Range Rover P38
ECU Upgrade Chip

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FITTING INSTRUCTIONS

Part Number - DA4497

Important Notes For Fitting New EPROM Chips Into The Lucas-Sagem GEMS ECU.

Please take the trouble to read these notes, which are provided to help you obtain a successful installation. The notes should be read completely before starting work, as some time spent now could avoid tears later! It is not our normal practice to provide EPROM chips for self-fitting except in exceptional circumstances, since the results cannot be guaranteed. Self-fitting is performed entirely at your own risk. This information is provided for your guidance, and whilst every care has been taken it is not guaranteed to be error free or totally comprehensive.

The ECU (Electronic Control Unit) is easily damaged by Static Electricity (ESD or Electro-Static Discharge). Therefore you need to use extreme care when working inside the ECU. If you do not have the correct facilities, the risk can be reduced by working on an earthed metal workbench (a stainless steel sink draining board fits this description!), or a large sheet of aluminium kitchen foil. Avoid wearing man-made fabrics whilst performing this type of work if possible, since they tend to generate Static Electricity (suggest cotton or wool clothing).

Please note that the EPROM and its decoder board are not covered by warranty in case of ESD damage, or incorrect fitting (especially plugged in the wrong way around). A small charge is made for replacement in these cases.

Never disconnect the ECU whilst the ignition is switched on, and especially not while the engine is running. Never work on the ECU whilst it is plugged in, even though it is only powered up when the ignition is switched on. If anything is unclear then please do not hesitate to contact your supplier. There's no such thing as a silly question, except the one you didn't ask although you needed to....

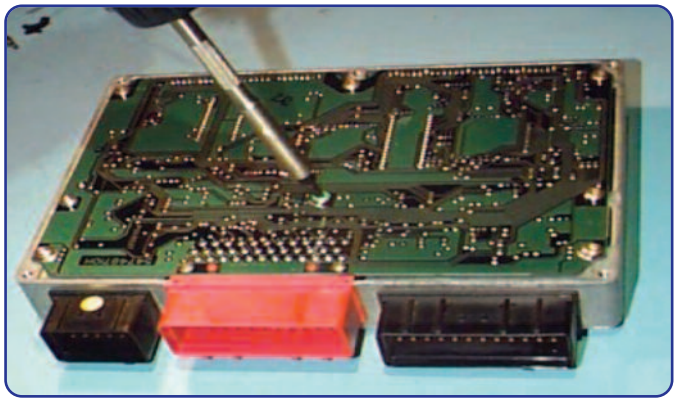
Fitting Instructions

Ensure that the vehicle ignition is switched off, although it is not necessary to disconnect the vehicle battery. Unplug and remove the ECU from the vehicle. The ECU is unplugged by pressing down the retaining clip on the side of each of the three plugs and pulling them away from the ECU body.

All screws used to assemble the ECU are TORX T20 M4. Place the ECU on an anti-static work surface with the label face up. Note that if you look carefully at the red connector in the centre, it is closer to the labelled side.

Remove the lid of the ECU by removing the five screws that secure it.

The circuit board itself may then be released by unscrewing the 8 screws that hold it in place, using the picture for assistance.

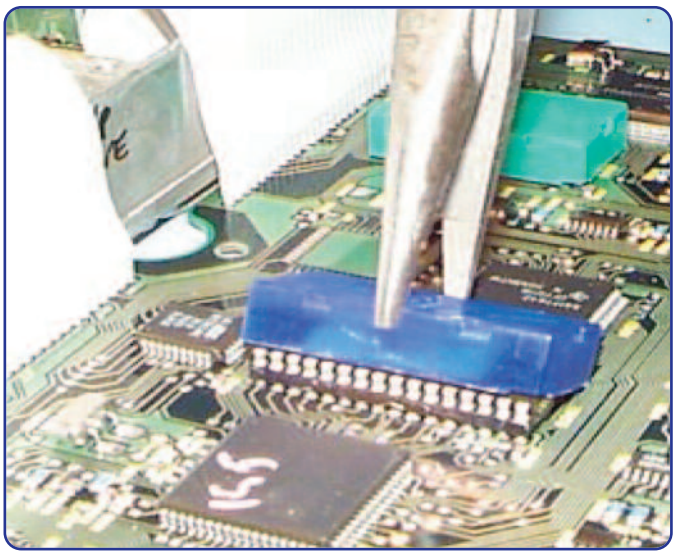


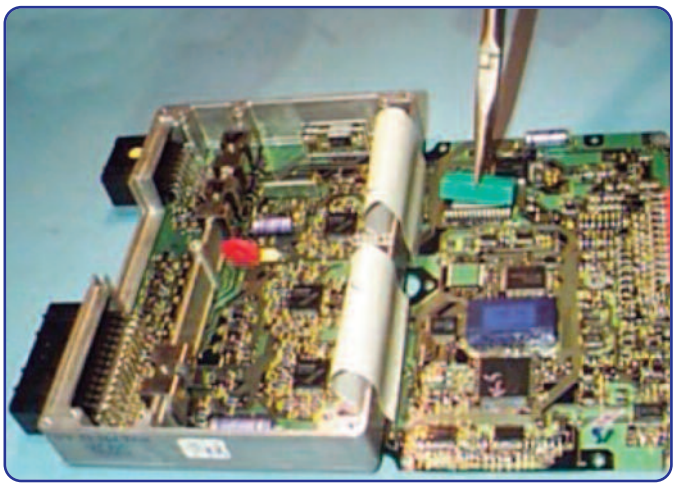
At this stage you will encounter the tamper detection system. When one or two of the screws are released, a squirt of clear liquid will be released. This is quite harmless and it will quickly evaporate. However it does make you jump the first time it happens!

FITTING INSTRUCTIONS - continued

The EPROM chips are always fitted in sockets in this type of ECU. There is a plastic cover over each one with the word LUCAS moulded on to it. The larger chip has a Blue cover, and the smaller one is Green.

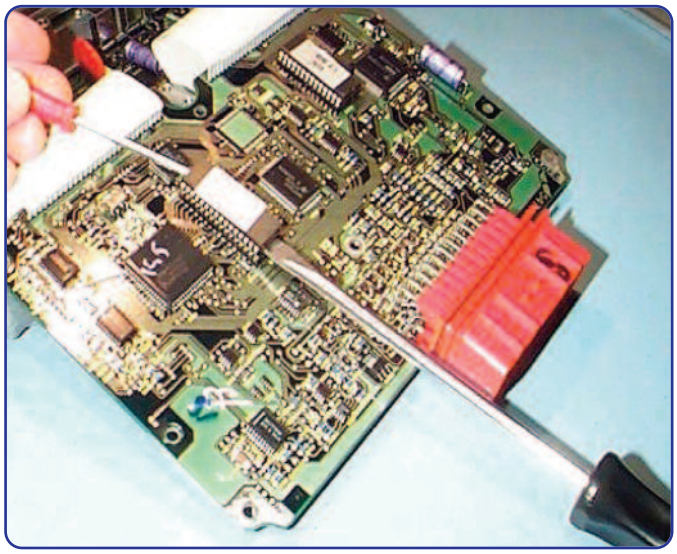
The cover must be removed with pliers as shown in the picture below. Note that the pliers are used to grip the cover firmly at least half way up the sides, to avoid pinching the socket underneath.





It may be necessary to rock the cover gently from side to side several times in order to release it from the circuit board – be patient and take your time!

Now the EPROM itself may be removed as follows, again as shown in the picture on the top right. Gently lever it out by placing a thin screwdriver blade between the chip and socket, and rotate the tip to prise it out.



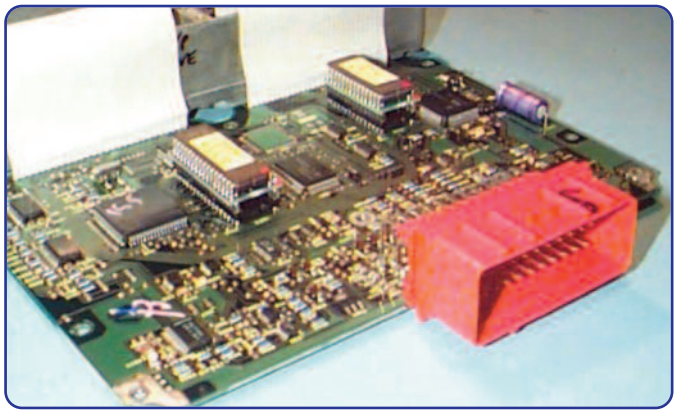
Take great care not to bend the pins of the old EPROM as it comes out. Be very careful to avoid damage the circuit board or socket underneath.

Pay particular attention to the orientation of the chips. Pin one is marked by a notch in one end of the chip (nearest the main red connector for the GEMS ECU).

A new EPROM chip must be fitted the same way round as the one it replaces, or else it will probably be destroyed (fry and die!). The decoder board and the EPROM chip are marked with a red paint spot by pin number one, in addition to any manufacturer's markings. If you look at the socket on the circuit board you will see that that also has a notch at one end, which identifies the pin one end. However we have seen the sockets fitted incorrectly in the circuit boards, so the most important thing is to pay close attention to the way the original EPROM was fitted.

The fitting order of the components is as follows. The green decoder board fits into the socket on the ECU circuit board, and the EPROM fits into the decoder board.

When fitting the new EPROM chip into the decoder board, take time to ensure that all the pins enter the socket correctly. It is quite easy for one or two pins to fold underneath during insertion. A good firm press will be required to seat the devices in the circuit. The picture below shows the correctly fitted chip.



Now reassemble the case and stick the provided label onto the outside of the ECU case.

Refit the ECU into the car by reversing the removal procedure. When the ignition is turned on for the first time without starting the engine, the fuel pump will be heard to run for three seconds and then stop. This is a good sign at this stage!

It is recommended that you retain the old chips and covers, and keep them in a safe place. This may be handy if you wish to retain the chips when you sell the vehicle, or in case the original ECU fails and needs to be exchanged one day (although they have proved to be exceptionally reliable in service so far). Please note that the chips cannot be replaced if you exchange them! Remember that the chips are still vulnerable to ESD deaths so please take care when handling them.

Setting Up After Fitting

It is important to understand that the Lucas-Sagem GEMS system is adaptive, and it will "learn" how to manage the engine over the first couple of hundred miles. The rest of the process actually continues over the first 3,000-Miles. Therefore there is no explicit setting up process required.

When the new chips are first fitted, there will be a small improvement in performance which is noticeable immediately, but the real benefits will not be observed until a couple of hundred miles have been covered.

Tornado series EPROM chips provide full diagnostic capabilities, which are fully compatible with the Land Rover Test-Book and Black Box Rovacom diagnostic systems.

Trouble Shooting

Due to the complexity of the Lucas-Sagem GEMS system, the chip upgrade should not be fitted if the vehicle has any existing engine faults. If in doubt then it is best to visit a dealer who is equipped with a Land Rover Test Book or Black Box Rovacom diagnostic system, and have the vehicle checked over. This is strongly recommended even where there is no obvious fault, although in 95% of installations there will be no problems.

If you have problems then **don't panic!** Your supplier can help you here. Most of the mistakes you can make have been made before. Just be honest and then we can help you. If there is any problem with the chipset then it will need to be returned for inspection before it can be replaced.

1. The fuel pump either doesn't run for three seconds, or runs continuously when the ignition is turned on.

Oh dear. At least one chip is probably plugged in the wrong way round, or one of the legs is bent underneath, or the ECU has been damaged during the process, or the EPROM/ECU is not plugged in yet.

2. I plugged in the EPROM chip the wrong way round and realised after I switched it on.

In this case it is almost always the EPROM chip and/or the decoder that is damaged, not the ECU. The best thing to do here is confess, and a replacement can be issued at a reasonable cost upon return of the dead one. Both the EPROM and the decoder contain unique signatures that are destroyed by incorrect connection.

3. The vehicle is difficult to start, or runs poorly.

This type of behaviour usually means that there are fault codes in the ECU. It is most likely that this behaviour was apparent before the chip upgrade was fitted. However in certain cases the upgrade can expose or highlight a previous fault. The cure for this is a visit to a dealer equipped with the Land Rover Test Book or Black Box Rovacom or Diagnos Autologic diagnostic system.

4. The "Check Engine" lamp remains illuminated when the engine is running.

Note that this information applies only to certain versions of the software. For all territories **except** North American Specification (NAS) vehicles, the "Check Engine" lamp will never be illuminated if there are fault codes stored within the ECU. If the lamp is illuminated when the engine is running after fitting the new EPROM chips, this means that there are fault codes in the ECU. These fault codes were probably present before the upgrade was performed, although the original software would have prevented the lamp from being illuminated. In any case the cause of any fault codes should be investigated immediately.

5. The "Check Engine" lamp does not illuminate when the ignition is turned on.

When the ignition is turned on but before the engine is cranked over, the "Check Engine" lamp should be illuminated (assuming the bulb has not failed). If the "Check Engine" lamp is not seen then the engine will not start when cranked. This means that the ECU has not been able to exchange the correct codes with the alarm/immobiliser system. As soon as the engine is cranked over, the "Check Engine" lamp should then be extinguished.