

## Programmable Management Mania, Part 3

We've shown you the full engine management systems from around the globe, here are the ones that control only fuel delivery- not ignition as well.

*By Michael Knowling*

Here is the last (we promise!) instalment, this time on fuel-only computers. These are really best suited for when you're upgrading from an overworked conventional carb/ignition set-up and you want the flexibility and accuracy only EFI can give.

In the last two instalments we covered combined fuel and ignition computers. This time we'll show you the fuel-only systems on the market worldwide. So why on earth would anyone want a fuel-only system in preference to a full fuel and ignition ECU? Well, a fuel-only computer is certainly significantly cheaper and they are fine to use when up-grading from a carb and conventional ignition system.

So here are all the computers we've found that tip fuel into your engine; if we've left any out please let us know.



### EMS

The EMS QM-4 is the sole EMS fuel-only ECU.

#### Fuel Features

It uses three fuel plots every 500rpm from 0 to 12500rpm and seventy-eight points need to be user-set, but the ECU will calculate over 65,000 points. Two separate sets of maps can be stored for increased flexibility. A staged injector function can be set to bring on another bank of injectors, there's acceleration enrichment

adjustment, adjustable warm-up settings and cold-start enrichment, fuel trimming (as a percentage) plus a fuel cut or enrichment on deceleration. There are 8 injector drivers, a fuel pump control (with a safety cut) and idle control included.

### Other Features

It is suitable for normally aspirated, forced induction, 2-stroke, 4-stroke, 1-16 cylinder and rotary engines. Throttle body or multipoint injection is possible. Inputs are from a built-in map sensor, air temp sensor, barometric compensation, internal battery sensing and compensation, water temp sensor and a TPS. Adjustments are made via a hand-held real-time "intelligent interface" with a four-line backlit information display. The so-called "fuel pak" comes with a colour coded wiring loom with fuses relays and plugs, service and back up, instruction manual and A/W sensors.



## Haltech

The F9 series is the sole fuel only system in the Haltech line up.

### Fuel Features

The F9 has 17 adjustable fuel maps in 500rpm increments when configured with a 10,500rpm maximum or 22 maps in 1000rpm increments when the higher 16,000rpm maximum is set. In both cases, there are 32 individual bars of adjustment on the PC screen and tuning can be made in real-time. In standard form, the F9 can control 4 low impedance injectors using 4 drivers, but the optional F9-8 spec comes with 8 drivers able to manage 8 low impedance injectors or 16 high impedance items. Injectors can be controlled directly, fired all together, in batches or staged.

It is also upgradeable to F9A specifications, which will add the capability for closed loop sensing, idle speed control, torque convertor control, thermofan, wastegate and various other controls.

### Other Features

The F9 series can run 1-12 cylinder engines or up to 2 rotors, normally aspirated or forced induction. The series are PC programmable. Included in the kit is the ECU, main and injector wiring loom, 2 power relays, air and water temperature sensors, throttle position sensor, communication cable, programming software and an instruction manual. A high-pressure MAP sensor is extra and an additional driver box can be added for more injector inputs.



## Holley

Holley offer the Pro-Jection system in 1, 2 or 4 barrel versions and a high performance Pro-Series aimed at modified big-block Chevs.

### Fuel Features

The single barrel systems range from 300 to 900CFM and are designed to suit six cylinder engines. Analog electronics is used (with TPS, engine temp and rpm inputs) and there is no change in manifold necessary. Fuel adjustment is via control knobs at the end of the ECU, with changes at idle, mid-range, power, acceleration and choke sites. These are designed for use on stock engines only.

The universal 2-barrel Pro-Jection uses digital operation (a speed-density system) and is suitable for almost any V8 rated up to 275hp.

Programming of this and the other up-spec models is via a laptop PC, but a control knob on the ECU offers further tuning flexibility. Inputs to the digital systems are throttle position, MAP, engine temperature and exhaust gas oxygen. The 2-barrel system is compatible with modified and stock engines.

The four-barrel version uses a square flange throttle-body and is available in 650, 700 and 900CFM sizes. This has similar software specs to the 2-barrel, but there is an optional Di (Digital interactive) system also available. This allows the fuel curve to be changed to suit any engine via PC use. Up to 256 fuel map points can be altered.

The Pro-Series is for only rectangular port Big Blocks pushing at least 400hp. It comes complete with a massive intake manifold and twin throttle-bodies. The 4-barrels ECU is used giving adjustment over idle, mid-range, power, acceleration and choke.

### Other Features

The single barrel Pro-Jection 1 comes with all adaptors and the option to run in a closed-loop configuration. Pro-Jection 2 also has available an optional dual-plane intake manifold for small-block Chevs, which has a dedicated 2-barrel flange to mount the system. All sensors and equipment are supplied. Included in the top Pro-Series is a Holley Pro-Dominator manifold and two 670CFM throttle-bodies with two 80lb/hr injectors in each. Once again, this system comes with all necessary hardware and software. Note that most of the components across the four versions are not shared, so interchangeability is not usually possible. Please refer to the listed website for specific engine application details.



## MoTeC

The M4 ECU is produced with three different software programs: the Standard, Clubman and Pro. All are built up from the same base unit, and they share the same current 32 bit computer technology. However, it is the M4 Standard that is the sole fuel-only computer.

### Fuel Features

The M4 Standard uses a 220 point main table with 20 rpm sites and 11 load sites and it comes with four injector drivers that can be run sequentially on engines up to four cylinders, or in group fire mode for up to 12 cylinders. Closed-loop narrow-band lambda control is included.

## Other Features

The M4 Standard can run engines of up to 12 cylinders and also rotary engines.

It has options of 3D mapping, advanced tuning (more reference points, traction control, definable sensors etc), ignition control and more. It is even possible to gradually upgrade from Standard to full Pro specs with the extra software. For further information on upgrades and other MoTeC matters, please refer to their listed website. All MoTeC units have a 1-year warranty.



## SDS

The SDS (Simple Digital Systems) EM-2D gives control over fuel only.

## Fuel Features

This system uses a MAP sensor as part of a speed/density system and it is designed for port-type injection only. It can be wired to drive low or high impedance injectors at up to 18,000rpm in 500rpm increments. There is automatic enrichment during cranking and warm-up. Closed loop can be used with 5-adjustment points influencing the main 64-point manifold pressure map. The ECU monitors TPS for acceleration enrichment and the system allows for 3 different mixture variations under these conditions. A mixture trim knob gives a further  $\pm 50\%$  change in base pulse width.

## Other Features

The EM-2D is suitable only for 4, 6 and 8 cylinder engines as well as rotaries. There is optional VTEC control, fast idle, high range MAP sensors and extra fuel pump relays etc. The manufacturer claims it to be the easiest system to set up, and you don't need a PC as it uses a detachable handset with a LCD display. Tuning via this handset can be done with the engine off or on and it also serves as a monitor for engine operating conditions. The ECU comes in a new CNC machined aluminium billet box that is gold anodised. The kit includes the ECU and handset programmer, injector driver, air temp sensor, water temp or CHT sensor, main wiring harness/injector harness, fuel trim control, crank sensor, timing magnets, coil/amp unit and a comprehensive manual. A 180-day warranty on parts and labour is part of the package also.



## Injec

Injec's EM1 computer is the unit Injec has for firing fuel only.

## Fuel Features

This system can fire up to 16 injectors, has adjustable cranking mixtures, cold-running enrichment, acceleration pump enrichment and switching temperatures. It can be mapped up to 10psi or 30psi with the "high boost" option. Plus it is also capable of auxiliary injector switching.

### Other Features

Configurable with 4/6/8 cylinder, rotary, normally aspirated and forced induction engines. There are outputs for AC switching, warning lights, fuel pump relay control and cooling fans. It comes with a backlit LCD screen that displays live information in English, and has a buzzer for any faults. Legible messages are also given when there is a problem. A security code also protects the program from unauthorised adjustment. The kit comes with an in-built vacuum/boost sensor, air and coolant temperature sensor, 20 and 16 pin plugs and pins and a comprehensive instruction manual. A 12-month guarantee backs it up with fast repairs/replacement.



### Accel

One of the American aftermarket performance giants, Accel, has both throttle-body and multi-point fuel systems available.

### Fuel Features

The throttle body system can suit almost any carbureted eight cylinder with a four-barrel flange. The body itself is good enough to flow 750CFM and is recommended for engines making 250-300hp. There are four injectors angled carefully into the throttle body so intake airflow is not disturbed. It has digital control with inputs from coolant and air temperature sensors, throttle position, engine rpm and manifold pressure. An idle air control motor and closed-loop oxygen feedback is also included.

The multi-point system uses a high-speed micro-processor and takes inputs from the same type of sensors as the throttle-body unit. The ECU makes adjustment to fuel flow hundreds of times each second and delivers crisp throttle response not possible with a carb. A 1200CFM throttle body is available along with a single plane intake manifold and is said to give outstanding flow. There are many different multi-point applications available for popular V8s.

### Other Features

The throttle body system is quoted as "a snap to install". The kit comes with the ECU, main and injector harnesses, throttle-body assembly with gaskets, air cleaner, fuel pump and filter, all sensors, idle air control motor and complete instructions. The multi-point EFI also comes with everything needed for installation. It is packaged with ECU, wiring harness, throttle-body, intake manifold, injectors, air filter, fuel pump and all sensors. Comprehensive instructions are included. Depending on application, there is also a choice of intake systems for ultimate performance. Further to this, special PC based tuning software is available to make the multi-point system more flexible.



## Microtech

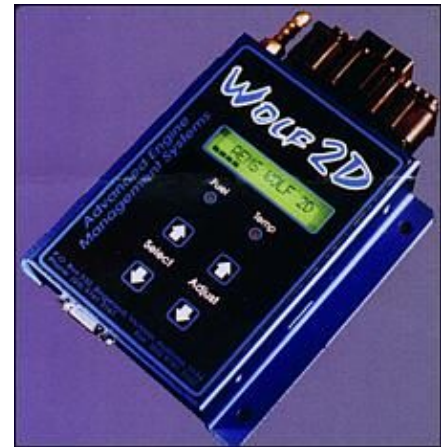
The Microtech MT-4 is designed for fuel applications only.

### Fuel Features

There are sixteen load points from 30"Hg to 20psi via an in-built MAP sensor, with eight load points at idle from 30"Hg to 00"Hg. Mapping is in 500rpm intervals between 500 and 8000rpm. It includes adjustable acceleration enrichment, WOT adjustment, water and air temp correction (both with 16 adjustment points between -25 degrees and 124 degrees). Cranking enrichment is adjustable in 16 stages for easy starting, hot or cold.

### Other Features

This system is designed to suit 4, 6, 8 cylinders and rotaries. It has two auxiliary outputs and a multi-stage rev limiter fuel-cut. Using an external handset, fine-tuning of the system can be carried out. This handset features real time information. It also comes fitted with a "factory programmed chip that will allow you to start the engine as soon as the MT has been installed". The product is backed with a 12-month warranty.



## Wolf

The Wolf 2D is the sole fuel-only computer offering from this Melbourne based company.

### Fuel Features

Fuel is adjustable in 128 points per map with 16rpm and 8 load increments, and full interpolation gives over 65,000 usable points. There is current limited injector drivers capable of running almost any injector and injector staging to allow big injectors to be run while keeping smooth idle. It has acceleration enrichment, automatic air temp and pressure (ie. ram air) compensation, special adjustment modes for "fast map" set up and injector cut-off for clean deceleration. An adjustable rev limiter (fuel-cut) is built in.

### Other Features

Suitable for rotaries and 1-12 cylinder engines, forced induction or normally aspirated.

The system features a full backlit LCD screen on the ECU displaying real-time information.

There's an adjustable over temperature warning light, electric engine fan control, and an in-built turbo timer. One other major feature is an exhaust gas oxygen bar graph display. Plus it has memory cartridges, which enable loading and saving of complete fuel and ignition maps. Kit includes ECU, wiring loom, memory cartridge, temperature sensors, controller relay, fuses and instruction manual.

### **Contacts:**

EMS

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<http://www.pem.com.au/enginemanagement.htm>

Haltech

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<http://www.holley.com/HiOctn/ProdLine/FuelInj/FuelInj.html>

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<http://www.motec.com.au/ecu.htm>

SDS

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