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**M191 Engine Control
Software version 0.0**

Rev 1.0

MICROTEC S.R.L.

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Panoramic

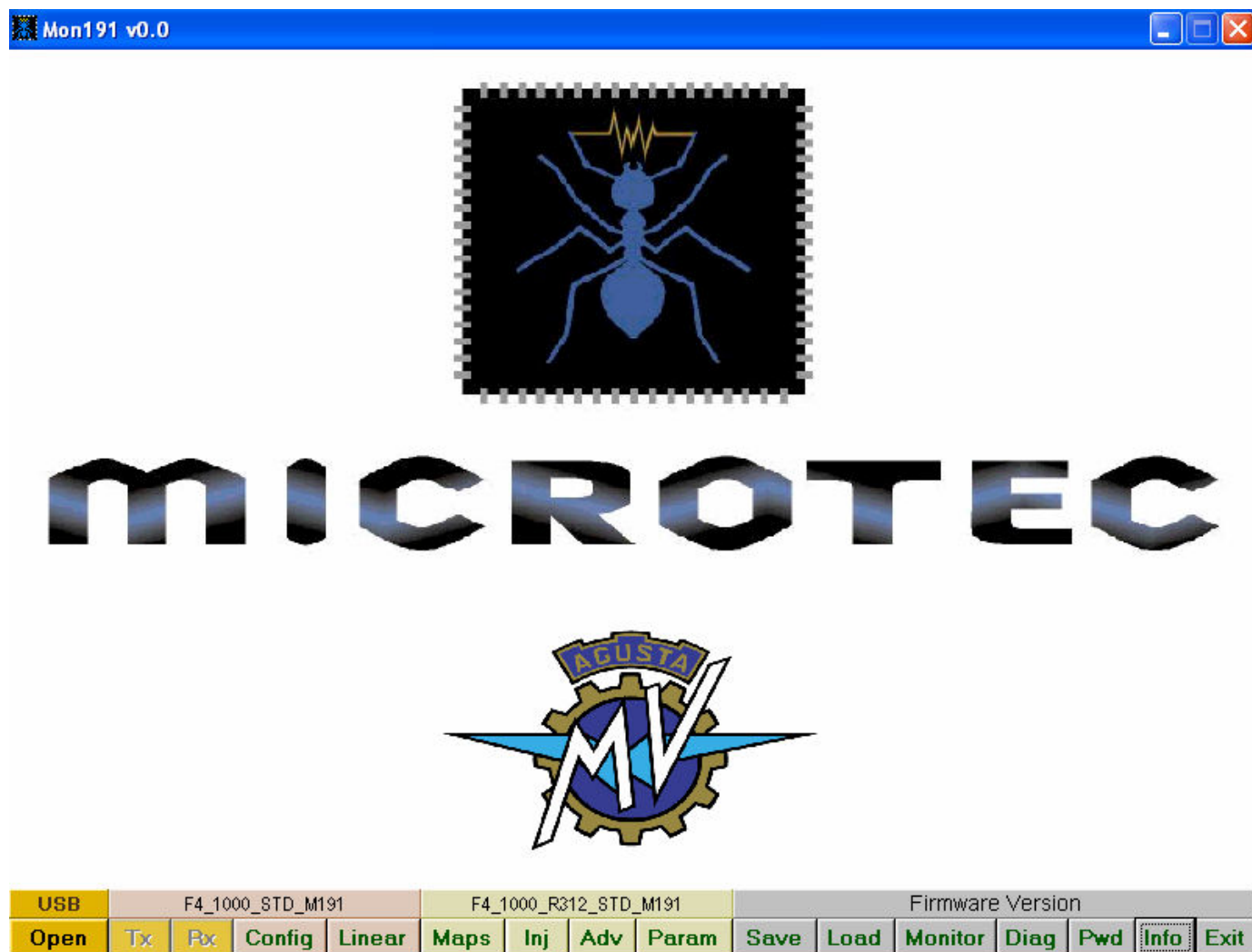
This ECU is a complete replacement solution for the original MV F4 engine control unit.

It implements all the functions and security strategies given by the original one, and is supplied with the original maps, completely configurable

All are programmed via an RS232 link to any PC with a serial port. Usb converter - RS232 (M189) are available at Microtec srl

Additional functions are:

- Speed input
- Launch control input
- Pit limiter input
- Map select input
- Gear position input
- Lambda sensor input for automapping
- Load cell input for electronic change
- Can communication for data acquisition



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After installation your software should look like this with the **Configuration / General** page showing as default and empty settings in all environments.

The Mon191 software splits the ECU settings into 2 distinct areas.

- **Configuration** – Any parameter that relates to the application of the ECU to the installation.
- **Map** – Any parameter that could be considered as an 'engine tuning' setting.

If your system has been pre-designed or you have been given some base settings to work with, you can load them now using the LOAD buttons at the bottom of this page.

Mon191 v0.0

Configuration (general)

Engine

Coupling Angle [deg] 450.0

Scam Inhibition Limit [RPM] 15000

Signals

Shift HIGH

Stop LOW

DropSwitch LOW

Miscellaneous

Tacho Pulses per Revolution 2

Stop Delay [ms] 100

Velocity Reference Front Wheel

Gear-Shift Mode Standard

PWM Frequencies [Hz]

EBS Valve 200

TSS Valve 200

Injection Battery Offset

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	2.500	2.150	1.700	0.868	0.740	0.640	0.564	0.480	0.380	0.300	0.150	0.100	0.050	0.000	1.050	1.100

Dwell

[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0				
[ms]	6.300	6.300	6.300	4.700	3.600	3.000	2.650	2.400	2.200	1.980	1.900	1.780	1.670	1.500	1.250

Pick-Up Table

RPM	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes

Motore 1000cc STD scarico libero (arrow)

USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Monitor Diag Pwd Info Exit

A link can be established with the ECU by applying the correct **Com** port number and by pressing **Open** button. With double click you can choose USB mode to work faster, only with our converter RS232-USB M189

Add comments to your file in this section

The Configuration page can be accessed at any time by pressing this button. Use this button to toggle between **Configuration / general** and **Configuration / CAN acquisition**

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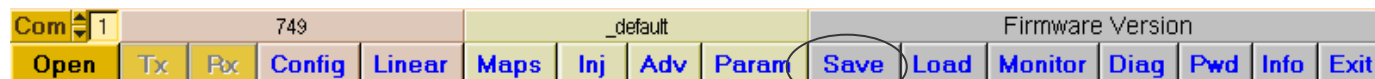
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Save / Load / Tx

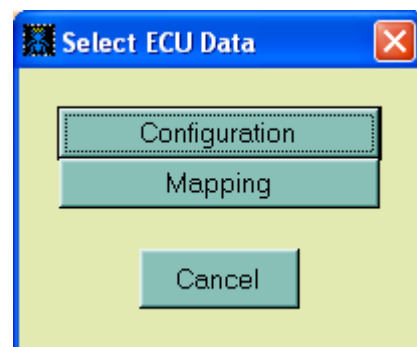
Any changes that are made to software parameters must be saved and then transmitted (uploaded) to the ECU for them to take affect.



Save - Use the Save button on the tool bar to save any changes you have made, you will be given the choice to save either the Configuration or the Map file, if you have made changes to both of these zones you will need to make the Save file to both the configuration file (*.ecd) and the Map file (*.emd)

Your choice of file name is completely free.

You will also notice that the file names shown above the button bar will change to match your naming choice. These are the file names in use on your PC, NOT the ones currently loaded in the ECU.



Load - Use the Load button to choose a previously stored Configuration or Map file. After pressing you are again given the choice to load either the Config or Map as shown above.



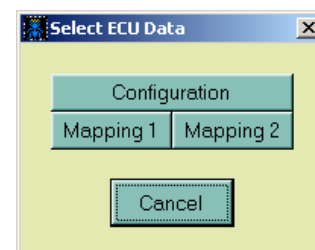
Transmit - To transmit (upload) a file from your PC to the ECU you must first establish a link by pressing the Open button, if the link is established correctly the TX and RX button will become active as shown here.

To send either a Configuration or a Map to the ECU press the **TX** button, the following window will open.

By pressing the **Configuration** button you will send the complete Configuration file to the ECU, this takes approx 5-6 seconds and will be followed by this confirmation.



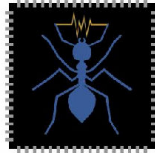
By pressing **Mapping 1** or **Mapping 2** you can send your complete map into either Map position 1 or Map position 2. In this way you can have 2 completely different maps that are instantly switch able by the rider/driver. It takes 45-55 seconds for the Map to be uploaded (be patient), when it is completed you will receive the OK confirmation window. With our converter this time is very small.



By default the Map 1 is used when the switch input (30) is open circuit, Map 2 is selected when this input is closed with ground.

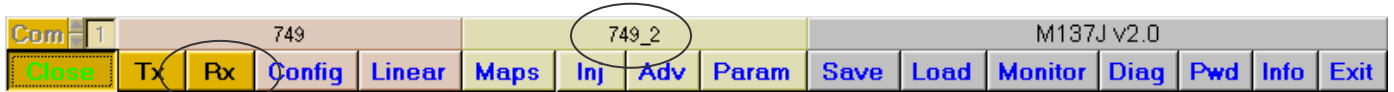
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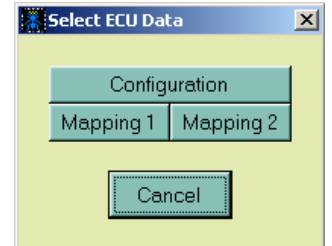
Upload



Receive (RX) – Per ricevere un file dalla centralina al pc per prima cosa bisogna attivare una connessione premendo il pulsante open per attivare il pulsante RX.

When the Rx button is pressed you can choose to download the Configuration, Map 1 or Map 2. make the selection using this window.

Whenever you download a file from the ECU, it is taken in as a single complete file containing all of the parameters within that zone. (zone being either the Config or the map). If the process is completed without error you will see this message.



You should also note that the file name showing above the button bar would now represent the name of the file taken from the ECU.



Any differences between the original PC map and the Map taken from the ECU will be shown in Bold Red text as in this example.

Mon137J v2.0

Maps (edit)

Multiple Matrix Editing

Enabled

Injection

1

RPW

Throttle

	1000	1500	2100	3000	4000	5000	5500	6000	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9100
1.4	2.157	1.959	1.684	1.520	1.314	1.068	0.904	0.904	0.780	0.739	0.698	0.698	0.698	0.698	0.698	0.698	0.698	0.719	0.749
2.8	1.931	1.685	1.395	1.395	1.427	1.427	1.340	1.168	1.122	1.140	1.158	1.129	1.100	1.004	0.907	0.864	0.820	0.842	0.842
4.9	2.317	1.896	1.643	1.520	1.470	1.362	1.275	1.448	1.265	1.317	1.369	1.359	1.349	1.243	1.136	1.089	1.042	0.993	0.993
8.1	2.798	2.633	2.300	2.218	2.013	1.753	1.669	1.904	1.693	1.665	1.637	1.552	1.466	1.431	1.396	1.376	1.355	1.274	1.274
10.9	3.090	2.949	2.751	2.751	2.423	2.213	2.129	1.981	1.972	1.826	1.679	1.684	1.688	1.812	1.935	1.929	1.923	1.886	1.886
15.2	3.862	3.475	3.327	3.327	3.122	2.544	2.420	2.215	2.205	2.184	2.162	2.259	2.355	2.212	2.068	2.444	2.819	2.752	2.752
19.1	4.082	3.897	3.696	3.696	3.368	2.876	2.793	2.427	2.481	2.430	2.379	2.478	2.576	2.401	2.226	2.571	2.916	2.943	2.943
22.9	4.524	4.319	4.148	4.148	3.985	3.574	3.327	2.999	2.722	2.950	3.177	3.078	2.979	2.860	2.741	3.075	3.408	3.453	3.453
27.2	4.439	4.238	4.070	4.070	4.030	3.749	3.467	3.295	3.395	3.494	3.548	3.601	3.426	3.251	3.520	3.788	3.767	3.767	3.767
32.1	4.763	4.548	4.432	4.432	4.353	4.232	3.989	3.951	4.192	4.243	4.294	4.335	4.375	4.068	3.760	4.077	4.394	4.413	4.413
38.1	4.763	4.548	4.432	4.432	4.432	4.432	4.313	4.232	4.484	4.609	4.733	4.899	5.065	4.725	4.384	4.671	4.957	4.960	4.960
45.2	5.214	5.087	4.615	4.615	4.615	4.701	4.485	4.356	4.485	4.852	5.219	5.456	5.692	5.238	4.783	5.454	6.124	6.103	6.103
48.0	5.281	5.087	4.764	4.764	4.764	4.726	4.485	4.306	4.409	4.726	5.042	5.405	5.768	5.373	4.977	5.739	6.501	6.404	6.404
51.9	5.329	5.087	4.873	4.873	4.873	4.744	4.485	4.270	4.356	4.599	4.842	5.288	5.734	5.510	5.286	6.028	6.770	6.620	6.620
55.0	5.400	5.291	5.139	5.113	5.006	4.931	4.618	4.270	4.330	4.626	4.921	5.355	5.788	5.683	5.578	6.228	6.878	6.801	6.801
60.0	5.445	5.418	5.305	5.262	5.089	5.046	4.701	4.270	4.313	4.680	5.046	5.478	5.909	5.893	5.877	6.411	6.944	6.923	6.923
65.0	5.799	5.582	5.433	5.411	5.260	5.153	4.637	4.377	4.398	4.744	5.089	5.456	5.822	6.054	6.286	6.679	7.072	7.115	7.115
69.9	4.890	4.880	4.844	4.774	4.714	4.592	4.572	4.485	4.485	4.809	5.132	5.434	5.735	6.102	6.469	6.836	7.203	7.310	7.310
75.0	5.065	5.047	4.862	4.669	4.570	4.589	4.549	4.438	4.604	4.904	5.203	5.541	5.878	6.185	6.492	6.729	6.966	7.086	7.086
81.2	5.329	5.087	5.778	5.735	5.735	5.219	4.529	4.399	4.701	4.962	5.262	5.620	5.977	6.234	6.491	6.621	6.750	6.880	6.880

Notes

Mon137J v2.0

Close

Tx

Rx

Config

Linear

Maps

Inj

Adv

Param

Save

Load

Monitor

Diag

Pwd

Info

Exit

749.2

M137J v2.0

These values will remain in Red until you make a Save of the map.

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Configuration - General – Engine 1.1 – Coupling angle

Engine	
Coupling Angle [deg]	450.0
Scam Inhibition Limit [RPM]	15000

The **coupling angle** is the angle between tooth 0 and TDC 1.

Tooth 0 for a crank pattern with equi-spaced teeth is the crank tooth following the cam signal.

Configuration - General – Engine 1.2 – Scam inhibit time

Engine	
Coupling Angle [deg]	450.0
Scam Inhibition Limit [RPM]	15000

Above this RPM the engine is able to operate without the need for a cam phase sensor.

Configuration - General – Signals 1.3 – Shift

Signals	
Shift	HIGH
Stop	LOW
DropSwitch	LOW

This is the switch for the activation of the gear shift strategy.

The Shift option is used to select either a 'normally open' or 'normally closed' switch to activate the gear shift strategy

HIGH – Shift input must be connected with gnd permanently; shift is activated when the gnd is removed.

LOW – When the shift input is connected with gnd the strategy activates.

Configuration - General – Signals 1.4 – Stop

Signals	
Shift	HIGH
Stop	LOW
DropSwitch	LOW

The Stop input is used as a kill switch, when the input is active the engine will not run.

HIGH – When the stop input is connected with 12v the strategy activates

LOW – Stop input must be connected with 12v permanently; shift is activated when the 12v is removed.

Configuration - General – Signals 1.5 – Drop switch

Signals	
Shift	HIGH
Stop	LOW
DropSwitch	LOW

This is the switch for the activation of the kill 'drop switch' strategy (used for sensors, which indicate when the bike has fallen over).

The Stop input is used as a kill switch, when the input is active the engine will not run

HIGH – Drop input must be connected with ground permanently; Drop is activated when the ground link is removed.

LOW – When the Drop input is connected with ground the engine cut activates

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Configuration - General – PWM output 1.6

PwM Frequencies [Hz]	
EBS Valve	200
TSS Valve	200

This is the output frequency of PWM EBS and TSS, utilized for pilot respective valve.

You can modify duty cycle signal into Maps – edit – EBS or TSS windows

Configuration - General – Miscellaneous 1.7

Miscellaneous	
Tacho Pulses per Revolution	2
Stop Delay [ms]	100
Velocity Reference	Front Wheel
Gear-Shift Mode	Standard

Tacho Pulses for Revolution – Output provides a square wave Tacho signal of either 1 or 2 pulses per engine revolution.

Stop Delay [ms] – set delay to activate the strategy from stop input.

Velocity reference – You can choose to use the **front** or **rear** wheel speed as the reference speed for correction within the **Map /**

Correction by velocity.

Gear-Shift Mode

All Inputs – The gear-shift strategy is based on all inputs available for this purpose such as the gear position sensor (potentiometer on selector drum) and the “set” signals from either the gear-shift input switch and/or loadcell input). This is the standard gear-shift strategy.

Potentiometer Only – The gear-shift strategy is based only on the gear position sensor, ignoring both of the “set” signals from the gear-shift input switch and loadcell. In this mode there is no need to connect a gear shift switch or loadcell. (Note: Set = start of gear shift strategy)

Configuration - General – Injection battery offset 1.8

Injection Battery Offset																
[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	2.500	2.150	1.700	0.868	0.740	0.640	0.564	0.480	0.380	0.300	0.150	0.100	0.050	0.000	1.050	1.100

This table is of significant importance for the system to calculate the injection time. At different battery voltage levels the injector will take a specific time in ‘Ms’ (milliseconds) to go from fully closed when the signal is received to fully open. The lower the voltage the longer this will take, but there is course fuel being injected during this phase.

You are free to choose your own ‘break point’ within the top row and differing offset values for the upper and lower injector bank. Note: This data is sometimes referred to as injector ‘dead time’

These additive corrections are referred to as **OffsVbatL** and **OffsVbatH** for low and high bank.

Configuration - General – Dwell 1.9

Dwell																
[Volt]	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	14.0	15.0	16.0
[ms]	7.999	7.999	7.999	6.007	4.851	3.727	3.148	2.731	2.506	2.281	2.088	1.928	1.831	1.606	1.446	1.317

This table controls the duration of the ignition coil ‘trigger’ pulse as a function of battery voltage in Ms (milli seconds). You are free to choose your own ‘breakpoints’ within the top row.

Configuration - General – Pick up 1.10

Pick-Up Table																
RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

This table contains the correction to spark advance at differing RPM values (applied to all cylinders) to correct for errors resulting from the signal delay from the crank pick up.

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Configuration - CAN acquisition 2.1

You can toggle between **Configuration / General** and **Configuration / CAN acquisition** by pressing either of the buttons shown here.



The CAN acquisition page looks like this.

Mon191 v0.0															
Configuration (CAN-acquisition)															
Frame	ID (hex)	Frequency	Channel 1				Channel 2				Channel 3				Channel 4
1	200	0ff	RPM				Mean RPM (over 1 Rev.)				Programmable Mean RPM				Engine Acceleration
2	204	0ff	Revolutions				Smot Errors				Scam Errors				Gap Errors
3	208	0ff	Terog 1				Terog 2				Terog 3				Terog 4
4	20c	0ff	TerogBase 1				TerogBase 2				TerogBase 3				TerogBase 4
5	210	0ff	KJCyl 1				KJCyl 2				KJCyl 3				KJCyl 4
6	214	0ff	Advance 1				Advance 2				Advance 3				Advance 4
7	218	0ff	KACyl 1				KACyl 2				KACyl 3				KACyl 4
8	21c	0ff	TetaBase				Phase				FaseBase				-
9	220	0ff	KJCrank				DAPickUp				KJAcc				KAAcc
10	224	0ff	KJTH20				KATH20				KJTAir				KATAir
11	228	0ff	KJPAir				KAPAir				OfifsVbat				Dwell
12	22c	0ff	KJGear				KAGear				KJVel				KAVel
13	230	0ff	KJSpeedLim				KASpeedLim				Advance Transient				Injection Transient
14	234	0ff	DJDInTrpm				DJDInTth2o				DJDInT				DADInT
15	238	0ff	KJbnc 1				KJbnc 2				KJbnc 3				KJbnc 4
16	23c	0ff	KAbnc 1				KAbnc 2				KAbnc 3				KAbnc 4
17	240	0ff	KJbnc				KAbnc				KFbnc				-
18	244	0ff	Throttle				Throttle Variation				Lambda				Load-Cell
19	248	0ff	Battery				Water Temperature				Air Temperature				Air Pressure
20	24c	0ff	Gear				Map				Gear Potentiometer				Map-Select Potentiometer
21	250	0ff	Throttle Potentiometer				-				Lambda Sensor AD				Load-Cell AD
22	254	0ff	Battery AD				Water Temp. AD				Air Temp. AD				Air Pressure AD
23	258	0ff	Velocity Front				Velocity Rear				Space Front				Space Rear
24	25c	0ff	EBS Valve Duty-Cycle				TSS Valve Duty-Cycle				EBS Valve Manual Adjust				TSS Valve Manual Adjust
25	260	0ff	Engine Flags				Error Flags				Digital I/Os				Shift Flags
26	264	0ff	Map-Tuning Updates Count				Current Injection Map-Cell [X,Y]				Current Advance Map-Cell [X,Y]				Map-Tuning Flags
27	268	0ff	CPU Flags				-				-				Milliseconds
USB			F4_1000_STD_M191				F4_1000_R312_STD_M191				Firmware Version				
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

This page contains the layout of the 27 packets (frames) transmitted by the ECU at 1mbps. The content of each is fixed to 4 Words per packet with channel 1 being indicated the channel at the furthest left.

All CAN data is transmitted in Motorola format (MSB first, LSB last)

The only choices you need to make are the ID of the packet and the frequency of the transmission. The ID can be any 11bit hexadecimal value between 0 and 7FF.

Details of these channels can be found in the back of this manual

At the time of ordering you can choose to have the CAN Closed or Open at the ECU, default = Closed.

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Configuration / Linearizations 3.1

This page is accessed by pressing the **Linear** button on the button bar.

Com	1	749				_default				Firmware Version						
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit	

Settings within this page define the calibration of the following inputs

Throttle – 10 bit analogue input with a range of 0-5v

Water temperature – 10 bit analogue input with a dedicated pull up resistor to 5v of 0.468k Ω

Air temperature – 10 bit analogue input with a dedicated pull up resistor to 5v of 0.468k Ω

Air pressure – 10 bit analogue input with a range of 0-5v

lambda – 10 bit analogue input with a range of 0-5v for an external wide band lambda sensor

Mon191 v0.0

Linearizations

Throttle

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A/D	86	135	183	232	281	330	378	427	476	525	573	622	671	720	768	817
[deg]	2.3	7.6	12.9	18.3	23.6	28.9	34.2	39.5	44.9	50.2	55.5	60.8	66.1	71.5	76.8	82.1

Water Temperature

A/D	183	251	310	378	456	541	628	713	791	857	885	910	949	977	996	1008
[°C]	125.0	110.0	100.0	90.0	80.0	70.0	60.0	50.0	40.0	30.0	25.0	20.0	10.0	0.0	-10.0	-20.0

Air Temperature

A/D	183	251	310	378	456	541	628	713	791	857	885	910	949	977	996	1008
[°C]	110.0	100.0	90.0	80.0	70.0	60.0	50.0	40.0	25.0	20.0	15.0	7.0	0.0	-10.0	-20.0	-30.0

Air Pressure

A/D	187	240	292	344	397	449	502	554	606	659	711	763	816	868	921	973
[mBar]	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050

Lambda

A/D	0	68	136	204	273	341	409	477	545	614	682	750	818	886	955	1023
[A/F]	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.1	13.6	14.1	14.6	15.1	15.6	16.1

USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Throttle – To calibrate the throttle sensor, first choose the values for the break points. Use the Monitor page to note the minimum and maximum value for the throttle inputs and enter these values at the 2 ringed positions. Now press Interpolate and the software will automatically re-distribute the A/D values equally between these 2 extremes.

In all cases you are free to enter your own values for the breakpoints and the A/D representation.

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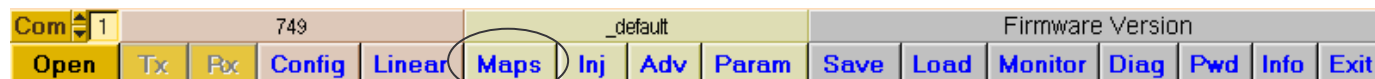
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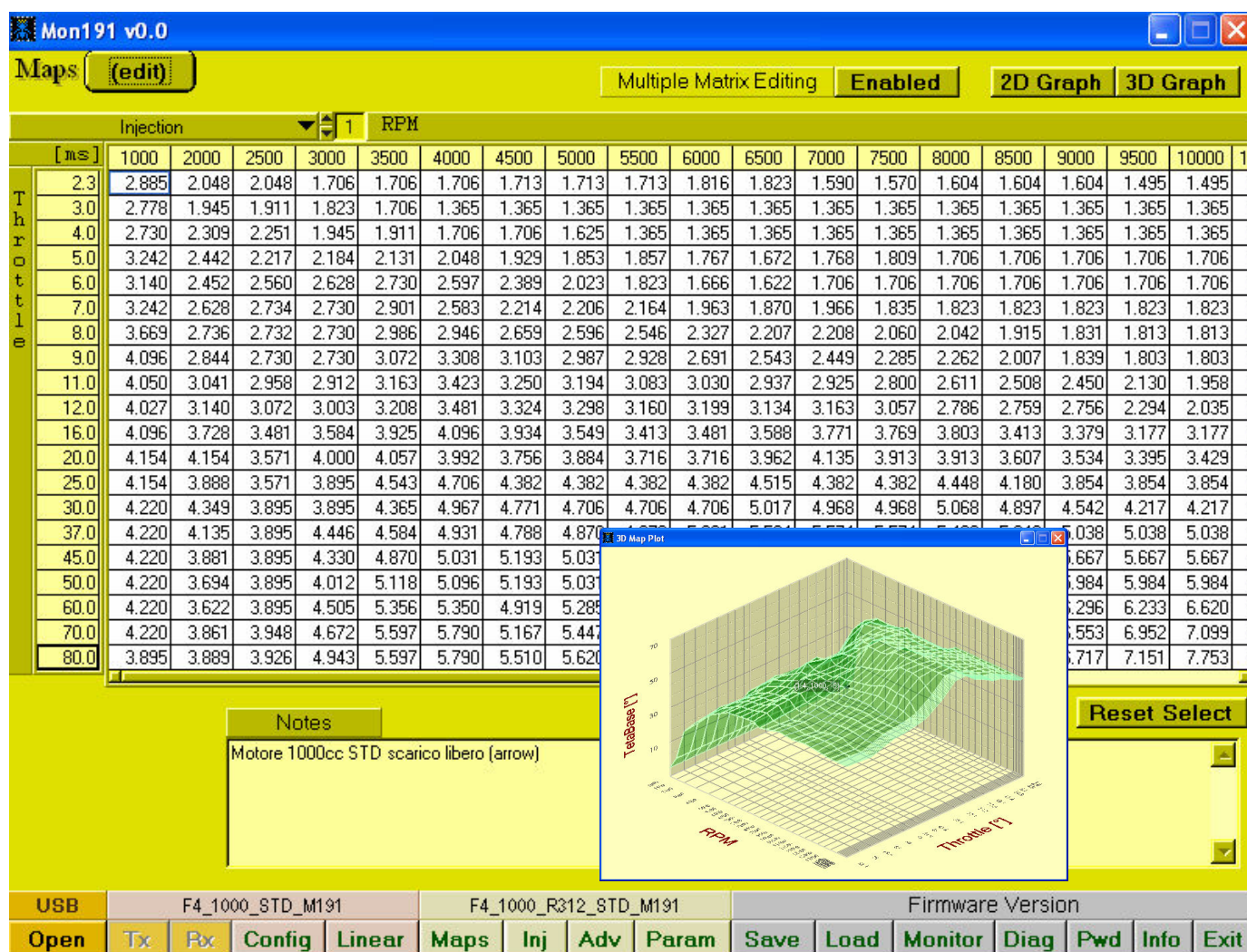
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Maps / Edit 4.1 / Overview

The Map editor can be found by pressing this button.



In Edit mode a 3D representation is automatically displayed as a separate window as shown here, this can be minimised if necessary.



Within the Edit window you can make changes to both the Breakpoints and the contents of the Cells.

The upper left 'pull down' menu contains all of the maps you can edit; alongside it is the cylinder that the map will be applied to. If you do not want individual cylinder mapping, disable the 'Multiple Matrix Editing' button at the top right.

IMPORTANT – If you disable 'Multiple Matrix Editing' all of the map settings within these pages will be deleted.

- ✓ Injection
- Advance
- Injection Correction by Gear
- Advance Correction by Gear
- Injection Correction by Velocity
- Advance Correction by Velocity
- Injection Correction by Acceleration
- Advance Correction by Acceleration
- Cranking Correction
- EBS Valve
- TSS Valve

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Maps / Edit 4.2 / Injection

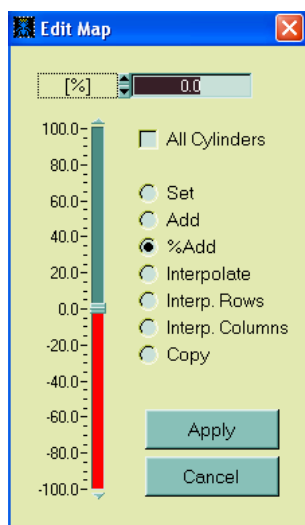
Choose Injection from the pull down menu to display a table of fuel injector Ms plotted against RPM / Throttle for non-pressure charged engines or RPM / Air pressure for charged engines.

Use the Arrow keys to decide which cylinder you are working with. For Ducati engines cylinder 1 relates to the Horizontal cylinder.

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Injection		RPM					
[ms]		1000	1500	2100	3000	4000	
Throttle	1.4	2.157	1.959	1.684	1.520	1.314	
	2.8	1.931	1.685	1.355	1.355	1.427	
	4.9	2.317	1.896	1.643	1.520	1.470	
	8.1	2.758	2.633	2.300	2.218	2.013	
	10.9	3.090	2.949	2.751	2.751	2.423	
	15.2	3.862	3.475	3.327	3.327	3.122	

Injection		RPM					
[ms]		1000	1500	2100	3000	4000	5000
Throttle	1.4	2.157	1.959	1.684	1.520	1.314	1
	2.8	1.931	1.685	1.355	1.355	1.427	1
	4.9	2.317	1.896	1.643	1.520	1.470	1
	8.1	2.758	2.633	2.300	2.218	2.013	1
	10.9	3.090	2.949	2.751	2.751	2.423	2
	15.2	3.862	3.475	3.327	3.327	3.122	2
19.1		4.082	3.897	3.696	3.696	3.368	2



Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

All cylinders – Tick here if you want your changes to be applied to all cylinders, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

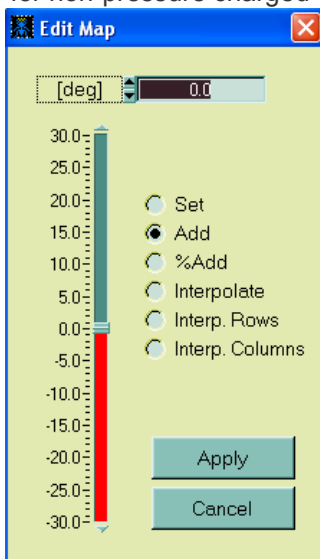
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy – Copies the selected cell values to all other cylinders in this group.

Maps / Edit 4.3 / Advance

Choose Advance from the pull down menu to display a table of spark advance in Deg plotted against RPM / Throttle for non-pressure charged engines or RPM / Air pressure for charged engines.



Individual cylinder mapping is not available

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Advance		RPM					
[deg]		1000	1500	2100	3000	4000	
Throttle	1.4	-5.0	2.0	36.0	38.8	40.5	
	2.8	-5.0	2.0	35.0	39.8	42.5	
	4.9	-5.0	2.0	34.0	42.3	46.8	
	8.1	-5.0	2.0	29.3	38.0	46.8	
	10.9	-5.0	2.0	24.8	37.0	47.3	
	15.2	-5.0	2.0	21.8	31.5	40.0	

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

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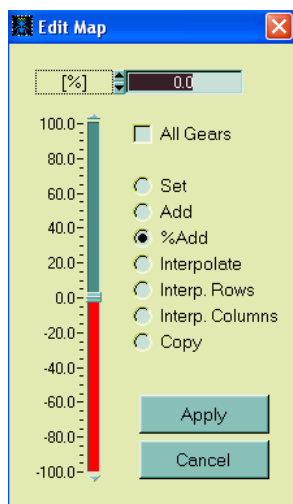
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Maps / Edit 4.4 / Injection correction by gear

Injection correction as a function of RPM/TPOS or RPM/Air pressure with each gear being available via the up/down toggle at top left **KJGear**



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Injection Correction by Gear		1 RPM				
K		1000	1500	2100	3000	4000
Throttle	1.4	1.000	1.000	1.000	1.000	1.0
	2.8	1.000	1.000	1.000	1.000	1.0
	4.9	1.000	1.000	1.000	1.000	1.0
	8.1	1.000	1.000	1.000	1.000	1.0
	10.9	1.000	1.000	1.000	1.000	1.0

All gear – Tick here if you want your changes to be applied to all gears, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

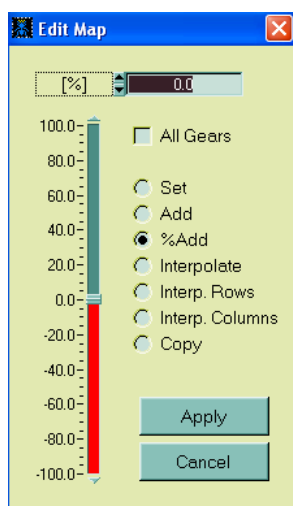
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy – Copies the selected cell values to all other cylinders in this group.

Maps / Edit 4.5 / Advance correction by gear

Advance correction as a function of RPM/TPOS or RPM/Air pressure with each gear being available via the up/down toggle at top left **KAGear**



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Advance Correction by Gear		1 RPM				
[deg]		1000	1500	2100	3000	4000
Throttle	1.4	0.0	0.0	0.0	0.0	0.0
	2.8	0.0	0.0	0.0	0.0	0.0
	4.9	0.0	0.0	0.0	0.0	0.0
	8.1	0.0	0.0	0.0	0.0	0.0
	10.9	0.0	0.0	0.0	0.0	0.0

All Gears – Tick here if you want your changes to be applied to all gears, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy – Copies the selected cell values to all other cylinders in this group.

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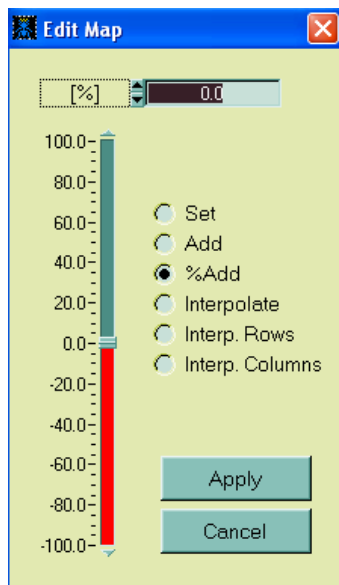
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Maps / Edit 4.6 / Injection correction by Velocity

Injection correction percentage as a function of TPS/SPEED - **KJVel**



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

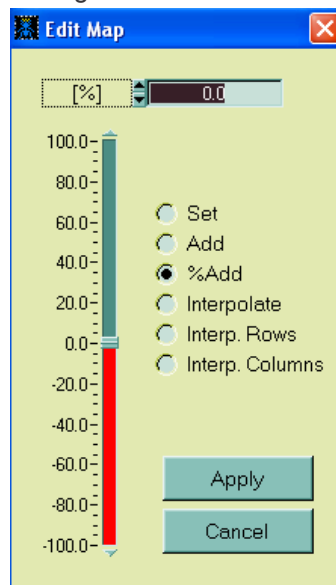
Injection Correction by Velocity						Velocity
K						5
Throttle	1.4	1.000	1.000	1.000	1.000	1.000
	2.8	1.000	1.000	1.000	1.000	1.000
	4.9	1.000	1.000	1.000	1.000	1.000
	8.1	1.000	1.000	1.000	1.000	1.000
	10.9	1.000	1.000	1.000	1.000	1.000
15.2	1.000	1.000	1.000	1.000	1.000	1.000

Set – Applies a fixed value to all of the chosen cells
Add – Adds a fixed amount to all of the chosen cells
%Add – Adds a percentage to all of the chosen cells
Interpolate – Tick here to interpolate 9 or more cells
Interp. Rows – Tick here to interpolate 3 or more cells in the same row
Interp. Columns – Tick here to interpolate 3 or more cells in the same columns
Copy – Copies the selected cell values to all other cylinders in this group.

Maps / Edit 4.7 / Advance correction by Velocity

Injection correction additive as a function of TPS/SPEED - **KAVel**

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.



Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Advance Correction by Velocity						Velocity
[deg]						500
Throttle	1.4	0.0	0.0	0.0	0.0	0.0
	2.8	0.0	0.0	0.0	0.0	0.0
	4.9	0.0	0.0	0.0	0.0	0.0
	8.1	0.0	0.0	0.0	0.0	0.0
	10.9	0.0	0.0	0.0	0.0	0.0
15.2	0.0	0.0	0.0	0.0	0.0	0.0

Set – Applies a fixed value to all of the chosen cells
Add – Adds a fixed amount to all of the chosen cells
%Add – Adds a percentage to all of the chosen cells
Interpolate – Tick here to interpolate 9 or more cells
Interp. Rows – Tick here to interpolate 3 or more cells in the same row
Interp. Columns – Tick here to interpolate 3 or more cells in the same columns
Copy – Copies the selected cell values to all other cylinders in this group.

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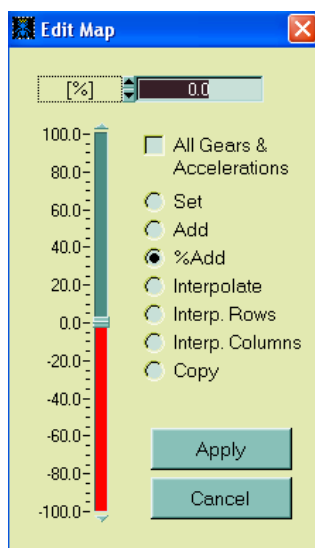
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Maps / Edit 4.8 / Injection Correction by Acceleration

Injection correction percentage as a function of
TPS/RPM/ACCELERATION - **KJAcc**



Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Injection Correction by Acceleration		1 RPM				
K		1000	1500	2000	2500	3000
Throttle	0.0	1.000	1.000	1.000	1.000	1.000
	3.0	1.000	1.000	1.000	1.000	1.000
	5.0	1.000	1.000	1.000	1.000	1.000
	10.0	1.000	1.000	1.000	1.000	1.000
	15.0	1.000	1.000	1.000	1.000	1.000
	20.0	1.000	1.000	1.000	1.000	1.000

All Gears & Accelerations – Tick here if you want your changes to be applied to all gears and all accelerations, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group.

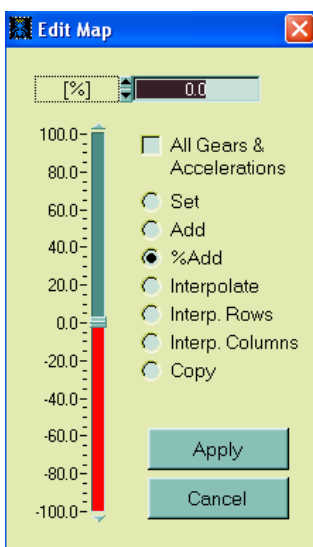
In this box you can choose 6 different values of engine acceleration. For each value you have different maps for each gear, so in this window you have 36 plans listed.

Acceleration	
1	500
2	800
3	1500
4	2000
5	2500
6	3000

Maps / Edit 4.9 / Advance Correction by Acceleration

Injection correction additive as a function of
TPS/RPM/ACCELERATION - **KAAcc**

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.



Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Advance Correction by Acceleration		1 RPM				
[deg]		1000	1500	2000	2500	3000
Throttle	0.0	0.0	0.0	0.0	0.0	0.0
	3.0	0.0	0.0	0.0	0.0	0.0
	5.0	0.0	0.0	0.0	0.0	0.0
	10.0	0.0	0.0	0.0	0.0	0.0
	15.0	0.0	0.0	0.0	0.0	0.0
	20.0	0.0	0.0	0.0	0.0	0.0

All Gears & Accelerations – Tick here if you want your changes to be applied to all gears and all accelerations, not just the one you are working on

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

Copy - Copies the selected cell values to all other cylinders in this group

In this box you can choose 6 different values of engine acceleration. For each value you have different maps for each gear, so in this window you have 36 plans listed.

Acceleration	
1	500
2	800
3	1500
4	2000
5	2500
6	3000

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Maps / Edit 5.0 / Cranking corrections

This is the starting enrichment map **KJCrnk** with the temperature at the left side and the number of crank rotations on the upper row. Within the table are the gains to be applied to the map during the start procedure.

To help understand this, choose a typical temperature at the left side (example +30°C) for the first 5 rotations of the engine the base fuel map will be multiplied by 2.01, from 5-10 rotations this will drop to 1.82 and onwards until the far right hand column is reached. The map will then work from this final cell downwards as the engine warms up and normal running temperature is reached.

Cranking Correction		Revolutions																	
Water Temperature	K	5	10	15	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
	-30.0	2.500	2.200	2.100	1.900	1.850	1.800	1.700	1.650	1.500	1.400	1.300	1.250	1.200	1.150	1.100	1.050	1.000	1.
	-25.0	2.500	2.200	2.100	1.900	1.850	1.800	1.700	1.650	1.500	1.400	1.300	1.250	1.200	1.150	1.100	1.050	1.000	1.
	-20.0	2.500	2.200	2.100	1.900	1.850	1.800	1.700	1.650	1.500	1.400	1.300	1.250	1.200	1.150	1.100	1.050	1.000	1.
	-15.0	2.500	2.200	2.100	1.900	1.850	1.800	1.700	1.650	1.500	1.400	1.300	1.250	1.200	1.150	1.100	1.050	1.000	1.
	-10.0	2.500	2.200	2.100	1.900	1.850	1.800	1.700	1.650	1.500	1.400	1.300	1.250	1.200	1.150	1.100	1.050	1.000	1.
	0.0	2.510	2.510	2.450	2.450	2.380	2.320	2.130	1.950	1.250	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	10.0	2.510	2.510	2.450	2.450	2.320	2.320	2.070	1.820	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	20.0	2.510	2.010	1.880	1.690	1.630	1.510	1.380	1.320	1.190	1.130	1.070	1.000	1.000	1.000	1.000	1.000	1.000	1.
	30.0	2.010	1.820	1.690	1.510	1.380	1.320	1.190	1.130	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	40.0	1.800	1.420	1.350	1.250	1.190	1.190	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	50.0	1.320	1.320	1.250	1.250	1.190	1.190	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	60.0	1.150	1.100	1.050	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	70.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	80.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	90.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	100.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	110.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	120.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	130.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.
	140.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.

Edit Map

[%]

0.0

100.0

80.0

60.0

40.0

20.0

0.0

-20.0

-40.0

-60.0

-80.0

-100.0

☐ Set

☐ Add

☒ %Add

☐ Interpolate

☐ Interp. Rows

☐ Interp. Columns

Apply

Cancel

Set – Applies a fixed value to all of the chosen cells

Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns

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Maps / Edit 5.1 / EBS valve

This table is to set duty cycle of output PWM EBS valve

		EBS Valve				RPM	
		1000	2000	2500	3000	3500	4000
Throttle	2.3	0.0	0.0	0.0	0.0	0.0	0.0
	3.0	0.0	0.0	0.0	0.0	0.0	0.0
	4.0	0.0	0.0	0.0	0.0	0.0	0.0
	5.0	0.0	0.0	0.0	0.0	0.0	0.0
	6.0	0.0	0.0	0.0	0.0	0.0	0.0
	7.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.0	0.0	0.0	0.0	0.0	0.0	0.0

Values in EBS VALVE are a percentage

100% = completely open

0% = completely closed

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Set – Applies a fixed value to all of the chosen cells

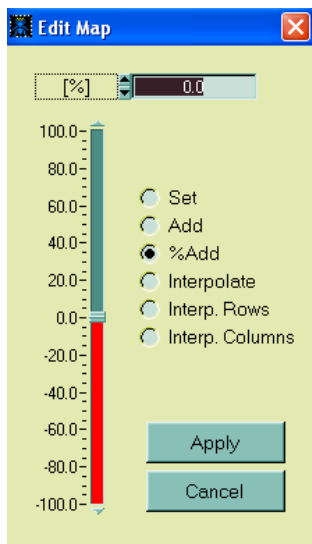
Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns



Maps / Edit 5.2 / TSS valve

This table is to set duty cycle of output PWM EBS valve

Values in TSS VALVE are a percentage

		TSS Valve				RPM
		1000	2000	2500	3000	3500
Throttle	2.3	0.0	0.0	0.0	0.0	0.0
	3.0	0.0	0.0	0.0	0.0	0.0
	4.0	0.0	0.0	0.0	0.0	0.0
	5.0	0.0	0.0	0.0	0.0	0.0
	6.0	0.0	0.0	0.0	0.0	0.0
	7.0	0.0	0.0	0.0	0.0	0.0
	8.0	0.0	0.0	0.0	0.0	0.0
	9.0	0.0	0.0	0.0	0.0	0.0

100% = completely open

0% = completely closet

Changes to individual cells can be made by 'double clicking' and typing directly into the cell the new value.

Use the mouse to drag an area covering multiple cells as shown here, then press the right mouse button to open the Edit window.

Set – Applies a fixed value to all of the chosen cells

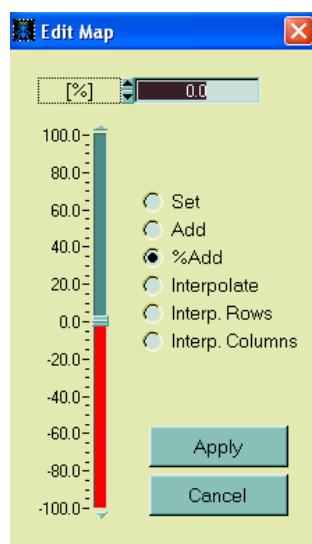
Add – Adds a fixed amount to all of the chosen cells

%Add – Adds a percentage to all of the chosen cells

Interpolate – Tick here to interpolate 9 or more cells

Interp. Rows – Tick here to interpolate 3 or more cells in the same row

Interp. Columns – Tick here to interpolate 3 or more cells in the same columns



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Maps / Edit 5.3 / Injection (correction) overview

The Injection correction editor can be found by pressing this button.

Com	1	749	default	Firmware Version											
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

Within this environment you can define the corrections to the fuel maps against other inputs:

- Air temperature
- Water temperature
- Individual cylinders
- Air pressure

This environment also allows you to define the injection phase as a function of engine RPM.

Maps / Edit 5.4 / Injection (correction) / Air temperature

Air Temperature Correction																
[°C]	-20.0	-10.0	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	60.0	70.0	80.0
K	1.000	1.000	1.000	1.030	1.020	1.010	1.000	0.990	0.980	0.970	0.960	0.950	0.940	1.000	1.000	1.000

A gain can be applied to the fuelling at each of the individual temperature breakpoints. Gain of 1.000 = no correction. Gain of 0.000 will switch off the fuel at this temperature.

Maps / Edit 5.5 / Injection (correction) / water temperature

Water Temperature Correction																
[°C]	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0
K	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

A gain can be applied to the fuelling at each of the individual temperature breakpoints. Gain of 1.000 = no correction. Gain of 0.000 will switch off the fuel at this temperature.

Maps / Edit 5.6 / Injection (correction) / Individual cylinders

Cylinder Correction																
RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
K1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
K2	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
K3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
K4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

A gain can be applied to the fuelling at each of the individual RPM breakpoints for each of the cylinders 1 > 4. Gain of 1.000 = no correction. Gain of 0.000 will switch off the fuel at this cell position.

Maps / Edit 5.7 / Injection phase

Phase																
RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
[deg]	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110

Table for the definition of injection phase as a function of RPM – The angle is measured from Tooth 0 to the injection opening time. **FaseBase**.

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Maps / Edit 5.8 / Air Pressure Correction

Air Pressure Correction																
[mBar]	700	805	857	909	930	950	971	992	1002	1013	1018	1024	1035	1040	1045	1050
K	0.776	0.828	0.875	0.930	0.948	0.960	0.975	1.000	1.010	1.015	1.020	1.025	1.030	1.035	1.040	1.045

A gain can be applied to the fuelling at each of the individual pressure / TPS breakpoints. Gain of 1.000 = no correction. Gain of 0.000 will switch off the fuel at this cell position.

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Maps / Edit 6.1 / Advance (correction) overview

The Advance correction editor can be found by pressing this button.

Com	1	749	default	Firmware Version											
Open	Tx	Rx	Config	Linear	Maps	Ini	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

Within this environment you can define the corrections to the advance maps against other inputs:

- Air temperature
- Water temperature
- Individual cylinders
- Air pressure

Maps / Edit 6.2 / Advance (correction) / Air temperature

Air Temperature Correction																
[°C]	-10.0	-5.0	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.0	-3.0	-4.0	-5.0	-5.0	-5.0

An offset in Deg can be applied to the advance at each of the individual temperature breakpoints.

Maps / Edit 6.3 / Advance (correction) / Water temperature

Water Temperature Correction																
[°C]	-20.0	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

An offset in Deg can be applied to the advance at each of the individual temperature breakpoints.

Maps / Edit 6.4 / Advance (correction) / Individual cylinders

Cylinder Correction																
RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
1 [deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 [deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 [deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 [deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

An offset in Deg can be applied to the advance at each of the individual RPM breakpoints, for each cylinder 1 > 4

Maps / Edit 6.5 / Advance (correction) / Air pressure

Air Pressure Correction																
[mBar]	400	450	500	550	600	650	700	750	800	850	900	1000	1050	1100	1150	1200
[deg]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

An offset in Deg can be applied to the advance at each of the pressure / TPS breakpoints

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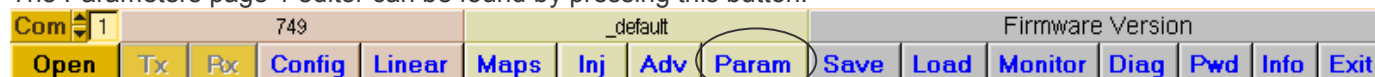
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Maps / Edit 7.1 / Parameters / Page 1 / Overview

The Parameters page 1 editor can be found by pressing this button.



Toggle between page 1, Page 2 and Page 3 of the parameters can be done by sequential presses of this **Param** button.

Parameters page 1 contains the following settings:

- Filter about engine calculations
- Controls during ECU power on and engine start
- RPM limiters
- Load cell (gear change) calibration
- Overrun cut off
- Gear change calibration and set up
- Wheel speed calibration
- Relay on/off control

Mon191 v0.0

Parameters (pag.1/3) Engine Calculations Mean RPM Filter Depth [Revs] 1 Acceleration Filter Depth [Revs] 1

Start & On/Off

Fuel-Pump Timer [ms]	2000	Engine Thresholds [rpm]	
Pre-Injection Delay [ms]	250	Upper (ON)	150
Drop-Switch Delay [ms]	1000	Lower (OFF)	100

Pre-Injection Time

[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
[ms]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Engine Limits [rpm]

Gear	Spark	Injection
1	13500	13600
2	13500	13600
3	13500	13600
4	13500	13600
5	13500	13600
6	13500	13600

Gear & Shift

Gear	Thresholds	Shift	Thresholds	TimeOuts [ms]	Shift Sequence
1	78	1-2	1023	55	MinSpeed [rpm] 2000
2	234	2-3	1023	55	Delay [ms] 5
3	390	3-4	1023	55	HoldOff [ms] 300
4	546	4-5	1023	55	Advance [deg] 0.0
5	702	5-6	1023	55	K-Injection 1.150
6	858				AfterTO [revs] 0
Delta	10				

Set Threshold Offset 11

Cut-Off

Thresholds	Standard	Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4	
Speed [rpm]	7000	0.0	0.0	0.0	0.0	
Throttle [deg]	2.7	1.000	1.000	1.000	1.000	
Throttle Variation [deg/s]	1200	0	0	0	0	
Throttle Var. Filter Depth	1	1^	2^	3^	4^	
Special Exit Duration Count	0	Advance Offset [deg]	0.0	0.0	0.0	0.0
		K-Injection	1.000	1.000	1.000	1.000
		Exit Time [ms]	0	0	0	0
		Special	1^	2^	3^	4^
		Advance Offset [deg]	0.0	0.0	0.0	0.0
		K-Injection	1.000	1.000	1.000	1.000
		Exit Delay Count	0	0	0	0

Load-Cell

Threshold	100
Compensation	0

Wheels

	Front	Rear
Circumference [mm]	1880	2040
Pulses	5	5

Fan Activation

[°C]	30	35	40	45	50	55	60	65	70	84	85	90	95	100	105	110
1=On	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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Maps / Edit 7.2 / Parameters / Page 1 / Engine calculations

Engine Calculations	Mean RPM Filter Depth [Revs] 1	Acceleration Filter Depth [Revs] 6
---------------------	---	---

Mean RPM Filter Depth [Revs] – number of motor revolutions which are calculated to obtain the value MeanRpm (average)

Acceleration Filter Depth [Revs] – number of motor revolutions which are calculated to obtain the value Acceleration (average)

Maps / Edit 7.3 / Parameters / Page 1 / Start – Turn on/off

Start & On/Off	Fuel-Pump Timer [ms] 2000	Engine Thresholds [rpm]														
	Pre-Injection Delay [ms] 250	Upper (ON) 150														
	Drop-Switch Delay [ms] 1000	Lower (OFF) 100														
Pre-Injection Time																
[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
[ms]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Fuel pump timer – value in Ms for the fuel pump to run at 'power on'

Pre-Injection delay - Amount of time after power on before the injectors open for the single pre-injection.

Drop switch delay time – Delay after the Dropswitch input is activated before the engine cut occurs, this is to ensure that small events less than this time do not interfere with normal operation.

Engine threshold – ON/OFF - RPM boundaries to define when the engine is running and when it has stopped. Always ensure that the Lower is less than the Upper and provide spacing between these parameters to create a hysteresis.

Pre injection time – At ECU power on all injectors are opened for a short period of time to prime the cylinders. The duration of this opening is defined within the **Pre-injection Time** table as a function of water temperature.

Maps / Edit 7.4 / Parameters / Page 1 / Engine speed limits

Values in RPM for each of the 6 possible gears. To create a softer cut the Injection value is usually a little lower than the Spark value.

For systems without a gear position sensor you should make all values in both columns the same. In this way, any fluctuation of the unconnected input will not affect your cut limit.

Engine Speed Limits [rpm]		
Gear	Spark	Injection
1	14000	13900
2	14000	13900
3	14000	13900
4	14000	13900
5	14000	13900
6	14000	13900

Maps / Edit 7.5 / Parameters / Page 1 / Wheels

These parameters are used to calibrate the front and rear wheels speeds. Enter the rolling circumference in mm and the number of trigger teeth for one wheel revolution.

Remember that this needs to be correct if you are planning to use wheel speed within your map corrections.

Wheels	Front	Rear
Circumference [mm]	1900	2005
Pulses	5	5

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Maps / Edit 7.6 / Parameters / Page 1 / Load cell

Parameters for the load cell connected to the gear change linkage.

Threshold – This threshold applies to the pre-amplified loadcell signal: When this signal gets greater than the threshold a “set” signal is generated to initiate the gear change strategy –

Note – If your load cell creates a reducing signal with applied load swap the S1 and S2 signal wires.

Compensation – Correction of a possible loadcell offset.

LoadCell	
Threshold	100
Compensation	0

Maps / Edit 7.7 / Parameters / Page 1 / Cut off

The ‘cut off’ parameters are used for controlling spark advance and fuelling during engine ‘over-run’.

To enable this strategy the engine must have a higher RPM than the **Threshold – Speed** and lower throttle value than the **Threshold – Throttle**.

Throttle variation – limit to disable special strategy in function of throttle variation

Throttle var. Filter Depth – number of sample to calculate throttle variation

Special Exit Duration Count – number of revolutions to get the maximum out of the special strategy

Cut-Off						
Thresholds		Standard	Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4
Speed [rpm]	8000	Advance Offset [deg]	0.0	0.0	0.0	0.0
Throttle [deg]	20.0	K-Injection	1.000	1.000	1.000	1.000
Throttle Variation [deg/s]	1200	Exit Time [ms]	0	0	0	0
		Special	1^	2^	3^	4^
Throttle Var. Filter Depth	1	Advance Offset [deg]	0.0	0.0	0.0	0.0
		K-Injection	1.000	1.000	1.000	1.000
Special Exit Duration Count	1	Exit Delay Count	0	0	0	0

When the strategy is active the correction settings for Advance as an ‘additive’ and Injection time as a Gain are applied to the map for each cylinder. Note that a gain of 0 to the injection time will cut the fuel completely.

When the strategy de-activates you can specify an **exit time** to return to normal map settings.

I parametri del cut off vengono utilizzati per il controllo dell'anticipo e l'iniezione durante l'over run.

Maps / Edit 7.8 / Parameters / Page 1 / Fan activation

Relais Activation																
[°C]	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
1=On	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ECU has a dedicated output for pilot fan. It's possible to set different temperature to activate or not the fan.

0 = off

1 = on

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Maps / Edit 7.9 / Parameters / Page 1 / Gear

The gear settings control both the calibration of the gear position sensor and the reaction of the ECU during gear change.

Note: It is assumed that the value of the potentiometer will increase with the gear number, if not you should change the wiring of the potentiometer.

Gear & Shift	Gear Thresholds		Shift Thresholds		TimeOuts [ms]		Shift Sequence	
	1	276	1-2	1023	-	80	MinSpeed [rpm]	5000
	2	427	2-3	1023	-	80	Delay [ms]	5
	3	587	3-4	1023	-	80	HoldOff [ms]	300
	4	742	4-5	1023	-	80	Advance [deg]	0.0
	5	897	5-6	1023	-	80	K-Injection	0.800
	6	1000	Set Threshold				AfterTO [revs]	0
	Delta	0	Offset		11			

Gear thresholds – Values in 10bit format of the potentiometer when the gear is fully inserted and recognised.

Shift thresholds – Values of the gear potentiometer to provide the ‘aimed threshold’ and placed half way between adjacent gears.

Delta - This is half the width of the “inserted gear recognition intervals. To create a boundary around which the gear is recognised – The gear will be considered as fully inserted when zone created by the tolerance is entered.

Set Threshold – This parameter is only active if “Potentiometer Only” is selected as the “Gear-Shift Mode” (see Configuration – General – Miscellaneous 1.17). Adding this value to each gear thresholds gives the A/D-point beyond which a simulated “set” signal is generated. –

Min Speed – Minimum RPM for the gear shift sequence to activate.

Delay – Delay in Ms for the strategy to activate following either a signal from the Load cell, the Switch input or the Shift threshold from the potentiometer.

Time out – The maximum time for the gear change process to complete in Ms.

Hold Off – To eliminate the possibility of a ‘double switch’ the time ‘de-bounce’ disables the strategy from re-occurring for ‘x’ Ms starting from the end of the previous occurrence.

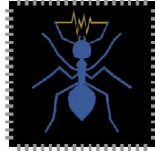
Advance – Spark advance value to be applied during gear change, this value replaces the main map.

K- Injection – Correction factor applied to the main Injection map for the duration of the gear change.

After TO revs – When the gear-shift strategy reaches the Time-Out limit, the end of the strategy is delayed by the number of engine revolutions given by this parameter.

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Maps / Edit 7.10 / Parameters / Page 1 / Gear Strategy

Inserted gear recognition – Each of the 6 gears corresponds to a fixed zone in the 10bit A/D-range of the gear-position potentiometer. A gear is considered completely inserted when the gear-position is within the corresponding zone. We call these zones the “inserted gear recognition intervals”, or simply “gear intervals”. These intervals are centred on the “**gear thresholds**” and their tolerance is given by “**delta**”.

The lower limit of a gear interval is the point where the corresponding gear gets “completely inserted” and is thus called “complete gear insertion threshold”.

IMPORTANT - you should set all values in order to avoid overlapping intervals

Start of gear change – A gear-shift sequence starts when the leading edge of the “set” signal is detected.

In case of standard strategy (“All Inputs”) the “set” signal is given by the gear-shift input OR with the load cell signal. When the alternate strategy is selected (“Potentiometer Only”) the “set” signal is initiated when the gear position reaches the **Shift Threshold**. This simulated “set” signal is deactivated when the gear position reaches the “complete insertion threshold” of the next gear.

The “set” is recognized and is initiated only after the time given by the **Delay** parameter has elapsed, starting from the leading edge of the signal.

Recognition of subsequent set signals is inhibited under the following circumstances:

- When a gear change sequence is already in progress.
- During a time-interval given by the **HoldOff** parameter starting from the end of the completion of the gear change.
- If the 6th gear is inserted.
- If the engine speed is below the limit given by the **MinSpeed** parameter.

Gear change strategy – A gear change sequence is composed by a maximum of 4 phases.

Phase 1 – Starting when a “set” command and ending when the gear position reaches the “**shift threshold**”. During this phase ignition is inhibited (“Cut-Off” phase).

Phase 2 – Starting when the gear position reaches the “shift threshold” and ends on the “partial gear insertion threshold”, which is calculated as the arithmetic mean of the “shift threshold” and the “complete insertion threshold” of the next gear. In this phase ignition is reactivated, but with fixed advance given by the **Advance** parameter

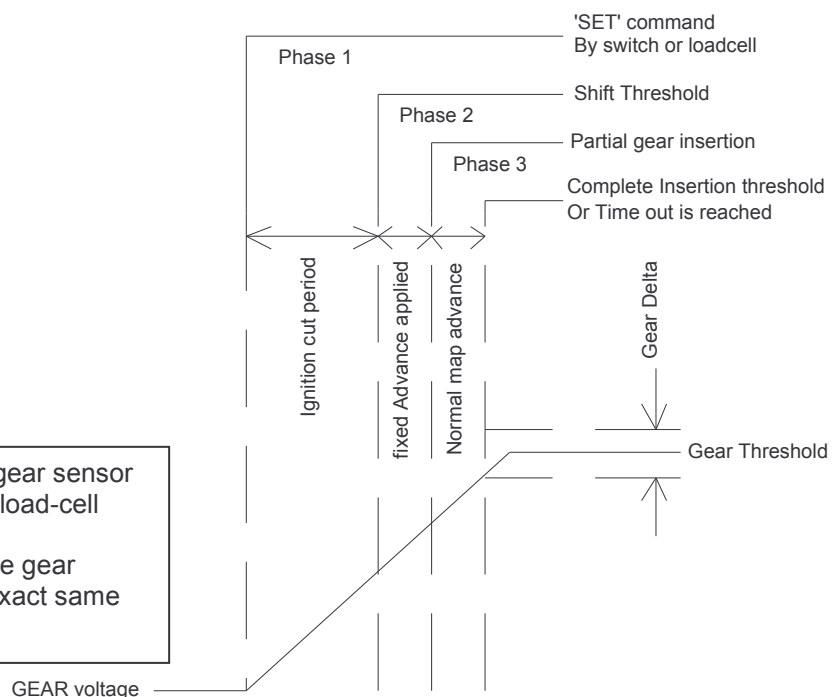
Phase 3 - Starting on the “partial gear insertion threshold” and ends on the “complete insertion threshold”, or when the time-out limit is reached. In this phase ignition occurs normally, with advance coming from map interpolations and all the various corrections.

Phase 4 - It starts when the Time-Out limit is reached (only if the gear still isn't completely inserted) and ends after a number of engine revolutions given by the **AfterTO** parameter (“After Time-Out” phase), or when the gear position reaches the “complete insertion threshold”. During this phase ignition is again inhibited.

During all 4 phases (that is during the whole gear change sequence) fuel injection is corrected by a gain given by the **K-Injection** parameter.

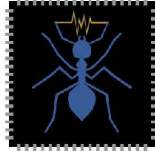
Example of shift strategy with a gear sensor and ‘Set’ initiated from switch or load-cell

Note: Example presumes that the gear sensor will start to move at the exact same moment as the Set command



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Special cases - With proper setting of parameter values, you can force a gear change sequence without some of the phases explained above.

1 - Gear change with Cut-off only.

You can avoid phase 2 and 3 completely by setting the **Shift Thresholds** greater than or equal to the **Complete Insertion Thresholds** of the next gear (the simplest way is to set them to 1023, that is the maximum A/D-value). If the **AfterTO** is greater than 0, the fourth phase is also applied as an extension of the cut-off phase. In this mode the Cut Off period will be equal to the **Time Out setting**

2 - Gear change without cut-off.

To avoid the occurrence of the phase 1, you have to set the **shift thresholds** less than the **Complete insertion Thresholds** of the next gear (simply set them to 0). Doing so the **Partial Insertion Thresholds** are ignored by the strategy.

3 - Gear change without After Time-Out phase.

Simply set the **AfterTO** parameter to 0.

4 - Gear change with forced time-out.

To force the sequence to reach the time-out limit (without ending on the complete insertion threshold) you have to set the **Delta** parameter to 0. Doing so the strategy also ignores the shift thresholds and the partial insertion thresholds. This setting is needed when using a selector instead of a potentiometer as the gear position sensor (in this case there is no guarantee as for the AD-value during the gear change sequence).

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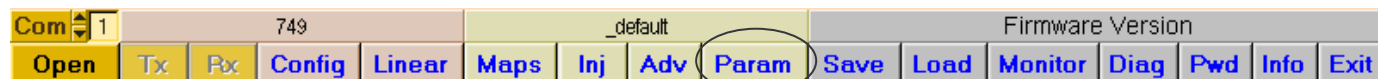
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Maps / Edit 8.1 / Parameters / Page 2 / Transient

The Parameters page 2 editor can be found by pressing this button.



Toggle between page 1 page 2 and page 3 of the parameters can be done by sequential presses of this **Param** button.

Parameters page 2 contains the corrections for both Injection and Advance transient strategy.

Mon191 v0.0

Parameters (pag.2/3)

Advance Transient

	1 (lower)	2	3	4	5	6	7	8 (upper)
Time Base [ms]	5							
Filter Depth	1							
Noise Threshold [deg]	2.0							
Clipping [deg]	+ 7.0							
	- 5.0							
Thresholds [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800
Thresholds [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800

Coefficient by RPM

[rpm]	1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6750
KA+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
KA-	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000

Injection Transient

	1 (lower)	2	3	4	5	6	7	8 (upper)
Time Base [ms]	5							
Filter Depth	1							
Noise Threshold [deg]	2.0							
Clipping [ms]	+ 5.000							
	- 5.000							
Threshold [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Decay [deg/s]	800	800	800	800	800	800	800	800
Threshold [deg]	2.0	4.0	6.0	9.0	16.0	30.0	43.0	60.0
Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decay [deg/s]	800	800	800	800	800	800	800	800

Coefficient by RPM

[rpm]	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
KJ+	1.400	1.400	1.400	1.400	1.400	1.200	0.950	0.950	0.950	0.950	0.950	0.900	0.950	0.950	0.950	0.950	0.950	0.950
KJ-	-1.400	-1.400	-1.400	-1.400	-1.400	-1.200	-1.200	-1.200	-1.200	-1.100	-1.100	-1.050	-1.050	-1.050	-1.050	-1.050	-1.050	-1.050

Coefficient by Water Temperature

[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
KJ+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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Maps / Edit 8.2 / Parameters / Page 2 / Advance Transient settings 1.

The advance transient is defined by a series of parameters.

Time base Ms. – Time period over which the input change is considered.

Filter depth – Number of samples over which the filter is calculated.

Noise threshold – Value in throttle deg variation within which the transients are not considered. This is used to eliminate small fluctuations in throttle stability.

Clipping – Maximum (+) and Minimum (-) value in Degrees of spark advance that are permitted as a result of the transient strategy.

Advance Transient

Time Base [ms]	5	
Filter Depth	5	
Noise Threshold [deg]	1.0	
Clipping [deg]	+	5.0
	-	5.0

Maps / Edit 8.3 / Parameters / Page 2 / Advance Transient settings 2.

To enable differing transient values at different throttle values, 8 breakpoints for throttle may be defined in the upper row.

Within these throttle boundaries the rate of change of throttle is monitored as per

previous settings in 8.2 and a positive **Gain** is applied to suit your needs. This output is known as the **Throttle Advance transient** and will be a value either Positive or Negative depending whether the throttle was opening or closing. For all of the Positive transient states the upper set of values will be applied.

		1 (lower)	2	3	4	5	6	7	8 (upper)
+	Thresholds [deg]	0.0	10.0	20.0	30.0	40.0	50.0	70.0	100.0
	Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Decay [deg/ms]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-	Thresholds [deg]	0.0	10.0	20.0	30.0	40.0	50.0	70.0	100.0
	Gain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Decay [deg/ms]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Decay (deg/ms) – Maximum transient decay (decreases for positive values) allowed in a single time interval (as defined by the time base). This applies starting from the time the transients begins to decrease until it returns to 0. The effect is to limit the speed of the transient's decay (return to normal)

Similar settings are applied when the throttle is closing.

The throttle advance transient can be further modified by applying Gains as a function of different RPM **DADInT** as shown in this table below.

Coefficient by RPM																		
[rpm]	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
KA+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
KA-	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000

The KA+ is used to modify positive (increasing) throttle transients and the KA- is used to modify negative (reducing) throttle transients.

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Maps / Edit 8.4 / Parameters / Page 2 / Injection Transient settings 1

The Injection transient is defined by a series of parameters.

Time base Ms. – Time period over which the input change is considered.

Filter depth – Number of samples over which the filter is calculated.

Noise threshold – Value in throttle deg / mBar variation within which the transients are not considered. This is used to eliminate small fluctuations in throttle / Air pressure stability.

The choice of **mBar** or **Throttle** is defined with the Configuration page as detailed in section 1.17

Clipping – Maximum (+) and Minimum (-) value in mSec injector duration that are permitted as a result of the transient strategy.

Injection Transient

Time Base [ms]	5	
Filter Depth	5	
Noise Threshold [mBar]	1	
Clipping [ms]	+	0.900
	-	0.500

Maps / Edit 8.4 / Parameters / Page 2 / Injection Transient settings 2

To enable differing transient values at different throttle values / Air pressures, 8 breakpoints for may be defined in the upper row.

Within these boundaries the rate of change of

Throttle / Air pressure is monitored as per previous settings in 8.4 and a positive **Gain** is applied to suit your needs. This output is known as the **Injection time transient** and will be a value either Positive or Negative depending whether the throttle was opening or closing. For all of the Positive transient states the upper set of values will be applied.

		1 (lower)	2	3	4	5	6	7	8 (upper)
+	Threshold [deg]	0.0	10.0	20.0	30.0	40.0	50.0	70.0	100.0
	Gain	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Decay [deg/ms]	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
-	Threshold [deg]	0.0	10.0	20.0	30.0	40.0	50.0	70.0	100.0
	Gain	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Decay [deg/ms]	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Decay (deg/ms) – Maximum transient decay (decreases for positive values) allowed in a single time interval (as defined by the Time Base). This applies starting from the time the transients begins to decrease until it returns to 0. The effect is to limit the speed of the transient's decay (return to normal)

Similar settings are applied when the throttle / Air pressure is reducing.

The injection time transient can be further modified by applying Gains as a function of different RPM **DJDInTrpm** as shown in this table below.

Coefficient by RPM																		
[rpm]	900	1000	1150	1300	1500	1600	1800	2200	2400	2600	2800	3000	3200	3500	3800	4000	4200	4600
KJ+	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.500	1.500	1.300	1.300	1.300	1.300	1.500	1.200	1.200
KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.500	-1.000	-1.000	-1.000	-1.000	-1.000

It may also be adjusted by applying gains as a function of water temperature - **DJDInTth2o**

Coefficient by Water Temperature																
[°C]	-10.0	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0
KJ+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
KJ-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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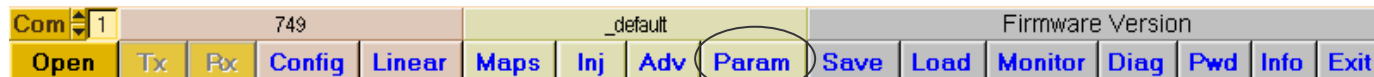
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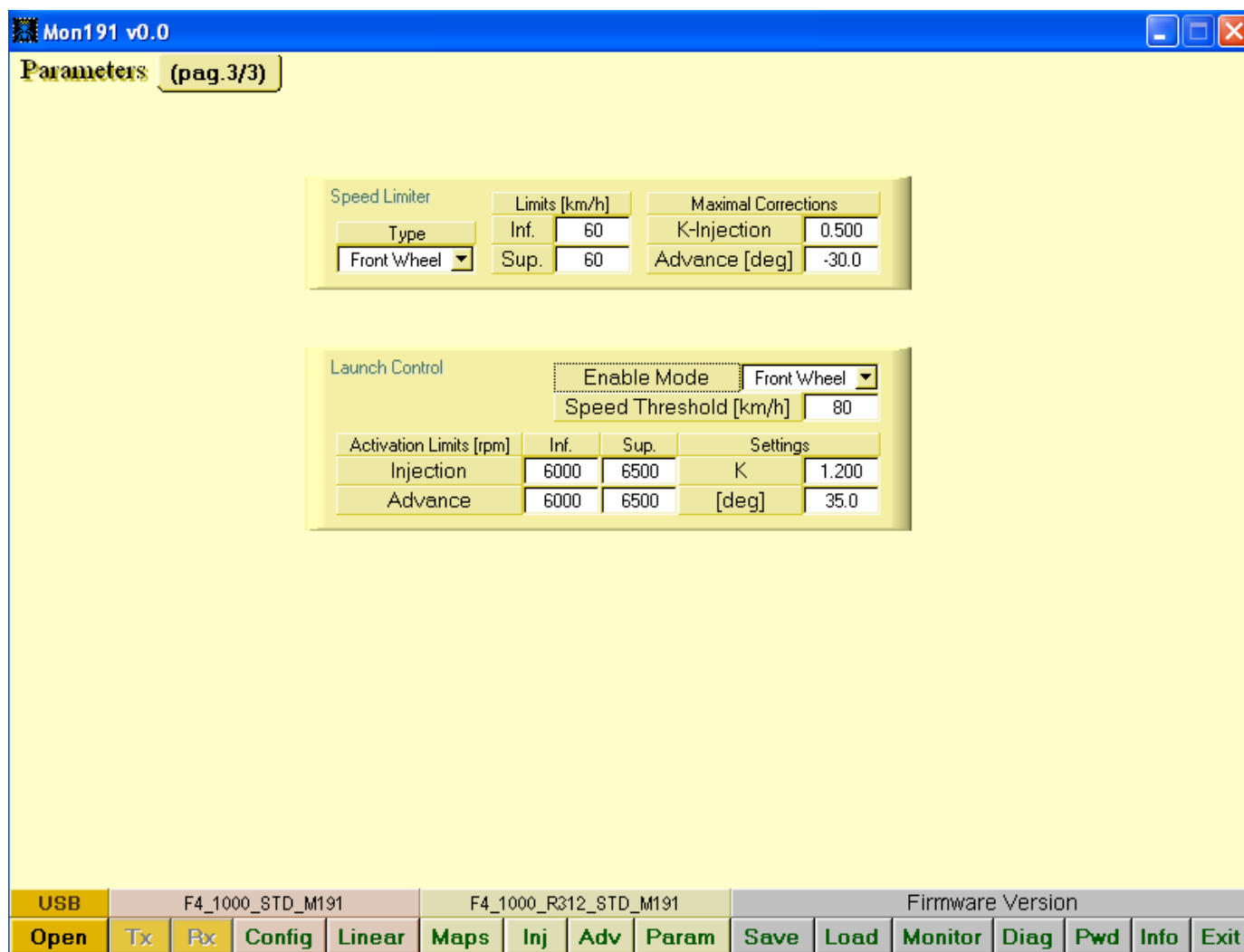
Maps / Edit 8.5 / Parameters / Page 3 / Strategy

The Parameters page 3 editor can be found by pressing this button.



Toggle between page 1 page 2 and page 3 of the parameters can be done by sequential presses of this **Param** button.

Parameters page 2 contains the parameters for speed limiter and launch control strategy.



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Maps / Edit 8.6 / Parameters / Page 3 / Speed limiter

This strategy is defined by a series of parameters.

Type – select a reference wheel to calculate this strategy

Limits [km/h] – set minimum speed and maximum speed of operation strategy

Upper than Sup. Limits apply the corrections from 2 parameters **K-Injection** and **Advance**

Speed Limiter		Limits [km/h]		Maximal Corrections	
Type	Front Wheel	Inf.	40	K-Injection	0.950
		Sup.	50	Advance [deg]	-10.0

Maps / Edit 8.7 / Parameters / Page 3 / Launch control

Type – select a reference wheel to calculate this strategy

Speed Threshold [km/h] - below the threshold set you can turn on strategy with launch control input

within the range inserted in the upper (**Sup.**) and lower (**Inf.**) limits. The strategy adds the corrections column **settings**.

There are 3 corrections:

- Injection (percentage)
- Advance (additive)
- PWM (set a value)

Launch Control		Enable Mode		Speed Threshold [km/h]	
		Front Wheel		20	
Activation Limits [rpm]		Inf.	Sup.	Settings	
Injection		4000	5000	K	1.000
Advance		4000	5000	[deg]	10.0
PWM		4000	5000	[%]	0.0

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Monitor 9.0 / Overview

Com	1	749			_default				Firmware Version						
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

The Monitor page can be accessed by pressing this button on the lower tool bar. This page is used for the following purposes.

- Real time monitoring of input / outputs / Internal calculated values
- Warning signals
- Manual control over injectors / coils / pump
- Manual temporary trims
- Read back of the map names stored in the ECU.

Remember that you must have an Open – Rs232 link to see this data.

The Monitor page is split into a number of different sections, these are discussed in detail over the following pages.

Mon191 v0.0

Engine RPM 0 0 Acceleration 0 Revolutions 0 Scam 0 err 0 Smot 0 err 0 Injection Spark Cranking Cut-Off Pit-Lane Launch Injection 1 2 3 4 OverTime - - - - OverDwell - - - - EBS Valve 0.0 TSS Valve 0.0	Injection Components TerogBase 1,2,3,4 0.000 0.000 0.000 0.000 KJCy1,2,3,4 0.000 0.000 0.000 0.000 KJTH2D 0.000 KJTAir 0.000 KJPair 0.000 KJCrank 0.000 KJGear 0.000 KJVel 0.000 KJAcc 0.000 DJDInTrpm 0.000 DJDInTh2o 0.000 DJDInT 0.000 OffsVbat 0.000	Injection Phase FaseBase 0	Wheels Front Rear Velocity 0 0 Space 0 0
Analog Inputs Throttle 0.0 0 Gear Position 1 0 0 Load-Cell 0 0 Water Temp. 0.0 0 Air Temperature 0.0 0 Air Pressure 0 0 Lambda 0.0 0 Map-Select 1 0 Battery 0.0 0 Adv. Transient 0.0 Throttle Inj. Transient 0.0 Throttle	Advance Components TetaBase 0.0 KATH2D 0.0 KATAir 0.0 KACy1,2,3,4 0.0 KAPair 0.0 KAGear 0.0 KAVel 0.0 KAAcc 0.0 DADInT 0.0 DAPickUp 0.0	Digital Inputs Code Load Scam Hall Stop Drop Switch Shift Set Neutral Clutch Sidestand Launch Pit Limiter Start	Manual Adjusts KJbnc 0.000 KJbnc1 0.000 KJbnc2 0.000 KJbnc3 0.000 KJbnc4 0.000 KFbnc 0 KAbnc 0.0 KAbnc1 0.0 KAbnc2 0.0 KAbnc3 0.0 KAbnc4 0.0 EBS Valve 0.0 TSS Valve 0.0
Mapping Data 1 Mapping Data 2 Configuration Parameters	Outputs Start Relay Trigger 1 Injector 1 Fuel Pump Trigger 2 Injector 2 Fan Relay Trigger 3 Injector 3 Light Relay Trigger 4 Injector 4	USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version	Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

Monitor 9.1 / Engine

RPM – Real time read out of the engine speed. The larger green LED to the left only illuminates when the crank/(cam) pattern is recognised and considered by the ECU to be correct. The smaller LED turns red if the drop switch or kill switch inputs are active.

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Revolutions – Total number of engine revolutions since the engine started, each time the motor stops/starts this count is reset.

Scam / err – Total number of signals seen from the cam sensor with an error count of the number of signals that are considered to be out of sequence. Count is re-set at engine stop/start

Smot / err – (Smot = Speed Motor) Total number of signals seen from the crank sensor with an error count of the number of signals that are considered to be out of sequence. Count is re-set at engine stop/start

Injection – This LED is activated when the fuel injectors are in operation.

Cranking – This LED is activated during the cranking phase of the engine start.

Spark – This LED is activated when the ignition coils are in operation.

Cut Off – This LED is activated when the engine is in 'Cut Off' state.

Pit-Lane – This LED is activated when the pitlane strategy is on.

Launch – This LED is activated when the launch control strategy is on.

Over Dwell – One or more of these LEDs will illuminate if the ignition coil charge time is too long. Number equates to the cylinder number.

Injection over time – One or more of these LEDs will illuminate if the injection time is too long. The upper row is for high bank injectors, the lower row for the primary bank. Number equates to the cylinder number.

EBS Valve – value indicates the percentage of valve EBS

TSS Valve – value indicates the percentage of valve TSS

Engine			
RPM	0	0	
Acceleration	0		
Revolutions	0		
Scam	0	err	0
Smot	0	err	0
Injection	Spark	Cranking	
Cut-Off	Pit-Lane	Launch	
Injection	1	2	3
OverTime			
OverDwell			
EBS Valve	0.0		
TSS Valve	0.0		

Monitor 9.2 / Engine

Injection phase is the angle between tooth 0 and the opening command of the injectors in degrees of crank rotation.

Injection Phase	
FaseBase	110

Monitor 9.3 / Wheels

Values of the front and rear wheel **Velocity** in Km/h and the **Space** (distance) in meters since the last time the Space was re-set using the Space Re-Set command in the **Diag** page.

Wheels	Front	Rear
Velocity	0	0
Space	0	0

Monitor 9.4 / Digital I/O

This set of LEDs monitor the status of the Inputs / Outputs

Drop Switch – LED is on when drop signal is activated

Shift Set - LED is on when shift signal is activated

Stop - LED is on when stop signal is activated

Scam Hall - LED on when scam signal is activated

Code load - LED on when codeload signal is activated. Note: used for upgrade firmware.

Neutral – led on when neutral signal is activated

Clutch – led on when clutch signal is activated

Sidestand – led on when sidestand signal is activated

Launch – led on when launch signal is activated

Pit Limiter – led on when pit limiter signal is activated

Start – led on when start signal is activated

Digital Inputs	
Code Load	
Scam Hall	
Stop	
Drop Switch	
Shift Set	
Neutral	
Clutch	
Sidestand	
Launch	
Pit Limiter	
Start	

Monitor 9.5 / Output test

These buttons are used to manually activate the Trigger outputs and injector outputs, relay command of Start – Fan – Light and command for fuel pump to test electrical function. These manual tests should always be done before starting the engine for the first time to ensure correct function.

Outputs		
Start Relay	Trigger 1	Injector 1
Fuel Pump	Trigger 2	Injector 2
Fan Relay	Trigger 3	Injector 3
Light Relay	Trigger 4	Injector 4

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Monitor 9.6 / Advance components

This section is dedicated to the values and corrections that make up the ignition advance. All values are in degrees of crank angle

TetaBase - Base Ignition advance taken from the map at the current breakpoint position.

KATH20 - Correction as a function of water temperature

KATAir - Correction as a function of air temperature

KAPair - Correction as a function of air pressure

KAGear - Correction as a function of gear position

KAVel - Correction as a function of speed

KACyl - Correction as a function of individual cylinder settings.

KAAcc - Correction as a function of acceleration

DADint - Correction as a function of the Advance transient strategy

DAPickUp - Correction as a function of the PickUp table

Advance Components			
TetaBase	0.0	KAPair	0.0
KATH20	0.0	KAGear	0.0
KATAir	0.0	KAVel	0.0
KACyl 1,2,3,4	0.0	KAAcc	0.0
	0.0		
	0.0	DADint	0.0
	0.0	DAPickUp	0.0

Monitor 9.7 / Injection components

This section is dedicated to the values and corrections that make up the Injection time.

TerogBase 1,2,3,4 - Base injection time at the current map position in Ms of duration.

KJCyl 1,2,3,4 - Gain correction applied as individual cylinder correction.

KJTH20 - Correction gain as a function of water temperature

KJTair - correzione in funzione della temperatura aria

KJPair - Correction as a function of air pressure

KJCrnk - Correction as a function of cranking and cold start map

KJGear - Correction as a function of gear position

KJVel - Correction as a function of speed

KJAcc - Correction as a function of acceleration

DJDInjTrpm - Correction additive in Ms generated by the transient strategy as a function of RPM.

DJDInjTth2o - Correction additive in Ms generated by the transient strategy as a function of water temperature.

DJDIntT - Total correction additive in Ms generated by the transient strategy including the 'clipping'

OffsVbat - Additive correction to the injection time as a function of the battery voltage

Injection Components				
TerogBase 1,2,3,4	0.000	0.000	0.000	0.000
KJCyl 1,2,3,4	0.000	0.000	0.000	0.000
KJTH20	0.000			
KJTair	0.000	DJDInTrpm	0.000	
KJPair	0.000	DJDInTth2o	0.000	
KJCrnk	0.000	DJDIntT	0.000	
KJGear	0.000			
KJVel	0.000			
KJAcc	0.000	OffsVbat	0.000	

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Monitor 9.8 / Manual adjustments

This section allows you to make temporary real time adjustments. These are not stored in the map.

KJbnc – Global gain correction applied to all cylinders

KJbnc 1 – Gain correction applied to cylinder 1

KJbnc 2 – Gain correction applied to cylinder 2

KJbnc 3 – Gain correction applied to cylinder 3

KJbnc 4 – Gain correction applied to cylinder 4

KFbnc – Additive correction to the injection phase

KAbnc – Additive correction to the ignition advance

KAbnc 1 – Additive correction applied to cylinder 1

KAbnc 2 – Additive correction applied to cylinder 2

KAbnc 3 – Additive correction applied to cylinder 3

KAbnc 4 – Additive correction applied to cylinder 4

EBS Valve – Additive correction in percentage applied to EBS valve

TSS Valve – Additive correction in percentage applied to TSS valve

Manual Adjusts		
KJbnc		0.000
KJbnc 1		0.000
KJbnc 2		0.000
KJbnc 3		0.000
KJbnc 4		0.000
KFbnc		0
KAbnc		0.0
KAbnc 1		0.0
KAbnc 2		0.0
KAbnc 3		0.0
KAbnc 4		0.0
EBS Valve		0.0
TSS Valve		0.0

Monitor 9.9 / Analog Inputs

This section allows you to see the values of inputs in both raw and calibrated states. The right hand column shows raw value in 10bit format, the left column shows the same input using engineering values.

Throttle – Throttle pedal position

Gear position – Gear position

Load cell – Signal obtained through a non-linear processing of the AD input (with some similarities to a derivative). The green LED shows the status of the “Set” signal read from the load cell

Water temperature – Water temperature input

Air temperature – Air temperature input

Air pressure – Air pressure input

Lambda – Wide band UEGO input

Map select – switch input, default open circuit = 1

Valve – Feedback position from the Valve input as a percentage

Battery – Battery voltage value with a red LED to indicate if the voltage drops below 10.5v. Note: There is a 0.5v hysteresis on this warning.

Adv/Inj transient – Values of the transient are not genuine channels but an indication of the transient state. Note: Advance always uses throttle, Injection may be air pressure or throttle depending on your configuration.

Analog Inputs		
Throttle	70.1	719
Gear Position	4	528
Load-Cell		506
Water Temp.	60.2	627
Fuel Calibration	2.715	554
Air Temperature	-20.0	1023
Air Pressure	659	562
Lambda	12.5	572
Map-Select	1	1021
Valve	0.0	546
Battery	12.5	602
Adv. Transient	0.0	Throttle
Inj. Transient	0.0	Throttle

Monitor 9.10 / loaded files

Mapping data 1 – File name of the map loaded into map slot 1

Mapping data 2 – File name of the map loaded into map slot 2

Configuration parameters –

File name of the loaded configuration

These are the contents of the ECU, not the files loaded onto your PC.

Mapping Data 1	*749_2
Mapping Data 2	
Configuration Parameters	scrap

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Diag 10.0 / Overview

Com	1	749				_default				Firmware Version						
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit	

The Diagnostic button can be accessed by pressing this button on the lower toolbar. Within this environment you have the following options:

- Reset of stored errors
- Definition of 'correct working' parameters

The errors seen here do not need to occur when the ECU and PC are connected, whenever an error occurs, a count of the events are stored in memory 'EEPROM' and re-called when this page is accessed. They are only re-set at your command.

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Diagnostics

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Engine	Count		RPM-Thr.
RPM Errors	0	Reset	0
Smot Errors	0	Reset	0
Scam Errors	0	Reset	0
DN-time [min]	0	Reset	

Wheels	Count		Vel. Thr.
Front Errors	0	Reset	0
Rear Errors	0	Reset	0

Over-Dwell	Count	
Trig 1	0	Reset
Trig 2	0	Reset
Trig 3	0	Reset
Trig 4	0	Reset

Over-Time	Count	
Inj 1	0	Reset
Inj 2	0	Reset
Inj 3	0	Reset
Inj 4	0	Reset

Reset All ☐ Reset All at Power-On

Set All Parameters to Default

Inputs	Count	
Code Load	0	Reset
Scam Hall	0	Reset
Stop	0	Reset
Drop Switch	0	Reset
Shift Set	0	Reset
Neutral	0	Reset
Clutch	0	Reset
Sidestand	0	Reset
Launch	0	Reset
Pit Limiter	0	Reset
Start	0	Reset

Analog	Total Errors		On	Max. Consec. Errors	Min. Value	Max. Value	Recovery Value	
Throttle	0	Reset		0	0	0.0	0	0.0
Gear Position	0	Reset		0	0	0	0	0
Load-Cell	0	Reset		0	0	0	0	0
Water Temp.	0	Reset		0	0	0.0	0	0.0
Air Temperature	0	Reset		0	0	0.0	0	0.0
Air Pressure	0	Reset		0	0	0	0	0
Lambda	0	Reset		0	0	0.0	0	0.0
Map-Select	0	Reset		0	0	0	0	0
Battery	0	Reset		0	0	0.0	0	0.0

USB	F4_1000_STD_M191	F4_1000_R312_STD_M191	Firmware Version												
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

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Diag 10.1 / Engine

RPM errors – Counts the number of times the engine has exceeded the limit defined in the white area RPM-Thr.

Smot / Scam errors – Error count related to crank and cam sensors. They are similar to the normal error counters in the Monitor page, but errors in this page are only counted when the engine speed exceeds the adjacent threshold **TPM-Thr**

ON Time – Total time in minutes that the engine has been running since last re-set

Engine	Count		RPM-Thr.
RPM Errors	0	Reset	0
Smot Errors	0	Reset	0
Scam Errors	0	Reset	0
ON-time [min]	0	Reset	

By pressing the '**Set all parameters to default**' the following values are preset

- RPM errors – RPM-Thr. = 20000
- Smot errors – RPM-Thr. = 20000
- Scam errors – RPM-Thr. = 20000

Set All Parameters to Default

Diag 10.2 / Wheels

Front / Rear errors – Counts the number of times the speed (either front or rear) has exceeded the threshold defined in **Vel-Thr**

Wheels	Count		Vel. Thr.
Front Errors	0	Reset	0
Rear Errors	0	Reset	0

By pressing the '**Set all parameters to default**' the following values are preset

- Front errors – 500
- Rear errors – 500

Set All Parameters to Default

Diag 10.3 / Over Dwell

Counts the number of times that the individual ignition coil drivers are considered to have excessive dwell time. This count is related to the warning LED within the monitor page

Over-Dwell	Count	
Trig 1	0	Reset
Trig 2	0	Reset
Trig 3	0	Reset
Trig 4	0	Reset

Diag 10.4 / Over Time

Counts the number of times that the individual injector drivers are considered to have excessive duty. This count is related to the warning LED within the monitor page

Over-Time	Count	
Inj 1	0	Reset
Inj 2	0	Reset
Inj 3	0	Reset
Inj 4	0	Reset

Diag 10.5 / Inputs

Counts the number of times that each of the switch inputs are activated

Inputs	Count	
Code Load	0	Reset
Scam Hall	0	Reset
Stop	0	Reset
Drop Switch	0	Reset
Shift Set	0	Reset
Neutral	0	Reset
Clutch	0	Reset
Sidestand	0	Reset
Launch	0	Reset
Pit Limiter	0	Reset
Start	0	Reset

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Diag 10.6 / Analogue Inputs

By default all of these diagnostics are turned off, to activate them place a tick on the **On** box. Note: You will need an active link with the ECU to achieve this as the parameters are stored directly into the ECU EEPROM

Each line of this section is split up into the following sections:

Total errors – Count of the number of times this input has gone outside of your Min / Max values

Reset – Resets the error count to 0

On – Turns on the diagnostic for this input

Max consecutive errors

– Maximum number of error count before the ECU considers this input

to be unreliable and uses the Recovery value

Min value – Minimum sensor value in 10bit A/D, the figure on the right automatically shows you the value in engineering units based on your input elaborations.

Max value – Maximum sensor value in 10bit A/D, the figure on the right automatically shows you the value in engineering units based on your input elaborations.

Recovery value – value used by the ECU if the error count exceeds the limits you have specified in 'max consecutive errors'. Enter a value in 10bit A/D format, the figure on the right automatically shows you the value in engineering units based on your input elaborations.

Analog	Total Errors		On	Max. Consec. Errors	Min. Value		Max. Value		Recovery Value	
Throttle	0	Reset		0	0	0.0	0	0.0	0	0.0
Gear Position	0	Reset		0	0	0	0	0	0	0
Load-Cell	0	Reset		0	0	0	0	0	0	0
Water Temp.	0	Reset		0	0	0.0	0	0.0	0	0.0
Air Temperature	0	Reset		0	0	0.0	0	0.0	0	0.0
Air Pressure	0	Reset		0	0	0	0	0	0	0
Lambda	0	Reset		0	0	0.0	0	0.0	0	0.0
Map-Select	0	Reset		0	0	0	0	0	0	0
Battery	0	Reset		0	0	0.0	0	0.0	0	0.0

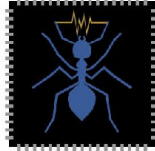
Diag 10.7 / Reset

You have the option here to Reset All diagnostic counts manually by pressing the button, or by applying a tick within the box you can re-set the counters every time you power on.

Reset All	☐	Reset All at Power-On
Set All Parameters to Default		

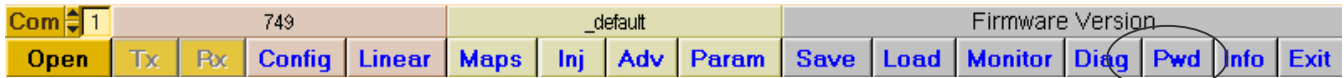
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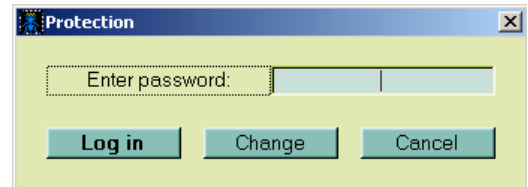
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Diag 11.1 / Password



The password is a means of protecting your maps and configurations from other subsequent users of the ECU. When the protection is active it is not possible to transmit or receive either the configuration or mapping data between ECU and PC, map-tuning is also inhibited.

All internally calculated values related to engine control for ignition and injection plus some others are hidden, and the protection state of the ECU is signalled by the text colour in the **Open/Close** push-button (red = protected; green = unprotected; black = not connected).



Pressing the **PWD** button opens the Protection dialog-box. You can enter a password at any time, even when the connection between ECU and monitor is not active. After typing the password press the **Log in** button to confirm it. When the connection to an ECU is established, the password is repeatedly sent to the ECU which evaluates if it is correct by comparing it with the copy stored in memory, the protection state is set accordingly.

You can modify the internally stored password when connection is active. In this case, after entering the new password, you have to press the **Change** button, then re-enter the password and press the **Confirm** button.

IMPORTANT -Be aware that changing the ECU's internal password will erase all configuration and mapping data (after a final confirmation by the user)

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Maps 12.1 / Mapping overview

The mapping is achieved via the Maps button; sequential presses of this button move you between the mapping window as shown on this page and the Edit window as shown in section 4.1



The mapping window allows you to make changes at individual cells where there is a corresponding breakpoint of both RPM and Throttle or for turbo engines RPM / Air pressure.

This page gives you 2 options for mapping.

- Manual tuning where the operator uses the 'sliders' or numeric fields at the bottom of the page to define the values of spark advance and fuel at each cell.
- Auto tune – In this mode a fixed AFR value is used as a target and the ECU will automatically adjust the fuel for you. You also have the opportunity to use Auto Tune both on the dyno and on the road.

Your page will look like this when neither the Manual or Auto methods have been chosen.

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Maps (tuning) Tuning OFF Manual Auto Off

Injection 1 RPM All Cylinders

[ms]	1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	11000
2.3	2.885	2.048	2.048	1.706	1.706	1.706	1.713	1.713	1.713	1.816	1.823	1.590	1.570	1.604	1.604	1.604	1.495	1.495	1.495
3.0	2.778	1.945	1.911	1.823	1.706	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365
4.0	2.730	2.309	2.251	1.945	1.911	1.706	1.706	1.625	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365	1.365
5.0	3.242	2.442	2.217	2.184	2.131	2.048	1.929	1.853	1.857	1.767	1.672	1.768	1.809	1.706	1.706	1.706	1.706	1.706	1.706
6.0	3.140	2.452	2.560	2.628	2.730	2.597	2.389	2.023	1.823	1.666	1.622	1.706	1.706	1.706	1.706	1.706	1.706	1.706	1.706
7.0	3.242	2.628	2.734	2.730	2.901	2.583	2.214	2.206	2.164	1.963	1.870	1.966	1.835	1.823	1.823	1.823	1.823	1.823	1.823
8.0	3.669	2.736	2.732	2.730	2.986	2.946	2.659	2.596	2.546	2.327	2.207	2.208	2.060	2.042	1.915	1.831	1.813	1.813	1.813
9.0	4.096	2.844	2.730	2.730	3.072	3.308	3.103	2.987	2.928	2.691	2.543	2.449	2.285	2.262	2.007	1.839	1.803	1.803	1.803
11.0	4.050	3.041	2.958	2.912	3.163	3.423	3.250	3.194	3.083	3.030	2.937	2.925	2.800	2.611	2.508	2.450	2.130	1.958	1.958
12.0	4.027	3.140	3.072	3.003	3.208	3.481	3.324	3.298	3.160	3.199	3.134	3.163	3.057	2.786	2.759	2.756	2.294	2.035	2.035
16.0	4.096	3.728	3.481	3.584	3.925	4.096	3.934	3.549	3.413	3.481	3.588	3.771	3.769	3.803	3.413	3.379	3.177	3.177	3.177
20.0	4.154	4.154	3.571	4.000	4.057	3.992	3.756	3.884	3.716	3.716	3.962	4.135	3.913	3.913	3.607	3.534	3.395	3.429	3.429
25.0	4.154	3.888	3.571	3.895	4.543	4.706	4.382	4.382	4.382	4.382	4.515	4.382	4.382	4.448	4.180	3.854	3.854	3.854	3.854
30.0	4.220	4.349	3.895	3.895	4.365	4.967	4.771	4.706	4.706	4.706	5.017	4.968	4.968	5.068	4.897	4.542	4.217	4.217	4.217
37.0	4.220	4.135	3.895	4.446	4.584	4.931	4.788	4.870	4.870	5.031	5.584	5.574	5.574	5.409	5.343	5.038	5.038	5.038	5.038
45.0	4.220	3.881	3.895	4.330	4.870	5.031	5.193	5.031	5.031	5.356	5.818	5.842	5.842	5.842	5.900	5.667	5.667	5.667	5.667
50.0	4.220	3.694	3.895	4.012	5.118	5.096	5.193	5.031	5.031	5.518	6.019	6.167	6.167	6.167	6.229	5.984	5.984	5.984	5.984
60.0	4.220	3.622	3.895	4.505	5.356	5.350	4.919	5.285	5.181	4.976	5.518	5.518	6.491	6.491	6.426	6.296	6.233	6.620	6.620
70.0	4.220	3.861	3.948	4.672	5.597	5.790	5.167	5.447	5.016	5.391	5.914	6.094	6.613	6.855	6.265	6.553	6.952	7.099	7.099
80.0	3.895	3.889	3.926	4.943	5.597	5.790	5.510	5.620	5.144	5.513	5.962	6.094	6.613	7.029	6.425	6.717	7.151	7.753	7.753

Enabled Min. Max. Cell Current Tolerance Lambda Current Set-Points Tolerance

TH2O 0.0 60.0 90.0 RPM 0 +/- 200

Over-Rev Extra-Margin 150 Throttle 0.0 +/- 3.0 Tracking Mode Fine

Cut-Off Save Manual Current Corrected Correction Step

Cranking Load Injection 0.000 0.000 1.000 Freeze 0.010

Transient Advance 0.0 0.0 0.0 Freeze 1.0

USB F4_1000_STD_M191 F4_1000_R312_STD_M191 Firmware Version

Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

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Maps 12.2 / Page function overview

Enabled	Min.	Max.	Cell	Current	Tolerance	Lambda	Current	Set-Points			Tolerance
TH2O	0.0	60.0	RPM	0	+/- 200	0.0	12.5	12.5	12.5	+/- 0.5	
Over-Rev	Extra-Margin	150	Throttle	0.0	+/- 3.0	Tracking Mode	Fine				
Cut-Off	Save		Manual	Current	Corrected	Correction					Step
Cranking			Injection	0.000	0.000			1.000	Freeze	0.010	
Transient			Load	Advance	0.0	0.0			0.0	Freeze	1.0

RPM / Current – value of engine RPM

RPM / Tolerance - +/- gate within which the engine must be stabilised for mapping to be permitted

Throttle / Current – Value of Throttle sensor

Throttle / Tolerance - +/- gate within which the engine must be stabilised for mapping to be permitted

Manual tuning / Injection / Current – Value of cell taken from the map

Manual tuning / Injection / Corrected – Value of injection time as a result of the manual adjustments.

Manual tuning / Advance / Current – Value of cell taken from the map

Manual tuning / Advance / Corrected – Value of advance as a result of the manual adjustments.

Freeze – Applies the adjustment to the specific cell within the ECU and then automatically returns to nil offset.

Lambda / Current – Current value of the lambda sensor in AFR

Lambda / Set point - Yours 3 desired targets AFR values

Lambda tolerance - +/- gate around your target AFR that is deemed to be acceptable. Once within this boundary to further Auto tuning would occur in Auto tune mode.

Traking mode – In Auto tuning mode the engine must be latched into a cell for this amount of time before any correction will occur. You can choose between Fine, Medium, Coarse.

Enabled – This LED lights when the 'lambda searching phase' of the tuning strategy is permitted (not considering the enable setting of single cells). The lambda searching phase is inhibited during cranking, gear change, injection transients, engine cut-off, when the water temperature exceeds the given limits, or when the engine speed is near the limit set in the "Parameters" page..

Cranking – LED turns from brown to red during engine start. When active mapping will be inhibited.

Over rev – LED turns from brown to red when the engine is within 150RPM of the limiter.

Cut off – LED turns from brown to red when the 'cut off' strategy is enabled. When active mapping will be inhibited.

Transient - LED turns from brown to red when the transient strategy is active. When active mapping will be inhibited.

TH2O – Value of water temperature.

TH2O / Min-Max – Values of water temperature which are considered as normal for the operation of the engine, when outside of these limits the LED will turn red and mapping will be inhibited

TH2O	84.1	60.0	90.0
------	------	------	------

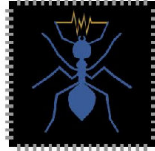
Maps (tuning)		Tuning OFF												Manual	Auto	Off
Injection 1		RPM												All Cylinders		
Throttle	[ms]	1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6750
	0.0	1.346	1.343	1.117	0.921	0.742	0.684	0.673	0.665	0.646	0.652	0.699	0.748	0.758	0.739	0.678
	3.0	1.844	1.824	1.734	1.607	1.441	1.212	1.018	0.934	0.922	0.916	0.893	0.954	0.960	0.937	0.831
	5.0	2.368	2.310	2.240	2.093	1.891	1.670	1.408	1.293	1.306	1.226	1.168	1.110	1.110	1.098	1.069
	10.0	2.874	2.819	2.762	2.682	2.509	2.330	2.047	1.891	1.709	1.665	1.712	1.661	1.645	1.638	1.575
	15.0	3.616	3.610	3.599	3.543	3.368	2.801	2.414	2.135	2.014	2.043	2.042	2.060	2.101	2.080	2.019

Injection 1 – Use the pull down to visualize the map that you plan to work with

Cylinders – This option lets you choose to apply your mapping to all cylinders equally or to specific cylinders.

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Maps 12.3 / Manual mapping

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter a value for your desired AFR value and tolerance; this is not used to control the ECU it is simply used to turn the value from yellow to red when you have manually achieved the target.
6. Choose whether to map the injection on 'all cylinders' or an individual one
7. Use the left pull down to visualise the map you plan to work in.

To begin manual mapping press the **Manual** button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.

- Synchronising mapping data
- Loading injection data
- Loading advance data
- Manual tuning mode (you are now ready to map)



You will notice that the file name you are now working with at the bottom of the screen is prefixed by a *, this is to indicate that the map has been taken from the ECU and not yet stored on your PC.

Adjust the engine using the dyno so that the throttle and RPM align with your chosen cell.

Correct engine state will be indicated by the RPM and TPS values changing from yellow to red and the cell in the main window changing to grey as shown here.

10	4.030	3.743	3.41
33	4.232	3.989	3.91
32	4.432	4.313	4.21
15	4.701	4.485	4.31
34	4.726	4.485	4.31

Use the sliders or double click the value and use up/down arrow keys to change the fuel injection time and the spark advance. Your changes are applied in real time to the ECU so be careful. When you are happy with the results, press the Freeze button to apply either injection or advance changes. After the change has been permanently written the injection correction will return to 1.000 and the advance to 0.0.

Manual Tuning	Current	Corrected	Correction	
Injection	4.481	4.965	1.108	Freeze
Advance	49.0	46.4	-2.6	Freeze

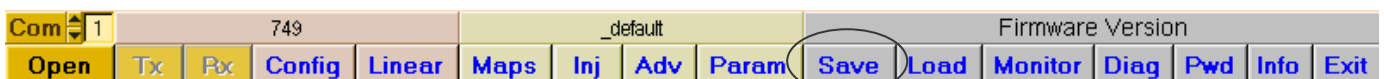
The Current and corrected windows give a real time readout of the existing ECU setting and the new setting, after the new settings have been written, both will be the same and the cell in the main window will be updated and showing in bold red to indicate that a change has been made

609	4.733	4.733
852	5.746	5.746
726	5.042	5.042

Now move onto the next cell you wish to work on. When all mapping work is done use the OFF button at top right. All of the modified cells are showing in bold red, including the ones in other pages.

If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

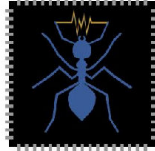
This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

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Maps 12.4 / Auto mapping - Dyno

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU, the 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter values for your lambda and PI controls
6. Define the cells that you want the Auto tuning to take place in. You can choose between 3 different break point by a single, double or triple click in cell. Also you can choose an entire row or column.
7. Choose whether to map the injection on 'all cylinders' or an individual one
8. Use the left pull down to visualise the map you plan to work in.

It is very important when Auto tuning to specify which areas of the map this tuning should take place in. These cells can be defined by a double click in the map cell window to change colors, an example of this is shown here.

The end result can be saved and re-loaded at any time using these buttons.



Maps (tuning)		Tuning OFF																Manual		Auto		Off	
Injection 1		RPM																All Cylinders					
[ms]		1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6750				
0.0		1.348	1.342	1.117	0.921	0.742	0.684	0.673	0.655	0.646	0.652	0.638	0.748	0.758	0.739	0.723	0.723	0.699	0.678				
3.0		1.844	1.824	1.734	1.507	1.441	1.212	1.016	0.954	0.922	0.916	0.893	0.954	0.960	0.937	0.916	0.890	0.865	0.821				
5.0		2.368	2.310	2.240	2.093	1.891	1.670	1.408	1.293	1.306	1.226	1.168	1.110	1.110	1.098	1.066	1.066	1.075	1.063				
10.0		2.874	2.819	2.762	2.682	2.509	2.330	2.047	1.891	1.709	1.665	1.712	1.661	1.645	1.638	1.667	1.674	1.608	1.575				
15.0		3.616	3.610	3.599	3.543	3.369	2.901	2.414	2.195	2.014	2.043	2.042	2.060	2.101	2.080	2.002	1.997	2.002	2.015				
20.0		3.874	3.862	3.852	3.860	3.825	3.356	2.860	2.670	2.489	2.400	2.386	2.367	2.386	2.405	2.441	2.471	2.424	2.413				
25.0		4.278	4.278	4.288	4.278	4.278	4.170	3.404	3.218	2.983	2.930	2.900	2.883	2.875	2.860	2.865	2.908	2.882	2.887				
30.0		4.531	4.548	4.553	4.553	4.526	4.438	3.733	3.420	3.360	3.418	3.415	3.427	3.443	3.485	3.455	3.403	3.444	3.410				
35.0		4.681	4.679	4.681	4.696	4.637	4.567	4.354	4.032	3.845	3.804	3.792	3.917	4.085	4.130	4.130	4.073	4.025	3.962				
40.0		4.706	4.715	4.711	4.691	4.667	4.614	4.411	4.380	4.318	4.310	4.368	4.489	4.532	4.552	4.585	4.577	4.486	4.537				
45.0		4.932	4.936	4.940	4.933	4.926	4.901	4.403	4.412	4.451	4.475	4.597	4.750	4.912	5.004	5.032	5.069	5.047	4.987				
50.0		4.957	4.957	4.969	4.975	4.982	4.988	4.406	4.483	4.524	4.639	4.745	5.011	5.292	5.492	5.479	5.461	5.414	5.337				
55.0		4.434	4.444	4.453	4.453	4.466	4.469	4.462	4.491	4.521	4.618	4.745	4.938	5.298	5.746	5.774	5.762	5.753	5.719				
60.0		4.510	4.511	4.536	4.531	4.550	4.550	4.517	4.488	4.517	4.596	4.745	4.995	5.299	6.000	6.063	6.062	6.091	6.101				
65.0		4.443	4.459	4.460	4.453	4.467	4.476	4.436	4.411	4.426	4.515	4.718	4.977	5.352	6.095	6.186	6.199	6.224	6.261				
70.0		4.378	4.388	4.383	4.374	4.384	4.400	4.395	4.324	4.336	4.433	4.672	4.960	5.485	6.109	6.302	6.339	6.396	6.420				
75.0		4.309	4.314	4.306	4.296	4.301	4.325	4.274	4.237	4.244	4.352	4.636	4.947	5.578	6.112	6.320	6.406	6.423	6.512				
80.0		4.241	4.241	4.229	4.217	4.217	4.250	4.193	4.150	4.152	4.270	4.599	4.934	5.670	6.115	6.338	6.476	6.489	6.603				
90.0		4.078	4.071	4.058	4.050	4.040	4.063	4.056	4.040	4.066	4.146	4.474	4.927	5.723	6.194	6.391	6.570	6.718	6.807				
98.0		3.910	3.900	3.886	3.895	3.862	3.888	3.922	3.929	3.960	4.022	4.349	4.919	5.769	6.295	6.439	6.663	6.942	7.011				

IMPORTANT – Auto mapping will only take place in a cell that has been activated in this way.

To begin Auto Tuning press the Auto button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.

- Synchronising mapping data
- Loading injection data
- Loading advance data
- Lambda match or waiting for lambda (you are now ready to start)

You will notice that the file name you are now working with at the bottom of the screen is prefixed by a *, this is to indicate that the map has been taken from the ECU and not yet stored on your PC.

Adjust the engine using the dyno so that the throttle and RPM align with your chosen cell. Correct engine state will be indicated by the RPM and TPS values changing from yellow to red and the cell in the main window changing to grey as shown here.

0.0	4.430	3.743	3.91
33	4.232	3.989	3.91
32	4.432	4.313	4.2
15	4.701	4.485	4.3
34	4.726	4.485	4.3

Providing that all of the following conditions have been met, the ECU will begin to adjust the injection time to your target AFR. This will be seen in the main cell window by the text changing to red and the numbers moving. The manual sliders are inoperable during auto tuning.

- Cell must be activated for Auto Tuning
- Water temperature must be within limits
- No transient or start strategy active
- The engine is not in 'Cut off' or 'Over rev' status
- The engine has been locked onto the cell for at least the 'Hold time'
- The current lambda value must be outside of the target tolerance.

Once the target AFR has been achieved and the cell value stops changing, move onto the next cell and repeat

When all mapping work is done use the OFF button at top right. All of the modified cells are showing in bold red, including the ones in other cylinder pages

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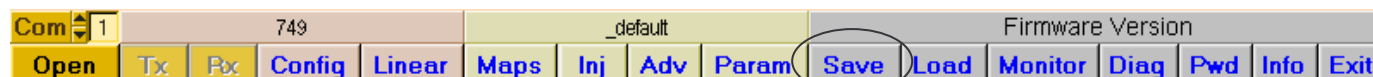


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Maps 12.4 / Auto mapping – Dyno - continued

If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

Maps 12.5 / Auto mapping – Road tune

Before you begin mapping it is important to make sure that you have transmitted the latest version of your configuration and 'start map' into map slot 1. The ECU, the 'start map' is the one provided by your ECU supplier or one you believe to be closest to the one needed for this engine.

1. Make sure that your external map switch is in position 1 (open circuit)
2. Run the engine and check that all sensor readings are correct.
3. Warm up the engine until the water temperature value is within the correct zone
4. Ensure that there are no red LEDs showing
5. Enter values for your lambda and PI controls
6. Define the cells that you want the Auto tuning to take place in (see below)
7. Choose whether to map the injection on 'all cylinders' or an individual one
8. Use the left pull down to visualise the map you plan to work in.

It is very important when Auto tuning to specify which areas of the map this tuning should take place in. These cells can be defined by a double click in the map cell window to change color, an example of this is shown here.

[ms]	1500	2100	3000	4000	5000	5500	6000	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9000
1.4	1.959	1.694	1.520	1.314	1.069	0.904	0.904	0.780	0.739	0.698	0.698	0.698	0.698	0.698	0.698	0.698	0.698	0.698
2.8	1.686	1.355	1.355	1.427	1.427	1.340	1.168	1.122	1.140	1.158	1.129	1.100	1.004	0.907	0.864	0.820	0.842	0.863
4.9	1.896	1.643	1.520	1.470	1.362	1.275	1.148	1.265	1.317	1.369	1.359	1.349	1.243	1.136	1.089	1.042	0.993	0.943
8.1	2.633	2.300	2.218	2.013	1.753	1.669	1.904	1.693	1.665	1.637	1.552	1.466	1.431	1.396	1.376	1.355	1.274	1.192
10.9	2.949	2.751	2.751	2.423	2.213	2.129	1.981	1.972	1.826	1.679	1.684	1.688	1.812	1.935	1.928	1.923	1.886	1.849
15.2	3.475	3.327	3.327	3.122	2.544	2.420	2.215	2.205	2.184	2.162	2.259	2.355	2.212	2.068	2.444	2.819	2.752	2.684
19.1	3.897	3.696	3.696	3.368	2.876	2.793	2.427	2.481	2.430	2.379	2.478	2.576	2.401	2.226	2.571	2.916	2.943	2.969
22.9	4.319	4.148	4.148	3.985	3.574	3.327	2.999	2.722	2.950	3.177	3.078	2.979	2.860	2.741	3.075	3.408	3.453	3.498
27.2	4.238	4.070	4.070	4.070	4.030	3.749	3.467	3.295	3.395	3.494	3.548	3.601	3.426	3.251	3.520	3.788	3.767	3.746
32.1	4.548	4.432	4.432	4.353	4.232	3.989	3.951	4.192	4.243	4.294	4.335	4.375	4.068	3.760	4.077	4.394	4.413	4.432
38.1	4.548	4.432	4.432	4.432	4.313	4.232	4.484	4.609	4.733	4.899	5.065	4.725	4.384	4.671	4.957	4.960	4.962	
45.2	5.087	4.615	4.615	4.615	4.701	4.485	4.356	4.485	4.852	5.219	5.456	5.692	5.238	4.783	5.454	6.124	6.103	6.081
48.0	5.087	4.764	4.764	4.764	4.726	4.485	4.306	4.409	4.726	5.042	5.405	5.768	5.373	4.977	5.739	6.501	6.404	6.306
51.9	5.087	4.873	4.873	4.873	4.744	4.485	4.270	4.356	4.599	4.942	5.288	5.734	5.510	5.286	6.028	6.770	6.620	6.469
56.0	5.291	5.139	5.113	5.006	4.931	4.618	4.270	4.330	4.626	4.921	5.355	5.788	5.683	5.578	6.228	6.878	6.801	6.723
60.0	5.418	5.305	5.262	5.089	5.046	4.701	4.270	4.313	4.680	5.046	5.478	5.909	5.893	5.877	6.411	6.944	6.923	6.901
65.0	5.582	5.433	5.411	5.260	5.153	4.637	4.377	4.398	4.744	5.089	5.456	5.822	6.054	6.286	6.679	7.072	7.115	7.157
69.9	4.880	4.844	4.774	4.714	4.592	4.572	4.485	4.485	4.809	5.132	5.434	5.735	6.102	6.469	6.836	7.203	7.310	7.417
75.0	5.047	4.862	4.869	4.570	4.589	4.549	4.438	4.604	4.904	5.203	5.541	5.878	6.185	6.492	6.729	6.966	7.086	7.205
81.2	5.087	5.778	5.735	5.735	5.219	4.529	4.399	4.701	4.982	5.262	5.620	5.977	6.234	6.491	6.621	6.750	6.880	7.009

This is especially important for tuning under normal road conditions; you should also note that tuning will not take place under transient conditions or if the engine does not have sufficient time at each breakpoint. You may even decide to only activate the full throttle cells.

When using Auto tune modify your driving style so that there are no rapid changes of throttle, use of full power is fine, just get there progressively.



The end result of your selections can be saved and re-loaded at any time using these buttons. IMPORTANT – Auto mapping will only take place in a cell that has been activated in this way.

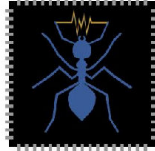
To begin Auto Tuning press the Auto button at the top of the page. The PC will now read back from the ECU the latest version of the injection and spark map. At the top of the page you will see a series of messages.



- Synchronising mapping data
- Loading injection data
- Loading advance data
- Lambda match or waiting for lambda (you are now ready to start)

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Disconnect the serial lead from the ECU and begin your road tests, at no time should the map switch be changed or the power to the ECU switched off. If the power to the ECU is switched off the ECU will revert to the original map loaded into map 1. This last comment is also useful to note in the event that you have a failure of the lambda sensor and the corrections applied are not correct.

Auto tuning will occur when driving providing the following conditions are met

- Cell must be activated for Auto Tuning
- Water temperature must be within limits
- No transient strategy active
- The engine is not in 'Cut off' or 'Over rev' status
- The engine has been locked onto the cell for at least the 'Hold time'
- The current lambda value must be outside of the target tolerance.

It should be noted that all of the changes are not being written to the original maps 1 or 2, the

After the road test the ECU should be re-connected to the PC, at this point there are 2 possibilities:

- ECU has been switched off/on during the test
- ECU has remained switched on since it was disconnected from the PC.

Maps 12.5 / Auto mapping – Road tune - continued

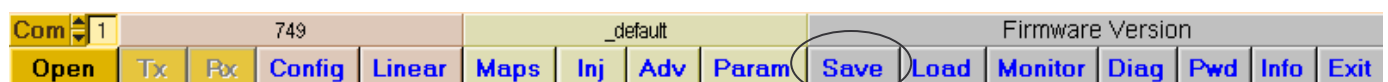
If the power to the ECU has **remained on** throughout the test the ECU will re-synchronise with the PC as soon as you re-connect and press the Open button. This is seen as a series of messages at the top of the screen.

- Synchronising mapping data
- Loading injection data
- Loading advance data

Once this sequence has completed any cells that have been modified in any cylinder will be visible as red bold text.

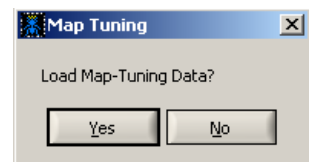
If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

This file must now be saved, use the Save button, choose Mapping and remember to remove the * prefix or you will not be allowed to save the file.



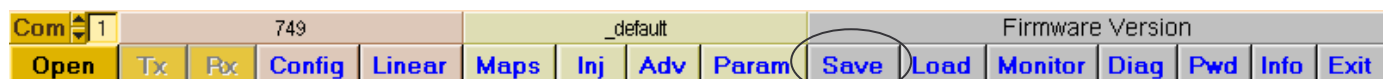
To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

If the power to the ECU has been **switched off** at any time during the test the ECU will give you the option to 'Load Tuning maps' as soon as you re-connect and press the Open button. This is seen as a pop up window. If you press **Yes**, the changes stored in the ECU will be visible as red bold text. If you press No, the changes are not uploaded.



If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

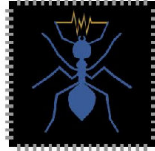
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To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

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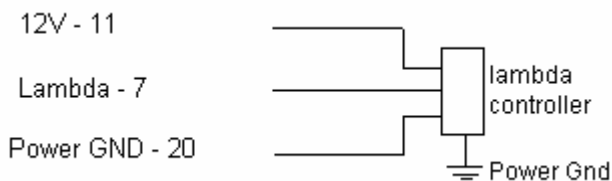
Installation 13.1 / Electrical connections

PIN	Function	Note
1	CODELOAD	Input to upgrade firmware
2	VEL POS	Rear speed input
3	LAUNCH	Launch control input
4	PIT LIMITER	Pit limiter input
5	MAP SEL	Input map switch
6	GEAR POS	Input gear position
7	LAMBDA	Input lambda sensor
8	LOAD CELL +	Positive input load cell
9	LOAD CELL -	Negative input load cell
10	VREF CELL	Supply voltage load cell
11	VBAT	Supply battery voltage
12	RXD DEBUG	Rx debug serial
13	TXD DEBUG	Tx debug serial
14	RXD RS232	Rx communication serial RS232
15	TXD RS232	Tx communication serial RS232
16	PGND	Power GND
17	CAN L	Can negative
18	CAN H	Can positive
19	+VREF	Supply voltage for sensor
20	PGND	Power GND

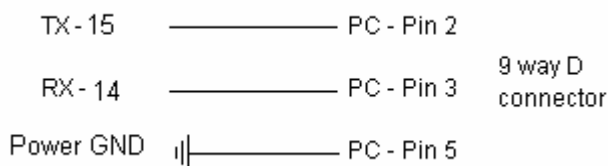
Gear position potentiometer



lambda – Wide band input – This input may be connected to any wide band UEGO type lambda system that produces an output in the range of 0-5v. This output may linear or non-linear and will be mapped to produce a value

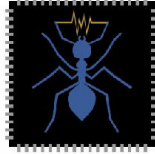


PC Communication – RS232



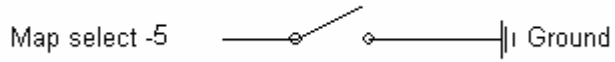
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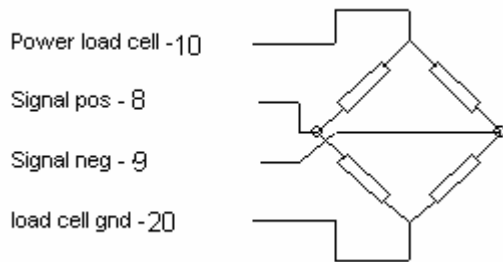


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Map switch – Used to select either Map 1 or Map 2 – Map 1 = open circuit.



Load cell – Used to activate the gear change strategy



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CAN	Byte	Bit	Canale	Tipo	Alias	Descrizione
1	0-1		valRpm	U16		rpm istantaneous (measured over the period of Smot)
	2-3		valGrpm	U16		Average rpm for one revolution
	4-5		valMrpm	U16		Average rpm for a programmable number of revolutions
	6-7		valDrpm	S16		Engine acceleration (rpm/sec)
2	0-1		cntRevs	U16 (<-U32)		Revolution count
	2-3		cntSmotErrs	U16 (<-U32)		Smot error count
	4-5		cntScamErrs	U16 (<-U32)		Scam error count
	6-7		cntGapErrs	U16 (<-U32)		Gaps error count
3	0-1		usInj1	U16		Injection time injector 1 [us]
	2-3		usInj3	U16		Injection time injector 2 [us]
	4-5		usInj4	U16		Injection time injector 3 [us]
	6-7		usInj2	U16		Injection time injector 4 [us]
4	0-1		usInjBase1	U16		Time base injection cylinder 1 [us]
	2-3		usInjBase2	U16		Time base injection cylinder 2 [us]
	4-5		usInjBase3	U16		Time base injection cylinder 3 [us]
	6-7		usInjBase4	U16		tempo base iniezione cilindro 4 [us]
5	0-1		kInjCyl1	U16		Injection correction time cylinder 1 [1/1000]
	2-3		kInjCyl2	U16		Injection correction time cylinder 2 [1/1000]
	4-5		kInjCyl3	U16		Injection correction time cylinder 3 [1/1000]
	6-7		kInjCyl4	U16		Injection correction time cylinder 4 [1/1000]
6	0-1		ddgAdv1	S16		Advance cylinder 1 [tenths of a degree]
	2-3		ddgAdv2	S16		Advance cylinder 2 [tenths of a degree]
	4-5		ddgAdv3	S16		Advance cylinder 3 [tenths of a degree]
	6-7		ddgAdv4	S16		Advance cylinder 4 [tenths of a degree]
7	0-1		ddgAdvCyl1	S16		Advance correction cylinder 1 [tenths of a degree]
	2-3		ddgAdvCyl2	S16		Advance correction cylinder 2 [tenths of a degree]
	4-5		ddgAdvCyl3	S16		Advance correction cylinder 3 [tenths of a degree]
	6-7		ddgAdvCyl4	S16		Advance correction cylinder 4 [tenths of a degree]
8	0-1		ddgAdvBase	S16		Advance base [tenths of a degree]
	2-3		ddgFase	S16		Injection phase [°]
	4-5		degFaseBase	S16		Injection base phase [°]
	6-7					
9	0-1		kInjCrank	U16		Injection correction time from cranking [1/1000]
	2-3		ddgPickUp	S16		Advance correction from pickup [tenths of a degree]
	4-5		kInjAcc	U16		Injection correction time from engine acceleration [1/1000]
	6-7		ddgAdvAcc	S16		Advance correction from engine acceleration [tenths of a degree]
10	0-1		kInjTh2o	U16		Injection correction time from water temperature
	2-3		ddgAdvTh2o	S16		Advance offset from water temperature [tenth of a degree]
	4-5		kInjTair	U16		Injection correction from air temperature [1/1000]
	6-7		ddgAdvTair	S16		Advance offset from air temperature [tenth of a degree]
11	0-1		kInjPair	U16		Injection correction time from air pressure [1/1000]
	2-3		ddgAdvPair	S16		Advance offset from air pressure [tenth of a degree]
	4-5		usInjVbat	U16		Injection offset from battery voltage [us]

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	6-7	usDwell	U16		dwel time [us]
12	0-1	klnjGear	U16		Injection correction from gear position [1/1000]
	2-3	ddgAdvGear	S16		Advance offset from gear position [tenth of a degree]
	4-5	klnjVel	U16		Injection correction from speed [1/1000]
	6-7	ddgAdvVel	S16		Advance offset from speed [tenth of a degree]
13	0-1	klnjVelim	S16		Injection correction from pit limiter [1/1000]
	2-3	ddgAdvVelim	S16		Advance correction from pit limiter [tenth of a degree]
	4-5	valJtrans	S16		Injection transient [tenth of a degree/ms]
	6-7	valAtrans	S16		Advance transient [tenth of a degree/ms]
14	0-1	uslnjTransRpm	S16		Injection offset from rpm transient [us]
	2-3	uslnjTransTh2o	S16		Injection offset from water temperature transient [us]
	4-5	uslnjTrans	S16		Total injection offset [us]
	6-7	ddgAdvTrans	S16		Advance offset from transient [tenth of a degree]
15	0-1	klnjBanco1	U16		Injection correction bench cylinder 1[1/1000]
	2-3	klnjBanco2	U16		Injection correction bench cylinder 2[1/1000]
	4-5	klnjBanco3	U16		Injection correction bench cylinder 3[1/1000]
	6-7	klnjBanco4	U16		Injection correction bench cylinder 4[1/1000]
16	0-1	ddgAdvBanco1	S16		Advance correction bench cylinder 1 [tenth of a degree]
	2-3	ddgAdvBanco2	S16		Advance correction bench cylinder 2 [tenth of a degree]
	4-5	ddgAdvBanco3	S16		Advance correction bench cylinder 3 [tenth of a degree]
	6-7	ddgAdvBanco4	S16		Advance correction bench cylinder 4 [tenth of a degree]
17	0-1	klnjBancoAll	U16		Total injection correction bench [1/1000]
	2-3	ddgAdvBancoAll	U16		Total advance correcionr bench [tenth of a degree]
	4-5	degFaseBanco	S16		Injection offset from bench phase [°]
	6-7				
18	0-1	valFarf	S16		Throttle position (tenth of a degree)
	2-3	valDfarf	S16		Throttle derivative (°/sec)
	4-5	valLambda	S16		Lambda sensor
	6-7	valLoadCell	S16		Load cell
19	0-1	valVbat	S16		Battery voltage [tenth of a degree]
	2-3	valTh2o	S16		Water temperature [tenth of a degree °C]
	4-5	valTair	S16		Air temperature [tenth of a degree °C]
	6-7	valPair	S16		Air pressure [mBar]
20	0-1	marcia	U8		Gear insert (1..6)
	2-3	mappa	U8		Active map
	4-5	adGEARPOS	U16		Gear potenziometer [AD-count]
	6-7	adMAPSEL	S16		Map sel potenziometer [AD-count]
21	0-1	adFARF	U16		Throttle potenziometer [AD-count]
	2-3				
	4-5	adLAMBDA	U16		lambda sensor [AD-count]
	6-7	adLOADCELL	U16		Load cell [AD-count]
22	0-1	adVBAT	U16		Battery voltage [AD-count]
	2-3	adTH2O	U16		Water temperature [AD-count]
	4-5	adTAIR	U16		Air temperature [AD-count]
	6-7	adARIA	U16		Air pressure [AD-count]
23	0-1	velAnt	S16		Front speed [km/h]
	2-3	velPos	S16		Rear speed [km/h]

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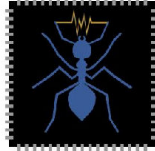


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	4-5	distAnt	U16 (<-U32)		Front space [meters]	
	6-7	distPos	U16 (<-U32)		Rear space [meters]	
24	0-1	valEbsVlv	U16		duty-cycle command PWM valve EBS [tenth of a degree]	
	2-3	valTssVlv	U16		duty-cycle command PWM valve TSS [tenth of a degree]	
	4-5	ebsVlvBanco	U16		Correction bench duty-cycle command PWM valve EBS [tenth of a degree]	
	6-7	tssVlvBanco	U16		Correction bench duty-cycle command PWM valve TSS [tenth of a degree]	
25	0	7	isSpento	BOOL	engineFlags	flag engine off
		6	disabilitazioneMotore	BOOL		flag disable engine (stop, dropswitch, etc.)
		5	abilitazioneTrigger	BOOL		flag enable trigger
		4	abilitazioneIniettori	BOOL		flag enable injector
		3	isBadSync	BOOL		flag errore synchro
		2	isTrigOverRev	BOOL		flag enable advance over revolution
		1	isInjOverRev	BOOL		flag enable injection over revolution
		0	isCranking	BOOL		flag cranking
	1	7	isPreInj	BOOL		flag pre-injection
		6	isVelim	BOOL		flag enable pit limiter
		5	isCutOff	BOOL		flag enable engine cut-off
		4	isPostCutOff	BOOL		flag reporting phase out of cut-off
		3	isLaunchCtrl	BOOL		flag enable launch-control
		2				
		1				
		0				
	2	7	isVbatFail	BOOL	errorFlags	flag low battery
		6	noConfig	BOOL		flag configuration missing
		5	noEngCfg	BOOL		flag engine configuration not valid
		4				
		3				
		2				
		1				
		0				
	3	7	isOverDwell1	BOOL		flag over-dwell error trigger 1
6		isOverDwell2	BOOL	flag over-dwell error trigger 2		
5		isOverDwell3	BOOL	flag over-dwell error trigger 3		
4		isOverDwell4	BOOL	flag over-dwell error trigger 4		
3		isOverInj11	BOOL	flag over-time error injector 1		
2		isOverInj12	BOOL	flag over-time error injector 2		
1		isOverInj13	BOOL	flag over-time error injector 3		
0		isOverInj14	BOOL	flag over-time error injector 4		
4	7	CODELOAD	BOOL	I/Os	Input CODE_LOAD	
	6	HALL	BOOL		Input SCAM_HALL	
	5	isStop	BOOL		Enable input STOP	
	4	isDrop	BOOL		Enable input DROP_SW	
	3	isShift	BOOL		Enable input SHIFT	
	2	FOLLE	BOOL		Input FOLLE	
	1	CLUTCH	BOOL		Input CLUTCH	

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5	0	SIDESTAND	BOOL		Input SIDESTAND
	7	LAUNCH	BOOL		Input LAUNCH
	6	SPEEDLIM	BOOL		Input PIT_LIMITER
	5	STARTIN	BOOL		Input START
	4	STARTOUT	BOOL		Command START_RELAY
	3	FUELPUMP	BOOL		Command FUEL_PUMP
	2	FAN	BOOL		Command FAN_RELAY
	1	LIGHT	BOOL		Command LIGHT_RELAY
	0	WARNLAMP			command WARNING_LAMP
	7	shiftSignal	BOOL	shiftFlags	Command change filter
	6	isLoadCell	BOOL		Command change from loadcell
	5	shiftInhibByRPM	BOOL		flag inhibition change from engine threshold
	4	isCambiata	BOOL		flag change
	3	isHoldOff	BOOL		flag hold-off change
	2	isTimeOut	BOOL		flag time-outchange
	1	fShiftCutOff	BOOL		flag cut-off change
	0	fShiftLead	BOOL		flag advance from change
	7				
26	0-1	cntMtJupdates	U16		Counter map updates injection auto tuning
	2	xMtJmatch	S8		Abscissa map centred on injection cell
	3	yMtJmatch	S8		Ordered map centred on injection cell
	4	xMtAmatch	S8		Abscissa map centred on advance cell
	5	yMtAmatch	S8		Ordered map centred on advance cell
	7	isMapTuning	BOOL	mapTuningFlags	flag map-tuning enable (manual o auto)
	6	isAutoTuning	BOOL		flag auto-tuning enable
	5	isMtEnabled	BOOL		flag centred cell enable
	4	isMtCellJmatch	BOOL		flag enabling and balance current injection cell
	3				
	2				
	1				
	0				
	7				
27	7	SIU_RSR.PORS	BOOL	cpuFlags	Power-on reset status
	6	SIU_RSR.ERS	BOOL		External reset status
	5	SIU_RSR.LLRS	BOOL		Loss of lock reset status
	4	SIU_RSR.LCRS	BOOL		Loss of clock reset status
	3	SIU_RSR.WDRS	BOOL		Watchdog timer/debug reset status
	2	SIU_RSR.CRS	BOOL		Checkstop reset status
	1	SIU_RSR.SSRs	BOOL		Software system reset status
	0	SIU_RSR.SERF	BOOL		Software external reset flag
	7	SIU_RSR.WKPCFG	BOOL		Weak pull configuration pin status
	6	SIU_RSR.BOOTCFG	BOOL		Reset configuration pin status
	5	SIU_RSR.RGF	BOOL		Reset glitch flag
	4				
	3				
	2				
	1				

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	0	resetFlag	BOOL		reset-flag global
2-3					
4-5					
6-7		ms	U16		Millisecond counter

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