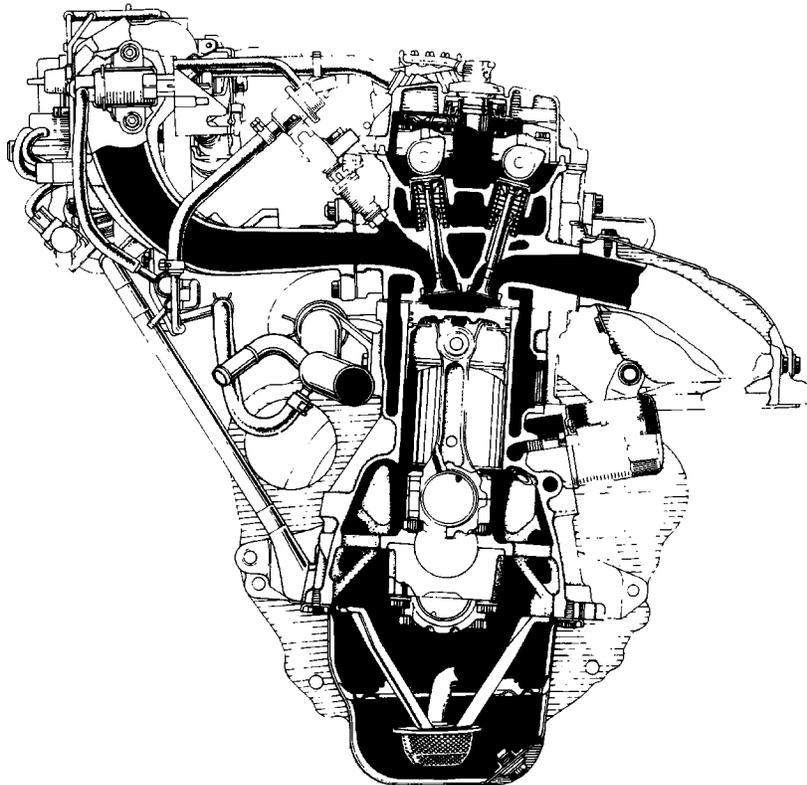
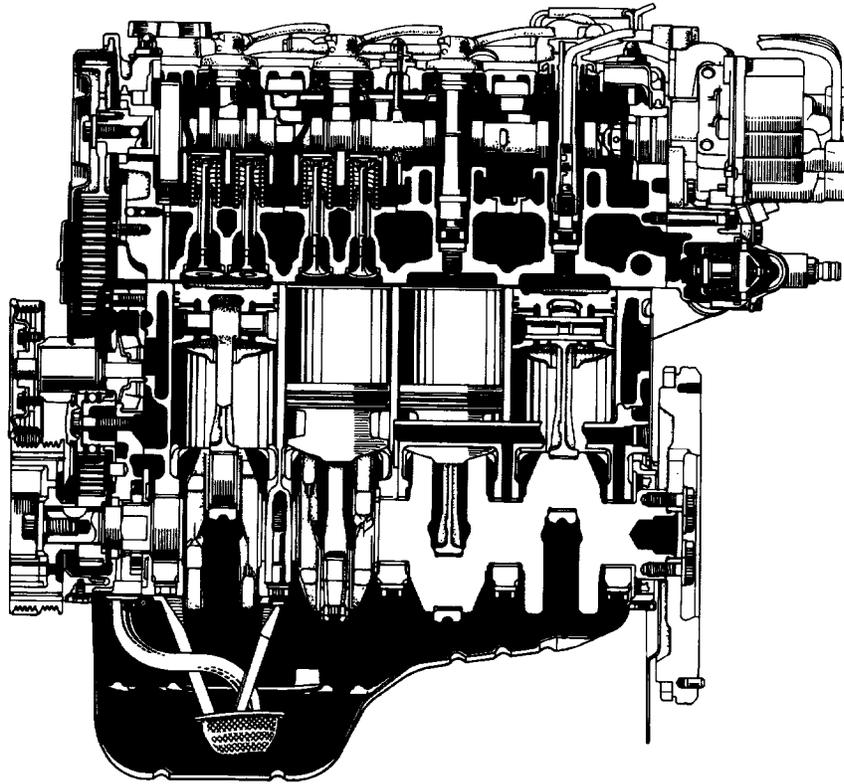


# ENGINE MECHANICAL

## DESCRIPTION (4A-FE)

The 4A-FE engine is an in-line, 4-cylinder, 1.6 liter DOHC 16-valve engine.



The 4A-FE engine is an in-line, 4-cylinder engine with the cylinders numbered 1 – 2 – 3 – 4 from the front. The crankshaft is supported by 5 bearings inside the crankcase. These bearings are made of aluminum alloy.

The crankshaft is integrated with 8 weights for balance. Oil holes are placed in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components.

The ignition order is 1 – 3 – 4 – 2. The cylinder head is made of aluminum alloy, with a cross flow type intake and exhaust layout and with pent-roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.

The intake manifold has 4 independent long ports and utilizes the inertial supercharging effect to improve engine torque at low and medium speeds.

Exhaust and intake valves are equipped with irregular pitch springs made of special valve spring carbon steel which are capable of functioning no matter what the engine speed.

The exhaust camshaft is driven by a timing belt, and a gear on the exhaust camshaft engages with a gear on the intake camshaft to drive it. The cam journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head. Lubrication of the cam journals and gears is accomplished by oil being supplied through the oiler port in the center of the camshaft.

Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.

The resin timing belt cover is made of 3 pieces. A service hole is provided in the No. 1 belt cover for adjusting the timing belt tension.

Pistons are made of high temperature-resistant aluminum alloy, and a depression is built into the piston head to prevent interference with the valves.

Piston pins are the semi-floating type, with the pins fastened to the connecting rods by pressure fittings, allowing the pistons and pins to float.

The No. 1 compression ring is made of stainless steel and the No. 2 compression ring is made of cast iron. The oil ring is made of a combination of steel and stainless steel. The outer diameter of each piston is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No. 1 and No. 2 work to prevent gas leakage from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion chambers.

The cylinder block is made of cast iron. It has 4 cylinders which are approximately twice the length of the piston stroke. The top of each cylinder is closed off by the cylinder head and the lower end of the cylinders becomes the crankcase, in which the crankshaft is installed. In addition, the cylinder block contains a water jacket, through which coolant is pumped to cool the cylinders.

The oil pan is bolted onto the bottom of the cylinder block. The oil pan is an oil reservoir made of pressed steel sheet. A dividing plate is included in side the oil pan to keep sufficient oil in the bottom of the pan even when the vehicle is stopped suddenly and the oil shifts away from the oil pump suction pipe.