

MAR500

Engine Control Unit



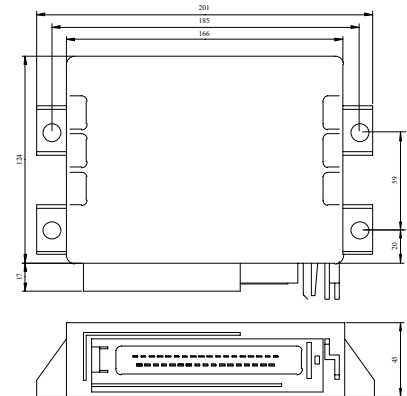
Description

The MAR500 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 units "sealed for life".



Technical Data

Mechanical characteristics

Operating temperature range-30 to +70 °C
Connector 35 pin
Weight 0.78 kg

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

Injector Driver
no 1
type Current Controlled
max current 4+1 A

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

Serial RS232 line 1

Applications Software

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

Ordering information

Description	Order Code
MAR500 Engine Control Unit	83814001200

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Features

- Single point or multi-point 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.

Fuel Control

For normally aspirated engines, the MAR500 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 MAR500 are single point and multi-point injection

Single point injection provides fuel for each cylinder in turn, i.e. injects fuel twice per engine revolution.

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 use engine speed and coolant temperature, to add or subtract fuel quantity to modify the injection time appropriately. Closed throttle fuel cut off may be used.

Fuel consumption is continually calculated and available on the serial 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.

- Stepper motor idle air valve control
- Multi function output drivers
- Gear change algorithm

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 function.

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

Serial Communication

A data stream of engine parameters is continuously transmitted through the serial line which can interface via CAN with the Magneti Marelli data acquisition product range.

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 MAR500 flash EPROM.