

Installation of Adapter board and High Boost EEPROM in Lotus Elan

Checklist

Disclaimer

This modification is intended for track day use to increase the maximum boost of the Lotus Elan. Installation and use are at your own risk. It is the owner's responsibility to ensure that this modification meets any local legal requirements. Any modification that increases power makes mechanical failures more likely as engine/drivetrain stresses increase. I accept no responsibility or liability for any failures caused by this upgrade.

If you do not accept this disclaimer then do not install the upgrade. You will be refunded (p&p excepted) if you return the upgrade undamaged within a month.

Modifications

The following common modifications will affect the functionality of the chip.

1. Fuel Cut Defenser (FCD)

The Elan must not have an FCD installed (this includes the BBR upgrade). The FCD is a device that prevents fuel cut on overboost. If your Elan has a performance exhaust from Paul Matty Sportscars (they often insist on one being fitted to combat boost creep) or it has another performance modification that allows it to boost beyond 0.9bar then there is a good chance one is present. DO NOT FIT IF YOU ARE IN ANY DOUBT – CONSULT SOMEONE WHO KNOWS WHAT TO LOOK FOR.

2. Manual Boost Controller (MBC)

Any MBC must be removed. It is usually a bleed valve in the pipe between the wastegate capsule and the BSV. Sometimes one is installed in place of the BSV. Either way the system should be restored to standard configuration BEFORE fitting the new chip.

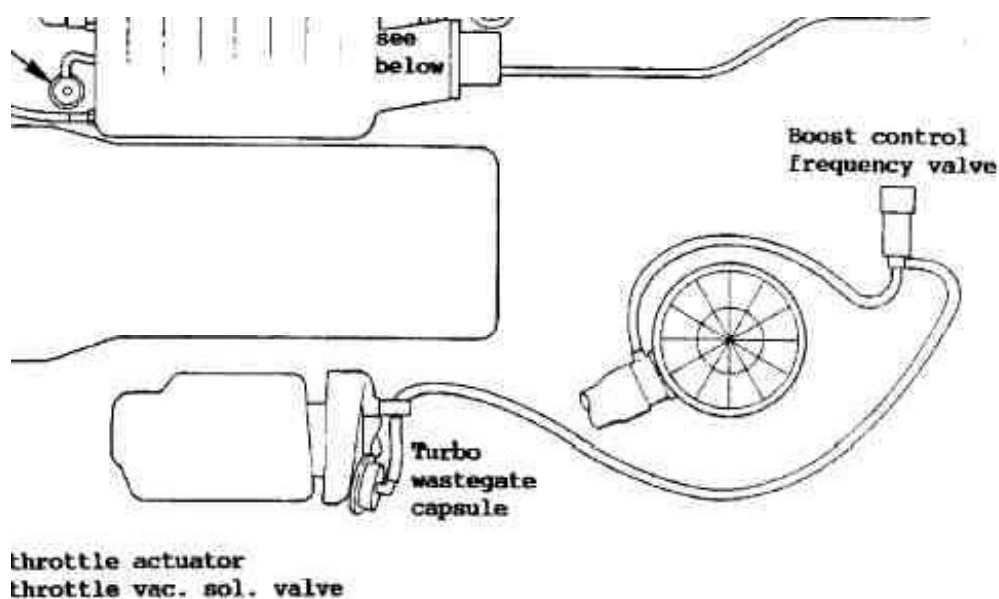


Figure 1 BSV (or BCFV) plumbing

3. Sports exhaust fitted (greater than 2 inch diameter)

If you have a large bore exhaust fitted (>2" bore) and suffer with boost creep this upgrade will not cure it. However, if an MBC was employed then its removal may have corrected the issue. It is advisable to check the hoses to the BSV for leaks thoroughly and to ensure unions are fully secured. Remember this line is pressurised under boost so the seals must be good. Test-drive the car to see if the creep has been resolved before fitting the chip. If boost increases beyond 0.95 bar then fuel cut will still occur with the chip and you should consider porting the wastegate, putting a constriction in the exhaust and whether its worthwhile installing the chip.

4. Blow-Off Valve

If a blow valve is fitted with a spring that leads to the valve opening with a boost pressure of less than the maximum target level then this effectively limit the boost to its cracking point and you will not achieve the rated boost for the chip. Should this occur I would advise it is rectified quickly (preferably before chip installation) as the turbo will spin very rapidly in this state due to the low resistance in the intake and the high BSV duty cycle applied by the ECU in an attempt to meet the target boost.

5. SuperChip

I am not familiar with this modification and so do not know what potential issues/conflicts with this upgrade. If you wish to install this chip in place of a SuperChips upgrade please contact me and I'll advise.

6. Upgraded Turbo

In principle this upgrade should work with a new turbo so long as the BSV plumbing is laid out as in figure 1 and the target boost is no more than 0.9bar or so. It is possible some further table changes will be required. Contact me with details.

7. No faults

If you have a problem – this will probably make it worse. Any misfire will be worse and if your cylinder head gasket is on the way out the extra boost will finish it off. Only install if the car is running perfectly.

Any doubts/questions please contact me.

A refund (excepting p&p) will be given if the upgrade is returned undamaged for any reason within a month of receipt.

Function

In the Elan boost from the turbo is limited using a wastegate, when this is open exhaust gasses bypass the turbo and drive is removed from it. An actuator opens the wastegate when the pressure in the output side of the turbo exceeds 0.41bar. In order to provide extra boost when high throttle openings are used, Lotus installed a solenoid valve on the input pipe to the wastegate actuator. The engine management unit looks up a target boost, the value of which depends on engine RPM and throttle opening, and it flutters the solenoid valve at the rate required to give this boost. The rate is determined using a feedback loop from the MAP sensor. In this upgrade the tables have been modified to allow higher boost values to be employed – up to 0.9 bar.

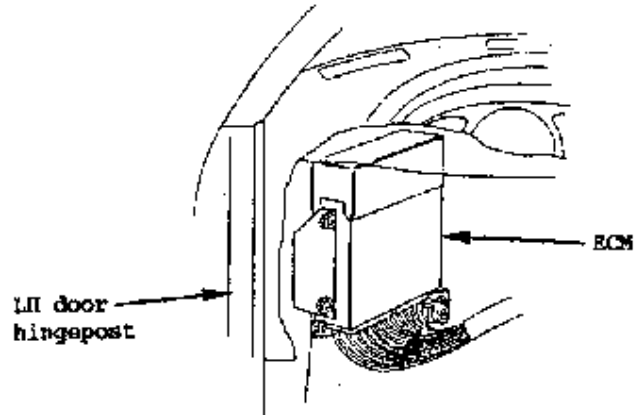
Installation

Locating the ECU

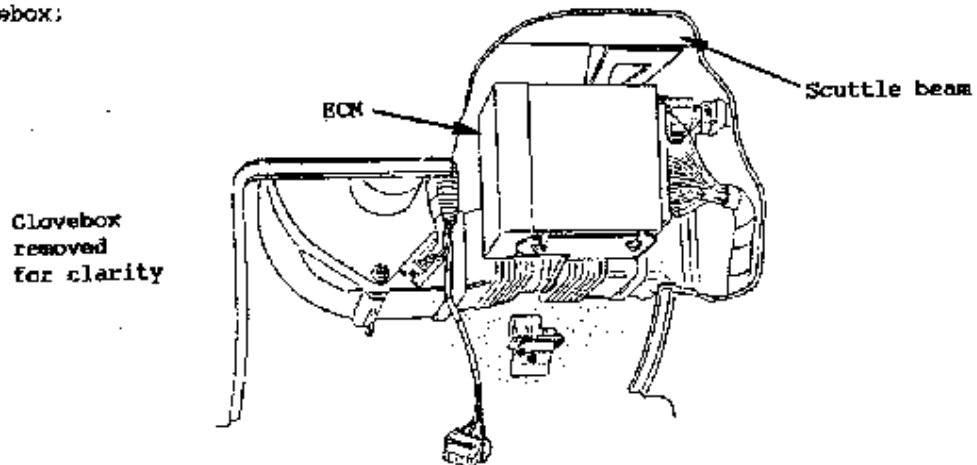
The position of the ECU in your car can be found by consulting the workshop manual:

The ECM is mounted:

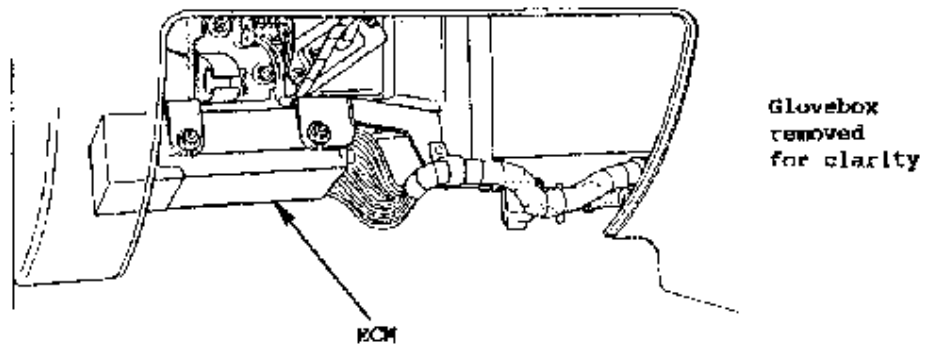
i) on LHD cars in the driver's footwell, outboard of the pedal box on the front bulkhead;



ii) on RHD heater cars, hanging from a scuttle beam bracket behind the glovebox;



iii) on RHD a.c. cars, below the blower fan housing in the passenger footwell.



1. Disconnect the battery
2. Locate the ECU.

In the RHD SE:

Access can be easily gained by flexing the top of the glove-box to defeat the catch and fully dropping the glove-box as shown:



Remove the two multipole plugs. These can be quite hard to get out - be patient and don't pull by the wires. Undo the two 10mm nuts and withdraw the ECU. In the case of the SE pivot the bottom clear of the bracket and pull it downwards

In the LHD Elan

1. Look up there and see what's what -- find the 2 10mm nuts on the side brackets -- the other side has rubber bungs and pops right out
2. With driver's door open, sit on floor right next to the car and reach right hand in and find the ECU by feel and the 2 nuts. (This is actually a very comfortable normal sitting position)
3. Put a 10mm ratchet spanner on the two nuts to loosen them a bit only
4. Undo the nuts carefully by hand -- don't drop and lose them!
5. Pull ECU out and fold it down on the harness
6. Remove the two multipole plugs. These can be quite hard to get out - be patient and don't pull by the wires.

3. Ensure you are earthed to prevent damage to either the ECU or the upgrade. The ECU has a lid held on by two 1/4" head screws. Undo these screws and remove the lid.



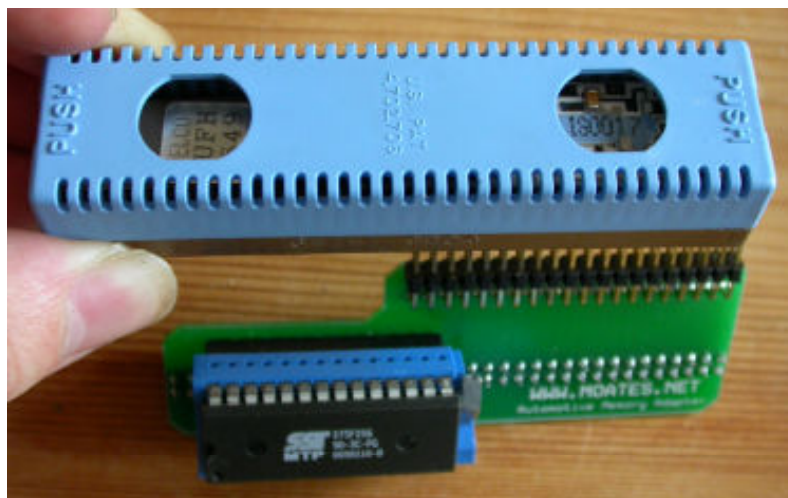
The blue-lidded MEMCAL and the retaining clips at each end can be clearly seen.

4. Push the clips at each end outwards to remove the MEMCAL from the ECU.



Notice the chip inside the MEMCAL can be seen through the opening on the left and the limp home circuitry through the window on the right in the picture above.

5. Take the MEMCAL and plug it into the Moates adapter card:



The side of the MEMCAL with the limp-home circuitry should be connected to the adapter board. In the picture above the chips of the MEMCAL and adapter can be seen to be on the same side.

6. The ECU casing can be opened up a little by taking the top and bottom edges of the casing at the open side and pushing them apart. This gives more room to insert the MEMCAL/adapter assembly. The adapter should be held with the adapter board horizontal and the MEMCAL pushed into the opening in the ECU case:



Move the assembly in to the case until the plug on the bottom of the adapter board is over the MEMCAL socket in the ECU. Don't use force, if the assembly is positioned correctly and the case is opened sufficiently it goes in quite easily.

7. Ensure the adapter card is correctly situated over the socket. Then push it home by applying pressure to both ends of the adapter board assembly. The catches will pop up to a vertical position when it is fully home.
8. Replace the plastic end piece,



the lid and the screws.

9. Remount in car, insert the two plugs and reconnect battery.

Testing

Turn on the ignition. The check engine light (CEL) should blink and stay on as normal. On starting the car should behave entirely normally. If the CEL remains on then you should disconnect the battery for a minute or two and retry. If the problem persists remove the ECU, check your handiwork and if necessary remove the upgrade.

If the CEL remains off and the car is running normally then test drive the car. Allow the engine to reach operating temperature before attempting any boost testing – the ECU will limit boost until the engine is warm. Once operating temperature has been reached, and the road conditions allow, use full throttle. The boost observed depends on the chip variant you have selected:

- **Kilimanjaro** The boost will remain standard until around 3000RPM then increase steadily with RPM until reaching a maximum of 0.8bar.
- **Everest** The boost will remain standard until around 2800RPM and increase to 0.9Bar by from around 3600RPM

If the boost goes off the scale, where boost creep was not present before and the boost gauge is working normally, then an FCD may be present – I'd recommend removal of the upgrade until the cause is identified and corrected.

If the boost does not reach the target value under full throttle and high revs then:

1. If a BOV is installed it may be opening early preventing full boost (see checklist section)
2. The TPS may be faulty maladjusted
3. The throttle cable may be maladjusted
4. Exhaust back-pressure (perhaps a dented exhaust or failing catalyst)
5. A leak in the intake track between the turbo and the intake plenum
6. Another pre-existing fault

If power is not what you expected then check the following:

1. Base timing

It is critical that the base timing is correct to achieve the power gains

2. Vacuum leaks

The vacuum line that feeds the vacuum reservoir often leaks from the elbow connected to the intake plenum near the throttle body. Under boost any leak causes loss of all the vacuum which prevents the secondary throttles from opening as they are vacuum actuated. This will effect performance.

3. Spark plugs

Some elans lose power and 'fluff' a bit at high and mid revs. Reducing the spark plug gap or installing iridium plugs works around this, although there must be an underlying cause.

4. Sensors

A sensor (CTS etc) may be faulty or out of calibration

Let me know if you have problems and I'll do my best to help.

Finally

I've dwelt on the possible problems quite a lot in this – don't worry its easy to do and I expect few problems if you use the checklist. Let me know what you think of it!