
ELECTRONIC FUEL INJECTION (EFI) KITS

FOR TRIUMPH TR2-8

INTRODUCTION

Engine Management is the broad term used to describe the combination of EFI and mapped ignition systems.

SO, WHAT IS ENGINE MANAGEMENT?

Over the last 25 years, the specific power output of automotive internal combustion engines has risen dramatically. Many road cars today have bhp/litre outputs that would previously have been considered good figures for racing engines.

Current normally aspirated racing engines achieve power outputs that could only have been achieved historically through forced induction. Contemporary turbo charged engines could develop unprecedented levels of performance, but with standards of driveability that would traditionally have been considered impossible. This is due partly to advanced engine design e.g. 16 valve engines. A lot of the performance increase is because of the precise fuel and ignition control provided by electronics, which is made possible by the availability of electronic sensors, and controls. The cost effective availability of these has revolutionized all aspects of life in the last quarter of the twentieth century, from satellite communications to pocket calculators. It is the ability of microprocessors to handle information, and to be programmed to provide near instantaneous controls that allows Engine Management Systems to transform the performance of internal combustion engines.

As important as the improvements in power and torque, is the advance that has been achieved in driveability. Accurate control of the relevant criteria has maximized the width of power bands, flattened torque curves and transformed cold starting and warm up responsiveness. These characteristics allow racing, rally and high performance engines to be used much more easily and effectively by the driver. Traditionally engines relied on static settings that could only relate to the ideal calibration at one engine speed, with a narrow band of adjustment based on manifold depression and centrifugal forces. Managed systems are pro-active and provide a broad spectrum of ideals across a range of engine speeds.

Another benefit of Engine Management Systems, is the fact that standards of reliability in electronics are such that we take it for granted whether in business or domestic equipment? This is mirrored in Engine Management Systems, which have achieved very high levels of reliability when properly fitted, and when wiring is of an appropriate specification.

THE SYSTEMS

Our systems are based on two manufacturers' products, Standard Motor Products (Alpha+) and Lumenition.

Standard Motor Products (Alpha+) (SMP) [formally Webcon – Weber Concessions UK Ltd] have nearly half a century of leadership in carburettor design and manufacture which they have built-on to produce engine management systems for championship winning Formula 1 and World Rally Championship domination, along with systems fitted to Aston Martin, Ferrari and Sierra Cosworth, to name but a few.

Lumenition have been well known in the electronic ignition field, and approach the engine management area from this background rather than the traditional carburettors direction, which SMP have come from.

Lumenition systems are very slightly less sophisticated and also less expensive. The price disparity between the two systems is because the SMP version includes an additional air valve to aid starting and promote smoother running in hot idling conditions (traffic jams!)

WHY FIT EFI TO TR'S 2-8?

Triumph TR's from TR2-8 use a variety of ignition and induction systems from 1½" SU Carburettors through to mechanical fuel injection on the TR5-6, coupled with mechanical distributors. Many alternative carburettors have been fitted too, 40 or 45 DECO Weber carburettors being the most common.

Whilst these conversions work adequately, they all have the same basic limitations that the standard system does, linear fuel and ignition curves with limited opportunity to change settings at intermediate points.

TR's fitted with Weber carburettors are often characterized by suffering from a spluttering misfire at low speed light throttle cruise.

Similarly many TR5's suffer from a dead spot at 2500-2600 RPM when the fuel to air ratio just moves outside acceptable limits.

Revington TR have also experienced problems with modified TR6 engines where the same vacuum readings exist at low RPM just off idle, as at full throttles the nett result being massive over fuelling at low RPM, assuming the engine is correctly tuned for high RPM.

Similarly, we have experienced engines, which would benefit from ignition curves which peak before maximum RPM then tail off again. A physical impossibility with bob-weight mechanical ignition advance.

All of these limitations are a thing of the past with full engine management consisting of electronic fuel injection and mapped ignition systems.

Our EFI systems will take your car into the new century providing accurate fuelling and ignition timing under all conditions.

WHAT ARE THE BENEFITS?

Fitting Engine Management to a TR will benefit you in three ways

1. Unleaded Fuel Compatibility

As leaded fuel become less and less available, it is important to ensure all parts of the fuel and engine system are compatible with unleaded fuel. All our EFI kits are designed to run on unleaded fuel.

2. Driveability

Unleaded 95 RON regular petrol does make tuning a TR with standard induction and ignition difficult, particularly ensuring smooth pick up without pinking. These problems are completely solved by EFI. Whilst top end power will be increased only slightly, it is the mid-range power and torque where real benefits are to be found. There is now no need for a choke. Cold and hot starting should be much improved. Carburetted cars, which have been tuned on a rolling road, will only work to optimum performance when the prevailing ambient conditions are the same as the day the rolling road tuning was performed. EFI on the other hand, with air pressure, engine temperature and air temperature compensation will maintain the engines' tune more accurately over a wide range of conditions.

3. Long Term Economy

Petrol consumption will be improved, as the mapped fuel and ignition will ensure that a leaner burn on cruise can be achieved without loss of performance. As there are few moving parts and modern electronics are incredibly reliable, service costs should be reduced to simply checking the sparking plugs.

WHAT YOU GET

Sensors provide the engine control unit (ECU) with engine environment information as follows: -

1. Ambient air temperature
2. Ambient air pressure
3. Block water temperature
4. Throttle position
5. Crank position (by direct sensing or distributor position depending on the kit)

The ECU also provides battery voltage compensation.

All these sensors ensure the ECU can provide the correct fuel and ignition settings under all conditions. The ECU features direct digital mapping of ignition and fuel, cold start warm up fuelling and acceleration enrichment, as the ECU is able to identify rapid throttle position movements.

A rev. limiter is built in, and for those who need it an up-shift limiter on Lumenition systems.

An output is available for an electronic tachometer. Revington TR has devised a process for incorporating an electronic tachometer mechanism into original TR instruments, thus preserving the cockpit appearance. These rev. counters are of particular interest when the distributor is removed on some TR2-4A, TR5, 250 and TR6 systems. (The distributor drives the tachometer).

Crank position information is provided by a toothed wheel, positioned behind the fan belt pulley. This allows high data rate updating to be achieved. This can however be omitted on the Lumenition systems in favour of a low data rate sensor placed in the original distributor.

Should this be opted for, the internals of the distributor must be locked up, leaving the distributor cap and rotor to simply distribute high tension (HT) electricity to the spark plugs.

ECU's are provided with ignition and fuel maps, which can be adjusted using a PC to closely match the requirements of a variety of engine configurations.

Maps are currently held for standard and mildly tuned engines. The system will be provided ready mapped, however the ECU can be reprogrammed on a rolling road to suit the exact requirements of your engine.

The systems offered broadly fall into three categories.

1. Distributor Sensed, Distributor Cap Retained for Directing HT to Spark Plugs

These systems use a Lumenition distributor sensor and a single amplifier to fire a high-energy coil. The ECU counts the time elapsed between trigger events, and uses this as a basis for ignition and fuel timing. As there is inevitably 'slop' in the cam drive and distributor drive, this is not the most accurate method of determining crank position.

2. Crank Sensed, Distributor Cap Retained for Directing HT to Spark Plugs

These systems use an inductive sensor mounted close to a toothed wheel on the end of the crankshaft to give accurate crankshaft position data to the ECU. The Standard Motor Products (Alpha+) version uses 6+1 teeth to establish top dead centre (TDC). The Lumenition system uses 36-1 teeth to establish TDC.

3. Crank Sensed, No Distributor

These systems use crank sensing as described in two, but the distributor is now completely removed from the system. HT is provided to the spark plugs by a multi pack coil, operating on the wasted spark principle. Here there is an amplifier for each pair of cylinders, each amplifier feeds a coil which fires at both ends simultaneously. As one cylinder will be on an exhaust stroke, the spark has no effect other than to clean up the exhaust gases, hence being called the wasted spark principle.

FUEL PUMP

For safety reasons the fuel pump is switched off when the engine is not rotating.

HOW DOES IT WORK?

In the simplest terms, the fuel pump delivers constant pressure fuel to a fuel rail connected to the injectors.

The ECU determines how much fuel is required and turns the injector on and off for a finite time to accurately inject the exact amount of fuel required. The amount of fuel is controlled by the delivery map stored in the Erasable Programmable Memory (EPROM).

Ignition is similarly controlled by a map in the ECU's EPROM, here the ignition amplifier is fed a signal when a spark is required, and this in turn energises the ignition coil. Clever stuff!

OUR RANGE

NOTE: - Please see the following matrix for kit contents. Currently we have developed kits for TR2-6. Kits for TR7 and eight are currently under development. Please enquire.

TR2-4A

RTR4206	Lumenition based, distributor triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition.
RTR4207	Lumenition based crank triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition.
RTR4370	SMP based crank triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition.
RTR4208	Lumenition based crank triggered. No distributor. Fully mapped fuel and ignition.
RTR4371	SMP based crank triggered. No distributor. Fully mapped fuel and ignition.

TR5-6, TR250, TR6 CARB.

RTR4201	Lumenition based, distributor triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition
RTR4202	Lumenition based, crank triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition.
RTR4203	Lumenition based, crank triggered. No distributor. Fully mapped fuel and ignition.
RTR4204	SMP based, crank triggered with the distributor cap directing HT to spark plugs. Fully mapped fuel and ignition.
RTR4205	SMP based, crank triggered. No distributor. Fully mapped fuel and ignition.

TR7

RTR4271	Lumenition. Crank sensed, distributor less. Fully mapped ignition and fuel. (Under development with others in the range.
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TR8

RTR4223	Lumenition. Crank sensed, distributor less. Fully mapped ignition and fuel. Under development with others in the range. Other combinations will be considered at customer request.
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KIT CONTENTS MATRIX

NOTE: Multiple stars indicates the number included in the kit

	TR2-4A					TR5-6					TR7	TR8
	RTR4206	RTR4207	RTR4370	RTR4208	RTR4371	RTR4201	RTR4202	RTR4203	RTR4204	RTR4205	RTR4271	RTR4223
Twin Throttle Body 45mm set (ie 4 inlets)	*	*		*		*	*	*			*	**
Single Throttle Body 45mm set (ie 2inlets)						*	*	*				
Twin Throttle Body 40mm (ie 4 inlets)			*		*				*	*		
Single throttle Body 40mm (ie 2 inlets)									*	*		
Engine Control Unit (ECU)	*	*	*	*	*	*	*	*	*	*	*	*
Ignition Amps	*	*		**		*	*	***	*	***	**	****
Wiring Loom	*	*	*	*	*	*	*	*	*	*	*	*
Relays Power & Pump	*	*	*	*	*	*	*	*	*	*	*	*
Air Temp Sensor	*	*	*	*	*	*	*	*	*	*	*	*
Throttle Sensor	*	*	*	*	*	*	*	*	*	*	*	*
Water Temp Sensor	*	*	*	*	*	*	*	*	*	*	*	*
Ignition Coil Single	*	*				*	*		*			
Ignition Coil Multi-Point				*	*			*		*		**
Coil Adapter Lead	*	*		*		*	*	*	*	*	*	*
Pressure Regulator & Bracket	*	*	*	*	*	*	*	*	*	*	*	*
Set of Electronic Injectors	*	*	*	*	*	*	*	*	*	*	*	*
High Pressure Fuel Kit - Tank to Rail	*	*	*	*	*	*	*	*	*	*	*	*
Exchange 7 Tooth Front Crank Pulley									*	*		
35 Tooth Crank Disc	*	*	*	*	*						*	*
Exchange 35 Tooth Front Crank pulley						*	*	*				
Crank Sensor		*	*	*	*		*	*	*	*	*	*
Crank Sensor Bracket		*	*	*	*		*	*	*	*	*	*
Coil Bracket	*	*		*	*	*	*	*	*	*		*
Fuel Rail Kit - Rail to Regulator	*	*	*	*	*	*	*	*	*	*	*	*
Low Pressure Fuel Line Kit Regulator to Tank	*	*	*	*	*	*	*	*	*	*	*	*
Adapter for Water Temp Sender	*	*	*	*	*	*	*	*	*	*	*	
Ignition Lead Set High Engergy	*	*	*	*	*	*	*	*	*	*	*	*
Fuel Tank Aluminium with Anti-Swirl Pot and Return Connections	*	*	*	*	*							
Manifold Set	*	*	*	*	*	*	*	*	*	*	*	*
Kit of Sundry, P Clips, O Clips etc.	*	*	*	*	*	*	*	*	*	*	*	*
Distributor Blank Plate				*	*			*		*		*
Air Horns	*	*	*	*	*	*	*	*			*	*
Throttle Kit	*	*	*	*	*	*	*	*	*	*	*	*
Trigger Sensor Adapter Lead	*	*		*		*	*	*	*	*	*	*
Pump Mounting Bracket	*	*	*	*	*	*	*	*	*	*	*	*
Fitting Instructions	*	*	*	*	*	*	*	*	*	*	*	*

ADDITIONAL PARTS WHICH MAY BE REQUIRED

- Breather for Rocker Cover
- Pedestal }
- Gear Set } for cars not using the distributor
- Air Filters or Air Box
- Petrol Tank (supplied fr TR2-4A but may be needed for TR5-8)

Please use the website www.revingtontr.com for current prices