

MoTeC

M142 LAMBORGHINI HURACAN 2014 KIT



This kit is a complete replacement for the two factory ECUs, utilising existing wiring, sensors and mounting hardware to deliver plug-in convenience with fully programmable control. The M1 ECUs are supplied with firmware preloaded, providing all the functionality of MoTeC's GPR-DI Package, plus Engine Torque Control and additional features unique to the Lamborghini Huracan 2014.

The kit comprises a Master ECU, in which all tuning adjustments are made, and a Slave ECU that mimics settings from the Master. After initial (pre-configured) setup, only the Master ECU requires connection to M1 Tune for adjustments.

Along with fuel, ignition and camshaft control, this kit also supports other OE ECU features, including:

- **Push button start**
- **7-Speed DSG transmission integration**
- **Optional boost control via wastegate solenoids or servos**
- **Air conditioner control**
- **High and low speed fan control**
- **Adjustable driving modes (Strada, Sport, Corsa) - map switching from steering wheel**
- **Fuel canister purge valve control**
- **Engine speed matching (throttle blip) on downshifts**
- **Fuel Lift Pump and Coolant Pump control**
- **Reverse lockout**
- **Cruise control**
- **Integrated electronics for OE Lambda Sensors**
- **All OE dash functionality including warnings**

The supplied start files contain all the calibrations and settings for the sensors, direct fuel injectors, port fuel injectors, ignition coils, knock control, throttle servos and camshafts. They have also been calibrated to match the OE factory fuelling, ignition and camshaft

phasing. This saves a significant amount of time by shortcutting the setup process. Users can begin tuning to their desired power level right away with the assurance of a safe base tune that is equivalent to the original vehicle.

Included are many ancillary features commonly found on race cars, such as anti-lag, driver switches (e.g. pit switch, launch enable, boost trim), gearbox control, knock control, intercooler sprays, launch control, coolant pumps and traction control.

The product fully integrates with other MoTeC devices, providing pre-defined CAN messaging for all current Displays/Loggers, LTCs, E888, Video Capture Systems, GPS, ADR, BR2, PDMs and SLMs.

► KIT CONTENTS (11407)

Hardware

- **13142** – M142 ECU x 2:
Two M142 ECUs preloaded with the Lamborghini Huracan 2014 Master and Slave M1 Packages. (Two MoTeC M1 Licences are required to run these Packages.)
- **61432** – M142 LAMBORGH HURACAN 2014 ADAPTOR KIT :
 - 61404 M1 ADAPTOR 250MM 26W KEY 1 STUB LOOM x2
 - 61405 M1 ADAPTOR 250MM 26W KEY 3 STUB LOOM x2
 - 61406 M1 ADAPTOR 250MM 34W KEY 1 STUB LOOM x2
 - 61407 M1 ADAPTOR 250MM 34W KEY 2 STUB LOOM x2
 - 61433 M142 LAMBO HURACAN 2014 BREAKOUT LOOM
 - 61434 M142 LAMB HURACN 2014 ADPT MASTER BOX
 - 61436 M142 LAMBO HURACAN 2014 ADAPT SLAVE BOX

Licences

- **23390** – M1 LIC - LAMBORGHINI HURACAN 2014 MASTER
- **23391** – M1 LIC - LAMBORGHINI HURACAN 2014 SLAVE

These Licences are required to run the Lamborghini Huracan 2014 Master and Slave M1 Packages in the M142 ECUs.

▶ FEATURES

- Pre-configured calibrations for Original Equipment sensors.
- Pre-configured reference mode for engine synchronisation.
- Pre-configured physical settings for engine displacement, fuel density, stoichiometric ratio, fuel pressure and injector characterisation, which allow for simplified engine start-up prior to tuning.
- Engine load modelling based on inlet manifold pressure and inlet air temperature, with a pre-configured engine efficiency map that allows for quick and easy engine tuning.
- Pre-configured control of Direct Injectors and high pressure pumps.
- Pre-configured secondary (port injector) fuel control with a tuneable balance table. **Note:** Only saturated (high-ohm) secondary injectors are supported in this hardware. Peak-hold (low-ohm) secondary injectors are not supported.
- Optional alternative fuel operation for Flex Fuel using ethanol composition sensor, or Secondary Fuel operation on secondary injectors.
- Closed Loop Lambda control supported using integrated electronics; additional LTC devices are not required. OE lambda sensors can be used and do not need to be replaced.
- Pre-configured coolant temp compensations for engine speed limit, ignition timing, fuel volume, fuel mixture, boost limit.
- Pre-configured transient fuelling compensation using physical modelling of fuel film.
- Engine Load Average channel with tables for engine speed limit, ignition timing trim, fuel mixture aim, boost limit and throttle limit.
- Pre-configured ignition output and coil settings.
- Pre-configured Advanced Knock system:
 - Knock is detected by DSP
 - Knock Levels are added to the Knock Count channels (counting the percentage over the knock threshold).
 - Knock Count decays non linearly.
 - Knock Ignition Retard and Fuel Trim are based on the count:
 - Non linear retard
 - Some count can accumulate before any retard/trim is applied
 - Retard trim is a percentage of the Knock Ignition Timing Limit. The limit can change based on engine operating point.
 - Knock count can be masked under various conditions so false knock or first knock can be ignored.
- Pre-configured camshaft control of inlet and exhaust cams.
- Pre-configured engine start fuel volumes.
- Pre-configured Idle Closed Loop control system using ignition and Drive by Wire actuation.
- Optionally configurable boost control via either single or dual wastegate solenoids or servo motors.
- Optionally configurable turbocharger bypass control.
- Intercooler temperature and spray control.
- Configurable Anti-Lag for turbos with ignition timing limit, fuel volume trim, ignition cut, engine speed limit, boost aim and throttle aim tables.
- Supports nitrous system with two activation stages and additional fuel pumps, bottle heater control and pressure sensor.
- Configurable Launch Control with tables for engine speed, torque limit, boost aim and fuel volume trim.
- Traction Control. The Traction system aids power delivery for two- or four-wheel drive by means of engine speed limiting. Compensation for Vehicle Acceleration Lateral may be applied. In four wheel drive vehicles, if all four wheels slip by the same amount the wheel slip cannot be detected so more wheel slip than desired can occur. In two wheel drive vehicles, if the non driven wheels are not touching the road surface, (wheel lift in a RWD drag car) the wheel slip cannot be detected and may cause early torque reduction. When accelerating from a standing start, in both of these cases the Race Time Vehicle Speed can be used to give a time based estimation of Vehicle Speed that can be used in Traction. Traction Warning allows a warning light (CEL) to activate or flash when Traction Control is actively reducing torque.
- Traction Model. The Traction Model is designed to limit the engine torque by throttle control such that wheel torque is limited to the available grip level. By reducing torque with the throttle, if wheel slip still occurs, the amount of ignition cut and/or retard needed to control it is reduced, sometimes significantly. This improves the overall effectiveness of the entire traction system.
- Clutch Slip Control provides a method to reduce engine torque if excessive slip is detected. This is primarily to prevent damage caused by excessive heat if the clutch slips at high engine load. Torque is reduced by ignition timing and/or throttle control and can be configured as a large reduction to maximise clutch life, or a controlled reduction to gain peak performance from the clutch.
- Pre-configured OE coolant fan outputs.
- Coolant pump output with PWM control.
- Coolant pump after-run functionality, optionally with additional pump output.
- Pre-configured air conditioner control.
- Pre-configured closed loop fuel pressure control for lift subsystem.
- Pre-configured Gearbox shift request.
- Gearbox shift support with ignition cut, fuel cut, throttle blip and engine speed matching in forward gears.

- Transmission pump output with transmission temperature threshold and hysteresis control.
- Differential pump output with differential temperature threshold and hysteresis control.
- Pre-configured Drive by Wire throttle servo control.
- Pre-configured Throttle Pedal sensor with translation table for each Drive Mode (Strada, Sport, Corsa).
- 8 configurable driver switches and 8 rotary switches, each with 10 positions that can be simultaneously mapped to launch control, pit switch, anti-lag, traction, race time reset, engine speed limit maximum, throttle pedal translation, fuel volume trim, ignition timing, fuel mixture aim, boost limit, torque limit, traction aim and traction control range.
- Vehicle speed limiting (pit speed control).
- Configurable pulsed tachometer output with configurable output pin and scaling.
- Pre-configured vehicle speed measurement using wheel speed sensors.
- Pre-configured warning system that activates engine check light on OE dash (MIL).
- Test settings for most outputs, including injection and ignition outputs, for easier setup.
- Lap distance, time and number via GPS, BR2 or switched input, with split and sector options.
- Race time system with tables for ignition timing trim, fuel mixture aim, boost limit and throttle limit.
- Engine run time total for engine hour logging.
- GPS acquisition and logging via CAN or RS232.
- GLONASS messaging support on GPS devices.
- Support of MoTeC devices: ADR, E8XX, PDM, SLM, VCS.
- ECU CAN Receive from other MoTeC devices.
- ECU CAN Transmit of the most common channels using standard MoTeC CAN templates.
- Configurable security for multiple users with differing access options.
- Channels for sensors via input pin and/or CAN message, including:
 - Airbox Mass Flow*, Temperature and Pressure
 - Air Conditioner Refrigerant Pressure
 - Ambient Pressure and Temperature
 - Boost Pressure and Servo Position
 - Brake Pressure Front and Rear
 - Brake Switch and Vacuum Pressure
 - Coolant Pressure and Temperature*
 - Engine Oil Pressure and Temperature

- Engine Crankcase Pressure
- Exhaust Pressure
- Exhaust Temp (EGT) via TCA Thermocouple Amplifier, Generic CAN, or E888 for Collector and Cylinders 1 to 10.
- Exhaust Lambda via LTC, LTCN, or PLM for Collector and Cylinders 1 to 10.
- Fuel Flow Supply and Return
- Fuel Pressure and Temperature
- Fuel Composition
- Fuel Tank Level
- Gear Position, Lever Force and Input Shaft Speed
- Inlet Air Temperature and Manifold Pressure*
- Intercooler Temperature
- Steering Angle and Pressure
- Throttle Pedal* and Position*
- Transmission Temperature and Pressure
- Turbocharger Speed, Inlet* and Outlet Temperature
- G-Force (acceleration) - Longitudinal, Lateral, Vertical
- Wastegate Pressure and Position
- Wheel Speed*
- Engine Oil Level*

* These sensors have been pre-configured with a calibration and settings to match the OE sensor.

► VEHICLE COMPATIBILITY

This product includes CAN messaging for full OE vehicle integration. The Package caters for OE vehicle systems such as power steering, ABS, starting systems and dashboards.

The following table shows compatible vehicles.

Vehicle	Engine Designation	Year	Vehicle Platform	Comment
Lamborghini Huracan	DGFA	2014-2018	LP610-4	7 Speed DSG Transmission
Lamborghini Huracan Performante	DGFA	2017-2018	LP640-4	7 Speed DSG Transmission
Audi R8 (second generation)	DGFA	2016	Type 4S	7 Speed DSG Transmission

NOTE: This product is not suitable for unlisted Audi R8 variants (e.g. first generation 2008-2015 models). Initial release does not include 2 wheel drive variants (LP580-2, Audi R8 RWS).

▶ OPERATION

Description of Dual M142 Operation

This kit uses two M142 ECUs mounted on Adaptor Boxes that connect directly to the OE harness plugs, in place of the two OE ECUs. Each ECU effectively controls one 5-cylinder bank of the V10 engine and has three forms of wiring:

- Common wiring for power supply, CAN bus communication, Engine Speed (Crank) signal.
- Duplicated wiring for engine bank components such as injectors, ignition coils, camshaft control, camshaft positions, sensors and fuel pressure systems.
- Individual devices wired to only one of the ECUs, such as throttle pedal, brake switches, power relays, fan control, air filter bypass, fuel tank pressure, starter solenoid, oil pressure switches. In some cases, data (such as throttle pedal) acquired from an individual device on one ECU is sent to the other ECU via a dedicated inter-ECU CAN bus.

One of the two original ECUs has more individual devices wired than the other, so in this kit, one M142 is designated the Master ECU and Adaptor Box and the ECU with fewer individual devices is designated the Slave ECU and Adaptor Box. For normal tuning work it is necessary to connect M1 Tune to the Master ECU alone, as the inter-ECU CAN bus is used to transfer map and tuning settings from the Master to the Slave ECU while tuning work is undertaken.

It is only necessary to connect M1 Tune to the Slave ECU to initially load the provided Slave Package which contains tuning settings that do not require adjustment, such as injector calibration and high pressure fuel pump settings.

In addition to the originally fitted wiring for each ECU, the kit is supplied with a Breakout Loom which joins the two Adaptor Boxes and adds optional input or output features such as boost pressure and boost control. The Breakout Loom also passes control signals from one ECU to the other to provide extra output capacity to the Master ECU (which has more individual devices than the Slave ECU). These wires are designated SHARE lines in the Breakout connectors and loom.

This kit makes use of the OE-fitted lambda sensors in each bank by means of LTC devices built into each Adaptor Box. No external LTC devices are required. As supplied, the LTC in the Master Adaptor Box should be configured on CAN ID 0x640 and the LTC in the Slave Adaptor Box should be configured on CAN ID 0x641.

For detailed information on Master and Slave ECU wiring differences, refer to the Pinout section of this document.

CAN Networking

Each M142 has 3 CAN buses, configured via the Adaptor Box as follows:

- CAN Bus 1 operates at 1 MBit/sec. This bus connects to Breakout 32 and 33 and is available for use with MoTeC devices such as Colour Displays, PDMs etc. M1 ECU messaging on this bus includes M1 General 0x640 CAN messages.
- CAN Bus 2 operates at 500 kBit/sec. This bus connects to 91/79 and 91/80 on each ECU harness connector and Breakout 27 and 28, and is designated as the Powertrain CAN bus.

This bus connects the ECUs, Airbag, Transmission Mechatronics, auto gearbox ECU and CAN Gateway devices on the vehicle. The vehicle CAN Gateway transports messages between this bus and other vehicle buses which connect OBD, Headlights, Dash, TPMS, Steering Column, Power Steering, ABS, Damper, Doors and other devices.

M1 ECU messaging on this bus mimics that of the OE ECUs to provide full integration of engine and vehicle functions with the M1 Kit.

- CAN Bus 3 operates at 1 MBit/sec. This bus connects to 91/77 and 91/60 on each ECU harness connector and is designated as the Inter-ECU CAN Bus. It also connects the internal LTC devices.

M1 ECU messaging on this bus does not interact with the vehicle and is used for information exchange between the two ECUs.

It is strongly recommended that all CAN settings in the Master and Slave Packages remain unchanged as vehicle operation may be compromised.

Fuel and Torque Model Features

This product offers a fuel control model very similar to the MoTeC Nissan GT-R adaptor kit.

Torque modelling is used in conjunction with the gearbox to provide optimum performance. Numerous conditions arise where engine torque must be limited in order to perform ideal gear shifts. This is achieved through a combination of ignition retard and fuel cut in a manner similar to the OE control system.

Additional or Optional Sensors

Normal operation of an unmodified Huracan with this Kit requires these additional sensors to be mounted and connected to the Master and Slave breakouts:

- Inlet Manifold Pressure Sensor for Bank 1 and Bank 2
- Inlet Air Temperature Sensor for Bank 1 and Bank 2

This may be achieved by mounting a spacer plate between each throttle body and inlet manifold that has sensor fittings for Bosch integrated TMAP sensors or pressure ports for external pressure sensors. The preferred Bosch TMAP sensor is MoTeC part number

53010, which operates from 20 to 300 kPa and -20 to 130 Degrees C.

If a TMAP sensor is not used, suitable Air Temperature sensors with MoTeC calibration include:

- Bosch 0 280 130 039 - JGM 280 039
- Bosch 0 280 130 060 - JGM 280 060
- Delphi 1261 4717 - MoTeC 54012
- Delphi 2503 7225 - MoTeC 54001
- KA NPT2
- KA NTC2
- KA NTC2F

Operation of a boosted Huracan requires these additional sensors to be mounted and connected to the Master and Slave breakouts:

- Boost Pressure Sensor for Bank 1 and Bank 2

The preferred Bosch TMAP sensor is MoTeC part number 53010, which operates from 20 to 300 kPa and -20 to 130 Degrees C. For higher boost levels TI (Honeywell) sensors are suggested.

Reference Mode

The M1 Reference Mode in this Package is locked to this engine variant.

Gearbox Features

Operation of this system mimics that of the OE vehicle. In addition, it is possible to redefine shift points to achieve different behaviour of the 7-speed DSG gearbox. This feature also requires the vehicle to be in Corsa driving mode so that the Up and Down paddles are the only shift request sources. For this function to operate the following is required:

- Two wires must be added from the Slave breakout connector to the Transmission Control Module 2 which is located immediately forward of the Slave ECU on the left side of the engine bay.
- Slave Breakout pin 14 is spliced to the violet/black wire in pin 40/108 of J1006 Transmission Control Module 2.
- Slave Breakout pin 15 is spliced to the blue/white wire in pin 81/79 of J1006 Transmission Control Module 2.
- **Gear Request Up Output Resource** on the Slave M142 is configured to **Ignition Low Side 7**.
- **Gear Request Down Output Resource** on the Slave M142 is configured to **Ignition Low Side 8**.
- **Gear Automatic Mode** in the Master M142 is configured to **Enabled**.
- **Gear Shift Up Engine Speed** and **Gear Shift Down Engine Speed** tables must be populated.
- **Gear Automatic Engine Speed Maximum** must be populated.

Further detail on this feature can be found in the Package help in the Gear group.

Power ECU

The M1 ECU will be powered whenever the vehicle is active, e.g. when the door is open. With the key inside the vehicle, turn the ignition on by pushing the engine start button twice. To turn off, simply push the engine start button once. The ECU power will remain on if the ignition is turned off while the M1 ECU is connected to M1 Tune.

Ignition sense is via Driver Switch 1 which is linked to Engine Run Switch.

Resetting the M1 while the ignition is on will interrupt the CAN communications on the vehicle CAN bus causing other CAN modules to display errors on the dash. To avoid this, turn the ignition off before resetting the M1 ECU.

Engine Start

The OE engine start procedure is maintained in this Package. To start the engine, the key must be inside the vehicle. With the engine off, depress the brake and push the engine start button.

Cruise Control

Initial release of this product does not include Cruise Control.

Adjustable Driving Modes

The Driving Mode can be changed between Strada, Sport and Corsa by operating the Drive Mode Switch.

The Driving Mode can also be used as a customisable driver switch within the Package - this driver switch can be mapped to launch control, pit switch, anti-lag, traction, race time reset, engine speed limit maximum, throttle pedal translation, fuel volume trim, ignition timing, fuel mixture aim, boost limit, traction aim, and traction control range.

Dash Lights

The functionalities of the Engine Check Light (All Warnings) are activated with the associated M1 warning system.

Boost Control (optional)

Boost control is included in this product to accommodate the likely addition of turbochargers to the engine.

As each engine bank operates as a separately controlled subsystem, it is assumed that turbochargers will be added to each bank separately, as is the case with other features such as Inlet Manifold Pressure, Fuel Pressure Direct, and Throttle Servos.

Provision has been made for a Boost solenoid and Boost Pressure Sensor to be connected to each of the Breakout plugs on the two M142 ECUs.

If boost control is facilitated by means of servo actuators rather than solenoids, [contact MoTeC](#) for additional information on connecting and configuring these devices.

Radiator Control

Each radiator is independently speed controlled by a PWM signal by means of the **Coolant Fan 1 / 2 Duty Cycle Coolant Temperature** table in the M1 Package.

Fuel Pump Control

Low pressure fuel is delivered to both the port injectors and the High pressure fuel pumps using closed loop control. This system is found as **Fuel Pressure Control** in the M1 Package.

Coolant Pump Control

Coolant circulation is controlled with respect to Coolant Temperature or Engine Load Average by means of the **Coolant Pump Duty Cycle** table in the M1 Package.

Air Filter Bypass Control

Operation of this system mimics that of the OE vehicle. This system is found as **Intake Air Filter Bypass Control** in the M1 Package.

Purge Canister Control

Operation of this system mimics that of the OE vehicle, with the exception that both purge solenoids are wired together and thus operate simultaneously. This system is found as **Fuel Purge** in the M1 Package.

Brake Vacuum Pump Control

Operation of this system mimics that of the OE vehicle. This system is found as **Brake Vacuum Pump Control** in the M1 Package.

Exhaust Flap Control

Operation of this system mimics that of the OE vehicle. This system is found as **Exhaust Flap Control** in the M1 Package.

Electrohydraulic Engine Mount Control

Operation of this system mimics that of the OE vehicle. This system is found as **Engine Mount Control** in the M1 Package.

Piston Cooling Nozzle Control

Operation of this system mimics that of the OE vehicle. This system is found as **Piston Cooling Nozzle Flap Control** in the M1 Package.

▶ PINOUT

M142 Connector A - 34 Way

Mating Connector: Tyco Superseal 34 Position Keying 2 (MoTeC #65067)

Pin	Designation	Full Name	Master Pin*	Slave Pin*	Function Master / Slave
A01	AT5	Analogue Temperature Input 5	105-39		Oil Pressure Switch / not used
A02	AT6	Analogue Temperature Input 6	Breakout 19	Breakout 19	Inlet Manifold Temperature (optional)
A03	AV15	Analogue Voltage Input 15			
A04	AV16	Analogue Voltage Input 16			
A05	AV17	Analogue Voltage Input 17	91-21		Fuel Tank Pressure Sensor / not used
A06	INJ_D1A_NEG	Direct Injector 1A -	105-24	105-24	Injector 1 / Injector 6 Low
A07	INJ_D1A_POS	Direct Injector 1A +	105-44	105-44	Injector 1 / Injector 6 High
A08	INJ_D1B_POS	Direct Injector 1B +	Do not connect	Do not connect	Injector operation compromised if connected
A09	INJ_D1B_NEG	Direct Injector 1B -	Do not connect	Do not connect	Injector operation compromised if connected
A10	SEN_5V0_C1	Sensor 5.0V C			
A11	LA_NB1	Lambda Narrow Input 1			
A12	LA_NB2	Lambda Narrow Input 2			
A13	KNOCK3	Knock Input 3	105-101	105-101	Knock Sensor 2 / Knock Sensor 4 pin 1
A14	KNOCK4	Knock Input 4	105-80	105-80	Knock Sensor 2 / Knock Sensor 4 pin 2
A15	DIG2	Digital Input 2	91-15	91-15	Airbox Mass Flow Sensor
A16	DIG3	Digital Input 3	Breakout 23	Breakout 23	Spare DIG3 Input
A17	DIG4	Digital Input 4	Breakout 24	Breakout 24	Spare DIG4 Input
A18	SEN_5V0_C2	Sensor 5.0V C			
A19	SEN_5V0_B2	Sensor 5.0V B	91-66		Throttle Pedal Tracking 5V / not used
A20	LIN	LIN Bus			
A21	RS232_RX	RS232 Receive	Breakout 16		GPS Receive (optional)
A22	RS232_TX	RS232 Transmit			
A23	DIG1	Digital Input 1	105-16	105-16	Exhaust Temperature Bank1 / Bank 2
A24	BAT_NEG3	Battery Negative	91-01, 91-02, 91-04	91-01, 91-02, 91-04	Chassis Ground
A25	BAT_NEG4	Battery Negative	91-01, 91-02, 91-04	91-01, 91-02, 91-04	Chassis Ground
A26	SEN_0V_C1	Sensor 0V C			
A27	SEN_0V_C2	Sensor 0V C			
A28	CAN3_HI	CAN Bus 3 High	91-60	91-60	ECU SHARE CAN High, Internal LTC
A29	CAN3_LO	CAN Bus 3 Low	91-77	91-77	ECU SHARE CAN Low, Internal LTC
A30	CAN2_HI	CAN Bus 2 High	91-79, Breakout 28	91-80, Breakout 28	CAN Powertrain High
A31	CAN2_LO	CAN Bus 2 Low	91-79, Breakout 27	91-80, Breakout 27	CAN Powertrain Low
A32	BAT_NEG5	Battery Negative	91-01, 91-02, 91-04	91-01, 91-02, 91-04	Chassis Ground
A33	SEN_0V_B2	Sensor 0V B	91-45, 91-46, 91-64, 91-69	91-46, 91-69	0V Fuel Tank Pressure, Lift Pressure, Air Temp, Pedal Tracking, Oil Temp, Airbox Mass Flow / 0V Lift Pressure, Air Temp, Airbox Mass Flow
A34	SEN_0V_A2	Sensor 0V A	91-81		0V Pedal Main

*Master and Slave pin numbers, listed above, refer to the two ECUs which have slightly different pin usage. Where only a single function is shown, both ECUs have the same operation.

M142 Connector B - 26 Way

Mating Connector: Tyco Superseal 26 Position Keying 3 (MoTeC #65068)

Pin	Designation	Full Name	Master Pin*	Slave Pin*	Function Master / Slave
B01	OUT_HB9	Half Bridge Output 9	91-91	105-50	Fuel Pump Control / Piston Cooling Spray Control
B02	OUT_HB10	Half Bridge Output 10	105-8	91-73	Coolant Pump Control / Exhaust Flap Control
B03	UDIG8	Universal Digital Input 8	91-48		Crank Request / not used
B04	UDIG9	Universal Digital Input 9	91-51		Starter Solenoid Feedback / not used
B05	UDIG10	Universal Digital Input 10	91-50	91-50	Ignition Switch Sense
B06	UDIG11	Universal Digital Input 11	91-30		Brake Switch 2 / not used
B07	UDIG12	Universal Digital Input 12	91-29		Brake Switch 1 / not used
B08	INJ_LS5	Low Side Injector 5	105-32	105-32	Port Injector 5 / Port Injector 10
B09	INJ_LS3	Low Side Injector 3	105-6	105-6	Port Injector 3 / Port Injector 8
B10	AV9	Analogue Voltage Input 9	Breakout 11	Breakout 11	Inlet Manifold Pressure Sensor
B11	AV10	Analogue Voltage Input 10	Breakout 12	Breakout 12	Boost Pressure Sensor (optional)
B12	AV11	Analogue Voltage Input 11			
B13	BAT_POS	Battery Positive	91-3, 91-5, 91-6	91-3, 91-5, 91-6	Switched Power Source
B14	INJ_LS6	Low Side Injector 6			
B15	INJ_LS4	Low Side Injector 4	105-11	105-11	Port Injector 4 / Port Injector 9
B16	AV12	Analogue Voltage Input 12			
B17	AV13	Analogue Voltage Input 13			
B18	AV14	Analogue Voltage Input 14			
B19	BAT_POS	Battery Positive	91-3, 91-5, 91-6	91-3, 91-5, 91-6	Switched Power Source
B20	OUT_HB7	Half Bridge Output 7	91-36		Radiator Fan Control Unit 2 / not used
B21	OUT_HB8	Half Bridge Output 8	91-35, 91-87		Engine Component Relay, Main Relay / not used
B22	INJ_D2A_NEG	Direct Injector 2A -	105-2	105-2	Injector 2 / Injector 7 Low
B23	INJ_D2A_POS	Direct Injector 2A +	105-65	105-65	Injector 2 / Injector 7 High
B24	INJ_D2B_POS	Direct Injector 2B +	Do not connect	Do not connect	Injector operation compromised if connected
B25	INJ_D2B_NEG	Direct Injector 2B -	Do not connect	Do not connect	Injector operation compromised if connected
B26	SEN_5V0_A	Sensor 5.0V A	91-83		5V Throttle Pedal Main

*Master and Slave pin numbers, listed above, refer to the two ECUs which have slightly different pin usage. Where only a single function is shown, both ECUs have the same operation.

M142 Connector C - 34 Way

Mating Connector C: Tyco Superseal 34 Position Keying 1 (MoTeC #65044)

Pin	Designation	Full Name	Master Pin*	Slave Pin*	Function Master / Slave
C01	OUT_HB2	Half Bridge Output 2	105-66	105-66	Throttle Servo Motor +
C02	SEN_5V0_A	Sensor 5.0V A	105-20, 105-41	105-20, 105-21	5V Cam 1,3, Fuel Pressure Direct, Secondary Air Pressure / Cam 2,4, Crank, Secondary Air Pressure
C03	IGN_LS1	Low Side Ignition 1	105-93	105-93	Ignition 1 / Ignition 6
C04	IGN_LS2	Low Side Ignition 2	105-94	105-94	Ignition 2 / Ignition 8
C05	IGN_LS3	Low Side Ignition 3	105-73	105-73	Ignition 3 / Ignition 7
C06	IGN_LS4	Low Side Ignition 4	105-91	105-91	Ignition 4 / Ignition 9
C07	IGN_LS5	Low Side Ignition 5	105-72	105-72	Ignition 5 / Ignition 10
C08	IGN_LS6	Low Side Ignition 6	105-86	105-86	Fuel Pressure Direct Bank 1 Pump A / Bank 2 Pump A
C09	SEN_5V0_B	Sensor 5.0V B	105-42	105-42	5V Throttle Servo Position
C10	BAT_NEG1	Battery Negative	91-01, 91-02, 91-04	91-01, 91-02, 91-04	Chassis Ground
C11	BAT_NEG2	Battery Negative	91-01, 91-02, 91-04	91-01, 91-02, 91-04	Chassis Ground
C12	IGN_LS7	Low Side Ignition 7	91-52, 91-70		Starter Relay 1, Starter Relay 2 / not used
C13	IGN_LS8	Low Side Ignition 8	91-40		Air Filter Bypass Solenoid / not used
C14	AV1	Analogue Voltage Input 1	105-103	105-103	Throttle Servo Position Sensor - Main
C15	AV2	Analogue Voltage Input 2	105-82	105-82	Throttle Servo Position Sensor - Tracking
C16	AV3	Analogue Voltage Input 3	91-82		Throttle Pedal Sensor - Main / not used
C17	AV4	Analogue Voltage Input 4	91-65		Throttle Pedal Sensor - Tracking / not used
C18	OUT_HB1	Half Bridge Output 1	105-88	105-88	Throttle Servo Motor -
C19	INJ_D3A_POS	Direct Injector 3A +	105-64	105-64	Injector 3 / Injector 8 High
C20	INJ_D3B_POS	Direct Injector 3B +	Do not connect	Do not connect	Injector operation compromised if connected
C21	INJ_D4A_POS	Direct Injector 4A +	105-43	105-43	Injector 4 & 5, Injector 9 & 10 High
C22	INJ_D4B_POS	Direct Injector 4B +	Do not connect	Do not connect	Injector operation compromised if connected
C23	INJ_LS1	Low Side Injector 1	105-74	105-74	Port Injector 1 / Port Injector 6
C24	INJ_LS2	Low Side Injector 2	105-95	105-95	Port Injector 2 / Port Injector 7
C25	AV5	Analogue Voltage Input 5	105-59	105-59	Fuel Pressure Direct Bank 1 / Bank 2 Sensor
C26	BAT_POS	Battery Positive	91-3, 91-5, 91-6	91-3, 91-5, 91-6	Switched Power Source
C27	INJ_D3A_NEG	Direct Injector 3A -	105-46	105-46	Injector 3 / Injector 8 Low
C28	INJ_D3B_NEG	Direct Injector 3B -	Do not connect	Do not connect	Injector operation compromised if connected
C29	INJ_D4A_NEG	Direct Injector 4A -	105-23	105-23	Injector 4 / Injector 9 Low
C30	INJ_D4B_NEG	Direct Injector 4B -	105-22	105-22	Injector 5 / Injector 10 Low
C31	OUT_HB3	Half Bridge Output 3	Breakout 34	Breakout 34	Turbo Wastegate Solenoid - (optional)
C32	OUT_HB4	Half Bridge Output 4	91-37		Radiator Fan Control Unit 1 / not used
C33	OUT_HB5	Half Bridge Output 5	105-53	105-53	Inlet Camshaft Bank 1 / Bank 2 Control Solenoid B
C34	OUT_HB6	Half Bridge Output 6	105-9	105-9	Exhaust Camshaft Bank 1 / Bank 2 Control Solenoid B

*Master and Slave pin numbers, listed above, refer to the two ECUs which have slightly different pin usage. Where only a single function is shown, both ECUs have the same operation.

M142 Connector D - 26 Way

Mating Connector D: Tyco Superseal 26 Position Keying 1 (MoTeC #65045)

Pin	Designation	Full Name	Master Pin*	Slave Pin*	Function Master / Slave
D01	UDIG1	Universal Digital Input 1	105-18	105-18	Crank Reference Position Sensor
D02	UDIG2	Universal Digital Input 2	105-36	105-36	Inlet Camshaft Bank 1 / Bank 2 Position Sensor
D03	AT1	Analogue Temperature Input 1	105-105		Coolant Temperature Sensor / not used
D04	AT2	Analogue Temperature Input 2	Breakout 13	Breakout 13	Air Temperature Sensor (optional)
D05	AT3	Analogue Temperature Input 3	91-11	91-11	Airbox Mass Flow Temperature Sensor
D06	AT4	Analogue Temperature Input 4	91-12		Oil Temperature Sensor 2 / not used
D07	KNOCK1	Knock Input 1	105-79	105-79	Knock Sensor 1 / Knock Sensor 3 pin 1
D08	UDIG3	Universal Digital Input 3	105-15	105-15	Exhaust Camshaft Bank 1 / Bank 2 Position Sensor
D09	UDIG4	Universal Digital Input 4	105-13		Engine Oil Level and Temperature Sensor / not used
D10	UDIG5	Universal Digital Input 5	91-17		Park Neutral Switch / not used
D11	UDIG6	Universal Digital Input 6	105-38		Reduced Oil Pressure Switch / not used
D12	BAT_BAK	Battery Backup	91-86	91-86	Permanent Power
D13	KNOCK2	Knock Input 2	105-100	105-100	Knock Sensor 1 / Knock Sensor 3 pin 2
D14	UDIG7	Universal Digital Input 7	91-34		Cruise Off Switch (optional)
D15	SEN_OV_A	Sensor 0V A	105-55, 105-76, 105-97	105-19, 105-55, 105-76, 105-97	0V Cam Pos, Fuel Pressure Direct, Secondary Air Pressure, Coolant Temperature / 0V Crank, Cam Pos, Fuel Pressure Direct, Secondary Air Pressure
D16	SEN_OV_B	Sensor 0V B	105-102	105-102	0V Throttle Servo Bank 1 / Bank 2 Position
D17	CAN1_HI	CAN Bus 1 High	Breakout 33	Breakout 33	MoTeC 1 Mbit/sec CAN
D18	CAN1_LO	CAN Bus 1 Low	Breakout 32	Breakout 32	MoTeC 1 Mbit/sec CAN
D19	SEN_6V3	Sensor 6.3V	Breakout 3	Breakout 3	
D20	AV6	Analogue Voltage Input 6	105-104	105-104	Secondary Air Pressure 1 / 2 Sensor
D21	AV7	Analogue Voltage Input 7	Internal	Internal	Barometric Pressure Sensor
D22	AV8	Analogue Voltage Input 8	91-47	91-47	Fuel Lift Pressure Sensor
D23	ETH_TX+	Ethernet Transmit+			
D24	ETH_TX-	Ethernet Transmit-			
D25	ETH_RX+	Ethernet Receive+			
D26	ETH_RX-	Ethernet Receive-			

*Master and Slave pin numbers, listed above, refer to the two ECUs which have slightly different pin usage. Where only a single function is shown, both ECUs have the same operation.

Breakout Connector

Mating Connector: Tyco Superseal 34 Position Keying 2 (MoTeC #65044)

Pin	Designation	Full Name	M142 Pin#	Function
Breakout 01	BAT_POS	Battery Positive	B13, B19, C26	
Breakout 02	BAT_POS	Battery Positive	B13, B19, C26	Boost Solenoid Supply (optional)
Breakout 03	SENS_6V3	SEN_6V3	D19	
Breakout 04	SENS_5V0_B2	Sensor 5.0V B	A19	5V Supply MAP Sensor
Breakout 05	SENS_5V0_B2	Sensor 5.0V B	A19	5V Supply Boost Sensor
Breakout 06	SENS_5V0_B2	Sensor 5.0V B	A19	
Breakout 07	SENS_5V0_B2	Sensor 5.0V B	A19	
Breakout 08	BAT_NEG	Battery Negative	A24, A25, A32, C10, C11	
Breakout 09*	BAT_NEG	Battery Negative	A24, A25, A32, C10, C11	
Breakout 10	SHARE_ENGMT			Shared wiring between ECUs
Breakout 11	AV9	Analogue Voltage Input 9	B10	MAP Sensor Signal
Breakout 12	AV10	Analogue Voltage Input 10	B11	Boost Sensor Signal
Breakout 13	AT2	Analogue Temperature Input 2	D04	
Breakout 14	PADDLE_UP			
Breakout 15	PADDLE_DN			
Breakout 16	RS232RX	RS232 Receive	A21	
Breakout 17*	SHARE_PURGE			Shared wiring between ECUs
Breakout 18*	SHARE_BRK_REL			Shared wiring between ECUs
Breakout 19	AT6	Analogue Temperature Input 6	A02	Inlet Air Temperature Sensor Signal
Breakout 20	SENS_0V_B2	Sensor 0V B	D16	0V Inlet Air Temperature Sensor
Breakout 21	SENS_0V_B2	Sensor 0V B	D16	0V MAP Sensor
Breakout 22	SENS_0V_B2	Sensor 0V B	D16	0V Boost Sensor
Breakout 23	DIG3	Digital Input 3	A16	
Breakout 24	DIG4	Digital Input 4	A17	
Breakout 25*	SHARE_PIST_COOL			Shared wiring between ECUs
Breakout 26*	SHARE_EXH_FLAP			Shared wiring between ECUs
Breakout 27	CAN2LO	CAN Bus 2 Low	A31	
Breakout 28	CAN2HI	CAN Bus 2 High	A30	
Breakout 29	SENS_0V_B2	Sensor 0V B	D16	
Breakout 30	SENS_0V_B2	Sensor 0V B	D16	
Breakout 31	SENS_0V_B2	Sensor 0V B	D16	
Breakout 32	CAN1LO	CAN Bus 1 Low	D18	
Breakout 33	CAN1HI	CAN Bus 1 High	D17	
Breakout 34	OUT_HB3	Half Bridge Output 3	C31	Boost Solenoid (optional)

*These pins allow sharing of control functions from one ECU to the harness connector of the other ECU.