

REPLACING LUCAS PETROL INJECTION PUMPS WITH BOSCH FUEL PUMPS

For some time now owners of cars using the Lucas Petrol Injection system have been encountering fuel delivery problems, particularly during hot weather, whilst using the original Lucas pump, and also when a replacement Bosch pump is fitted, without due consideration for the Bosch pumps' requirements.

The problem lies with the Lucas fuel pump itself. Most units have now been reconditioned at least once in their lives using second hand components and are in less than perfect condition. The composition of "unleaded" fuel, increases the chance of cavitations occurring where fuel in the overheating pump turns to a vapor, in which the pump spins uselessly. The fuel flow is cut and the engine is abruptly stopped.

At Revington TR we have tried a few solutions on the Lucas P.I. equipped TR5 and 6, including square-section cooling coils for the Lucas pump motor and, latterly, Bosch fuel pumps from other suppliers. These pumps did not last well, were also prone to cavitations, and caused resonance in the fuel lines. There are over 300 different Bosch fuel pumps. It is important that the correct unit is used and that it is mounted below the tank and does not have to suck through the C.A.V. filter.

As fuel, injected Mercedes or BMWs are not commonly seen stranded by the roadside with overheated Bosch pumps during the summer months we realized there must be an effective solution.

First, it is necessary to understand the design/installation criteria for the Bosch pump.

The pump cannot draw fuel up from a lower level (unlike the Lucas unit). It requires a flood feed, draws more current than the Lucas unit and normally has the paper filter after the pump.

When arranged correctly the Bosch pump will work well under all conditions and last longer. We have now sold many, many hundreds of these kits and when all criteria are met, the system will neither over-heat nor cavitate even when exposed to extremely high ambient temperature.

Investigations of the various parts of the Lucas system, which will remain when a Bosch pump is fitted, reveal that there are limitations. The Bosch pump requires a minimum of 2.6 litres per minute (LPM) free feed of fuel and preferably 5 LPM. When we took the fuel delivery pipe out of a TR5/6 fuel tank and allowed petrol to flow freely, with half a tank of fuel, we got 2.5 LPM. Not quite enough, but the best we could hope for without altering the fuel tank. When the 5/16" fuel delivery pipe was refitted [with 1/4" internal diameter (1/D)] the flow was immediately reduced to 1.7 LPM. When the Lucas filter and housing assembly was re-introduced into the line, this figure further reduced to 1.0 LPM. Clearly an inadequate feed. Add to this the normal practice of mounting the Bosch pump on the boot floor adjacent to where the Lucas pump was fitted (where it would be required to suck fuel up on a low tank of fuel which it is not designed to do) and it becomes obvious why the Bosch conversion has erstwhile had a less than glittering reputation.

At Revington TR, armed with the basic criteria, we designed a system, which allows the Bosch pump to work in its intended environment. Firstly, the pump must be sited as low as possible. With the Lucas filter assembly removed, the forward LH corner of the spare wheel pan is ideal in temperatures encountered in England. In much hotter environments, the pump can be sited outside of the spare wheel compartment, although this has been proved not to be generally necessary. We have many units in operation in Northern

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Page 2 of 3

Australia where temperatures are exceptionally high without problems. Between the tank and the pump we use stainless steel braided hose with large 3/8" bore and a simple in line gauze filter. A stainless steel braided hose with banjo unions connects the pump to a Bosch high-pressure filter, via a non-return valve. The outlet of the filter is fitted with an adaptor to which the original hose to the pressure relief valve is connected or our special hose RTR4048 can be used.

The assembly is held in a special bracket and secured (in the original version, RTR4001K) to the sidewall of the spare wheel tray with shock absorbing mountings. This kit was then improved to incorporate a tap (RTR4050) and then further improved to place the kit externally to reduce the possibility of fuel vapour contamination in the boot. This kit is part no. RTR4050XK. For those wishing to keep their Bosch pump components safe from the elements there is no technical reason for not using RTR4050K, just that as modern fuel permeates through the walls of rubber hoses even modern braided steel covered versions, it is highly likely that the boot (trunk) will smell of petrol.

Installed in this way, with a correctly specified pump (we have seen some installations using a pumps designed for 40PSI operation and pumps which are designed to be force fed with a fuel tank internally mounted primary pump) designed for 110-PSI operation, the pump should not cavitate and should assume a normal working life. This life will be slightly lower than on modern applications, because the highest pressure Bosch pump available is working right at the top of its safety margin.

When considering the conversion, the following should be noted:

1. TR5's and early TR6's do not have an anti-surge reservoir in the bottom of the tank. If the kit is fitted, these cars will cough on sharp corners with a low tank of fuel. The solution is a new tank. These are available in aluminum.
2. The tank you use must not be internally rusty or dirty. Remember that the pump cannot suck through a paper filter and large particles of rust will quickly block the gauze filter. The small gauze filter between the tank and the pump lives inside a glass tube and is intended only as an indicator. Any debris found in this filter should be taken as an indication that the tank or fuel supply is suspect.
3. The pressure relief valve must vent into the tank reservoir if you have a separate return from the metering unit this can be connected to the PRV return via a 'T' piece or connected to another tank inlet.
4. The Lucas pump takes 3.5 amps and the standard car is wired accordingly. The Bosch pump draws nine amps and will therefore require a separate feed and relay. The Bosch pump will not deliver full flow below 10 volts therefore operating battery voltage must not be less than 11.5 volts.
5. A tap can be fitted between the tank and the gauze filter to facilitate ease of filter cleaning/changing. This tap when open must not introduce a smaller bore - Revington TR can offer a kit with a suitable tap installed.

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Page 3 of 3

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We now manufacture a kit, which mounts under the rear wheel arch thus eliminating fumes, which sometimes occur when using unleaded fuel.

Please note that prices are a guide only - please refer to our current price list for price prevailing at time of purchase.

Bosch fuel pump kit	part number RTR4001K
Bosch fuel pump kit with tap, internally mounted	part number RTR4050K
Bosch fuel pump kit with tap, externally mounted	part number RTR4050XK
Relay kit	part number RTR4017K
Aluminum petrol tank	part number 312359XALK
Hose filter to PRV	part number RTR4048
Aluminium shield	part number RTR7259

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