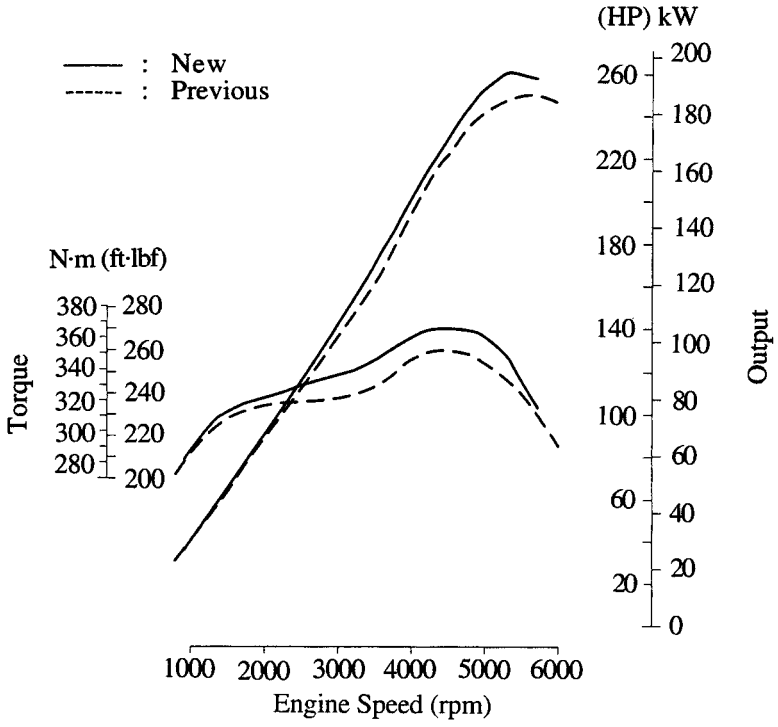
■ 1UZ–FE ENGINE

1. Description

Various improvement have been made to the 1UZ–FE engine in order to realize weight reduction and low–friction performance. As a result, the engine provides both high power output and low fuel consumption, while reducing noise and vibration for quieter operation.

2. Engine Specifications and Performance Curve

1UZ–FE Engine / Item			New	Previous
No. of Cyls. & Arrangement			8–Cylinder, V Type	←
Valve Mechanism			32–Valve DOHC, Belt & Gear Drive	←
Combustion Chamber			Pentroof Type	←
Manifolds			Cross–Flow	←
Fuel System			SFI	MFI
Displacement		cm^3 (cu. in.)	3969 (242.1)	←
Bore x Stroke		mm (in.)	87.5 x 82.5 x (3.44 x 3.25)	←
Compression Ratio			10.4 : 1	10.0 : 1
Max. Output		[SAE–NET]	194 kW @ 5300 rpm (260 HP @ 5300 rpm)	186 kW @ 5600 rpm (250 HP @ 5600 rpm)
Max. Torque		[SAE–NET]	366 N·m @ 4500 rpm (270 ft·lbf @ 4500 rpm)	353 N·m @ 4400 rpm (260 ft·lbf @ 4400 rpm)
Valve Timing	IN.	Open	6°BTDC	3°BTDC
		Closed	46°ABDC	41°ABDC
	EX.	Open	46°BBDC	←
		Closed	3°ATDC	←
Fuel Octane Number		(RON)	96	←
Oil Grade			API SH EC–II, ILSAC or Better	←



3. Features of 1UZ–FE Engine

The features of the 1UZ–FE engine and differences between ’96 SC400 and ’95 LS400 are listed below.

Item	Features	’96 SC400	’95 LS400
Engine Proper	● The water jacket configuration in the cylinder head is modified to improve the cooling performance in the area surrounding the combustion chamber in order to increase the engine’s anti–knocking performance. ● Passage holes are provided in the crankcase of the cylinder block to reduce pumping loss. ● The shape of the piston is modified to produce a lightweight and low–friction piston. At the same time, the piston rings are given less tension to reduce friction loss. ● The piston pin, connecting rod, and crankshaft are made lightweight to reduce the noise and vibration.	○	○
Valve Mechanism	● The valve timing and amount of valve lift of the intake valve are modified. ● The valve spring is given less tension to reduce friction loss. ● The crankshaft timing pulley and camshaft timing pulleys are made more lightweight.	○	○
Lubrication System	● An aluminum alloy gasket is used on the oil drain plug of the oil pan.	○	○
Cooling System	● The number of water pump rotor blades is increased from 7 to 12.	○	○
Intake and Exhaust System	● The exhaust manifold is changed from the single type to the semi–dual type to improve exhaust efficiency.	—	○
Starting System	● A compact and lightweight starter with higher torque is used to improve the engine’s startability.	○	○
Engine Control System	● The hot–wire type mass air flow meter improves the accuracy of the intake air volume measurement. ● A sequential multiport fuel injection system improves the engine response and reduces exhaust emissions. ● The diagnosis system conforms to OBD–II.	○	○
Emission Control System	● An EGR gas cooler is adopted in the EGR system to improve the engine’s anti–knocking performance.	○	○

4. Engine Control System

General

The engine control system of the new 1UZ–FE engine is basically same in construction and operation as that of the 1UZ–FE engine for the ’95 LS400.

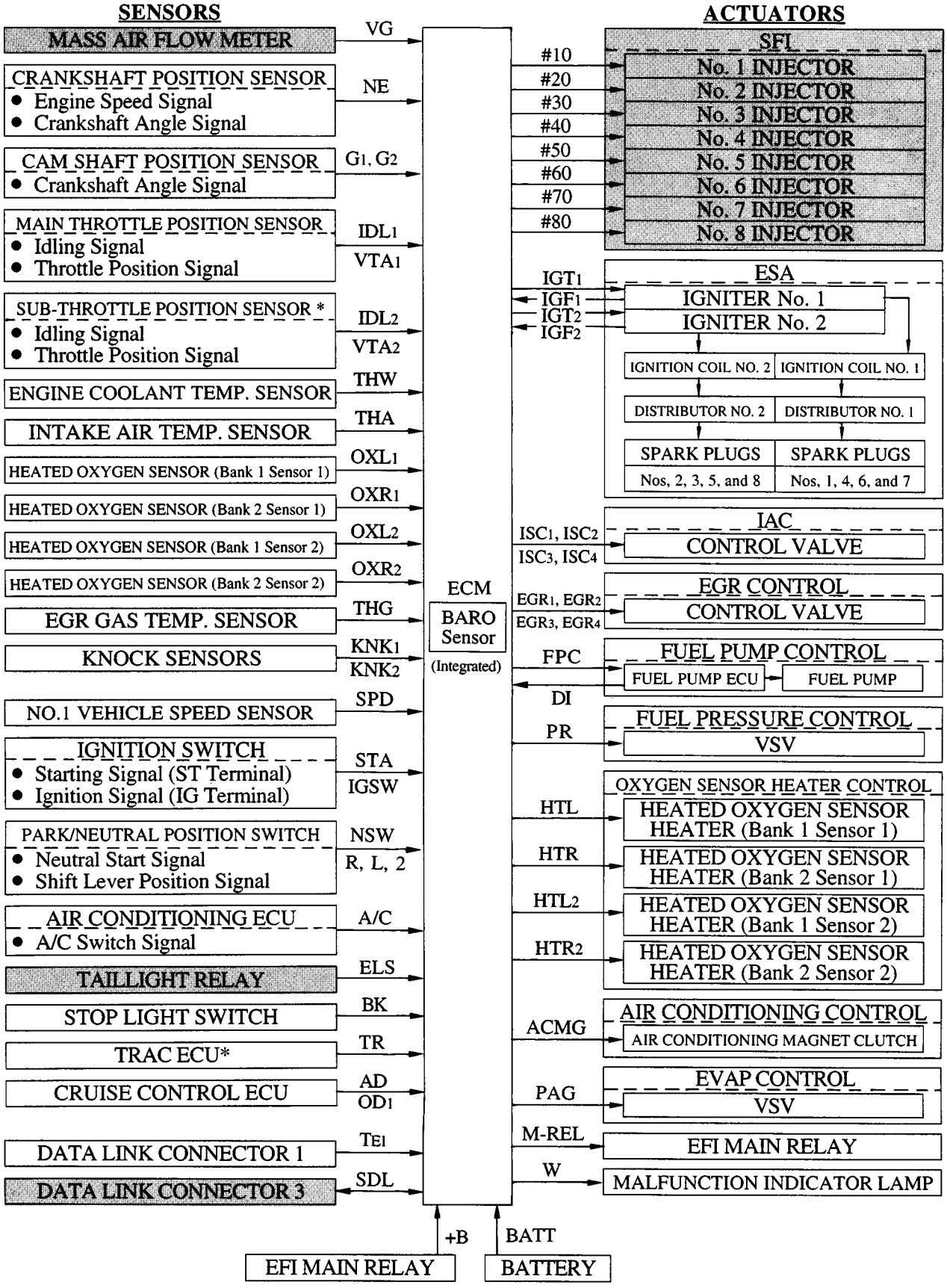
Comparison of the engine control system between the 1 UZ–FE engine for the ’96 SC400, ’95 LS400 and ’95 SC400 is as follows.

System	Outline		’96 SC400	’95 LS400	’95 SC400
SFI (Sequential Multiport Fuel Injection)	An L-type SFI system directly detects the intake air volume with a hot wire type mass air flow meter.		○	○	—
	An L-type MFI system directly detects the intake air volume with an optical Karman–Vortex type volume air flow meter.		—	—	○
	The fuel injection system is a sequential multiport fuel injection system.		○	○	—
	The fuel injection system is a 4–group type and injects to 2 cylinders each.		—	—	○
ESA (Electronic Spark Advance)	Ignition timing is determined by the ECM based on signals from various sensors. Corrects ignition timing in response to engine knocking.		○	○	○
	Torque control correction during gear shifting has been used to minimize the shift shock.		○	○	○
	The dwell angle control is implemented by the ECM.		○	○	—
	2 knock sensors are used to improve knock detection.		○	○	○
IAC Idle Air Control)	A step motor type IAC system controls the fast idle idle and idle speeds.		○	○	○
Fuel Pump Control	Under light engine loads, pump speed is low to reduce electric power loss.	Uses a fuel pump relay and a fuel pump resistor.	—	○	—
		Uses a fuel pump ECU.	○	—	○
Fuel Pressure Control	In hot engine conditions, the fuel pressure is increased to improve restartability.		○	○	○
Oxygen Sensor Heater Control	Maintains the temperature of the oxygen sensors at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.		○	○	○

System	Outline	’96 SC400	’95 LS400	’95 SC400
Air Conditioning Cut–Off Control	By controlling the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.	○	○	○
EGR Control	Drives the EGR valve with step motor, controlling the EGR volume in accordance with the engine conditions.	○	○	○
Evaporative Emission Control	The ECM controls the purge flow of evaporative emissions (HC) in the charcoal canister in accordance with engine conditions.	○	○	○
Diagnosis	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.	○	○	○
	The diagnosis system complies with OBD–II.	○	○	—
Fail–Safe	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in memory.	○	○	○

Construction

The configuration of the engine control system in the 1UZ–FE engine of the '96 SC400 is as shown in the following chart. Shaded portions ▭ differ from the 1UZ–FE engine of the '95 SC400.



*: Vehicles equipped with TRAC (Traction Control) system.