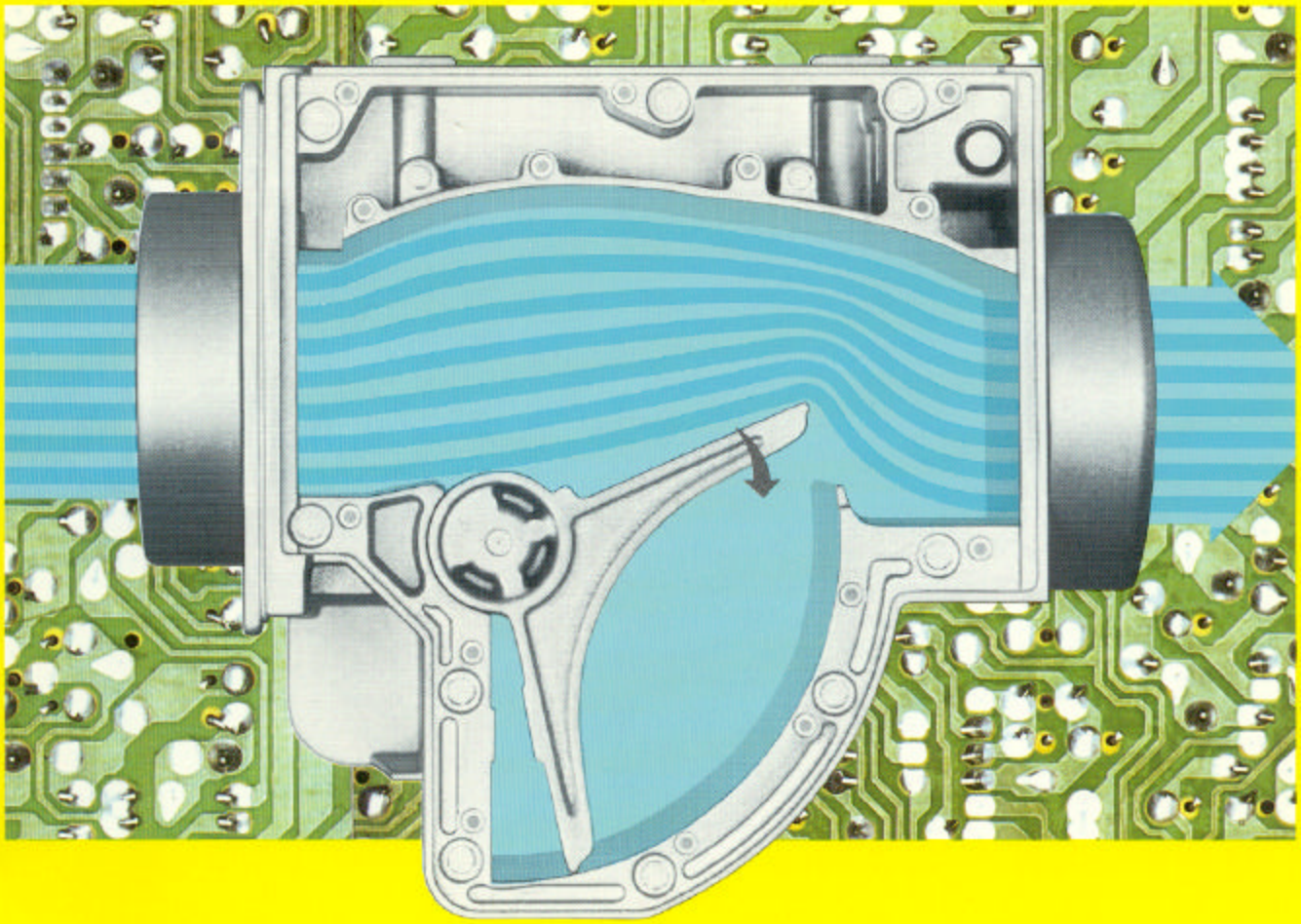
Gasoline Fuel-Injection System L-Jetronic

Edition 95/96



Technical Instruction

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L-Jetronic

Since their introduction, Jetronic fuel-injection systems have proved themselves millions of times over under the harsh conditions of everyday driving.

The on-going development of the control unit and the sensors has led from the D-Jetronic to the L-Jetronic, and resulted in this fuel-injection system becoming even more precise and reliable.

New circuitry for the evaluation of the sensor signals has led to more economical and more sophisticated engine operating characteristics. Thanks to the employment of the Lambda sensor, and the integration of the Lambda closed-loop control unit, the L-Jetronic can already comply today with the exhaust-gas legislation of tomorrow. This booklet tells you all you want to know about the latest developments in the L-Jetronic.

Combustion in the spark-ignition engine

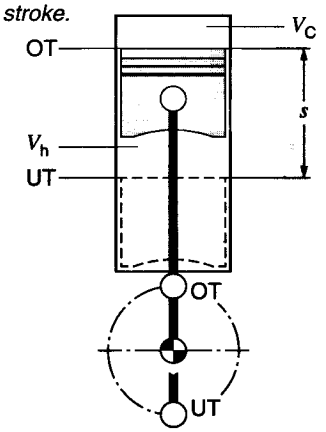
The spark-ignition or Otto-cycle engine

Principles

The spark-ignition or Otto-cycle[1]) engine is a combustion engine with externally supplied ignition which converts the energy contained in the fuel into kinetic energy.

The spark-ignition engine employs a mixture-formation apparatus located outside the combustion chamber to form an air-fuel mixture (based on gasoline or a gas). As the piston descends, the mixture is drawn into the combustion chamber, where it is then compressed as the piston moves upward. An external ignition source, triggered at specific intervals, uses a spark plug to initiate combustion in the mixture. The heat released in the combustion process raises the pressure within the cylinder, and the piston pushes down against the crankshaft, providing the actual work energy (power). After each combustion stroke the spent gases are expelled from the cylinder and a fresh air-fuel mixture is drawn in. In automotive engines this exchange of gases is generally regulated according to the four-stroke principle, with two crankshaft revolutions being required for each complete cycle.

Fig. 1: Design concept of the reciprocating piston engine
TDC Top Dead Center, BDC Bottom Dead Center, V_h Stroke volume, V_C Compression volume, s Piston stroke.



The four-stroke principle

The four-stroke spark-ignition engine employs gas-exchange valves to control the gas flow. These valves open and close the cylinder's intake and exhaust tracts:

1st stroke: Induction
2nd stroke: Compression and ignition
3rd stroke: Combustion and work
4th stroke: Exhaust.

Induction stroke
Intake valve: open,
Exhaust valve: closed,
Piston travel: downward,
Combustion: none.

The piston's downward motion increases the cylinder's effective volume and pulls in fresh air-fuel mixture through the open intake valve.

Compression stroke
Intake valve: closed,
Exhaust valve: closed,
Piston travel: upward,
Combustion: initial ignition phase.

[1]) After Nikolaus August Otto (1832 – 1891), who unveiled the first four-stroke gas-compression engine at the Paris World Exhibition in 1878.