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**M232 Engine control
Software v1.11
Rev 1.00**

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Overview

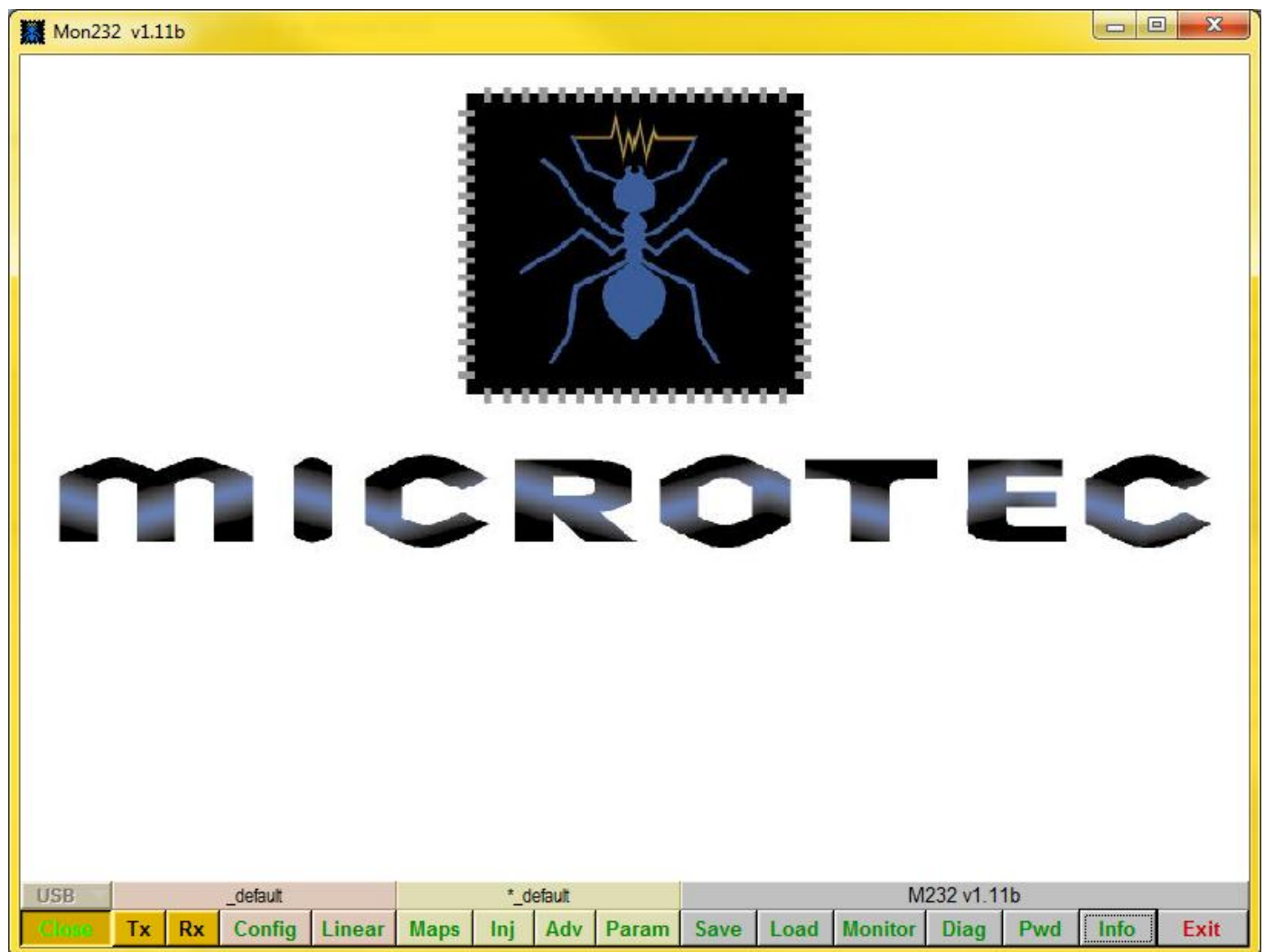
The M232 is a fully programmable engine control system capable of sequential injection.

- 1 → 4 cylinders (lost spark)
- 1 or 2 injectors for cylinder (high/low bench up to 2 cylinders)
- sequential or semi sequential operation

Basic functions are:

- 2 input for pick up, 1 inductive and 1 hall.
- 2 output high side (triggers for coil)
- 4 command for injectors
- Analog inputs
- Digital inputs
- Digital outputs
- PWM control

Everything is programmed via CAN line at high speed using the M196 product (9.001.196.01021) distributed by Microtec s.r.l.



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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 Mon232 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.

The screenshot shows the Mon232 v1.11b software interface. The 'Configuration' tab is active, and the 'General 1' sub-tab is selected. The interface is divided into several sections:

- Engine:** Engine Type (2cyl 2trig Dinj (odd)), Toothed Wheel Arrangement (smf24-2), Coupling Angle [deg] (270.0), Cam Inhibition Limit [RPM] (5000), Max. Percentual Error Sync [%] (0.0), Virtual Cam Type (Disabled), Phased-Like Injection (OFF, Ratio 1.000).
- Signal:** Stop (Low), Drop-Switch (OFF, Low), Shift (Low), Threshold Shift [A/D] (0).
- Pneumatic Cam Thresholds:** Rpm (Lower: 0, Upper: 0), Throttle (Lower: 0.0, Upper: 0.0), S-mot Tooth (Lower: 0, Upper: 0), Min. Variation [A/D] (0).
- Miscellaneous:** Tacho Pulses per Revolution (1), Nominal Fuel Consumption [cc/min] (377), Low/High Injectors Ratio (1.000), Compound Injection Limit [ms] (0.000), Min. Time ON Injectors [ms] (0.000), Delta_off Time ON Injectors [ms] (0.000), Injection Mapping Mode (Upper: 0.0, Lower: 0.0), Vacuum Pressure Filter Depth (100), Transient Type (Normal), Phase Injection (START), Max. Phase Variation [deg/cycle] (720.0), Turbo Configuration (Disabled), AntiLag Output (Disabled), PWM [Hz] (1000, by Throttle).

At the bottom, there is a 'Notes' section with the text 'Default - Base Configuration'. Below that is a toolbar with buttons: USB, _default, *_default, M232 v1.11b, Close, Tx, Rx, Config, Linear, Maps, Inj, Adv, Param, Save, Load, Monitor, Diag, Pwd, Info, Exit. The 'Save' button is circled in red.

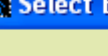
Save / Load / Transmit

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

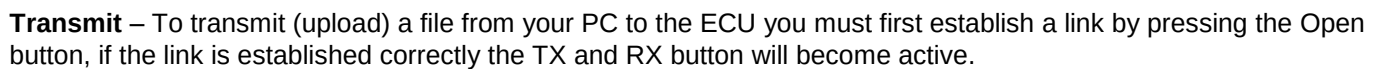
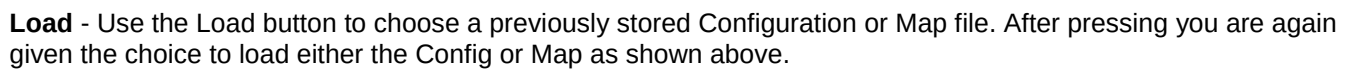
This is a close-up of the software toolbar. The buttons are: USB, Open, Tx, Rx, Config, Linear, Maps, Inj, Adv, Param, Save, Load, Monitor, Diag, Pwd, Info, Exit. The 'Save' button is circled in red.

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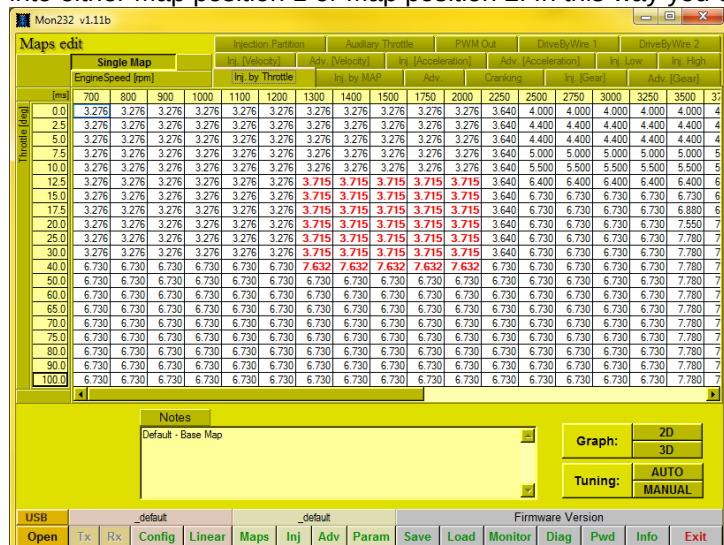
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You will also notice that the file names shown above the button bar will change to match your naming choice. These are the file names in use on your PC, NOT the ones currently loaded in the ECU.



By pressing the **Configuration** button you will send the complete Configuration file to the ECU.



When it is completed you will receive the OK confirmation window.

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.

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

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The **config** page can be found by pressing this button



Mon232 v1.11b

Configuration | General 1 | General 2 | General 3 | Drive by Wire | CAN - Acquisition

Engine

Engine Type	2cyl 2trig Dinj (odd)
Toothed Wheel Arrangement	smf24-2
Coupling Angle [deg]	270.0
Cam Inhibition Limit [RPM]	5000
Max. Percentual Error Sync [%]	0.0
Virtual Cam Type	Disabled
Phased-Like Injection	OFF Ratio 1.000

Miscellaneous

Tacho Pulses per Revolution	1
Nominal Fuel Consumption [cc/min]	377
Low/High Injectors Ratio	1.000
Compound Injection Limit [ms]	0.000
Min. Time ON Injectors [ms]	0.000
Delta_off Time ON Injectors [ms]	0.000
Injection Mapping Mode	Upper 0.0
Throttle Thresholds	Lower 0.0
Vacuum Pressure Filter Depth	100
Transient Type	Normal
Phase Injection	START
Max. Phase Variation [deg/cycle]	720.0
Turbo Configuration	Disabled
AntiLag Output	Disabled
PWM [Hz]	1000 by Throttle

Signal

Stop	Low
Drop-Switch	OFF Low
Shift	Low
Threshold Shift [A/D]	0

Pneumatic Cam Thresholds

	Lower	Upper
Rpm	0	0
Throttle	0.0	0.0
S-mot Tooth	0	0
Min. Variation [A/D]	0	0

Notes

Default - Base Configuration

USB | _default | *_default | M232 v1.11b

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

Page - General 1 Engine settings

Engine type: use the UP/DOWN arrow keys to select the type of engine you are using. Through left click of the mouse you can see different engine type. With right click of the mouse you find information about it.

Example: **2cyl 2trig sinj** → 2 cylinder, 2 coil, and single injector for cylinder (total 2 injectors)

Dinj → double injectors for cylinder. Use the map **injection partition** to define the repartition between the injectors.

Cinj → compositive injector, double injectors for cylinder. It is a particular injection mode, that use 2 injectors for cylinder but one is primary injector and the other is secondary injector.

When primary is working at full flow, secondary start to works to help primary injector.

Into the config page there is a parameter called **compound injection limit [ms]**.

This parameter is used for fix the maximum flow of the injector.

If we set 10.00ms, primary injector works for injection time until 10ms.

If the final injection time is 12ms, 10 ms will be to the primary injector and 2ms will be to the secondary injector.

(Even) → Cyl 1 at 0° and Cyl 2 at 360°

(Odd) → Cyl 1 at 0° and Cyl 2 at 180°

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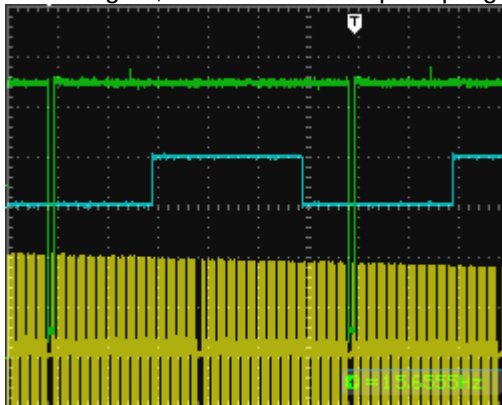
4Cyl FG → Full group injectors, all injections at the same time

Toothed wheel arrangement: use the UP/DOWN arrow keys to locate the crank signal type you are using. Through left click of the mouse you can see different toothed wheel type. With right click of the mouse you find information about it.

“Clio RS”:

Tooth	56	57	58	59	60	1	2	3		
	█	█	█	█	█	█	█	█	█	
	█	█	█	█	█	█	█	█	█	CLIO RS FASE III
Tooth	56	57	58	59	60	1	2	3		
	█	█	█	█	█	█	█	█	█	
	█	█	█	█	█	█	█	█	█	60-2 STD

“fasX-Y”: as the picture below (i.e. 60-2), CAM HALL signal need to be 5V during the “-2” (hole) of the previous revolution and then need to be 0 during the “-2” (hole) of the next revolution. This revolution is the 0° starting point. Green line is coil signal with 0° coupling angle, and 0° for advance. Blue is the CAM HALL signal, and Yellow is the pickup signal.



“camX”: negative edge of the CAM signal needs to be before one pickup tooth. This pickup tooth is 0°.

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.

Tooth 0 for non equi-spaced crank patterns such as 60-2 is the tooth immediately following the missing teeth after the cam signal is seen.

Scam inhibition limit [RPM]: Above this RPM the engine is able to operate without the need for a cam phase sensor.

Virtual CAM – is possible to use pneumatic mode to define the correct phase without a cam sensor.

With **speed and throttle thresholds** you fix **lower** and **upper** range for use this strategy. Outside this range, ECU can't recognize the correct phase. If ECU already know the correct phase, will no lost the phase if goes over the range.

Phased-like injection ON – during not phased engine, ECU pilot injectors every two revolution with an injection time = base map.

Phased-like injection OFF + ratio – during not phased engine, ECU pilot injectors each revolution with an injection time = base map x ratio

Pneumatic cam

S-mot interval – teeth range for determinate the minimum pressure

Min. variation [A/D]: minimum change in pressure, from barometric pressure, allowed to accept as a good value.

Engine will be phased in pneumatic mode only if:

- Pcam variation is bigger than barometric pressure – min Pcam variation ($P_{cam} > P_{baro} - minP_{camVar}$)
- Minimum pressure value is into vacuum interval
- RPM and throttle values are into lower and upper range.

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Miscellaneous Settings

Stop signal: The Stop input is used as a kill switch, when the input is active the engine will not run. Choose is active when have a ground contact (LOW) or 12V contact (HIGH). When not connected, STOP input is = GND

Drop switch: this is the switch for the activation of the kill 'drop switch' strategy (used for sensors, which indicate when the bike has fallen over). Choose is active when have a ground contact (LOW) or 12V contact (HIGH). When not connected, DROP input is = 12V

Shift signal: The shift input is used as a quick shift switch, when the input is active the gear shift strategy can starts. Choose is active when have a ground contact (LOW) or 12V contact (HIGH). When not connected, SHIFT input is = 12V. Use pin #15 connector 18 pole for digital input, or use pin #4 or #16 for analog input (selection in the page General 2).

Threshold shift (A/D): available only if analog input is used. This threshold is used for fix the switch level. (0AD = 0V, 1023AD = 5V).

Tacho pulses for revolutions: Enter how many pulses per revolution, requires the rev counter to see the correct value (set from 1 to 2 pulses per revolution).

Nominal fuel consumption – expressed in cc/min used for fuel consumption calculation (diagnostic page)

Low / high injectors ratio - the value expressed as a percentage of the employment relationship between low and high injectors. The injectors do not always have the same range, with this parameter you can work around this problem, for example if we have a low injectors, at the same injection time is 10% more fuel (higher range) then we enter 1.100 as the value.

Use the parameters called **Min.Time ON injectors** and **Delta_off Time ON injectors** for change the ON and OFF threshold value for start and finish to use the secondary injector, high bench.

I.e. if this value is 0.500ms, secondary injector starts to work only if the injection timing reach 0.5ms on the secondary injector, and stops to work under 0.5ms injection timing value.

Compound injection limit [ms] and Low/High injectors Ratio: These cells are active only if are selected with an engine with double injector per cylinder

Compound injection limit [ms] - Maximum injector time over which comes into operation the auxiliary injectors.

Injection mapping mode throttle thresholds: Threshold throttle opening to determine the function of which input to use an injection or advance map. Upper value is the setpoint to use throttle map, lower value is the setpoint to use M.A.P. map. There are an hysteresis cycle from these 2 values.

Vacuum Pressure filter Depth: set the sample number for calculate the vacuum value. i.e. value = 10, means that the vacuum value is defined from the average of 10 samples.

Transient type: Choose from Normal, Low injection and High injection for define if the transient strategy is applied to all the injectors or only one bench.

Phase Injection: select if the injection phase value is calculated on the END or on the START of the injection.

Max Phase Variation: select how many degree variation can happens per revolution regarding injection phase. A value of 30° means that between 2 revolution the maximum variation will be 30° also if the command is 60°. In total ECU needs another revolution for reach 60°. In this way, big phase variation will be more smooth.

Turbo Configuration: if enable, turbo mode is active and injection and ignition are in function of MAP and not TPS. and the antilag strategy is active, pin #6 connector 18 pole is used a led status. When disable, this signal is used for fuel consumption pulse.

AntiLag output: if enable, and the antilag strategy is active, pin #6 connector 18 pole is used a led status. When disable, this signal is used for fuel consumption pulse.

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PWM outputs

In this section, we set the different frequencies of output PWM signal (pin #3 connector 26 pole).
When enabled you can set in function as a parameter between throttle and MAP is active the table.

Page - General 2

The screenshot shows the 'Mon232 v1.11b' software interface with the 'General 2' configuration tab selected. The window is divided into several sections for configuring various system parameters.

CAN Setting

Lamda 1 [hex]	300
Lamda 2 [hex]	304
Traction Control [hex]	314
Ext. Control 1 [hex]	320
Ext. Control 2 [hex]	324
Ext. Control 3 [hex]	328
Ext. Control 4 [hex]	32C
Ext. DBW Control [hex]	330
Front Speed [hex]	310
Front Speed [gain]	0.5

Miscellaneous

Stepper Reference	RPM
Velocity Reference	Rear Wheel
Front Speed	CAN

Speed Rpm Filter Depth

1	2	3	4	5	6	Neutral
20	20	20	20	20	20	20

Traction Control Adjusting

Stepper Type: **LOW Torque**

Gear-Shift Mode: **Force 1^ Gear**

Auxiliary Output: **Warning Lamp**

Analog Type: **AUX1 - Gear Position Sensor; AUX2 - Shift Switch**

Stepper Motor

Fast Period [ms]	1.0
Slow Period [ms]	2.0
A/D Tolerance	5
Raw A/D Tolerance	12

Idling Control

Kp	5.00
Ki	0.5000
Kd	1.000

SpeedRpm Error

Difference [km/h]	0
Delay [ms]	0

Footer

USB: _default * _default M232 v1.11b

Buttons: Close Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

CAN Setting: select the address for each different frame. Default setting for communication with controller lambda M163 is 300 and 304. For more details regarding Ext. Control CAN frames see the end of the manual.

Stepper motor – enable only with auxiliary throttle control selected on stepper Type.

Fast period = this time expressed in ms indicates the minimum period of movement of the stepper motor at the high speed set from Raw A/D tolerance.

Slow period = this time expressed in ms indicates the minimum period of movement of the stepper motor at the low speed set from Raw A/D tolerance.

A/D tolerance = minimum A/D count tolerance from stepper potentiometer

Raw A/D tolerance = threshold stepper movement to change from slow and high speed period. (if you have a variation lower than this value the stepper motor move with slow period. If you have a variation greater than this value the stepper motor move with fast period).

Stepper reference: RPM or SpeedRPM. Identifies if the reference value for the stepper calculation during auxiliary throttle and Engine brake control strategy is RPM or Speed RPM (SpeedRPM is a particular calculation for RPM value that use also wheel speed ratio and the following formula for obtain the value).

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Formula:

SpeedRPM = (Front Speed / Rear Speed) x Engine RPM

If SpeedRPM Error condition met ----->SpeedRPM = EngineRPM

SpeedRPM Error condition -----> **Difference** > xxxx Km/h and **Delay** > yyyy msec

or

Front or Rear Speed < 25 Km/h

Velocity Reference: select which is the speed value that need to be used for the correction by velocity.

Speed Rpm Filter Depth: set the number of samples for the Speed RPM calculation in function of hte different GEAR.

Traction Control Adjusting: available only if in analog type selection there is a TC level input selected. In this area, it's possible to select the TC input type, between Selector (Trimmer) or Step switch (3,5,8,10 steps type selectable). Selector needs a linearization of the input into the Linear page 2.

Step switch needs an input that normally is 2.5V, 5V for UP and 0V for DOWN.

Stepper type: select in which way use the ECU stepper driver.

Auxiliary throttle – used for control a secondary throttle on the engine. This function enable a map in function of TPS and RPM.

Idling – used for control the idling in function of water temperature and RPM thresholds, in an OPEN loop way (no step number feedback from the stepper motor)

Idling Harley Davidson – used for control the idling in function of water temperature and RPM thresholds, in a CLOSE loop way (step number control needed)

Engine Brake Control – used for control the engine brake in function of gear and RPM in a CLOSE loop way (step number control needed).

Gear-shift mode: by this drop-down menu select the type of strategy for the electronic change.

Standard - the strategy of the electronic change is based on all available inputs such as the position of the gear and the input set. These are the devices for the electronic change strategy.

Only potentiometer - The strategy of the electronic change is based only on the position sensor ignoring the signal set. In this way there is no need to connect a shift switch. (Note: Set = start strategy changed)

N° forced gear - the unit does not read the signals shift, cell and potentiometer but force a gear and then using the maps relating to that gear.

Engine – wheel ratio – this function active the calculations of the gear from rpm and speed. Set it into Params page.

Auxiliary Output: switch to select if the auxiliary output (pin #14 connector 18 pole) is used as a warning light or a relais output in function of water temperature or engine speed.

Analog Type: this area is used for select the meaning of the two spare input (0-5V) called AUX 1 (#4 connector 26 pole) and AUX 2 (#16 connector 26 pole).

The different options are:

- Gear position sensor used for a gear recognize from a potentiometer
- Shift switch used for the electronic quick shift by using an analog input
- TC level used for the traction control adjusting as a selector or a switch
- Lambda used for an analog lambda input usable for autotune and CO-correction
- Fork and shock used for two analog input usable for suspension sensor. No corrections in function of these values. Use only for logging.

Idling Control: PID settings for the idling control only if stepper type is selected as a idling management.

SpeedRPM Error: parameters available only if stepper reference is selected as SpeedRPM. Difference is the tolerance between the two speed value and delay is the maximum tolerance time before set error condition.

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Page - General 3

Mon232 v1.11b

Configuration General 1 General 2 **General 3** Drive by Wire CAN - Acquisition

Injection Battery Offset

[Volt]	9.0	10.0	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	18.0
L [ms]	0.960	0.960	0.960	0.760	0.760	0.700	0.650	0.600	0.500	0.500	0.300	0.250	0.310	0.310	0.310	0.310
H [ms]	0.960	0.960	0.960	0.760	0.760	0.700	0.650	0.600	0.500	0.500	0.300	0.250	0.310	0.310	0.310	0.310

Dwell Time

Battery Voltage [Volt]

[ms]	9.0	10.0	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	18.0
500	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
1000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
2000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
3000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
4000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
5000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
6000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
6500	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
7000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640
8000	1.750	1.750	1.750	1.750	1.400	1.300	1.240	1.090	1.040	0.990	0.940	0.940	0.640	0.640	0.640	0.640

PickUp 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

USB _default *_default M232 v1.11b

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

Injection Battery offset

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.

Dwell time

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.

Pick-up Offset

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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Page – Drive by wire

Mon232 v1.11b

Configuration | General 1 | General 2 | General 3 | **Drive by Wire** | CAN - Acquisition

External Drive by Wire Control **ACTIVE**

Potentiometers	Gas	DbW 1	DbW 2
Type	Cross	Cross	Cross
A/D Tolerance	100	100	100
TimeOut [ms]	250	250	250

Drive by Wire Reference

Cylinder 1	DbW - 1
Cylinder 2	Dbw - 2
Cylinder 3	Dbw - 2
Cylinder 4	DbW - 1

Drive-by-Wire 1 Control

PWM freq. [Hz] 20000
DC Threshold Open/Close [%] 60.0

Pid Open		Pid Close	
Kp	1.40	Kp	1.25
Ki	1.95	Ki	1.60
Kd	1.40	Kd	1.30
Kf	0.16	Kf	0.10

PWM Offset - I term [%]
Open 13.0 Close -6.0
Thr. Reset - I term [deg] 0.2
Tolerance [A/D] 2
ExtraTolerance [A/D] 100
TimeOut [ms] 500
Mode Free Wheelling **Disable**
Current Limit 4.0 A

Drive-by-Wire 2 Control

PWM freq. [Hz] 20000
DC Threshold Open/Close [%] 60.0

Pid Open		Pid Close	
Kp	1.40	Kp	1.25
Ki	1.95	Ki	1.60
Kd	1.40	Kd	1.30
Kf	0.16	Kf	0.10

PWM Offset - I term [%]
Open 13.0 Close -6.0
Thr. Reset - I term [deg] 0.2
Tolerance [A/D] 2
ExtraTolerance [A/D] 100
TimeOut [ms] 500
Mode Free Wheelling **Disable**
Current Limit 4.0 A

USB | _default | *_default | M232 v1.11b

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

M232 unit allows to manage a double drive by wire by using the external module M282 (9.001.282.01001). This page can be used only if a M282 is equipped on the system. Press the button DISABLE for active the page and configure it.

Potentiometers

Table to choose if you have the double potentiometers on the following signals, Throttle, drive by wire 1 and 2, through a lift click on the "single" button.

You can choose also, the tolerance from the 2 potentiometers of the sensor, and the timeout beyond which if the two potentiometers are out of tolerance you have an sensor error.

Cross means a potentiometer where main and auxiliary potentiometer have a movement in opposite (i.e. main is 0V and aux is 5V, main is 4V and aux is 1V).

P.Half means parallel half, where main and auxiliary potentiometer have the same movement but the auxiliary has half value than main (i.e. main is 5V and aux is 2.5V, main is 4V and aux is 2.0V).

P.Equal means parallel equal, where main and auxiliary potentiometer have the same movement and the same value (i.e. main is 5V and aux is 5V, main is 4V and aux is 4V).

Drive by wire reference

In this area is possible to link drive by wire and engine cylinder.

It's possible to have a complete independent selection for every cylinders. In function of this selection, can change reference axis on the injection table for example.

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Drive by wire control

Each drive by wire can have a complete independent setting, and it's possible to have a different PID setting if the movement of the throttle is in opening or closing side

Freq. PWM: provides the operating frequency of the actuator.

DC Threshold Open/Close: is the PWM threshold above that are used PID open values. Under that are used PID close values. Usually this value is near to PWM necessary for start the open movement.

Kp, Ki, Kd: PID values that affect the movement and the speed of throttle motor.

Kf: is used as an extra compensation for add a gain to the total PWM, when very fast movement happens.

If the variation of TPS target between current value and previous value is small, F term has a very small influence.

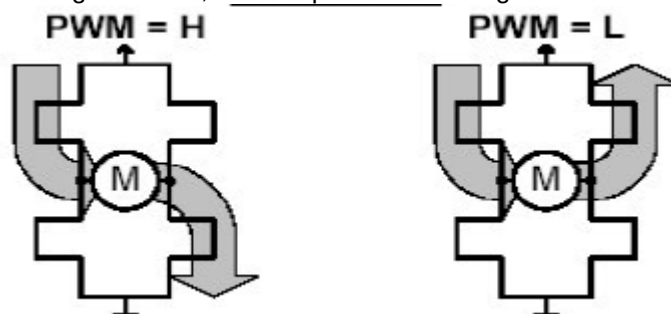
If the variation is big, F term is used for add an extra gain.

PWM Offset I term: In opposite of F term, for add a compensation when movement starts and is fast, it's possible to use parameters PWM offset I-term, open, close, Thr reset I-term, that are used especially for throttle body with a strong spring back. Open and close are offset to I-term applied when the throttle movement is bigger than Thr. Reset value.

Tolerance A / D : tolerance of positioning of the valve, expressed in bits measured by potentiometer valve. More is this range, and more natural movement will be. Es.450bit value, tolerance 5bit. It will be an upgrade if the readout is between 445 and 455.

Extra tolerance. / Time out : extra tolerance positioning of the valve, expressed in bits. This value is used together with time out, when that is exceeded this time and AD tol. Hasn't yet been reached, the new allowance will be given the extra parameter AD Tol.

Mode free wheeling: when enabled the H bridge works in a different way, more linear and soft. The picture on the left explain the normal operating condition, and the picture on the right show the free wheeling condition.



Current limit: selectable between 2.5A, 4.0A and 6.6A. Different current limit means different heating and pushing force.

Page CAN acquisition

This page contains the layout of the 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.

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

External drive by wire CAN acquisition channels are available only if M282 is used and connected

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Page Linearization

The **linear** page can be found by pressing this button. There are 2 page for the analog input linearization.



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Linearizations 1

Linearizations 1

Linearizations 2

Throttle Interpolate Auto Calibration

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A/D	0	68	136	205	273	341	409	477	546	614	682	750	818	887	955	1023
[deg]	0.0	6.7	13.3	20.0	26.7	33.3	40.0	46.7	53.3	60.0	66.7	73.3	80.0	86.7	93.3	100.0

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]	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

M.A.P. Pressure

A/D	0	68	136	205	273	341	409	477	546	614	682	750	818	887	955	1023
[mBar]	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700

Gas (external DBW) Interpolate

A/D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[deg]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Aux. Throttle 0% 100%

A/D	0	0
A/D	0	0

eDbw - GAS Min. Max.

A/D - A	0	0
A/D - B	0	0

eDbw - DBW1 Min. Max.

A/D - A	0	0
A/D - B	0 <td>0</td>	0

eDbw - DBW2 Min. Max.

A/D - A	0	0
A/D - B	0	0

* A/D - A must be rising. * A/D - A must be rising.

USB

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

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Settings within this page define the calibration of the following inputs

Throttle,

M.A.P.

eDBW GAS (with M282)

Traction Control Calibration

Water temperature,

Gas (only with M282),

eDBW 1 (with M282)

lambda narrow band 1 and 2,

Air temperature,

Aux. Throttle,

eDBW2 (with M282)

fork and shock.

Throttle – use the utility Autocalibration for set the linearization of the throttle input, or proceed in the manual way by clicking on the “1”, “16” cells and then interpolate button. *Remember to send the configuration to the ECU.*

eDBW - To calibrate the gas or the drive by wire potentiometer activate the connection with the unit M282 and the ECU. Bring gas to 0% and click 2 times the cell “Min”. Subsequently bringing the gas to 100% and click the cell “Max”. In this way the software will have acquired the values in the count format, read from the microprocessor.

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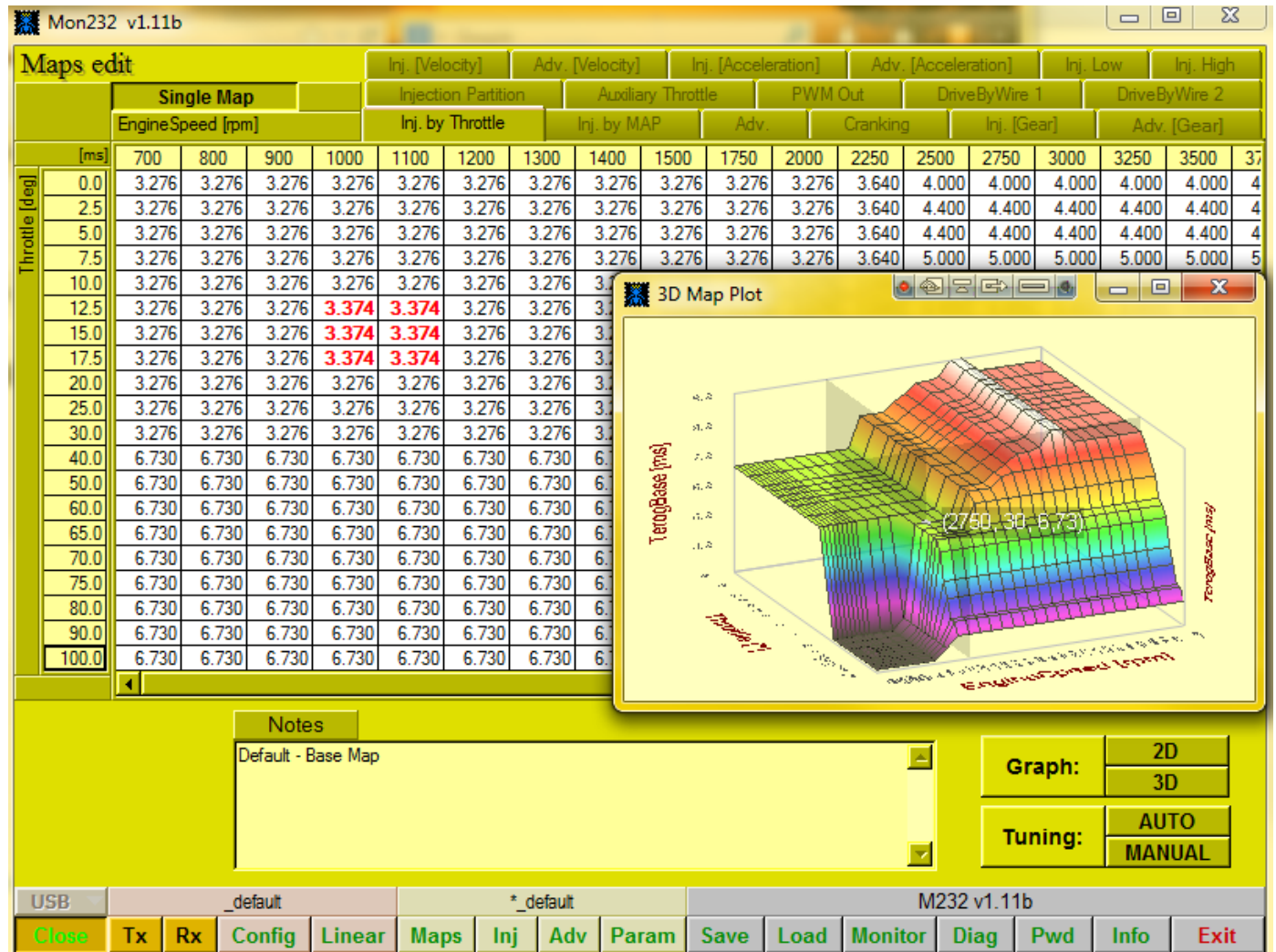
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Page Maps

The Map editor can be found by pressing this button.



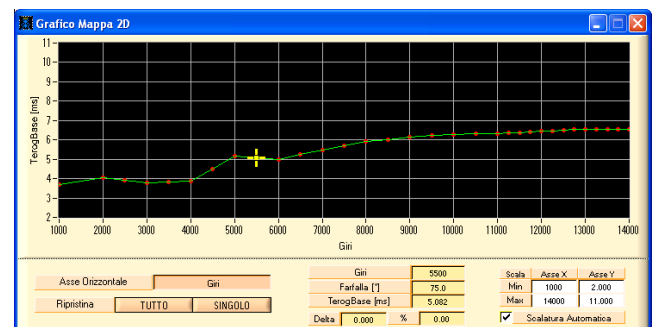
In Edit mode a 3D or 2D representation is automatically displayed as a separate window as shown here, this can be minimised if necessary.



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

The upper buttons menu contains all of the maps you can edit; the button on the left is used for have an independent map for every cylinders or only one map for all the cylinders.

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



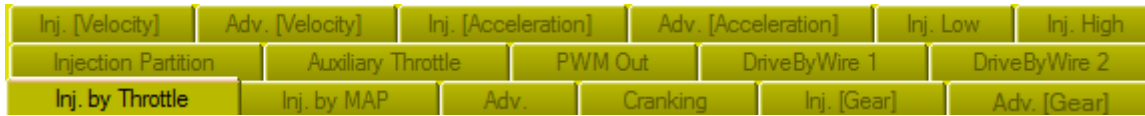
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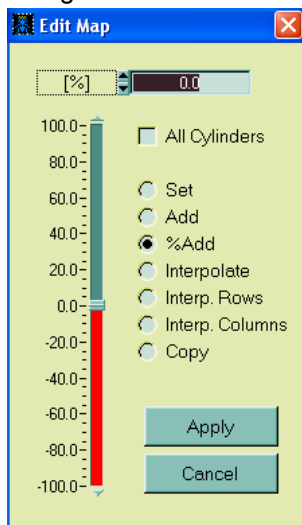
Maps / Edit / Injection



Choose Injection from the buttons 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.



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

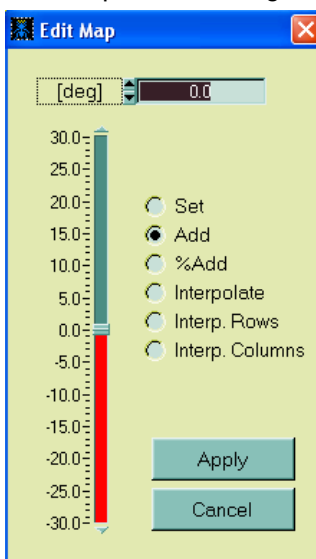
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

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 / 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.

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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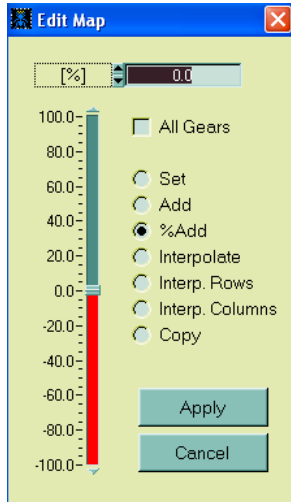
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Maps / Edit / Injection correction by gear, by velocity

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

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

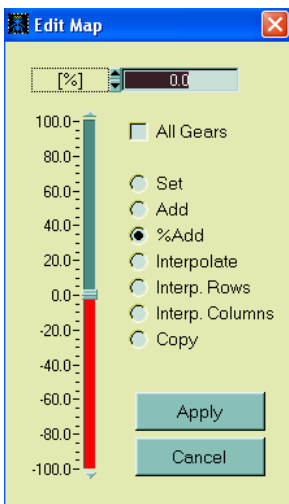
Interp. Rows – Tick here to interpolate 3 or more cells in the same row

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 / Advance correction by gear, by velocity

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

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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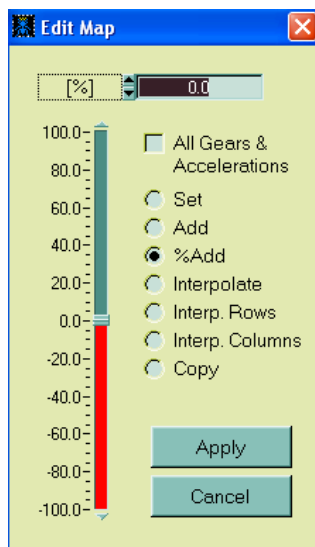


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Maps / Edit / Injection Correction by Acceleration (traction control)

For acceleration strategy details see the separated manuals.

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.

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.

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

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.

Maps / Edit / Advance Correction by Acceleration (traction control)

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.

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.

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Maps / Edit 5.0 / Cranking corrections

This is the starting enrichment map **KJCrank** 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.

Mon232 v1.11b

Maps edit

Water Temperature [°C]	Revolutions	Injection Partition					Auxiliary Throttle					PWM Out					DriveByWire 1					DriveByWire 2									
		Inj. [Velocity]					Adv. [Velocity]					Inj. [Acceleration]					Adv. [Acceleration]					Inj. Low					Inj. High				
		Inj. by Throttle					Inj. by MAP					Adv.					Cranking					Inj. [Gear]					Adv. [Gear]				
K	7	50	85	103	121	139	156	174	192	210	225	245	263	281	298	316	334	3													
-20.0	4.192	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													
-18.0	4.192	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													
-15.0	4.192	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													
-10.0	4.192	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													
-5.0	4.192	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													
0.0	4.192	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													
10.0	1.800	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
20.0	1.800	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
30.0	1.733	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
40.0	1.667	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
50.0	1.600	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
60.0	1.533	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
70.0	1.467	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
80.0	1.400	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
90.0	1.333	1.250	1.234	1.226	1.218	1.210	1.202	1.194	1.185	1.177	1.170	1.161	1.153	1.145	1.137	1.129	1.121	1													
100.0	1.267	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	1.200	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	1.133	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	1.067	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													

Notes: Default - Base Map

Graph: 2D, 3D

Tuning: AUTO, MANUAL

USB: _default, *_default

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

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 / Injection Partition

This table is only available if a twin injector configuration is defined in configuration

The value **KJRipBase** in each cell indicates the percentage of the total injection quantity will be delivered through the lower injector at each position.

100% = all through the lower injector

50% = equally distributed through upper and lower

0% = all fuel through upper injector.

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 / PWM duty cycle

Cell values are defined as a percentage

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.

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 / drive by wire – auxiliary throttle

This table allows you to set the position of the actuator depending on engine rpm and the throttle or air pressure. It is also possible to have a map for each different gear.

Cell values are defined as a percentage

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.

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.

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Maps / Mapping overview

For automapping details see the separated manuals.

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 before.



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 / Page function overview

RPM – value of engine RPM

Throttle – Value of Throttle sensor

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.

Manual tuning / Pause – button for suspend the correction and check the fuelling with the original map value.

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

Lambda – Current value of the lambda sensor in AFR. Through the button Lambda 1 or 2 you can set with how lambda sensor make automapping. For example in the picture is set lambda 1.

Lambda / Set point - Your desired target AFR value. You can choose from 3 different set point.

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.

Auto-tuning – In Auto tuning mode the engine must be latched into a cell for this amount of time before any correction will occur. You can set this speed from the menu **tracking mode**. 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 for example.

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
------	------	------	------

Injection 1		EngineSpeed [rpm]											by Throttle				
		700	800	900	1000	1100	1200	1300	1400	1500	1750	2000	2250	2500	2750	3000	3250
Throttle [deg]	0.0	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.640	4.000	4.000	4.000	4.000
	2.5	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.640	4.400	4.400	4.400	4.400
	5.0	3.276	3.473	3.473	3.473	3.473	3.276	3.276	3.276	3.276	3.276	3.276	3.640	4.400	4.400	4.400	4.400
	7.5	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.640	5.000	5.000	5.000	5.000
	10.0	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.276	3.640	5.500	5.500	5.500	5.500

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. This is particularly useful for Ducati engines. Set all the cylinder that you want to map simultaneous. In this example we activate cylinder 1,2.

Also we can see from this picture, which input is active for automapping, between throttle or M.A.P.

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Maps / 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.

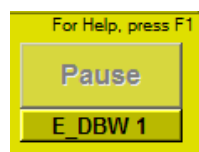
Correct engine state will be indicated by the RPM and TPS values changing from yellow to red

and the cell in the main window changing to grey as shown here.

Every time it's possible to pause the manual tuning by "pause" button.

During "pause" condition ECU come back to work with not-corrected values.

It's particular useful for compare the tuning with the original map.



10	4.030	3.743	3.41
33	4.232	3.989	3.91
32	4.432	4.313	4.2
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

609	4.733	4.
852	5.746	5.
726	5.042	5

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

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.

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

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

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Maps / 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.



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.

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.

[ms]	1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	1
2.0	2.638	1.912	1.881	1.550	1.685	1.187	1.187	1.187	1.187	1.187	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
2.3	2.539	1.955	1.859	2.020	1.847	1.350	1.354	1.387	1.344	1.252	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
2.7	2.605	1.939	1.695	1.519	1.523	1.516	1.747	1.747	1.747	1.747	1.544	1.524	1.524	1.524	1.524	1.524	1.524	1.524	1.524
3.0	2.605	1.930	1.649	1.516	1.319	1.319	1.319	1.550	1.550	1.418	1.418	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
4.0	2.670	2.426	2.016	1.803	1.566	1.534	1.220	1.154	1.451	1.418	1.418	1.319	1.319	1.319	1.319	1.319	1.319	1.319	1.319
5.0	3.132	3.070	2.524	2.054	1.899	1.830	1.853	1.704	1.706	1.657	1.674	1.657	1.649	1.649	1.649	1.649	1.649	1.649	1.649
6.0	3.033	2.481	2.539	2.450	2.222	2.206	1.978	1.735	1.626	1.595	1.526	1.533	1.549	1.549	1.549	1.549	1.549	1.549	1.549
7.0	3.132	2.846	2.696	2.735	2.520	2.478	2.377	2.034	1.781	1.650	1.499	1.694	1.797	1.779	1.733	1.681	1.681	1.681	1.681
8.0	3.956	3.951	3.303	3.183	3.054	2.828	2.650	2.613	2.523	2.540	2.318	1.993	1.894	1.953	1.827	1.850	1.813	1.813	1.813
12.0	4.055	4.264	2.927	2.953	2.864	3.081	3.021	3.485	2.648	2.792	2.663	2.765	2.654	2.559	2.400	2.319	2.308	2.132	2.132
16.0	4.121	3.713	3.500	3.849	3.436	3.317	3.457	3.766	2.935	2.795	3.069	3.111	3.123	3.041	2.858	2.963	2.956	2.727	2.727
20.0	4.220	4.100	3.927	4.145	4.114	3.908	3.980	4.431	4.844	3.986	4.291	3.428	3.500	3.758	3.225	3.117	3.049	2.969	2.969
25.0	4.286	4.023	4.046	4.896	4.959	4.199	4.496	4.224	4.133	3.889	4.373	3.941	3.786	3.692	3.470	3.451	3.569	3.397	3.397
30.0	4.286	4.145	4.688	4.530	5.056	4.371	4.535	4.752	4.562	4.159	4.794	4.427	4.228	4.143	3.790	4.033	3.963	3.962	3.962
36.0	4.286	4.220	3.981	4.517	5.005	4.376	4.824	4.797	4.738	4.884	5.143	5.189	4.738	4.537	4.229	4.225	4.233	4.179	4.179
40.0	4.286	4.121	4.368	4.398	4.636	4.828	4.830	5.099	4.989	5.230	5.594	5.535	5.462	5.272	5.067	4.879	5.061	5.305	5.305
50.0	4.286	4.121	4.827	4.419	4.824	5.225	4.766	5.064	5.018	5.480	6.051	5.879	5.784	5.608	5.282	5.372	5.537	5.609	5.609
60.0	4.286	3.824	4.821	4.813	5.110	5.359	4.669	5.048	5.465	5.641	6.168	6.366	6.685	7.663	7.396	6.847	5.931	6.122	6.122
70.0	4.286	3.878	4.750	4.873	5.172	5.308	5.163	5.232	5.249	5.544	6.060	6.292	6.405	6.729	6.149	6.165	6.474	6.845	6.845
81.0	4.286	4.095	4.636	4.795	4.300	4.171	5.333	5.624	5.376	5.307	6.050	6.095	6.621	7.687	7.532	7.105	7.182	8.267	8.267

U	4.030	3.743	3.91
53	4.232	3.989	3.91
32	4.432	4.313	4.2
15	4.701	4.485	4.3
3d	4.776	4.485	4.3

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Maps / 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.

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

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

Maps / 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.

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.

[ms]	1500	2100	3000	4000	5000	5500	6000	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9000
1.4	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	0.739
2.8	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	0.863
4.9	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	0.943
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	1.923	1.886	1.849	
15.2	3.475	3.327	3.327	3.122	2.844	2.420	2.215	2.205	2.184	2.162	2.259	2.395	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	2.476	2.576	2.401	2.226	2.571	2.916	2.943	2.969
22.9	4.319	4.148	4.148	3.895	3.574	3.327	2.899	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	3.549	3.601	3.426	3.251	3.520	3.788	3.767	3.746
32.1	4.548	4.432	4.432	4.363	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	4.432	4.313	4.232	4.484	4.609	4.733	4.899	5.065	4.725	4.394	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	4.652	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	4.842	5.288	5.734	5.510	5.286	6.028	6.770	6.620	6.469
55.0	5.291	5.139	5.113	5.006	4.931	4.618	4.270	4.330	4.626	4.921	5.365	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	5.880	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	4.669	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	7.205
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

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)

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

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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 / Auto mapping – Road tune - continued

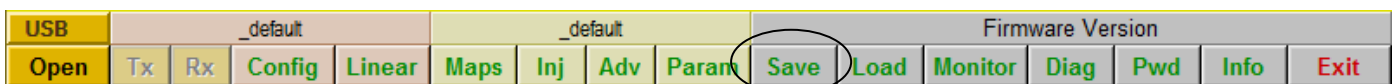
If the power to the ECU has **remained on** throughout the test the ECU will re-synchronise with the PC as soon as you re-connect and press the Open button. This is seen as a series of messages at the top of the screen.

- 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.

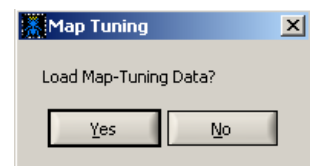
If you want to make some manual changes at this stage you will need to exit the Map tuning page and use the Map edit page, this is easily done by pressing the Map button at the bottom of the page, the red bold cells are still showing and you are free to make manual changes.

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.



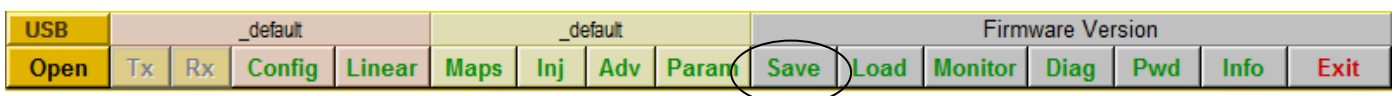
To finish the process, simply Transmit this map back to the ECU into either map 1 or map 2.

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.

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.

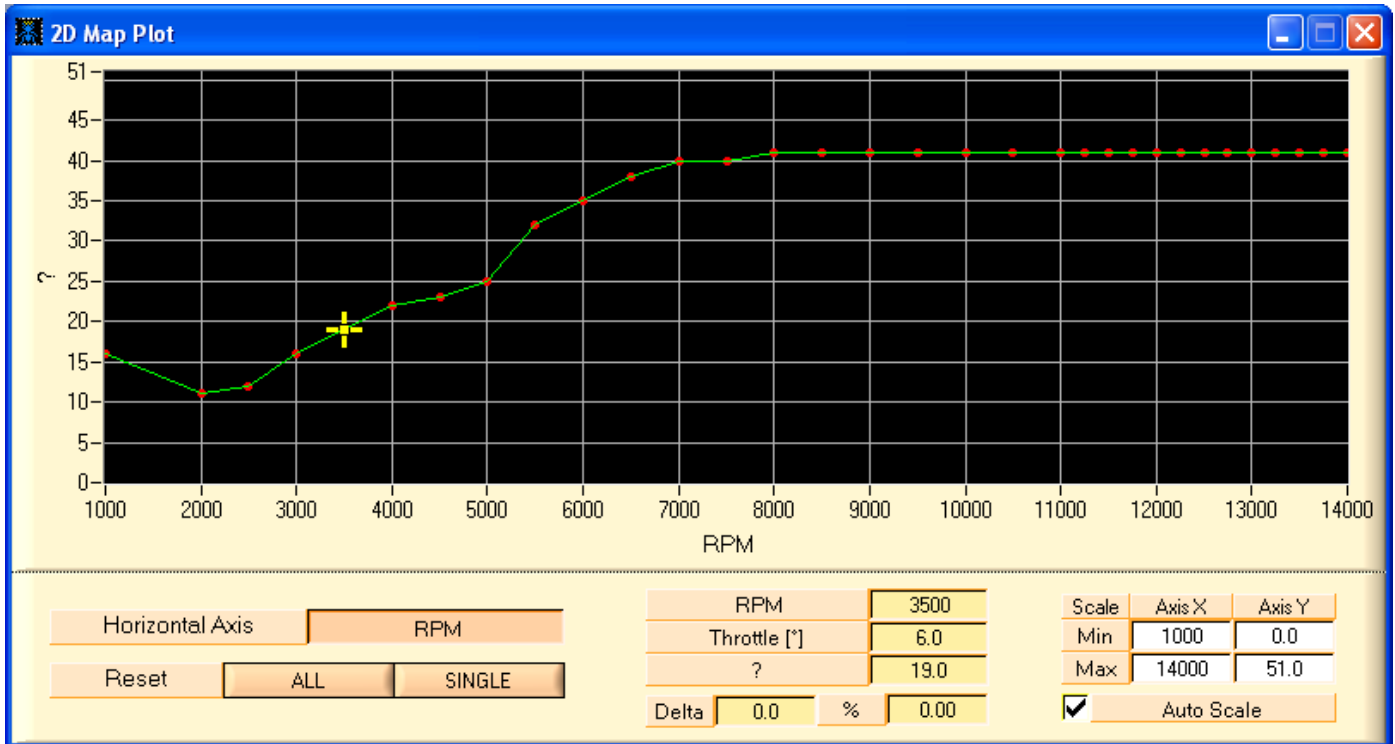
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Map / Graph 2D



With 2D graphics you can make corrections to the plans listed.

With the right mouse button (holding it clicked) you can make a multi-selection point on the chart, to change several values simultaneously, via dragging with the left button on the yellow cross.

You can also view the actual data (in the middle of the graph), change the scale (on the right), choose to display as abscissa the engine rpm or throttle. The changes made are then saved and transmitted.

Through 2D graph you can see the different between two maps.

Copy all the plans listed of injection time for example into another file and open now 2D graph.

You have 2 line, one red and one green.

The red line is the last file, and the green one is the original file.

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Maps / Edit / Injection (correction) overview

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

USB	_default				_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
- Airbox pressure
- Traction control adjustment

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

Air Temperature Correction																
Interpolate	[°C]	-20.0	-16.8	-13.5	-10.3	-7.1	-3.9	-0.6	2.6	5.8	9.0	12.3	15.5	18.7	21.9	25
Interpolate	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

It can be applied to gain the injection of each of the temperature or pressure breakpoint. 1.000 Gain = no correction, gain, 0.000 shutdown of the vehicle at this value.

Maps / Edit / Injection phase

Mon232 v1.11b															
Injection 2								Correction							
Phase Low								EngineSpeed [rpm]							
Throttle [deg]	[deg]	0	500	1000	2000	3000	4000	5000	6000	6000	6000	6000	6000	6000	6000
	0.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	10.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	25.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	50.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	60.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	70.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	90.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	100.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Phase High								EngineSpeed [rpm]							
Throttle [deg]	[deg]	0	500	1000	2000	3000	4000	5000	6000	6000	6000	6000	6000	6000	6000
	0.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	10.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	25.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	50.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	60.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	70.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	90.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	100.0	180	180	180	180	180	180	180	180	180	180	180	180	180	180
USB								*_default							
Open	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

Table for the definition of injection phase as a function of RPM – The angle is measured from Tooth 0 to the injection opening or closing time, in function of the settings in the configuration page. **FaseBase**.
Different phase are selectable in function of throttle and RPM for each bench side.

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Maps / Edit / Advance (correction) overview

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

USB	_default				_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 advance maps against other inputs:

- Air temperature
- Water temperature
- Individual cylinders
- Airbox pressure
- Traction control adjustment

Air Temperature Correction																
Interpolate:	[°C]	-20.0	-16.8	-13.5	-10.3	-7.1	-3.9	-0.6	2.6	5.8	9.0	12.3	15.5	18.7	21.9	25
Interpolate:	[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

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

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Maps / Edit / Parameters / Overview

The Parameters page can be found by pressing this button.



Parameters page contains the following settings:

- Controls during ECU power on and engine start
- RPM limiters
- Idling control
- Pit limiter
- Set points for water temperature and idle speed
- Launch control
- Overrun cut off
- Gear change calibration and set up
- Wheel speed calibration
- Relay on/off control
- Injection and advance transient
- CO correction
- Antilag strategy
- Traction control management

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Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off Transient Gear & Shift Anti-Lag CO-Corr. Traction Ctrl.

Start & On/Off

[°C]	-20.0	-10.0	0.0	10.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	80.0
[ms]	20.0	20.0	15.0	12.0	10.0	10.0	10.0	9.0	9.0	9.0	8.0	6.0	4.0	2.0	0.0	0.0

Engine Thr. Mechanical

ON Hyst. Mechanical Spark Tooth 0

Start Mechanical [rpm] 0 0 Mechanical Preload Teeth 0

Engine Thresholds Normal

Upper (ON) [rpm] 400

Lower (OFF) [rpm] 150

Drop-Switch Delay [ms] 800

Engine Limits [rpm] - [mBar]

	Spark	Injection
Main	15000	15100
Gear 1	15000	15100
Gear 2	15000	15100
Gear 3	15000	15100
Gear 4	15000	15100
Gear 5	15000	15100
Gear 6	15000	15100
M.A.P.	10000	10000

Injection Partition Filter Depth

Ratio Down 10000

Ratio Up 10000

(1=MaxFilter)

Wheels

	Rear	Front
Circumference [mm]	2000	2000
Pulses	4	4
Filter Depth	20	20
Slip Ratio - Filter Depth	20	

Set-Points Idling

Water T. [°C]	-20.0	-10.0	0.0	50.0	60.0	65.0	70.0	75.0	80.0	90.0
Idling [rpm]	1200	1200	1100	1100	1000	1000	1000	1000	900	900
Step Normal [%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Step Start [%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Throttles

Ramp Duration [ms] 5

Starting Offset [rpm] 1200

Delta Idling [rpm] 0

Ramp Idling [ms] 0

Min Throttle [deg] 0.0

Normal Step Correction [configuration]

Min Speed [rpm] 0

Max Speed [rpm] 0

Min Water T. [°C] 0.0

Min Time [ms] 0

Max Time [ms] 0

Reset

Throttle Thresholds

Stepper Re-Calibration [deg] 0.0

Config

Hold Time [ms] 5

Step Change Ratio [ms/step] 100

Rpm Idling Filter Depth 1

Pre-Injection Time

[°C]	-20.0	-10.0	0.0	10.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	80.0
[ms]	20.0	20.0	15.0	12.0	10.0	10.0	10.0	9.0	9.0	9.0	8.0	6.0	4.0	2.0	0.0	0.0

Engine Calculations

Mean RPM Filter Depth [Revs] 2

Acceleration Filter Depth [Revs] 2

Starter

Speed Threshold [rpm] 0

Water T. [°C] 0.0 0.0 0.0 0.0

Throttle Position [deg] 0.0 0.0 0.0 0.0

Mon232 v1.11b

USB _default * _default M232 v1.11b

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

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Page Misc1

Engine calculations

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

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

Engine Threshold Mechanical available only with 1 cylinder engine

Start Mechanical [Rpm] – rpm threshold for enable mechanical spark. From 0 rpm to start mechanical ON threshold, nothing happens. Between this threshold and “UPPER” (engine thresholds normal) mechanical spark is applied.

Hyst is the hysteresis value for enable again mechanical spark if rpm came back below “UPPER” thresholds.

Mechanical Spark Tooth and preload – reference tooth for enable the spark and “charge” coil time fixed by preload parameter.

Start & on/off

Drop switch delay time – Delay after the Drop-switch 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.

Starter – Only active when ‘drive by wire’ is selected in your configuration

Starter – Speed threshold RPM / Throttle position – In ‘drive by wire’ mode the ECU control of the throttle butterfly is not active until the RPM has exceeded the ‘Speed Threshold’, until this point a default Throttle value ‘Throttle Position’ is used to fix the throttle open amount in function of different water temperature.

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.

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.

If you write a lower value in the main cell, the unit will treat this as a limiting value.

It's also possible to set a engine rev limiter in function of the M.A.P. value, especially useful for Turbo engine.

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.

Idling speed control

These parameters are active only when stepper type selection is idling or idling Harley Davidson.

Water temperature ° C thresholds where different values apply to the idling. Within this range the values should be interpolated.

Idling RPM - Minimum value to be achieved by the water temperature in the previous item.

Throttle thr [deg] and Min throttle [deg] - opening throttle threshold above which disables the control of the minimum.

Speed threshold - engine speed threshold above which disables the control of the minimum

-Harley version-

Idling RPM - Minimum value to be achieved by the water temperature in the previous item.

Step normal – stepper position when the idling strategy is disable

Step start – stepper position during engine starting. End of start phase happens when rpm $\geq$ idling rpm + delta idling

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Idling strategy is enabled only if throttle position is under **min throttle** value and rpm is under **idling rpm + delta idling**.

The setpoint for the idling control is varied linearly from **idling rpm + delta idling** to **idling rpm** for a time fixed with **ramp idling** value.

Stepper motor is calibrated each power ON of the ECU. A special calibration happens if the throttle go over than **stepper re-calibration** parameter. If this parameter is = 100.0, special calibration never works.

Rpm idling filter depth – filter number for idling rpm calculation. There is a sample every **hold time**.

Page Misc 2

Mon232 v1.11b

Parameters Misc. 1 **Misc. 2** Misc. 3 Cut Off Transient Gear & Shift Anti-Lag CO-Corr. Traction Ctrl.

Engine Brake Control

Activation Limits	Speed Lower [rpm]	4000
	Throttle Upper [deg]	60.0
	Throttle Lower [deg]	10.0
Max Step Number		100

Control by Gear							
	1	2	3	4	5	6	Neutral
Hold Time [ms]	200	200	200	200	200	200	200
Fixed Step [%]	10.0	12.0	14.0	16.0	18.0	20.0	10.0

Step[%] by Gear																		
[rpm]	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000
1	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutral	0.0	0.0	10.0	15.0	18.0	20.0	23.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Relais Activation

[rpm]	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
1=On	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1

USB _default * _default M232 v1.11b

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

Engine Brake control

This strategy is selectable only if stepper type in the configuration is engine brake control.

Activation limits are used for define the range of value where the strategy is enable.

Needs to have a RPPM value lower than **Speer lower** rpm, and TPS needs to be between **Upper** and **Lower** thresholds.

Max step number is the value for define the total step number of the stepper motor.

During the strategy, stepper motor position is defined by the step [%] by gear table.

It's possible to have a fixed position of the stepper for each independent gear when the control is disable because outside the activation limits (fixed step [%]).

Hold time is the time step of the stepper motor, independent for each gear.

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Relais activation

This output is used as low side switch to control an on off. The signal is at 0V when it is ON, and at 12V when is OFF. Depending on the settings that were selected for output configurations, you can create an on / off with a map as a function of water temperature or rpm.

Page Misc 3

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 **Misc. 3** Cut Off Transient Gear & Shift Anti-Lag CO-Corr. Traction Ctrl.

Launch Control

Mode

Reference Speed

JetSki Engine Limits [rpm] Spark Injection

Rear Wheel

	Settings	
Injection	K	1.000
Advance	[deg]	-10.0
PWM	[%]	0.0

Speed Threshold [km/h]

	Activation Limits Lower [rpm]	6000	6250	6500	6750	7000	7250	7500	7750
Injection	Activation Limits Upper [rpm]	6250	6500	6750	7000	7250	7500	7750	8000

	Activation Limits Lower [rpm]	6000	6250	6500	6750	7000	7250	7500	7750
Advance	Activation Limits Upper [rpm]	6250	6500	6750	7000	7250	7500	7750	8000

	Activation Limits Lower [rpm]	6000	6250	6500	6750	7000	7250	7500	7750
PWM	Activation Limits Upper [rpm]	6250	6500	6750	7000	7250	7500	7750	8000

Speed Limiter

Control Type

Limits	Speed [km/h]	Gear 1 [rpm]	Gear 2 [rpm]
Inf.	45	0	0
Sup.	50	0	0

Maximal Corrections	
K-Injection	0.700
Advance [deg]	10.0

USB M232 v1.11b

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

For launch control and speed limiter details see the separated manuals.

-extra information-

Launch control

Pin for enable the strategy #10 connector 26 pole that needs to be connect at GND.

JetSki mode is a particular launch control mode that works similar to an engine rev limiter. When enable, the new engine limits are the two value fixed in the cell Spark and injection. For disable the strategy disconnect the pin

Speed limiter

Pin for enable the strategy #3 connector 18 pole that needs to be connect at GND

Control type RPM, works with RPM thresholds and not on speed value thresholds. It's possible to set different rpm thresholds for 1st and 2nd gear.

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Page Cut Off

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 **Cut Off** Transient Gear & Shift Anti-Lag CO-Corr. Traction Ctrl.

Gear 1 ▼ CutOff 1 Correction

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Speed [rpm]	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
Throttle [deg]	0.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
K-Injection	1.000	0.900	0.870	0.850	0.830	0.810	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
Advance Offset [deg]	0.0	-4.0	-5.0	-6.0	-7.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
Exit Time [ms]	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

Gear 1 ▼ CutOff 2 Correction

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Speed [rpm]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Throttle [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
K-Injection	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
Advance Offset [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
Exit Time [ms]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Enable CutOff Correction (1 = ON)

	Gear 1	Gear 2	Gear 3	Gear 4	Gear 5	Gear 6
Cyl. 1	1	1	1	0	0	0
Cyl. 2	1	1	1	0	0	0
Cyl. 3	1	1	1	0	0	0
Cyl. 4	1	1	1	0	0	0

Thresholds Special Exit

Throttle Variation - CutOff 1 [deg/s]	2
Throttle Variation - CutOff 2 [deg/s]	0
Throttle Variation Filter Depth	32

USB _default _default M232 v1.11b

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

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

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

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.

It's possible to have different correction in function of different gear and also a different setting for each cylinder related with gear.

Cutoff stops to work after exit time param or when TPS movement is faster than throttle variation special exit value.

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Page Transient

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off **Transient** Gear & Shift Anti-Lag CO-Corr. Traction Ctrl.

Advance Transient

Time Base [ms]	5	+	Thresholds [deg]	1 (lower)	2	3	4	5	6	7	8 (upper)	
Filter Depth	4		Gain	10.0	20.0	30.0	40.0	50.0	60.0	70.0	100.0	
Noise Threshold [deg]	1.5		Decay [deg/s]	0	0	0	0	0	0	0	0	
Clipping [deg]	+	2.0	-	Thresholds [deg]	10.0	20.0	30.0	40.0	50.0	60.0	70.0	100.0
	-	2.0		Gain	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Coefficient by RPM				Decay [deg/s]	0	0	0	0	0	0	0	

[rpm]	900	1150	1800	2700	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500
KA+	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	0.000	0.000
KA-	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	0.000	0.000

Injection Transient

Time Base [ms]	5	+	Threshold [deg]	1 (lower)	2	3	4	5	6	7	8 (upper)	
Filter Depth	4		Gain	10.0	20.0	30.0	40.0	50.0	60.0	70.0	100.0	
Noise Threshold [deg]	10.0		Decay [deg/s]	200	180	170	150	130	100	100		
Clipping [ms]	+	2.000	-	Threshold [deg]	10.0	20.0	30.0	40.0	50.0	60.0	70.0	100.0
	-	2.000		Gain	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Coefficient by RPM				Decay [deg/s]	200	200	200	200	200	200	200	

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

Coefficient by Water Temperature

[°C]	-10.0	-5.0	0.0	5.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	120.0	150.0
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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Open Tx Rx Config Linear Maps Inj Adv Param Save Load Monitor Diag Pwd Info Exit

For transient strategy details see the separated manuals.

Injection transient

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

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

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 for previous settings 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.

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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 RPMs **DJDInTrpm** as shown in this table below.

Injection Coefficient by RPM																
Interpolate	[rpm]	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	8000
Interpolate	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
Interpolate	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

Injection Coefficient by Water Temperature																
Interpolate	[°C]	-10.0	-5.2	-0.3	4.5	9.4	14.2	19.0	23.9	28.7	33.5	38.4	43.2	48.1	52.9	62.6
Interpolate	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
Interpolate	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

It may also be adjusted by applying gains as a function of water temperature - **DJDInTh2o**

Advance transient

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.

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 for previous settings 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.

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 RPMs **DADInT** as shown in this table below.

Coefficient by RPM																
Interpolate	[rpm]	1000	1500	2000	2500	3000	3500	4000	4250	4500	4750	5000	5250	5500	5750	6000
Interpolate	KA+	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
Interpolate	KA-	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

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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Page Gear & shift

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off Transient **Gear & Shift** Anti-Lag CO-Corr. Traction Ctrl.

Gear & Shift

Gear Thresholds		Shift Thresholds		TimeOuts [ms]		Advance Return Slope	
						Time [ms]	Step [deg]
1	78	1-2	156	-	60	1	10.0
2	234	2-3	312	-	60	1	10.0
3	390	3-4	468	-	60	1	10.0
4	546	4-5	624	-	60	1	10.0
5	702	5-6	780	-	60	1	10.0
6	858	Set Threshold					
Delta	10	Offset	11				

Shift Sequence

MinSpeed [rpm]	3000	Advance [deg]	-10.0
Shift Delay [ms]	5	K-Injection	0.800
HoldOff [ms]	300	AfterTO [revs]	2
Gear Delay [ms]		200	
Substitute Gear		Current	
Neutral Adjustments		OFF	

Neutral Gear Adjustments

Injection Correction EngineSpeed [rpm]

Throttle [deg]	K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0	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
0.0	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
0.0	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
0.0	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
0.0	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
0.0	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
0.0	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
0.0	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

Advance Correction EngineSpeed [rpm]

Throttle [deg]	[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	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
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	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	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	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	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

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The gear settings control both the calibration of the gear position sensor and the reaction of the ECU during gear change.
Different cells are available depending on the configuration settings (potentiometer only, engine/wheel ratio, standard, forced).

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 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" 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.

Shift 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.

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

Advance return slope – with time and step parameters you set how to get back to the normal map. If you see 10ms and 10 degree, each 10ms ECU will increase 10 degree of advance from the shift value to the normal map.

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.

Substitute gear – when the vehicle has the clutch active, ECU don't know which gear is engaged. During this moment, you can set from this part, which gear and witch plan listed use.

If in configuration page is active engine – wheel ratio, there are different parameters inside gear part.

- At first set rpm/kmh ratio to calculate the gear, for each gear.
- Choose which wheel is the reference wheel to calculate the ratio.
- Choose if activate the shift strategy with constant advance or with cut-off

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Special 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.

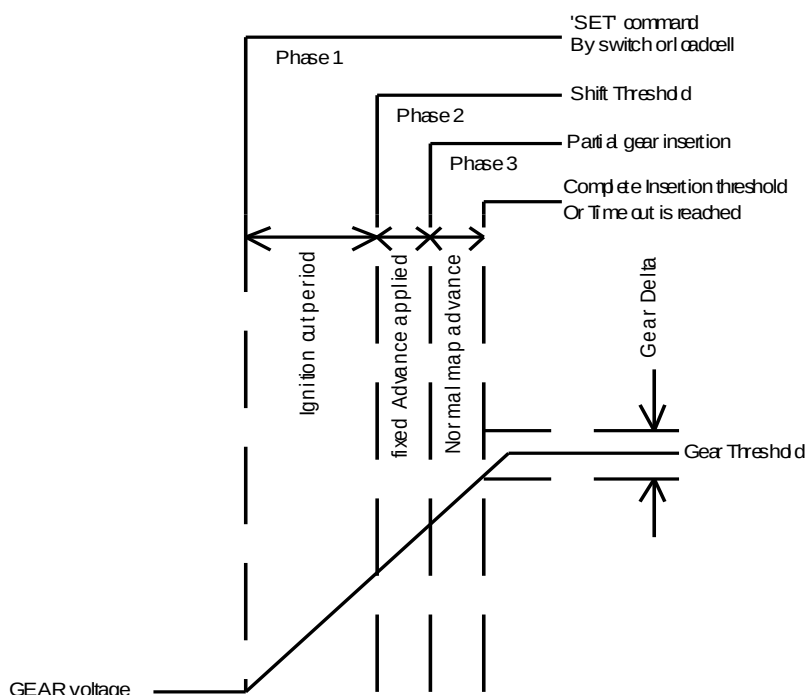
Phase 1 – Starting when a “set” command and ending when the gear position reaches the “**shift threshold**”. During this phase ignition is inhibited (“Cut-Off” phase).

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.



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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

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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Page Anti-Lag

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off Transient Gear & Shift **Anti-Lag** CO-Corr. Traction Ctrl.

Anti-Lag System **ENABLE** Repetition Periods Injection Cuts **1** Spark Cuts **1** Bang Activation Duration [sec] **5** Throttle Limit [deg] **20.0**

Injection Cuts EngineSpeed [rpm]

	N	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
Throttle [deg]																	
0.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
10.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
20.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
30.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
40.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
50.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
60.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
70.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0

Spark Cuts EngineSpeed [rpm]

	N	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
Throttle [deg]																	
0.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
10.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
20.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
30.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
40.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
50.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
60.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
70.0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0

Advance Offset EngineSpeed [rpm]

	N	0	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000
Throttle [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
10.0	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
20.0	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
30.0	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
40.0	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
50.0	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
60.0	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
70.0	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

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Anti-Lag strategy can be enabled with the pin #15 connector 18 pole that needs to be connected at GND. When TPS value is above the throttle limit param, Bang strategy is enable (advance offset correction applied for a period set in the Duration cell).

Meanwhile, if TPS is under the limit, on the ECU are applied injection and Spark cuts as explained below:

Injection cuts and spark cuts (repetition periods) values identify the number of repetition cycles where the strategy is enabled.

The tables in function of RPM and TPS are used for fix how many consecutive cycles cut per cylinder.

i.e. as the above picture

over 3500rpm nothing happens and ECU work normally if the TPS is under the Limit.

Under 3500, with a firing order 1-2-3-4, during the first revolution injector 1,2,3 are cut, and injector 4 works normally for 1 time (value in the Repetition periods cell).

After that, injector 1 will work normally and there will be a cut for injectors 2,3,4, in total for 1 time (revs).

Then, injector 2 will work normally and there will be a cut for injectors 1,3,4 in total for 1 time (revs).

This condition is maintained until TPS is under the limit or the antilag input is disable.

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Page CO corrections

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off Transient Gear & Shift Anti-Lag **CO-Corr.** Traction Ctrl.

Activation Limits	Lower	Upper	Break Point by	Water Temp. [°C]	0.0	20.0	40.0	60.0	80.0	90.0	100.0	110.0
Speed [rpm]	1000	10000	Throttle	Delay [s]	50	40	30	15	10	5	15	30
Throttle [deg]	0.0	70.0										
Water Temp. [°C]	50.0	90.0										
Suspend Time at Shift Start [ms]	150		Inj. Correction [%]	Step Low	Step High							
				0.5	1.0	Max. Correction	20.0					
			Lambda Threshold	[A/F] +/-	0.2	Time Base [sec]	0.1					

Reset

Channel A EngineSpeed [rpm]

Uego1	A/F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	13500	14000
Throttle [deg]	0.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Cyl1	10.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Cyl2	20.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Cyl3	30.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Cyl4	40.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	50.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	60.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	70.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	80.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	100.0	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8

Channel B EngineSpeed [rpm]

Disabled	A/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Throttle [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
Cyl1	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
Cyl2	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
Cyl3	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
Cyl4	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	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	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	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	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

USB _default _default Firmware Version

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

ForCO-correction details see the separated manuals.

First you must activate the strategy by choosing from the menu of the channel A and B as input lambda keep as a reference and check the cylinders to which you want to implement the strategy.
Fix the A/F ratio into the listed plan in function of your choosing.

Speed [RPM] - set the engine speed range within which the strategy is working

Degrees throttle - set the range of throttle openings within which the strategy is working

Water temperature - set the range of temperatures within which the strategy is working

Correction inj step Low[%] - sets the minimum step change that can be applied to correct the injection.

Correction inj step High[%] - sets the maximum step change that can be applied to correct the injection.

Correction inj Max [%] - sets the maximum correction injection which may have throughout this strategy.

Time base [sec] - set the time how the strategy is executed.

Correction table for CO that depending on water temperature, you can set a delay of the strategy.

The plan listed displays the corrections A / F to be made during the strategy. Using the reset button you can reset the correction table into the unit.

Water Temp. [°C]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay [ms]	0	0	0	0	0	0	0	0

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Page Traction Control

Mon232 v1.11b

Parameters Misc. 1 Misc. 2 Misc. 3 Cut Off Transient Gear & Shift Anti-Lag CO-Corr. **Traction Ctrl**

Traction Control - TC

ENABLE

	Inj. [%]	Inj OFF1	Inj ON1	Inj OFF2	Inj ON2	Inj OFF3	Inj ON3	Inj OFF4	Inj ON4	Adv. [%]	Trig OFF1	Trig ON1	Trig OFF2	Trig ON2	Trig OFF3	Trig ON3	Trig OFF4	Trig ON4
1	100.0	0	4	0	0	0	0	0	0	100.0	0	4	0	0	0	0	0	0
2	100.0	0	4	0	0	0	0	0	0	80.0	0	4	0	0	0	0	0	0
3	100.0	0	4	0	0	0	0	0	0	60.0	1	3	0	0	0	0	0	0
4	95.0	1	3	0	0	0	0	0	0	55.0	1	3	0	0	0	0	0	0
5	95.0	1	3	0	0	0	0	0	0	50.0	1	3	2	2	0	0	0	0
6	90.0	1	3	0	0	0	0	0	0	40.0	1	3	2	2	3	1	0	0

TC Inj EngineSpeed [rpm]

	1000	2000	3000	4000	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	11000
0.0	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
10.0	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
20.0	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
40.0	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
50.0	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
60.0	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
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
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
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
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

TC Adv EngineSpeed [rpm]

	1000	2000	3000	4000	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	11000
0.0	0.0	0.0	-11.1	-16.8	-22.5	-22.8	-23.1	-23.3	-23.6	-22.9	-22.1	-21.4	-20.6	-20.5	-20.5	-20.3
10.0	-3.5	-3.5	-18.8	-26.1	-33.5	-31.1	-28.7	-26.3	-23.9	-25.5	-27.2	-28.9	-30.5	-29.2	-27.9	-25.3
25.0	-7.2	-7.1	-23.8	-20.8	-17.8	-19.1	-20.4	-21.6	-22.9	-23.6	-24.3	-25.0	-25.7	-26.5	-27.3	-28.9
37.5	-5.8	-5.8	-20.5	-20.8	-21.1	-21.3	-21.6	-21.8	-22.0	-22.3	-22.6	-23.0	-23.3	-23.5	-23.7	-24.1
50.0	-4.5	-4.5	-17.2	-20.8	-24.4	-23.6	-22.8	-21.9	-21.1	-21.1	-21.0	-20.6	-20.4	-20.5	-20.1	-19.4
75.0	-11.6	-11.6	-21.5	-20.9	-20.4	-19.8	-19.1	-18.5	-17.9	-17.9	-17.9	-18.2	-18.3	-18.4	-18.9	-19.8
87.5	-12.8	-12.8	-24.6	-21.9	-19.2	-18.7	-18.3	-17.8	-17.3	-17.2	-17.1	-17.0	-16.9	-17.6	-18.3	-19.6
100.0	-13.9	-13.9	-27.8	-22.9	-18.0	-17.6	-17.3	-17.0	-16.6	-16.4	-16.1	-15.9	-15.7	-16.6	-17.6	-19.5
100.0	-13.9	-13.9	-27.8	-22.9	-18.0	-17.6	-17.3	-17.0	-16.6	-16.4	-16.1	-15.9	-15.7	-16.6	-17.6	-19.5

USB _default _default Firmware Version

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

TC command	Address software selectable
Byte 0	0 = TC disable, no correction
	1-64 = TC level
	>64 = TC disable, no correction

Traction control strategy works only if an external module is connected by CAN line (not provides by Microtec). This strategy doesn't work with the analog input TC switch.

Tc Inj and TC Adv are two correction tables to the base map depending on TPS and RPM.
In function of the input command (by CAN line), is possible to set 64 different TC level.
For each level is possible to set the % correction for fuel and spark applied to the tables.

i.e. if inj% is 50% and the correction in the table is 0.800, the final TC correction is 0.900

Inj OFF - injections number OFF phase 1
Inj ON - injections number ON phase 2
Inj OFF - injections number OFF after phase 2 (phase 3)
Inj ON - injections number ON after phase 3 etc...

Trig OFF - sparks number ON phase 1
Trig ON - sparks number OFF phase 2
Trig OFF - sparks number ON after phase 2 (phase 3)
Trig ON - sparks number OFF after phase 3 etc...

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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.

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.

Vcam – this LED is activated when virtual cam is enable (pneumatic mode)

Pit lim – this LED is activated when the pit lane limiter is on

Launch control – this LED is activated when the launch control strategy is on

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

CO-correction – this LED is activated when the CO-correction is enabled

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.

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.

Digital input and output

These LEDs identify the status of inputs and digital outputs

Dark green = input / output off

Green = input / output active

Loaded file

Mapping 1 - name of the file saved in slot number 1 (in dark grey because the map is on)

Mapping 2 - name of the file saved in slot number 2

Configuration - the name of the file saved in the slot configurations.

These are the file names of the unit does not present on the PC.

Command PWM

This window allows you to see in real time the status of various PWM outputs.

There are only those selected in the menu configuration.

The reading is expressed as a percentage%, while the opposite indicates cell function in which input signal works.

Gear

This section highlights the different activations of the gear change.

Starting from the set to turn on the strategy until the end with time out

Transient

Small section that display the values of transient signal and its reference to the maps.

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Window display cylinder to cylinder of all are the final injection, advance, phase and time charging coil in real time.

	Cyl.1	Cyl.2	Cyl.3	Cyl.4
Terog High	0.000	0.000	0.000	0.000
Terog Low	4.025	4.025	4.025	4.025
Phase High	180.0	180.0	180.0	180.0
Phase Low	180.0	180.0	180.0	180.0
Advance	4.3	4.3	4.3	4.3
Dwell	1.380	1.380	1.380	1.380

Output test

These buttons are used to manually activate the trigger output and the injectors in order to test the electrical circuit. These manual tests must be done before starting the engine for the first time to ensure proper function. Some buttons are not highlighted for use. This depends on the configuration of the system.

Outputs Test					
☐	Mil Lamp	☐	Consum.	Trigger 1	Injector 1
☐	Fuel Pump	☐	Trigger 2	Injector 2	Injector 3

Advance components

This section is dedicated to the values and the corrections that make up the advance. All values are expressed in degrees.

Injection components

This section is dedicated to the values and the corrections that make the injection. All values are multiplying.

Manual corrections

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

KJ= injection correction
KA= advance correction

Analogic signal

See all current information on analog inputs. In dark boxes appear in the count values of converters A / D channels of different input and clear the boxes containing the value obtained through linearization. For some inputs there is a third indication. About gear position, when red led is on, there is neutral gear active.

DBW 1		DBW 2	
Active	☐	Active	☐
Fail	☐	Fail	☐
Err Match	☐	Err Match	☐
Err Config	☐	Err Config	☐
Module DBW		M000 v0.0	

Drive by Wire 1		Drive by Wire 2	
Target DBW 1	0.0	Target DBW 2	0.0
Pwm DBW 1	0.0	Pwm DBW 2	0.0
ExtCor1 DBW 1	0.0	ExtCor1 DBW 2	0.0
ExtCor2 DBW 1	0.0	ExtCor2 DBW 2	0.0

Ext. Gas	0.0	0	0
Ext. Dbw1	0.0	0	0
Ext. Dbw2	0.0	0	0

Manual Adjusts			
KJbnc	☐	☐	1.000
KJbnc 1	☐	☐	1.000
KJbnc 2	☐	☐	1.000
KJbnc 3	☐	☐	1.000
KJbnc 4	☐	☐	1.000
KJRBnc	☐	☐	0.0
KFbnc H	☐	☐	0
KFbnc L	☐	☐	0
KAbnc	☐	☐	0.0
KAbnc 1	☐	☐	0.0
KAbnc 2	☐	☐	0.0
KAbnc 3	☐	☐	0.0
KAbnc 4	☐	☐	0.0
PWMbnc	☐	☐	0.0
DBWbnc 1	☐	☐	0.0
DBWbnc 2	☐	☐	0.0

DBW components

Available only with M282 connected and if the drive by wire function is enabled in the config page.

In these cells are showed all the values regarding DBW potentiometer, DC motor, status flag and PWM command.

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Diag / Overview

USB	_default				_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

Mon232 v1.11b

Diagnostics

Engine			Thresholds
Engine Password		Change	
Time Motor On	0d 0h 30m 8s	Reset	
Time Over Rpm	0d 0h 0m 0s	Reset	9000
Time Over Throttle	0d 0h 0m 8s	Reset	70.0
Maximum RPM	6044	Reset	
Errors Over Vel	0	Reset	400
Total Mileage [Km]	0.0	Reset	0

Service Warning		
Engine User		
Time Motor On	0d 0h 30m 8s	Reset
Mileage [Km]	0.0	Reset

Inputs	Count	
Stop	0	Reset
Starter In	0	Reset
Shift Set	0	Reset
Drop Switch	0	Reset
Neutral	0	Reset
Change Map	0	Reset
Code Load	0	Reset
Over-Rev	0	Reset

Analog	Total Errors		On	Max. Consec. Errors	Min. Value	Max. Value	Recovery Value
Throttle	0	Reset		65535	0	0.0	1023 100.0 512 50.0
Water Temp.	0	Reset		65535	0	125.0	1023 -20.0 512 73.5
Air Temp.	0	Reset		65535	0	125.0	1023 -20.0 512 73.5
Barometric Press.	0	Reset		65535	0	150.0	1023 1150.0 512 651.0
Vacuum Press.	0	Reset		65535	0	200.0	1023 1700.0 512 951.0
Auxiliary ch.1	0	Reset		65535	0	0.0	1023 0.0 512 0.0
Auxiliary ch.2	0	Reset		65535	0	0.0	1023 0.0 512 0.0
Auxiliary Throttle	0	Reset		65535	0	0.0	1023 0.0 512 0.0
Battery	0	Reset		65535	0	0.6	1023 20.8 512 10.7

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

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

Fuel		
Total [cc]	0	
Remaining [cc]	-4	Reset
Consumed [cc]	4	Reset
Inject. Flow	1.000	High
Correction	1.000	Low

Reset Error and Count

Set Parameters to Default

☐ Reset All at Power-On

USB	_default		_default		M232 v1.11b										
Close	Tx	Rx	Config	Linear	Maps	Inj	Adv	Param	Save	Load	Monitor	Diag	Pwd	Info	Exit

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.

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

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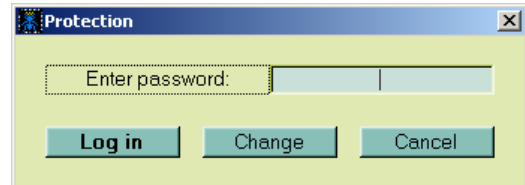
Diag / Password

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

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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PIN OUT - M232_4cyl_V1.01

10/12/2013

Connector 1 - 26 pin

Pin	Signal	Type	Function 1	Function 2	Function 3	Function 4	Function 5
1	STEPPERA	OUT	Idling Control	Auxiliary Throttle Control	Bypass Air	---	---
2	STEPPERB	OUT	Idling Control	Auxiliary Throttle Control	Bypass Air	---	---
3	PWM_OUT	OUT	Waste Gate Valve (PWM)	---	---	---	---
4	AUX1	IN analog	Oxygen sensor Lambda 1	Front Susp.	Gear Position Sensor	Gear Position Sensor	Shift SW with threshold
5	VEL_POS	IN digital	Rear Speed	---	---	---	---
6	GAS	IN analog	Throttle	---	---	---	---
7	M.A.P.	IN analog	Manifold Air Pressure	---	---	---	---
8	+VREF1	OUT	Power supply to sensors (+5V)	---	---	---	---
9	DROPSW	IN digital	Drop switch	---	---	---	---
10	NEUTRAL	IN digital	Neutral	Launch Control	---	---	---
11	PICKUP (S-MOT)	IN	S-Mot (Pickup)	---	---	---	---
12	VBAT	Power	Power supply to ECU (+12V)	---	---	---	---
13	CAN1L	I/O	Communication CAN L	---	---	---	---
14	STEPPERB	OUT	Idling Control	Auxiliary Throttle Control	Bypass Air	---	---
15	STEPPERD	OUT	Idling Control	Auxiliary Throttle Control	Bypass Air	---	---
16	AUX2	IN analog	Oxygen sensor Lambda 2	Rear Susp.	Shift SW with threshold	TC Level input	TC Level input
17	TH2O	IN analog	Water temperature	---	---	---	---
18	CAN1H	I/O	Communication CAN H	---	---	---	---
19	SUBTHROTTLE	IN analog	Subthrottle	---	---	---	---
20	TAIR	IN analog	Air temperature	---	---	---	---
21	HALL (S-CAM)	IN digital	S-Cam (Hall)	S-Mot (Hall) for HarleyDavidson	---	---	---
22	SGND	Power	Signal GND	---	---	---	---
23	SGND	Power	Signal GND	---	---	---	---
24	SGND	Power	Signal GND	---	---	---	---
25	CODELOAD	IN digital	Code load	---	---	---	---
26	PGND	Power	Power GND	---	---	---	---

Connector 2 - 18 pin

Pin	Signal	Type	Function 1	Function 2	Function 3	Function 4	Function 5
1	---	---	---	---	---	---	---
2	STOP	IN digital	Stop	---	---	---	---
3	CLUTCH	IN digital	Clutch	Distance Reset (with Stop enable)	Speed Limiter	---	---
4	STARTERIN	IN digital	Starter IN	Fuel Reset (with Stop enable)	---	---	---
5	FUELPUMP	OUT	Fuel pump	---	---	---	---
6	FUELPULSE	OUT	Fuel Consumption Pulse	Antilag output	---	---	---
7	INJ2	OUT	Out Injector 2	---	---	---	---
8	INJ1	OUT	Out Injector 1	---	---	---	---
9	COIL1	OUT	Out Coil 1	---	---	---	---
10	MAPSELECT	IN analog	Change map	---	---	---	---
11	INJ4	OUT	Out Injector 4	---	---	---	---
12	INJ3	OUT	Out Injector 3	---	---	---	---
13	TACHO	OUT	Tacho	---	---	---	---
14	WARNLIGHT	OUT	Warning light	Relais by Water Temp	Relais by RPM	---	---
15	SHIFT	IN digital	Shift	Antilag input	---	---	---
16	PGND	Power	Power GND	---	---	---	---
17	PGND	Power	Power GND	---	---	---	---
18	COIL2	OUT	Out Coil 2	---	---	---	---

Note: Function 1 is the default use of the pin. For enable a different function, needs to be set through the software.

i.e. pin #14 of 18 pin pole connector default function is warning light, but by the software it's possible to set this pin as output relais in function of water temperature.

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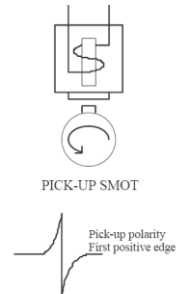
How to connect sensors

Ducati with 48-2 wheel fitted to the camshaft only. - The standard 3 way minitimer connector of the cam sensor should be wired as follows:

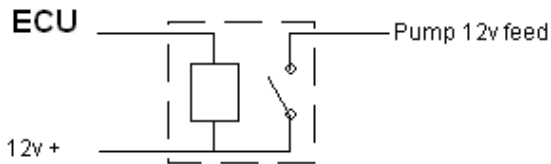
Pin 1 – To analogue ground of ECU

Pin 2 – Signal to the ECU

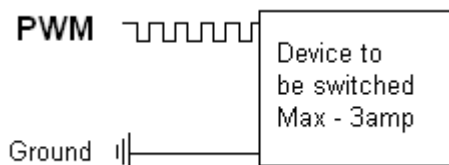
Pin 3 – This is the screen and may be connected to power ground if required.



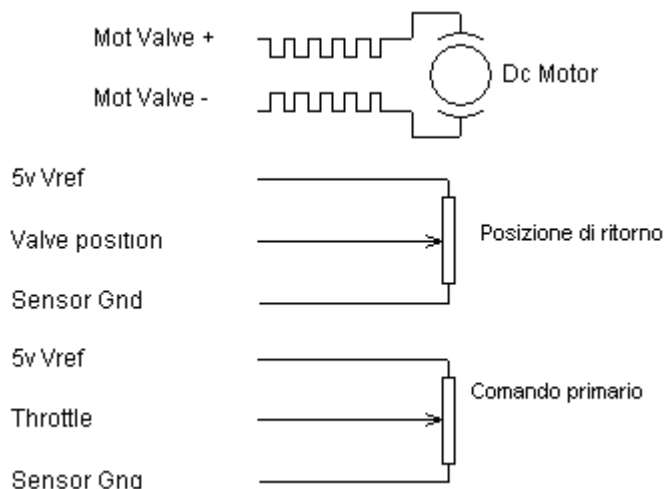
Fuel pump should be routed through a relay as per this diagram



PWM control – The ECU is able to control any PWM device up to a maximum of 3amp continuous.



Drive by wire – The ECU is able to control a drive by wire system or an exhaust valve using the following inputs / outputs



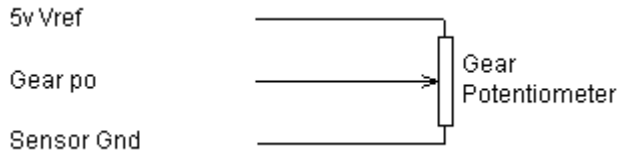
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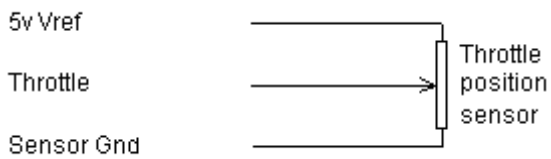


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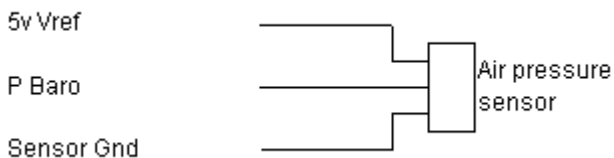
Gear potentiometer



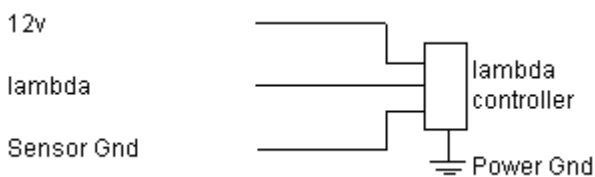
Throttle position



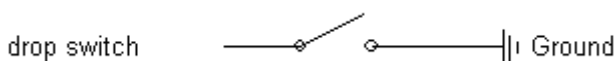
Air pressure sensor – This input may be connected to any pressure sensor that produces an output in the range of 0-5v. This output may linear or non-linear and will be mapped to produce a value. In some cases the sensor may be powered by 12v rather than the 5v shown in this example.



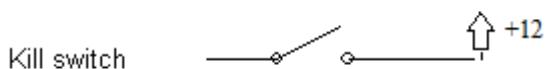
lambda – Wide band input – This input may be connected to any wide band UEGO type lambda system that produces an output in the range of 0-5v. This output may linear or non-linear and will be mapped to produce a value in AFR.



Drop switch – Switch input from an external sensor to know when the bike has fallen over.



Stop switch – External kill switch



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

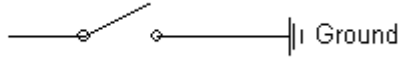
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Map select

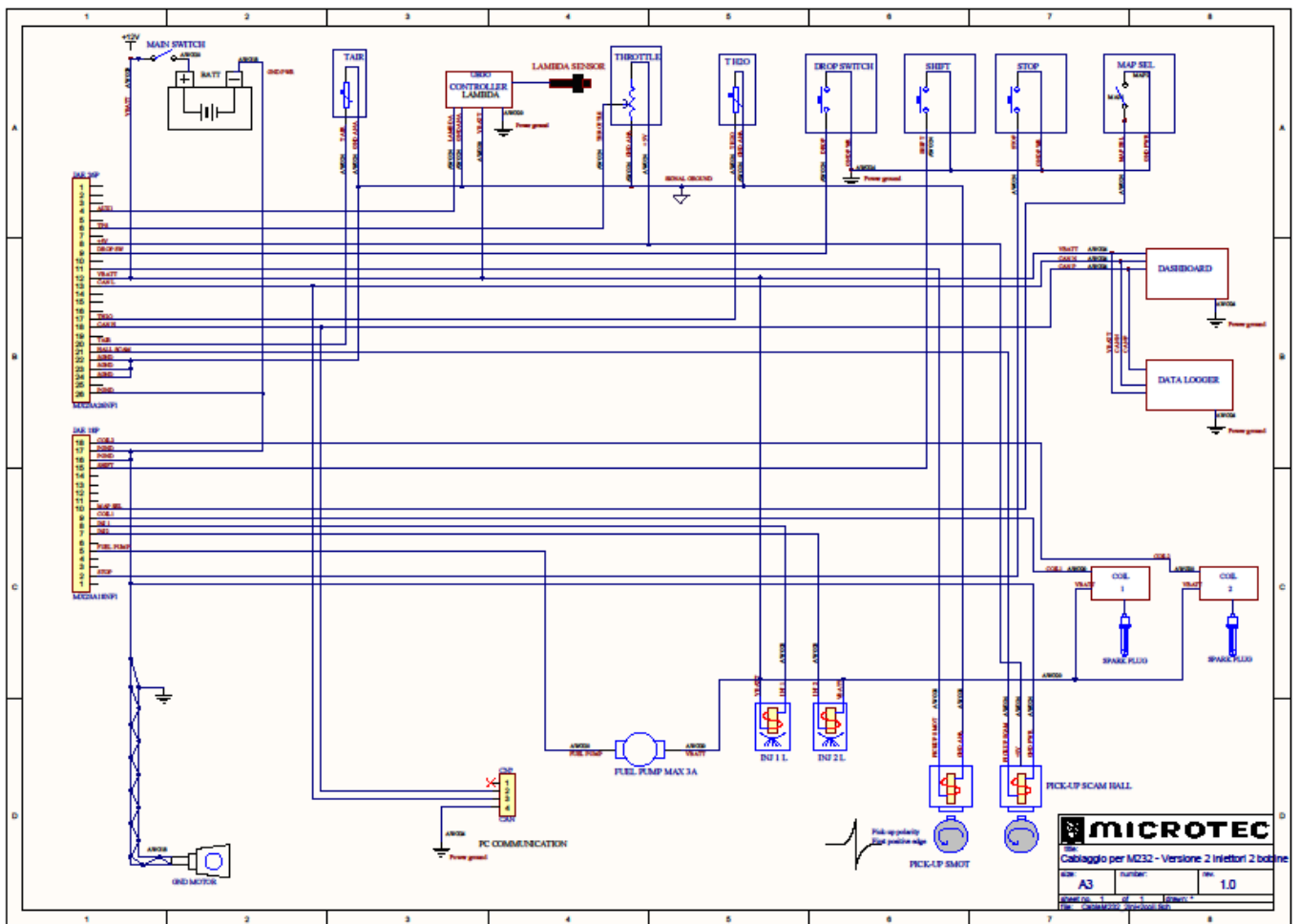


Gear shift – Used to activate the gear change strategy

Shift



Wire harness – example



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CAN frame details

- External control

M232 External Control via CAN								
External Control Interface								
ID	0	1	2	3	4	5	6	7
Ext 1	#1 CYL KJ ext. [1/1000] (0 to 2000)		#2 CYL KJ ext. [1/1000] (0 to 2000)		#3 CYL KJ ext. [1/1000] (0 to 2000)		#4 CYL KJ ext. [1/1000] (0 to 2000)	
Ext 2	#1 CYL KA ext. [1/10 degree] (-3600 to +3600)		#2 CYL KA ext. [1/10 degree] (-3600 to +3600)		#3 CYL KA ext. [1/10 degree] (-3600 to +3600)		#4 CYL KA ext. [1/10 degree] (-3600 to +3600)	
Ext 3	#1 COIL nExtSparkOFF	#1 COIL nExtSparkON	#2 COIL nExtSparkOFF	#2 COIL nExtSparkON	Engine Brake Control Offset [step] (-200 to +200)		Aux Throttle offset [1/10 %] (-1000 to +1000)	
Ext 4	Dwell Time for #1Coil ext. Gain [1/10] (0 to 1.00)		Dwell Time for #2Coil ext. Gain [1/10] (0 to 1.00)		PWM OUT ext. offset [1/10 %] (-1000 to +1000)			
DBW Module External Control via CAN								
External Control Interface								
ID	0	1	2	3	4	5	6	7
Ext DBW	DBW 1-1 ext. offset [1/10 %] (-1000 to +500)		DBW 1-2 ext. offset [1/10 %] (-1000 to +500)		DBW 2-1 ext. offset [1/10 %] (-1000 to +500)		DBW 2-2 ext. offset [1/10 %] (-1000 to +500)	

- Flags

EngineFlags1		EngineFlags2		ErrFlags		InOutFlags	
EngineOffi		VelLim		VbatFail		CODELOAD	
TrigOn		BpsAir		NoConfig		STOP_ACTIVE	
InjOn		StepperBySpeedRpm		NoEngCfg		DROPSWITCH_ACTIVE	
SparkInhib[0]		LaunchCtrl		SpeedRpmErr		StopOrDrop	
SparkInhib[1]		LaunchJlim		Uego1 timeOut		STARTER_IN_ACTIVE	
TrigOverRev		LaunchAlim		Uego1 alert		Shift	
InjOverRev		LaunchKinj		Uego2 timeOut		Clutch	
Cranking		LaunchLead		Uego2 alert		SpeedLimiter	
PreInj		LaunchPwm		OverDwell[0]		Launch	
JMMbyPair[0]		CutOff1		OverDwell[1]		(...)	
JMMbyPair[1]		PostCutOff1		NoEngMap		(...)	
JMMbyPair[2]		CutOff2		Warning		(...)	
JMMbyPair[3]		PostCutOff2		OverInjTime[0]		FUELPUMP	
Turbo		(...)		OverInjTime[1]		FUELCONSUM	
Bang		(...)		OverInjTime[2]		(...)	
VcamOn		(...)		OverInjTime[3]		AUXOUT	
ShiftFlags		CocFlags		DbwFlags1		DbwFlags2	
ShiftSignal		CocReady		NoConfig - no valid configuration on M282		NoConfig - no valid configuration on M282	
Folle		CocActiveA		Dbw1Fail - DBW1 hazard error		Dbw2Fail - DBW2 hazard error	
NoShiftByRpm		CocActive		Dbw1MatchErr - DBW1 position error		Dbw2MatchErr - DBW2 position error	
Cambiate		CocPending		Dbw1PotErr - DBW1 potentiometer error		Dbw2PotErr - DBW2 potentiometer error	
HoldOff		(...)		GasPotErr - DBW1 potentiometer error		GasPotErr - DBW2 potentiometer error	
TimeOut		(...)		EcuRxTimeOut - ECU communication TimeOut		EcuRxTimeOut - ECU communication TimeOut	
ShiftCutOff		(...)		(...)		(...)	
ShiftLead		(...)		diagDbw1_act - DBW1 bridge enable		diagDbw2_act - DBW2 bridge enable	
ShiftExit		(...)		diagDbw1_iLim - DBW1 current limitation		diagDbw2_iLim - DBW2 current limitation	
(...)		(...)		diagDbw1_tWarn - DBW1 warning temperature		diagDbw2_tWarn - DBW2 warning temperature	
(...)		(...)		diagDbw1_tsd - DBW1 over temperature		diagDbw2_tsd - DBW2 over temperature	
(...)		(...)		diagDbw1_oc - DBW1 over current		diagDbw2_oc - DBW2 over current	
(...)		(...)		diagDbw1_vsUv - DBW1 under voltage		diagDbw2_vsUv - DBW2 under voltage	
(...)		(...)		diagDbw1_vddOv - DBW1 over voltage		diagDbw2_vddOv - DBW2 over voltage	
(...)		(...)		diagDbw1_sc - DBW1 short to GND or Batterie		diagDbw2_sc - DBW2 short to GND or Batterie	
(...)		(...)		diagDbw1_ol - DBW1 open load		diagDbw2_ol - DBW2 open load	

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