
- Column x rows: 13 x 16
- Values: 16 Bit (LoHi)
- Number format: Decimal (Base 10 System)
- Reciprocal: ☐ Difference: ☐
- Sign: ☐ Percent: ☐
- Original values: ☐ No factor / offset: ☐
- Organization: Twodimensional
- Factor & Offset: 0.010000 0.000000 Bar °C 1
- Precision: 0.000000 % f(x) ▼

Buttons at the bottom: OK, Cancel, Help.

Picture 3.2: The factor and offset from the Smoke limiter

Properties of...

Map properties: X-Axis Y-Axis 3d

Description: airflow mg/hub luft

Unit: .

Data source: Eprom

Start address: 4DBCC From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☒ Sign

Signature byte:

Factor & Offset: 0.100000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 3.3: The properties of the X axis of the Smoke limiter

Properties of...

Map properties: X-Axis Y-Axis 3d

Description: rpm

Unit: .

Data source: Eprom

Start address: 4DBA8 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte:

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

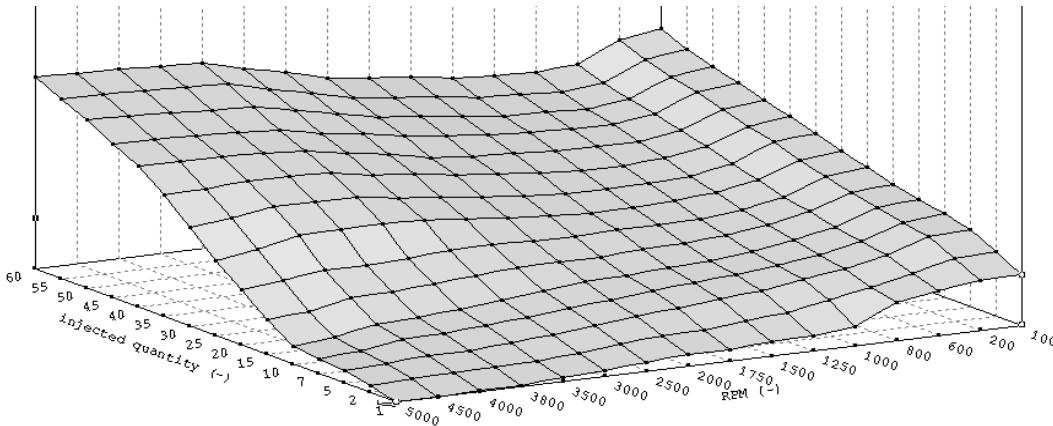
OK Cancel Help

Picture 3.4: The properties of the Y axis of the Smoke limiter

4. Duration map:

General:

This map shows how much degrees engine rotation it takes to achieve the amount of fuel injected. So this is a "calibration" map. Often there is more than one duration map, in case of the 150hp tdi even 4. There are 4 maps for different coolant temperatures etc.



Picture 4.1: 3D view of the Duration map

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

A screenshot of a software dialog box titled 'Properties of...'. It contains various configuration options for a map. The 'Map properties' tab is selected. The 'Description' field is 'duration degrees'. The 'Unit' is '-'. The 'Id' field is empty. The 'Name' is 'Duration limiter 1'. The 'Start address' is '54656'. The 'Column x rows' is '16 x 15'. The 'Values' dropdown is set to '16 Bit (LoHi)'. The 'Number format' dropdown is set to 'Decimal (Base 10 System)'. There are checkboxes for 'Reciprocal', 'Difference', 'Sign' (checked), 'Percent', 'Original values', and 'No factor / offset'. The 'Organization' dropdown is set to 'Twodimensional'. At the bottom, there are fields for 'Factor & Offset' (0.023437 and 0.000000) and 'Precision' (0.000000). There are also buttons for 'OK', 'Cancel', and 'Help'.

Picture 4.2: The factor and offset from the Duration map

Properties of...

Map properties X-Axis Y-Axis 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 54636 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 4.3: The properties of the X axis of the Duration map

Properties of...

Map properties X-Axis Y-Axis 3d

Description: injected quantity

Unit: -

Data source: Eprom

Start address: 54614 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: C5A4

Factor & Offset: 0.010000 0.000000 Bar °C 1

Precision: 0

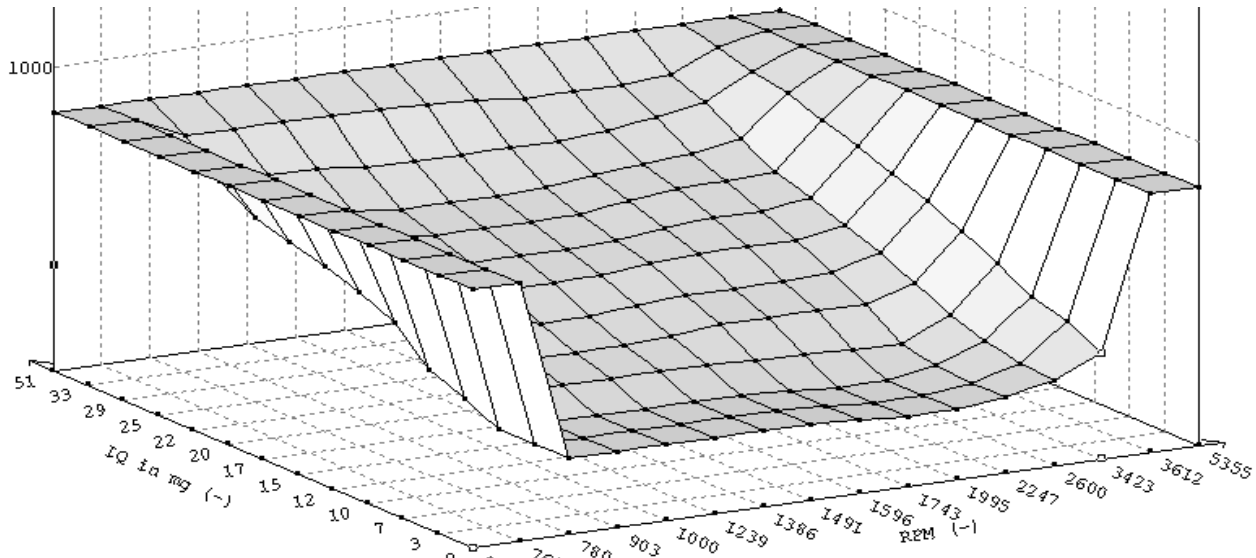
OK Cancel Help

Picture 4.4: The properties of the Y axis of the Duration map

5. EGR map:

General:

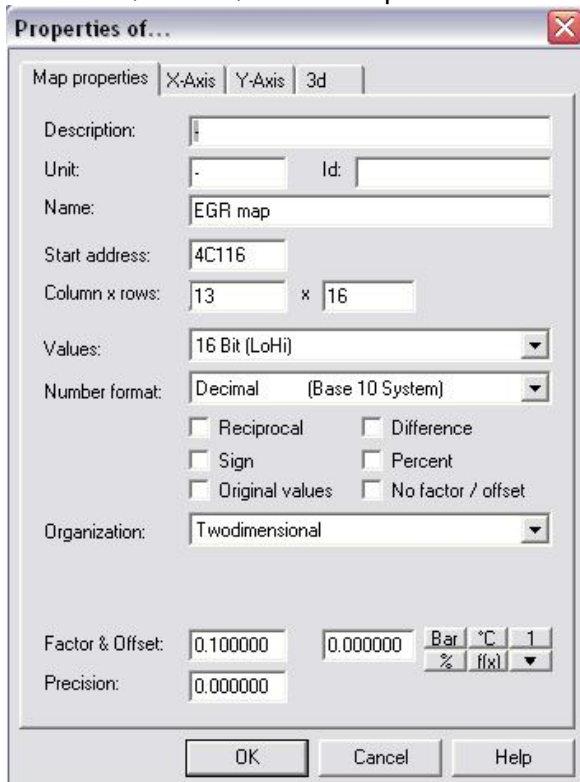
This map regulates the Exhaust gas recirculation valve.



Picture 5.1: 3D view of the EGR map

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.



Properties of...

Map properties | X-Axis | Y-Axis | 3d

Description:

Unit: Id:

Name:

Start address:

Column x rows: x

Values:

Number format:

☐ Reciprocal ☐ Difference

☐ Sign ☐ Percent

☐ Original values ☐ No factor / offset

Organization:

Factor & Offset:

Precision:

Picture 5.2: The factor and offset from the EGR map

Properties of...

Map properties | **X-Axis** | Y-Axis | 3d

Description: IQ in mg

Unit: -

Data source: Eprom

Start address: 4C0FC From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: C042

Factor & Offset: 0.010000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 5.3: The properties of the X axis of the EGR map

Properties of...

Map properties | X-Axis | **Y-Axis** | 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 4C0D8 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 5.4: The properties of the Y axis of the EGR map

6. Tuning the fuel maps:

Torque limiter:

If we want to tune a stock PD engine it is enough to change the torque limiter, smoke limiter, duration map and the EGR map (and the turbo maps but that comes later on). The drivers wish can stay the same for stock car tuning. The torque limiter can be increased from 1250rpm to 4800rpm by $\pm 25\%$. The highest value should be around 2250-2750rpm.

To give an example look at the picture below. It is an original text view of the torque limiter.

-	-	-(RPM,Atmospheric pressure)/-																			
		0	551	1000	1250	1500	1750	1900	2016	2247	2499	2750	3000	3250	3500	3750	4000	4250	4500	4800	5200
850		0	0	30	30	37	48	54	56	56	55	54	54	54	54	54	49	43	33	0	
900		0	0	30	30	37	48	54	58	57	56	55	54	54	54	54	54	49	43	33	0
1000		0	0	30	30	37	48	54	58	57	56	55	54	54	54	54	54	49	43	33	0

Picture 6.1: The original torque limiter

The modified torque limiter can look something like the picture below.

-	-	-(RPM, Atmospheric pressure) / -																				
		0	551	1000	1250	1500	1750	1900	2016	2247	2499	2750	3000	3250	3500	3750	4000	4250	4500	4800	5200	
850		0	0	30	30	41	53	64	67	68	69	70	70	69	68	68	68	67	67	56	39	0
900		0	0	30	30	41	53	64	67	70	70	70	70	69	68	68	68	67	67	56	39	0
1000		0	0	30	30	41	53	64	67	70	70	70	70	69	68	68	68	67	67	56	39	0

Picture 6.2: The modified torque limiter

Smoke limiter:

As you can see the values (mg/stroke) are increased. At this point the smoke limiter will still limit the IQ. So we need to change the smoke limiter as well. We only want to change the smoke limiter at high IQ's. Original the text view of the smoke map looked like the picture 6.3.

-	injected quantity in mg (airflow mg/hub luft ,rpm) / -												
	300	350	400	450	503	550	600	650	750	850	925	1075	1076
861	22	24	26	27	29	31	31	31	31	31	31	31	31
924	23	25	27	29	30	32	33	35	36	36	36	36	36
1008	23	25	27	29	31	33	35	37	39	42	42	42	42
1260	21	23	25	26	28	31	34	37	41	48	48	48	48
1491	19	21	23	24	26	29	32	36	41	49	54	54	54
1743	18	20	22	23	25	28	31	35	40	47	54	60	60
1995	18	19	21	22	25	27	30	34	39	46	53	60	60
2247	17	19	20	22	24	26	30	33	38	44	52	60	60
2499	17	19	20	22	24	26	29	33	37	43	50	58	58
2751	18	19	20	22	24	26	29	32	37	43	49	58	58
3003	18	19	20	22	23	26	29	32	37	43	49	57	57
3255	18	19	20	22	23	26	29	32	37	43	49	57	57
3507	18	19	20	22	23	26	29	32	37	43	49	57	57
3759	17	19	20	22	23	26	29	32	37	43	49	57	57
4242	17	18	19	21	23	26	29	32	37	43	49	57	57
5355	15	16	17	18	20	22	25	28	32	38	43	51	51

Picture 6.3: The original smoke limiter

At full throttle only the higher airflow parts will be used. You can see that even if we change the torque limiter to 70mg/stroke at 2500rpm the smoke limiter will limit this value back to 58mg/stroke.

That's the reason why we need to change the smoke limiter. To change the smoke limiter not too much (we don't want to smoke a lot). The air fuel ratio at which not too much smoke appears is 1:17. So if we pick the value 1076 (highest value on smoke map scale) and divide that by 17 we get: $1076/17 = 63\text{mg}$. So the max value in the most right column may be 63 mg/stroke. We made the torque limiter 70mg/stroke so we want to change the smoke map also to 70mg/stroke. But how do we do that without having lots of smoke behind the car? The answer to that is: Change the axis descriptor to a value where 70mg/stroke is 1:17. So we do $70 \times 17 = 1190$. We make this 1200 to make it easy. You can see that the most right column looks almost the same as the torque limiter.

Then the smoke limiter looks like the picture below.

injected quantity in mg(airflow mg/hub luft ,rpm)/-													
-	300	400	503	600	750	925	1200						
-	350	450	550	650	850	1035							
861	22	24	26	27	29	31	31	31	31	31	31	31	31
924	23	25	27	29	30	32	33	35	36	36	36	36	36
1008	23	25	27	29	31	33	35	37	39	42	42	42	42
1260	21	23	25	26	28	31	34	37	41	48	48	48	48
1491	19	21	23	24	26	29	32	36	41	49	54	55	55
1743	18	20	22	23	25	28	31	35	40	47	54	60	64
1995	18	19	21	22	25	27	30	34	39	46	53	60	67
2247	17	19	20	22	24	26	30	33	38	44	52	60	70
2499	17	19	20	22	24	26	29	33	37	43	50	60	70
2751	18	19	20	22	24	26	29	32	37	43	49	60	70
3003	18	19	20	22	23	26	29	32	37	43	49	60	70
3255	18	19	20	22	23	26	29	32	37	43	49	60	69
3507	18	19	20	22	23	26	29	32	37	43	49	60	69
3759	17	19	20	22	23	26	29	32	37	43	49	60	68
4242	17	18	19	21	23	26	29	32	37	43	49	60	68
5355	15	16	17	18	20	22	25	28	32	38	43	51	51

Picture 6.4: The modified smoke limiter

So the smoke map is changed. As you can see also the 1075 has been changed into 1035. This is done to give better precision at high airflows. This example also shows that the axis descriptors may be changed.

Duration map:

The duration maps do need to be changed also. Otherwise the duration map will limit the injected quantity at the highest possible axis. So we need to change the axis value from 60mg/stroke to 70mg/stroke in this case. And also we need to set the pump voltage higher by the same factor we changed the axis descriptor.

EGR map:

To prevent clogged intake and avoid unnecessary smoke the EGR map have to be disabled. The original EGR map looks like picture 6.5.

-	-(IQ in mg,RPM)/-												
	0	3	7	10	12	15	17	20	22	25	29	33	51
0	850	850	850	850	850	850	850	850	850	850	850	850	850
760	850	850	850	850	850	850	850	850	850	850	850	850	850
780	250	250	250	300	350	459	505	544	576	609	675	775	850
903	250	250	250	300	340	445	485	530	560	595	675	775	850
1000	250	250	250	300	340	430	470	515	550	580	670	775	850
1239	250	250	250	300	340	385	445	485	530	565	655	775	850
1386	250	250	250	300	340	385	445	485	530	565	650	770	850
1491	250	250	250	300	350	400	450	485	530	565	650	765	850
1596	240	240	240	290	365	410	465	490	530	570	650	755	850
1743	230	230	230	290	365	410	475	510	555	590	650	740	850
1995	230	230	230	280	365	410	475	520	570	600	660	740	850
2247	250	250	260	280	365	420	475	520	575	615	685	740	850
2600	280	292	315	350	410	460	502	540	580	640	710	750	850
3423	350	410	440	500	560	610	650	690	730	770	790	820	850
3612	850	850	850	850	850	850	850	850	850	850	850	850	850
5355	850	850	850	850	850	850	850	850	850	850	850	850	850

Picture 6.5: The original EGR map

How to disable the EGR map? Pick the highest value from the map, and make the whole map the highest value. In This case it is 850, so we change all values to 850 as showed in picture 6.6.

-	-(IQ in mg,RPM)/-												
	0	3	7	10	12	15	17	20	22	25	29	33	51
0	850	850	850	850	850	850	850	850	850	850	850	850	850
760	850	850	850	850	850	850	850	850	850	850	850	850	850
780	850	850	850	850	850	850	850	850	850	850	850	850	850
903	850	850	850	850	850	850	850	850	850	850	850	850	850
1000	850	850	850	850	850	850	850	850	850	850	850	850	850
1239	850	850	850	850	850	850	850	850	850	850	850	850	850
1386	850	850	850	850	850	850	850	850	850	850	850	850	850
1491	850	850	850	850	850	850	850	850	850	850	850	850	850
1596	850	850	850	850	850	850	850	850	850	850	850	850	850
1743	850	850	850	850	850	850	850	850	850	850	850	850	850
1995	850	850	850	850	850	850	850	850	850	850	850	850	850
2247	850	850	850	850	850	850	850	850	850	850	850	850	850
2600	850	850	850	850	850	850	850	850	850	850	850	850	850
3423	850	850	850	850	850	850	850	850	850	850	850	850	850
3612	850	850	850	850	850	850	850	850	850	850	850	850	850
5355	850	850	850	850	850	850	850	850	850	850	850	850	850

Picture 6.6: The modified EGR map

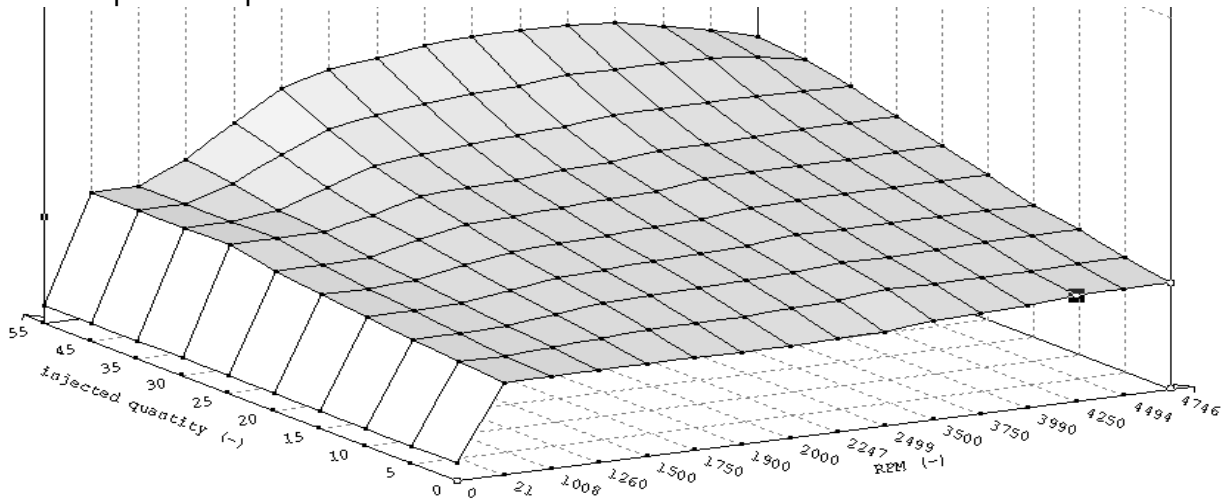
At this point all fuel related maps have been "tuned". We will continue with tuning the turbo related maps after explaining the basics of those maps.

Turbo related maps

7. Turbo map:

General:

This map shows the desired turbo pressure at a certain rpm and injected quantity. The output of this map is turbo pressure in mbar.



Picture 7.1: 3D view of the turbo map

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

The 'Properties of...' dialog box for the turbo map. It contains the following fields and options:

- Map properties: X-Axis, Y-Axis, 3d
- Description: boost atm millibar
- Unit: - Id:
- Name: turbo map
- Start address: 56926
- Column x rows: 10 x 16
- Values: 16 Bit (LoHi)
- Number format: Decimal (Base 10 System)
- ☐ Reciprocal ☐ Difference
- ☐ Sign ☐ Percent
- ☐ Original values ☐ No factor / offset
- Organization: Twodimensional
- Factor & Offset: 1.000000 0.000000 Bar °C 1
- Precision: 0.000000 % f(x) ▼
- Buttons: OK, Cancel, Help

Picture 7.2: The factor and offset from the turbo map

Properties of...

Map properties | X-Axis | Y-Axis | 3d

Description: injected quantity

Unit: -

Data source: Eprom

Start address: 56912 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: C036

Factor & Offset: 0.010000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 7.3: The properties of the X axis of the turbo map

Properties of...

Map properties | X-Axis | Y-Axis | 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 568EE From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

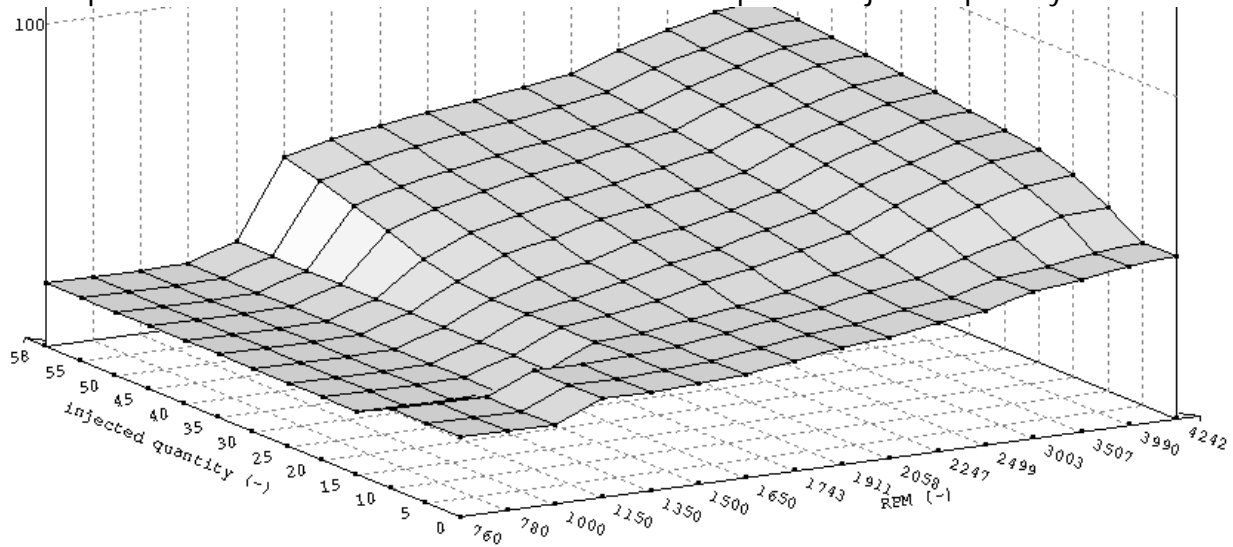
OK Cancel Help

Picture 7.4: The properties of the Y axis of the turbo map

8. N75 map:

General:

This map controls the vanes inside the turbo at a certain rpm and injected quantity.



Picture 8.1: 3D view of the N75 map

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

The 'Properties of...' dialog box for the N75 map. It contains the following fields and options:

- Map properties: X-Axis, Y-Axis, 3d (selected)
- Description: [Empty text box]
- Unit: [Empty text box] Id: [Empty text box]
- Name: n75 Map
- Start address: 56C32
- Column x rows: 13 x 16
- Values: 16 Bit (LoHi)
- Number format: Decimal (Base 10 System)
- ☐ Reciprocal ☐ Difference
- ☐ Sign ☐ Percent
- ☐ Original values ☐ No factor / offset
- Organization: Twodimensional
- Factor & Offset: -0.010000 100.00000 Bar °C 1
- Precision: 0.000000
- Buttons: OK, Cancel, Help

Picture 8.2: The factor and offset from the N75 map

Properties of...

Map properties | **X-Axis** | Y-Axis | 3d

Description: injected quantity

Unit: -

Data source: Eprom

Start address: 56C18 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EA44

Factor & Offset: 0.010000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 8.3: The properties of the X axis of the N75 map

Properties of...

Map properties | X-Axis | **Y-Axis** | 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 56BF4 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

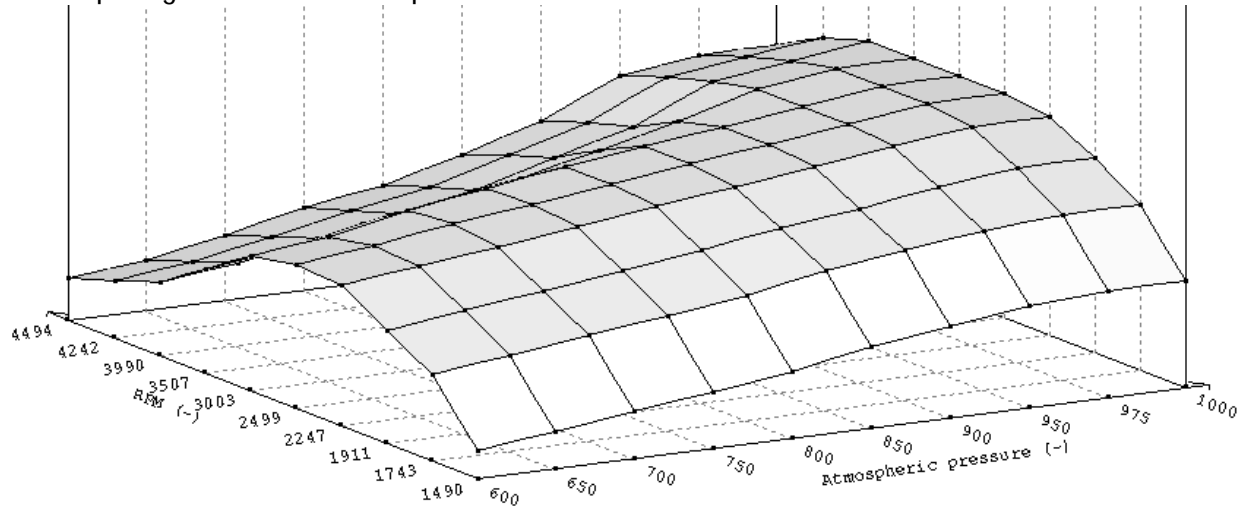
OK Cancel Help

Picture 8.4: The properties of the Y axis of the N75 map

9. Boost limiter map:

General:

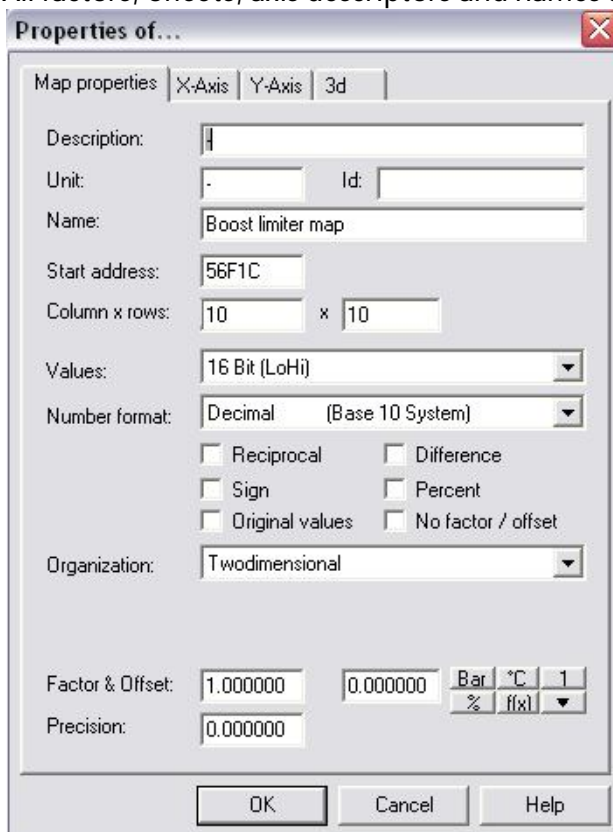
This map limits the turbo pressure at a certain rpm and atmospheric pressure. The output of this map is again in mbar turbo pressure.



Picture 9.1: 3D view of the boost limiter map

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.

A screenshot of the 'Properties of...' dialog box for the boost limiter map. The dialog has tabs for 'Map properties', 'X-Axis', 'Y-Axis', and '3d'. The 'Map properties' tab is selected. It contains fields for Description, Unit, Id, Name, Start address, Column x rows, Values, Number format, Organization, Factor & Offset, and Precision. The Name field is set to 'Boost limiter map'. The Start address is '56F1C'. The Column x rows are '10' x '10'. The Values are '16 Bit (LoHi)'. The Number format is 'Decimal (Base 10 System)'. The Organization is 'Twodimensional'. The Factor & Offset fields are '1.000000' and '0.000000'. The Precision is '0.000000'. There are checkboxes for Reciprocal, Difference, Sign, Percent, Original values, and No factor / offset. The dialog also has OK, Cancel, and Help buttons.

Picture 9.2: The factor and offset from the boost limiter map

Properties of...

Map properties | **X-Axis** | Y-Axis | 3d

Description: RPM

Unit: -

Data source: Eprom

Start address: 56F08 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: EC2E

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 9.3: The properties of the X axis of the boost limiter map

Properties of...

Map properties | X-Axis | **Y-Axis** | 3d

Description: Atmospheric pressure

Unit: -

Data source: Eprom

Start address: 56EF0 From hexdumpcursor

☐ Mirror map

Values: 16 Bit (LoHi)

Number format: Decimal (Base 10 System)

☐ Reciprocal

☐ Sign

Signature byte: C030

Factor & Offset: 1.000000 0.000000 Bar °C 1

Precision: 0

OK Cancel Help

Picture 9.4: The properties of the Y axis of the boost limiter map

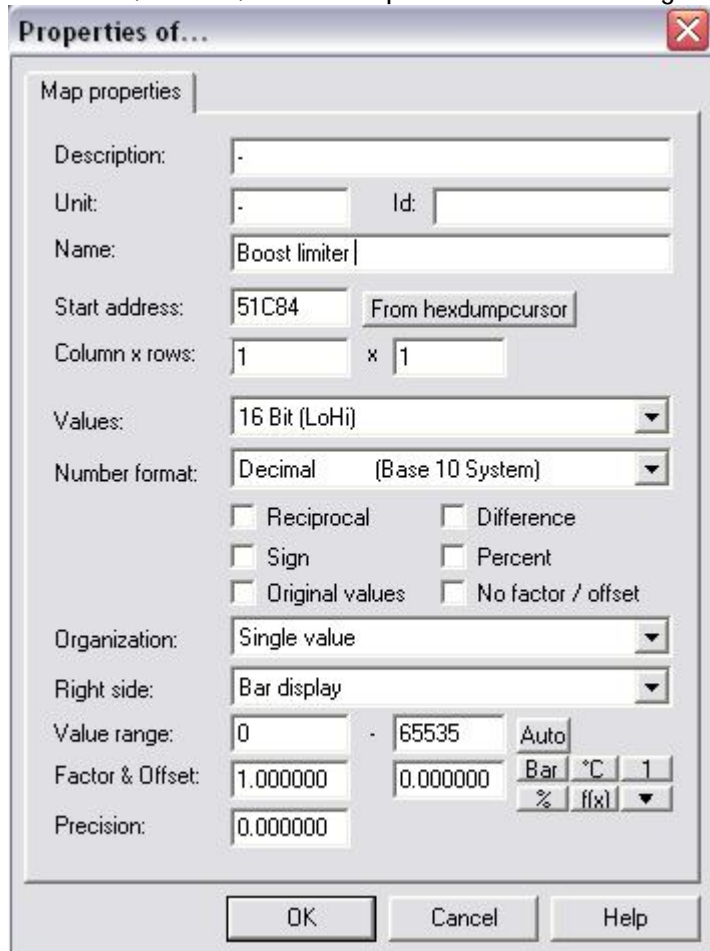
10. Single value boost limiter:

General:

This value limits the absolute pressure. The boost will (normally) never be higher as this value. To find this single value just look for the value 31455(decimal) or 7ADF(hexidecimal). The boost limiter is located in front of this value. The stock value for the 150 hp TDI is 2620mbar.

Factors & offsets:

All factors, offsets, axis descriptors and names are given by the pictures below.



The screenshot shows a 'Properties of...' dialog box with a 'Map properties' tab. The fields are as follows:

- Description: -
- Unit: - Id: -
- Name: Boost limiter
- Start address: 51C84 From hexdumpcursor
- Column x rows: 1 x 1
- Values: 16 Bit (LoHi)
- Number format: Decimal (Base 10 System)
- ☐ Reciprocal ☐ Difference
- ☐ Sign ☐ Percent
- ☐ Original values ☐ No factor / offset
- Organization: Single value
- Right side: Bar display
- Value range: 0 - 65535 Auto
- Factor & Offset: 1.000000 0.000000 Bar °C 1
- Precision: 0.000000 % f(x) ▼

Buttons at the bottom: OK, Cancel, Help.

Picture 10.1: The factor and offset from the single boost limiter value.

11. Tuning the turbo maps:

Turbo map:

If we want to tune a stock PD engine we need to change besides the fuel related maps also the turbo related maps. We will start by modifying the turbo map. The original map looks like picture 11.1.

	boost atm millibar(injected quantity,RPM)/-									
-	0	10	20	30	45					
-	5	15	25	35	55					
0	198	198	198	198	198	198	198	198	198	198
21	1002	1052	1092	1158	1205	1265	1350	1350	1350	1350
1008	1002	1048	1096	1153	1199	1265	1350	1350	1350	1350
1260	1002	1065	1114	1166	1220	1276	1353	1405	1500	1575
1500	1002	1095	1170	1230	1310	1395	1470	1595	1750	1900
1750	1002	1120	1220	1305	1390	1490	1600	1755	1950	2200
1900	1002	1135	1245	1335	1420	1525	1645	1825	2050	2350
2000	1002	1145	1255	1355	1440	1545	1660	1855	2100	2400
2247	1012	1165	1275	1375	1465	1575	1695	1895	2145	2475
2499	1021	1175	1285	1385	1485	1595	1715	1915	2160	2500
3500	1075	1230	1325	1435	1540	1650	1770	1975	2215	2500
3750	1095	1230	1335	1445	1555	1670	1785	1980	2215	2500
3990	1115	1240	1345	1445	1565	1675	1790	1980	2215	2455
4250	1150	1240	1355	1445	1565	1675	1800	1980	2200	2355
4494	1154	1250	1353	1445	1565	1680	1800	1970	2150	2240
4746	1150	1250	1350	1429	1555	1680	1805	1950	2050	2100

Picture 11.1: The original turbo map.

As you can see the boost goes up to max 2500mbar. The turbo on this car, a GT1749VB, can handle a max boost of around 2650-2700mbar. So the max value in this map may be 2650mbar. Since we are only tuning for max power only the most right column has to be changed. This turbo pressure is only for the 150hp version TDI. The lower hp versions have also lower turbo pressure! you can say that the turbo pressure may be increased by around 7% max. As you can see the axis value only goes up to 55mg/stroke, while we are injecting 70mg/stroke (set in the torque limiter and smoke map). To compensate that we changed the axis values from 45 to 55 and the 55 value to 60mg/stroke. This way the turbo pressure at high IQ's is easier to regulate.

-	boost atm millibar(injected quantity,RPM)/-									
	0	10	20	30	55	60				
-	5	15	25	35	55	60				
0	198	198	198	198	198	198	198	198	198	198
21	1002	1052	1092	1158	1205	1265	1350	1350	1350	1350
1008	1002	1048	1096	1153	1199	1265	1350	1350	1350	1350
1260	1002	1065	1114	1166	1220	1276	1353	1405	1500	1575
1500	1002	1095	1170	1230	1310	1395	1470	1595	1900	2050
1750	1002	1120	1220	1305	1390	1490	1600	1755	2100	2350
1900	1002	1135	1245	1335	1420	1525	1645	1825	2200	2500
2000	1002	1145	1255	1355	1440	1545	1660	1855	2250	2550
2247	1012	1165	1275	1375	1465	1575	1695	1895	2295	2625
2499	1021	1175	1285	1385	1485	1595	1715	1915	2310	2650
3500	1075	1230	1325	1435	1540	1650	1770	1975	2365	2650
3750	1095	1230	1335	1445	1555	1670	1785	1980	2365	2650
3990	1115	1240	1345	1445	1565	1675	1790	1980	2365	2605
4250	1150	1240	1355	1445	1565	1675	1800	1980	2350	2505
4494	1154	1250	1353	1445	1565	1680	1800	1970	2300	2390
4746	1150	1250	1350	1429	1555	1680	1805	1950	2200	2200

Picture 11.2: The modified turbo map.

What happens with the value 70mg/stroke which is outside the limits? This will be the same as the max axis value (in this case we made it 60mg/stroke).

N75 map:

The N75 map controls the vanes inside the turbo, and needs to be changed to prevent turbo spiking. In the range 1500rpm up to 5000rpm at high IQ's it needs to be higher. In picture 11.3 you can see the original n75 map.

-	-(injected quantity,RPM)/-												
	0	5	10	15	20	25	30	35	40	45	50	55	58
760	25	25	25	20	20	20	20	20	20	20	20	20	20
780	25	25	25	20	20	20	20	20	20	20	20	20	20
1000	25	25	25	20	20	20	20	20	20	20	20	20	20
1150	31	31	31	20	20	20	20	20	20	20	20	20	20
1350	31	31	31	25	25	25	25	25	25	25	25	25	25
1500	32	32	32	32	32	32	32	33	35	39	43	46	49
1650	33	33	33	33	33	34	36	39	42	44	47	50	52
1743	34	34	34	34	35	37	39	42	45	48	50	52	54
1911	37	37	37	36	39	41	43	46	48	51	53	55	57
2058	38	38	39	39	42	44	46	48	51	53	55	57	59
2247	40	40	41	42	45	47	49	51	54	56	57	59	61
2499	42	42	44	46	49	51	53	54	57	59	60	62	63
3003	45	45	48	52	55	57	59	60	62	64	66	67	68
3507	48	48	52	58	60	62	64	65	67	69	70	71	72
3990	50	50	56	61	64	66	68	69	71	72	74	75	76
4242	51	51	57	63	66	68	70	71	72	74	75	76	77

Picture 11.3: The original N75 map.

The modified N75 map look like picture 11.4. As you can see, again the axis value is changed into 70mg/stroke due to the torque and smoke limiter at 70mg/stroke. As a rule you can increase the values from 1500-5000rpm at high IQ's by 8%. This is depending on the car, and how much boost spikes you have. still got boost spikes? increase the map.

-	-(injected quantity,RPM)/-												
	0	5	10	15	20	25	30	35	40	45	50	55	70
760	25	25	25	20	20	20	20	20	20	20	20	20	20
780	25	25	25	20	20	20	20	20	20	20	20	20	20
1000	25	25	25	20	20	20	20	20	20	20	20	20	20
1150	31	31	31	20	20	20	20	20	20	20	20	20	20
1350	31	31	31	25	25	25	25	25	25	25	25	25	25
1500	32	32	32	32	32	32	32	33	35	39	43	46	51
1650	33	33	33	33	33	34	36	39	42	44	47	50	53
1743	34	34	34	34	35	37	39	42	45	48	50	53	55
1911	37	37	37	36	39	41	43	46	48	51	56	58	63
2058	38	38	39	39	42	44	46	48	51	53	58	60	65
2247	40	40	41	42	45	47	49	51	54	56	60	62	67
2499	42	42	44	46	49	51	53	54	57	59	63	65	69
3003	45	45	48	52	55	57	59	60	62	64	69	70	74
3507	48	48	52	58	60	62	64	65	67	69	73	74	78
3990	50	50	56	61	64	66	68	69	71	72	77	78	82
4242	51	51	57	63	66	68	70	71	72	74	78	79	83

Picture 11.4: The modified N75 map.

Boost limiter map:

At this point we have set the boost up to 2650 mbar in the turbo map, and prevent boostspikes by lowering the N75 map. But the boost limiter map will limit the 2650mbar back to 2500mbar as you can see in picture 11.5.

-	-(RPM,Atmospheric pressure)/-									
	1490	1743	1911	2247	2499	3003	3507	3990	4242	4494
600	1500	1800	1935	2075	2090	2045	1885	1730	1650	1575
650	1550	1850	1990	2125	2140	2100	1940	1780	1700	1620
700	1600	1900	2040	2175	2205	2180	2020	1860	1775	1695
750	1650	1950	2090	2225	2250	2240	2080	1930	1855	1780
800	1700	2000	2140	2275	2300	2300	2150	2000	1925	1840
850	1775	2075	2205	2325	2350	2350	2240	2110	2035	1950
900	1825	2125	2250	2375	2400	2400	2335	2220	2150	2070
950	1880	2175	2305	2425	2450	2450	2450	2400	2330	2250
975	1900	2200	2350	2475	2500	2500	2500	2450	2380	2300
1000	1900	2200	2350	2475	2500	2500	2500	2500	2430	2300

Picture 11.5: The original boost limiter map.

We need to change that values the same way as the turbo map, even a bit higher because this is the limiter. Since we only drive at sea level (1013,25hpa), there is no need to adjust the car at 900hpa and lower(or you live at more than 1000metres above sea level). Modified the boost limiter map looks like picture 11.6.

-	-(RPM,Atmospheric pressure)/-									
	1490	1743	1911	2247	2499	3003	3507	3990	4242	4494
600	1500	1800	1935	2075	2090	2045	1885	1730	1650	1575
650	1550	1850	1990	2125	2140	2100	1940	1780	1700	1620
700	1600	1900	2040	2175	2205	2180	2020	1860	1775	1695
750	1650	1950	2090	2225	2250	2240	2080	1930	1855	1780
800	1700	2000	2140	2275	2300	2300	2150	2000	1925	1840
850	1775	2075	2205	2325	2350	2350	2240	2110	2035	1950
900	1825	2125	2250	2375	2400	2400	2335	2220	2150	2070
950	1955	2250	2380	2500	2525	2525	2525	2475	2405	2325
975	2075	2375	2525	2650	2675	2675	2675	2625	2555	2475
1000	2075	2375	2525	2650	2675	2675	2675	2675	2605	2475

Picture 11.5: The modified boost limiter map.

Single value boost limiter:

At this point we have set almost everything to get a higher boost except the absolute limiter. That's the last one we need to change. This value has to be a bit(read 50mbar) higher than the highest turbo map value. So we set this value from 2620mbar up to 2700mbar.

Conclusion:

All information and values given in this document may be used at own risk. I do not stand in for any problems or blown turbo's. My special thanks go out to Matt and Tomek who helped me with all this information and tuning advice. I hope you enjoy the information.