

## ENGINE CONTROL SYSTEM

### 1. General

The engine control system for the 1GR-FE engine has following system.

System	Outline
SFI ( Sequential Multiport Fuel Injection ) (See page 49)	An L-type SFI system directly detects the intake air mass with a hot wire type mass air flow meter.
ESA ( Electronic Spark Advance )	<ul style="list-style-type: none"> <li>● Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking.</li> <li>● This system selects the optimal ignition timing in accordance with the signals received from the sensors and sends the (IGT) ignition signal to the igniter. The default ignition timing is set to 10° BTDC.</li> </ul>
ETCS-i ( Electronic Throttle Control System-intelligent ) (See page 50)	<p>Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle.</p> <ul style="list-style-type: none"> <li>● A link-less type is used, without an accelerator cable.</li> <li>● An accelerator pedal position sensor is provided on the accelerator pedal.</li> <li>● A no-contact type throttle position sensor and accelerator pedal position sensor are used.</li> </ul>
VVT-i ( Variable Valve Timing-intelligent ) (See page 55)	Controls the intake camshaft to an optimal valve timing in accordance with the engine condition.
ACIS ( Acoustic Control Induction System ) (See page 59)	The intake air passages are switched according to the engine speed and throttle valve opening angle to provided high performance in all speed ranges.
Fuel Pump Control (See page 62)	<p>The fuel pump speed is controlled by the fuel pump relay and the fuel pump resistor.</p> <p>A fuel cut control is adopted to stop the fuel pump when the airbag is deployed during front or side collision.</p>
Air Fuel Ratio Sensor, Oxygen Sensor Heater Control	Maintains the temperature of the air fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.
Evaporative Emission Control (See page 63)	<p>The ECM controls the purge flow of evaporative emission (HC) in the charcoal canister in accordance with engine conditions.</p> <p>A pressure gauge is attached to the service port, which is provided between the charcoal canister and the VSV (for purge valve), in order to detect an evaporative emission leakage.</p> <p>System construction and control logic have been made to comply with LEV-II evaporative emission regulation.</p>
Air Conditioning Cut-off Control	By turning the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Engine Immobiliser	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid ignition key.
Starter Control ( Cranking Hold Function ) (See page 73)	Once the ignition switch is turned to the START position, this control continues to operate the starter until the engine started.
Diagnosis (See page 75)	<p>When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.</p> <p>All the DTCs (Diagnostic Trouble Codes) have been made to correspond to the SAE controlled codes.</p>
Fail-Safe (See page 75)	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.