MAR600

Engine Control Unit

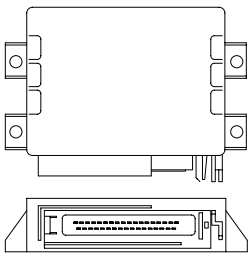
Description

The MAR600 ECU is designed for universal installation on 1, 2, 3 and 4 cylinder engines.

The ECU may use most common crank signal patterns with a single tooth on the cam.

The system uses a set of user definable engine maps and constants which are used to control the actuators based upon specific sensor inputs. All the lookup maps use linear interpolation between user definable breakpoints.

The ECU uses a single 32 bit microprocessor. All analogue to digital conversion is 10 bit resolution. The system firmware and the calibrations are stored in flash EPROM ensuring that the unitis “sealed for life”.



Technical Data

Mechnical characteristics

Overall dimensions (approx) ..... 210x145x48 mm
Weight ..... 0.78 kg
Container ..... Cast aluminium
Connector ..... 35 pin
Operating temperature range ..... -30 to +70 °C
Power supply ..... 9 to 16 V

Digital inputs

Speed pick-ups
- no 2
- type ..... magnetic
- typical uses ..... crankshaft
- ..... camshaft

Analogue inputs

Voltage
- no 3
- range ..... 0 to 5 V
- typical uses ..... throttle position
- ..... air pressure
- ..... barometric pressure
- ..... fuel pressure
- ..... oil pressure
- ..... gear position

Temperature
- type ..... NTC
- no 2
- typical uses ..... coolant
- ..... air
- ..... fuel

Lambda
- no 1
- type ..... ON/OFF

Outputs

Injector Drivers
- no 4
- type ..... ON/OFF
- max current ..... 3 A
- clamp ..... 60 V

Ignition drivers
- no 2
- type ..... inductive
- max charge current ..... 12 A

Electrovalve drivers
- no 3
- max current ..... 3 A

Fuel pump
- no 1
- max current ..... 3 A

Stepper Motor
- no 1
- type ..... H-bridge
- max current ..... 1 A

Warning Lamp
- no 1
- max current ..... 250 mA

Communications

CAN line 1
Serial RS232 line 1

Applications Software

Fully configurable 1,2,3,4 cylinder
normally aspirated or pressure charged
Ducati V twin

Ordering information

Part No.	Description	Order Code
MAR600	Engine Control Unit	83814062100
MAR600	Engine Control Unit - Ducati 748	83814062200

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Features

- Sequential or semi-sequential fuel injection for 1,2,3 and 4 cylinder applications
- Variable phase fuel injection
- Integral inductive drivers for wasted spark distributorless ignition coils.
- Multi function output drivers
- CAN communications suitable for Magneti Marelli data acquisition
- Gear change algorithm

Fuel Control

For normally aspirated engines, the MAR600 uses engine speed and throttle position as primary inputs to determine fuel injection quantity. Pressure charged engines use engine speed and inlet air pressure as primary inputs.

The injection quantity may be corrected for :

- Manifold air pressure (or air box pressure)
- Throttle position (pressure charged variant)
- Barometric air pressure
- Fuel temperature
- Air temperature
- Coolant temperature
- Lambda - ON/OFF
- Battery voltage
- Individual cylinder
- Cockpit mounted trimmer
- Number of crankshaft revolutions from engine start

Fuelling system notes

The types of fuelling control supported by MAR600 are sequential and semi-sequential multi-point injection.

Multi-point sequential fuel injectors operates the injectors in firing order sequence. Multi-point semi-sequential fuel injection operates the injectors in pairs, once per engine revolution, based upon the TDC firing position of the particular cylinder pair.

The start of each injection pulse may be optimised to a particular point in the cylinder 4-stroke cycle; the optimised point may vary with engine speed.

Both positive and negative throttle transient add or subtract fuel quantity to modify the injection time appropriately. These are corrected by engine speed, throttle position and coolant temperature. Closed throttle fuel cut off may be used.

Fuel consumption is continually calculated and available on the CAN data stream allowing accurate fuelling strategy / consumption prediction.

Multi Function Output Drivers

The multi function auxiliary output drivers are fully configurable by the user, for activation during any defined input or output condition.

Rev Limiters

The in built rev limiter can be set at different levels depending upon gear position for ignition, injection or both. The rev limiter is modified by a switch input for pit lane speed.

Ignition Control

Normally aspirated engines use engine speed and throttle position as primary inputs to determine spark advance, whilst pressure charged engines use engine speed and inlet air pressure as primary inputs.

The spark advance may be corrected for

- Throttle position (pressure charged variant)
- Air temperature
- Coolant temperature
- Individual cylinder
- Cockpit mounted trimmer
- Ignition coil dwell uses battery voltage and ambient temperature to determine charge time.

Dynamic spark advance correction provides a closed loop idle speed control function.

Stepper Motor Control

The system provides open loop control for a idle air speed control stepper motor.

Gear change algorithm

The system provides for correction to fuel quantity, spark advance and ignition coil activation during a detected gear change.

A gear change indicator lamp may be illuminated at and above an engine speed threshold.

Other functions

The ECU provides a fuel pump relay and a user configurable rev counter output.

A warning lamp function can be configured to illuminate when certain ECU detectable faults occur.

CAN Communication

A data stream of engine parameters is continuously transmitted via CAN, which interfaces directly with the Magneti Marelli data acquisition product range.

The MR600 can directly set the display options and alarm conditions that control a Magneti Marelli dashboard.

System Calibration

Calibrations for fuel quantity, fuel injection phasing, spark advance can be interactively implemented via a computer (PC) keyboard or using a potentiometer bank linked to the PC.

The calibrations can be modified with an editor program which uses a combination of graphical and text displays, allowing tuning of all system features. The calibrations can be downloaded to the MAR600 flash EPROM.