

**Change log for version 1.221**

- Patter spark cut added (Ignition / General)
- Pattern fuel cut added
- Soft rev limiter option for pattern fuel cut added
- Suzuki 36-2-2 trigger pattern added
- Crop to selection added for the log

**Change log for version 1.220b**

- Bug with Autotune (change load axis to TPS) fixed

**Change log for version 1.220**

- EMU clinet but with popup error window with EGO Feedback parameters fixed

**Change log for version 1.219**

- VW CAN stream CLT output calculation improved
- Any spark cut event disables EGO correction for the Transients delay time
- Any spark cut event disables knock sensig for user defined time (sprak cut delay in Knock action parameters)
- Parameters tree panel widht can be set to more than 300px
- Gauges can be displayed as gauge, value or bar,
- Channel properties added on pop up menu for quick tune display and gauges

**Change log for version 1.218**

- Custom fuel correction table
- New modes for Sync without camsync: Sync as soon as CAM is decoded or Sync at first fuel cut
- Export log to CVS fixed

**Change log for version 1.216**

- CAM based trigger with the missing tooth support added. The number of tooth must be equal to the half of tooth on the trigger wheel (eg. for 24-1 it must be 12)
- EDL logs now display proper time when selected option *Display System Time*.

**Change log for version 1.213**

- CAN Analog inputs issue (wrong voltage scale) introduced in version 1.212 fixed
- CAN Analog inputs can be used with the Launch control *Analog RPM control input*
- Gear detection based on gear position sensor bug fixed (spikes when there was no VSS signal connected)
- Desktops are saved correctly during firmware upgrade

**Change log for version 1.212**

- Racechono support over serial BT module
- Support for Ecumaster CAN switchboard (ID 0x666)

**Change log for version 1.211**

- RX-8 CAN stream ABS type selector
- Blip function bug fixed
- BMW E46 coolant gauge CAN stream modified
- Focus RS CAN stream fixed

**Change log for version 1.210**

- Mazda BP trigger added

**Change log for version 1.209**

- Scatter plots
- Stepper motor support improved
- Idle control: when stepper motor is used, it is possible now to keep it powered when the MAP is above defined target. It prevents stepper motor to move during boost.
- VTEC: Additional parameter to activate vtec over given RPM, independent to other parameters
- Honda S2000 (F20C) CAM#2 support added for faster synchronization
- Interrupts management modified

### Change log for version 1.208

- Knock boost correction

### Change log for version 1.207

- Idle afterstart DC scale table added
- Activation delay added to Idle PID and ignition control
- Now log channels selector added
- New shortcuts added for Log graph:
  - **Ctrl+Left** / **Ctrl+Right**, - Previous tab / Next Tab
  - **F5** start new log (clear log + resume if paused)
  - **S** - save log
  - **O** - open log
  - **Ctrl + X**- clear log

### Change log for version 1.206

- Min and max TPS/MAP values added to the knock action
- EMU serial protocol modified (increased update rate)
- Android Dashboard log import fixed (new Android Dash application is required)
- BMW E46 ABS CAN wheel speed support

### Change log for version 1.205b

- Bug with the 2D tables introduced in version 1.205 fixed

### Change log for version 1.205

- Ecumaster serial log stream modified (channels frequency)
- Fiesta MK6 CAN stream fixed (battery voltage, milage)
- Modified cell marks are removed from autotune window

### Change log for version 1.204

- CAN switches can be used with parametric / virtual outputs
- Alternative nissan trigger

### Change log for version 1.203

- Mini Cooper R53 CAM stream improved, (DSC system works)
- Fiat 500 CAN stream improved (No random battery warning)

### Change log for version 1.202

- Renault Megan RS CAN stream added (RPM, CLT)
- Gear calculations when speed source is CAN fixed

- Honda S2000 coolant gauge recalibrated
- Over run fuel resume enrichment added

### **Change log for version 1.201**

- Improved behavior on notebooks with FHD and SHD displays

### **Change log for version 1.200 RC**

- Crosshair on the tables displays correct when imperial units selected
- Modified cells in tables are marked
- Conditional logging bug fixed
- MAP sensor trigger added to idle control
- VVTi PWM generation improved
- Log files from EDL1 (\*.bgc) are associated with EMU client
- BGC files can be opened from graph log window (open file icon)

### **Change log for version 1.189c EXP3**

- Axis values decimal point bug fixed

### **Change log for version 1.189b EXP2**

- Tester firmware detection (firmware could be updated to the production one)

### **Change log for version 1.189 EXP1**

- Imperial units support added
- Clio Williams trigger synchronization improved

### **Change log for version 1.188 EXP1**

- Bug in idle stepper motors control fixed
- Bug with desktops load introduced in 1.187 fixed

### **Change log for version 1.187 EXP1**

- Graph log user interface from EMU BLACK implemented to EMU
- Quick tune flickering issue fixed
- TAB + Arrows allows to move among the opened windows
- Flex fuel temperature correction works without tables blend

### **Change log for version 1.186 EXP2**

- Golf R32 CAN stream added
- VIPER V10 trigger pattern added

### **Change log for version 1.185 EXP1**

- Gear ratio is correctly calculated when speed source is CAN BUS
- CAN BUS ecumaster protocol frame 606 added (see help for more details)
- Fuel pump state, AC clutch, Coolant Fan and parametric outputs can assigned to CAN BUS output.

### **Change log for version 1.184 EXP2**

- Autotune bug fixed,
- Copy / Paste works using windows clipboard. It is possible to copy tables into Excel / Open office calc,

### **Change log for version 1.184 EXP1**

- Citroen C4 CAN stream added
- EVO X can stream bug fixed (no more ASC error when stay on ignition on)
- Drawing graphical logs speed greatly improved

### **Change log for version 1.183 EXP1**

- DLI 7M-GE system supported

- COLT CZ CAN stream added
- During spark cut, dwell error log channel shows correct values
- USB communication improved

### **Change log for version 1.182b EXP1**

- Quick tune display bug with lambda/afr display fixed

### **Change log for version 1.182 EXP1**

- Boost DC can be used as a DBW Target (for motorized throttle boost control)
- Log channel on the log graph can be selected via popup menu (right mouse button)
- Quick tune display log channels can be customized (right mouse button)

### **Change log for version 1.181 EXP1**

- Maserati V6 trigger added
- Ford focus RS can stream fixed (rear window heating, AC)
- DBW calibration package included

### **Change log for version 1.180 EXP1**

- VW 30-2-30-2 trigger pattern added
- DC Ref table in DBW configuration can be in function of target pos or throttle pos
- Tables processing speed optimized
- RX8 dashboard CLT characteristic improved

### **Change log for version 1.179EXP1**

- Renault Clio 2 can stream fixed
- DBW control signal generation improved

### **Change log for version 1.178EXP1**

- Boost control solenoid could be disabled using analog input
- Gear sensor is correctly supported when no VSS signal

### **EMU Client**

- USB communication improved

### **Change log for version 1.177EXP1**

- CAN BUS module communication improved
- Gear box oil temperature sensor added

### **EMU Client**

- CAN EGT channels are displayed correctly on the log

### **Change log for version 1.176EXP1**

- LSU 4.2 measurement precision increased by 0.015 lambda
- Ford Tierra primary trigger added
- Entering bootloader for Rev B processors improved

### **EMU Client**

- Pop up menu for log window allows easy channels configuration
- Auto scale of Y axis for log channel could be set
- Import of DL1 logs time base bug fixed

### **Change log for version 1.175EXP1**

- RX8 CAN fixed: oil pressure, water temp., odometer
- Fiesta MK6 CAN stream added
- Hysteresis for AC pressure added

### **Change log for version 1.174EXP1**

- Launch control RPMs could be controlled via analog IN

### **Change log for version 1.173EXP1**

- Detection of CPU revision and fixed bug with CPU revision B

### **EMU Client**

- CPU revision displayed in about box

### **Change log for version 1.172 EXP1**

- VSS readings are correct when gear detection scale is set to sensor
- LC fuel enrichment bug fixed
- ECUMASTER logger support added

### **Change log for version 1.171 EXP1**

- Sensitivity switching in function of RPM for primary trigger VR sensor input

### **EMU Client**

- Auto scaling of 3D Graph modified
- SHIFT+O and SHIFT+P shortcuts changed to CTRL+SHIFT+P and CTRL+SHIFT+O
- 2JZ VVTI electronic throttle added to the wizard

### **Change log for version 1.170 EXP1**

- Gearcut advanced mode (gear time and gear level depends on gear)
- Analog inputs are correctly read during making map permanent

### **Change log for version 1.169 EXP1**

- MUX1-MUX3 can be used in parametric output

### **Change log for version 1.168 EXP1**

- Primary trigger input delay bug fixed
- EVO X AC switch support (over CAN BUS)
- Firmware upgrade support for PRO EMS devices fixed

### **Change log for version 1.167 EXP1**

- MAP dwell correction table added

### **Change log for version 1.166 EXP8**

- Ethanol content is now transmitted in ECUMASTER CAN stream

### **EMU Client**

- Outputs tester
- Channel logs presets could be defined by user
- If calibration defined in windows client software differs from the configuration in EMU device. the user could select what calibration should be used

### **Change log for version 1.165 EXP1**

- LC fuel enrichment could be negative (enleanment)
- Override wastegate DC table added to Launch Control
- DBW characteristic tables enlarged (2 additional RPM rows)
- Porsche 130 tooth trigger fixed

### **EMU Client**

- Collapse option tree view shortcut added ( CTRL + \ )

### Change log for version 1.164 EXP1

- Gear sensor could be connected now to CAN analog input
- Porsche 130 tooth trigger support

### Change log for version 1.163 EXP2

- Fixed bug with ALS arming
- Fixed bug with 2dn ALS DBW opening table
- Lancer EVO X throttle added to the wizard

### Change log for version 1.163 EXP1

- 3 missing tooth primary trigger pattern bug fixed
- Renault Clio RS 3 CAN BUS support added
- Audi RS4 CAN BUS support added
- TPS and RPM arming added to ALS
- 2D table of DBW throttle opening in function of RPM added for ALS

### Change log for version 1.162 EXP3

- Lancer EVO X trigger added
- Lancer EVO X CAN support added (RPM, CLT, coolant fan, AYC)
- Injection angle control added (start of injection / end of injection) using 3D injection angle table
- Ignition output offset is automatically applied to injection phase
- TPS integrator constant could be as low as 10ms

### Change log for version 1.161 EXP1

- Logging level added for password protected device. For limited log parameters: *ignition angle, ignition from table, injectors PW, injectors DC, afr target, lambda target, cam1, cam2 angle, cam1, cam2 target, VE* are not logged nor send via serial protocol
- Ignition restore rate added to ALS strategy
- Ignition restore rate added to Launch control strategy
- Ignition restore rate added to Rolling antilag strategy
- DBW characteristic gear based scale added
- DBW characteristic gear based limit added

### EMU Client

- Used outputs list improved (fixed support of ignition outputs)

### Change log for version 1.160 EXP1

- Gear cut signal source analog input strategy improved (now retard functions are working)
- Gear cut fuel multiplier parameter added
- 2<sup>nd</sup> DBW characteristic table added (switchable)
- DBW control during launch control added
- EMU State added as a parameter for parametric outputs

### Change log for version 1.159 EXP1

- Porsche Carrera 3.2 129 tooth trigger added
- Ecumaster CAN BUS switch panel experimental support added

### Change log for version 1.158 EXP1

- S65B40 VDO idle throttle support added (CAN)
- Optimizing PC communication

### EMU Client

- Real time logging improved
- Show assigned inputs option added

### **Change log for version 1.157 EXP1**

- DBW PPS plausibility check fixed
- Primary trigger delay compensation added (input delay parameter)
- 2 sets of boost gear scales
- Parametric outputs now can enable check engine light
- New parameters for parametric outputs (Radiator fan, VTEC, Injectors DC, TC Torq. reduction)

### **Change log for version 1.156 EXP1**

- Renault Clio CAN support improved (CLT)
- Gearcut blip bug fixed (in 1.155 the throttle opening was limited to 50%)
- Min VSS to activate gearcut added
- DBW PPS plausibility check improved

### **Change log for version 1.155 EXP1**

- Dual distributor added to spark distribution type
- Ford focus st CAN improvements

### **Change log for version 1.154 EXP1**

- PECTEL SQ6 protocol frame ID 0x170 update rate increased twice
- Blip for downshift ( load cell required) bug fixed
- Fuel usage per hour bug fixed

### **EMU Client**

- When upgrading to the same firmware version the calibration and desktops are loaded correctly
- Analog inputs definition (Sensor / Analog inputs) fixed

### **Change log for version 1.153 EXP1**

- Second PPS plausibility check improved
- Blip for downshift ( load cell required) added
- 1UZFE VVTi cam decoder added

### **Change log for version 1.152 EXP1**

- Staged injection bug fixed ( for 100%DC of secondary injectors)
- Fuel usage per hour channel added
- FIAT 500 CAN BUS support
- Nitrous fuel scale table can be negative (for decreasing fuel dose)

### **Change log for version 1.151 EXP1**

- MAP sensor characteristic can be defined using MAP sensor calibration table
- Default values for WBO PID controller modified
- Gear cut active log channel added

### **Change log for version 1.150 EXP1**

- CAN BUS module support from version 1.149 fixed
- VVTI control after engine start can be delayed

### **Change log for version 1.149 EXP1**

- FlexFuel fuel scale value added
- BMW S65B40 cam sensor support (for 2 intake cams control using additional exhaust cam sensor)
- Second PPS potentiometer could be defined for plausible check

### **EMU Client**

- Import of Lambda / AFR target from serial datalog fixed

### Change log for version 1.148 EXP1

- In rare condition (1/30000 injections) the single injection time was incorrect. Already fixed.
- Support for ECUMASTER S65B40 Control module (electronic ITB, electronic idle control throttle)
- Virtual outputs could be used to activate any strategy based on switch (eg. Boost map change, tables change, LC, ALS and so on)

### Change log for version 1.147 EXP1

- Gear variable added to parametric output
- Renault Clio CAN stream modified

### Change log for version 1.146 EXP1

- Lotus Elise trigger CAM sync support
- Boost DC output fixed (no signal when no RPM)
- Primary trigger type: Toothed wheel with additional tooth behavior change. Now the gap detection scale is applied during cranking and engine running

### Change log for version 1.145 EXP1

- Stepper motor outputs are initialized for high state (+12V) instead of ground, during start-up
- WBO enabled when no RPM fixed
- Shift light bug fixed (now the R and Neutral shift light is equal to 1<sup>st</sup> gear shift light)
- Lambda disturb option added for EGO Feedback (experimental)
- **Launch control modified, needs reconfiguration!!!**

### EMU Client

- Clear log crash fixed in the case of using disable logging when paused

### Change log for version 1.144 EXP1

- Renault Clio CAN support added

### EMU Client

- Crash during log clear when alarms enabled fixed

### Change log for version 1.143 EXP1

- Idle control *Activation increase duration* parameter stores correctly
- LC strategy modified (spark cut percent is interpolated now, fuel and spark can be totally disable over cut off RPM)
- AEM CAN protocol added (RPM, TPS, MAP, Lambda, Lambda target, IAT, CLT, CFAN, FPUMP, Check engine, Battery, VSS, Gear )
- Mazda RX8 CAN support fixed. Now the wheel speed is read correctly

### EMU Client

- Honda CLT/IAT sensors wizard fixed (thanks Przema)

### Change log for version 1.142 EXP1

- Logbook VSS and EGT fixed
- Idle control new parameters to increase target RPM when idle control is activated to prevent too low RPMs (experimental)

### EMU Client

- Alarms added (on gauges and on toolbar)

### Change log for version 1.141 EXP1

- Analog input switch threshold modified. On is over 3.66V (previously 3.9V), Off is under 1.22V (previously 0.96V)



### EMU Client

- Fueling help restored
- Fuel / General paramblock description fixed
- Suzuki Swift 1.6 throttle added to DBW Wizard

### Change log for version 1.140 EXP1

- PWM table X axis is now customizable (MAP, TPS, CLT)
- ALS fuel cut idle control improved
- KS error indication over 600RPM
- Lambda / AFR target add to ECUMASTER serial protocol

### EMU Client

- Crash during clearing log fixed

### Change log for version 1.139 EXP1

- AC fan could be activated with AC clutch
- Coolant fan can be disabled when no RPM
- Idle RPM Ref table is active if RPM is above idle control RPM or TPS > IdleTPSLimit (in previous version only TPS condition was used)
- When Fuel Cut idle control is used with ALS, then if RPM is below ALS RPM min the timer is not restarted

### EMU Client

- Autotune crash fixed
- Log zoom In / Out can be performed by up and down arrow

### Change log for version 1.138 EXP1

- Renault Alpina 66-2-2-2 support added
- Fuel cut idle control when ALS switch on
- Idle VE DC correction table change to 3D (DC/RPM)
- Afterstart RPM increase can be slow released after defined duration
- Coolant fan engage delay option added to allow increase idle RPM before fan activation

### EMU Client

- Autosaving logs (general options / Log / Auto save log)
- Log recording can be suspended when Log is paused ( General options / Log / Stop logging when paused)
- Connecting new device bug fixed (crash)
- Conditional logging
- Autotune for AlphaN bug fixed

### Change log for version 1.137 EXP1

- New ignition output pair (3+6)
- Ignition output cranking table (for starting engine in wasted spark mode)
- Lambda range extended from (0.7-1.7) to 0.6-2.0
- Suzuki swift M16A CAM decoder added

### EMU Client

- Log timing can be PC current time based (general options / Log / Display system time)
- Log channels can be configured (min, max, redline). Alarms are not working yet

### Change log for version 1.136 EXP1

- Fuel cut idle

### EMU Client

- Firmware upgrade bug fixed
- During firmware upgrade, in the device directory there is automatically backup of current calibration

### Change log for version 1.135 EXP1

- Momentary switch support added (see Help for sensor/momentary switch)
- Gear cut ignition retard added

### EMU Client

- P65 coils wizard definitions fixed
- Autotune bug with TPS parameters fixed
- EMU protocol import fixed

### Change log for version 1.134 EXP1

- External MAP sensor range extended to 800kPa
- Overpressure fuel cut delay added
- Boost DC ref table can be defined in function of MAP/RPM instead of TPS/RPM

### EMU Client

- Autotune bugs fixed and improvements
- AFR/Lambda target table bug with Load on Y axis fixed

### Change log for version 1.132 EXP1

- VVTi support for EVO9 improved
- EJ25 Mixed (trigger wheel 36-2-2-2, 7 tooth camsync (old subaru), 2 multitooth cam triggers)
- CAN BT module CAN ID changed to 0x7db

### Change log for version 1.131 EXP1

- MAP sensor reading strategy modified to improve MAP value stability.

### Change log for version 1.130 EXP2

### EMU Client

- Log pause/resume bug fixed

### Change log for version 1.130 EXP1

- Filtering for oil and fuel pressure
- BT CAN communication moved to ID 0x16B6ECD8
- Nitrous fuel PW adder table in function of RPM
- Idle AC RPM target increase
- Logbook engine error codes bug fixed

### EMU Client

- Import of Ecumaster serial protocol log from Keelog Ghost serial datalogger and Dashboard tablet

### Change log for version 1.128 EXP1

- Logbook records error codes,
- DBW invert motor option,
- DBW friction accrue option added

### Change log for version 1.127 EXP1

- Logbook (Max RPM, Max MAP, Max CLT, Max IAT, Time on full throttle),
- Stuck throttle protection,
- ALS fuel enrichment can be negative

### Change log for version 1.126 EXP1

- Timers added (can influence fuel, ignition and boost)
- TPS/RPM fuel scale added + activation when no ALS active (Fueling / general)
- MAP/RPM correction added
- For AlphaN AFR/Lambda target can be MAP based (Fueling / general)

### EMU Client

- Unused strategies can be hidden in client software (*Tools / Available strategies*)

### **Change log for version 1.125 EXP1**

- Virtual outputs bug fixed
- Timers added (not full functionality)

### **Change log for version 1.124 EXP1**

- FlexFuel temperature reading bug fixed
- AC pressure parameter added to parametric outputs

### **EMU Client**

- Extra desktop 4 and 5 added
- Gauge word removed from gauge window title bar

### **Change log for version 1.123 EXP1**

- New ignition output pairs are available (1+4, 1+6, 3+2, 5+2)
- AC clutch can be disable if CLT is greater than defined
- FlexFuel Lambda blend (advanced fueling) bug fixed

### **EMU Client**

- AC clutch can be disable if CLT is greater than defined

### **Change log for version 1.122 EXP1**

- VSS can be calculated based on CAN wheel speed
- Flat shift new parameters: ignition retard and fuel enrichment

### **Change log for version 1.121 EXP1**

- BT CAN Module support
- Fueling strategy Basic Lambda bug fixed
- Deceleration enrichment lean limit bug fixed

### **Change log for version 1.120 EXP1**

- Nissan VQ35 trigger support
- Time stamp channel added to Ecumaster serial protocol
- Flags representing all active fuel dose corrections (Log/Fueling/ Fuel corrections)
- Flags representing all active ignition correction (Log/Ignition/ Ignition corrections)

### **EMU Client**

- AC clutch state displayed on the client status bar

### **Change log for version 1.119 EXP1**

- DBW strategy improved
- DBW can be controlled via CAN-BUS (eg. could be used for BLIP)
- MAP filtering could be disabled when TPS rate is greater than defined
- AC Clutch could be disabled over defined RPMs
- Fuel cut based on TPS position could based on the pedal position (when DBW used)

### **EMU Client**

### **Change log for version 1.118 EXP1**

- Two sets of ALS tables (switchable)
- Deceleration enrichment
- Overrun fuel cut RPM could be increased during afterstart enrichment
- ALS disable nitrous bug fixed

### **EMU Client**

- Windows redraw modified

### Change log for version 1.117 EXP1

- USB communication improved

### EMU Client

- CPU usage reduced
- USB communication improved

### Change log for version 1.116 EXP1

- Cranking fuel PW (time divided by 2) when Batch all injectors option selected bug fixed (bug introduced in 1.114 )
- USB communication improved
- Variables range check at device startup
- BMW DBW Direct mode improved

### EMU Client

- CPU usage reduced
- USB communication improved

### Change log for version 1.115 EXP1

- Charge temperature bug fixed (when charge temperature was negative the fuel dose was incorrect!)

**Due to the bug with charge temperature calculations, firmware version 1.110, 1.111, 1.112, 1.113 must be upgraded to 1.115!!!**

### Change log for version 1.114 EXP1

- PWM 3 Wire solenoid without spring support added
- Idle PWM solenoids DC correction in function of battery voltage
- Acceleration enrichment TPS Factor bug fixed
- Acceleration enrichment strategy improved (re-tune of acceleration enrichment might be required)
- DBW ITB direct invert control added
- Per injectors cut rev limiter (for SR20 engines)
- Batch all injectors during acc. enrich function improved
- Reinitialization of CAN Bus module bug fixed

### EMU Client

- Minor corrections

### Change log for version 1.113 EXP1

- Virtual Output #1 and #2 added
- Parametric outputs can be named
- Coolant fan can be activated if the coolant sensor fails
- Flat shift TPS limit added
- Fuel pump on and coolant fan on flags added to log

### EMU Client

- Application doesn't require administrator rights,
- File association moved from application to installer,
- Table entries division operator bug fixed
- SSE2 instruction support disabled to maintain compatibility with older CPUs
- Auto positioning of new tables on free desktop area
- Windows snapping
- New customization window
- New gauges layouts added
- OpenGL optimization
- Auto hide option panel added

- Gauges flickering fixed
- New status bar with CEL details
- New upgrade firmware interface (two progress bars)
- Application termination (exit) bug fixed. Now it always exit.

### **Change log for version 1.112 EXP1**

- Modified EMU CAN protocol. New frame 0x605 added
- VE correction based on Idle valve DC (for Alpha-N)

### **EMU Client**

- EMU files (.emu, .emulog, .emuscp) are associated with the application. EMU client will open the files if double clicked
- Divide operator added to cell modify operators (eg. 2/ divides cells by 2)

### **Change log for version 1.111 EXP1**

- Staged injection added
- Full group injection during acceleration enrichment added

## Change log for version 1.110 EXP1

- 3 wire PWM idle control bug fixed
- New advanced fueling mode
- Charge air temperature estimation table
- AC compressor clutch strategy
- Idle RPM could be increased when AC clutch engaged and/or coolant fan turned on
- Boost control solenoid frequency increased to 400kPa
- AC pressure and AC evap temp. sensors support added
- Fuel level sensor signal filtered to prevent sudden change of its value
- Mini Cooper R53 CAN-BUS support added
- Peugeot 206 RC CAN-BUS support added

## EMU Client

- Maximization of windows fixed
- Real time autotune
- Tune display
- Flickering of windows fixed (?)

## Change log for version 1.104 EXP1

- Ignition outputs are not active after power up
- Ignition outputs can be assigned to Coolant fan, Fuel pump and Check engine functions
- Subaru EJ20 three cam sensors support added (VSS input used for one sensor)
- Afterstart idle DC increase option added
- Polaris RZR CAN stream bug fixed

## EMU Client

- Windows XP incompatibility bug fixed
- New electronic throttles added to the wizard

## Change log for version 1.102 EXP1

- DBW strategy improved by introducing friction correction
- Polaris RZR CAN stream added

## EMU Client

- Application build using the latest Microsoft compiler and latest wxWidgets library
- UI no longer flickers
- The size of paramlist windows and group log windows should be optimal
- Keys assignment may change due to new wxWidgets library (assigning new keys might be required)

## Change log for version 1.1 RC1

- TPS Rate log improved

## EMU Client

- Bin axis wizard works with non integer numbers

## Change log for version 1.1 BETA

- Traction control disable if second table set function works correct

## EMU Client

- OpenGL crash fixed
- Desktops could be renamed
- Some speed optimization
- New injectors added to Injectors Wizard
- UI flickering problem improved

## Change log for version 1.1 BETA

- WBO Heater support improved

## EMU Client

- Clear log crash fixed
- OpenGL support improved
- Next/Previous tab shortcuts added ],[ keys
- Save / Load desktop layouts
- Help for all EMU options added
- Contributors list added

## Change log for version 1.071 EXP1

- New version of rolling antilag strategy
- RX8 Dash CAN protocol RPM fixed
- Citroen C2 CAN protocol improved (speed displayed without ABS computer)

## EMU Client

- IDL flag added to status bar
- Close all windows option bug fixed (crash)
- Bug with closing windows fixed (crash)
- TAB key switches between options tree view and child windows

## Change log for version 1.070 EXP1

- VSS input frequency divider
- FlexFuel sensor can be connected to VSS input
- Rolling antilag added

## EMU Client

- New flags added to status bar
- About box shows device serial number
- Throttle Bosch 0280750030 added to the DBW Wizard

## Change log for version 1.069 EXP1

- BMW Z4 CAN dashboard support
- Mazda RX8 CAN dashboard support
- Disable CAM sync above given RPM
- Sensitivity switch strategy for CAM sync improved
- Scope trace for N+1 primary trigger bug fixed

## EMU Client

- Customize keys, new shortcuts added
- New option for 3D tables added (automodify cells above cursor)

## Change log for version 1.068 EXP1

- Knock sensor channel #2 readings bug fixed
- Ignition event that causes knock is logged ( Knock ignition event channel)
- Ignition event trim extended to +/- 15 degrees

**IMPORTANT: The engine noise table prepared with the previous software version should be lowered about 0.22V due to change in dynamic range of knock sensor input.**

## EMU Client

- Customize keys (Tools / Customize keys)
- Bug with Select All fixed

## Change log for version 1.066 EXP1

- Spike filter for CAM#1 removed completely
- MAP filtering improved. New filtering modes and filter power table in function of RPM

- Injectors opening time in battery function can be add to cranking and prime pulse fuel dose
- Restore rate for knock sensor action can be lower than 10

### Change log for version 1.065 EXP1

- 3 missing tooth primary trigger decoder added
- Cranking time correction table

### Change log for version 1.064 EXP1

- Cam trigger advanced filtering rewritten. Need to be tested in real word applications
- External MAP offset can be negative

### Change log for version 1.063 EXP1

- Electronic throttle position can be used as TPS
- Idle ignition control without 2D table strategy bug fixed
- Nissan trigger decoder modified. Check your ignition timing after update!

### Change log for version 1.062 EXP1

- Mitsubishi Colt 1.5 trigger pattern
- Pectel SQ-6 Omega CAN protocol

### Change log for version 1.061 EXP1

- Up to 8 sensors over CAN-BUS support
- Per cylinder EGT fuel correction
- EGT Boost DC correction based on maximum EGT from EMU and CAN sesnors
- Each injector correction send to log (Fuel Trim 1-6)

### EMU Client

- 20Hz dataloging (previous 10Hz)
- Log window improved:
  - scaling
  - HOME/END keys
  - 0.1 sec bars when scaled up
- Tables configuration bug fixed (color scheme selection)

### Change log for version 1.060 EXP1

- Haltech E8 E11v2 CAN data
- VVTi CAM control solenoids frequency base bug fixed
- ALS bug fixed when engine goes outside RPM range
- ALS can disable nitrous activation

### Change log for version 1.059 EXP1

- BMW E30 M3 116 tooth support
- New CAM#2 decoder: "Prim trig tooth range"

### EMU Client

- Desktops are saved to disc before firmware upgrade

### Change log for version 1.055 EXP1

- VTEC Off delay option added
- Support for CAN MODULE analog inputs

### EMU Client

- Bugs and crashes from 1.054 corrected
- Bug trap added for easy crash report submission

### Change log for version 1.054 EXP3



## EMU Client

- Option for square 3D Tables
- Child windows keyboard focus improved

## Change log for version 1.054 EXP1

- TFI trigger support
- CAN-DASH output for Shift Light and Check engine light
- Fuel cut above pressure variable max value increased to 700kPa
- 

## EMU Client

- CTRL+A selects all cells in table

## Change log for version 1.053 EXP1

- Support for CAM N+1 trigger as primary one (divide real number of tooth by 2, eg. For 12+1 the number of teeth is 6)
- Ignition lock options (primary trigger settings) to lock ignition angle to fixed value
- VVTi for CAM#2 can use CAM#1 angle table (useful for V engines with 2 inlet VVTi cams)
- Vvti valve frequency bug fixed

## Change log for version 1.052 EXP1

- 4 extra analog inputs with CAN-MODULE or EMU CAN
- New electronic throttle bodies added: BOSCH 0280750475, SUBARU 16112AA170

## Change log for version 1.051 EXP1

- Fuel level sensor support
- Lotus Elise/Exige dashboard support
- MOTEC M800 set 1 CAN protocol support
- Engine protection for low and high coolant temperatures (rev limiters)
- Two symmetrical tooth cam decoder (wasted spark)

## Change log for version 1.050 EXP1

- DBW Wizard
- Launch control can be activated by MUX input
- TPS/MAP fuel correction table values expanded from 200% to 255%
- VSS to activation of Flat Shift bug fixed
- VSS to activation of Nitro bug fixed
- Ford Fiesta MK7 CAN messages added

## EMU Client

- DBW Wizard
- CSV text file has column time
- 3D tables cross hair display method changed

## Change log for version 1.049 EXP1

- MUX Switch support
- Fuel pressure delta is calculated correctly

## Change log for version 1.048 EXP1

- 3UZ-fe cam decoder improved
- 1 tooth cam sync bug fixed ( bug was introduced in version 1.047)
- FlexFuel readings can be limited to TPS opening

## EMU Client

- Export selected log channels to CSV text file (separation character is ; )

### Change log for version 1.047 EXP1

- Delta fuel pressure correction
- Delta fuel pressure fail safe with RPM limit
- WBO error detection improved
- 3UZ-fe cam decoder

### EMU Client

- Engine status is displayed correctly (Running instead afterstart)
- Windows with parameters have correct height (all parameters are visible without scroll bar)

### Change log for version 1.046 EXP1

- Honda J35A8 trigger engine start bug fixed

### Change log for version 1.045 EXP1

- Audi trigger 135 teeth

### Change log for version 1.044 EXP1

- Honda S2000 dash CLT output big fixed

### EMU Client

- UI outlook improved for large system fonts
- Windows with 3D tables splitting strategy improved
- Help for parameters windows introduced (actually only for TPS and Oil pressure cut)
- Log can be scrolled with mouse wheel
- Bug with scrolling log using keys fixed
- User manual is installing with the software
- Error codes are displayed by name not a code number

### Change log for version 1.043 EXP1

- Honda S2000 dash CLT output
- Idle DC ref correction in function of RPM error (2D table)
- Boost DC correction in function of boost error (2D table)
- Boost control solenoid DC is 0 if under inactive pressure (not min DC as in previous versions)
- Ids of EMU CAN-BUS protocol can be defined

### Change log for version 1.042 EXP1

- Min CLT for Nitrous activation
- Ignition retard for soft rev limiter

### EMU Client

- Bug from version 1.041 with gauges fixed
- Honda temperature sensor added to temp. sensors wizard

### Change log for version 1.041 EXP1

- CAN BUS Ecumaster stream CLT channel is sent correctly
- First two sparks are at correct angle (before were at TDC)

### EMU Client

- Open 3D tables when load is on Y axis bug fixed
- Open / Save file dialogs opens in last visited directory. When device connected directory is changed to device name dir.

### Change log for version 1.039 EXP1

- AIM protocol new channels: Oil temp, Oil pressure, Fuel pressure

- VTEC VSS Min parameter added

### **Change log for version 1.038 EXP1**

- Subaru 36-2-2-2 trigger improved

### **Change log for version 1.037 EXP1**

- Synchronization of two engines via extension port

### **EMU Client**

- 3D tables position and size are handled correctly

### **Change log for version 1.036 EXP1**

- Traction control x-axis assigned to TPS not to Load
- Traction control can be disabled under defined speed
- CAN-BUS bug fixed (works with old correctly with old CAN modules)
- Idle DC can be altered by analog input voltage

### **Change log for version 1.035 EXP1**

- Trigger error scope trace

### **Change log for version 1.034 EXP1**

- Traction control

### **EMU Client**

- When loading project 3D tables with load on axis are updated correctly (AlphaN vs Speed density)

### **Change log for version 1.033 EXP1**

- Spike filter for CAM#1 input

### **Change log for version 1.032 EXP2**

- Gear detection based on voltage gearbox sensor
- Gear cut
- N + 1 60% - CAM#1 trigger added

### **EMU Client**

- Load on Y axis bug fixed

### **Change log for version 1.031 EXP3**

### **EMU Client**

- 2D Tables reinterpolation bug fixed

### **Change log for version 1.031 EXP2**

### **EMU Client**

- Log is referenced on tables when tracked

### **Change log for version 1.031 EXP1**

- VW Passat instrument cluster support (RPMs)
- BMW Multitooth CAM#2 trigger added

### **EMU Client**

- Load on Y axis bug fixed (storing tables to EMU)
- Magneti Marelli temperature sensors added (AST04 and WST04)
- Magneti Marelli BAE 801 double coils wizard added

### Change log for version 1.030 EXP1

- Nissan trigger improved. Please check ignition angle with timing lamp after upgrade!
- Vehicle speed is transmitted in Ecumaster serial protocol.

### Change log for version 1.029 EXP2

- 2JZ VVTi engine start improved (cam decoder bug fixed)
- Citroen C2 CAN BUS support (dashboard, bsi, power steering)
- VANOS solenoid DC set to 50% when not controlled

### EMU Client

- Configuration for 3D tables (load axis definition, color scheme)
- Password protected EMU can be reset to factory settings

### Change log for version 1.027 EXP1

- Cycle once for parametric outputs
- Idle control internal resolution increased (control by 0.25%DC)
- VANOS solenoid DC set to 50% when not controlled

### Change log for version 1.026 EXP1

- DBW support for ALS (Use DBW, BW Throttle opening)

### Change log for version 1.025 EXP1

- Flat shift fixed time ignition cut
- Filtering of DBW pos
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### Change log for version 1.024 EXP1

- Faster engine start
- BMW E46 CAN-Bus dashboard support
- Cranking gap detection scale – for adjusting gap detection during cranking

### Change log for version 1.023 EXP1

- Per cylinder injection trim
- PWM table can be scaled by PWM CLT scale table
- CAN-BUS module support
- CAN Ext. switch introduced for activation functions like LC, Boost Tbl, TBL Set, etc.
- EMU data log could be transmitted over CAN BUS
- WBO error checking sensitivity tuned
- Idle PWM frequency max limit increased to 500Hz

### Change log for version 1.022 EXP1

- Race Technology data stream bugs fixed

### Change log for version 1.021 EXP1

- FlexFuel sensor temperature readings fixed
- dTPS integrator constant can be defined
- Maximum value of Idle afterstart increase changed to 800
- Ignition correction table in function of CLT for Idle
- DBW opening characteristic changed for 3D table in function of TPS and RPM
- Double Warmup correction tables for FlexFuel use

- Double ASE correction tables for FlexFuel use
- Removed DBW position limit in function of RPM
- Maximum value for ASE table increased to 255%
- Maximum value for Warmup table increased to 255%
- Value ranges in datalog for FlexFuel channels fixed

## EMU Client

### Change log for version 1.020 EXP1

- TPS value under min voltage and TPS value over max voltage parameters added. **For TPS with inverted max and min value default values should be modified!**

## EMU Client

- New operators for table editing added. Numbers with operator \* multiply cells value (eg. 0,5\* ), operator + and – adds and subtracts values (eg. 7+ adds 7 to all selected cells).

### Change log for version 1.019 EXP1

- VE, IGN, AFR, BOOST tables are 16x20 now
- VW 1.8T 4 teeth cam trigger type added
- Oil pressure cut function added
- Time cycling function added to parametric outputs
- Oil pressure, Oil temperature and Fuel pressure can be used as argument for parametric output
- IAT ignition correction is not applied if engine is idling.
- Check engine flags are logged now

## EMU Client

- CEL (Check engine light) on status bar

### Change log for version 1.016 RC1

- Rejection of incorrect pulse form VR sensor amplifier.
- TPS voltage log channel

## EMU Client

- Ethanol content gauge

### Change log for version 1.015 EXP1

- Ignition cut idle control
- Idle On/Off valve control
- Fire injector twice per cycle for wasted spark applications

## EMU Client

### Change log for version 1.014 EXP1

- ALS

## EMU Client

- 3D tables selection outlook improved
- Temperature sensor wizard improved. Error message for wrong sensor data
- Road dyno

### Change log for version 1.012 EXP1

- Characteristic table works for DBW
- Second cranking Fuel table for FlexFuel sensor blend

- Filtering option for secondary trigger

#### EMU Client

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#### Change log for version 1.011 EXP2

- WBO controller could be enabled even there is no RPM ( enable when no RPM)
- Hysteresis added to VTEC control
- Full Flex Fuel sensor support
- WBO Heater could be used as NBO Heater
- VSS signal filter

#### EMU Client

- Log groups are sorted in main tree view
- Gauges are sorted in main tree view
- CLT gauge scale overlap fixed

#### Change log for version 1.010 EXP2

- Multitooth false trigger rejection
- MX-5 two teeth ignore false cam sync

#### EMU Client

- Paste bug fixed when paste to selected area

#### Change log for version 1.010 EXP1

- Battery voltage added as variable type for parametric output
- VTEC support
- Dual tables set support (VE, AFR, IGN, VVTi#1, VVTi#2, BOOST) for manual and VTEC switching

#### EMU Client

- Improved lost log frame support.
- Reduced flickering of text log controls
- Copy / Paste for cells of 2D and 3D tables (CTRL+C, CTRL+V)

#### Change log for version 1.009 EXP1

- Injection angle delay (for test purpose)
- Two teeth cam sync false trigger detection (for MX-5 1.8BP)

#### Change log for version 1.008 EXP1

- Drive by wire (ETC) first release
- Two teeth cam sync modified

#### Change log for version 1.007 EXP1

- Double VVT tables
- VVT tables size increased from 8x8 to 12x12
- TPSvsMAP correction table size increased from 8x8 to 12x12
- Digital filter control added to MAP sensor input
- Dodge SRT CAS & CAM triggers
- Injectors DC value for low resolution ignition triggers bug fixed

#### EMU Client

- Sound added for make permanent function.
- Text items in log windows are sorted and colored

#### Change log for version 1.006 EXP5

## EMU Client

- CTR+Arrows bug fixed.

## Change log for version 1.006 EXP3

- Idle control for 3 WIRE PWM improved when inactive and DC = 0% or 100%
- Idle RPM Ref DC table is used only when Idle control inactive and TPS > idle active control threshold

## EMU Client

- CLT wizard transfers the whole table to EMU

## Change log for version 1.005 EXP1

- Idle control for 3 WIRE PWM improved. It could be required to tune DC Ref table
- Reverse option available for all idle valve types ,
- Integral limit for PID control fixed,
- Idle RPM ref table works correctly with PWM and 3 WIRE PWM Valves
- IDLE VALVE control bug fixed. Under some rare condition the valve could open or close for no visible reason,
- Digital filtering for false cam signal for one tooth cam trigger,

## EMU Client

- Assigned outputs list

## Change log for version 1.004 EXP2

- 2 teeth cam sync (MX5 1.6BP)

## EMU Client

- Tables colors recalculate correct if there is no 3D graph

## Change log for version 1.004 EXP1

- Double vanos support
- Race Technology dash support

## Change log for version 1.003 EXP1

- Idle control: ignition correction in function of target error
- Idle control: idle control active up to max idle RPM parameter
- Idle control: DC Ref in function of RPM when idle control not active
- Boost control: closed loop functionality fixed
- Boost control: PID scaling removed (PID parameters are not compatible with previous version !)
- Boost control: PID debug to log
- Boost control: Logged value of boost target is correct
- Oil pressure, fuel pressure and oil temperature sensors support added

## Change log for version 1.002 EXP1

- Subaru 36-2-2-2 primary trigger support
- Subaru 6 teeth primary trigger support
- Subaru 7 teeth cam sync support
- Output for Speedometer bug fixed
- Nitrous min gear

## Change log for version 1.001 EXP1

- Lotus Elise engine start improved
- WBO error detection improved (no false check engine light)

- Gear dependent nitrous activation
- TPS vs MAP 3D VE correction table
- TPS vs MAP 3D ignition correction table
- Alpha-N with MAP based ignition
- Alpha-N with MAP based ignition and MAP multiplication
- Max acceleration enrichment limit increased to 250
- Sustain rate for acceleration enrichment increased to 95%

## Change log for version 1.000 EXP4

### EMU Client

+ 2D tables bug fixed (crash)

## Change log for version 1.000 EXP3

### EMU Firmware

+ disable spark during overrun fuel cut (to decrease coils and coil driver load)  
+ Porsche 132 teeth trigger sec trigger filter added

### EMU Client

+ log window scrollbar functionality improved  
+ when disconnected you can always scroll log  
+ log could be scrolled with keys. Arrows scroll by 2, shift + arrows scroll by 10, page up/ page down scroll by 32  
+ space key on log window pause / resume logging  
+ cancel button on log preset window works correct  
+ autoscale for 3d graphs  
+ changing bins correctly re-interpolates all dependent tables  
+ x axis bins wizard bug fixed

## Change log for version 1.000 EXP2

### EMU Firmware

+ Lotus Elise / Rover trigger added  
+ fixed speedometer bug when no vss present

### EMU Client

+ log file name bug fixed

## Change log for version 1.000 EXP1

### EMU Firmware

+ CLT range increased to 250C  
+ invert output for main relay  
+ changing output for main relay disable previous output

### EMU Client

+ making permanent feedback on connection status  
+ making permanent saves current project into QuickSave directory of current device  
+ VW Beetle CLT sensor added  
+ Log file name format improved  
+ Boost target could be lower than 100kPa

## Change log for version 0.999 EXP8

### EMU Firmware

+ Porsche trigger (4 cylinder 132 teeth + 1 on cranksahft)



## Change log for version 0.999 EXP7

### EMU Client

- + colours added to connection status
- + automatic reconnection
- + software doesn't hang when loosing USB connection with EMU device.

## Change log for version 0.999 EXP6

### EMU Firmware

- + ROVER K Series 18-1-18-1 primary trigger decoder added
- both edges for primary trigger

### EMU Client

## Change log for version 0.999 EXP5

### EMU Firmware

- + Honda J35A8
- + missing tooth cam decoder added
- + Fixed dwell bug when low resolution trigger used
- + Both edges for primary trigger
- + Mazda MX-5 3 teeth cam#2 decoder added

### EMU Client