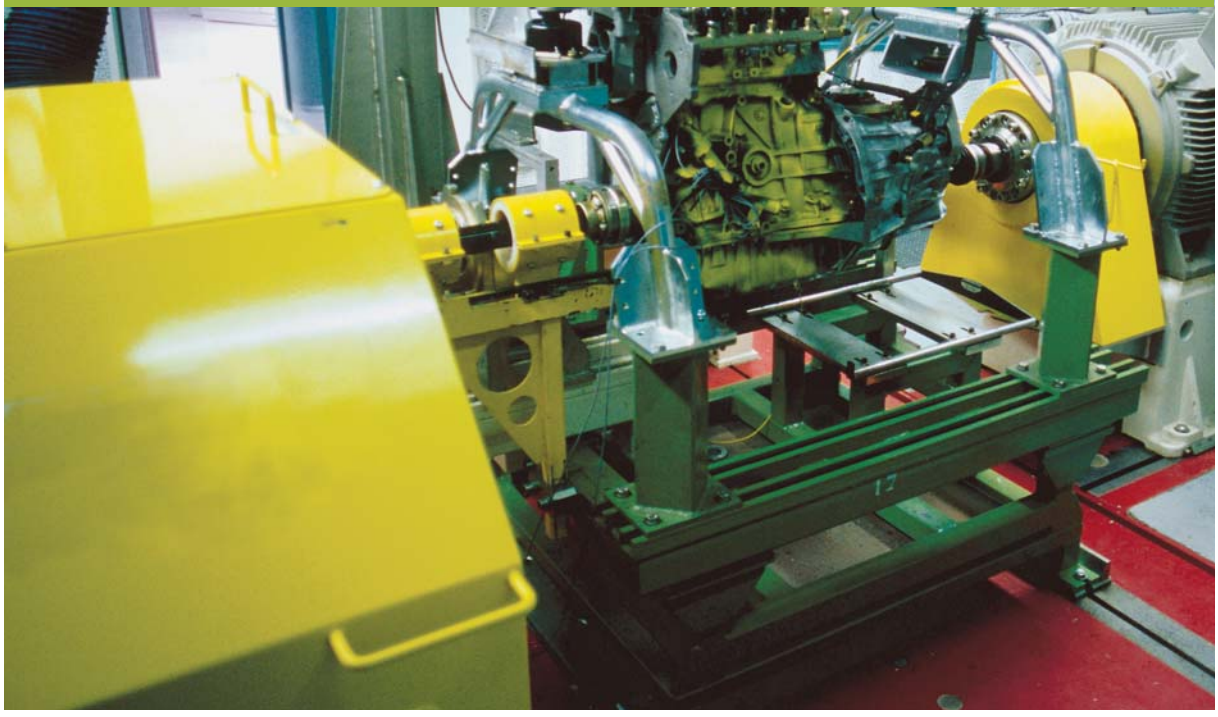
Engine management

The engine is the only source of energy for a car. Optimising its efficiency is therefore critical because it determines the engine's fuel consumption for a given amount of available power. In addition, **the greenhouse gases (CO_2) released by a combustion engine** are linked to its fuel consumption. The more efficient an engine is, the more it respects the planet, if only by making the most efficient use of natural resources.



RENAULT COMMUNICATION

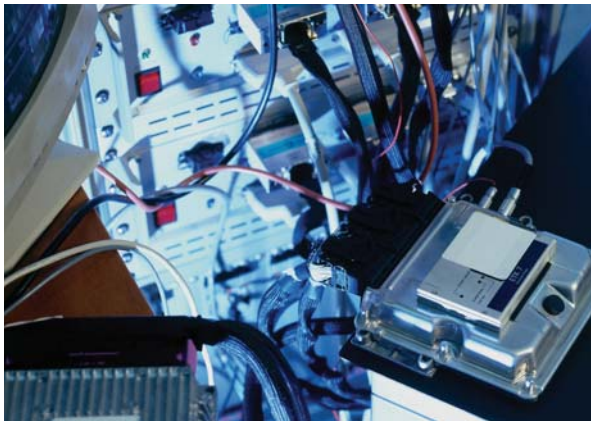
BASIC FACTS

Engine management must constantly strive to strike a balance between reducing fuel consumption and reducing exhaust emissions. The optimisation areas of these two entities are different and a trade-off has to be arrived at. The engine management unit does this by continually taking account of measurements made by multiple sensors which gather information about the driver's intentions and the condition of the engine. Based on this, the management unit makes real-time decisions, acting on dozens of parameters which will ultimately have a direct impact on engine function. Among these parameters are: fuel flow rate, ignition advance, air intake pressure, rate of exhaust gas recirculation, etc. Consequently it supervises, among other parameters, the richness of the air/fuel mix, which in turn determines engine efficiency and exhaust emissions (their composition and the proportions of different gases and components).

IN SHORT

An engine's exhaust emissions change depending on multiple parameters. The role of engine management is to continuously optimise engine running at the same time as managing supplementary features to reduce pollution to the minimum.

: HOW DOES IT WORK?



"Hardware in the loop": the computer is linked to a system that simulates the engine.

RENAULT COMMUNICATION

Engine management provides continuous dialogue between multiple computers so as to optimise engine running.

The engine management unit is one of many supervisor units in the vehicle and it provides real-time management of some fifty engine function parameters. To achieve this, it permanently analyses signals sent by the various sensors (accelerator position, engine mode, occurrence of knock, pressures, temperatures, etc.), decides the optimal engine adjustment and acts on the numerous actuators (fuel throttle, fuel injectors, exhaust gas recirculation valves, turbocharger blade positions, etc.), which will place the engine in the condition the supervisor has chosen. Among other operating parameters, the engine management unit acts on the richness (air/fuel mass ratio present in the combustion chamber), the key parameter that, under optimal conditions, will allow the catalytic converter of a petrol engine to convert polluting exhaust emissions of CO (carbon monoxide), HC (unburned hydrocarbons) and NO_x (nitrogen oxides) into non-toxic gases – water vapour and CO_2. In the case of a diesel engine equipped with a particulate filter, it is also an accurate control of the mix richness which controls the increase in exhaust gas temperatures during the periodic phases of filter regeneration (combustion of soot).

Dialogue between vehicle management units

The engine management unit also interacts with a host of other management units present in the vehicle, constantly sending and receiving instructions in real time, over a multiplexed CAN network. Thus, in the case of a vehicle equipped with automatic transmission or a robotised gearbox, it establishes a dialogue with the management unit computer, in order, for instance, to control engine speed and instantaneous torque very precisely. In this way it avoids unpleasant jolts during gear changes and delivers greater driveability.

In the case of an ASR anti-slip regulation system, a function which is controlled by a specific management unit (see sheet), information is exchanged constantly with the engine management unit so that it reduces engine torque as soon as slip of the drive wheels is detected. Certain accessories, such as air-conditioning (see sheet), also inform the injection computer of the amount of power that they are drawing so that it can modify its behaviour as well, in particular for idling mode management.

Even the passive safety system is constantly connected to the engine management unit. In this way, the airbag release sensor, which is capable of detecting fast deceleration of the vehicle, asks the engine management unit to immediately cut the fuel pump if it is involved in a violent collision.

Engine supervision is thus based on a continual dialogue between some twenty vehicle computers to optimise engine functioning, as much in terms of output as in terms of exhaust emissions, while maintaining driving comfort.