EMU BLACK
ENGINE MANAGEMENT UNIT

CHANGE LOG

Version 2.178 21-03-2026

- Two way communication with EDL logger implemented (requires EDL firmware 1.25 or newer)
- BT switch 1-8 added

Version 2.177 21-10-2025

- Lancer EVO X CAN improved: Oil pressure indicator, Cruise control, Check engine, Battery indicator, Intercooler spray (when table set 2 and engine running)
- LC active flag added to parametric outputs

Version 2.176 31-07-2025

- EDL-1 logging improved
- Clio 3 RS CAN stream improved
- Subaru GH CAN stream modified
- Lancer EVO X coolant temperature indicator rescaled
- Syltech sensors added to temperature wizard (MSCS-4P-A05-N8, MSCS-4P-G10-N8, MSTS-2P-CST-SS-E20, MSTS-2PEAT-SS-G25, MSTS-2P-LAT-SS-G15, MSTS-2P-M14-AL-G15)
- Parametric output fixed issue with fast output toggling when active
- F.ALS flag works correctly

Version 2.175b 26-12-2024

- Subaru GH CAN stream modified

Version 2.175 19-12-2024

- Skiido Mach Z 900 Premium dash, Air ride CAN stream added
- DSG pedal postion CAN information bug fixed
- DSG combined load table added

Version 2.174 22-11-2024

- Skiido Mach Z 900 Premium dash, Air ride CAN stream fixed
- CAN VW ESP traction control bug fixed

Version 2.173 15-11-2025

- Skiido Mach Z 900 Premium dash, Air ride CAN stream added
- DSG pedal postion CAN information bug fixed
- DSG combined load table added

Version 2.171 07-11-2025

- Scatter plot fixed

- Skiido Mach Z 2024 900R, year 2024, premium dash, no samrt shock CAN stream added

Version 2.170 25-10-2024

- Skiido Mach Z 2024 900R, year 2025, premium dash, samrt shock CAN stream added
- Clio RS3 CAN stream fixed (AC clutch)
- Citroen C2 CAN stream fixed
- OBD2 new PIDs added. Already supported PIDs: 0x1, 0x3, 0x5, 0x6, 0xA, 0xB, 0xC, 0xD, 0xE, 0xF, 0x11, 0x13, 0x14, 0x24, 0x44
- User CAN stream values for CAN analog inputs are clamped to the type size.
- External controller AFR at 0V can be set to 0.

Version 2.169 07-02-2024

- Skiido Mach Z 2024 900R, year 2024, premium dash, air ride CAN stream added

Version 2.168 18-01-2024

- Skiido Mach Z 2024 premum cluster CAN protocol added

Version 2.167 22-12-2023

- Skiido Mach Z 2024 CAN protocol added
- The clutch switch (or the brake switch) allows to start the engine when the Cruise control is active
- Icons for Scope, Graph log and Quick tune window added to the main toolbar

Version 2.166 21-11-2023

- F2 resets the changed cell marks even when ECU is not connected
- CAN BUS stream for Maverick model 2023 added
- Opel Adam CAN BUS stream added
- Ford RS/ST oil temperture is displayed correctly when the external sensor is used
- Ford Monde CAN BUS stream updated
- Fuel level added to Parametric outputs
- Custom fuel correction table minimum value is 0% now (previously 25%)

Version 2.165 28-09-2023

- F2 resets the changed cell marks even when ECU is not connected
- Bug with two the same warning windows when loading project fixed
- Option for DSG gearbox, that the brake pedal is not required for engine start when the selected gear is P
- Base ID 0x648 for Ecumaster GPS can be selected in VSS configuration
- Ford Mondeo Mk 4 CAN stream added (experimental, work in progress)
- For CAN VW protocol support for cruise controll switches (CAN_SW9 – Cancel, CAN_SW10 – Set, CAN_SW11 – Resume)
- MUX switches works correctly with the CAN Analog inputs
- DSG Gearbox mode added to parametric outptus

Version 2.164 28-07-2023

- Keypads support improved in the low battery voltage situation (eg. cranking)
- Ecumaster external lambda module support fixed
- Can Am Maveric 2022 Max support added
- VW cruise control buttons from CAN are mapped to CAN_SW1 to CAN_SW3
- Short term trim active added to parametric output
- Parametric outputs cycling time extended to 2000 seconds
- Colt CZ cam trigger support fixed
- Prime pulse now exectutes when the ignition is swith on again during delayed turn off
- Wizards for temperature and pressure sensors fixed
- Displaying axes descriptions in 2D tables improved

Version 2.163 30-04-2023

- Rev. matching now support multiple clutch events
- Multitooth trigger can be used with syncing after engine start up (Enable sync. without camsync)
- Short term trim proportional and integral terms scaling as a function of airflow added
- Short term trim maximum lambda above the strategy turns off added
- Lotus torque calculation modified
- Short term trim is disabled during DSG shifting
- Short term trim PID debug support added
- Airflow estimation added for Alpha-N strategy
- EMU CAN stream TPS behaviour changed. In the case of mechanical throttle it works as in previous version. In the case of DBW it sends PPS position. The DBW position is send as in previous versions.
- Enable CAM sync tooth window now have 3 options (for high compression low engines):
  - *Sync only during cranking* – use cam sync window only during cranking
  - *Sync always* – always use cam sync window
  - *Sync always, skip 2nd gap* – only sync primary trigger gap after cam sync, skip second primary trigger gap
- Parametric outputs added to all functtion activation inputs
- TPS Rate added to paramteric outputs

Windows Client

- Validation for Trigge angle added (the trigger angle cannot be higher than 720 / numCylinders)
- Launch control 3D tables axes bug fixed in windows clinet

Version 2.162B 06-03-2023

- Autotune works correctly with log files recorded with version 2.162
- Detection of V3 firmware and possibility to downgrade to V2 firmware

Version 2.162 03-03-2023

- EGO correction replaced by Short term trim strategy. The closed loop control must be set up again (it is not comptaible with the previous project versions). The narrow band lambda sensors are no longer supported.
- Air flow log channels (g/s) introduced for lambda delay table
- Bosch LSU 4.9 and 4.2 strategy improved. The precision as well as the noise level around Lambda 1 improved
- DSG torqe reduction ignition now is 3D table
- Faster DSG torque reduction ignition angle recovery
- Mazda RX8 PPS plausibility check added to the DBW strategy
- AFR values on the log can be set lower than 10
- When the parameter Use cal. Table for built-in MAP was set, reading MAP from analog sensors wasn't possible. Fixed

Version 2.161 19-01-2023

- The keypad now can work on two different Ids (0x195 (CANOpen node 0x15) or 0x197 (CANOpen node 0x15))

Version 2.160 13-01-2023

- Ford Focus ST option added to Focus RS CAN stream fixes ESP lamp on the dash
- Mach Z support for displaying boost with imperial unit
- Alterantive function (spark and fuel cut %) added to both PWM ouputs.
- The EMU startup time speeded up by 50ms

Version 2.159 24-11-2022

- DSG behavior when the throttle is closed improved
- Mach Z Ace 900 with premium dash CAN support added
- PPS plausibility check for Lexus SC430 / Corolla Verso added
- Throttle plausibility check for Lotus 2ZZ added
- DBW throttle speed limit parameter added. We suggest setting it to 800-900%/s
- DBW auto tune PID coeficient made less agressive

Version 2.158 16-11-2022

- Plausibility check for Lotus Evora PPS fixed
- Mach Z Ace 900 support added

Version 2.157 04-11-2022

- Plausibility check for Lotus Evora TPS and PPS
- AC Evap temperature hysteresis added
- Copy / Paste rounding bug fixed
- Timeout added for undriven axle speed measurement connected to CAM#2
- Nitrous activation TPS value now can be set to 0

Version 2.156 07-10-2022

- DSG starts from a standstill and substantially improved
- Skidoo Mach Z CAN stream added
- Ignition outputs added to PWM#1 and PWM#2 tables
- Minimum speed to resume cruise control parameter added
- Subaru EZ30 trigger support added (prim: Subaru 36-2-2-2 (EJ/EZ), sec: Subaru EZ30)
- Clio RS3 CAN stream modified
- Fuel usage filtering added

Version 2.155 13-07-2022

- DSG gearbox ABS emulation improved
- DSG /Gateway/SSR emilation added
- Maverick CAN-AM X3 Turbo RR CAN stream improved, added option for year 2022
- Ignition outputs added to parametric outputs
- Launch control fuel based cut bug fixed
- When the engine is not running the DBW target is taken from characteristic table not from Idle/DC during cranking
- ECUMASTER GPS module (base id 0x646) VSS source description modified. The GPS module base id should be 0x646

Version 2.154 07-06-2022

- WBO Ri / Vs measurement startegy modified for better performance

- Knock sensor gearcut delay works proper with times higher than 255ms
- Electronic wastegate (EWG) inevert analog input option added
- CAN-AM Maverick X3 Turbo CAN stream added (experimental)
- ECUMASTER GPS module (id 0x646) VSS source description was wrong. The proper CAN ID is 0x647
- Displaying of some percentage channels (WBO heater, spark cut, fuel cut) bug fixed
- Comparing changes in Autotune window bug fixed
- Mini R53 CAN message added for Chrono dash (oil temp, oil pressure)
- Overriding CAN Analog inputs from User defined CAN stream bug fixed
- Toyota GT86 AC button support added to CAN Switch 8
- Lotus 2ZR cruise control status information send to the Dashboard
- DBW target during ramping out Launch control is set to user reqest immediately

Version 2.153b 20-05-2022

- Crash when Coils, Injectors and DBW wizards open fixed (introduced in 2.153)
- kD coefficients for DBW autocalibration reduced

Version 2.153 11-04-2022

- Bug with Autotune for Alpha N fixed
- Bug with Autotune when there was more than 32000 samples per one cell fixed
- DSG ABS and steering wheel angle emulation added for LC for non VW cars. Make sure your brake switch and VSS is connected and configured in EMU
- VW ESP on / off status is mapped to CAN SWITCH 8
- Increased precision of spark calculation for high rpm (Primary trigger settings / Increase precision for high RPM). This setting is recommended for new tunes. For old tunes, make sure that there is no knocking at high RPM. This can advance the spark in some cases about 1 degree for each 6000 RPM
- Nitrous strategy deactivation input added
- Paramters rangees for nitrous strategy extended
- Pattern fuel cut replaced random fuel cut
- Soft rev limiter now can use pattern fuel cut for smooth fuel based rev limiter
- Pattern spark cut added (more smooth effect than random spark cut). Can be selected in Ignition / General options
- Pattern fuel cut added to launch control
- Tacho multiplier range increased to 50
- Crop to selection option added to graph log
- Cruise control PID debug fixed (added I and D terms)
- Two ECUMASTER WBO2CAN modules can be connected as Lambda1 and Lambda2
- Haltech WBO2CAN module support fixed
- Fixed bug when parametric outputs have not selected variable type, the status of the output changed but the physical output didn't

Version 2.152b 08-04-2022

- Bug with Autotune (change load axis to TPS) fixed
- Bug trap application crash reporting system added

Version 2.152 01-04-2022

- Launch Control x axis can be selected between TPS and MAP
- Ignition outputs added to AC fan output
- Lotus Exige rotary switch sport / race mode support added
- Client parameters panel size maximum size increased to 600
- Autotune bug introduced in 2.150 fixed

Version 2.151 21-03-2022

NOT PUBLIC VERSION!!!!

Version 2.150 16-03-2022

- New DSG strategy implemented
- WBO precision improved. For LSU 4.9 we strongly recommend to connect 150kΩ resistor between +5V and WBO VS pin
- Filter power added for fuel level
- Lambda active and cruise control active added to parametric outputs

Version 2.144 07-02-2022

NOT PUBLIC VERSION!!!!

- New DSG strategy implemented
- Clio RS3 AC clutch over CAN support added

Version 2.143 24-01-2022

- DBW output DC limit added to prevent small throttlies from damage
- The colums witdths in log group windows are saved with the desktops

Version 2.142 20-01-2022

- Gauges flickering fixed
- Fixed displaying torque tables with unnecessary decimal point.
- Small adjustment of battery voltage measurement for plug and play ECUs (BAM, BUB, Mini, Lotus 2ZR)

Version 2.141 16-01-2022

- Gauges are scaled correctly depends on screen DPI
- Haltech V2 CAN stream vehicle speed multiplicator fixed
- Option for disable immobilizer message for Clio 3RS CAN

Version 2.140b 16-01-2022

- Fixed gauges value flickering when ECU not connected
- Fixed bar gauge when ECU not connected

Version 2.140 15-01-2022

- Any spark cut event disables knock sensig for user defined time (sprak cut delay in Knock action parameters)
- Gauges can be displayed as gauge, value or bar,
- Gauges now shows log value whne tracing the log
- Channel properties added on pop up menu for quick tune display and gauges

Version 2.139 11-01-2022

- Haltech IDC stream modifications: added injectors DC, ign angle, ethanol content and check engine fixed
- EGO correction disables during flat shift as well as at any spark and fuel cut condition

- Primary trigger types list sorted

Version 2.138 23-12-2021

- PWM fan coolant control – disable fan when no RPM function works correctly
- BMW E46 AC switch support bug fixed (CAN SW 1)
- Subaru BRZ / Toyota GT86 fuel usage added for support fuel level indicator
- Haltech IC7 dash support via Haltech V2 stream. Supported channels: *RPM, MAP, TPS, Fuel pressure, Oil pressure, Ethanol content, Lambda1, Lambda2, Check engine lamp, VBatt , Fuel Level, CLT, IAT, Fuel Temp, Oil Temp, Gear, Lambda target*
- Timers range extended to 62.5s

Version 2.137 02-12-2021

- Spark precision at high RPMs improved
- Ford LT plausibility check added to DBW
- Soft rev limiter spark cut percent can be set to 0%
- Nitrous load max can be 700kpa
- DBW autocalibration limited kP to +/- 35%
- Volvo C70 CAN stream improved

Version 2.136 23-11-2021

- Timers bug fixed
- EVO X CAN stream modified
- BMW E46 ABS module initialisation fixed
- LOTUS Exige sport mode controlled by CAN SWITCH 9

Version 2.135b 06-09-2021

- Proper firmware included in the package

Version 2.135 27-08-2021

- DSG fixes from 2.134b implemented
- Appending of logs added
- Cranking gap detection scale range increased to 250%
- Differential control during LC strategy fixed
- Haltech V2 protocol new channels added: RPM, MAP, TPS, fuel pressure, oil pressure, injectors DC, ign angle, lambda 1, lambda2, VSS, fuel level, CLT, IAT, fuel temperture, oil temperture

Version 2.134 29-06-2021

- DSG blip strategy improved / modified
- Fuel enrichment for DSG blip added
- DSG blip level defined in 2D table as a function of RPM difference
- DSG blip time defined
- DSG idle correction added based on reported by DSG transmission loses
- Volvo C70 CAN stream added
- BMW Z4 can stream fixe
- Boost corrections bug fixed when the pressure was higher than 400kpa

Version 2.131 10-05-2021

- DSG torque table size increased to 12x10
- DSG VE based torque model removed. Torque now is based on DSG torque size
- DSG rev matching and blip strategy modified
- DSG maximum blip level per gear table added for fine tuning blip
- DSG ignition restore after shit up modified
- DSG CAN Rx messages buffering improved
- Lotus CAN stream modified
- Subaru STI CAN added (ABS working and wheel speeds can be read in EMU)
- Overbost protection flag setting fixed
- Mazda MX5 ABS model 2 CAN communication modified
- Engine protections (CLT, OILT) soft rev limiter bug fixed
- Windows client compiled with new compiler

Version 2.129 09-03-2021

- Cranking gap detection scale modification for N+1 trigger introduced in 2.128 removed
- If for Enable CAM Sync tooth window both tooth (min and max) are set for the same value, then during cranking the synchronisation primary trigger tooth will be forced for set value (in both engine revolution). This is the feature that allow start the high compression engines.
- Mazda RX8 ABS initialisation message can be disabled (Custom 0x620 option in CAN stream). Add own initialization message to user defiend stream. ID 0x620, Length 7, 0x0, 0x,0, 0x0, 0x0, 0x10, 0x0, **0x3** (this number must match the ABS requirement)
- Lotus Elise and Evora message timings now fits perfectly OEM ECUs
- Bosch M4 CAN rx mask modified
- Used outputs list bug fixed with the Parametric outputs when Act as virutal output was selected

Version 2.128 21-01-2021

- Oil metering pump strategy, can be used now with DC motors. That allows to control DC motor valves like secondary throttles
- 2nd speed limit for Speed limiter strategy added
- Mini Cooper R53 CAN stream improved (no DSC error on dash, DSC switch state can be read in EMU BLACK as CAN SW 4
- Negative values clamp to 0 for custom correction tables (fuel / ignition) when loading project bug fixed
- Crash during loading the old versions of autosave files fixed

Version 2.127 12-12-2020

- Ford Fiesta MK7 CAN stream improved
- Corsa VXR CAN stream bug fixed, now the dash works correctly
- Renault Clio RS3 speed is read from separate wheels (ABS module)
- RPM based traction control strategy of dRPM calculations improved
- Boost control corrections overflow bug fixed
- In the Full Screen mode the toolbar is visible

Version 2.126 14-11-2020

- Check engine lamp on CAN BUS drive dashes, is turned on when there is no RPM
- 6HP19 gearbox experimental support added
- Custom coding for DSG boxes added

Version 2.125 07-11-2020

- Bug with axes corruption for VE and Ignition table, when the autotune window was open fixed.
- Added EGT1 and EGT2 for PWM#2 and custom correction 3D tables,
- Added Lambda as a parameter for virtual / parametric outputs
- Honda FN2 plausibility check added for DBW throttle position
- BMW E90 stream is sent correctly
- Fixed bug with the idle target value when the RPM drops under the cranking threshold

Version 2.124 03-10-2020

- Added Ethanol content and CAN Analogs for PWM#2 3D table
- Custom Fuel correction table added (instead of TPS/MAP fuel correction table). If TPS/MAP table was in use, it must be rewritten manually
- Custom Ignition correction added (instead of TPS/MAP fuel correction table). If TPS/MAP table was in use, it must be rewritten manually
- Cruise control status was added to the EMU BLACK standard stream
- CAM toothed wheel with missing tooth decoder bug fixed. Due to this fact the engine phase must be changed (modify Ignition output offset by 2 for 4 cylinders engine, 3 for 6 cylinder and 4 for 8 cylinders engne)

Version 2.123 12-09-2020

- Alternator control strategy can use PWM#2 otuput
- Ego correction gear cut delay bug fixed
- RaceChrono support removed
- Gear cut C*ut delay* parameter delays also ignition retardation
- Lotus S3 Cup shiftlight support modified. Now the 1st led appears when the RPM are equal or higher than Shift light RPM (shiftlight strategy) - 600, 2nd led when the RPM are equal or higher thatn Shiflt light RPM - 300, and all leds are lit when RPM are higher than Shift light RPM
- EDL logs now display proper time when selected option Display System Time.

Version 2.122 23-08-2020

- 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)
- Seadoo RXP CAN stream bug fixed
- Windows client: number of desktops increased from 12 to 20
- Windows client: number of graph log tabs increased from 6 to 12

Version 2.121c 04-08-2020

- Interpolation of 2D tables X axis definition crash fixed

Version 2.121b 28-07-2020

- Missing outputs list for AC Clutch output, Starter output and Shift light output bug introduced in version 2.121 fixed

Version 2.121 24-07-2020

- Idle DC REF table CLT scale range increased (to 250C)
- Lotus Exige CAN frames sent frequency increased
- CAN-AM Maveric CAN stream improved
- ALS active parameter added to Parametric outputs
- Fiat Panda CAN stream added
- AC max clt parameter range increased (to 250C)
- When Load on Y axis was selected in general settings, not all tables with common axes were reinterpolated when axis was changed bug fixed.
- Unised ignition outputs can be assigned to Fuel Pump output, Coolant fan output and Check Engine Light output.
  The output type depends on the sleceted coils type. In the case of coils without amplifier the ouput is Low side type (switch to ground) and provide several amps of contiunous current. In the case of Coils with the amplifier, the output is high side, switch to +9V, with the maximum current of 80mA. This type of output can control only LED or transistor based switch directly.

Version 2.120 04-06-2020

- 2ZZ CAN stream bug introduced in 2.114 fixed
- Lotus S3 2ZZ CAN stream added
- When clutch is pressed now the calculated gear remains unchanged (before went to 0)

Version 2.119b 28-05-2020

- Log channel selector bug fixed (missing .. button for channel selection)

Version 2.119 28-05-2020

- Haltech CAN O2 wideband sensor support added for Lambda1or Lambda2
- Ecumaster Lambda 2 CAN support added for Lambda 1
- EMU classic serial stream compatibility option added (fix Android Dash fuel pressure issue)
- BMW ITB control bug fixed when option Disable when no RPM selected

Version 2.118 18-05-2020

- Cruise control - maximum TPS change rate added

Version 2.117 16-05-2020

- CAN-AM Maverick CAN stream added
- Mazda RX8 CAN stream bug fixed (vehicle speed from ABS)
- Blip input added for external paddle shift controller

Version 2.116 09-05-2020

- Idle DC ref table converted from 2D to 3D (as a function of CLT and RPM Target)
- Renault Clio RS3 CAN stream improvements

- Oil metering pump support
- Cruise control strategy added
- Reading vehicle speed using Flex Fuel input bug fixed
- Axis info for 2D/3D tables shows all tables that use given axis definition
- When starting in wasted spark it is possible to sync during the first fuel cut

Version 2.115 27-04-2020

- DSG: improved blip
- DSG: for parking or low-speed applications, the ecu will raise the idle speed, allowing for low speed driving by just releasing the brake
- VW / AUDI AC module support added
- Seadoo Spark RXP 300 ES can stream added
- Parametric output hysteresis for GREATER THAN and LOWER THAN conditions bug fixed
- Trailing ignition delay angle added to the log
- Removed support for 2 engines synchronization
- Lotus Evora, Exige, S3, S3 CUP fuel level fixed bug (indicator shows 0 when the tank was full)

Version 2.113 19-03-2019

- Autocalibration of DBW added

Version 2.112 11-03-2020

- Offset for Tx frames in User Defined bug fixed

Version 2.111 01-03-2020

- DSG support improvements (better blip, LC control mode activated in the gearbox)
- Oil pressure sensor plausibility check added
- Oil pressure cut strategy can be disabled when oil pressure sensor fails
- RGB Keypads control changed
- Backlight color for RGB keypads can be defined
- Lotus 2ZZ odometer fixed
- Race Technology serial stream modified
- Blending for DWB characteristic tables added
- Disable handbrake when the brake pedal pressed parameter added for the diff control
- PNP ECUs support added
- PNP ECUs - internal MAP sensor can be calibrated using MAP Cal. table
- PNP ECUs - SW1,SW2,SW3 switches have proper paliarity
- VDO BMW S65B40 idle throttle support removed
- Scatter plots point size bug fixed
- DC ref MAP based table for boost control bug fixed

Version 2.110 28-12-2019

- Engine protection flags log channel added
- To read wheels speed using vehicle specific CAN stream, Speed source in VSS and Gearbox settings must be set to ***CAN wheel speed***

- Ecumaster Lambda 2 CAN readings bug fixed
- EWG base DC Y axis changed from kPa to Bar
- Ford Fiesta MK7 CAN stream fixed (wheels speed)
- CLT protection units conversion between metric and imperial fixed

Version 2.109b 25-11-2019

- 3D graphs OPEN GL compatibily improved

Version 2.109 21-11-2019

- Calibrations comparator
- New 3D tables
- Editing with keys enabled on 3D tables
- Export log to CVS bug fixed
- Fiesta MK7 CAN stream wheel speed added
- Used fuel channel added (in l)
- ALS switching DBW target tables bug fixed
- BMW E46 CAN battery indicator support modified
- Renault Laguna CAN stream fixed

Version 2.108 14-10-2019

- Slow tables editing bug fixed
- Channel value offset is properly supported by used defined stream (bug introduced in 2.107)
- Ecumaster GPS speed support added to VSS (GPS BASE ID 0x646)
- Global debounce for CAN SWITCH BOARD v3 added
- Graph log drawing improved
- Cell selection in tables bug fixed

Version 2.107 29-09-2019

- Switches improved
- Lotus Exige ESP support fixed
- CAN Switch board V2 enable debouncing bug fixed (inverted parameter)
- Restore to defaults for 2D tables
- New injectors calibrations in Injectors Wizard (thanks to Miroslav Karanović)
- EGT#1 can be used as CLT input value. (Sensors setup ->Temperature->Parameters)
- Engine start is disabled when DSG gearbox is not in P / N mode or brake pedal is not pressed. The engine stays in Inactive State during cranking
- Overboost strategy bug with Boost Target when using scaling fixed. Now after scaling boost target cant be lower than MAP 100kPa (means boost = 0kPa/0bar/0psi)
- Restore to default for 2D tables added
- Boost control PID resets when the boost control is inactive

Version 2.106 08-09-2019

- Ecumaster Wheel speed to CAN support added
- Built-in switches debounce time increased
- Fiat 500 CAN stream bug introduced in version 2.103 fixed

- Loading log bug introduced in 2.104 fixed
- Overlaping of channel name and channel values on Grpah log fixed

Version 2.105 30-08-2019

- Bug with gear information for DSG gearbox introduced in 2.104 fixed
- New log channel with the voltage from internal mux switch adc (*Switches voltage raw*)

Version 2.104 23-08-2019

- DSG engine torque calculaction based on VE fixed
- DSG engine torque table added
- Engine torque correction based on fuel cut % and spark cut %
- Engine torque correction base of fuel cut
- Torqe correction table when the nitrous is active
- Engine power log channel added
- Engine torqur and power can be displayed in imperial units
- Boost DC ref can be Boost target based (x axis)
- Fuel cut probablity is displayed on the log as % (0-100) instead of (0-255)
- Momentary switch states added to parametric / virtual outputs variables

Version 2.103 15-07-2019

- Support for Ecumaster WBO CAN controller as Lambda #2
- Ford Fiesta MK6 CAN stream added
- Lotus Elise S3 CUP - Traction control preset displays on the dash
- Rev matchin strategy bugs fixed (still under testing)
- Gear cut bug with load cell support introduced in version 2.080 fixed
- Bug with can switches introduced in version 2.102 fixed
- If the clutch input defined, the gear calculation is inactive when the clutch is pressed
- Log interpolation of negative numbers bug fixed

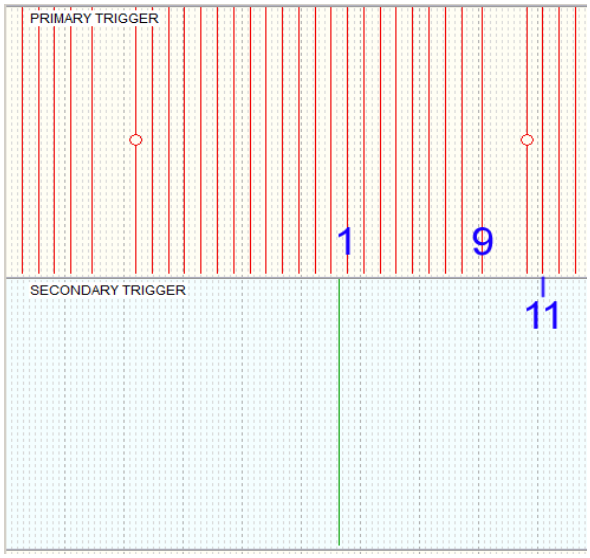
Version 2.102 06-07-2019

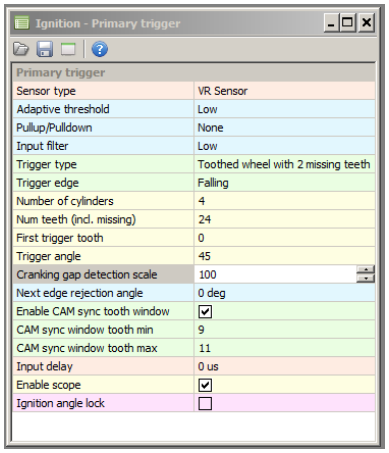
- Staged injection when Rotary support is enable is offsetef by 180 degrees between *Staged injector #1* and *Staged Injector #2*
- DSG torque calculation improved
- DSG gearbox selector
- CAN Analog inputs inverted can be used as a switch

Version 2.101 16-06-2019

- New heater strategies introduced for WBO (Conservative heat up, Fast heat up and Always active (replaces *enable when no RPM parameter*))
- Support of CAN Switch Board V3 bug fixed
- New log channel *Lambda error mult.* added. It represents *Lambda/Lambda target* value and can be used for VE table cell correction

- New parameters added to the primary trigger setup: Enable CAM sync tooth window, CAM sync tooth window tooth min, CAM sync tooth window tooth max. This feature is usefeul in the case of high compression engines, when during cranking it is not possible to detect missing tooth. For example on the following scope the crank tooth 0 is the first tooth after the gap (marked with the dot). We can define that during cranking the missing tooth can be onlu decoded between tooth 9 and 11 after the CAM sync trigger tooth (green line). The missing tooth will be detected when the tooth relative to CAM sync is > 9 and < 11 (tooth 10)





Version 2.100, 04-06-2019

- Bug with PWM control of boost control solenoid introduced in version 2.099 fixed
- Debounce option added to the support of CAN Switch board V1

Version 2.099, 25-05-2019

- Bug with the switches introduced in version 2.098 fixed
- Bug with the VTEC support introduced in version 2.098 fixed
- New alogirthm for calculating WBO Ri value
- New PID settings for WBO controller
- Removed parameter *Enable WBO when no RPM*
- Bosch ABS M5 CAN support added (wheel speed reaiding)
- Lotus Evora CAN stream added
- Lotus Exige and Lotus Elise S3 ESP CAN stream improved (ESP light is off now)
- Renault Clio RS3 CAN stream improved
- Parametric outputs can work as virtual outputs (select *Act as virtual output* as Output)
- New variables added to parametric / virtual output: *CAM2 switch*, *Fuel Pump state*, *AC clutch state*, *Parametric output 1* to *Parametric output 5*
- *Parametric output 1* to *Parametric output 5* can be used to activate PWM#2 (in addition to *Virtual outputs*)

Version 2.098, 25-04-2019

- Bosch LSU 4.2 / LSU 4.9 strategy for water condensation phase modified
- User defined CAN stream bug introduced in 2.097 fixed

- Autotune bug introduced in version 2.097 fixed
- Launch control bug introduced in version 2.097 fixed
- LOTUS S3 CUP CAN stream improved: texts on the dash (PIT LIM, LAUNCH, TC) support for tables switch
- Parametric / Virtual outputs update rate changed from 20ms to 10ms (100Hz)
- Unipolar stepper motor support fixed. For unipolar motors the common connection must be connected to +12V!!!
- Switches (SW1, SW2, SW3) support fixed
- Pulse option on signal edge added to Parametric / Virtual outputs (Cycle once must be selected)
- Shift light argument added to Parametric / Virtual otputs
- Traction control bug with scaling driven and undriven axles fixed
- Bug when Analog input #6 was selected in DBW parameters (warning) fixed
- Desktops save correctly when firmware is upgraded
- EWG control when min sensor voltage is greater than max sensor voltage the position of throttle is inverted

Version 2.097, 07-04-2019

- Memory optimisations
- Afterstart ignition lock feature negative angle bug fixed
- CAN BUS performance optimised
- DSG: Emulation of ESP to allow launch control (for non VW cars)
- DSG: Shifter (gear selector) emulation fixed (no more gearbox errors)
- DSG: Gearbox CAN timeout errors fixed

Version 2.096, 29-03-2019

- Log file name displayed on the application title bar
- Rev matching for H-Pattern gear box introduced (alpha version)
- EVO X - AC pressure read from CAN
- EVO X - in the case of using EMU differential control strategy, the index of selected tables is sent to the Dash
- Boost IAT correction bug fixed
- Lotuse Elise S3 CUP CAN stream added
- Lambda target is send over standard CAN stream
- Gearcut blip minimal RPM added
- Afterstart ignition lock feature added
- Per injector fuel cut, ethanol content fuel cut, overboost fuel cut and overrun fuel cut also set log channel *Fuel Cut*

Version 2.095, 18-03-2019

- User defined CAN stream can send messages independently on CAN-Bus dash setting,
- EGT1, EGT2 and CAN EGT 1-8 are added to parametric output
- Lotus Elise S3 CAN stream added

Version 2.094, 10-03-2019

- Desktops are stored before firmware upgrade
- Coolant pressure and crankcase pressure sensors added
- Hysteresis for coolant fan can be set to 0
- Boos DC can be used as an axis for PWM2 output
- Paddle shift: to switch from 1 to N, switch must be kept pressed

Version 2.092, 16-02-2019

- VW CAN stream bug introduced in version 2.087 fixed
- RaceChrono support bug fixed (only via CAN to BT module)
- CAN SW5 is set to 1 when the gear is changing up
- 0x677 BLIP message, extended to set current gear (byte 2)
- WBO controller memory usage optimised

Version 2.091, 09-02-2019

- VW CAN stream bug introduced in version 2.087 fixed
- VW CAN stream fuel consumption bug fixed
- Suzuki Swift MK3 odometer support bug fixed
- Secondary throttle can be controlled using idle / stepper motor
- LC. The restore time of ignition angle and spark cut can be slowed downy by factor of 10
- CSB V2 preliminary support added
- RaceChrono support added (only via CAN to BT module)

Version 2.089, 03-02-2019

- Virtual TPS option added, when there is switch instead of variable throttle position sensor
- Options for controling CAN switchboard using parametric / virtual outputs added to ECM switch board window
- IAT and CLT voltage added to log
- Colt CZ AC control over CAN bug fixed
- EGO correction behaviour improved when WBO sensor is not valid for the short time

Version 2.088, 28-01-2019

- EWG control strategy added
- PWM controlled radiator fan hysteresis bug fixed
- PWM controlled radiator fan turn off during cranking implemented
- PWM controlled radiator fan turn on at maximum speed when sensro broken implemented
- Citroen C2 CAN stream sends coolant temeprature to the dashboard
- ESP/ASR support for VW cars

Version 2.086, 05-01-2019

- VSS added to axes in PWM #2 table
- Spark can be disabled during start engine dealy when cranking
- RPM limit increased to 20000 RP
- Clamp DBW pos when exit idle strategy uses DBW Target instead of DBW Pos

Version 2.085, 20-11-2018

- PWM #2 table added with customizable axes

- PWM #1 and PWM#2 tables can be controled via virtual output
- PWM controlled radiator fan support added to Coolant fan strategy
- Delay parameter added to all parametric and virtual outputs
- Colt CZ support of Start button (CAN SW 3 and 4)
- Bug with temperatures range for VVti when imperial unit selected fixed

Version 2.084, 14-11-2018

- **User CAN stream bug intorduced in version 2.082 fixed**
- The number of log channels exported to cvs file increased from 8 to 16

Version 2.083, 13-11-2018

- Bug with loading old log files fixed
- DSG torque reduction ignition angle restores 3 degs / rev
- DSG fuel enrichment for up shifts
- Traction control indicator output invert option
- Traction control indication when disable bug fixed
- Ecumaster EDL-1 protocol V2 introduced (required EDL firmware ver 1.08)

Version 2.082, 12-11-2018

- Beta version of DSG Gearbox support (Other / DSG control)
- VW/AUDI CAN streams updated
- 12 POS RGB keypad bug fixed
- Mazda RX8 CAN added "mode 5 ABS" and additional option for emulation power steering
- Clamp DBW position when exit idle strategy bug fixed

Version 2.081, 31-10-2018

- Scatter plots
- Gear cut MAP correction for cut duration table added
- Gear cut: When signal source is *load cell* and activation level is *level low*, the cut/blip condition changed. Gearcut is when the voltage from load cell is lower than *Gear force down* value. Blip is when the voltage from load cell is higher than *Gear force up* voltage.
- 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.
- Nitrous active parameter added to parametric / virtual outputs
- X Axis of PWM table can be now: MAP, TPS, IAT,CLT, Analog1 to Analog6
- Traction control output light, can be configured to light up when TC is disabled
- VTEC: Additional parameter to activate vtec over given RPM, independent to other parameters

Version 2.080, 10-10-2018

- Engine states transitions behaviour changed. Now when the engine eneters running state never comes back to afterstart and cranking again (even when the rpms drops below cranking threshold)
- New option for idle control and DBW. ***Clamp DBW pos. when exit idle*** enables clamping throttle position in the situation when after exiting idle the throttle position target from characteristic table is lower than idle controll throttle position. It prevenrts
- Renault Laguna 2006 CAN stream added: clt, rpm, wheel speed, ac clutch control, ac status

(CAN_SW1), engine state, check engine
- Honda S2000 colant temp gauge support improved
- CAN EGT channels range in log fixed
- Cursor displaying on tables when table is scaled down fixed

Version 2.079, 03-10-2018
- Toyota GT86 CAN stream improved
- Ford Focus RS oil temp and oil pressure gauges support improved
- VW ABS wheel speed support fixed
- VW steering angle sensor support added (via CAN)
- Ford F150 CAN support improved
- RX8 ABS initialisation fixed
- User CAN stream (receiving) fixed
- Vehicle speed value when using GPS fixed
- Interrupts management modified

Version 2.078, 19-07-2018
- New Ecumaster RGB keypads support added

Version 2.077, 17-07-2018
- Ford Focus RS2 oil temperature gauge and AC switch bug fixed
- AC control strategy can override PWM output DC (to enable PWM controlled coolant fans)
- Narrow band oxygen sensor support improved
- Copy / paste clipboard crash fixed

Version 2.076, 30-06-2018
- HALDEX Gen. 1 direct support added to differential control
- filtering for DPRF value added

Version 2.075, 26-06-2018
- Yamaha FX trigger added (24-1 + 1 cam sync)
- 13b rotary engine ignition support added (12 + 1 cam sync)
- start delay added to engine start/stop strategy
- boost min RPM parameter added for boost control (in previous version this value was fixed to 400 RPM)

Version 2.074, 25-06-2018
- bug with staged injection when Aux outputs were assigned fixed. (The injector can open for no reason),
- *idle rpm ref* table is used also when map sensor value condition is not met
- new plausibility check added to the PPS (sum of both pots should be 5V)
- CAN EGT channels can be used for EGT alarm,
- Toyota GT86 start button (when pressed with the clutch) assigned to CAN_SW 6
- un-driven axle can be used instead of VSS for boost scale
- maximum RPM limit for all strategies increased to 16000
- DC range for differential control to scale tables to differential usable range

Version 2.073, 05-06-2018

- Motec M800 CAN stream fixed
- ALS, LC and BOOST current parameters set, added to EMU CAN STREAM
- Ford FX-150 CAN stream added

Version 2.072, 26-05-2018

- User CAN stream input channels bug fixed (bug introduced in 2.068)
- Fuel Level filtering improved
- Peugeot 207 CAN stream added
- PMU keypad assignment to CAN switches bug fixed
- Check engine channel added to parametric output
- User defined CAN stream parameter offset bug fixed
- Back pressure sensor range extended to 8 Bar
- PIT limiter active flag added to EMU CAN stream (Flags1)

Version 2.071, 24-04-2018

- Gear calculation strategy rewritten. Now tolerance means percentage of ratio to the next gear ratio.
- Gear detection delay added
- Alternator control signal can be inverted
- Boost can be reduced when knock occurs
- DBW throttle position plausible check improved. Now it works with systems where 2 pots produce the same voltage
- Undriven axle speed can be used for parametric outputs

Version 2.070, 16-04-2018

- COLT CZ CAN stream added

Version 2.069, 09-04-2018

- Bosch ABS support added
- Subaru BRZ / Toyota GT86 CAN stream added
- Traction control active log channel bug fixed
- Traction control undriven axle speed source bug fixed
- Traction control user torque reduction scale bug fixed
- 12-2 cranking bug timeout fixed
- New user defined shortcuts added: Previous desktop / Next desktop
- 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

Version 2.068, 10-03-2018

- Lambda tables size lowered to 8x10 with separate independent axes bins. **PLEASE CHECK YOUR LAMBDA TABLES AFTER UPGRADE!**
- Log format file modified, *.emublog files cannot be loaded in previous client versions!
- Traction control based on wheel speeds added
- VTEC override FlexFuel VE tables blend option added
- Warmup tables are now 3D
- Lambda control strategy PID modified, less signal filtration
- Caterham CAN added
- Ecumaster CAN stream expanded. See CAN stream details in help
- Idle control afterstart RPM increase, increases the idle control range RPM
- Activation delay added to Idle PID and ignition control
- Idle afterstart DC scale table added
- Coolant fan can be disabled over defined vehicle speed
- EGO transient delay range increased from 255ms to 2000ms
- Bug with VSS when the sensor was connected to the FlexFuel input fixed
- Now log channels selector added

Version 2.066, 02-03-2018

- FIAT 500 reverse gear information send over CAN (hill holder bug fixed). The reverse gear switch should be connected to the switch 1 input

Version 2.065, 02-03-2018

- Astra VRX CAN stream improved
- Corsa VRX CAN stream introduced
- Gearbox oil temperature and differential oil temperature added to parametric outputs

Version 2.064, 14-12-2017

- OBD 2 support
- 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
- Ethanol content variable added to parametric / virtual outputs
- Marking modified cells can be disabled (General options)
- Log channel *CAM#2 switch state* added
- Astra VRX CAN vehicle speed output fixed
- Idle vss increase parameter could be higher than 255 RPM
- Launch control time to activate parameter added
- 2D tables description font size fixed for high DPI displays
- New password entering dialog

Version 2.063b, 29-11-2017

- 2D tables bug introduced in version 2.063 fixed

Version 2.063, 28-11-2017

- Fiat 500 CAN stream modified (Hill holder error)
- Paddle shift strategy bug fixed, added 3rd input for R and 1 gear engagement
- EMU serial protocol modified (channels frequency)
- Modified cell marks are removed from autotune window

Version 2.062, 30-10-2017

- Nissan QR25DE trigger pattern added
- Astra Vrx CAN stream updated

Version 2.061, 30-10-2017

- Astra Vrx CAN stream updated
- Paddle shift strategy improved (added gear count and down shift per gear RPM limit)

Version 2.060, 28-10-2017

- Dwell calculations strategy during cranking improved
- Nissan alternative trigger strategy added
- User CAN stream bug with log channels > 255 fixed

Version 2.059, 23-10-2017

- Switch inputs improved (denouncing added)
- Paddle shift strategy

Version 2.058, 19-10-2017

- Mazda BP 4/3 trigger support
- Saab CAN stream
- Opel Astra VRX CAN stream

Version 2.057, 12-10-2017

- Mini Cooper R53 CAM stream improved, (DSC system works)
- Fiat 500 CAN stream improved (No random battery warning)
- Knock noise table is 3D now
- Gear cut strategy bug fixed (external controller)
- Debouncing added to momentary switches

Version 2.056, 05-10-2017

- Overrun fuel resume enrichment
- Honda S2000 coolant gauge recalibrated
- Boost target was wrong when Dcref is MAP based

Version 2.055, 04-10-2017

- Vehicle speed from GPS can be assigned to VSS channel

- Ignition angle could be trimmed using analog input (2D table)
- External fuel temperature sensor support added in addition to Flex Fuel
- Audi A3 2006 CAN stream added
- BMW E46 AC switch support added to CAN stream

Version 2.054, 29-09-2017

- Improved behavior on notebooks with FHD and SHD screens
- Fiat 500 EURO 6 CAN stream added

Version 2.053, 13-09-2017

- EGO feedback update interval bug fixed
- EVOX wheels speed sorted
- Steering wheel angle offset extended to -125 to 125 degs
- EGT alarm settings for ALS and LC added
- Knock sensing could be disabled during gear cut

Version 2.052, 30-08-2017

- Overboost protection added
- Ethanol content based RPM limit added
- Seadoo 36-2 specific trigger added
- EGO corection bug introduced in 2.051 fixed
- Modified cells in tables are marked

Version 2.051, 03-08-2017

- GPS speed could be used as parametric output argument
- MAP sensor trigger added to idle control
- Flex fuel TPS limit bug fixed
- VVTi PWM generation improved
- Swift 2nd gen odometer increase fixed

Version 2.050, 31-07-2017

- Fuel level calibration table visibility fixed (bug introduced in 2.047)

Version 2.049, 28-07-2017

- Fuel cut option added to ALS
- ALS ignition retard rated parameter added
- Brake switch support for Suzuki Swift 3rd gen CAN stream

Version 2.048, 11-07-2017

- Imperial units support bugs fixed
- FlexFuel input could be used as VSS source (HALL sensor only)
- GPS speed channel added to log

Version 2.047b, 10-07-2017

- Imperial units support bug fixed

- User CAN stream could be exported to canx format for PMU use
- EDL-1 logs could be load by open log function

Version 2.047, 09-07-2017

- Imperial units introduced (general settings)
- New help format introduced (general settings)
- Clio Williams trigger synchronization improved
- Brake switch added
- EVO X lateral G and Yaw rate reading fixed
- EVO X steering wheel position offset added (Sensors/Other/Parameters)
- Corvette CAN stream added (AC switch, wheel speed)
- DBW characteristic could be as a TPS/MAP function (experimental)
- Fuel cut reason flags bug fixed (fuel pressure cut, oil pressure cut, idle fuel cut)
- Gear cut switch support modified (inverted state, works once per switch)
- Gear cut works correctly with analog#5 and analog#6 inputs
- Gear detection when gear sensor used fixed
- EMU connection status on status bar fixed
- Copy / Paste bug fixed with floating point values (eg. Lambda tables)

Version 2.046, 13-06-2017

- Seadoo spark CAN stream added
- Lotus Exige CAN stream fixed
- When idle valve type is set to None, idle control is disabled
- Soft RPM limiter hysteresis minimum value is 1 now
- Differential control tables size changed from 6x6 to 8x5

Version 2.045, 23-05-2017

- CAN BUS wheel speed validation for VSS calculations
- Swift 3rd gen CAN stream improved
- Lotus Exige CAN stream added

Version 2.044, 13-05-2017

- Bug with analog inputs used as enable switch for strategies fixed. (The bug was introduced in version 2.040)

Version 2.043, 11-05-2017

- Swift 3rd generation speed from CAN reading fixed
- Nissan 350Z AC clutch activation message added
- CAN Analogs and CAN Switches added to Virtual and Parametric outputs

Version 2.042, 10-05-2017

- User defined CAN stream bug fixed (when the user CAN stream was enabled, always during, connection PC local calibration differs from EMU BLACK calibration),
- injection angle control code performance optimized

Version 2.041, 07-05-2017

- RPM of 2nd engine can be set via user CAN stream,
- idle after start rpm increase bug fixed (when rpm increase was > 255),
- rpm spike (for low resolution trigger wheels and TFI) during cranking bug fixed,
- CAN analog inputs defined in user CAN stream (in rx messages) have priority over PMU standard stream

Version 2.040, 28-04-2017

- Second fuel rail support (for additional fuel delivery)
- Staged injection could be assigned to 2 outputs
- Switches based on CAN Analog inputs bug fixed
- Quick tune display flickering issue fixed
- Graphical log tabs names are correctly refreshed after opening user layout at startup

Version 2.039, 22-04-2017

- Staged injection load could be forced to MAP when Alpha-N selected
- Swift MK3 oil pressure sensor CAN support fixed
- Blending for LC tables added (use rotary switch or pot)
- Virtual output 3 could be used to activate idle PID control
- Displaying floating point numbers in quick tune window improved

Version 2.038, 13-04-2017

- CAN Analog inputs could be used for Diff control rotary switch,
- Gear cut indicator added on status bar

Version 2.037, 06-04-2017

- CLT boost scale added,
- 2nd lambda sensor could be connected using external controller,
- LSU 4.2 / 4.9 PID settings are embedded into firmware and cannot be altered anymore,
- Copy / Paste in client software correctly handle non integer numbers

Version 2.036, 04-04-2017

- BMW ITB throttle control added
- Start / stop strategy sends starter motor request over CAN BUS

Version 2.035, 29-03-2017

- Bug from versions 2.030 – 2.034 with pullups when BT CAN stream enabled fixed,
- Gear detection bug fixed
- 1JZ/2JZ CAM#2 support added for faster synchronization
- For ALS pedal position is used instead of TPS
- Bug with CLT/IAT error code at device startup fixed
- DBW can control is assigned to fixed ID 0x667

Version 2.034, 13-03-2017

- Copy / Paste functions for tables use windows clipboard (it is possible to copy tables cells to Excel)
- Race Technology dash serial stream fixed (low update rate)
- Honda S2000 CAM#2 support added for faster synchronization
- Swift 3rd gen CAN oil pressure switch support

Version 2.033, 10-03-2017

- Fix for user defined CAN

Version 2.032, 07-03-2017

- Fix for high DPI laptops displays,
- Golf R32 can stream added,
- User defined CAN stream UI improved,
- ALS max egt is now calculated using internal EGT as well as CAN EGT

Version 2.031, 06-03-2017

- Firmware 2.030 doesn't contain all listed features and fixes. 2.031 is the proper one

Version 2.030, 06-03-2017

- User defined CAN stream,
- CAN output added for Nitrous output,
- Differential controller oil pump maximum work time added,
- Differential controller behavior during Launch control could be defined,
- Check engine code added for differential control (when oil pump cannot build required pressure),
- Switch input could be used as Oil pressure sensor input,
- Nitrous active state added to the EMU CAN stream,
- Gear and gear ratio is calculated when speed source is CAN wheel speed

Version 2.029, 16-02-2017

- Lancer EVO CAN stream update: steering wheel angle, yaw rate
- Nissan 350ZX CAN stream coolant fan support added

Version 2.028, 16-02-2017

- USB packet timeout restored to the value from version 2.026 (fix connection issue on slow PC)
- EVO X CAN stream fixed
- Nissan 350ZX CAN stream added
- Lotus 2ZZ cable throttle CAN stream added
- Idle control PWM generator bug fixed (when the PC connected to device)
- Log based autotune bug fixed
- Bug with loading autos save logs fixed

Version 2.027b, 25-01-2017

- Connection time improvement

Version 2.027, 24-01-2017

- All inputs / outputs could be labeled by user (Show assigned outputs / inputs and press right mouse button to rename)
- Boost blend now works correctly with CAN Analogs
- USB communication improved
- Firmware upgrade time improved (25sec instead of 30 sec)
- Switch#1-#3 debouncing added
- Dwell error value is correct when spark cut occurs
- Visible min and max values for given channel are marked on the log
- Drawing log speed is improved by a factor of 5
- Open log window allows also opening EDL-1 files
- Numeric keypad could be used for entering table values

Version 2.026, 05-01-2017

- All pressure sensors are defined as 2 point 2D table. Each sensor has own x axis (voltage). **Due to this modification when upgrading from older firmware presure sensors calibration should be corrected!.**
- Differential control added (for EVO 9,10) and Haldex,
- Differential oil pressure sensor added,
- Quick tune display log channels could be customized (right mouse button)
- New log groups (pressure and temperature)
- Crash when right mouse button was pressed on log group icon fixed

Version 2.025, 29-12-2016

- Lotus CAN stream fixed (fuel level and check engine status)
- Suzuki Swift 2nd gen CAN stream added
- TAB+Arrows allow to swap between windows
- Default deskto layout added

Version 2.024, 17-12-2016

- Output for VVTi control could be inverted (for HBRIDGE low side control)

Version 2.023, 13-12-2016

- Haldex 4gen control strategy added (requires modification of haldex module)
- Ignition outputs 4+5 could be paired
- PWM output signal generation bug fixed
- VSS max value increased to 500 km/h
- DBW calibration package included

Version 2.022, 08-12-2016

- DC Ref table in DBW configuration can be in function of target pos or throttle pos
- Tables processing speed optimized
- VSS value is calculated correctly when speed source is CAN
- Real time autotune improved (lock cells)

Version 2.021, 06-12-2016

- Idle DC correction in function of IAT
- Real time autotune improved

Version 2.020, 04-12-2016

- Wizard for temperature and pressure sensors
- Real time autotune replaces “K” key based autotune (experimental)
- Bug when restoring password protected device to factory state fixed

Version 2.019, 26-11-2016

- Internal MAP could be used as BARO when external MAP is used
- VIPER V10 trigger added
- Device delayed off using virtual output as off condition
- Renault Clio CAN stream fixed
- Help updated

Version 2.018, 18-11-2016

- DBW PWM control signal generation modified to decrease heat and lower the throttle noise
- Bug with initialization of DBW and FlexFuel input when there was CAN BUS error during startup
- Boost control solenoid can be disabled by switch / analog

Version 2.017, 04-11-2016

- PC USB communication improved
- ECM CAN switch board support improved
- PMU CAN communication improved

Version 2.016, 30-10-2016

- Support for CAN keyboard connected to PMU
- New temperature sensors added (gear box oil, differential oil, power steering fluid, pre IC)
- Default state for CAN keyboard can be defined
- Overrun fuel cut bug fixed (the cut was always performed above resume RPM)

- Tabs added for graph window to speed up switching between different log sets (shortcut keys from 1 to 6)

Version 2.015, 17-10-2016

- 8 CAN analog inputs added (from PMU device)
- 8 CAN Switches added (16 total)
- CAN support for CAN switch board (8 switches + 2 analogs) (CAN ID 0x666)
- 3 momentary switches added (could be controlled via CAN switch board or CAN keyboard)
- CAN ID for EGT moved to 0x660 and 0x661
- CLT engine protection bug fixed
- Now all BLACK files (log, calibration, scope, DL1 logger files) are associated with application and could be opened just by mouse click,
- Fuel cut reason log group added
- Graph log window improved:
  - Zoom extent
  - Channel autoscale
  - Scaling center is at the cursor
  - Extended popup menu (mouse button right) allow fast channel change or setup
  - Different line style (thin, thick, dots)
  - Up to 16 channels on the log

Version 2.014, 08-10-2016

- Bosch LSU 4.2/4.9 response speed improved
- Alternator control added
- When importing DL1 data loger data, log window refreshes correctly
- All files associated with BLACK (project, log, scope DL1 log) can be opened just by clicking the file