M1 GPA-IGN PACKAGE

MoTeC's M1 GPA-IGN (Ignition only) is a versatile and adaptable platform for the operation of engines with mechanical injection or carburetors. Configurable engine synchronisation modes accommodate most modern engine triggering systems.

For race applications, refer to the M1 GPR-IGN Package (part number 23628).

Included are numerous ancillary features common to race cars, such as driver switches, knock control, intercooler sprays and gearbox coolant pumps. It also caters for many systems found on modified road vehicles that may be useful in a racing context, such as air conditioning control.

This Package is available across MoTeC's range of M1 port injection ECUs (M130, M150, M170 and M190). The product provides pre-defined CAN messaging for full integration with other MoTeC products like Display Loggers, Video, Power Distribution Modules, Expanders, Shift Lights and more.

FEATURES

- Configurable engine synchronisation modes for many common engine types. Refer to the Engine Speed Modes section for current details.
- Configurable top dead centre for each cylinder allows for odd-fire engines.
- Configurable ignition output pin for each cylinder allows for coil-on-plug or wasted spark and distributor ignition systems.
- Configurable on-board knock for each cylinder with up to 4 assignable knock sensors (hardware dependant) and selectable centre frequencies.
- Configurable camshaft control from 1 to 4 cams, plus 1 switched camshaft.
- Dual bank lambda control supported; requires optional LTC with Bosch LSU4.9 sensor or LTCN with NTK sensor.
- Engine load modelling based on inlet manifold pressure and inlet manifold temperature. Alternatively, for example, when using individual throttle bodies, throttle position can be used.
- Sensor calibrations available for many common automotive sensors.
- Nitrous system with two activation stages and additional fuel pumps, bottle heater control and pressure sensor.
- Transmission brake control ('bump') functionality for perfect positioning of cars.
- Support of MoTeC devices: ADR, E8XX, PDM, SLM, VCS
- Test settings for most outputs, including ignition outputs, for easier setup.
- Turbocharger wastegate pressure control with pressure sensor and two PWM outputs.
- Configurable turbocharger boost control (using a normal and inverted solenoid output).
- Support of a turbocharger bypass valve control.

- Configurable ignition cut, engine speed limit, boost aim and throttle aim tables.
- Support of two coolant fan outputs (PWM controlled).
- Air conditioner support with switched output control.
- Coolant temperature compensations for engine speed limit, ignition timing, boost limit.
- Coolant pump output with PWM control.
- Coolant pump after-run functionality, optionally with additional pump output.
- Engine speed limiting with ignition cut.
- Fuel pump switched output.
- Fuel Flow Supply Sensor and Fuel Flow Return Sensor.
- Gearbox position detection via optional dual sensor or engine speed / wheel speed estimate.
- Intercooler temperature and spray control.
- Differential temperature control with dedicated temperature sensor and switched pump output.
- Lap distance, time and number via BR2, GPS or switched input, with split and sector options.
- Race time system with trim tables for ignition timing compensation, boost limit and throttle limit.
- Idle closed loop control system using ignition, drive by wire actuation or idle solenoid.
- Idle bypass control with stepper motor supported.
- Engine Load Average channel with tables for engine speed limit, ignition timing trim, boost limit and throttle limit.
- Inlet Manifold Flap support (actuator with 2 bank position feedback).
- Inlet Manifold Runner support (actuator with position feedback).
- Closed loop Alternator control.
- Engine run time total for engine hour logging.
- Configurable security for multiple users.
- Configuration of brake state using a switch or a pressure sensor.
- Brake Vacuum control system with dedicated switched pump.
- Configuration of clutch state using a switch, a position sensor or a pressure sensor.
- Calculation of clutch slip.
- ECU-internal G-force (acceleration) – longitudinal, lateral, vertical
- ECU CAN receive from a defined CAN ID for data reception from MoTeC devices. Support of 1 (M130/M170) or 3 (M150/M190) CAN buses.
- ECU CAN transmit of the most common channels using standard MoTeC CAN templates.
- 8 configurable switches and 8 rotary switches (wired or CAN input) with each of 9 positions simultaneously mappable to Pit Switch, Auxiliary Time, Race Time Reset, Engine Speed Limit Maximum, Throttle Pedal Translation, Ignition Timing, Boost Limit.
- Analogue tachometer output with configurable output pin and scaling.
- Dual bank drive by wire throttle servo control.
- Throttle Pedal sensor with translation table.
- Use of a Throttle Pedal sensor or a Throttle Position sensor in case of a cable throttle.
- Transmission pump output with transmission temperature threshold and hysteresis control.
- Vehicle speed measurement using wheel speed sensors, estimation or GPS.
- Vehicle Speed Limit Control system (DBW-throttle based), which can also be used for pit speed limiting.
- Configurable warning system with light and CAN output.
- Auxiliary time system with table for ignition timing compensation.
- GPS acquisition and logging via CAN or RS232.
- 4 auxiliary outputs for PWM control of added actuators:
  - Duty cycle tables using Engine Speed and Throttle or Manifold Pressure Axis'
  - Activation based on inlet manifold pressure or throttle position
  - Auxiliary Output 1 includes table for Ignition Timing Compensation
- Optional channels for additional sensors via input pin and/or CAN message, including:
  - Airbox Mass Flow, Pressure and Temperature
  - Ambient Pressure and Temperature
  - Boost Pressure
  - Brake Pressure Front and Rear
  - Brake Switch
  - Clutch Pressure and Position
  - Clutch Switch
  - Coolant Pressure and Temperature
  - Engine Oil Pressure and Temperature
  - Engine Crankcase Pressure
  - Exhaust Pressure Bank 1 and Bank 2
  - Exhaust Temperature (EGT) via TCA Thermocouple Amplifier, Generic CAN, or E888 for Collector, Bank 1 and 2 Collector, and Cylinders 1 to 8 (M150/M190: 12)
  - Exhaust Lambda via LTC, LTCN, or PLM for Collector, Bank 1 and 2 Collector, and Cylinders 1 to 8 (M150/M190: 12)
  - Fuel Pressure and Temperature
  - Fuel Tank Level

- Gear Position
- Gear Neutral Switch
- Intercooler Temperature
- Steering Angle and Pressure
- Transmission Pressure and Temperature
- Turbocharger Speed
- Turbocharger Inlet/Outlet Temperature
- Turbocharger Wastegate Position
- G-Force (acceleration) – Longitudinal, Lateral, Vertical
- Wheel Speed sensors front/rear left/right, wired or CAN input.

ENGINE SPEED MODES

As of M1 System 1.4.00.0019

- BMW M54
- BMW N55 - BMW N55 and N52 engines
- BMW S1000RR MY2015
- BMW S50 - BMW S50B32 (E36M3)
- BMW S62 - BMW E36 M3 S52B32, BMW E46 M3 S64B32, BMW E39 M5 S62B50 NOTE: not tested - please contact MoTeC before running this engine
- BMW S85 - BMW E60 M3 S85B50, BMW E90 M3 S65B40
- Bosch 140 40 - General Motors LLT, Audi BXA / Lamborghini LP560, Mazda L3-VDT
- Chrysler SRT8 2005 - Chrysler 6.1l Hemi 2005-2010 (eg Chrysler 300C SRT–8, Dodge Challenger SRT–8)
- Chrysler SRT8 2011 - Chrysler "Apache" 6.4l Hemi with variable camshaft timing 2011- (eg Chrysler 300C SRT–8, Dodge Challenger SRT–8)
- Camshaft One Missing Four Stroke
- Camshaft Two Missing Four Stroke
- Corvette C4 ZR1 - GM LT5 (1990 - 1995)
- Crankshaft One Missing Four Stroke
- Crankshaft One Missing Two Stroke
- Crankshaft Two Missing Four Stroke
- Crankshaft Two Missing Two Stroke
- Custom EJ20G - Subaru GC8 WRX and STi (EJ20G, EJ20K, EJ207 etc.) from MY95 - MY00 with the MY01 crankshaft sprocket (part number 13021AA141)
- Denso 270 90
- Dodge Viper - Experimental mode for Dodge Viper pre 2008
- Dodge Viper MY2008 - Experimental mode for 2008-
- Fiat TwinAir
- Ford Coyote
- Ford Duratec Synchronisation - Duratec, EcoBoost, BA cams
- Ford Sigma TiVCT
- Ford Windsor - with 'PIP' sensor in the distributor
- General Motors DMAX LMM - General Motors 6.6L Duramax LMM diesel engines (late 2007 - early 2011) when the eighth digit of the VIN number is 6.
- General Motors LS1 - (Gen 3 V8)
- General Motors LS7
- Honda 20FC (Honda S2000)
- Honda Bike Synchronisation
- Hyundai Gamma T GDI
- Honda K20
- Honda K20C1 - Civic Type R 2015+
- Hyundai Lambda II RS GDi Engine (Hyundai Genesis V6)
- Lamborghini V10 - Experimental mode for 5.0L port injected Gallardo 2003 - 2007
- Mazda L3 - Mazda L3 VVTi (example Mazda 3 SPorts SP23, Mazda 6), Ford Duratec 23EW iVCT (e.g. Ford Fusion CD338)
- Mazda MX-5 2006: Mazda LF (MZR family) in MX5 NC (2006-), Suzuki M16A VVT in Swift Sport (2012-)
- Mazda RX8 - Mazda Renesis 13B-MSP
- Mazda SkyActiv G - Mazda6 GJ 2012+, MX5 ND 2015+, Mazda3 BM 2014+, Mazda2 DJ 2014+
- Mercedes M120 - 6.0l V12 (S600 1992 - 2001)
- Mitsubishi 4B11 - Lancer Evolution X
- Mitsubishi 4G63T
- Mitsubishi 6A12 - 6A12, 6A13, 6G74, 6G75
- Mitsubishi Fuso 4P10 (also Agco Sisu Power 49G)
- Mitsubishi Fuso 6M60 - 2015 Fuso TKG-FK61F
- Multi Tooth Four Stroke
- Multi Tooth Two Stroke
- Nissan RB26 - Nissan RB26 and other six cylinder engines with 360 degree optical trigger on camshaft
- Nissan SR20 - Nissan SR20, CA18DET and other four cylinder engines with 360 degree optical trigger on camshaft
- Nissan One wide slot - Nissan RB30 and other engines with 360 degree optical trigger on camshaft
- Nissan VK50VE
- Nissan VK56DE - Nissan VK56DE engine and others
- Nissan VQ35 - Nissan VQ35HR engine, Nissan VR38DETT engine as used in the R35 GTR 2007
- Porsche 997: Porsche Direct Injected engine, 2009 Porsche GT2 with 3.6 Lt engine (Variocam PLUS)
- PSA EP6DTS - Mini Cooper S Turbo (2007-2010) and Peugeot 207 RC/GTI (2006-2010)
- Scania DC16
- Scania SGL12A

- Subaru EJ207AVCS - Subaru EJ205, EJ207, EJ255, EJ257 from MY01 to MY05
- Subaru EJ20G - Subaru GC8 WRX and STi (EJ20G, EJ20K, EJ207 etc.) from MY95 - MY00
- Subaru EZ30 - EZ30D with Dual AVCS
- Subaru FA20D - Subaru EJ205, EJ207 etc. with dual AVCS (MY06-), Subaru FA20D for BRZ and FT86 (2012-)
- Subaru FA20DIT - Subaru Forester 2014, WRX 2015
- Toyota 1FZ FE - Toyota Landcruiser
- Toyota 1UZ-FE
- Toyota 2GR-FE - Lotus Evora, 3GR-FE etc, V6 with dual VVT-i.
- Toyota 2JZ GE - Toyota 6 cylinder 2JZ-GE with VVT (example Lexus IS300)
- Toyota 2UR-GSE in Lexus RC-F 2015 MY (2014/09 -)
- Toyota 2ZZ - Toyota 2ZZ, 3GS and others with VVT.
- Volvo D11C - D11C truck engine (FM450 Platform)
- Yamaha FX SHO

EXAMPLE M130 PINOUT - GENERIC 8 CYLINDER

M130 Connector A — 34 way

Mating Connector: Tyco Superseal 34 Position Keying 1 – MoTeC #65044

Pin	Designation	Full Name	Example Use
A01	OUT_HB2	Half Bridge Output 2	
A02	SEN_5V0_A	Sensor 5.0V A	
A03	IGN_LS1	Low Side Ignition 1	Ignition Cylinder 1 and 4 Output
A04	IGN_LS2	Low Side Ignition 2	Ignition Cylinder 2 and 3 Output
A05	IGN_LS3	Low Side Ignition 3	Ignition Cylinder 5 and 7 Output
A06	IGN_LS4	Low Side Ignition 4	Ignition Cylinder 6 and 8 Output
A07	IGN_LS5	Low Side Ignition 5	Coolant Fan 1 Output
A08	IGN_LS6	Low Side Ignition 6	
A09	SEN_5V0_B	Sensor 5.0V B	
A10	BAT_NEG1	Battery Negative	
A11	BAT_NEG2	Battery Negative	
A12	IGN_LS7	Low Side Ignition 7	
A13	IGN_LS8	Low Side Ignition 8	
A14	AV1	Analogue Voltage Input 1	Throttle Servo Bank 1 Position Main
A15	AV2	Analogue Voltage Input 2	Inlet Manifold Pressure Sensor
A16	AV3	Analogue Voltage Input 3	Engine Oil Pressure Sensor
A17	AV4	Analogue Voltage Input 4	Engine Crankcase Pressure Sensor
A18	OUT_HB1	Half Bridge Output 1	
A19	INJ_PH1	Peak Hold Injector 1	
A20	INJ_PH2	Peak Hold Injector 2	
A21	INJ_PH3	Peak Hold Injector 3	
A22	INJ_PH4	Peak Hold Injector 4	
A23	INJ_LS1	Low Side Injector 1	Fuel Pump Output
A24	INJ_LS2	Low Side Injector 2	
A25	AV5	Analogue Voltage Input 5	
A26	BAT_POS	Battery Positive	ECU Battery Voltage
A27	INJ_PH5	Peak Hold Injector 5	
A28	INJ_PH6	Peak Hold Injector 6	
A29	INJ_PH7	Peak Hold Injector 7	
A30	INJ_PH8	Peak Hold Injector 8	
A31	OUT_HB3	Half Bridge Output 3	
A32	OUT_HB4	Half Bridge Output 4	Transmission Brake Output
A33	OUT_HB5	Half Bridge Output 5	Tachometer Output
A34	OUT_HB6	Half Bridge Output 6	Idle Actuator Solenoid Normal Output

M130 Connector B — 26 way

Mating Connector: Tyco Superseal 26 Position Keying 1 – MoTeC #65045

Pin	Designation	Full Name	Example Use
B01	UDIG1	Universal Digital Input 1	Engine Speed
B02	UDIG2	Universal Digital Input 2	Engine Synchronisation
B03	AT1	Analogue Temperature Input 1	Transmission Temperature Sensor
B04	AT2	Analogue Temperature Input 2	Coolant Temperature Sensor
B05	AT3	Analogue Temperature Input 3	Fuel Temperature Sensor
B06	AT4	Analogue Temperature Input 4	Inlet Air Temperature Sensor
B07	KNOCK1	Knock Input 1	Knock Sensor 1
B08	UDIG3	Universal Digital Input 3	Wheel Speed Rear Drive Sensor
B09	UDIG4	Universal Digital Input 4	Engine Run Switch
B10	UDIG5	Universal Digital Input 5	Driver Ignition Timing Main Switch
B11	UDIG6	Universal Digital Input 6	
B12	BAT_BAK	Battery Backup	
B13	KNOCK2	Knock Input 2	
B14	UDIG7	Universal Digital Input 7	Driver Transmission Brake Bump Switch
B15	SEN_0V_A	Sensor 0V A	
B16	SEN_0V_B	Sensor 0V B	
B17	CAN_HI	CAN Bus 1 High	LTC
B18	CAN_LO	CAN Bus 1 Low	LTC
B19	SEN_6V3	Sensor 6.3V	
B20	AV6	Analogue Voltage Input 6	
B21	AV7	Analogue Voltage Input 7	
B22	AV8	Analogue Voltage Input 8	
B23	ETH_TX+	Ethernet Transmit+	Ethernet Green/White
B24	ETH_TX-	Ethernet Transmit-	Ethernet Green
B25	ETH_RX+	Ethernet Receive+	Ethernet Orange/White
B26	ETH_RX-	Ethernet Receive-	Ethernet Orange