



# Paisley News



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As many of you know J E Paisley have completed the factory training and invested in the service tools and test equipment necessary to fully overhaul and test Denso **ECD V3** resistor and ROM pumps fitted to Toyota 2L-TE, 1KZ-TE, 5L-E and 3C-TE engines. Now these pumps are able to be stripped, cleaned, re-kited and tested at realistic prices. This has come about by our customer demands to have these pumps serviced and tested at a reasonable cost.

Recently the training was completed and the service and test equipment installed allowing the overhaul and testing of Denso **ECD V4** pumps fitted to Toyota 100 series Landcruiser, Mitsubishi Rosa and Isuzu engines

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## Exhaust gas recirculation

For those of you unfamiliar with EGR its basic function is to reduce nitrogen oxides (NOx) from diesel exhaust emissions. Diesel exhaust emissions consist mainly of nitrogen oxides NOx, hydrocarbons (HC) black smoke and particulates. NOx, HC and black smoke are the harmful components while CO is only a concern when the engine is over loaded or excessive E.G.R is performed.

### **Some of the main influences on exhaust emissions are:**

**1/ Engine condition**, poor compressions mean less heat and therefore incomplete fuel burn.

**2/ Injectors**, hole diameter, hole length, spray patterns, injector pressure and dribbly nozzles all affect HC formation

**3/ Injection rate**, the injection quantity and rate per injection period can be increased by increasing the plunger diameter and cam lift of the fuel injection pump. By doing so the combustion period is shortened reducing black smoke and HC, but this increases NOx. Unless pilot injection is implemented.

**4/ Injection pressure**, injecting fuel at high pressure speeds the atomisation of the fuel and is effective in reducing black smoke especially at low engine speeds where the swirl effect is at it's weakest. This reduces HC but increases NOx, unless again pilot injection can be incorporated into the injection process eg Common rail systems.

In it's simplest form E.G.R dumps exhaust gases back into the inlet manifold by way of a control valve. Water temperature, throttle position and engine speed values are fed into a ECU which opens and closes the E.G.R via a vacuum operated solenoid valve.

In general the follow conditions apply.

Below 70 °c under all loads the E.G.R is closed.

Above 70 °c under light loads the E.G.R is open and under full load the E.G.R is closed.

When a faulty E.G.R system is open under full load conditions the following engine symptoms may appear:

- Black smoke
- Lack power
- A high frequency, metallic rattle may be heard

The E.G.R normally fails in one of three ways.

1. Vacuum is continuously applied to the valve holding it open
2. The valve itself jams open
3. High exhaust back pressure acts on the valve head forcing it open under full load.

Making the EGR inoperative will help prove the EGR is the cause of the problem. Whether the system is then repaired or left by passed is for your customer to decide. The simplest way to make the EGR inoperative is to simply disconnect the vacuum supply to the valve, provided the valve is closed. Fitting a plate between either the exhaust or inlet manifold pipe is preferable.

This latter method is the only method to use if the ECU senses the valve position, as making the valve inoperative may throw a trouble code and put the system into limp home mode. New EGR systems with air flow meters can not be by passed.