ENGINE

CONTENTS

GENERAL INFORMATION

This engine has the same basic structure as the previous 4G63-T/C engine, however, the following enhancements have been added in order to provide improved performance.

- The piston shape has been changed.
- The width of the piston rings has been reduced in order to reduce engine friction.
- The turbocharger type has been changed.
- An EGR valve has been added.

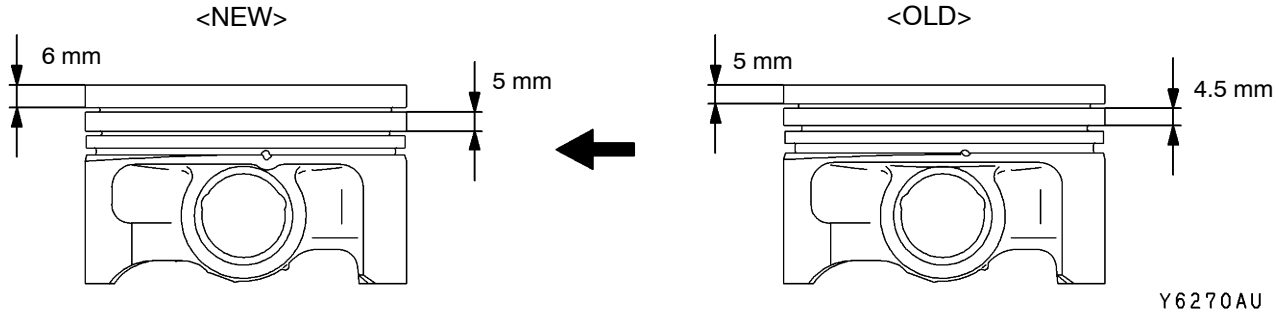
MAJOR SPECIFICATIONS

Items		4G63-T/C
Total displacement mL		1,997
Bore × stroke mm		85.0 × 88.0
Compression ratio		8.8
Combustion chamber		Pentroof type
Camshaft arrangement		DOHC
Valve timing	Intake opening	BTDC 21°
	Intake closing	ABDC 59°
	Exhaust opening	BBDC 58°
	Exhaust closing	ATDC 18°
Maximum output kW/r/min		206/6500
Maximum torque N·m/r/min		383/3500
Fuel system		Electronic controlled multipoint fuel injection
Rocker arm		Roller type
Auto-lash adjuster		Equipped

BASE ENGINE

PISTON

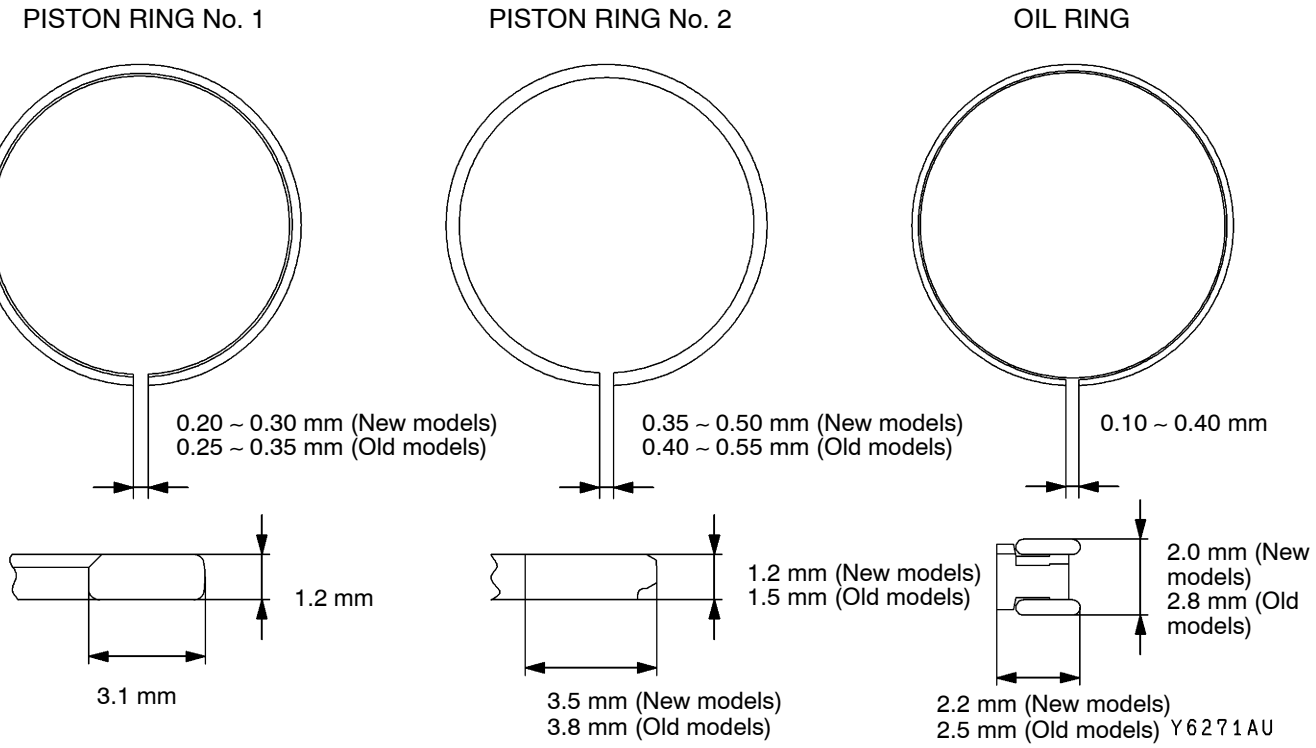
The top land height has been changed from 5 mm to 6 mm, and the second land height has been changed from 4.5 mm to 5 mm.



PISTON RING

The tension of the rings has been changed as shown in the table below, and the thicknesses of the No. 2 ring and the oil ring have been reduced in order to provide reduced engine friction.

	NEW	OLD
PISTON RING No. 1	9.5 N	8.34 N
PISTON RING No. 2	7.0 N	10.49 N
OIL RING	25.0 N	33.34 N



LUBRICATION SYSTEM

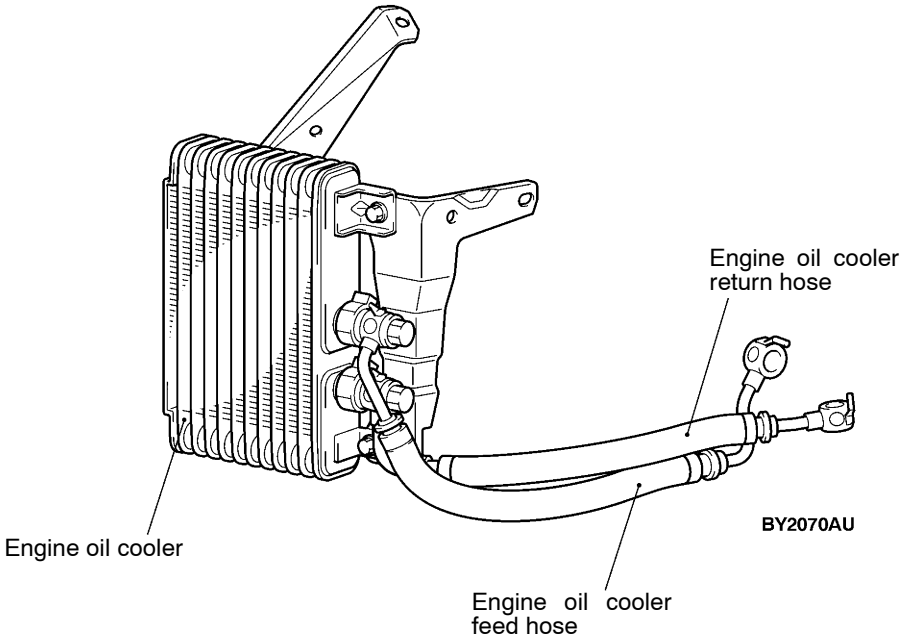
ENGINE OIL COOLER

The drawn cup air-cooled type engine oil cooler has been adopted. The engine oil cooler is installed below the right head lamp assembly and brings in the air through the oil cooler duct of the front bumper to cool the engine oil.

SPECIFICATIONS

Items	Specifications
Type	Drawn cup type
Core size mm (Width × Hight × Thickness)	160 × 200 × 49
Engine oil cooler oil amount L	0.35
Performance kJ/h	29,900

CONSTRUCTION DIAGRAM



COOLING SYSTEM

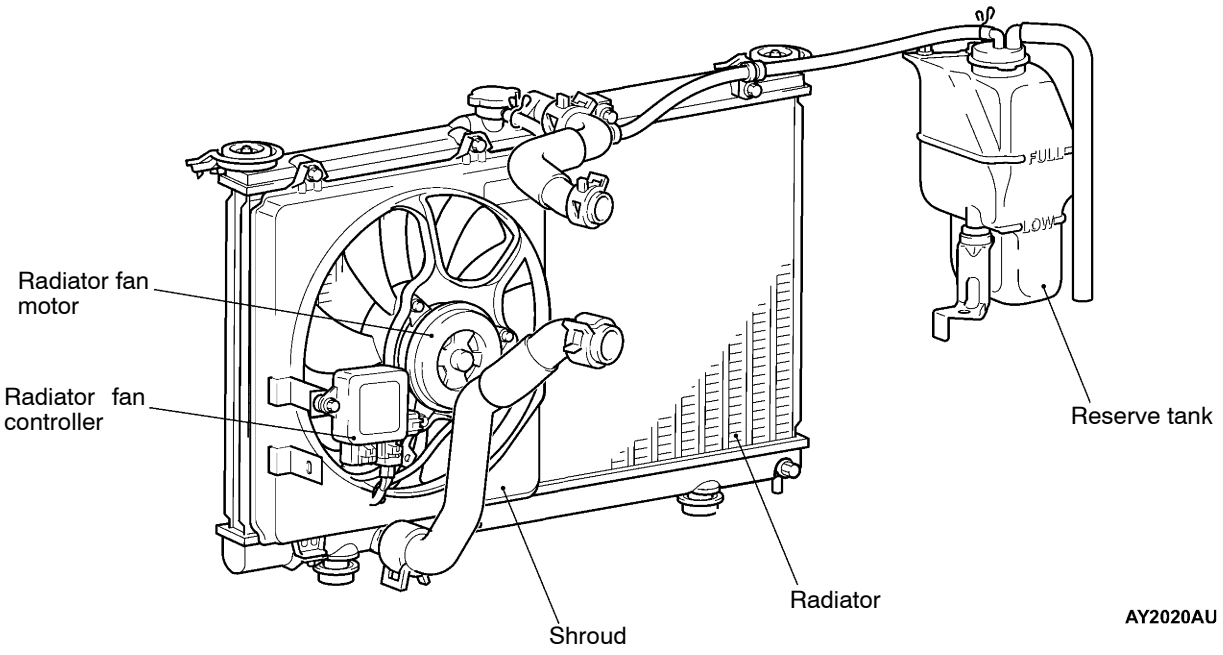
The cooling system is a water-cooled pressurized, forced circulation type which offers the following features.

- To improve the reliability of cavitation at a high engine speed and to increase the amount of engine coolant, output control system in which a thermostat is installed at the outlet of engine coolant from the engine to the radiator has been adopted.
- To improve the engine cooling performance and save weight, a plastic tank and an aluminium radiator fins have been introduced.
- The speed of electric cooling fan is optimally controlled by a radiator fan controller and the engine-ECU according to driving conditions so that the fan operating noise is minimized and the fuel efficiency is improved.

SPECIFICATIONS

Items		Specifications
Cooling method		Water-cooled pressurized, forced circulation with electrical fan
Radiator	Type	Pressurized corrugate type
	Performance kJ/h	216,700
Water pump	Type	Impeller of centrifugal type
	Drive method	Drive belt
Thermostat	Type	Wax pellet type with jiggle valve
	Valve open temperature °C	80 ± 1.5

CONSTRUCTION DIAGRAM



INTAKE AND EXHAUST

AIR INTAKE SYSTEM

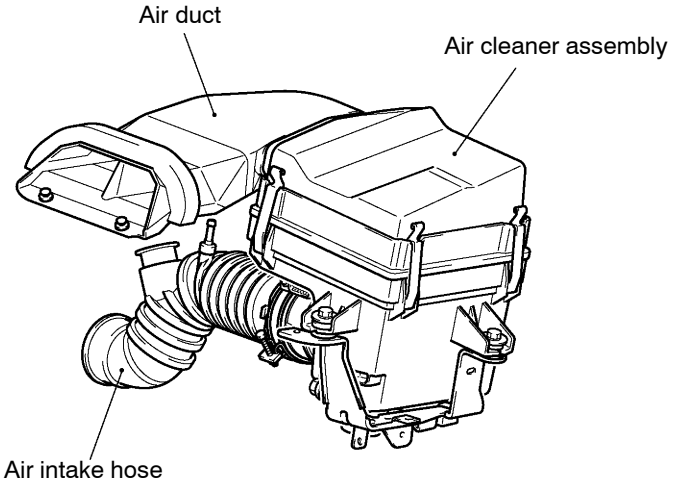
AIR DUCT, AIR CLEANER

- By introducing fresh cool air from the top of the radiator efficiently, the engine performance has been enhanced and intake air noise has been reduced.
- Burnable used paper mixed with plastic materials have been adopted in consideration for reduction of industrial wastes and protection of global environment.

AIR INTAKE HOSE

Unleaded rubber materials have been adopted for air intake hose in consideration for protection of global environment.

CONSTRUCTION DIAGRAM

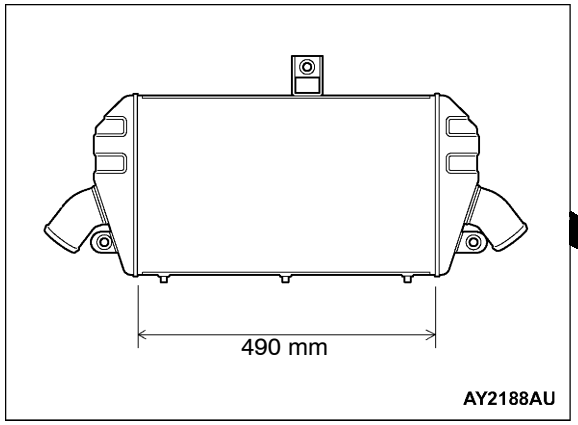


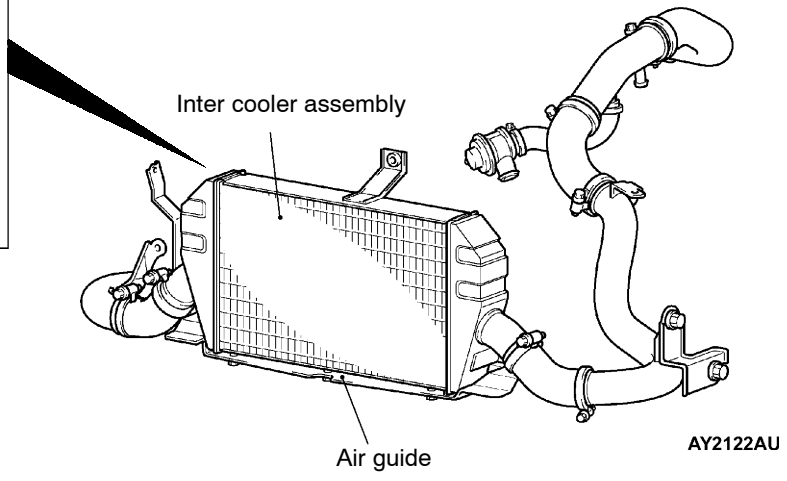
INTER COOLER

By mounting an air cooled intercooler to reduce the intake air temperature after boosting, engine output has been improved. The features of the air cooled intercooler are as follows.

- Large intercooler (Core size: 289.5×490×65 mm)
- Air guides are mounted to the bottom of the intercooler.

CONSTRUCTION DIAGRAM





INTER COOLER WATER SPRAY

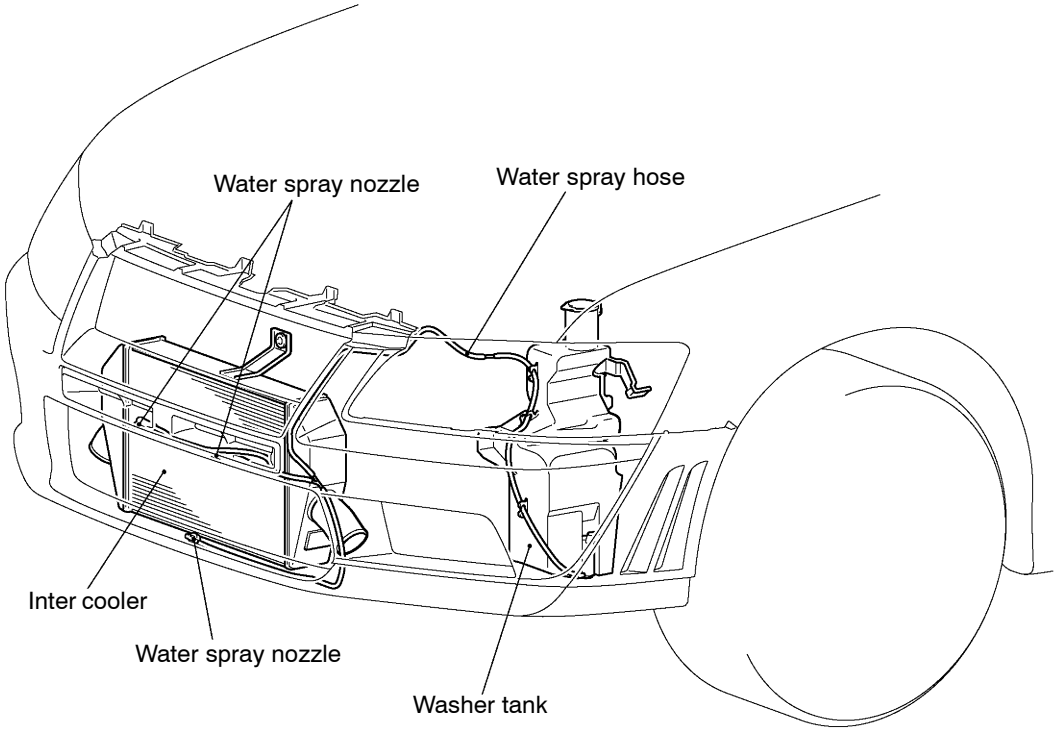
To complement the intercooler efficiency in ranges where the cooling efficiency of the air cooled intercooler is insufficient, and attain high performance in various operating environments, a system which cools by spraying water from a special washer tank for the intercooler to the front of the intercooler has been adopted.

The features of the intercooler water spray system is as follows.

- Sprays water when the water spray switch on the floor console is operated.
- Adopts a system which enables switching between the auto mode which automatically sprays water at the optimum operating conditions by signals from the ECU according to the engine state, and the manual mode which is operated by the driver.
- Three water spray nozzles are located at optimum positions to enhance the intercooler efficiency.

CONSTRUCTION DIAGRAM

<Water Spray Nozzle/Water Spray Hose/Washer Tank>



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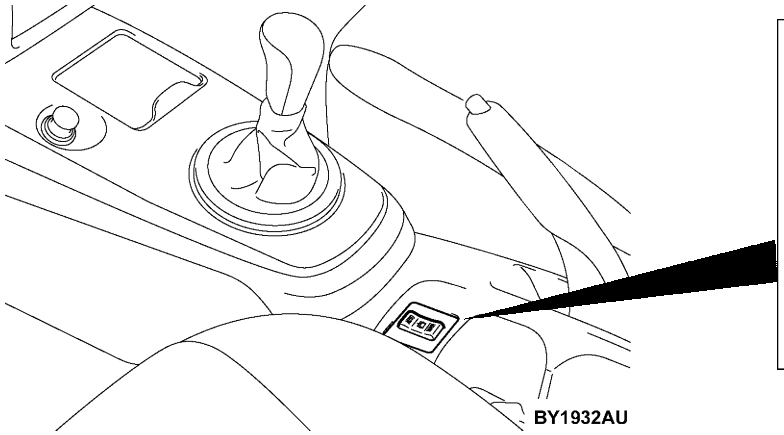
<Water Spray Switch>



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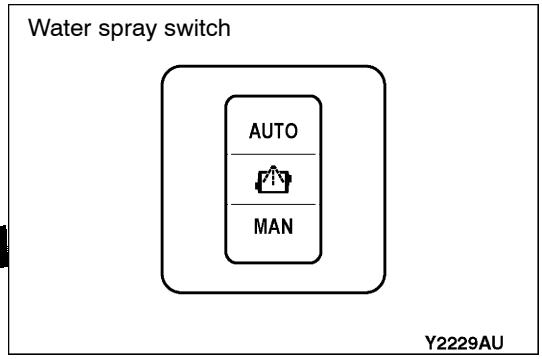

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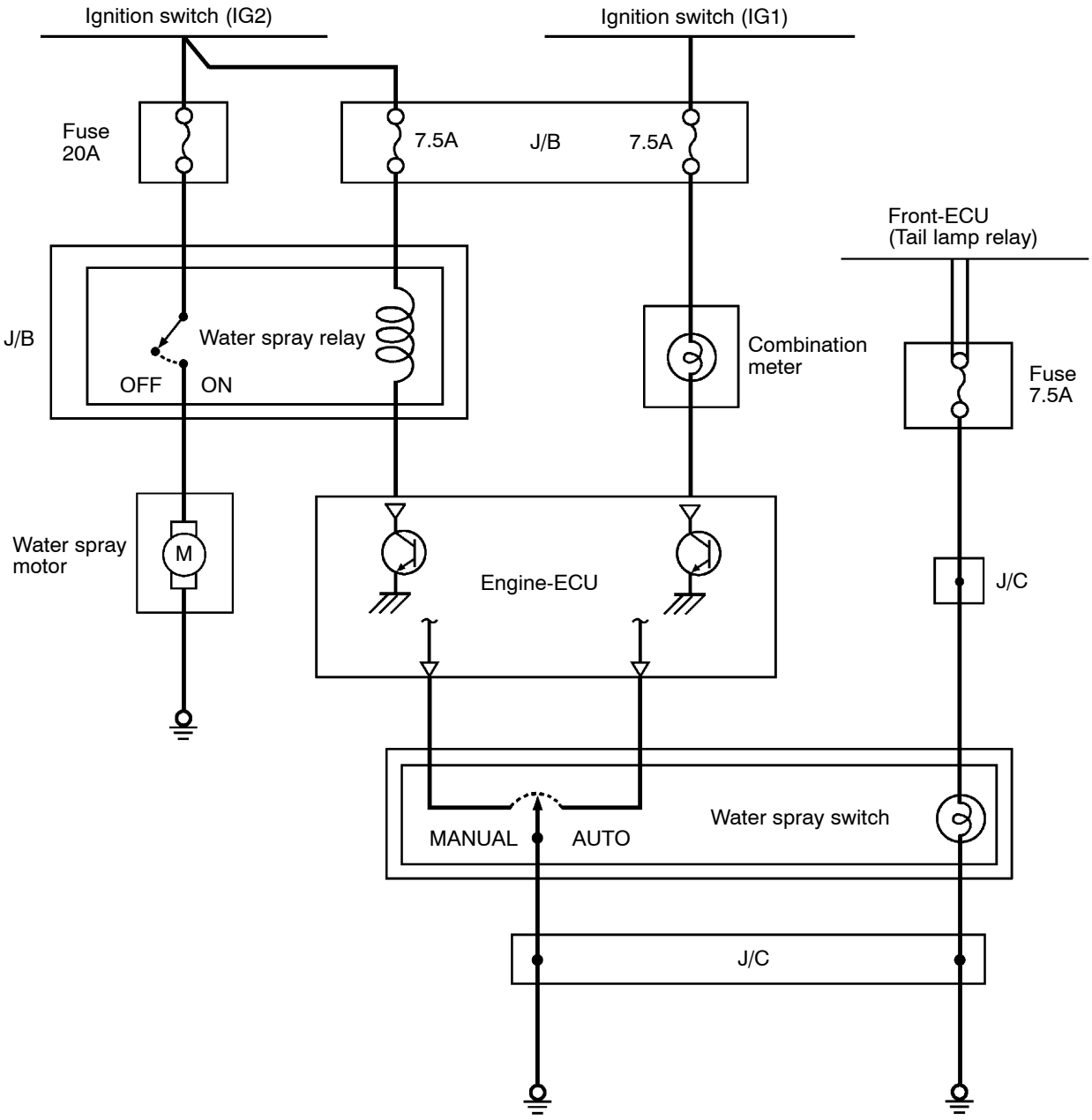
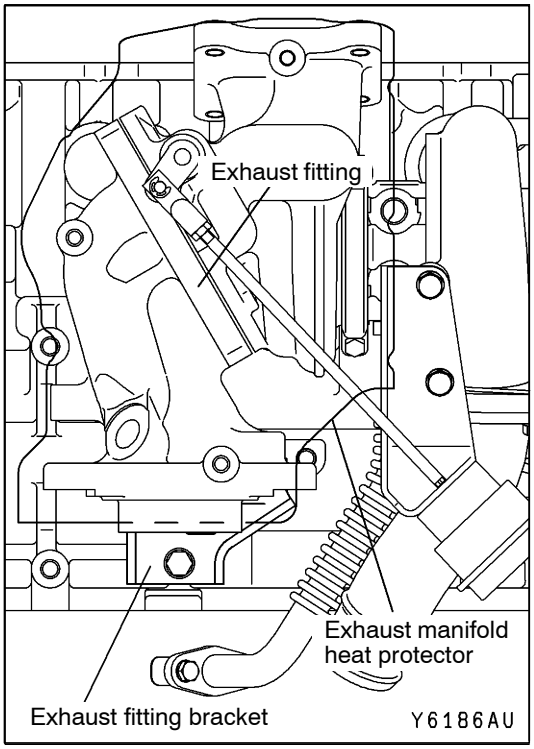
SYSTEM DIAGRAM





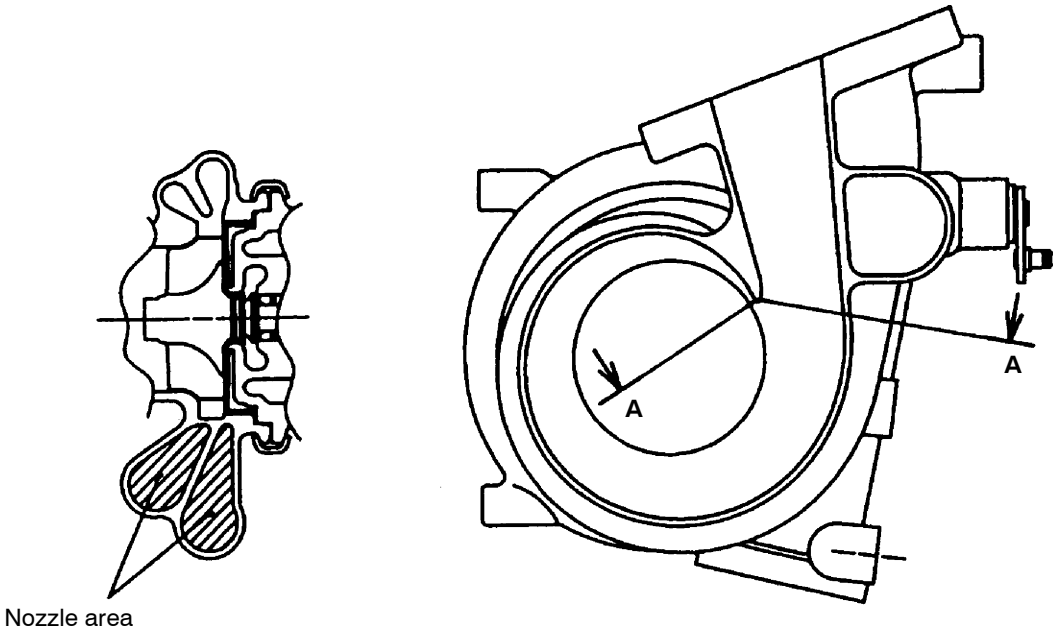
EXHAUST SYSTEM

EXHAUST FITTING BRACKET

An exhaust fitting bracket has been added in order to provide greater rigidity.

TURBOCHARGER

The turbocharger type TD05HR-16G6-9.8T and TD05HRA-16G6-9.8T have been adopted.
Compared to previous types of turbocharger, these new types have a smaller turbine housing nozzle area which improves response at medium to low speeds.



Section A - A

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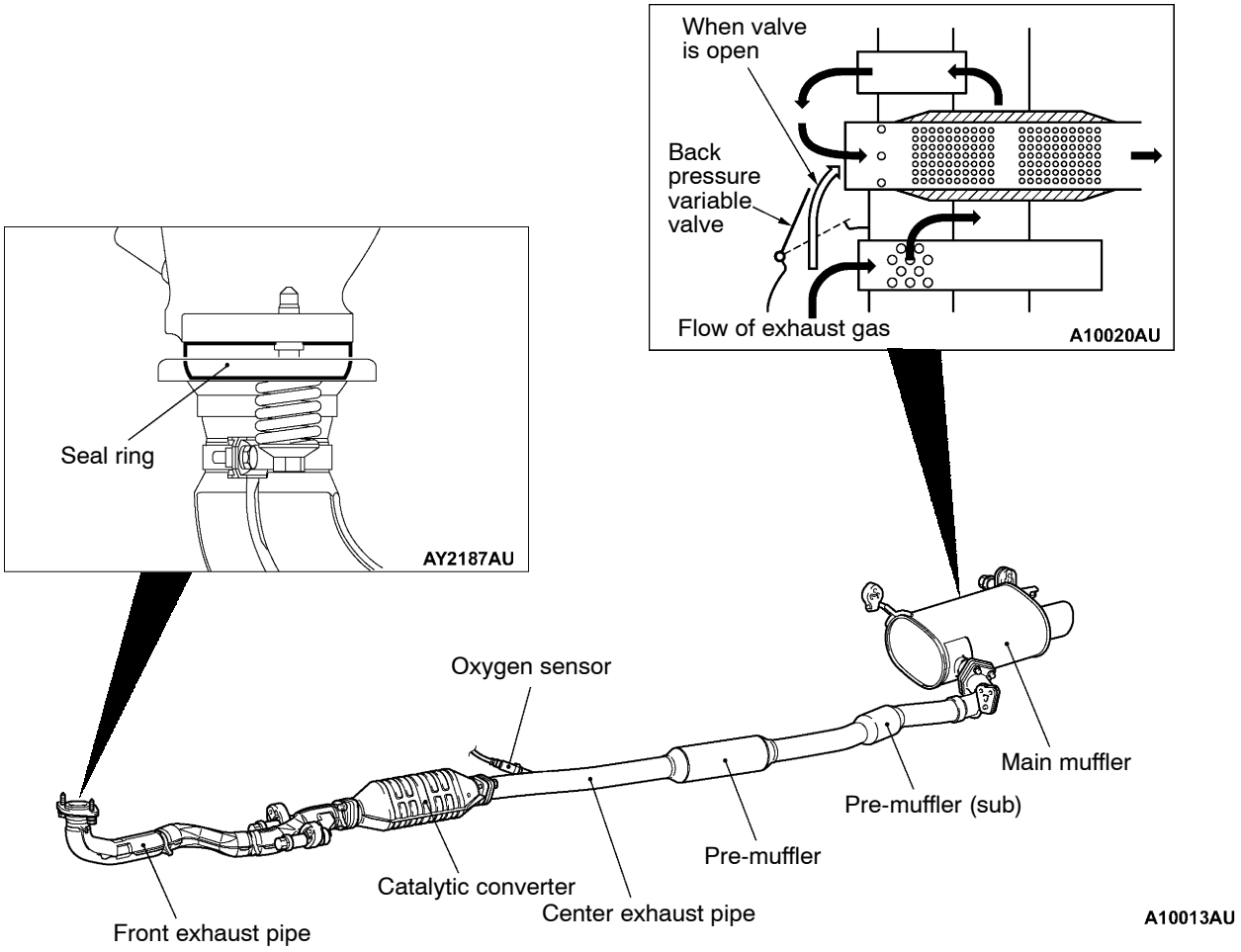
EXHAUST PIPE AND MUFFLER

Exhaust pipe consisting of 3 separation system: front exhaust pipe, center exhaust pipe, and exhaust main muffler, has the following features:

- The adoption of a seal ring has reduced vibrations during idling and driving noise.
- A main muffler incorporating a back pressure variable valve is adopted.
- Straight layout of exhaust piping has reduced vibration and exhaust pressure in exhaust system.
- The adoption of hanger rubber with lower spring constant and the decreased number of hangers have reduced vibration in exhaust piping.
- The adoption of all stainless exhaust piping has enhanced resistance to corrosion and heat.
- Installation of thermal insulating cover and materials on front pipe has improved emission control performance.

CONSTRUCTION DIAGRAM



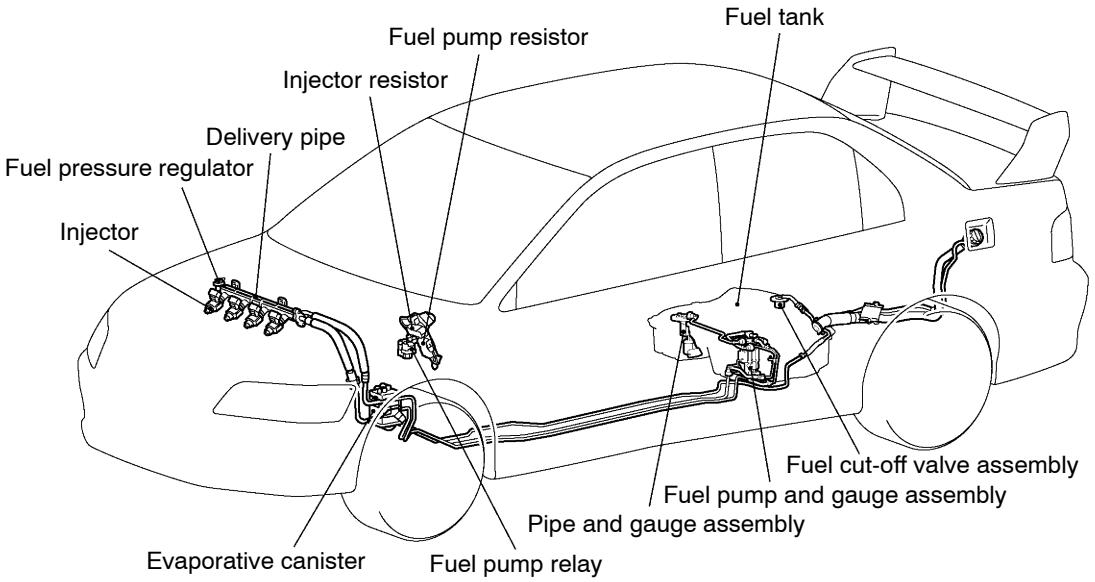
FUEL SYSTEM

The fuel system consists of parts such as electromagnetic-type fuel injectors, a delivery pipe and a fuel pressure regulator. In addition, a fuel pressure control solenoid valve has been provided in order to maintain idling stability after the engine is re-started when it is hot. This system is basically the same as the previous system used in the 4G63-DOHC-Turbocharger engine for the EVOLUTION-VI.

SPECIFICATIONS

Items		Specification
Fuel tank capacity L		48
Fuel pump type		Electric
Fuel filter type		Cartridge (filter-paper type)
Fuel return system		Fuel pressure regulator return
Fuel pressure regulator control pressure kPa		294
Injectors	Type	Electromagnetic
	Quantity	4
Evaporative emission control system		Canister type

CONSTRUCTION DIAGRAM

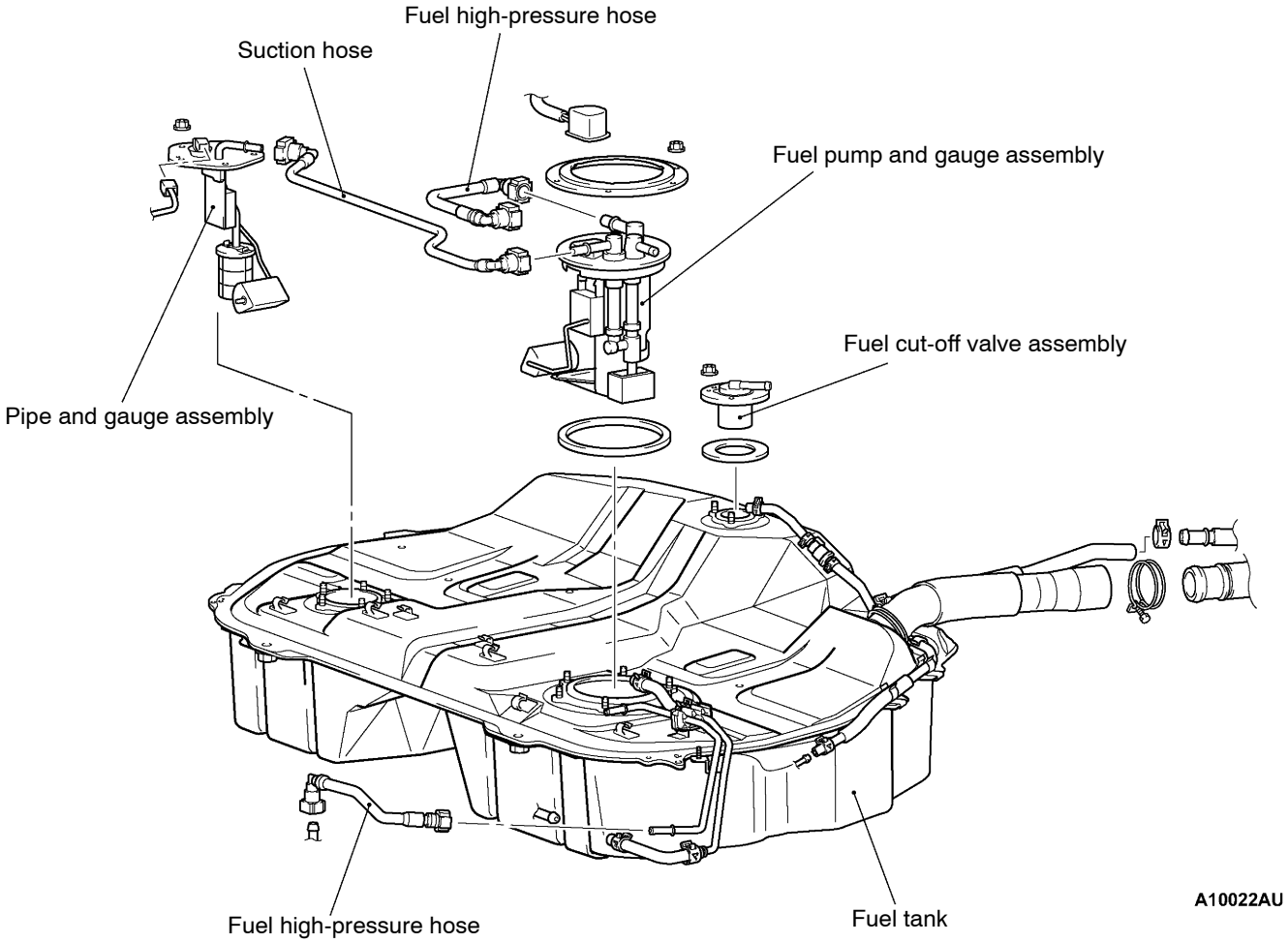


FUEL TANK

A steel fuel tank is located under the floor of the rear seats to provide increased safety and increase the amount of luggage compartment space.

- The fuel tank has been equipped with a valve assembly which incorporates a fuel cut-off valve to prevent fuel from leaking out in the event of a collision for adjusting the pressure inside the fuel tank.
- For better serviceability, the fuel tank has been coupled with the main line by a one-touch joint method, not the conventional double flare nut method.

CONSTRUCTION DIAGRAM

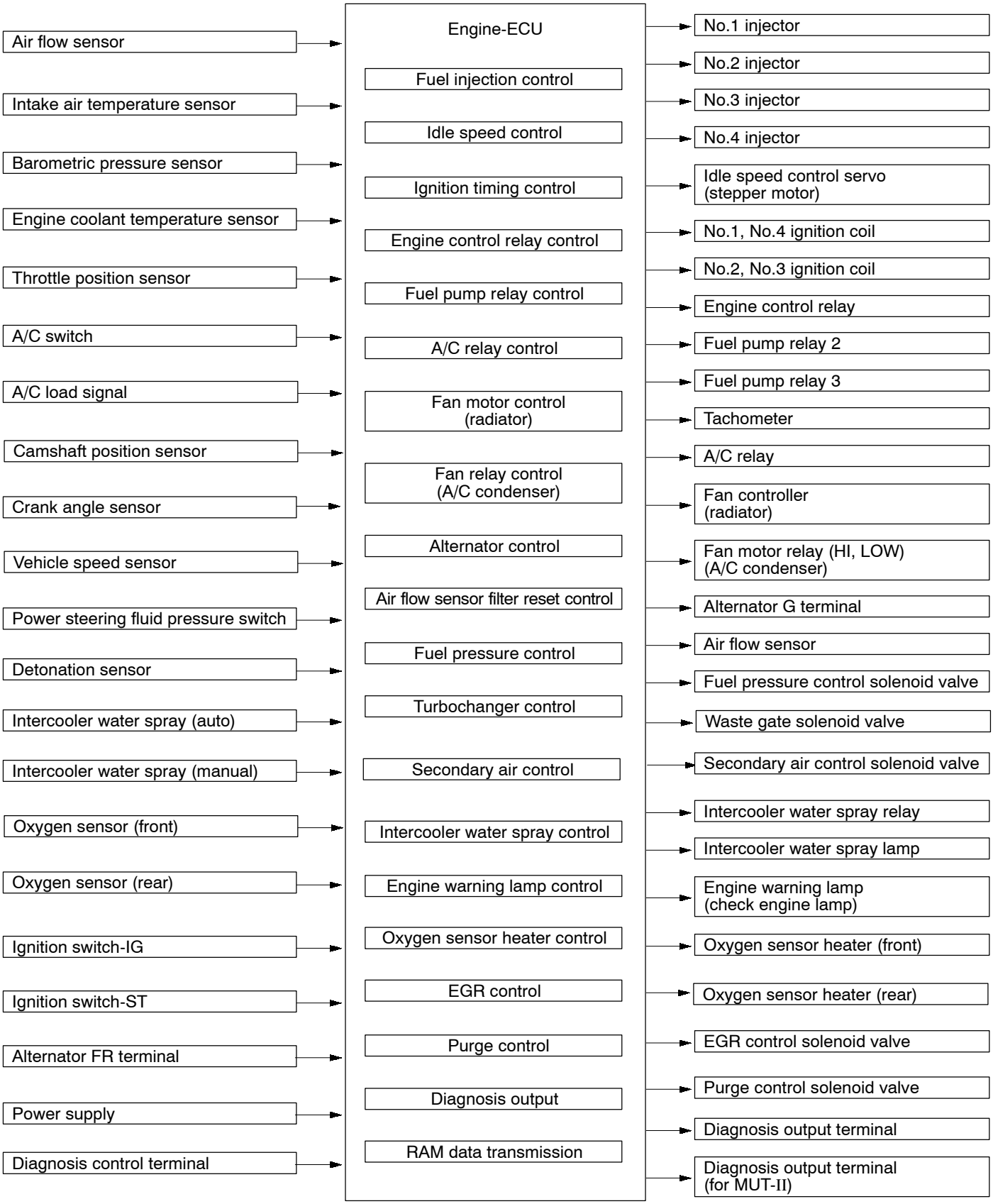


CONTROL SYSTEM

The control system is based on the system for 4G63-DOHC-Tubocharger which has been installed in the EVOLUTION-VI, with the following improvements added.

Improvements/Additions	Remarks
Adoption of compact throttle position sensor	● Smaller size and light weight ● Higher resistance to vibration ● Idle position switch disused ● Basically the same as that used in the SPACE WAGON
Adoption of compact stepper motor for idle speed control servo	● Improved ignition performance ● Basically the same as that used in the LANCER
Adoption of PWM (pulse width modulation) method of radiator fan motor control	● Reduced fuel consumption ● Reduced fan noise ● Basically the same as that used in the LANCER
Adoption of dual oxygen sensor	● Higher reliability of air fuel ratio control ● Basically the same as that used in the GALANT
Adoption of intercooler water spray control	● Improved intercooler cooling efficiency

SYSTEM BLOCK DIAGRAM



CONTROL SYSTEM DIAGRAM

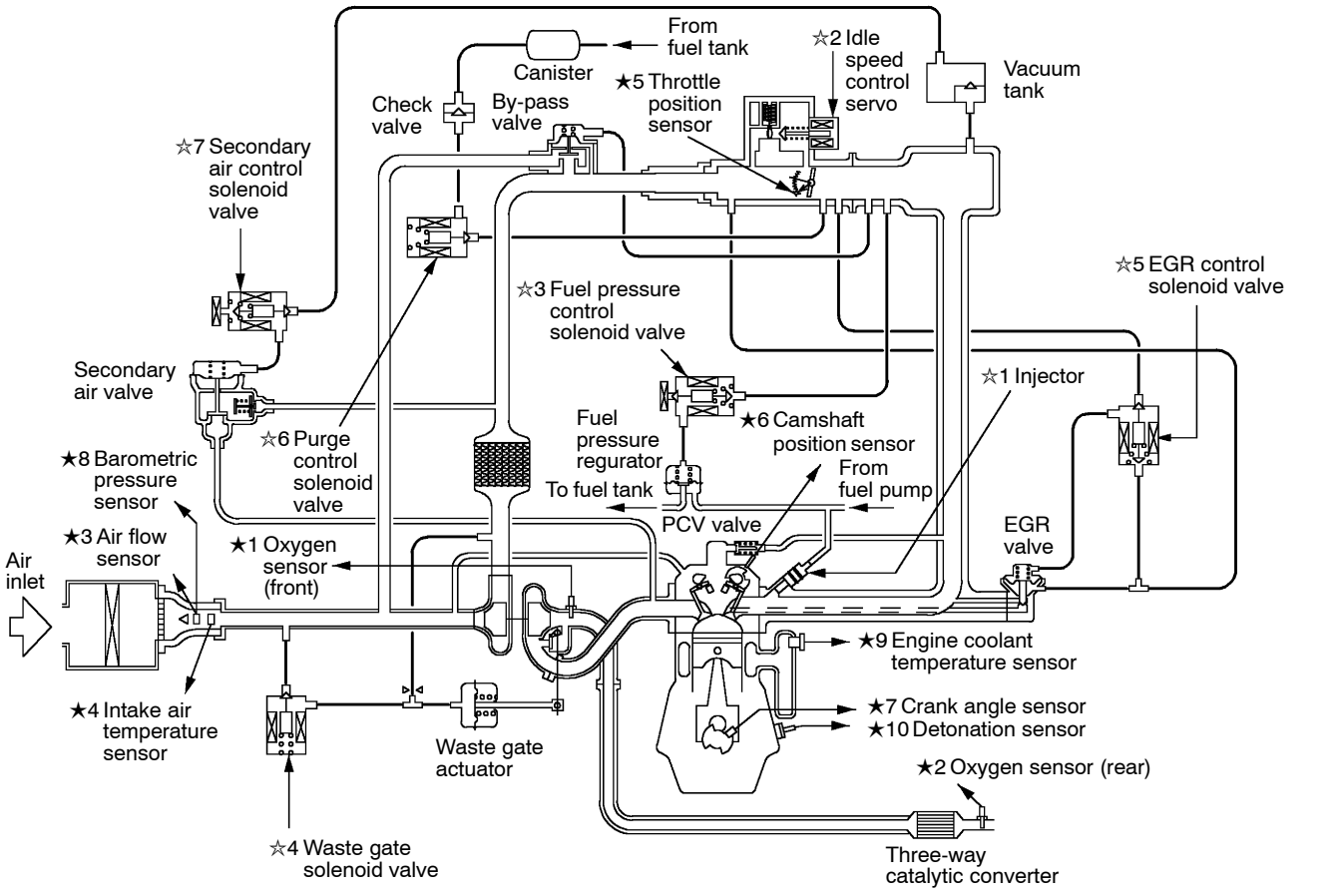
★1 Oxygen sensor (front)
★2 Oxygen sensor (rear)
★3 Air flow sensor
★4 Intake air temperature sensor
★5 Throttle position sensor
★6 Camshaft position sensor
★7 Crank angle sensor
★8 Barometric pressure sensor
★9 Engine coolant temperature sensor
★10 Detonation sensor

- Power supply
- Ignition switch-IG
- Ignition switch-ST
- Vehicle speed sensor
- A/C switch
- A/C load signal
- Power steering fluid pressure switch
- Alternator FR terminal

→ Engine-ECU →

☆1 Injector
☆2 Idle speed control servo
☆3 Fuel pressure control solenoid valve
☆4 Waste gate solenoid valve
☆5 EGR control solenoid valve
☆6 Purge control solenoid valve
☆7 Secondary air control solenoid valve

- Engine control relay
- Fuel pump relay 2, 3
- A/C relay
- Ignition coil
- Fan controller
- Condenser fan relay (HI)
- Condenser fan relay (LOW)
- Engine warning lamp
- Diagnosis output
- Alternator G terminal



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LIST OF COMPONENT FUNCTIONS

Name		Function
ECU	Engine-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-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-ECU controls the fuel injection, throttle valve opening angle and ignition timing to the appropriate settings based on this signal.
	Air flow sensor	Detects the amount of intake air (volumetric capacity) by means of a Karman vortex meter. The engine-ECU controls the basic injector drive time based on this signal and on the engine speed.
	Barometric pressure sensor	Detects the barometric pressure by means of a semiconductor diffusion-type pressure sensor. The engine-ECU detects the vehicle's altitude based on this signal, and uses this to correct the fuel injection amount so that the optimum air/fuel mixture ratio is obtained for that altitude.
	Oxygen sensor	Detects the concentration of oxygen in the exhaust gas by means of zirconia and platinum electrodes. The engine-ECU judges whether the air/fuel mixture ratio is at the optimum theoretical ratio based on this concentration.
	Intake air temperature sensor	Detects the temperature of the intake air by means of a thermistor. The engine-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-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-ECU controls the throttle valve and also determines the optimum fuel injection for the vehicle's degree of acceleration based on the voltage output from this sensor.
	Vehicle speed sensor	Detects the vehicle speed by means of a magnetic rheostatic element.
	Camshaft position sensor	Detects the No. 1 cylinder compression top dead centre position by means of a hall element.
	Crank angle sensor	Detects the crank angle by means of a hall element. The engine-ECU controls the injectors based on the signal from this sensor.
	Alternator FR terminal	Detects the energising duty ratio of the alternator field coil.
	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.

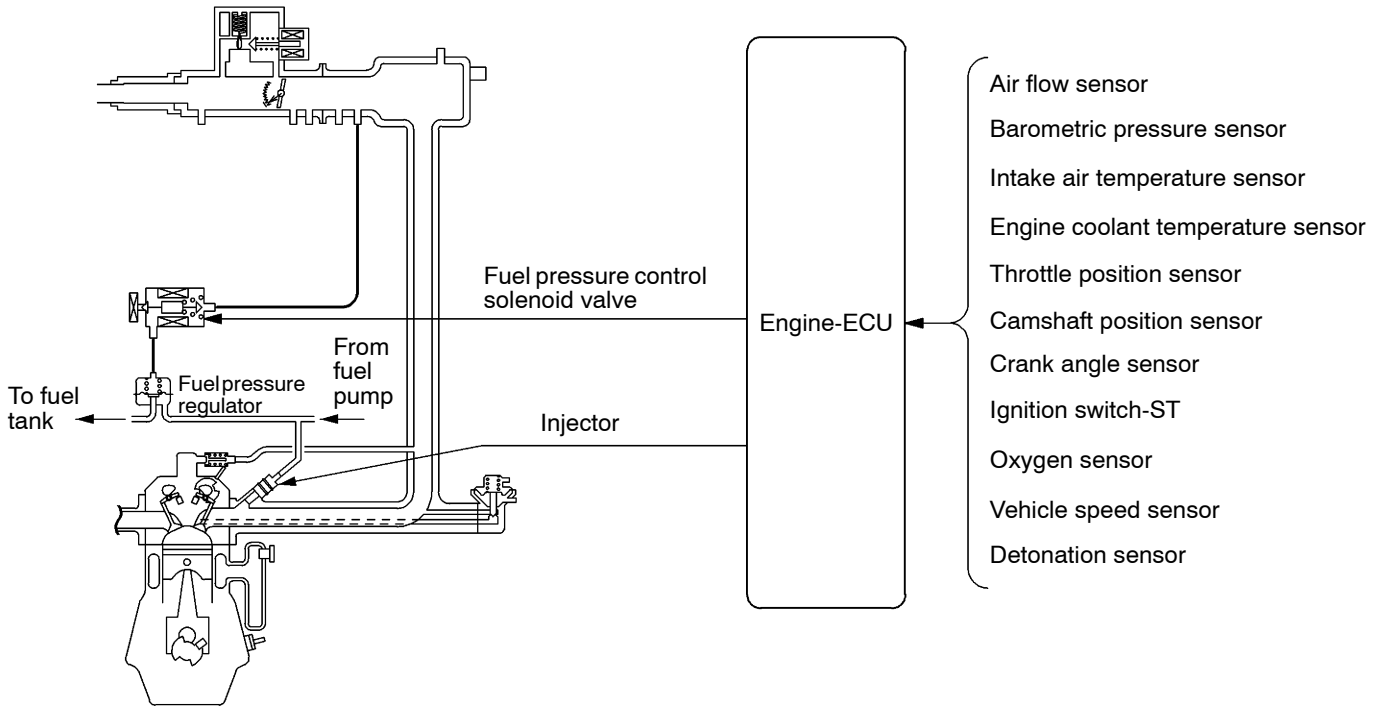
Name		Function
Sensors	A/C load signal	Inputs the compressor drive state (low load/high load) to the engine-ECU. The engine-ECU controls the A/C idle-up revolution speed using this signal.
	Intercooler water spray switch (automatic)	Sprays water when certain driving conditions are satisfied.
	Intercooler water spray switch (manual)	Sprays water while the switch is being pressed by the driver.
	Diagnosis control terminal	Notifies the engine-ECU that the MUT-II has been connected to the diagnosis connector, and enables communication between the MUT-II and the engine-ECU.
Actuators	Engine control relay	Turns the engine-ECU power circuit on and off.
	Injector	Drives the fuel injection by means of drive signals from the engine-ECU.
	Ignition coil (integrated power transistor)	Interrupts the ignition coil primary current in accordance with the ignition signals from the engine-ECU, in order to generate a high voltage for ignition.
	Idle speed control servo	The throttle valve bypass air amount during idling and deceleration is controlled with the signal from the engine-ECU.
	Fuel pump relay 1	Supplies power to the fuel pump when the ignition switch is at the ON position.
	Fuel pump relay 2	Controls the supply of power to the fuel pump in accordance with the signal from the engine-ECU.
	Fuel pump relay 3	Controls the supply of power to the fuel pump when driving at low loads and when driving at high loads, in accordance with the signal from the engine-ECU.
	Fan controller	Controls the smooth operation of the radiator fan in accordance with the signal from the engine-ECU.
	Condenser fan relay (HI)	Controls the condenser fan operation (high speed) in accordance with the signal from the engine-ECU.
	Condenser fan relay (LOW)	Controls the condenser fan operation (low speed) in accordance with the signal from the engine-ECU.
	Intercooler water spray relay	Controls the driving of the intercooler spray motor in accordance with the signal from the engine-ECU.
	Waste gate solenoid valve	Controls the supercharging pressure which acts on the waste gate actuator in accordance with the signal from the engine-ECU.
	Purge control solenoid valve	Controls the purge air flow amount which is introduced into the surge tank in accordance with the signal from the engine-ECU.
	EGR control solenoid valve	Controls the negative pressure which operates the EGR valve in accordance with the signal from the engine-ECU.
	Secondary air control solenoid valve	Controls the pressure which is introduced into the secondary air valve in accordance with the signal from the engine-ECU.
	Fuel pressure control solenoid valve	Controls the fuel pressure in accordance with the signal from the engine-ECU.

Name		Function
Actuators	Alternator G terminal	Controls the current generated by the alternator in accordance with the signal from the engine-ECU.
	A/C relay	Controls the A/C compressor operation.
	Engine warning lamp (check engine lamp)	Illuminates when a sensor malfunction is detected to warn the driver of the problem.
	Intercooler water spray lamp	Illuminates when the intercooler is being sprayed in accordance with the signal from the engine-ECU.

FUEL INJECTION CONTROL

The fuel injection control system is basically the same as the control system for the 4G63-DOHC-Turbocharger engine installed in the Evolution-VI.

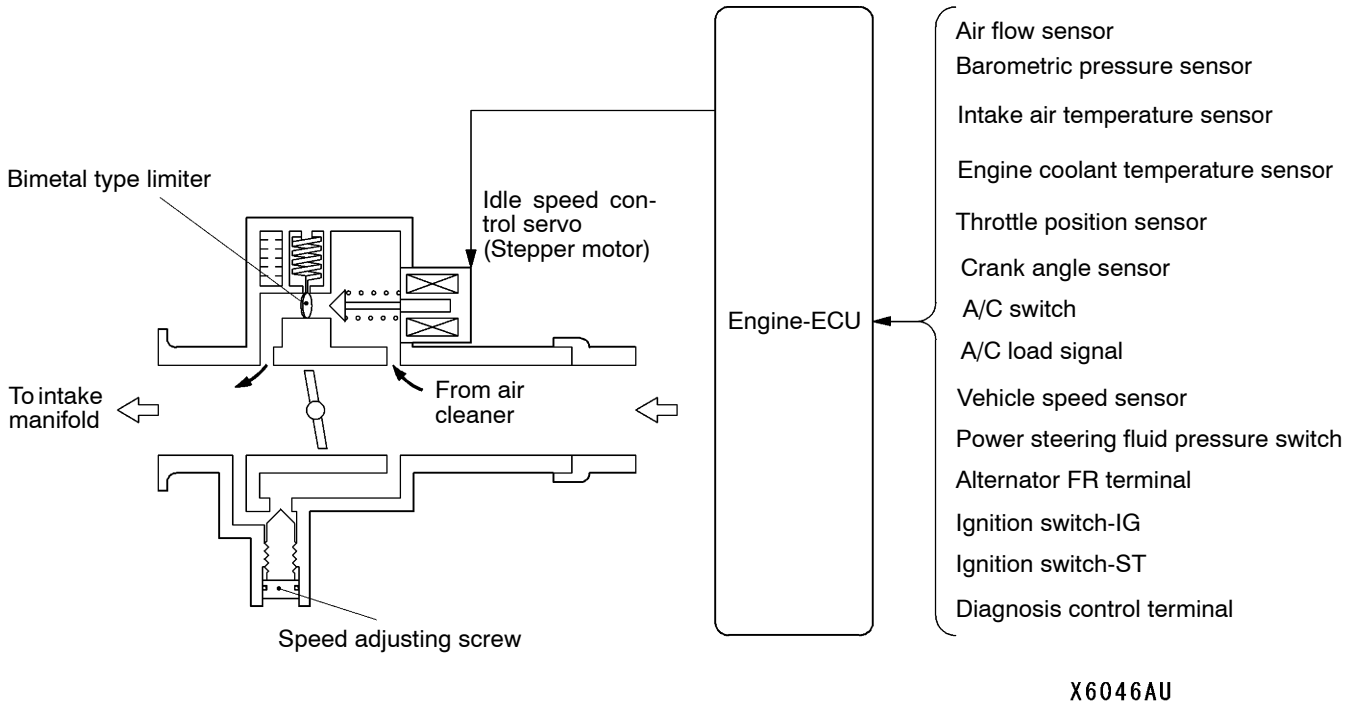
SYSTEM CONFIGURATION DIAGRAM



IDLE SPEED CONTROL

The idle speed control system is basically the same as the control system for the 4G63-DOHC-Turbocharger engine installed in the Evolution-VI.

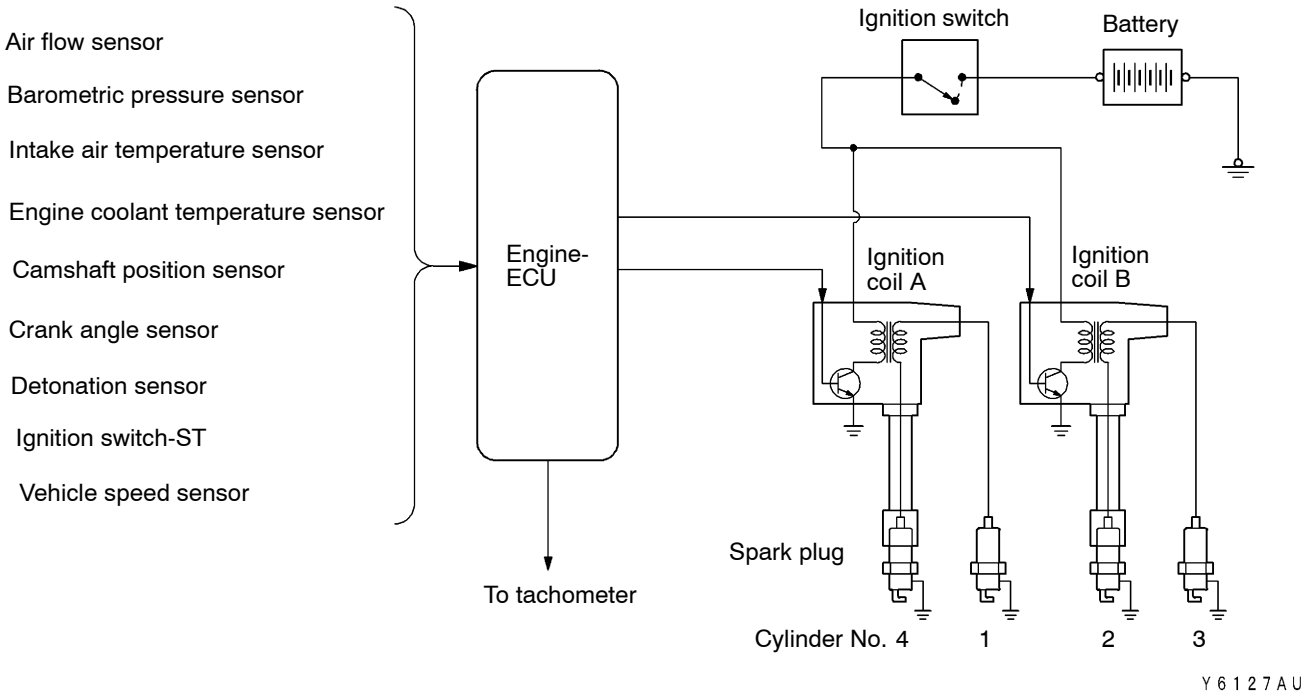
SYSTEM CONFIGURATION DIAGRAM



IGNITION TIMING AND DISTRIBUTION CONTROL

The ignition timing and distribution control system is basically the same as the control system for the 4G63-DOHC-Turbocharger engine installed in the Evolution-VI.

SYSTEM CONFIGURATION DIAGRAM



RADIATOR FAN MOTOR CONTROL

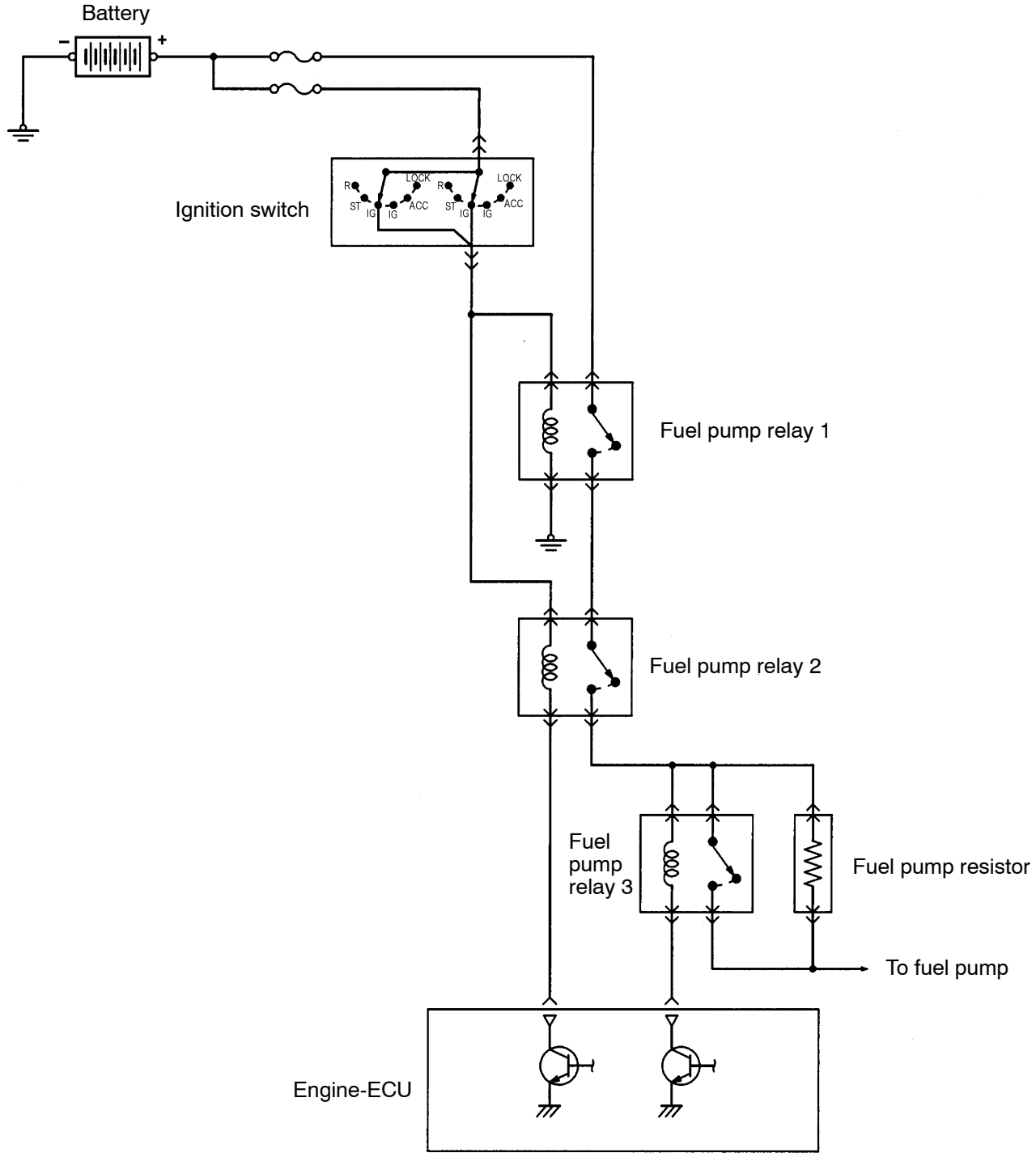
The radiator fan motor control system is basically the same as the control system for 4G6-MPI engine installed in the GALANT.

POWER SUPPLY AND A/C CONDENSER FAN RELAY CONTROL, OXYGEN SENSOR HEATER CONTROL, AIR FLOW SENSOR FILTER RESET CONTROL, ALTERNATOR CONTROL, FUEL PRESSURE CONTROL, SUPERCHARGING PRESSURE CONTROL, SECONDARY AIR CONTROL

These control systems are basically the same as those for 4G63-DOHC-Turbocharger engine installed in the EVOLUTION-VI.

FUEL PUMP RELAY CONTROL

- The fuel injection amount is controlled by the fuel pump relay 3 in order to reduce the amount of return fuel when the engine is running at low speeds and fuel consumption is low, and also to reduce noise.



EGR CONTROL AND PURGE CONTROL

Refer to the EMISSION CONTROL SYSTEM.

DIAGNOSIS SYSTEM

The engine-ECU is prvided with the following functions to make system inspection easier.

- Engine warning lamp control
- Diagnosis function
- Service data output
- Actuator test

NOTE
Refer to the Workshop Manual for details on each item.

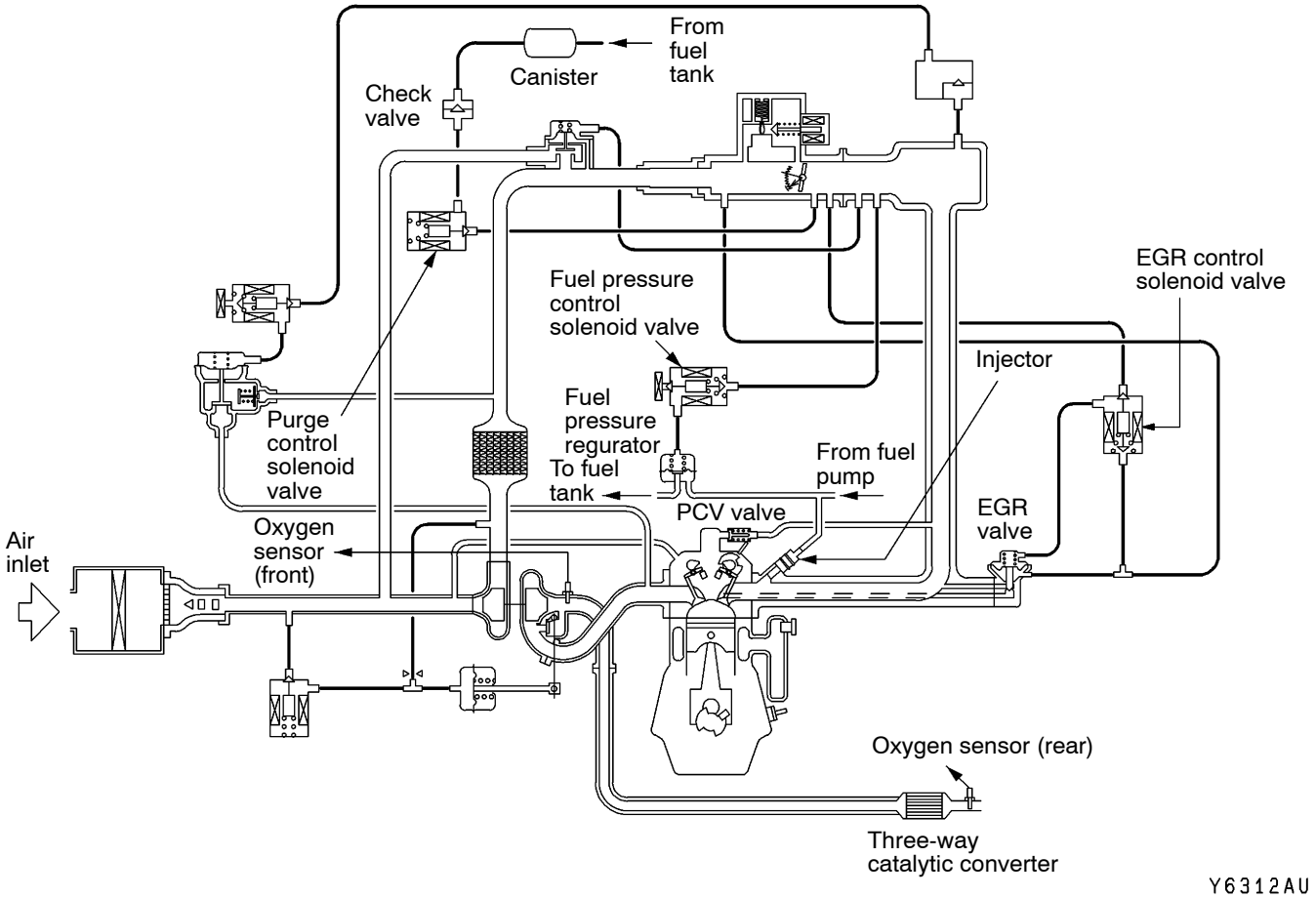
EMISSION CONTROL SYSTEM

The following improvements in the control details have been made to the system, which is basically the same as the previous system used in the 4G63-DOHC-Turbocharger engine for the EVOLUTION-VI.

- An electronically-controlled EGR system utilizing an EGR control solenoid valve has been adopted.
- An electronically-controlled purge control system utilizing purge control solenoid valve has been adopted.

System	Remarks
Evaporative emission control system	Electronic control type (Duty cycle type purge control solenoid valve)
Exaust gas recirculation (EGR) system	Electronic control type (Duty cycle type EGR control solenoid valve)

EMISSION CONTROL SYSTEM DIAGRAM



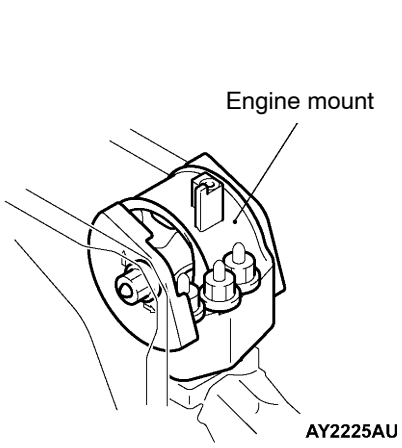
MOUNT

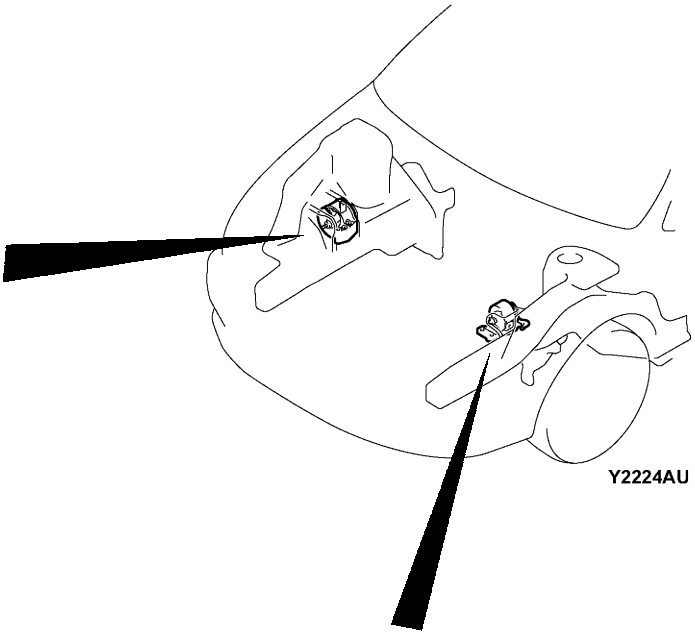
The inertia axial system based on the past achievements in COLT/LANCER has been adopted for the engine mount system.

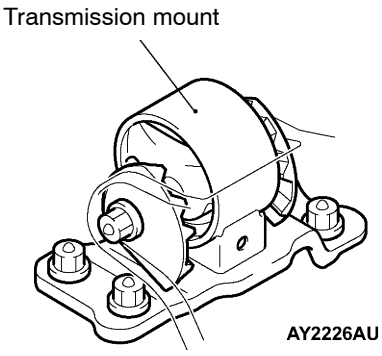
- Longitudinal installation type of cylindrical liquid-filled engine mount has been adopted for reduction of idle vibration and improvement of ride feeling.
- The liquid-filled mount system has been adopted for transmission mount to improve ride feeling by optimizing the insulator.
- Installation of roll mount in the upper area has reduced engine rolling. Furthermore, enlargement of insulator diameter has reduced idle vibration.

CONSTRUCTION DIAGRAM

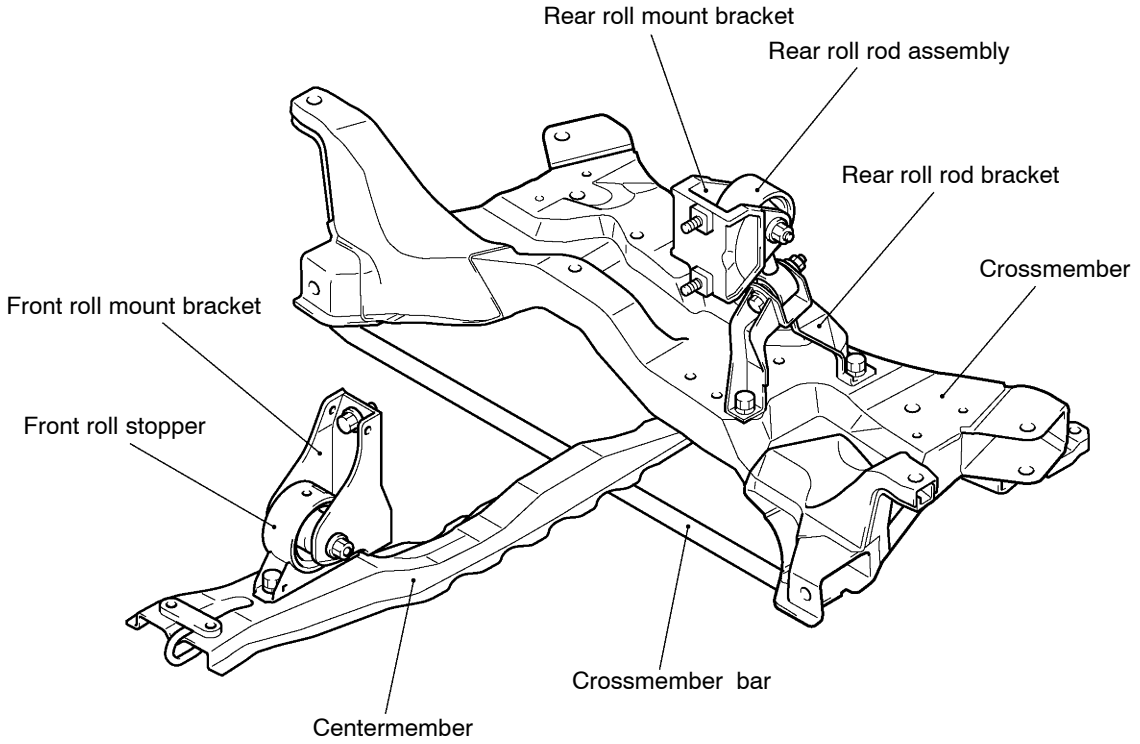
<Engine mount/Transmission mount>



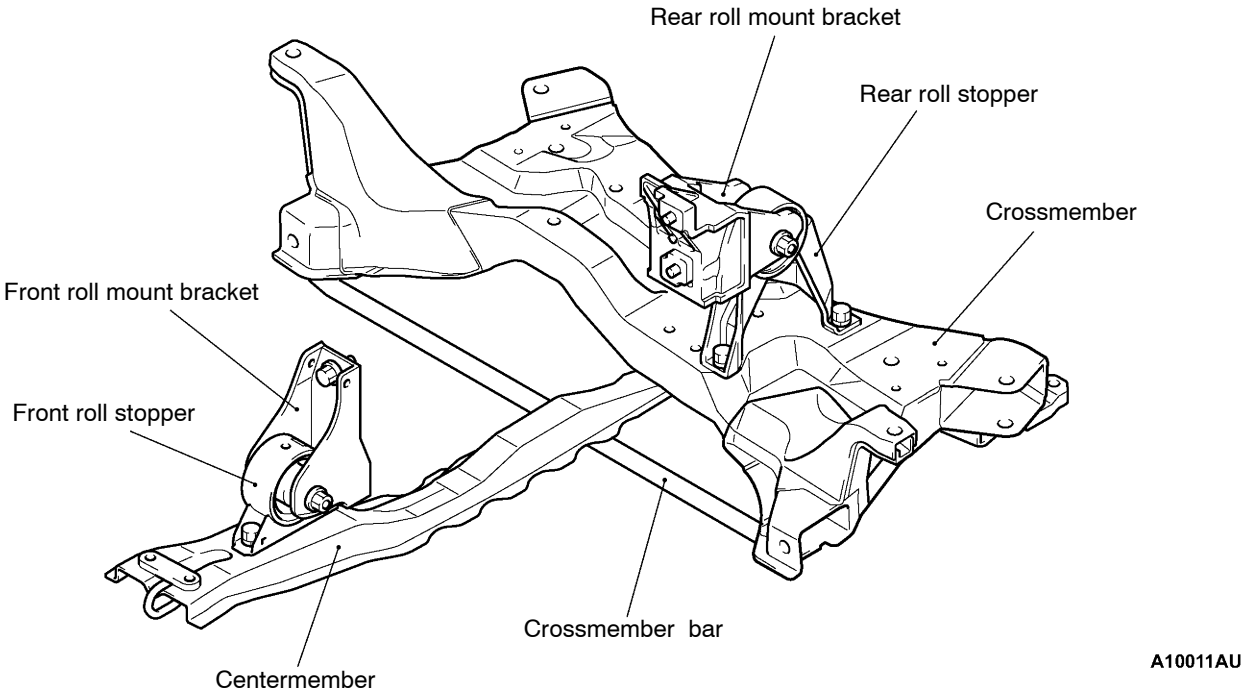




<Engine roll stopper/Crossmember/Centermember : L.H. drive vehicles>



<Engine roll stopper/Crossmember/Centermember : R.H. drive vehicles>



ACCELERATOR SYSTEM

The accelerator system is a cable and suspended pedal combination.
Plastic bushing and rubber damper have been attached to the end of the accelerator cable, to prevent noise and vibration when the cable and accelerator arm contact.

CONSTRUCTION DIAGRAM