M1 GP LITE PACKAGE

The GP Lite Package is an entry level platform for the operation of port-injected engines. This single product can be configured over a range of complexities, from controlling a simple, naturally aspirated 4 cylinder engine to a twin turbo charged V8. Configurable engine synchronisation modes accommodate most modern engine triggering systems.

Included are numerous ancillary features, such as driver switches (engine map, boost limit etc.), launch control and single stage nitrous oxide injection. GP Lite also caters for many systems found on modified road vehicles, such as closed loop boost control and fuel control, and includes two definable auxiliary control outputs. The Package does not include drive by wire, variable cam control or knock control.

It seamlessly integrates with other MoTeC products like Display Loggers and Shift Light Modules.

▶ LICENCING

To load the Package onto the ECU, the **M1 GP Lite Licence** (part number 23456) is required.

▶ ECU VARIANTS

The Package is available on the following MoTeC M1 port injection ECU:

- M130

  An example pinout is provided.

⇒ Injector and wiring loadings must be calculated prior to the commencement of the project.

▶ VEHICLE COMPATIBILITY

This product does not include CAN messaging for OE vehicle integration. Therefore, it does not cater for OE vehicle systems such as power steering, ABS, starting systems and dashboards.

▶ FEATURES

- Operates port injected engines from 1 to 8 cylinders (M130 ECU).

- Configurable engine synchronisation modes for many common engine types. Refer to the Engine Speed Modes section for current details.

- GP Lite can sense camshaft position on variable cam engines for synchronisation, however it does not provide variable cam control.

- TDC setup wizard may be used to set the top dead centres on even-fire engines.

- Configurable ignition output pin for each cylinder allows for coil-on-plug or wasted spark and distributor ignition systems.

- Dual bank lambda control supported; requires optional LTC with Bosch LSU4.9 sensor or LTCN with NTK sensor.

- Physical settings for engine displacement, fuel density + molar mass, stoichiometric ratio and injector characteristics, allow for simplified engine start-up prior to tuning.

- Easy and fast engine tuning using engine volumetric efficiency map.

- Engine load modelling based on inlet manifold pressure and inlet manifold temperature.

- Sensor calibrations available for many common automotive sensors.

- Transient fuelling compensation using physical modelling of fuel film.

- Nitrous system with one activation stage with fuel and ignition compensations.

- Support of MoTeC devices: Shift Light Module, Displays/Loggers

- Test settings for most outputs, including injection and ignition outputs, for easier setup.

- Configurable turbocharger closed loop boost control (using a normal solenoid output).

- Support of coolant fan output.

- Air conditioner support with switched output control.

- Coolant temperature compensations for engine speed limit, ignition timing, fuel mixture, boost limit.

- Coolant pump output with PWM control.

- Coolant pump after-run functionality, optionally with additional pump output.

- Engine speed limiting with ignition cut and/or fuel cut with definable interaction.

- Fuel pump switched output.

- Engine Charge Temperature calculation, allows for correction of Inlet Air Temperature (compensation of heat soak effect etc.).

- Flame feature achieved by retarding ignition timing to allow enrichment and after-fire combustion of exhaust gas.

- Idle closed loop control system using ignition and/or idle solenoid.

- Idle bypass control with stepper motor supported.

- Assisted engine start with dedicated fuel volume and idle compensations during crank and post start.

- Configurable security for multiple users.

- Pre-defined ECU CAN transmit of the available common channels.

- Configurable switches to control Ignition Timing, Fuel Mixture Aim, Boost Limit, Flame Functionality and Nitrous Injection.

- Analogue tachometer output with configurable output pin and scaling.

- Use of a Throttle Position sensor for a cable throttle.

- Vehicle speed measurement using tail shaft and wheel speed sensors.

- Configurable warning system with light and CAN output.

- Hardcoded pin inputs for reduced set up complexity:
  - AV1: Throttle Position Sensor
  - AV2: Manifold Air Pressure Sensor
  - AV4: Fuel Pressure Sensor
  - AV5: Oil Pressure Sensor
  - AT1: Inlet Air Temperature Sensor
  - AT2: Coolant Temperature Sensor
  - Udig1: Reference signal (from crankshaft position)
  - Udig2: Synchronisation signal (eg from camshaft position)

- 2 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 vehicle speed
  - Auxiliary Output 1 includes tables for Ignition Timing Compensation and Fuel Volume Trim

- Optional channels for additional sensors via input pin including:
  - Ambient Pressure
  - Brake Switch
  - Engine Oil Temperature
  - Exhaust Lambda via LTC, LTCN, or PLM for Bank 1 and/or 2
  - Driver interaction switches
  - Exhaust Temperature (EGT) via TCA Thermocouple Amplifier
  - Wheel Speed sensors front/rear left/right.

▶ ENGINE SPEED MODES

As of M1 System 1.4.00.0058

- Aston Martin AJ37

- BMW M54

- 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

- Bosch 140 40 36M1

- Bosch 140 40 Alternate

- Bosch 60 120 180

- Camshaft One Missing Four Stroke

- Camshaft Two Missing Four Stroke

- Chrysler Pentastar

- 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)

- Corvette C4 ZR1 - GM LT5 (1990 - 1995)
- Crankshaft 12P15 Two Stroke
- 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
- Denso 270 90 Magnetic
- Dodge Viper
- Dodge Viper MY2008
- Fiat TwinAir
- Ford Cosworth YB
- Ford Coyote
- Ford Duratec Synchronisation - Duratec, EcoBoost, BA cams
- Ford Sigma TiVCT
- Ford Windsor - with 'PIP' sensor in the distributor
- General Motors LS1 - (Gen 3 V8)
- General Motors LS7
- Gibson ZA348
- Honda Bike Synchronisation
- Honda CBR250RR
- Honda F20C (Honda S2000)
- Honda J35A
- Honda K20
- Honda K24Z7
- Kia G4TH
- Lamborghini V10 - Experimental mode for 5.0L port injected Gallardo 2003 - 2007
- Lamborghini LP520
- Mazda L3 - Mazda L3 VVTi (example Mazda 3 SPorts SP23, Mazda 6), Ford Duratec 23EW iVCT (e.g. Ford Fusion CD338)
- Mazda MX5 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)
- Mercruiser 1075
- Mitsubishi 4B11 - Lancer Evolution X
- Mitsubishi 4G63T
- Mitsubishi 6A12 - 6A12, 6A13, 6G74, 6G75
- 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
- Rover K Series
- 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
- Suzuki K6A
- 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 2ZZ - Toyota 2ZZ, 3GS and others with VVT.
- Volvo B4204T9
- Volvo B5244S
- Yamaha FX SHO

▶ EXAMPLE M130 PINOUT

M130 Connector A — 34 way

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

⇨ Items in **bold** are hard-coded

Pin	Designation	Full Name	OE Pin	Function	Example Use
A01	OUT_HB2	Half Bridge Output 2			Idle Actuator Stepper Phase A
A02	SEN_5V0_A	Sensor 5.0V A			
A03	IGN_LS1	Low Side Ignition 1			Ignition Cylinder 1 Output
A04	IGN_LS2	Low Side Ignition 2			Ignition Cylinder 2 Output
A05	IGN_LS3	Low Side Ignition 3			Ignition Cylinder 3 Output
A06	IGN_LS4	Low Side Ignition 4			Ignition Cylinder 4 Output
A07	IGN_LS5	Low Side Ignition 5			Ignition Cylinder 5 Output
A08	IGN_LS6	Low Side Ignition 6			Ignition Cylinder 6 Output
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			Nitrous Stage 1 Output
A13	IGN_LS8	Low Side Ignition 8			
A14	AV1	Analogue Voltage Input 1			**Throttle Position Sensor**
A15	AV2	Analogue Voltage Input 2			**Inlet Manifold Pressure Sensor**
A16	AV3	Analogue Voltage Input 3			Engine Oil Temperature Sensor
A17	AV4	Analogue Voltage Input 4			**Fuel Pressure Sensor**
A18	OUT_HB1	Half Bridge Output 1			Idle Actuator Stepper Phase A
A19	INJ_PH1	Peak Hold Injector 1			Fuel Cylinder 1 Output
A20	INJ_PH2	Peak Hold Injector 2			Fuel Cylinder 2 Output
A21	INJ_PH3	Peak Hold Injector 3			Fuel Cylinder 3 Output
A22	INJ_PH4	Peak Hold Injector 4			Fuel Cylinder 4 Output
A23	INJ_LS1	Low Side Injector 1			Boost Actuator Normal
A24	INJ_LS2	Low Side Injector 2			Fuel Pump Output
A25	AV5	Analogue Voltage Input 5			**Engine Oil Pressure Sensor**
A26	BAT_POS	Battery Positive			ECU Battery Voltage
A27	INJ_PH5	Peak Hold Injector 5			Fuel Cylinder 5 Output
A28	INJ_PH6	Peak Hold Injector 6			Fuel Cylinder 6 Output
A29	INJ_PH7	Peak Hold Injector 7			
A30	INJ_PH8	Peak Hold Injector 8			
A31	OUT_HB3	Half Bridge Output 3			Idle Actuator Stepper Phase B
A32	OUT_HB4	Half Bridge Output 4			Idle Actuator Stepper Phase B
A33	OUT_HB5	Half Bridge Output 5			
A34	OUT_HB6	Half Bridge Output 6			Air Conditioner Clutch

M130 Connector B — 26 way

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

⇨   Items in **bold** are hard-coded

Pin	Designation	Full Name	OE Pin	Function	Example Use
B01	UDIG1	Universal Digital Input 1			**Engine Speed Reference**
B02	UDIG2	Universal Digital Input 2			**Engine Synchronisation**
B03	AT1	Analogue Temperature Input 1		1k Pull up to SEN_5V_A	**Inlet Air Temperature Sensor**
B04	AT2	Analogue Temperature Input 2		1k Pull up to SEN_5V_B	**Coolant Temperature Sensor**
B05	AT3	Analogue Temperature Input 3		1k Pull up to SEN_5V_A	Air Conditioner Request
B06	AT4	Analogue Temperature Input 4		1k Pull up to SEN_5V_B	Engine Map Switch
B07	KNOCK1	Knock Input 1**			Engine Run Switch
B08	UDIG3	Universal Digital Input 3			Wheel Speed
B09	UDIG4	Universal Digital Input 4			Tail Shaft
B10	UDIG5	Universal Digital Input 5			Wheel Speed Tail Shaft
B11	UDIG6	Universal Digital Input 6			
B12	BAT_BAK	Battery Backup			
B13	KNOCK2	Knock Input 2**			Nitrous Enable Switch
B14	UDIG7	Universal Digital Input 7			
B15	SEN_0V_A	Sensor 0V A			
B16	SEN_0V_B	Sensor 0V B			
B17	CAN_HI	CAN Bus 1 High			
B18	CAN_LO	CAN Bus 1 Low			
B19	SEN_6V3	Sensor 6.3V			
B20	AV6	Analogue Voltage Input 6			Exhaust Temperature Sensor Bank 1
B21	AV7	Analogue Voltage Input 7			Boost Limit Switch
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		

⇨   ** Knock is not supported by this product, these pin names reflect the hardware resource assignment in Tune