

The skinny on upgrading:

ENGINE MANAGEMENT SYSTEMS

The Electronic Control Unit (ECU) is a nifty little computer that senses all the stuff that effects a car's donk and then controls the fuel mix and ignition (among other things) so it runs pretty much spot on every time. Engine temperature, air temperature, the amount of oxygen in the exhaust, engine speed and load, throttle position and the car's speed are all things the ECU uses to calculate the right air-fuel mixture and when it's ignited. The way it controls this is by varying the time it opens and closes the fuel injectors, and the timing of the spark – these days they even control a turbo's boost pressure.

It's all really clever, except for one thing: the dude in the factory who programs your ECU is not into chucking performance bits on the car. He's on the side of evil bureaucrats who are all caught up on emissions and fuel economy and has therefore turned your potential weapon into an insipid shopping trolley. That means that when you do add an exhaust, turbo and/or intercooler, the ECU will have a seizure trying to compensate, and that can severely root your engine by making it too lean and detonating. Overseas manufacturers also don't take into consideration that Australia has different conditions that affect performance as well as shit fuel, so often you'll find that even the most hi-tech, of-the-floor car is not as right as it could be.

Rejoice then that there are good people in the world who have come up with a bunch of ways to snap your car's brain out of its factory stupor and give you gains of up to 35kW. These include adding another electronic component (often called an interceptor) in front of the ECU to alter the sensor input, replacing the chip (referred to as "chipping"), or getting in there and altering the software (remapping).

The first one is designed to trick a dumbarse early generation computer into thinking it's getting more or less of each of the variables that affect performance to make it over compensate and ultimately improve performance. But those

smart fellas in the factory have all but ruined their effectiveness by making their ECUs smarter and able to tell when another computer is feeding it shit. And coz they're also making it near impossible to upgrade chips, potentially significant power gains have been lost to technology. But where there's a will, there's a way – real-time computer remapping.

This can only be done by installing an aftermarket computer, either in place of the factory ECU (called "stand-alone") or in conjunction with it (called "piggyback"). This allows the fuel and ignition to be tuned via a laptop or hand controller on a dyno. Some computers give you the ability to switch between two different maps for race and street.

We mentioned before that adding performance

You can even do on-road dyno testing, external data logging and tuning on the fly with some of the software packages now available



Modern ECUs control not only ignition and fuel, but most of the car's other electronic components

bits can cause problems due to the original ECU's limited parameters (or mapping) being unable to cope with extra flow of air through the engine. Remapping allows the tuning to be spot on and, when dialled in right, means big performance gains with less chance of blow ups. Of course, a lot depends on the tuner's expertise.

Talk to any of the reputable aftermarket engine management people out there about what's right for your set-up. Some systems are designed for specific cars, so shop around to find what will suit yours. Just remember that if you ever put a pipe or any other go-fast bit on your late-model car, make sure you have the ECU's mapping set right. ●