

Omnitek Engineering, Corp.

LOW-COST SYSTEM FOR THIRD-WORLD COUNTRIES **SINGLE-POINT OR MULTI-POINT ELECTRONIC FUEL INJECTION SYSTEM FOR RETROFIT TO CARBURETTED ENGINES, OR AS ORIGINAL EQUIPMENT**

This proposal outlines the installation requirements for such a project. There will be areas in which more than one possible implementation can be used, but for the sake of cost versus functionality, a product with reduced complexity may be chosen over a more comprehensive product. The ECU (Electronic Control Unit) is sufficient to meet current EC1 and EURO 2 emission standards in single-point configuration and up to EURO 4 standard in multi-point configuration. The ECU incorporates OBDII diagnostic and monitoring capability.

Mechanical Design Basics:

1. Single-Point retrofit: The mechanical concept of this product for engine retrofit projects is to retain the original carburettor for use as an air door, and replace the carburettor's fuel metering system with an electronic fuel injector. The injector may be mounted under the carburettor, or in the air cleaner. The system will require: Electronic control unit (ECU), Fuel injector, injector holder, surge tank, electronic fuel pump, (low pressure pre-pump), high pressure fuel lines, fuel filter, oxygen sensor, catalytic converter, fuel pressure regulator, water and air sensors, MAP sensor and a TPS sensor. If electronic ignition control is desired, modifications to the existing distributor is required, or a new distributor must be used.

2. Single-Point OE applications: The mechanical concept of this product is basically the same as the one outlined for Single-Point Retrofit applications, except that this application will also require a throttle body since the carburettor is not used. If electronic ignition control is desired, modifications to the existing distributor is required, or a new distributor must be used.

3. Multi-Point OE applications: The mechanical concept of this product is basically the same as the one outlined for Single-Point OE applications, except that this application will also require a new intake manifold and fuel rail, and one injector per cylinder. If electronic ignition control is desired, modifications to the existing distributor is required, or a new distributor must be used.

Multi-Point Injection and electronic ignition control represents the industry standard for new vehicles required to meet current US and European emission standards. A multi-coil distributorless ignition system can be implemented.

Electronic Design Basics:

The main function of the electronic system is to maintain a constant air/fuel ratio of 14.7:1 (stoichiometric) at cruise and low load conditions, allowing a catalytic converter to do its work. Therefore, a closed loop method of operation will be required. To achieve this, an oxygen sensor must be used to give feedback to the ECU controlling the injector(s). One option that improves both fuel economy and reduces emissions is to have a switch sensing closed throttle condition. This allows the ECU to suspend injector pulsing while the vehicle is coasting, or under low load. Zero fuel equates to zero emissions. Almost all engine management systems, including OEM systems, revert to open loop operation above a certain engine load. Operating the engine stoichiometric, although perfect for use with a catalytic converter in part-load, will result in low power and dangerous conditions when the engine operates under high load.

The current ECU is also capable of controlling the ignition timing, however, modifications to the existing distributor is required, or a new distributor must be used.

The current ECU is designed only with this application in mind. This means that there is no excess functionality above this requirement. The resultant low cost and improvement in production speed will satisfy many criteria.