MSA-15

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For more info: **www.ecuconnections.com**
Revision: 1.0

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Introduction:

The MSA15 is a much used ECU in VP37 diesel cars like golf 3 TDI 110hp from 1996 on. It is used in much more cars, but in the example's i give i used a 110hp Passat 3B TDI. Winols is used to change the maps. Some MSA15 ecu's do have more software banks, in my case there were 4 banks of software. There is only one of the four active at a moment but i decided to change all banks. Some ecu's have one or more banks. So just to be sure, change all banks exact the same (Winols will do this automatically).

Map explanations:

The different maps of the MSA-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 Passat 3B AFN VP37 110hp ECU 028906021GL. with 0.216 nozzles!

Fuel related maps:
-Drivers Wish
-Torque limiter
-Smoke limiter
-N146 Pump Voltage map
-N108 Beginning of Injection map
-(EGR map) not really a fuel map, but have to put it somewhere.

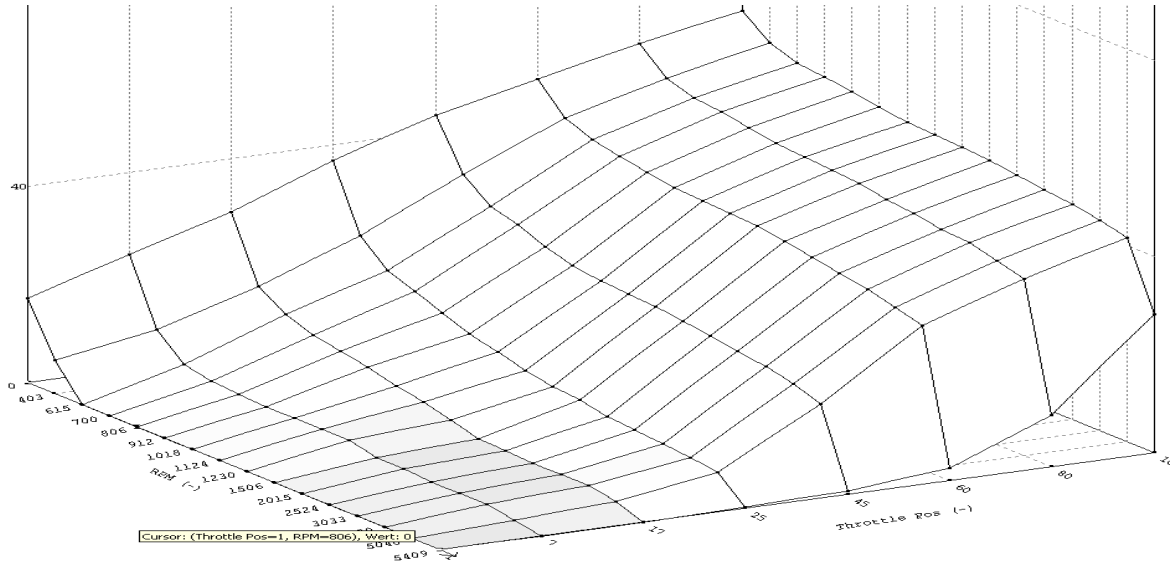
Turbo related maps:
-Turbo map
-N75 map
-Boost limiter map
-Single value boost limiter

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.

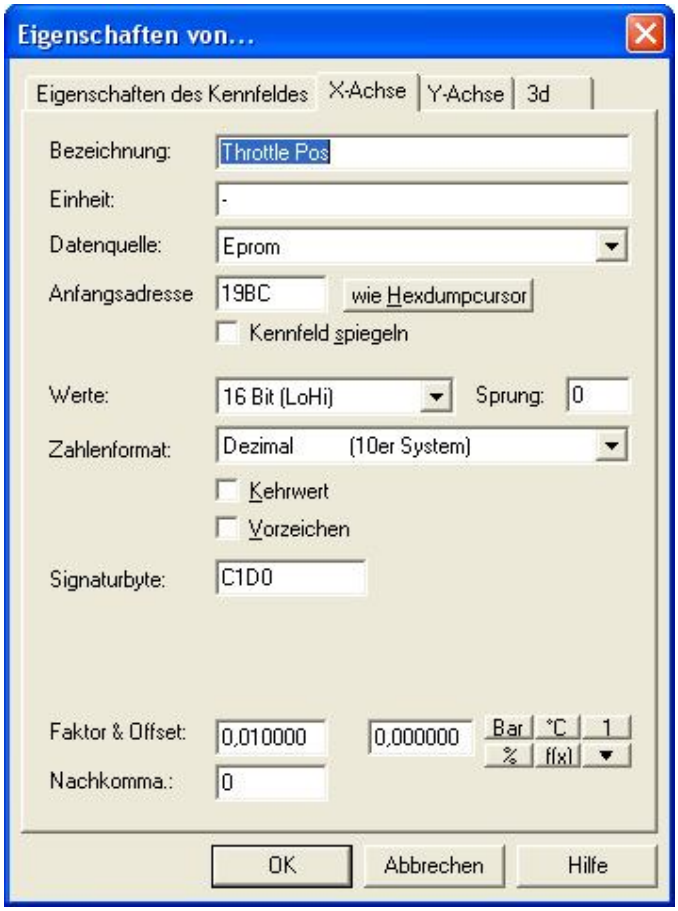


Picture 1.1: 3D view of the drivers wish map.

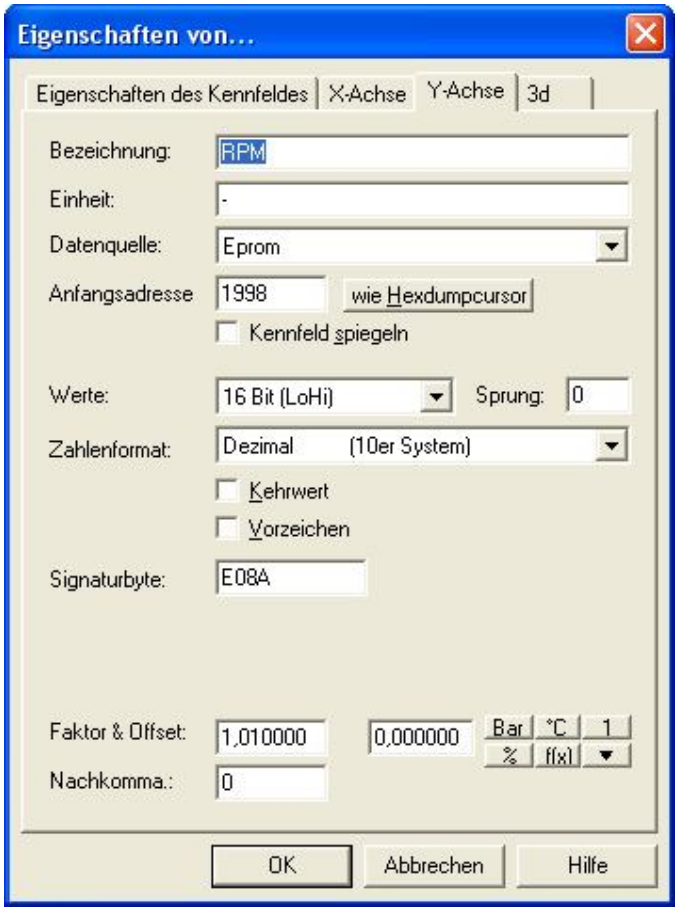
Factors & offsets:

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

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



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

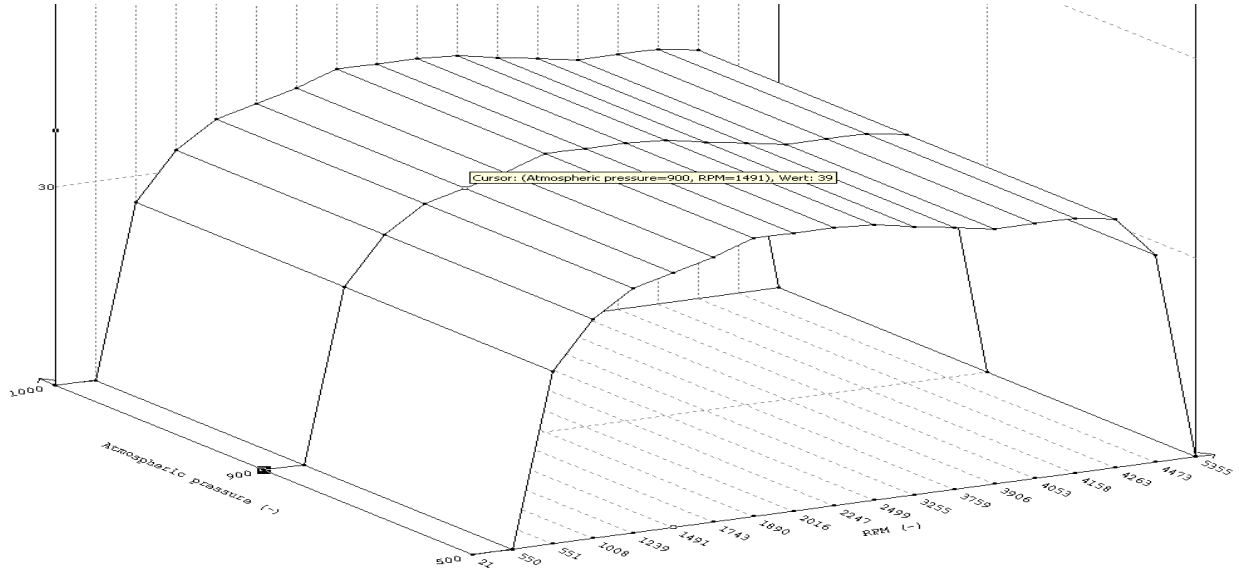


Picture 1.4: The properties of the Y axis of the map drivers wish

2. Torque limiter:

General:

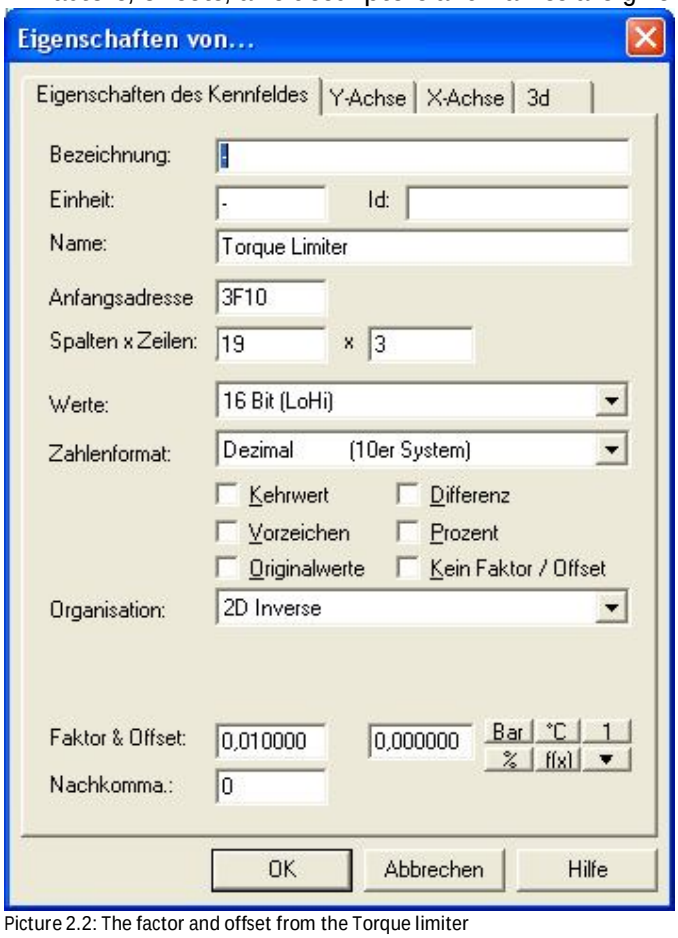
This map limits the torque of the engine based on RPM and atmospheric pressure. The output of this map is also mg diesel / stroke.



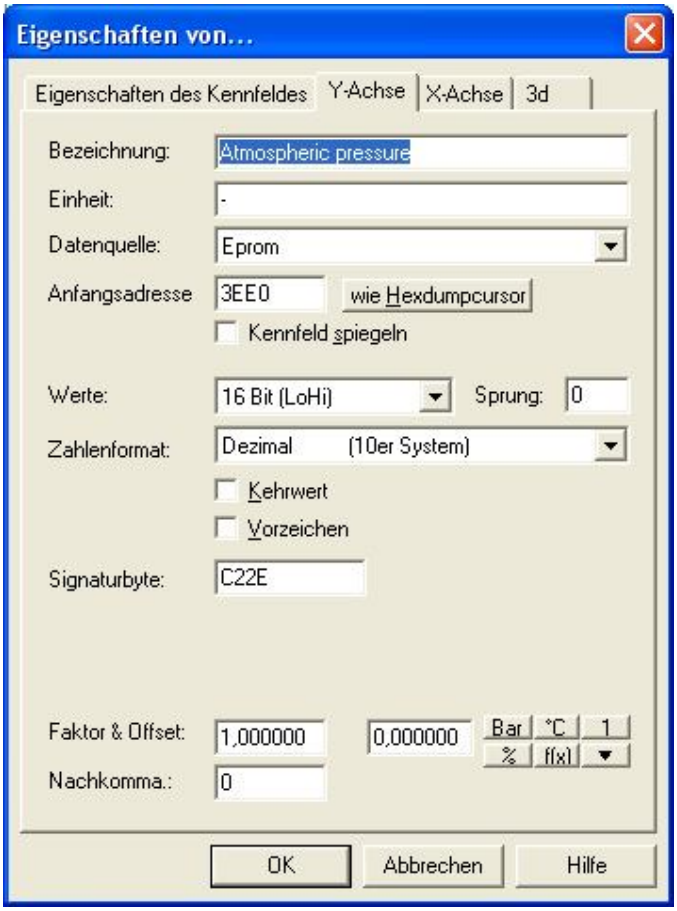
Picture 2.1: 3D view of the Torque limiter

Factors & offsets:

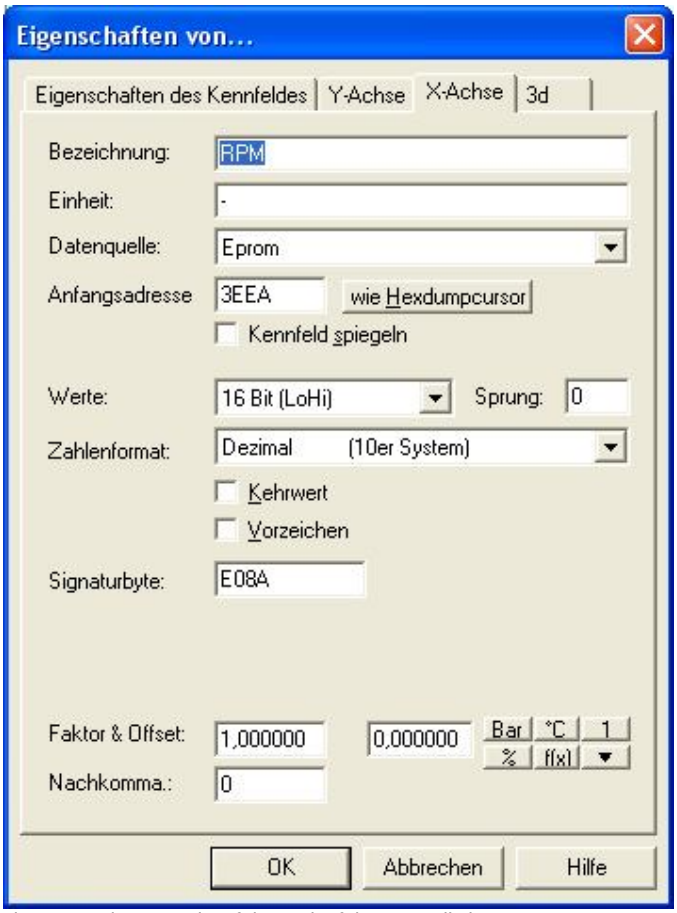
All factors, offsets, axis descriptors and names are given by the pictures below.



Picture 2.2: The factor and offset from the Torque limiter



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

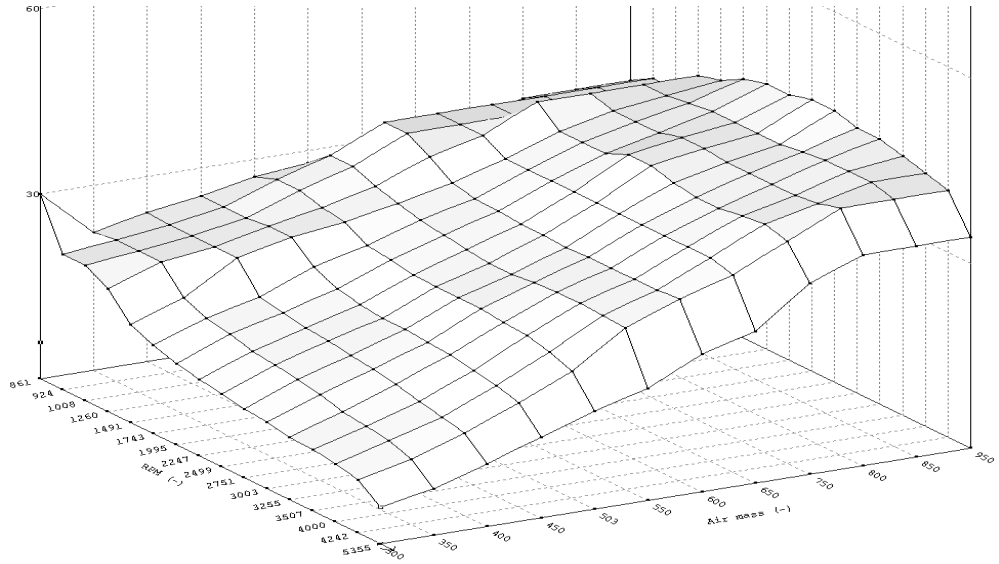


Picture 2.4: The properties of the Y axis of the Torque limiter

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.

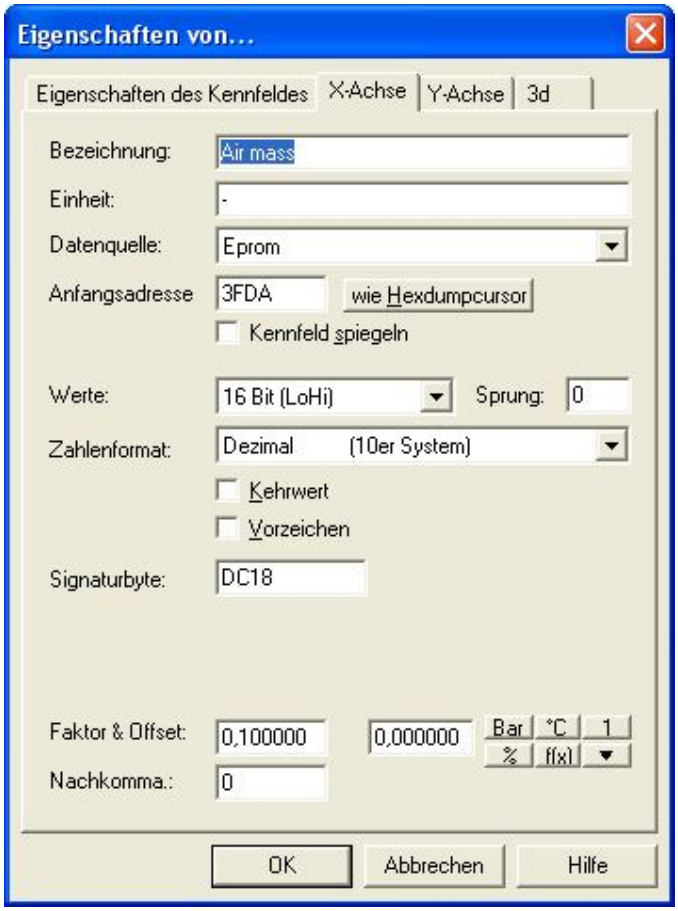


Picture 3.1: 3D view of the Smoke limiter

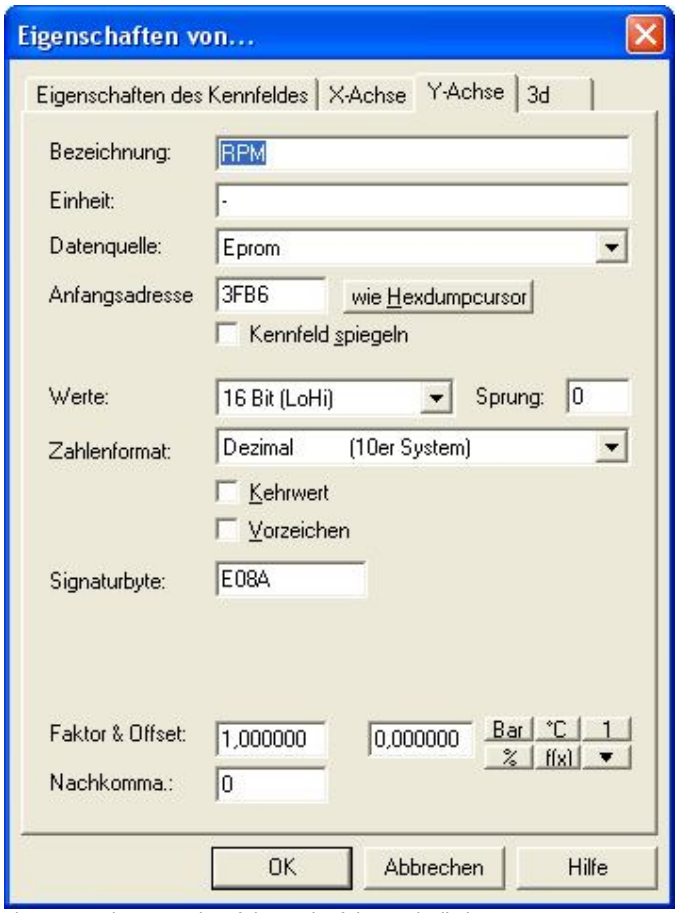
Factors & offsets:

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

Picture 3.2: The factor and offset from the Smoke limiter



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

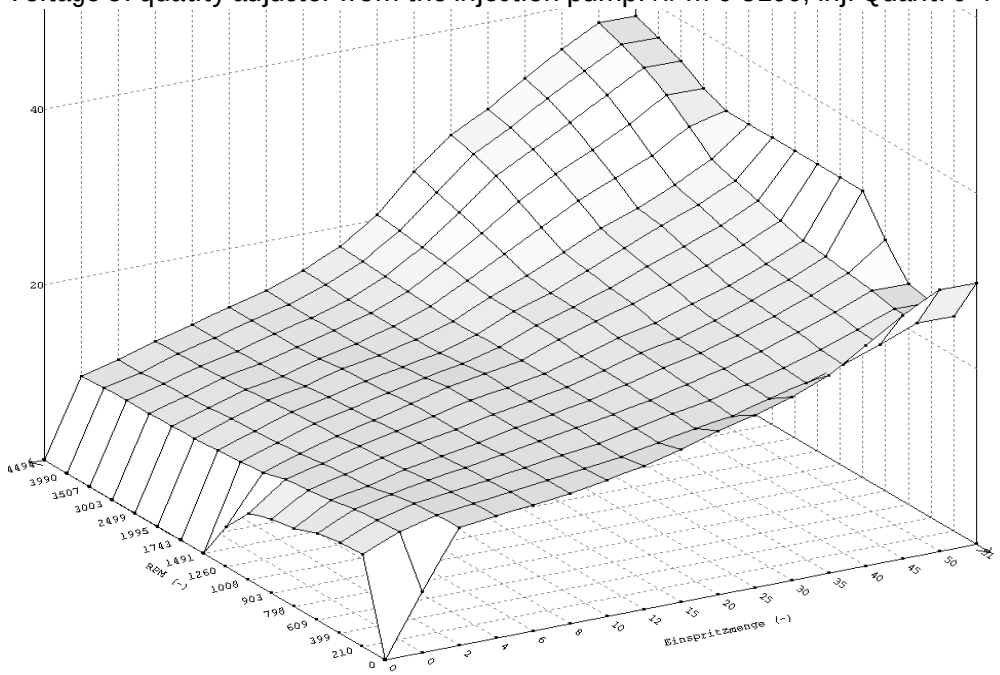


Picture 3.4: The properties of the Y axis of the Smoke limiter

4. N146 Pump Voltage map:

General:

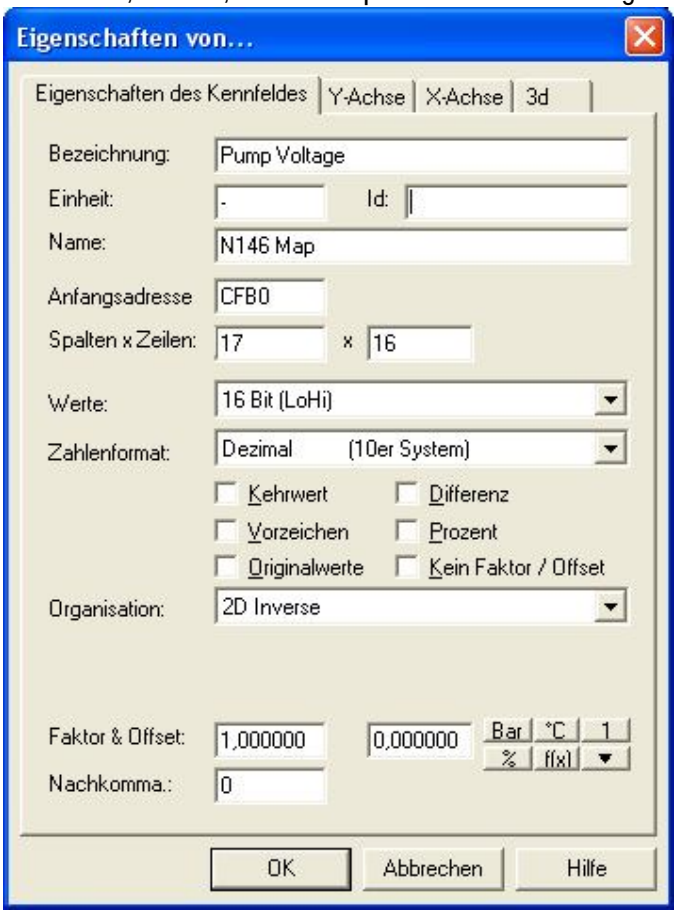
This is a calibration map→ Pump Voltage in cause of RPM and Injection quantity!
Voltage of quatity adjuster from the injection pump. RPM 0-5100, Inj. Quant. 0-44,94



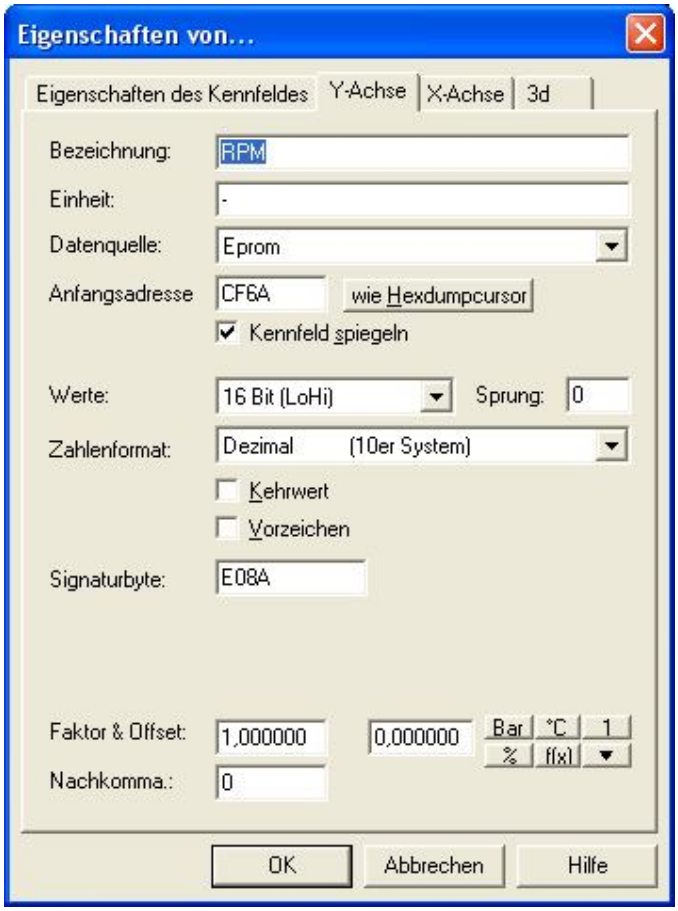
Picture 4.1: 3D view of the N146 Pump Voltage map

Factors & offsets:

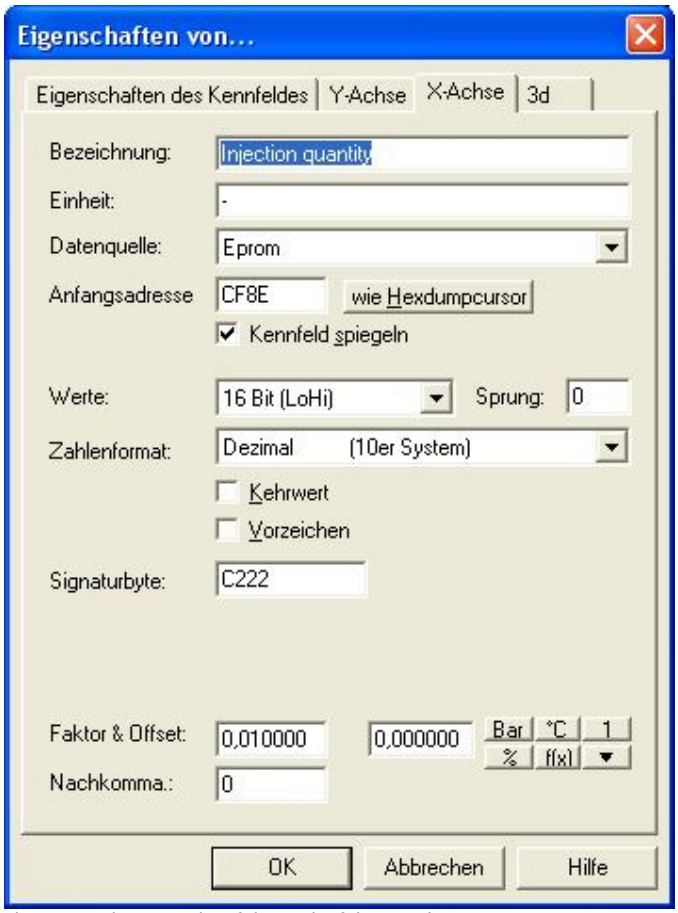
All factors, offsets, axis descriptors and names are given by the pictures below.



Picture 4.2: The factor and offset from the Duration map



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

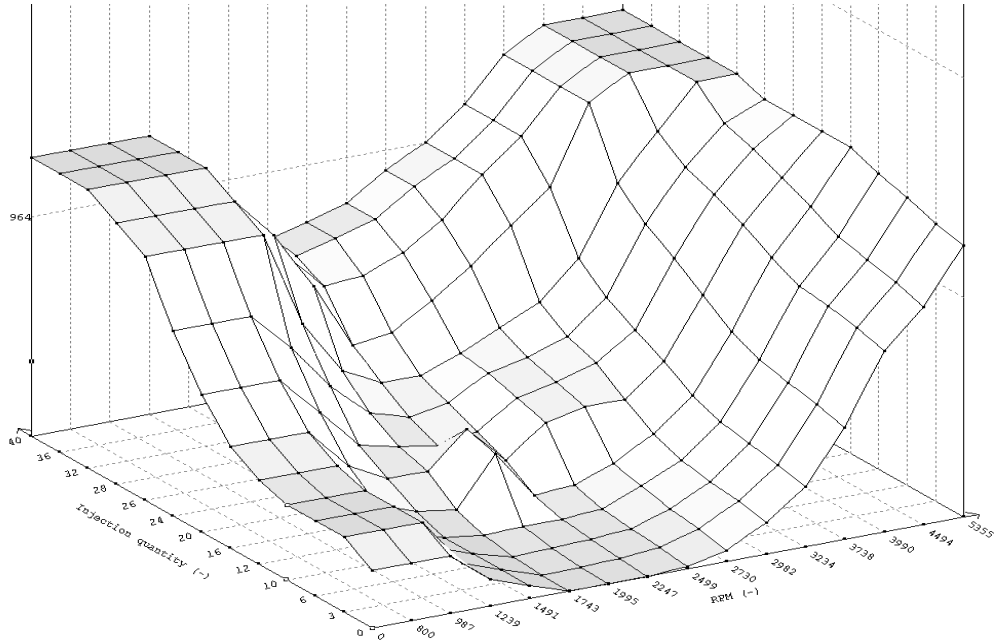


Picture 4.4: The properties of the Y axis of the Duration map

5. N108 Start of Injection map:

General:

This map shows at which degrees engine rotation the fuel injection starts. So this is a "calibration" map. Often there is more than one duration map, in case of the 110hp tdi even 4.
Positive values are injection start before OT, negative values are injection start after OT!

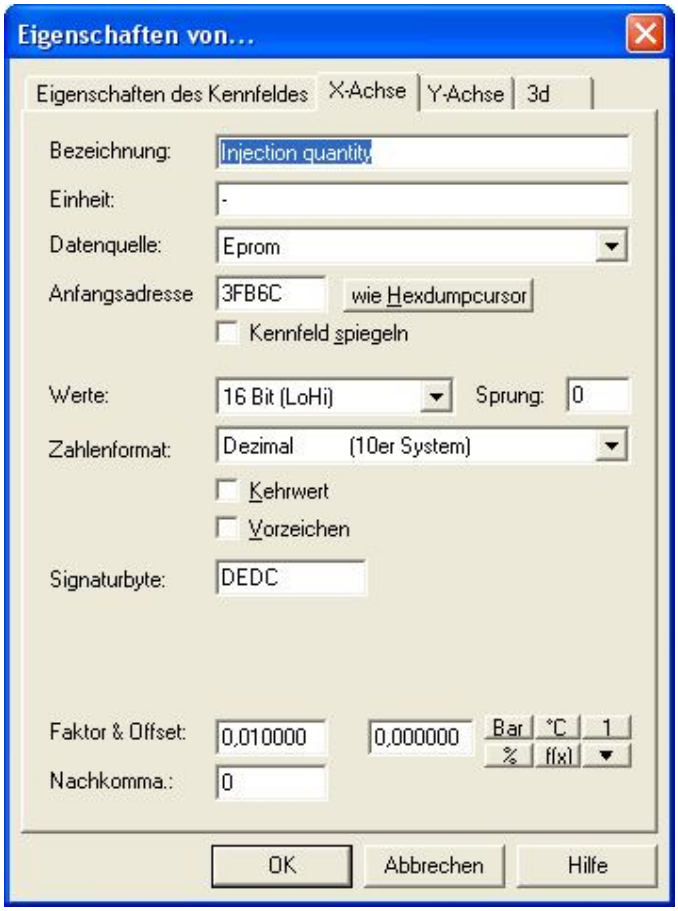


Picture 5.1: 3D view of the N146 Pump Voltage map

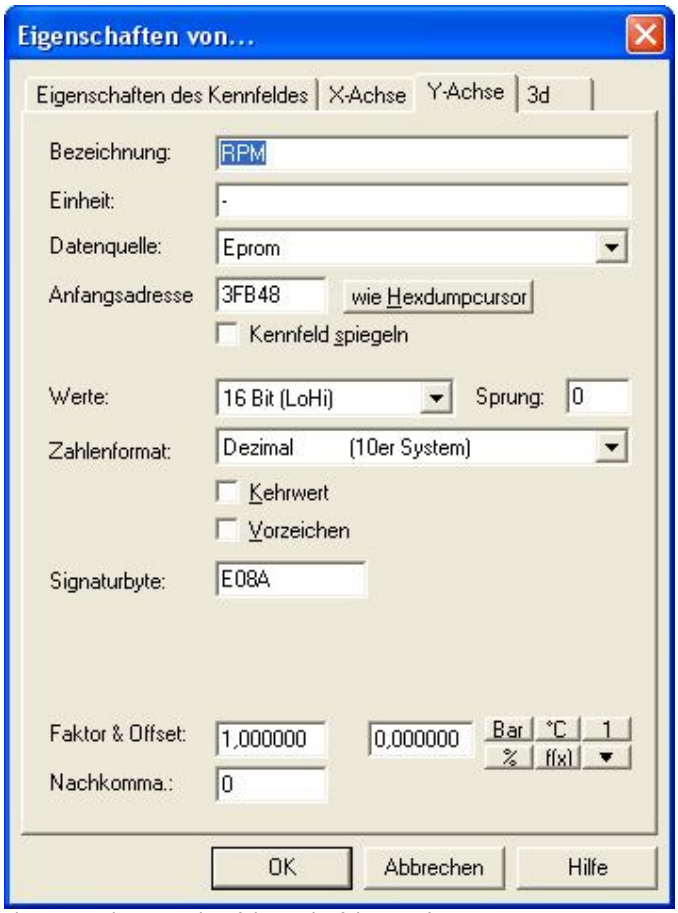
Factors & offsets:

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

Picture 5.2: The factor and offset from the Duration map



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

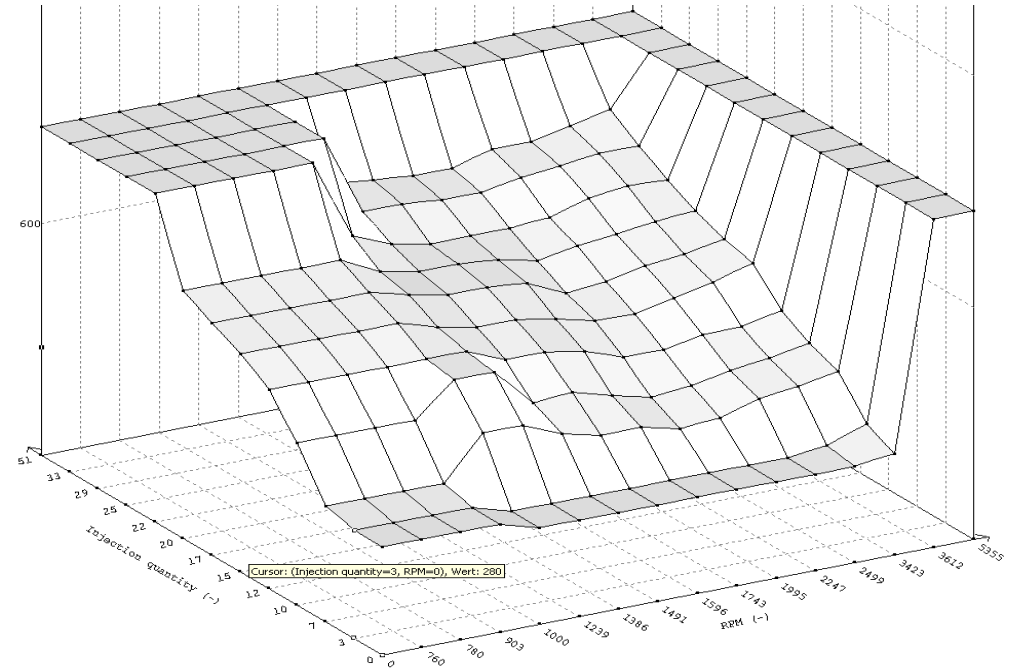


Picture 5.4: The properties of the Y axis of the Duration map

6. EGR map:

General:

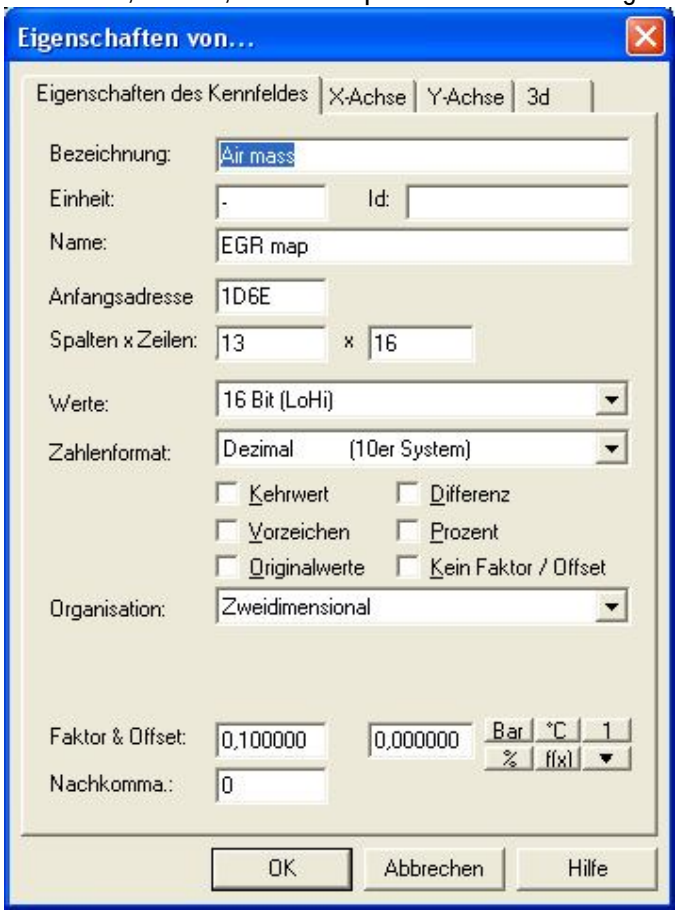
This map regulates the Exhaust gas recirculation valve.



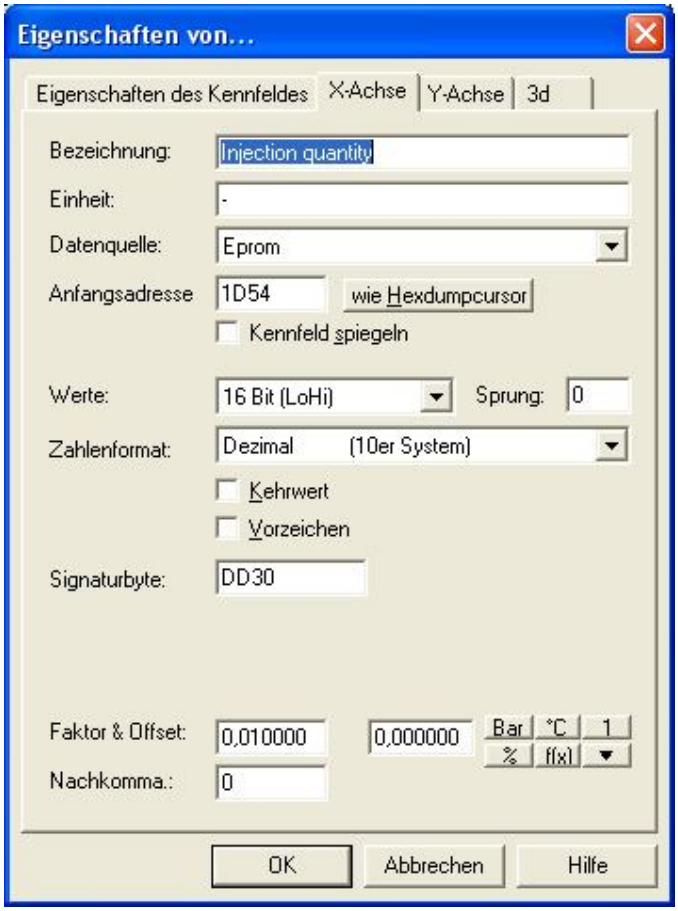
Picture 6.1: 3D view of the EGR map

Factors & offsets:

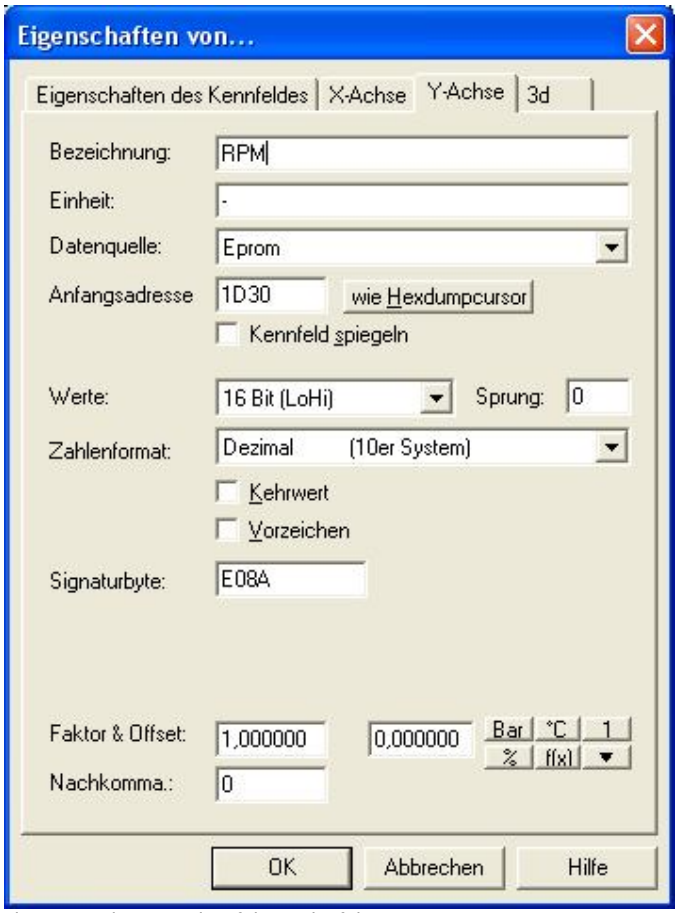
All factors, offsets, axis descriptors and names are given by the pictures below.



Picture 6.2: The factor and offset from the EGR map



Picture 6.3: The properties of the X axis of the EGR map



Picture 6.4: The properties of the Y axis of the EGR map

7. Tuning the fuel maps:

Drivers wish:

If we want to tune a stock VP engine it is enough to change the drivers wish, torque limiter, smoke limiter, N146 map and the EGR map (and the turbo maps but that comes later on).

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

-	Injection Quantity(Throttle Pos,RPM)/- 1	7	17	25	45	60	80	100
0	17	23	29	37	43	48	52	56
403	7	10	16	24	33	42	47	52
615	0	6	13	19	29	40	46	50
700	0	4	11	17	28	39	45	49
806	0	4	10	15	26	38	44	49
912	0	4	9	13	24	37	43	48
1018	0	4	8	12	23	37	43	47
1124	0	4	7	10	23	36	42	47
1230	0	4	5	9	22	36	42	46
1506	0	3	4	9	22	35	41	46
2015	0	3	3	8	21	34	40	45
2524	0	2	3	7	20	33	39	45
3033	0	2	3	7	19	32	39	44
4030	0	2	3	6	18	31	38	43
5048	0	1	2	5	16	29	36	42
5409	0	0	0	0	1	3	11	28

Picture 7.1: The original drivers wish

The modified drivers wish can look something like the picture below.

-	Injection Quantity(Throttle Pos,RPM)/- 1	7	17	25	45	60	80	100
0	17	23	29	36	43	47	52	56
403	7	10	16	23	33	42	52	52
615	0	6	13	19	29	40	52	50
700	0	4	11	17	27	38	49	50
806	0	4	10	15	25	37	49	53
912	0	4	9	13	24	37	49	58
1018	0	4	8	11	23	36	49	59
1124	0	4	7	10	22	36	49	60
1230	0	4	5	9	22	36	49	60
1506	0	3	4	8	21	35	49	60
2015	0	3	3	7	21	34	49	60
2524	0	2	3	7	20	33	49	59
3033	0	2	3	6	19	32	49	58
4030	0	2	3	5	18	30	49	57
5048	0	1	2	5	12	29	46	56
5409	0	0	0	0	1	2	10	45

Picture 7.2: The modified drivers wish

Torque limiter:

The torque limiter can be increased from 1250rpm to 4800rpm by ± 25%. The highest value should be around 2250-2750rpm.

The max value is 51mg/stroke in cause of the maximum value for diagnostics is at older VP-TDI´s 51mg! And I don't know how to change them!!!!

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

-	-(RPM,Atmospheric pressure)/-																		
	21	556	557	1018	1251	1506	1760	1909	2036	2269	2524	3288	3797	3945	4094	4200	4306	4518	5409
500	0	0	26	33	37	39	40	42	42	42	42	41	40	39	39	39	38	31	0
900	0	0	26	33	37	39	40	42	42	42	42	41	40	39	39	39	38	31	0
1000	0	0	26	33	37	39	40	42	42	42	42	41	40	39	39	39	38	31	0

Picture 7.3: The original torque limiter

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

-	-(RPM,Atmospheric pressure)/-																		
	21	556	557	1018	1251	1506	1760	1909	2036	2269	2524	3288	3797	3945	4094	4200	4306	4518	5409
500	0	0	26	33	37	39	45	47	48	50	50	50	49	47	44	42	38	31	0
900	0	0	26	33	37	42	47	48	49	50	51	51	51	51	51	51	51	50	0
1000	0	0	26	33	37	42	47	48	49	50	51	51	51	51	51	51	51	50	0

Picture 7.4: 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 7.5.

-	-(Air mass,RPM)/-											
	300	350	400	450	503	550	600	650	750	800	850	950
870	30	22	24	26	27	28	29	30	31	33	33	33
933	22	23	24	26	29	31	35	35	35	35	35	35
1018	22	23	24	26	29	31	35	35	35	35	35	35
1273	20	23	24	26	28	30	33	35	39	39	39	39
1506	16	19	24	26	27	29	31	33	36	38	39	40
1760	14	17	19	23	25	28	30	33	36	38	40	42
2015	13	17	19	21	24	27	30	33	36	38	40	43
2269	12	16	18	20	24	26	29	33	38	39	40	43
2524	12	15	18	20	24	26	29	33	38	39	40	44
2779	11	15	17	20	24	26	29	33	37	39	40	44
3033	11	14	17	20	24	26	29	33	36	39	41	43
3288	10	13	16	19	23	27	29	33	36	39	41	43
3542	10	12	15	19	23	27	29	33	37	39	41	42
4040	9	12	14	18	22	26	29	33	37	39	41	41
4284	9	11	13	17	21	26	30	32	36	40	40	40
5409	6	8	10	13	16	18	22	25	31	34	34	34

Picture 7.5: 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 51mg/stroke at 2500rpm the smoke limiter will limit this value back to 44mg/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 950 (highest value on smoke map scale) and divide that by 17 we get: 950/17 = 56mg. So the max value in the most right column may be 56 mg/stroke. We made the torque limiter 51mg/stroke in cause of diagnostics, so we want to change the smoke map also to 51mg/stroke.

Then the smoke limiter looks like the picture below.

- \ -(Air mass,RPM)/-	300	350	400	450	503	550	600	650	750	800	850	950
870	30	22	24	26	27	28	29	30	31	33	33	33
933	22	23	24	26	29	31	35	35	35	35	35	35
1018	22	23	24	26	29	31	35	35	35	35	35	35
1273	20	23	24	26	28	30	33	35	39	37	39	39
1506	16	19	24	26	27	29	31	33	36	38	40	43
1760	14	17	19	23	25	28	30	33	36	39	43	49
2015	13	17	19	21	24	27	30	33	36	40	48	51
2269	12	16	18	20	24	26	29	33	38	41	50	51
2524	12	15	18	20	24	26	29	33	38	41	50	51
2779	11	15	17	20	24	26	29	33	37	41	50	51
3033	11	14	17	20	24	26	29	33	36	41	50	51
3288	10	13	16	19	23	27	29	33	36	41	50	51
3542	10	12	15	19	23	27	29	33	37	41	50	51
4040	9	12	14	18	22	26	29	33	37	41	50	51
4284	9	11	13	17	21	26	30	32	36	41	50	51
5409	6	8	10	13	16	18	22	25	31	38	43	47

Picture 7.6: The modified smoke limiter

Pump voltage map:

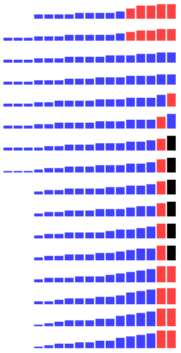
If we want to tune a stock VP engine, there is a problem, that with diagnostic software the highest value for injection quantity is 51mg/stroke! So we make the highest values in our file around 51mg, and then we change the values in the pump voltage map around 10% higher!

- \ Pump Voltage(RPM,Injection quantity)/-	0	212	403	615	806	912	1018	1273	1506	1760	2015	2524	3033	3542	4030	4539
0	0	1054	1039	990	894	846	766	460	0	0	0	0	0	0	0	0
0	701	1229	1212	1180	1131	1098	1065	991	966	942	925	917	909	901	893	876
2	1343	1327	1310	1269	1212	1191	1159	1122	1094	1079	1063	1041	1016	1006	983	983
4	1392	1375	1359	1343	1310	1296	1279	1239	1223	1207	1191	1159	1143	1127	1111	1102
6	1433	1433	1417	1409	1392	1384	1368	1343	1320	1303	1271	1239	1223	1215	1215	1215
8	1480	1480	1474	1475	1459	1459	1459	1442	1416	1400	1384	1352	1336	1327	1328	1328
10	1545	1531	1531	1540	1537	1541	1548	1548	1499	1472	1456	1440	1440	1424	1424	1432
12	1637	1588	1589	1613	1613	1613	1613	1622	1585	1561	1561	1561	1561	1561	1577	1592
15	1737	1663	1671	1679	1695	1695	1695	1695	1695	1687	1687	1697	1721	1737	1761	1777
20	1860	1736	1754	1762	1785	1794	1810	1843	1851	1859	1868	1913	1962	1990	2023	2048
25	1966	1810	1837	1867	1900	1916	1941	1974	1982	1999	2040	2138	2227	2310	2383	2465
30	2088	1916	1933	1957	1982	1998	2027	2092	2117	2170	2220	2351	2498	2638	2735	2801
35	2251	2015	2035	2073	2098	2114	2154	2219	2277	2336	2416	2572	2727	2859	2957	3014
40	2517	2148	2162	2214	2242	2266	2290	2367	2432	2514	2563	2752	2924	3088	3210	3284
45	2769	2287	2306	2354	2394	2423	2447	2515	2587	2671	2743	2924	3137	3317	3439	3534
50	2985	2447	2463	2520	2568	2600	2632	2708	2781	2861	2957	3174	3383	3544	3656	3752
51	2985	2447	2463	2520	2867	3276	3276	3276	3276	3276	3276	3276	3383	3544	3656	3752

Picture 7.7: The original N146 Pump voltage map

In this case, this is a modified pump voltage map, if you use 0.216 nozzles!!

-	-(RPM,RPM)/-																
	0	0	260	700	1100	1700	2700	3800	5100								
	0	60	500	950	1350	2200	3300	4600									
0	0	0	0	1028	1120	1156	1220	1269	1345	1397	1461	1824	2449	3009	3101	3250	3250
2	931	931	931	1052	1140	1204	1268	1329	1385	1449	1522	1680	2115	2223	2371	2612	2612
4	915	915	915	1008	1148	1224	1296	1365	1453	1505	1594	1702	1826	1931	2023	2344	2345
6	867	867	867	1007	1148	1236	1320	1417	1473	1561	1670	1766	1886	2003	2111	2455	2457
8	855	855	855	983	1132	1256	1344	1433	1509	1561	1670	1806	1903	2007	2164	2525	2875
9	807	807	807	975	1116	1244	1356	1433	1485	1573	1682	1818	1923	2015	2156	2618	3216
10	642	642	642	919	1104	1229	1335	1409	1481	1569	1690	1798	1895	1995	2220	2681	3276
13	337	337	337	859	1084	1224	1316	1401	1485	1577	1670	1806	1951	2071	2280	2810	3276
15	0	0	0	803	1063	1204	1332	1385	1477	1545	1662	1835	1987	2168	2361	2922	3276
17	0	0	0	739	1027	1188	1300	1389	1457	1554	1678	1847	2090	2280	2473	3019	3276
20	0	0	0	722	987	1164	1284	1345	1445	1541	1686	1911	2135	2360	2545	3115	3276
25	0	0	0	690	975	1144	1280	1329	1453	1561	1706	2007	2260	2521	2745	3276	3276
30	0	0	0	686	947	1136	1236	1329	1449	1550	1743	2047	2368	2666	2910	3420	3420
35	0	0	0	658	907	1104	1260	1317	1469	1565	1774	2112	2509	2838	3139	3613	3613
40	0	0	0	618	875	1088	1268	1316	1477	1578	1811	2224	2622	2982	3295	3790	3790
45	0	0	0	614	835	1071	1240	1292	1473	1594	1830	2263	2697	3063	3337	3934	3934



Picture 7.8: The modified N146 pump voltage map

Beginning of injection map:

You can change the values at higher rpm and higher injection in the map a littlebit, but in this case, there are bigger nozzles than stock, so there is no need to change the map.

EGR map:

To prevent clogged intake and avoid unnecessary smoke the EGR map have to be disabled. The original EGR map looks like picture 7.9.

-	-(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 7.9: 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 7.10: The modified EGR map

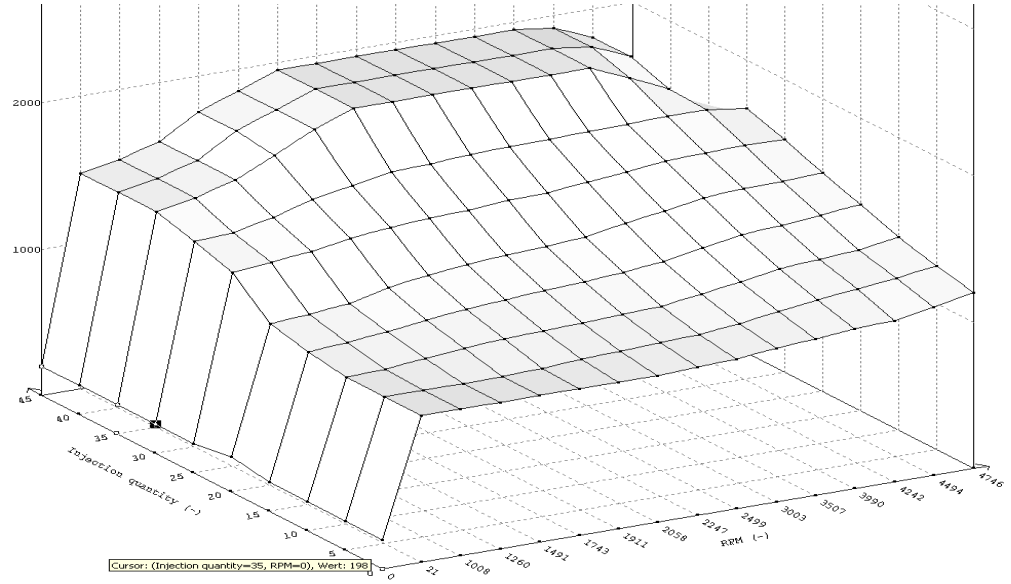
At this point all fuel related maps have been "tuned". We will continue with tuning the turbo related maps after explaining the basics of those maps.

Turbo related maps

8. Turbo map:

General:

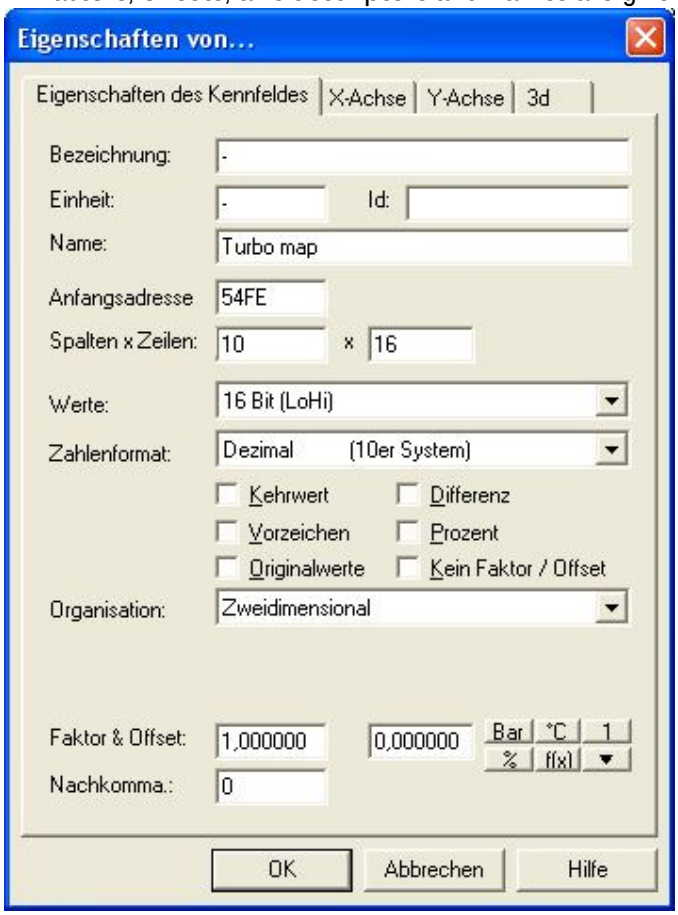
This map shows the desired turbo pressure at a certain rpm and injected quantity. The output of this map is turbo pressure in mbar.



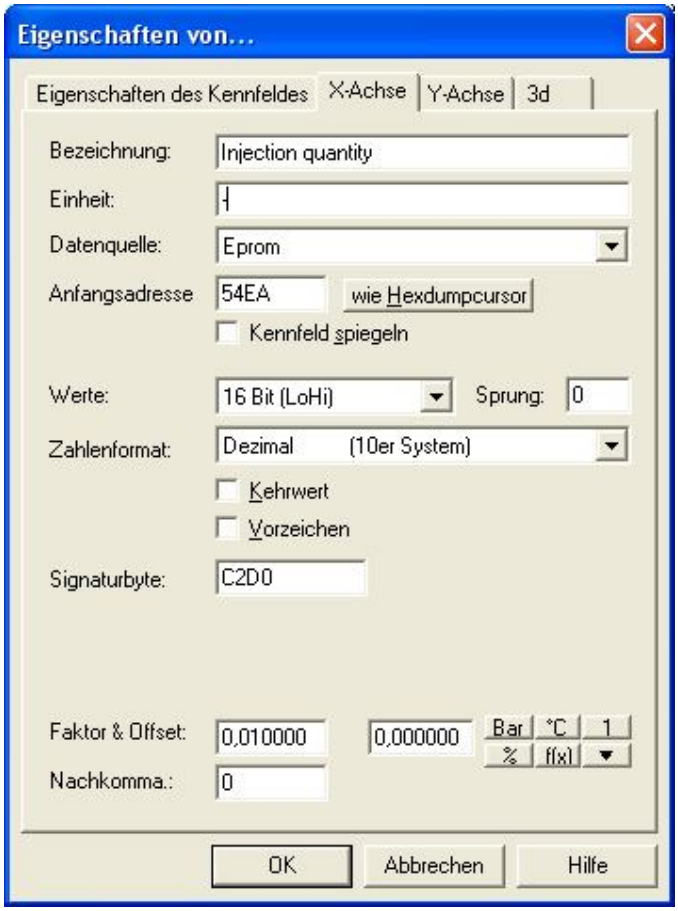
Picture 8.1: 3D view of the turbo map

Factors & offsets:

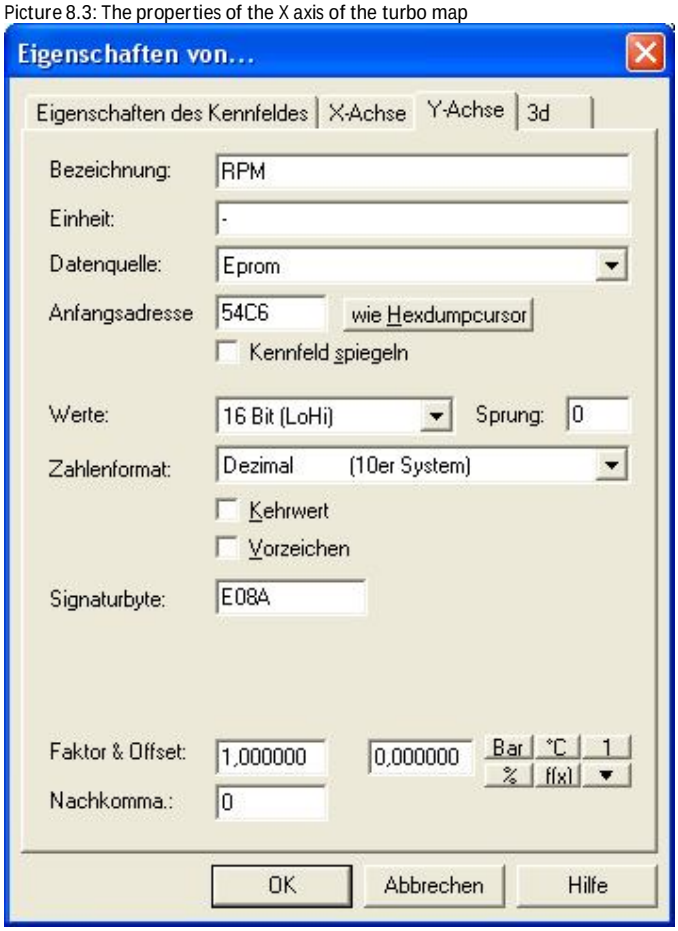
All factors, offsets, axis descriptors and names are given by the pictures below.



Picture 8.2: The factor and offset from the turbo map



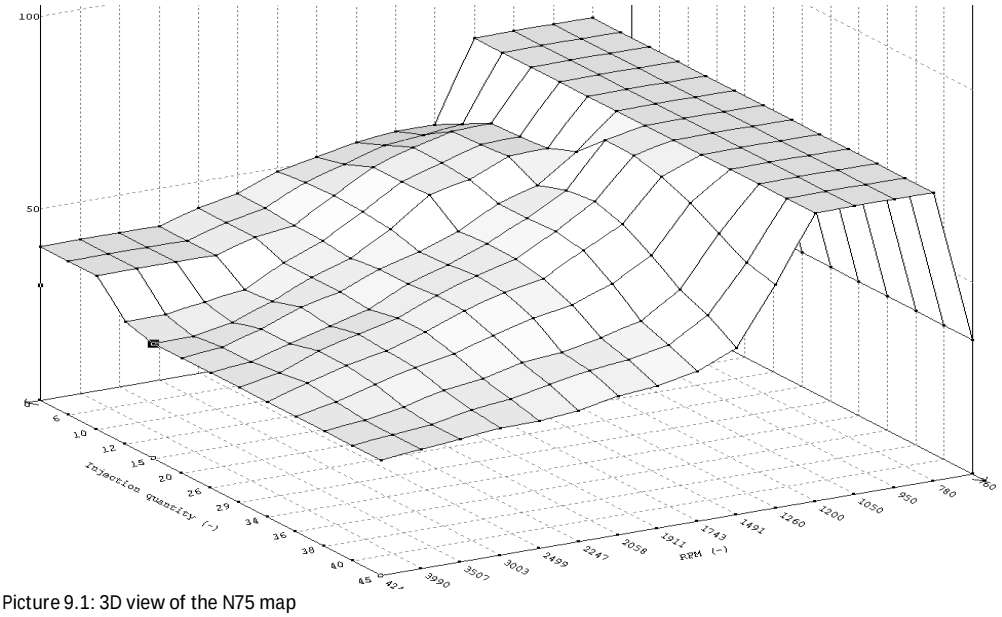
Picture 8.3: The properties of the X axis of the turbo map



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

9. N75 map:

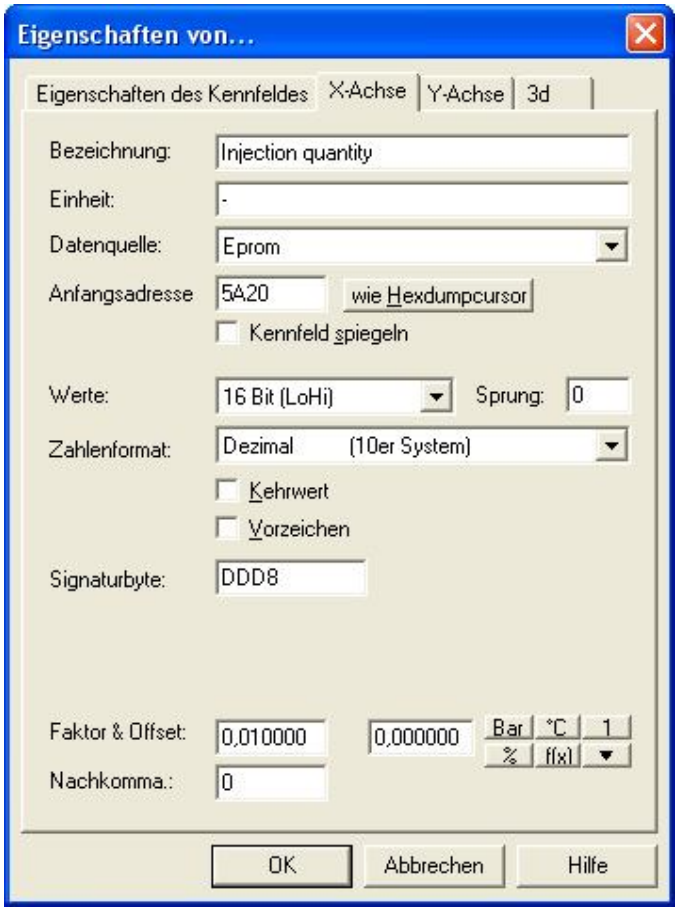
General:
This map controls the vanes inside the turbo at a certain rpm and injected quantity.



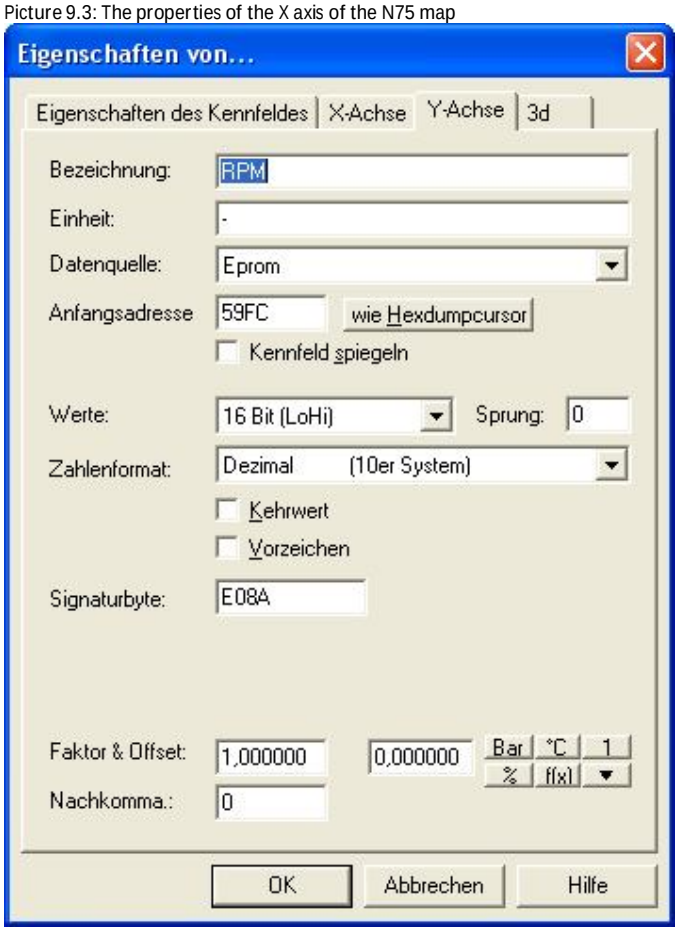
Picture 9.1: 3D view of the N75 map

Factors & offsets:
All factors, offsets, axis descriptors and names are given by the pictures below.#

Picture 9.2: The factor and offset from the N75 map



Picture 9.3: The properties of the X axis of the N75 map

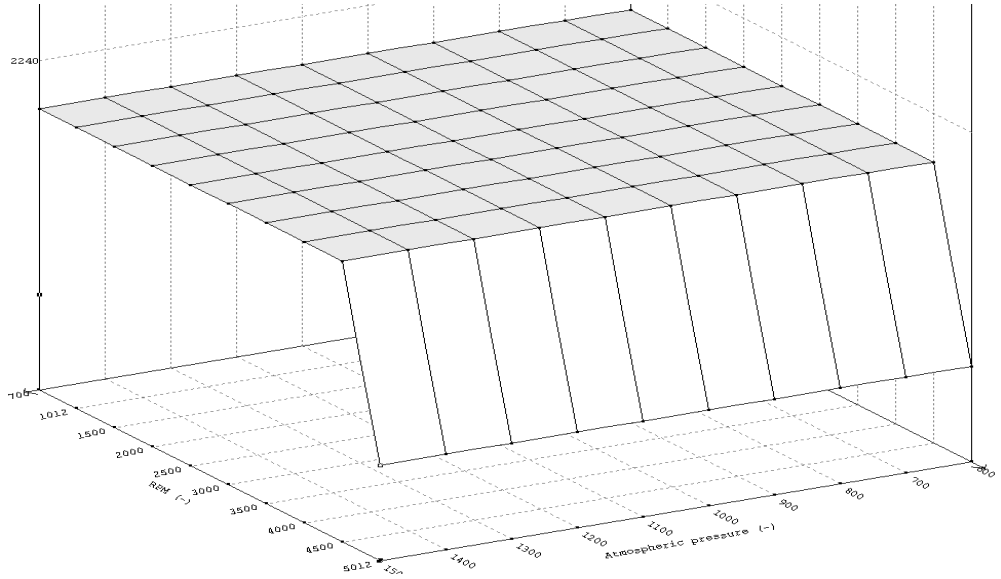


Picture 9.4: The properties of the Y axis of the N75 map

10. 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.

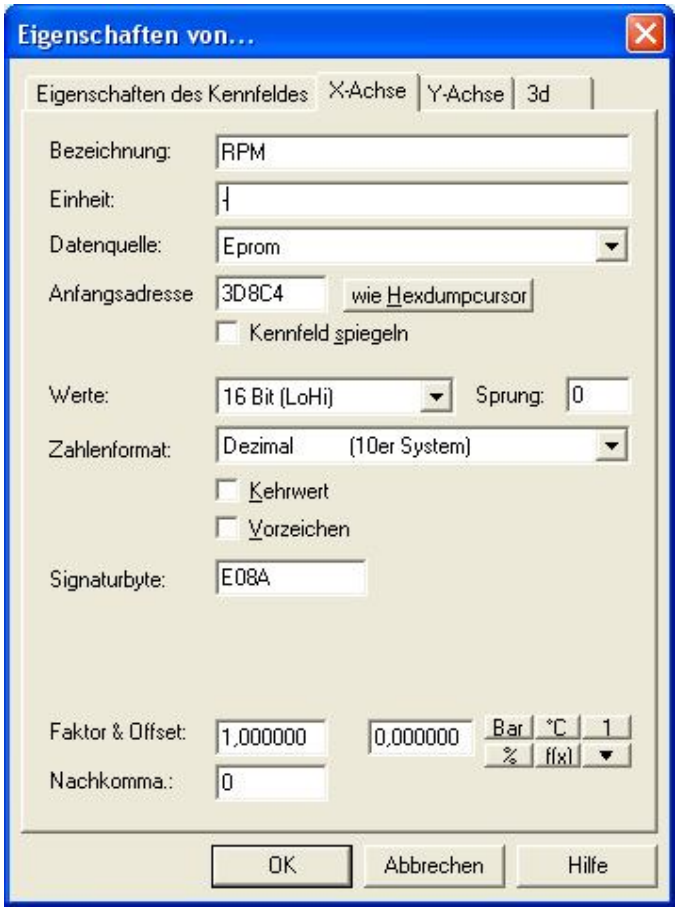


Picture 10.1: 3D view of the boost limiter map

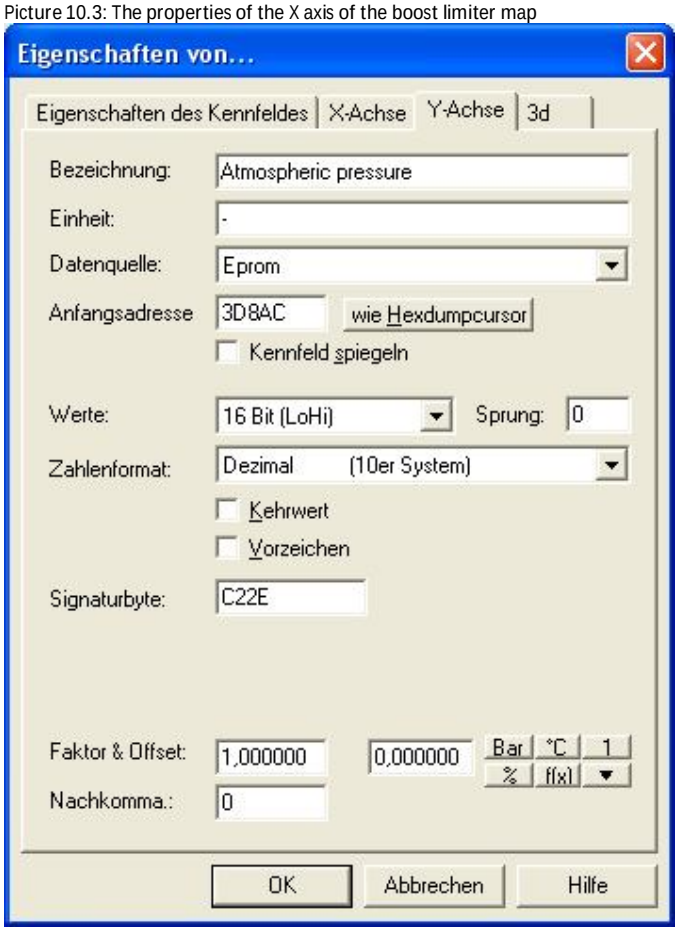
Factors & offsets:

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

Picture 10.2: The factor and offset from the boost limiter map



Picture 10.3: The properties of the X axis of the boost limiter map

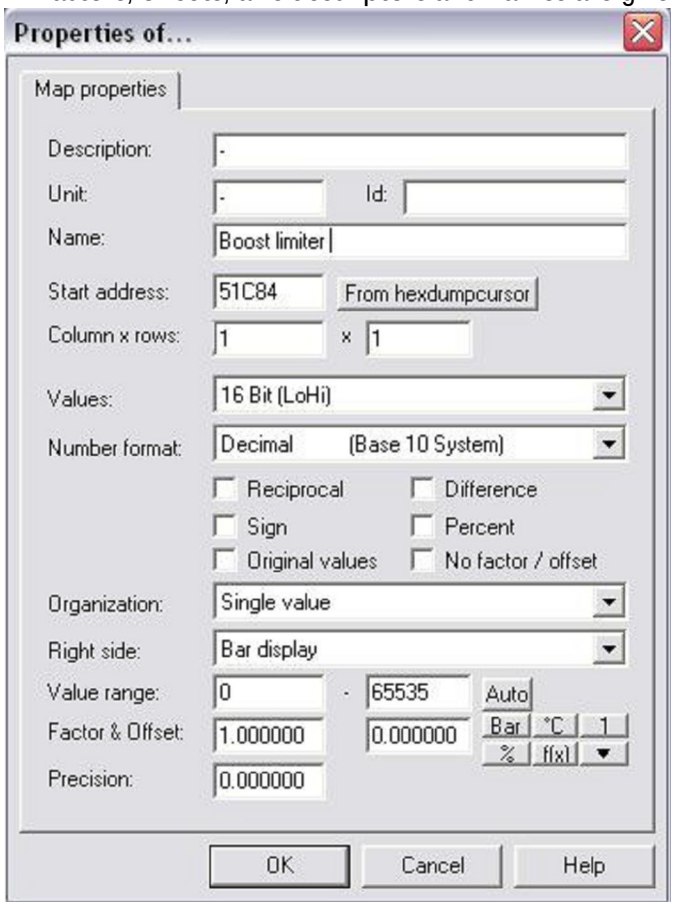


Picture 10.4: The properties of the Y axis of the boost limiter map

11. 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 110 hp TDI is 1950mbar.

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



Picture 11.1: The factor and offset from the single boost limiter value.

12. Tuning the turbo maps:

Turbo map:

If we want to tune a stock VP 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 12.1.

-	-(Injection quantity,RPM)/- 0	5	10	15	20	25	30	35	40	45
0	198	198	198	198	238	198	198	198	198	198
21	1002	1002	1002	1041	1100	1324	1400	1470	1470	1470
1008	1002	1002	1012	1061	1120	1348	1415	1519	1519	1519
1260	1002	1002	1041	1091	1149	1377	1473	1600	1600	1600
1491	1002	1002	1060	1120	1207	1414	1551	1718	1750	1750
1743	1002	1012	1081	1150	1248	1447	1599	1850	1850	1850
1911	1002	1032	1091	1170	1278	1467	1648	1950	1950	1950
2058	1002	1041	1100	1189	1298	1476	1659	1950	1950	1950
2247	1012	1051	1110	1198	1308	1494	1670	1950	1950	1950
2499	1021	1061	1120	1218	1328	1502	1680	1950	1950	1950
3003	1050	1091	1160	1247	1376	1532	1689	1950	1950	1950
3507	1070	1130	1200	1296	1416	1552	1698	1950	1950	1950
3990	1090	1160	1240	1335	1454	1580	1698	1950	1950	1950
4242	1100	1190	1259	1355	1473	1589	1708	1835	1914	1914
4494	1149	1219	1278	1384	1482	1600	1708	1718	1806	1806
4746	1198	1256	1316	1404	1492	1590	1669	1500	1500	1500

Picture 12.1: The original turbo map.

As you can see the boost goes up to max 1950mbar. The turbo on this car can handle a max boost of around 2300-2350mbar at lower rpm. So the max value in this map may be 2350mbar.
Since we are only tuning for max power only the most right column has to be changed! 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 45mg/stroke, while we are injecting 51mg/stroke (set in the torque limiter and smoke map). To compensate that we changed the axis values from 40 to 45 and the 45 value to 51mg/stroke. This way the turbo pressure at high IQ's is easier to regulate.

-	-(Injection quantity,RPM)/- 0	5	10	15	20	25	30	35	50	51
0	198	198	198	198	238	198	198	198	198	198
21	1002	1002	1002	1041	1100	1324	1400	1470	1470	1470
1008	1002	1002	1012	1061	1120	1348	1415	1519	1519	1519
1260	1002	1002	1041	1091	1149	1377	1473	1600	1600	1600
1491	1002	1002	1060	1120	1207	1414	1551	1718	1800	1900
1743	1002	1012	1081	1150	1248	1447	1599	1850	2000	2150
1911	1002	1032	1091	1170	1278	1467	1648	1950	2200	2300
2058	1002	1041	1100	1189	1298	1476	1659	1950	2270	2350
2247	1012	1051	1110	1198	1308	1494	1670	1950	2270	2350
2499	1021	1061	1120	1218	1328	1502	1680	1950	2270	2330
3003	1050	1091	1160	1247	1376	1532	1689	1950	2270	2320
3507	1070	1130	1200	1296	1416	1552	1698	1950	2270	2320
3990	1090	1160	1240	1335	1454	1580	1698	1950	2270	2320
4242	1100	1190	1259	1355	1473	1589	1708	1950	2270	2320
4494	1149	1219	1278	1384	1482	1600	1708	1800	1920	2150
4746	1198	1256	1316	1404	1492	1590	1669	1700	1700	1700

Picture 12.2: The modified turbo map.

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 normally to be higher. In picture 12.3 you can see the original n75 map.

-	-(Einspritzmenge,RPM)/-												
	0	6	10	12	15	20	26	29	34	36	38	40	45
768	0	0	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
788	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
960	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1061	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1212	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1273	5400	5800	6200	6250	6322	6600	7292	7270	7100	6793	6380	6000	5800
1506	5400	5700	6162	6200	6282	5900	6152	6242	6031	5590	5080	4800	4320
1760	5300	5600	5912	5900	5842	5600	5592	5642	5531	5036	4450	4200	3900
1930	5100	5300	5600	5600	5642	5070	5132	5100	4972	4662	4200	4000	3700
2079	4900	5000	5030	5000	4912	4712	4752	4842	4792	4500	3980	3900	3600
2269	4500	4500	4430	4400	4322	4422	4432	4502	4472	4212	3900	3700	3400
2524	4300	4300	4300	4000	4000	4000	3932	4092	4102	3912	3650	3500	3300
3033	4000	4000	4000	3500	3570	3792	3692	3862	3792	3742	3540	3400	3300
3542	4000	4000	4000	3350	3200	3392	3392	3592	3592	3470	3260	3200	3200
4030	4000	4000	4000	3200	3000	3100	3100	3200	3300	3200	3100	3100	3100
4284	4000	4000	4000	3200	3000	3000	3000	3000	3000	3000	3000	3000	3000

Picture 12.3: The original N75 map.

The modified N75 map look like picture 12.4. As you can see, again the axis value is changed into 51mg/stroke due to the torque and smoke limiter at 51mg/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.

In my knowledge, older TDI´s have most of the time mechanical problems like injection pumps who can´t bring the full injection quantity or even turbos, which are slower by making the boost, so most of the time, you don´t have to change the map!!!

-	-(Einspritzmenge,RPM)/-												
	0	6	10	12	15	20	26	29	34	40	45	48	51
768	0	0	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
788	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
960	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1061	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1212	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
1273	5400	5800	6200	6250	6322	6600	7292	7270	7100	5800	5600	5200	4800
1506	5400	5700	6162	6200	6282	5900	6152	6242	6031	4400	4000	3600	3100
1760	5300	5600	5912	5900	5842	5600	5592	5642	5531	3900	3400	3000	2600
1930	5100	5300	5600	5600	5642	5070	5132	5100	4972	3700	3300	2900	2500
2079	4900	5000	5030	5000	4912	4712	4752	4842	4792	3600	3200	2800	2400
2269	4500	4500	4430	4400	4322	4422	4432	4502	4472	3400	3000	2600	2300
2524	4300	4300	4300	4000	4000	4000	3932	4092	4102	3300	2900	2500	2100
3033	4000	4000	4000	3500	3570	3792	3692	3862	3792	3300	2900	2500	2100
3542	4000	4000	4000	3350	3200	3392	3392	3592	3592	3200	2800	2400	2000
4030	4000	4000	4000	3200	3000	3100	3100	3200	3300	3100	2700	2300	2000
4284	4000	4000	4000	3200	3000	3000	3000	3000	3000	3000	3000	3000	3000

Picture 12.4: The modified N75 map.

Boost limiter map:

At this point we have set the boost up to 2350 mbar in the turbo map, and prevent boostspikes by lowering the N75 map. But the boost limiter map will limit the 2350mbar back to 2150mbar as you can see in picture 12.5.

-	-(RPM,Atmospheric pressure)/-									
	700	1012	1500	2000	2500	3000	3500	4000	4500	5012
600	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
700	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
800	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
900	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1000	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1100	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1200	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1300	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1400	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800
1500	2150	2150	2150	2150	2150	2150	2150	2150	2150	1800

Picture 12.5: 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 boost limiter map looks like picture 12.6. 2500mbar is the highest value for the boost sensor!

-	-(RPM,Atmospheric pressure)/-									
	700	1012	1500	2000	2500	3000	3500	4000	4500	5012
600	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
700	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
800	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
900	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1000	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1100	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1200	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1300	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1400	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800
1500	2500	2500	2500	2500	2500	2500	2500	2500	2500	1800

Picture 12.5: 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 1950mbar up to 2350mbar.

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 Midas, tjwasiak, dieseljohnny, VectraDTI and Bar who helped me with all this information and tuning advice. I hope you enjoy the information.