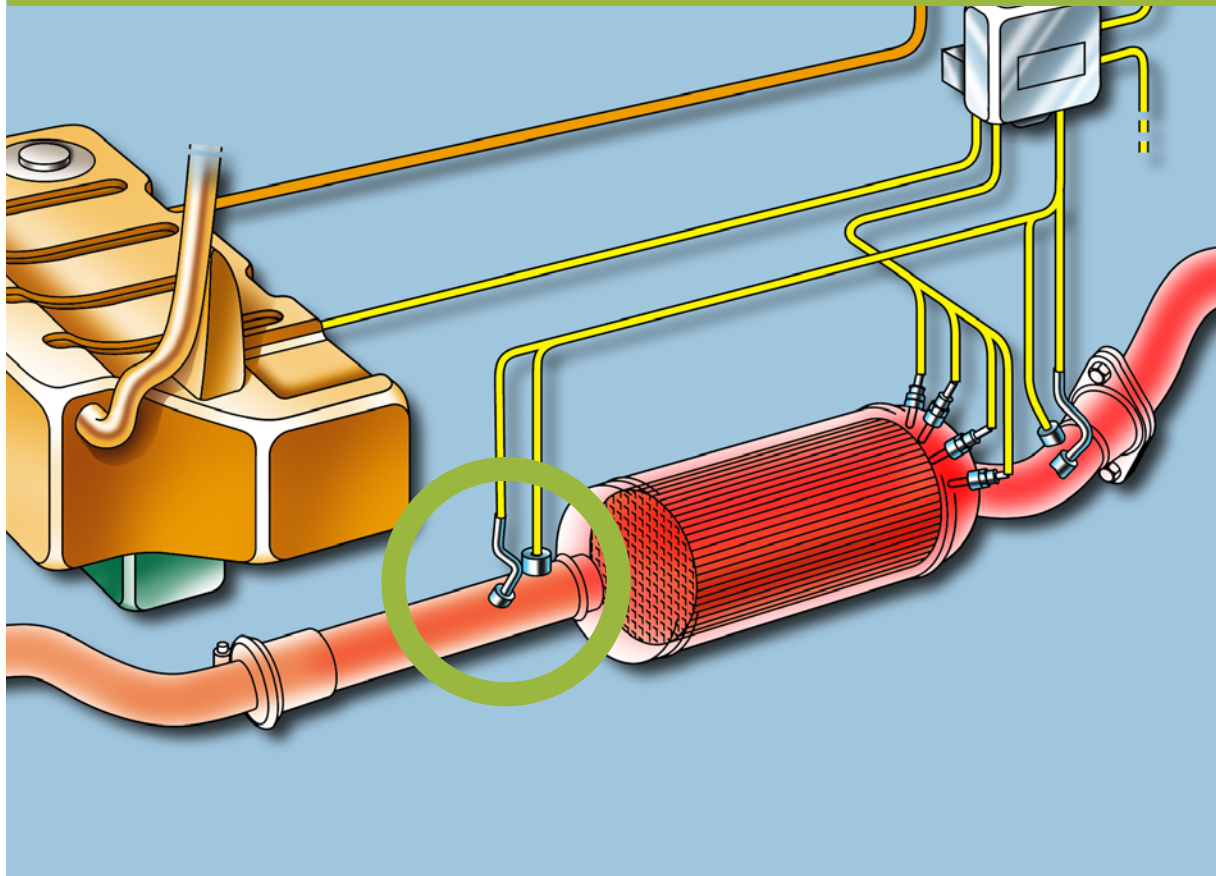




The lambda probe

> The lambda probe is an inseparable accessory for the catalytic converter, whose functioning it optimises. In order to maximise the efficiency of the catalytic converter, **the oxygen content of exhaust gases must be perfectly calibrated.** The role of the lambda probe is to indicate the oxygen concentration to the injection computer, so it can adjust the fuel/air mixture to meet the needs of the catalytic converter.



RENAULT COMMUNICATION

> BASIC FACTS

For a catalytic converter to function optimally, the concentration of the mixture must be 1 gram of fuel for 14.7 grams of air. If the proportion of fuel in the mixture is greater than this, the level of carbon monoxide in the exhaust is too high. Conversely, if the mixture contains too much air, then it is the nitrogen oxide emissions that are too high. While the injection computer is capable of making a very fine adjustment to the proportions of the air/fuel mixture supplied to the engine, it is nonetheless necessary for it to quantify the results of its actions in order to optimise them. By measuring the level of oxygen present in the exhaust gases, the lambda probe provides this feedback. To perform its measurement, it is posi-

tioned immediately after the engine, upstream of the first stage of the catalytic converter.

IN SHORT >>>

The lambda probe measures the concentration of oxygen in the exhaust gases to enable the injection computer to adjust it to meet the needs of the catalytic converter.



3 HOW DOES IT WORK?

The core of the lambda probe is a small porous ceramic cylinder made of zirconium dioxide “enriched” with traces of yttrium oxide (Y_2O_3). It is shaped like a small test tube. The external surface is enveloped by exhaust gases while the internal surface, in contact with a reference cavity (ambient air), is finely coated with platinum, which is also porous. This combination works like a cell which creates voltage in proportion to the difference in oxygen concentration between the internal and external surfaces of the probe. This voltage (of between 0 and 1 v) results from an ionic exchange which occurs when the oxygen crosses these porous milieus. By comparing the voltage with a reference value, the injection computer adjusts the richness of the air/fuel mixture. It thus sets the level of oxygen

needed for catalysis to occur under good conditions. If the probe's voltage is higher than the reference voltage, the mixture is considered to be rich, and the computer has to shorten the opening time of the injector(s) to reduce the richness of the mixture. If the probe's voltage is lower than the reference voltage, the computer will increase the richness of the mixture.

For diesel engines, proportional probes are now replacing lambda probes. Capable of measuring the oxygen content of exhaust gases very accurately, they enable the quantity of fuel injected to be proportioned very precisely. As a result, the engine's polluting emissions are better controlled because the catalytic converter can operate at full capacity.