
GROUP 13A

MULTIPOINT FUEL INJECTION (MPI) <4G64>

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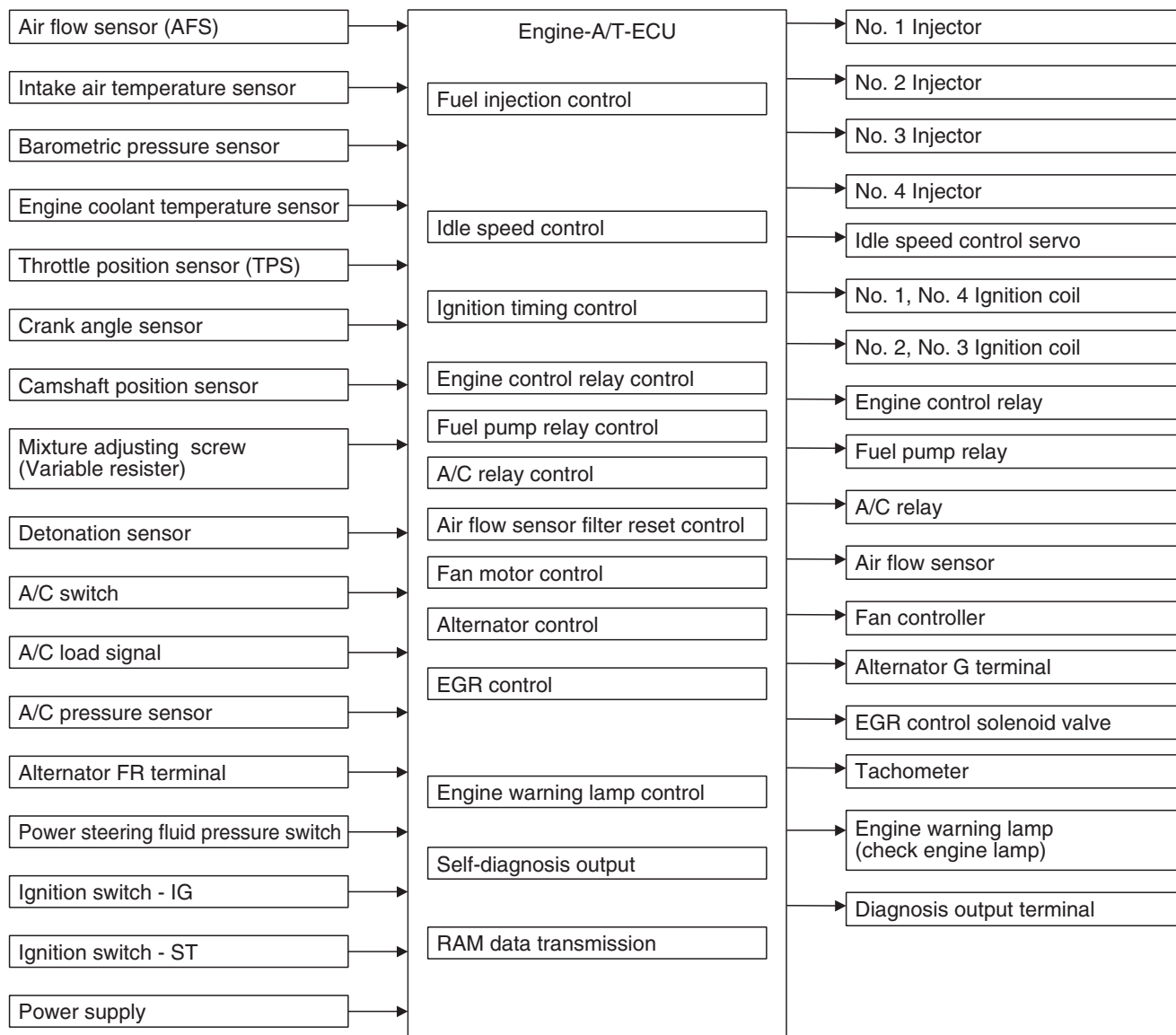
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GENERAL INFORMATION

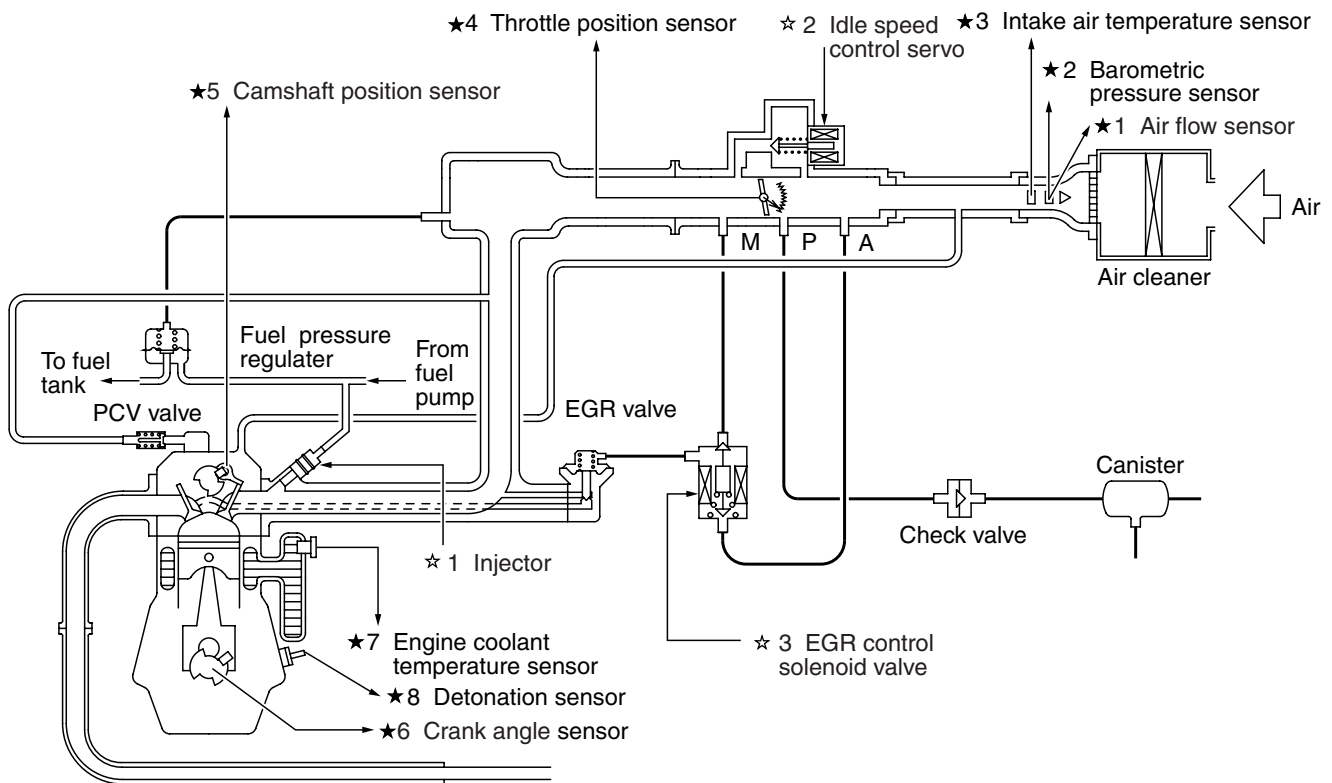
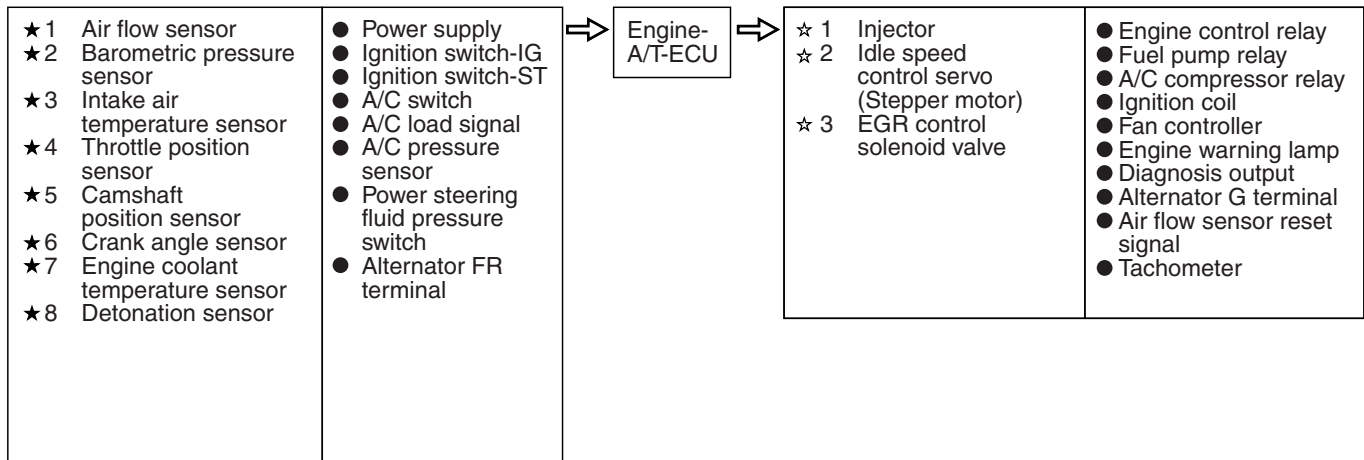
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The control system is basically the same as that of the 4G6 engine used in the Galante.

SYSTEM BLOCK DIAGRAM



MULTI POINT FUEL INJECTION SYSTEM DIAGRAM



LIST OF COMPONENT FUNCTIONS

Name		Function
ECU	Engine-A/T-ECU	Uses the signals input from the various sensors to control operation of actuators in accordance with the driving conditions.
Sensors	Ignition switch-IG	Detects the ON/OFF position of the ignition switch. When this signal is input to the engine-A/T-ECU, power is supplied to components such as the injectors, air flow sensor, idle speed control servo and crank angle sensor.
	Ignition switch-ST	Detects whether the engine is cranking. The engine-A/T-ECU controls the fuel injection, throttle valve opening angle and ignition timing to the appropriate settings based on this signal.
	Air flow sensor (AFS)	Senses air intake volume using karman flow meter. In accordance with this information and engine speed, engine-A/T-ECU controls injectors' basic activation duration.
	Barometric pressure sensor	Senses atmospheric pressure using semiconductor diffused pressure sensor. In accordance with data from this sensor, engine-A/T-ECU determines vehicle's altitude and adjusts fuel injection rate as a function of altitude to ensure appropriate air/fuel ratio.
	Intake air temperature sensor	Detects the temperature of the intake air by means of a thermistor. The engine-A/T-ECU corrects the fuel injection amount to the correct amount corresponding to the intake air temperature based on the voltage output from this sensor.
	Engine coolant temperature sensor	Detects the temperature of the engine coolant by means of a thermistor. The engine-A/T-ECU detects how warm the engine is based on the signal from this sensor, and uses this to control the fuel injection amount, idle speed and ignition timing.
	Throttle position sensor	Detects the throttle valve opening angle by means of a potentiometer. The engine-A/T-ECU controls the throttle valve and also determines the optimum fuel injection for how quick the throttle valve is opened based on the voltage output from this sensor.
	Detonation sensor	Detects cylinder block vibration when knocking is generated by the piezoelectric element. The engine-A/T-ECU controls retardation of the ignition timing according to the knocking strength.
	Camshaft position sensor	Detects the No. 1 cylinder compression top dead centre position by means of a magnetic resistance element.
	Crank angle sensor	Detects the crank angle by means of a hall element. The engine-A/T-ECU controls the injectors based on the signal from this sensor.
	Alternator FR terminal	Detects the energising duty ratio of the alternator field coil.

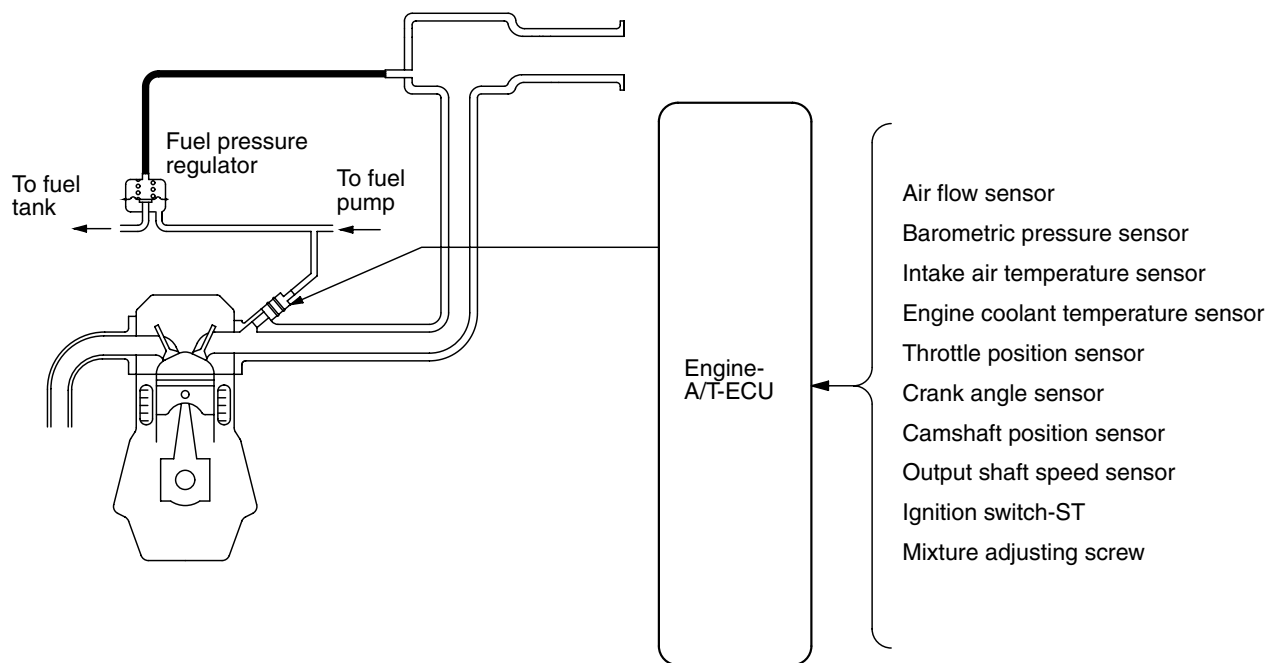
Name		Function
Sensor	Power steering fluid pressure switch	Detects whether there is a power steering load present by means of a contact switch.
	A/C switch	Detects the ON/OFF condition of the A/C.
	A/C load signal	A/C inputs the drive state of the compressor (low load/high load) to the engine-A/T-ECU. The engine-A/T-ECU controls the A/C idle-up engine speed using this signal.
	A/C pressure sensor	A/C detects the refrigerant pressure and inputs the load of the A/C compressor to the engine-A/T-ECU.
Actuators	Engine control relay	Turns the engine-A/T-ECU power circuit on and off.
	Injector	Drives the fuel injection by means of drive signals from the engine-A/T-ECU. Multiple spray hole type is used.
	Ignition coil (with power transistor)	Interrupts the ignition coil primary current in accordance with the ignition signals from the engine-A/T-ECU, in order to generate a high voltage for ignition.
	Idle speed control (ISC) servo (stepper motor)	The throttle valve bypass air amount during idling and deceleration is controlled with the signal from the engine-A/T-ECU.
	EGR control solenoid valve	Controls the EGR flow volume through signals under the duty control from the engine-A/T-ECU.
	Fuel pump relay	Turns the fuel pump on and off.
	Fan controller	Controls the radiator and condenser fan speeds smoothly by means of signals from the engine-A/T-ECU.
	Alternator G terminal	Controls the amount of power generated by the alternator by means of signals from the engine-A/T-ECU.
	A/C relay	Controls the operation of the A/C compressor.
	Engine warning lamp	Illuminates to notify the driver of any abnormalities when a problem occurs with any of the sensors.

FUEL INJECTION CONTROL

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The fuel injection of the 4G6 engine is controlled by a system that is essentially the same as the system for the Galant's 4G6 engine.

System Configuration Diagram



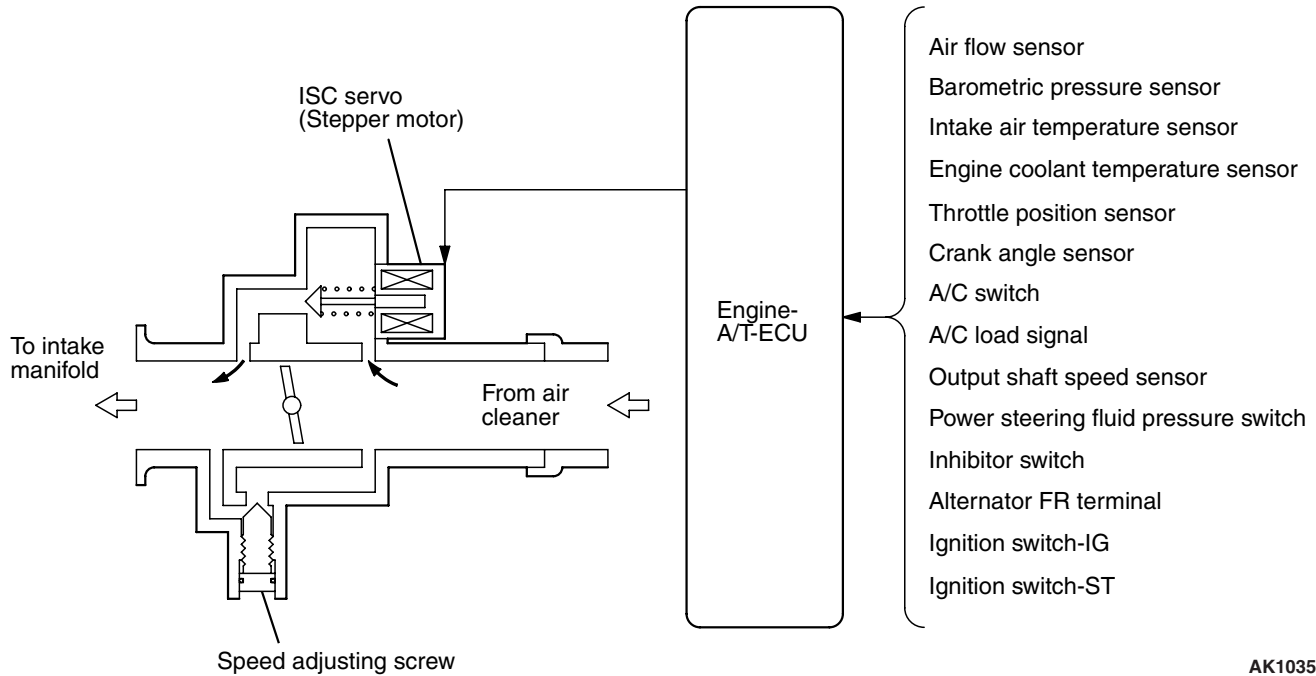
AK203825AD

IDLE SPEED CONTROL (ISC)

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The engine idling speed is controlled in an essentially the same way as in the 6A1 engine for Galant.

System Configuration Diagram



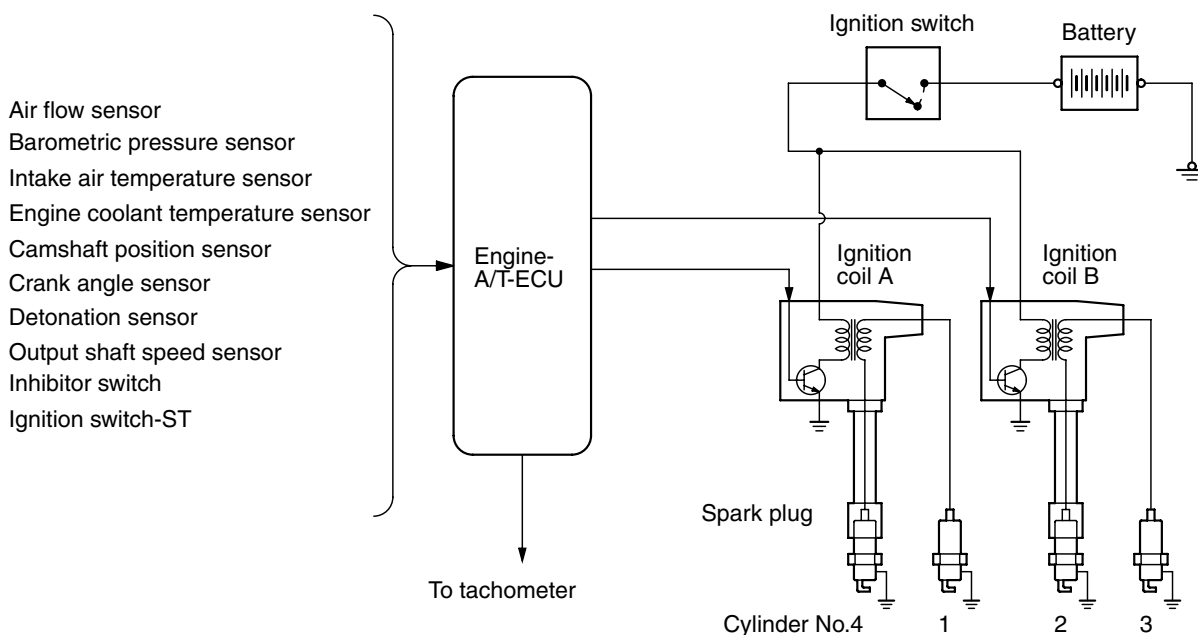
AK103568AC

IGNITION TIMING AND DISTRIBUTION CONTROL

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The ignition timing and distribution control system is basically the same as the control system for the 4G6 engine installed in the Galant.

System Configuration Diagram



AK203826AC

OTHER CONTROL FUNCTIONS

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These control systems operate on essentially same principles as those in the 4G6 engine for space wagon.

- ENGINE CONTROL RELAY CONTROL
- FUEL PUMP RELAY CONTROL
- A/C RELAY CONTROL
- AIR FLOW SENSOR FILTER RESET CONTROL
- FAN MOTOR CONTROL
- ALTERNATOR CONTROL

DIAGNOSIS SYSTEM

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Engine -A/T-ECU has been provided with the following functions for easier system inspection.

DIAGNOSIS CODE

The diagnosis and engine warning lamp items are given in the table below.

Code No.	Diagnosis item	Main diagnosis contents	Engine warning lamp
12	Air flow sensor system	Open circuit or short-circuit in sensor-related circuits	ON
13	Intake air temperature sensor system	Open circuit or short-circuit in sensor-related circuits	ON
14	Throttle position sensor system	Open circuit or short-circuit in sensor-related circuits	ON
21	Engine coolant temperature sensor system	Open circuit or short-circuit in sensor-related circuits	ON
22	Crank angle sensor system	Abnormal sensor output	ON
23	Camshaft position sensor system	Abnormal sensor output	ON
24	Vehicle speed signal system	Abnormal sensor output	–
25	Barometric pressure sensor system	Open circuit or short-circuit in sensor-related circuits	ON
31	Detonation sensor system	Abnormal sensor output	ON
41	Injector system	Open circuit or short-circuit in injector-related circuits	ON
44	Ignition coil (power transistor) system	Abnormal ignition signal (Mis-firing)	ON
54	Immobilizer system	Open circuit or short-circuit in system-related circuits	ON
64	Alternator FR terminal system	Open circuit or short-circuit in system-related circuits	–
–	Engine-A/T-ECU	Abnormality in engine-ECU	ON

DATA LIST FUNCTION

The data list items are given in the table below

Item No.	Inspection item	Unit
12	Air flow sensor	Hz
13	Intake air temperature sensor	°C
14	Throttle position sensor	mV
16	Power supply voltage	V
17	Mixture adjusting screw (variable resistor)	mV
18	Cranking signal (ignition switch-ST)	ON/OFF
21	Engine coolant temperature sensor	°C
22	Crank angle sensor	r/min
25	Barometric pressure sensor	kPa
27	Power steering fluid pressure switch	ON/OFF
28	A/C switch	ON/OFF
29	Inhibitor switch	P/R/N/D/3/2/L
37	Volumetric efficiency	%
3A	A/C pressure sensor	mV
41	Injectors	ms
44	Ignition advance	° BTDC
45	Idle speed control (stepper motor) position	STEP
49	A/C relay	ON/OFF

ACTUATOR TEST FUNCTION

The actuator test items are given in the table below

Item No.	Inspection item	Drive contents
01	Injectors	Cut fuel to No.1 injector
02		Cut fuel to No.2 injector
03		Cut fuel to No.3 injector
04		Cut fuel to No.4 injector
07	Fuel pump	Fuel pump operates and fuel is recirculated
10	Exhaust gas recirculation (EGR) control solenoid valve	Solenoid valve turns from OFF to ON
17	Basic ignition timing	Set to ignition adjustment mode
21	Fan controller	Drive the fan motor