

## Engine Management Systems



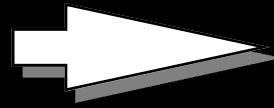
### Overview:

The POLESTAR HS engine management system is a low cost yet highly sophisticated system, ranging from the basic 2D ignition-only system up to the full 3D Turbo Fuel Injection System.

Although originally developed for the Mini A-Series engine the systems can now be used on virtually any engine including high revving motorbike engines. The systems features include,

- Supports up to 8 cylinders and 4 injector drivers
- Fully sequential 4 cylinder operation supported with cam sensor
- Special sequential twin-point fuel injection mode specifically designed for the A-Series engine (requires cam sensor)
- Single point mode (multi-injector)
- Low cost ignition only distributor-less versions also available
- Direct crankshaft trigger for greater accuracy. Supports standard 36-1 trigger wheel or existing POLESTAR sensor and disk
- Accurate control of ignition timing and fuelling. Timing/Fuelling adjusted with 8 load sites at every 500 rpm from 0-15000rpm with full interpolation.
- Optional closed-loop fuelling with wideband lambda input
- Integral 'smooth-cut' rev limiter
- Optional 'Boost Retard' feature with integral MAP sensor for Turbo engines

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## Details:

Originally developed and tested in conjunction with Bryan/Neil Stark of Stark Race Engineering and Jon Lee of LynxAE using their dyno facilities.

## Fuel Injection

The POLESTAR HS fuel injection system can be configured to operate in a number of different modes. These include 4 cylinder 4 injector fully sequential, single point multi injector, or up to 8 cylinder 4 injector batch injection. A special mode has been designed specifically for the A-Series engine allowing sequential operation with 2 injectors, where the injector timing is carefully controlled to ensure correct mixture balance between the cylinders sharing an inlet port.

The system will operate using a standard 36-1 crankshaft trigger wheel and VR sensor as fitted as standard on many production engines. It can also be configured to use an existing



POLESTAR trigger disk and hexagonal sensor (shown above). It will operate with various CAM sensors either hall effect or VR type. It also supports the crank and camshaft trigger arrangement on a Yamaha R1 motorbike engine. Various other sensors are required



depending on the system type. These are typically a throttle position sensor, MAP sensor, water temperature sensor and inlet air temperature sensor, usually the ECU can be calibrated to use an engine's existing temperature sensors.

With the addition of a wideband lambda sensor the system will run in closed loop fuel mode making mapping semi-automatic, and giving much tighter control of fuelling whilst running.

All POLESTAR HS ECUs provide a standard rev counter output, and the fuel injection ECUs can control the engine cooling fan and fuel pump.

## Ignition-only

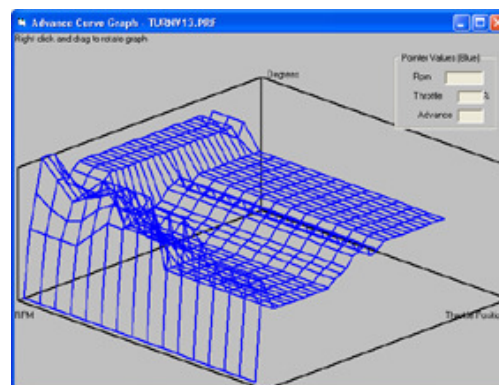
In addition to our fuel injection systems we also supply ignition only systems. The basic two dimensional ignition only system provides a simple mapped ignition for carburettor based engines. The engine's advance curve can be tailored to the engine with ignition points at every 500 rpm up to 15000rpm. POLESTAR systems has been used successfully for several years by Mini Miglia and many other race formulae.

By adding a throttle position sensor or using an optional MAP sensor (internal to the ECU) the system can operate in 3D mode. The ignition timing can then be set based on both RPM and throttle position/manifold pressure. This allows an engine to produce more power and run more efficiently with part throttle openings.

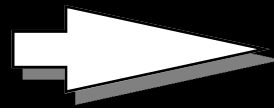
A typical 3D ignition curve is shown below

## Boost Retard

On turbo engines it is often ideal to be able to apply a controlled amount of ignition retard as the boost



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pressure increases. This is important to prevent dangerous detonation which can quickly melt pistons and destroy an engine.

The POLESTAR HS Turbo Management System employs an integral manifold absolute pressure sensor (MAP) which constantly measures the turbo boost pressure (0-1.5bar, or 0-22psi boost). The system can then be configured with between 0 and 5 degrees of ignition retard per PSI of boost pressure. This value can be configured in 0.25 degree increments for super accurate engine timing under boost conditions. The calculated retard value is subtracted from the base advance figure in the engine map. This gives safe smooth delivery of power from a turbo engine.

This functionality is available in both our fuel injection and ignition only ECUs.

## Mapping Software

All systems are supplied with a USB connecting cable and mapping software. This software will run on Windows 98/NT/2000/XP/Vista/Windows7. It is simple to use and allows 'Live mapping' of all engine parameters with the engine running.

For more information please contact POLESTAR directly at the address below, or at [www.polestarsystems.com](http://www.polestarsystems.com) or through

Slark Race Engineering,  
Boscombe Down Business Park,  
Mills Way, Amsebury,  
Wiltshire, SP4 7RX  
Tel: 01980-624477

LynxAE  
Unit 1, Hill View,  
Raunds Road, Chalveston,  
Wellingborough, NN9 6AA  
Tel / Fax : 07831 556973

## Options

POLESTAR Management System  
Ignition only ECU

**£270.00**

POLESTAR Turbo Management System

Ignition only ECU with integral 1.5bar MAP (manifold absolute pressure) sensor with 'boost retard' feature.

**£310.00**

POLESTAR Fuel Injection System  
Fuel injection ECU

**£350.00**

POLESTAR Turbo Fuel Injection System

Fuel injection ECU with integral 1.5bar MAP (manifold absolute pressure) sensor with 'boost retard' feature.

**£390.00**

(All prices exclude VAT)