
GROUP 13C

MULTIPOINT FUEL INJECTION (MPI)

<4G69>

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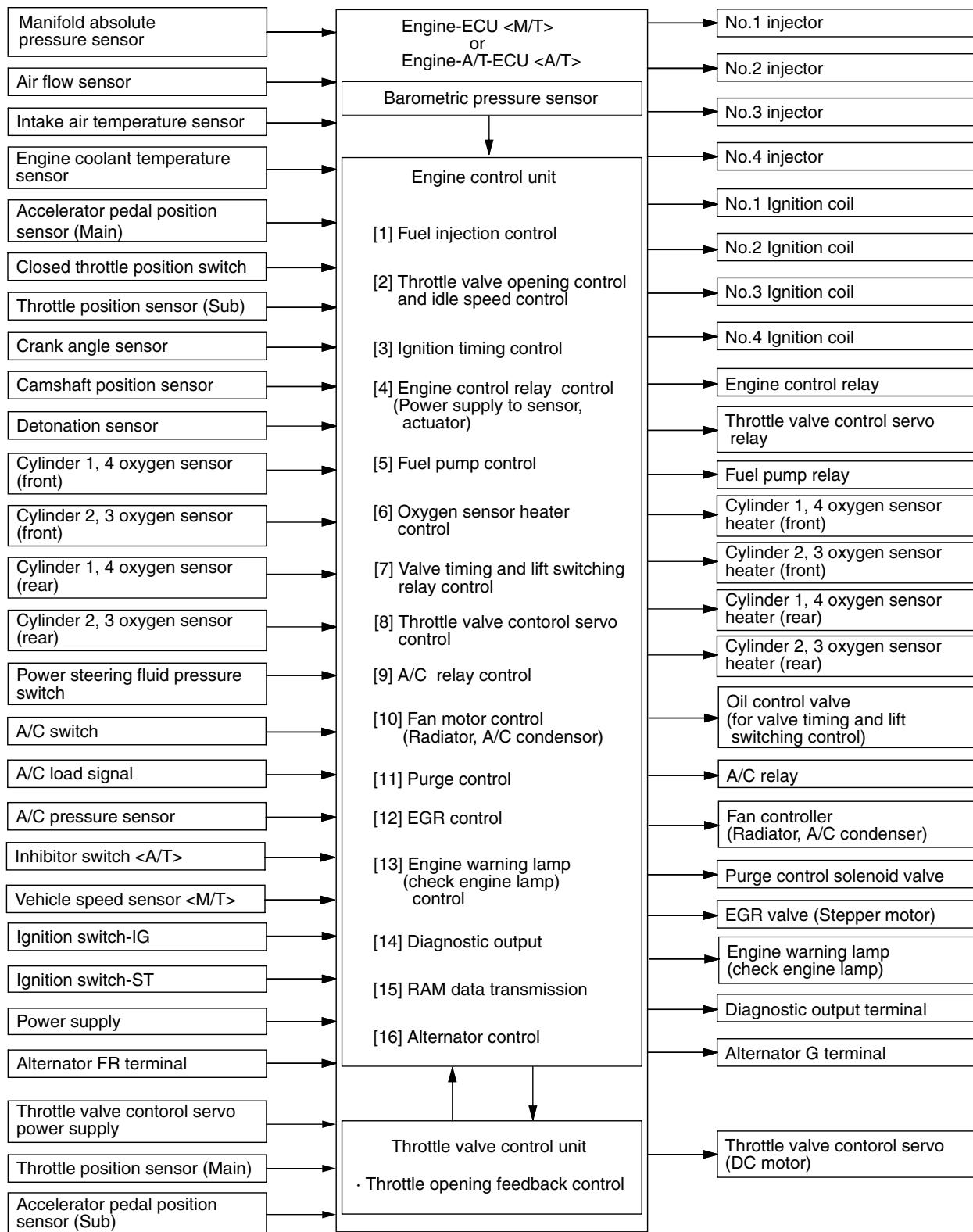
GENERAL INFORMATION

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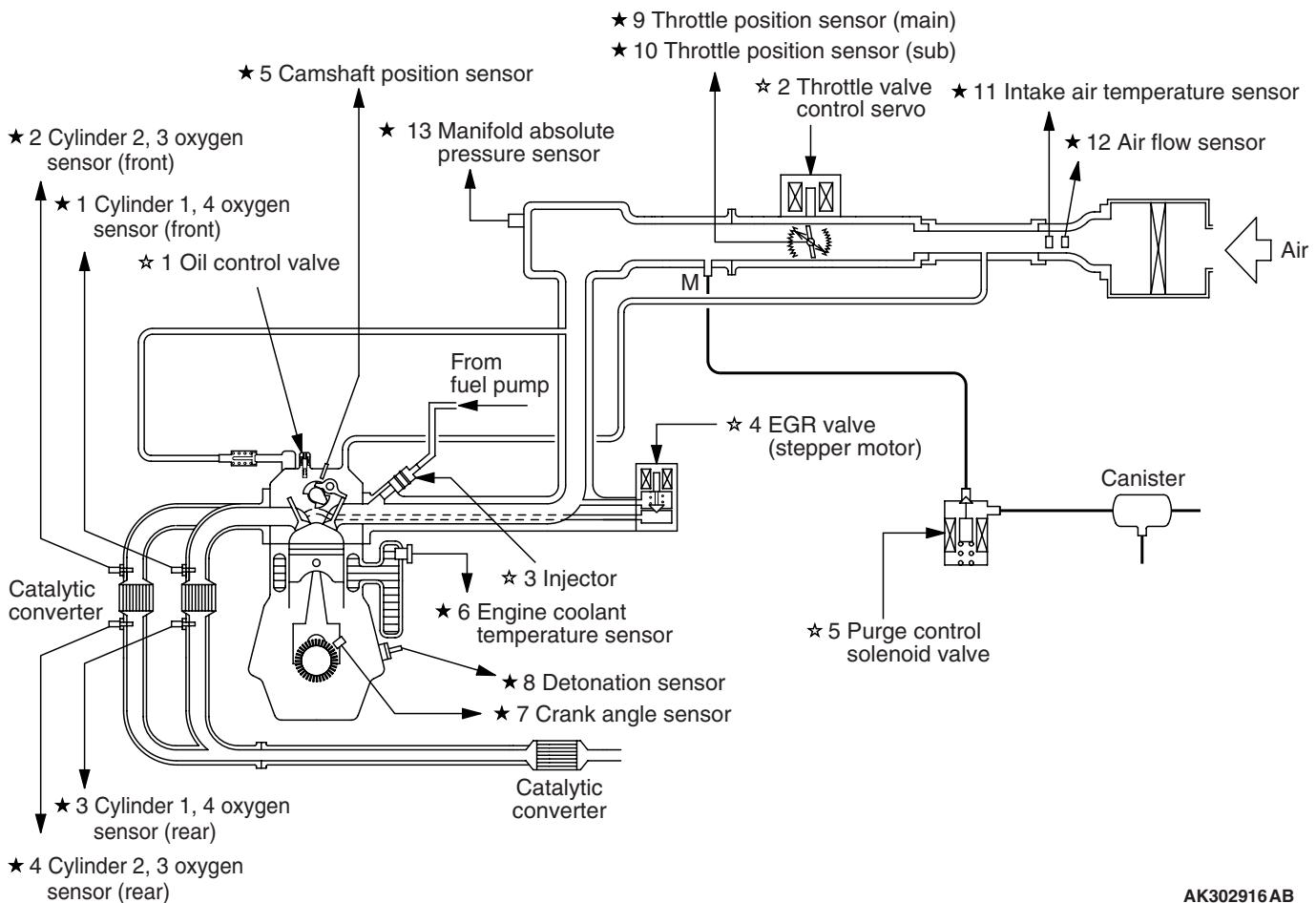
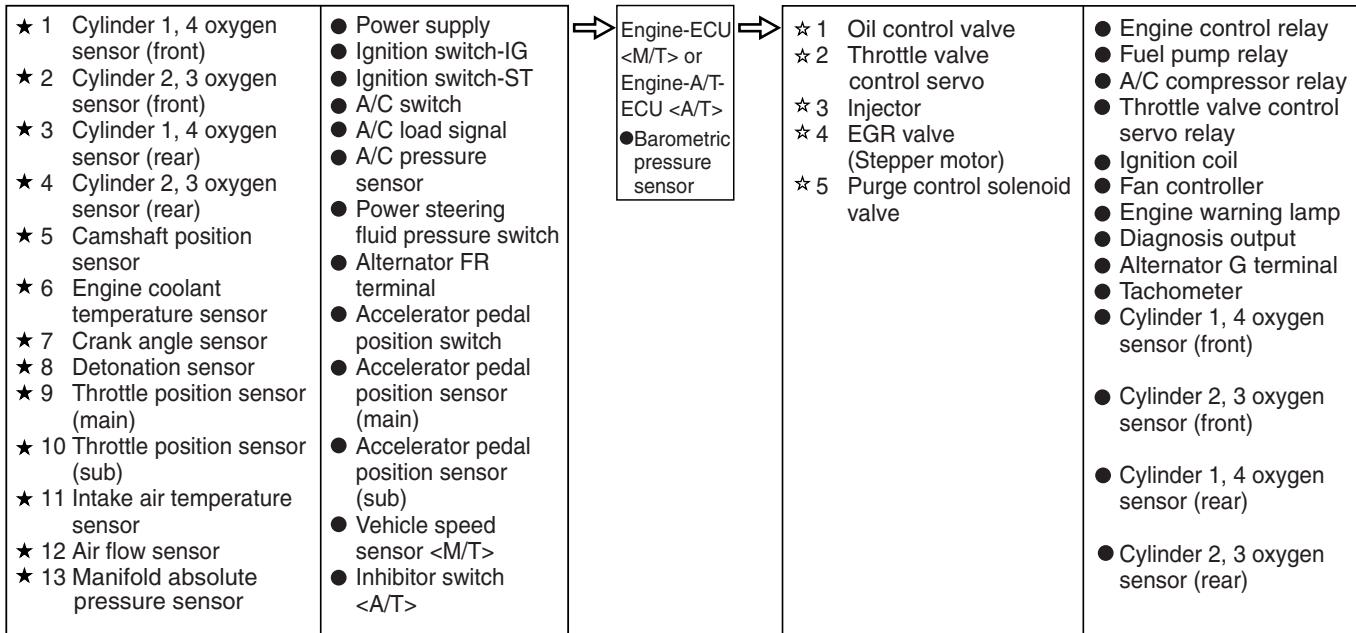
This time, 4G69-SOHC MIVEC of the addition added the following improvement based on 4G63-DOHC which is loaded into OUTLANER.

Improvements	Remarks
A variable induction control is adopted.	The improvement of low-speed torque and high-speed power output.
The barometric pressure sensor has been adopted to a type that is built into the Engine-ECU<M/T> or Engine-A/T-ECU<A/T>	The simplification of the system.
A dual manifold catalytic converters (MCC) is adopted.	The improvement of the exhaust gas purge performance.
The adoption of dual oxygen sensors, along with the adoption of dual manifold catalytic converters (MCC).	The improvement of the exhaust gas purge performance.
A heat-sensing type air flow sensor has been adopted.	Can be installed in the air intake hose because it is compact and light weight.
A electronically controlled throttle valve control is adopted.	The improves mileage and reduces emission gas(NOx).

SYSTEM BLOCK DIAGRAM



CONTROL SYSTEM DIAGRAM



LIST OF COMPONENT FUNCTIONS

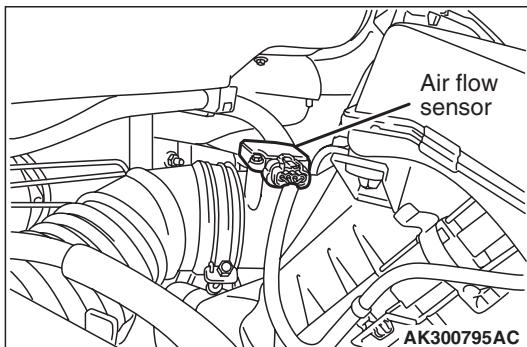
Name	Function
ECU	The signals that are input by the sensors enable the actuators to be controlled in accordance with the driving conditions.
Sensors	Ignition switch-IG This signal indicates the ON/OFF condition of the ignition switch. When this signal is input, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> supplies power to the crank angle sensor, camshaft position sensor, etc.
	Ignition switch-ST This signal indicates that the engine is cranking. Based on this signal, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> controls the fuel injection, throttle valve position, and the injection timing that are suited for starting the engine.
	Air flow sensor (AFS) This signal, which indicates the intake air flow rate (mass), is input into the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>. Based on the signals from this sensor, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> effects fuel injection control.
	Barometric pressure sensor This sensor detects the altitude of the vehicle. It enables the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> to make fuel injection volume corrections in order to achieve an appropriate air-fuel ratio.
	Oxygen sensor This sensor, which contains zirconia and platinum electrodes, detects the level of oxygen concentration in the exhaust gases. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> determines whether the air-fuel ratio is at the optimal stoichiometric ratio in accordance with this oxygen concentration level.
	Intake air temperature sensor This sensor, which contains a thermistor, detects the temperature of the intake air. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> makes fuel injection volume corrections that suit the intake air temperature, in accordance with the voltage that is output by this sensor.
	Engine coolant temperature sensor This sensor, which contains a thermistor, detects the temperature of the engine coolant. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> determines the warm-up condition of the engine in accordance with the voltage that is output by this sensor, in order to control the fuel injection volume, idle speed, and ignition timing.
	Throttle position sensor Detects the throttle valve opening angle by means of a potentiometer. The engine-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.
	Throttle position sensor (TPS) <main, sub> This sensor detects the position of the throttle valve and inputs it into the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>. Based on the voltage that is output by this sensor, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> effects throttle valve feedback control.
	Accelerator pedal position sensor (APS) <main, sub> This sensor detects the position of the accelerator and inputs it into the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>. Based on the voltage that is output by this sensor, which determines the accelerator position (and the intention of the driver), the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> effects appropriate fuel injection and throttle valve position controls.

Name	Function
Sensors	Camshaft position sensor This sensor detects the top-dead-center (TDC) of the compression stroke of each cylinder.
	Crank angle sensor This sensor detects the crank angle and inputs it into the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> effects injector control and other controls in accordance with the signals received from this sensor.
	Detonation sensor This sensor, which contains a piezoelectric element, detects the vibration of the cylinder block that results from knocking. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> detects only the knocking of the engine from these vibrations, in order to retard the ignition timing in accordance with the strength of the knocks.
	Power steering fluid pressure switch This is a contact point type switch that detects the load on the power steering.
	Alternator FR terminal This terminal is used for detecting the duty cycle ratio that energizes the alternator field coil.
	Inhibitor switch <A/T> This is a contact point type switch that inputs a signal into the Engine-A/T-ECU to determine whether the shift lever is in the neutral position.

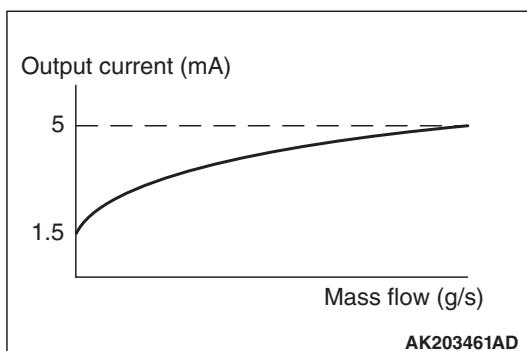
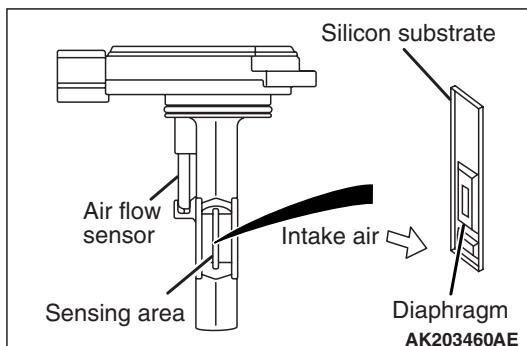
Name	Function
Actuators	Engine control relay This relay turns ON and OFF the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> power circuit.
	Throttle valve control servo relay This relay turns ON and OFF the actuation power circuit for the throttle valve control servo in the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	Injector The injectors inject fuel in accordance with the injection signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	Ignition coil (with power transistor) Applies ignition coil primary current intermittently in accordance with the ignition signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>, in order to generate high voltage for ignition.
	Fuel pump relay Controls the power supplied to the fuel pump in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	A/C relay Controls the operation of the A/C compressor in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	Purge control solenoid valve Controls the flow rate of the purge air introduced into the surge tank in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	EGR valve (stepper motor) Controls the EGR flow rate in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	Alternator G terminal Controls the amount of current generated by the alternator in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
	Fan controller Controls the speed of the radiator fan and the condenser fan steplessly in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
Throttle valve control servo	Controls the throttle valve position in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.
Oil control valve (OCV)	The oil control valve, which is actuated by the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>, changes the valve timing.
Oxygen sensor heater	Turns ON and OFF the oxygen sensor heater circuit in accordance with the signals received from the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.

SENSOR

AIR FLOW SENSOR



A heat-sensing type air flow sensor has been adopted. In contrast to the Karman vortex air flow sensor, which detects the volumetric flow rate of air, this type utilizes the flow speed dependence characteristics of heat transmission to detect the mass flow rate of air, converts it into an amperage, and outputs it to the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.



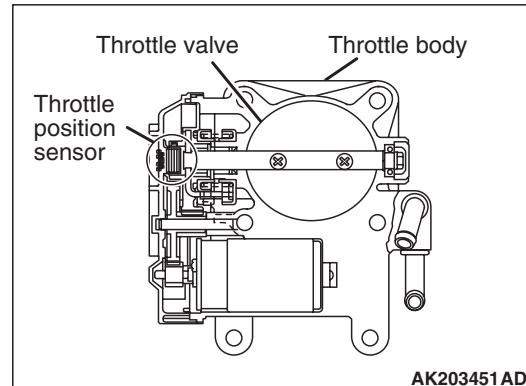
M2132001000167

The sensing portion consists of an ultra-compact, heat-sensing membrane resistor. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> regulates the amperage in order to maintain a constant temperature in the heat-sensing resistor. When the mass flow rate of air increases, the heat transmission from the heat-sensing resistor to the air also increases. Therefore, the amperage that is regulated by the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> increases. Because the heat transmission rate and the amperage are proportionate, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> is able to measure the air flow rate based on the amperage. The use of the ultra-compact membrane resistor, which provides the same high-speed response as the Karman vortex air flow sensor, enabled the compact and lightweight sensor to be installed in the air intake hose.

BAROMETRIC PRESSURE SENSOR

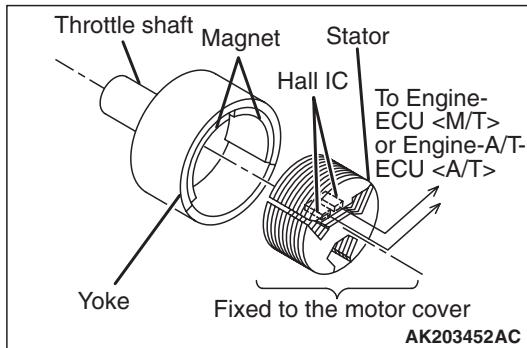
This sensor has been changed to a type that is built into the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>.

THROTTLE POSITION SENSOR

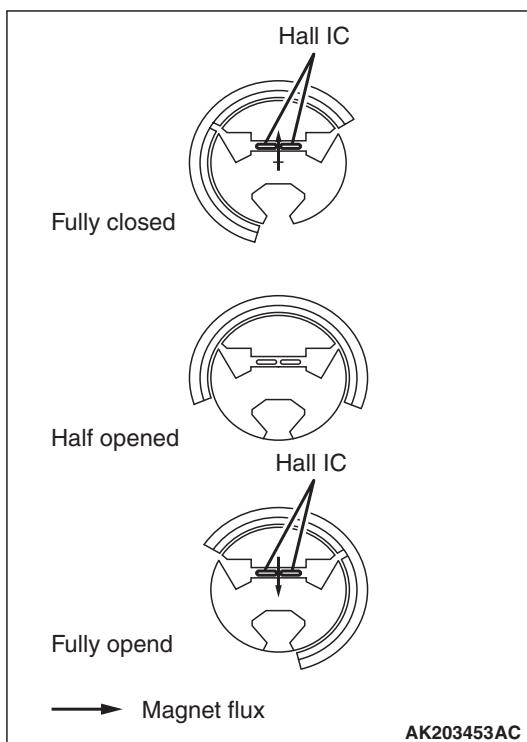


The throttle position sensor, which is located in the throttle body, outputs a voltage signal, which corresponds to the rotational angle of the throttle shaft, to the Engine-ECU <M/T> or Engine-A/T-ECU <A/T>. In accordance with this signal, the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> effects feedback control of the throttle valve control servo. This throttle position sensor uses a non-contact Hall IC to enhance its reliability.

CONSTRUCTION AND SYSTEM



The throttle position consists of a permanent magnet fixed to the throttle shaft, a Hall IC that outputs electrical voltage in accordance with the magnetic flux density, and a stator that effectively guides the magnetic flux from the permanent magnet into the Hall IC.

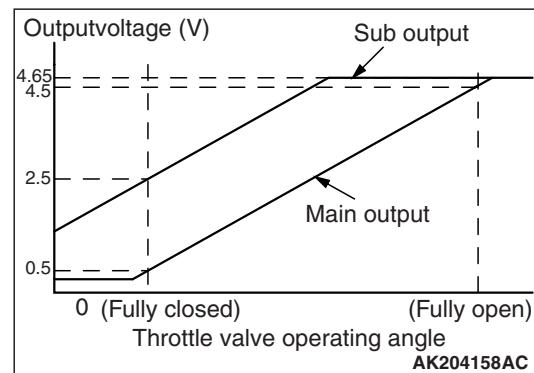


The magnetic flux density that passes into the Hall IC when the throttle valve is fully closed is kept to a maximum in the above direction on this paper. As the result of this, the electrical voltage is minimal output.

The magnetic flux density is zero when the throttle valve is half opened.

The magnetic flux density that passes into the Hall IC when the throttle valve is fully opened is kept to maximum in the below direction on this paper.

As the result of this, the electrical voltage is maximal output.

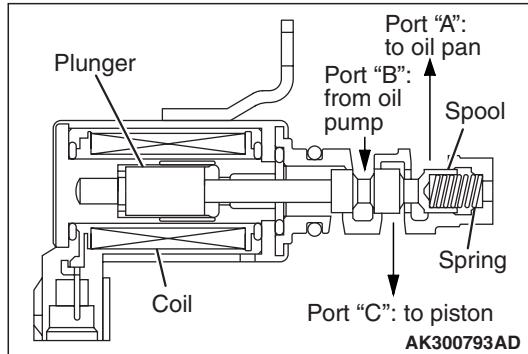


The throttle position sensor outputs through two systems (main and sub). This improves the accuracy of the system to detect malfunctions and reinforces the failsafe function in order to ensure reliability.

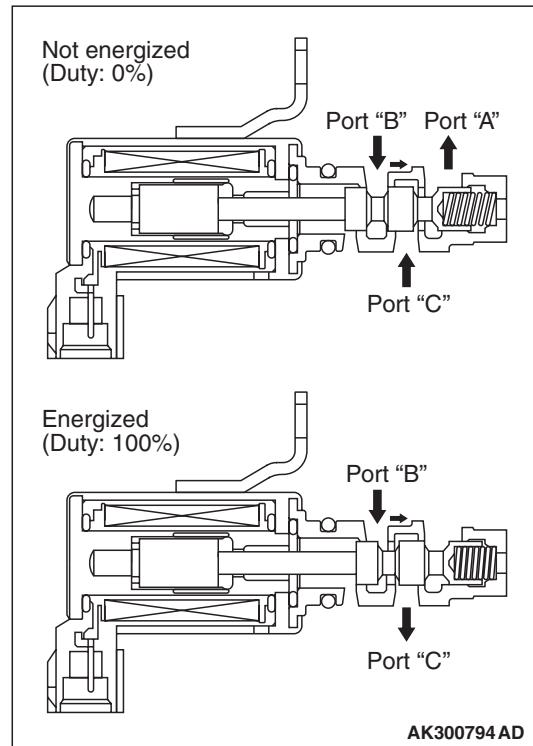
ACTUATOR

M2132002000096

OIL CONTROL VALVE



The oil control valve, which consists of a solenoid valve that operates under duty cycle control, is mounted to the cylinder head and used in hydraulic pressure control for switching the cams.



When the coil of the oil control valve is not energized (duty cycle ratio: 0%), port B closes, ports A and C open to each other, causing the oil that was acting on the cam switching control piston to be discharged from port C via port A. When the coil is energized (duty cycle ratio: 100%), the spool valve moves, port A closes, and ports B and C are open to each other. The oil that is pumped by the oil pump flows via ports B and C and acts on the cam switching control piston.

THROTTLE VALVE OPENING ANGLE CONTROL

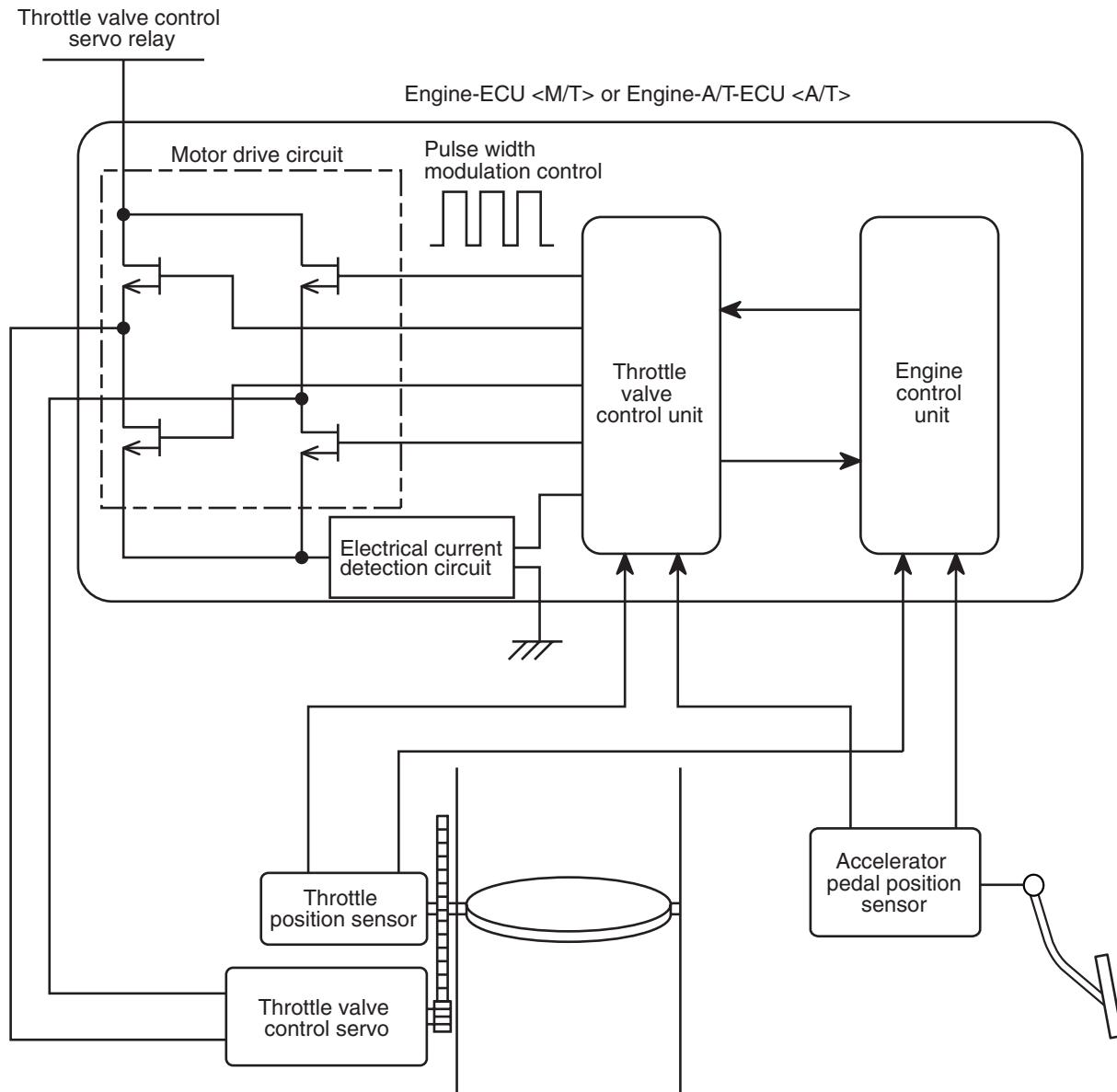
M2132015000052

- The electronically controlled throttle valve system electronically regulates the throttle valve opening. The engine control unit in the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> monitors the amount of the accelerator pedal travel through the accelerator pedal position sensor and issues premapped target throttle valve opening values to the throttle valve control servo unit in the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> in

accordance with operating conditions. Thus, the throttle valve control servo unit achieves the target throttle valve opening by controlling the current supplied to the throttle valve control servo, which is attached to the throttle body.

- This system also controls the idle speed in addition to controlling the throttle valve opening. Thus, the previously used idle air control (IAC) motor has been disconnected.

SYSTEM CONFIGURATION DIAGRAM



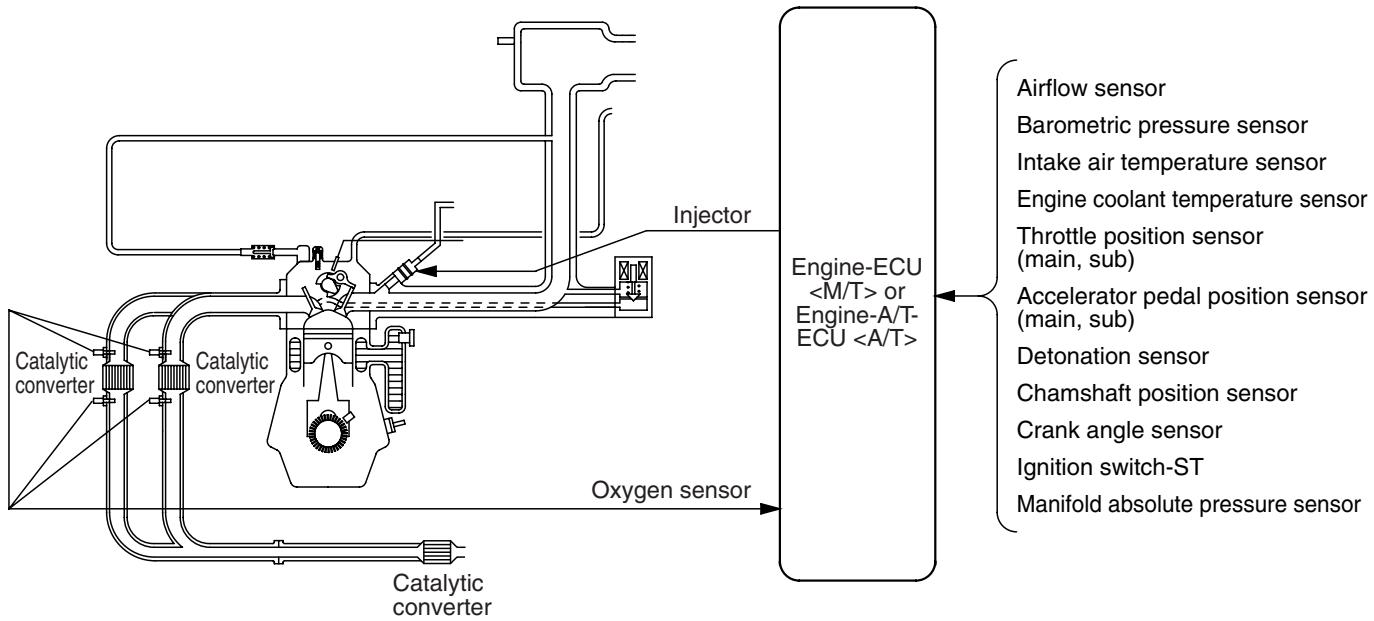
AK303329AC

FUEL INJECTION CONTROL

M2132003000260

The fuel injection of the 4G69-SOHC MIVEC engine is controlled by a system that is essentially the same as the system for the OUTLANDER 4G63-DOHC engine.

SYSTEM CONFIGURATION DIAGRAM



AK303426AB

OXYGEN SENSOR

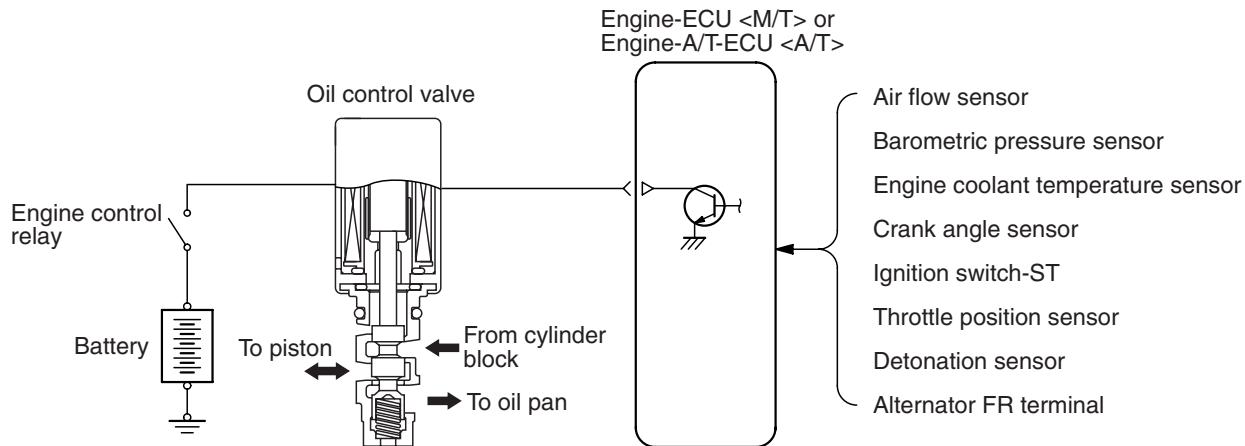
The oxygen sensors detect the level of oxygen concentration in the exhaust gases. A total of four front and rear oxygen sensors are installed in front and back of the dual manifold catalytic converter (MCC), respectively. The Engine-ECU <M/T> or Engine-A/T-ECU <A/T> uses the output signal of the front oxygen sensor for each MCC to effect

closed-loop control, and uses the output signal of the rear oxygen sensor in order to make corrections to the output signal of the front oxygen sensor. By resolving the output signal deviations associated with the deterioration of the front oxygen sensor, this system is able to effect a level of exhaust gas control that is higher than in the past.

VARIABLE INDUCTION CONTROL

M2132017000025

This system uses a low-speed cam to actuate the intake valve during low engine speeds, and a high-speed cam to actuate the intake valve during high engine speeds. As a result, this system realizes further improvement in low-speed torque and high-speed power output over the conventional engine.



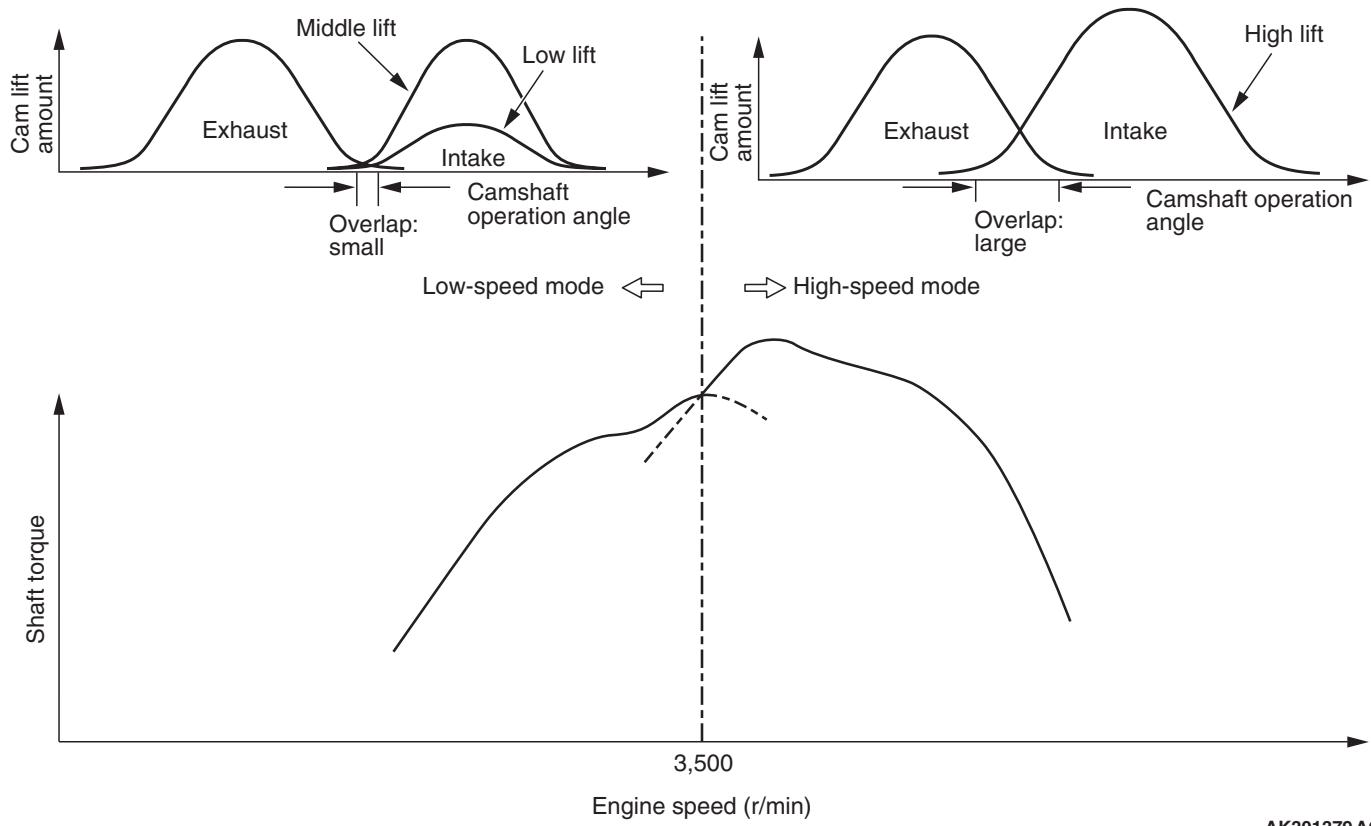
The low-speed cam has a shorter valve overlap and valve-opening duration, and possesses characteristics that are well-suited to low-speed operations in which the intake air inertia is small. The high-speed cam has a longer valve overlap and valve-opening duration, and possesses characteristics that are well-suited to high-speed operations in which the intake air inertia is large. When the engine is operating at low speeds (below 3,500 rpm), the oil control valve is OFF (duty cycle ratio: 0%). Therefore, the cam switching control piston remains down, allowing the intake valve to be actuated by the low-speed cam. The low-speed cam consists of two cams with different valve lifts, and the two cams actuate one intake valve each. For this reason, a difference is created between the valve lifts, creating a more powerful flow of air-fuel mixture and stabilizing combustion in the cylinder. As a result, low fuel consumption, low exhaust gas emissions, and high torque have been realized.

When the engine is operating at high speeds (above 3,500 rpm), the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> turns on the oil control valve (duty cycle ratio: 100 % for 2 seconds while switching, and 60 % after 2 seconds have elapsed). Consequently, the hydraulic pressure acts on the cam switching control piston, causing the high-speed cam to actuate the intake valve. As a result, the valve opening duration and the valve lift increase, effectively increasing the intake air volume and the power output.

Under the conditions indicated below, the low-speed cam always operates the intake valve:

- Engine coolant temperature below 20°C
- Within 10 seconds upon starting the engine

AK300245 AD



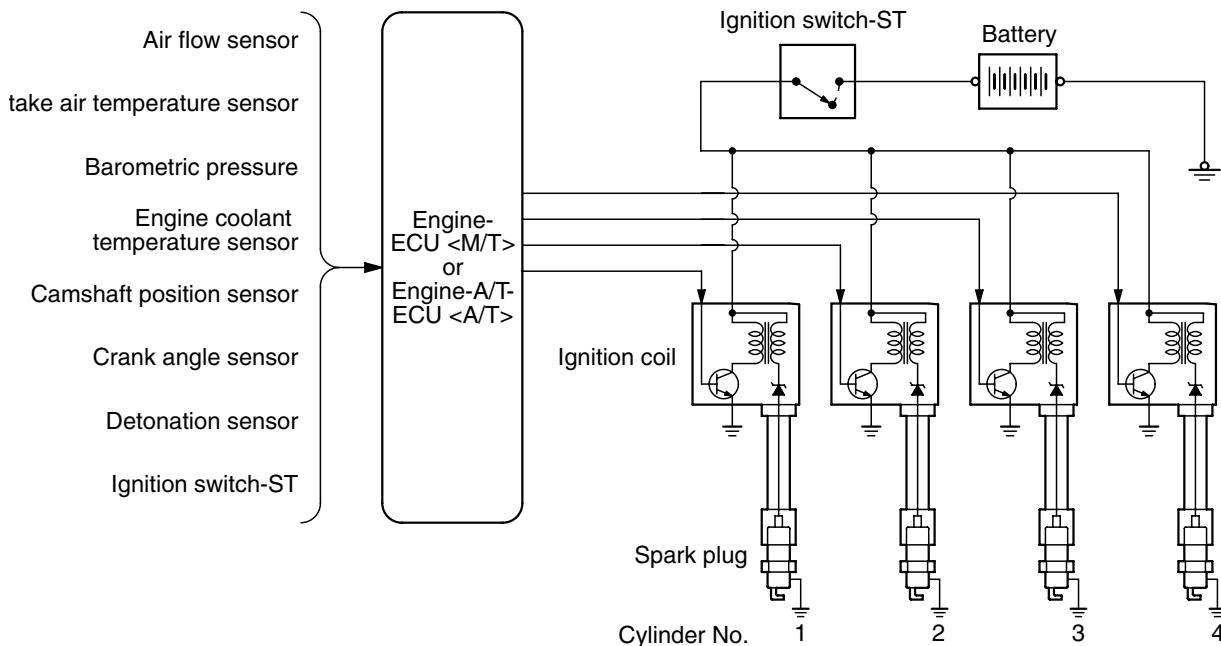
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IGNITION TIMING AND DISTRIBUTION CONTROL

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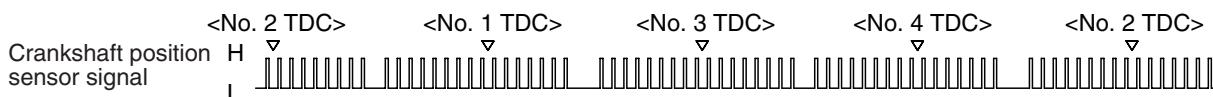
The control arrangement is basically the same as that 4G6-GDI engine using GALANT.

SYSTEM CONFIGURATION DIAGRAM



AK101328AG

IGNITION TIMING CONTROL



Cylinder stroke	Ignition			
	No. 1 Cylinder	No. 3 Cylinder	No. 4 Cylinder	No. 2 Cylinder
Compression	Combustion	Exhaust	Intake	
Intake	Compression	Combustion	Exhaust	
Exhaust	Intake	Combustion	Exhaust	Combustion
Combustion	Exhaust	Intake	Combustion	

AK301362AC

EGR CONTROL, PURGE CONTROL

Refer to EMISSION CONTROL SYSTEM

M2132011000072

OTHER CONTROL FUNCTIONS

The following controls are basically the same as those of the 4G6-MPI engine of the SPACE WAGON:

- Fan motor control
- Power supply
- Fuel pump relay control

- Oxygen sensor heater control
- A/C pressure relay control
- Air flow sensor filter reset control
- Alternator control

M2132010000176

DIAGNOSIS SYSTEM

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

M2132009000473

FREEZE-FRAME DATA

When the engine-ECU<M/T> or engine-A/T-ECU<A/T> detects a problem and stores the resulting diagnosis code, the engine condition at that time is also memorized. The M.U.T.-II/ III can then be used to analyze this data in order to increase the effectiveness of troubleshooting. The freeze-frame data display items are given below.

Item No.	Data	Unit
12	Air flow sensor	gm/s
13	Intake air temperature sensor	°C
21	Engine coolant temperature sensor	°C
22	Crank angle sensor	r/min
24	Vehicle speed	km/h
44	Ignition advance	deg
81	Long-term fuel compensation (cylinder 1, 4)	%
82	Short-term fuel compensation (cylinder 1, 4)	%
83	Long-term fuel compensation (cylinder 2, 3)	%
84	Short-term fuel compensation (cylinder 2, 3)	%
88	Fuel control condition (cylinder 1, 4)	Open loop
		Closed loop
		Open loop owing to drive condition
		Open loop owing to system malfunction
		Closed loop based on one oxygen sensor
89	Fuel control condition (cylinder 2, 3)	Open loop
		Closed loop
		Open loop owing to drive condition
		Open loop owing to system malfunction
		Closed loop based on one oxygen sensor

Item No.	Data	Unit
87	Calculation load value	%
8A	Throttle position sensor (main)	%
–	Diagnosis code during data recording	–

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
P0100	Air flow sensor system	Open circuit or short-circuit in sensor-related circuits	ON
P0105	Manifold absolute pressure sensor system	Open circuit or short-circuit in sensor-related circuits	ON
P0110	Intake air temperature sensor system	Open circuit or short-circuit in sensor-related circuits	ON
P0115	Engine coolant temperature sensor system	Open circuit or short-circuit in sensor-related circuits	ON
P0122*	Throttle position sensor (main) circuit low input	Open circuit or short-circuit in sensor-related circuits	ON
P0123*	Throttle position sensor (main) circuit high input	Open circuit in sensor-related circuits	ON
P0125*	Feedback system monitor	Oxygen sensor not operating	ON
P0130	Cylinder 1, 4 oxygen sensor (front) system	Open circuit or short-circuit in sensor-related circuits	ON
P0135	Cylinder 1, 4 oxygen sensor (front) heater system	Open circuit or short-circuit in heater-related circuits	ON
P0136	Cylinder 1, 4 oxygen sensor (rear) system	Open circuit or short-circuit in sensor-related circuits	ON
P0141	Cylinder 1, 4 oxygen sensor (rear) heater system	Open circuit or short-circuit in heater-related circuits	ON
P0150	Cylinder 2, 3 oxygen sensor (front) system	Open circuit or short-circuit in sensor-related circuits	ON
P0155	Cylinder 2, 3 oxygen sensor (front) heater system	Open circuit or short-circuit in heater-related circuits	ON
P0156	Cylinder 2, 3 oxygen sensor (rear) system	Open circuit or short-circuit in sensor-related circuits	ON
P0161	Cylinder 2, 3 oxygen sensor (rear) heater system	Open circuit or short-circuit in heater-related circuits	ON
P0170	Abnormal fuel system (cylinder 1 , 4)	Leanness or richness problem	ON
P0173	Abnormal fuel system (cylinder 2 , 3)	Leanness or richness problem	ON
P0201	No. 1 injector system	Open circuit or short-circuit in injector-related circuits	ON

Code No.	Diagnosis item	Main diagnosis contents	Engine warning lamp
P0202	No. 2 injector system	Open circuit or short-circuit in injector-related circuits	ON
P0203	No. 3 injector system	Open circuit or short-circuit in injector-related circuits	ON
P0204	No. 4 injector system	Open circuit or short-circuit in injector-related circuits	ON
P0222*	Throttle position sensor (sub) circuit low input	Open circuit or short-circuit in sensor-related circuits	ON
P0223*	Throttle position sensor (sub) circuit high input	Open circuit in sensor-related circuits	ON
P0300*	Random / multiple cylinder mis-fire detected	Abnormal ignition signal (Mis-firing)	ON
P0301*	No. 1 cylinder mis-fire detected	Mis-firing	ON
P0302*	No. 2 cylinder mis-fire detected		
P0303*	No. 3 cylinder mis-fire detected		
P0304*	No. 4 cylinder mis-fire detected		
P0325	Detonation sensor system	Abnormal sensor output	ON
P0335	Crank angle sensor system	Abnormal sensor output	ON
P0340	Camshaft position sensor system	Abnormal sensor output	ON
P0403	Exhaust gas recirculation (EGR) control system	Open circuit or short-circuit in valve-related circuits	ON
P0421	Warm up catalyst malfunction (cylinder 1 , 4)	Abnormal exhaust gas purification performance of catalyst	ON
P0431	Warm up catalyst malfunction (cylinder 2 , 3)	Abnormal exhaust gas purification performance of catalyst	ON
P0443	Purge control solenoid valve system	Open circuit or short-circuit in solenoid valve-related circuits	ON
P0500	Vehicle speed sensor system <M/T>	Abnormal sensor output	ON
P0513	Immobilizer malfunction	Open circuit or short-circuit in system-related circuits	ON
P0551*	Power steering fluid pressure switch system	Open circuit or short-circuit in system-related circuits	ON
P0606*	Powertrain control module main processor malfunction	Abnormality in engine-ECU<M/T> or engine-A/T-ECU<A/T>	ON
P0622	Alternator FR terminal system	Open circuit or short-circuit in system-related circuits	ON
P0638*	Throttle valve control servo circuit range/performance problem	Abnormal throttle valve control servo	ON
P0642*	Throttle position sensor power supply	Abnormality in engine-ECU<M/T> or engine-A/T-ECU<A/T>	ON
P0657*	Throttle valve control servo relay circuit malfunction	Open circuit or short-circuit in sensor-related circuits	ON
P0705	Inhibitor switch system	abnormality in A/T system	ON

Code No.	Diagnosis item	Main diagnosis contents	Engine warning lamp
P0710	A/T fluid temperature sensor system	abnormality in A/T system	ON
P0715*	Input shaft speed sensor system	abnormality in A/T system	ON
P0720*	Output shaft speed sensor system	abnormality in A/T system	ON
P0740*	Torque converter clutch solenoid valve system	abnormality in A/T system	ON
P0750*	Low-reverse solenoid valve system	abnormality in A/T system	ON
P0755*	Underdrive solenoid valve system	abnormality in A/T system	ON
P0760*	Second solenoid valve system	abnormality in A/T system	ON
P0765*	Overdrive solenoid valve system	abnormality in A/T system	ON
P1010	Oil control valve system	Open circuit or short-circuit in solenoid valve-related circuits	ON
P1602*	Communication Malfunction (between engine-ECU<M/T> or engine-A/T-ECU<A/T> main processor and system LSI)	Abnormality in engine-ECU<M/T> or engine-A/T-ECU<A/T>	ON
P1603*	Battery back-up circuit malfunction	Open circuit or short-circuit in system-related circuits	ON
P1751*	A/T control relay malfunction	Abnormality in A/T system	ON
P2100*	Throttle valve control servo circuit (open)	Open circuit in system-related circuits	ON
P2101*	Throttle valve control servo magneto malfunction	Short-circuit in system-related circuits	ON
P2102*	Throttle valve control servo circuit (shorted low)	Short-circuit in system-related circuits	ON
P2103*	Throttle valve control servo circuit (shorted high)	Short-circuit in system-related circuits	ON
P2121*	Accelerator pedal position sensor (main) circuit range/performance problem	Abnormal sensor output	ON
P2122*	Accelerator pedal position sensor (main) circuit low input	Open circuit or short-circuit in sensor-related circuits	ON
P2123*	Accelerator pedal position sensor (main) circuit high input	Open circuit in sensor-related circuits	ON
P2126*	Accelerator pedal position sensor (sub) circuit range/performance problem	Abnormal sensor output	ON
P2127*	Accelerator pedal position sensor (sub) circuit low input	Open circuit or short-circuit in sensor-related circuits	ON
P2128*	Accelerator pedal position sensor (sub) circuit high input	Open circuit in sensor-related circuits	ON
P2135*	Throttle position sensor (main and sub) circuit range/performance problem	Abnormal sensor output	ON

Code No.	Diagnosis item	Main diagnosis contents	Engine warning lamp
P2138*	Accelerator pedal position sensor (main and sub) circuit range/performance problem	Abnormal sensor output	ON
P2173*	Abnormal intake air amount	Abnormal sensor output	ON
P2226*	Barometric pressure sensor system	Open circuit or short-circuit in sensor-related circuits	ON
–	Engine-ECU<M/T> or Engine-A/T-ECU<A/T>	Abnormality in engine-ECU<M/T> or engine-A/T-ECU<A/T>	ON

NOTE: When the first time a malfunction is detected, the engine-ECU<M/T> or engine-A/T-ECU<A/T> does not store a fault code. However, if the same malfunction is again detected the next time the engine is operated, a fault code is stored. For systems or components marked with "" to be diagnosed, when the first time a malfunction is detected, a fault code is stored and the engine warning lamp is illuminated.*

DATA LIST FUNCTION

The data list items are given in the table below

Item No.	Inspection item	Unit
11	Cylinder 1,4 oxygen sensor (front)	mV
12	Air flow sensor	gm/s
13	Intake air temperature sensor	°C
14	Throttle position sensor (sub)	mV
16	Power supply voltage	V
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
26	Accelerator pedal position switch	ON/OFF
27	Power steering fluid pressure switch	ON/OFF
28	A/C switch	ON/OFF
37	Volumetric efficiency	%
39	Cylinder 2,3 oxygen sensor (front)	mV
41	Injectors	ms
44	Ignition advance	°BTDC
49	A/C relay	ON/OFF
59	Cylinder 1,4 oxygen sensor (rear)	mV
68	EGR valve	STEP
69	Cylinder 2,3 oxygen sensor (rear)	mV
77	Accelerator pedal position sensor (sub)	mV
78	Accelerator pedal position sensor (main)	mV
79	Throttle position sensor (main)	mV
95	Manifold absolute pressure sensor	kPa
9A	Throttle position sensor (main) mid opening learning valve	mV

Item No.	Inspection item	Unit
12*	Air flow sensor	gm/s
13*	Intake air temperature sensor	°C
21*	Engine coolant temperature sensor	°C
22*	Crank angle sensor	r/min
24*	Vehicle speed sensor	km/h
44*	Ignition advance	deg
81*	Long-term fuel compensation on (No.1, No.4 cylinder)	%
82*	Short-term fuel compensation on (No.1, No.4 cylinder)	%
83*	Long-term fuel compensation on (No.2, No.3 cylinder)	%
84*	Short-term fuel compensation on (No.2, No.3 cylinder)	%
87*	Calculated load valve	%
88*	Fuel control condition on (No.1, No.4 cylinder)	Closed loop/Open loop – drive condition
89*	Fuel control condition on (No.2, No.3 cylinder)	Closed loop/Open loop – drive condition
8A*	Throttle position sensor (main)	%
A1*	Cylinder 1,4 oxygen sensor (front)	V
A2*	Cylinder 1,4 oxygen sensor (rear)	V
A3*	Cylinder 2,3 oxygen sensor (front)	V
A4*	Cylinder 2,3 oxygen sensor (rear)	V
A9*	Engine warning lamp distance	–

NOTE: Items marked "" will not appear if a data list is selected in the check mode.*

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
08	Purge 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
22	Oil control valve	Solenoid valve turns from OFF to ON
34	Throttle valve control servo	Stop the throttle valve control servo

NOTES