

ENGINE

CONTENTS

ENGINE <4G6>	2	MOUNTING	12
OVERVIEW	2	Rear Roll Stoppers <EVOLUTION-V>	12
Major Specifications <EVOLUTION-IV>	2	Center Member <EVOLUTION-V>	12
Major Specifications <EVOLUTION-V>	3	FUEL SYSTEM	13
ENGINE PERFORMANCE CURVES	4	CONTROL SYSTEM	13
MAIN UNIT	5	Sensors	16
Pistons	5	Actuators	16
Connecting Rods	5	Fuel Injection Control	17
Flywheel	5	Idle Speed Control	17
LUBRICATION SYSTEM	6	Ignition Timing and Energization Time Control	18
Engine Oil Cooler	6	Power Supply and Fuel Pump Control ...	19
COOLING SYSTEM	7	Air Conditioner Relay Control; Air Flow Sensor Filter Reset Control; Fuel Pressure Control; Boost Pressure Control; Exhaust Temperature Warning Lamp Control	19
Radiator Fan Assembly	7	Alternator Control	20
Intercooler and Intercooler Water Spray System	8	Engine Speed Output	20
Intercooler and Radiator Water Spray System	9	Fan Motor Relay (Radiator Fan; Air Conditioner Condenser Fan) Control ..	21
Water Pump	9	Secondary Air Control	22
INTAKE AND EXHAUST SYSTEMS	10	Fuel Pump Delivery Rate Control	23
Turbocharger	10	Self-diagnosis System	24
Exhaust Pipe	11	EXHAUST EMISSION CONTROL SYSTEM	26

ENGINE <4G6>

OVERVIEW

<EVOLUTION-IV>

The engine of the EVOLUTION-IV is based on the 4G63 DOHC turbocharged unit used in the EVOLUTION-III. Its right/left alignment has been reversed and its structure simplified and optimized. In addition, it incorporates the revisions shown below for increased output and durability.

Revision	Aim (○: Newly adopted item; ●: Item already adopted on other engines)				
	Higher performance	Quieter operation	Cleaner exhaust emissions	Higher reliability	Lower weight
Revised engine mounting alignment		●			
Serpentine-belt-driven auxiliary devices				●	
Three-layer cylinder head metal gasket			●	●	
High-strength forged pistons				○	
High-strength connecting rods				○	
Steel flywheel	○				○
High-capacity water pump				○	
Straight-port intake manifold	●				
Twin-scroll turbocharger	○				
Throttle body with new type of ISC system	●			●	●
New type of compact throttle position sensor				●	●
New type of air flow sensor	○				
Secondary air system	○				
Low-noise fan alternator		●			
Crankshaft mounted crank angle sensor	●		●	●	
Plug-top ignition coils	●			●	

MAJOR SPECIFICATIONS <EVOLUTION-IV>

Items	4G63-DOHC-T/C
Displacement (cc)	1,997
Cylinder bore × stroke (mm)	85.0 × 88.0
Compression ratio	8.8
Valve mechanism	DOHC 16-valve
Fuel	Unleaded premium gasoline
Max. output (PS/rpm)	280/6,500
Max. torque (kgf-m/rpm)	36.0/3,000
Fuel supply	Electronically controlled MPI
Ignition timing	Electronically controlled

OVERVIEW

<EVOLUTION-V>

The engine of the EVOLUTION-V is based on the 4G63 DOHC turbocharged unit used in the EVOLUTION-IV. It incorporates the revisions shown below for increased output and durability.

Revision	Aim (○: Newly adopted item; ●: Item already adopted on other engines)		
	Higher performance	Reduced exhaust emissions	Higher reliability
Crankshaft pins induction hardened			○
Three-piece crankshaft thrust bearings			●
Lighter pistons	○		○
Increased turbocharger nozzle area	○		
Higher maximum injector flow rate (MDL510 → MDL560)	○		
Heater added to O ₂ sensor		●	
Divided connection of positive crankcase ventilation (PCV) system to intake manifold			●

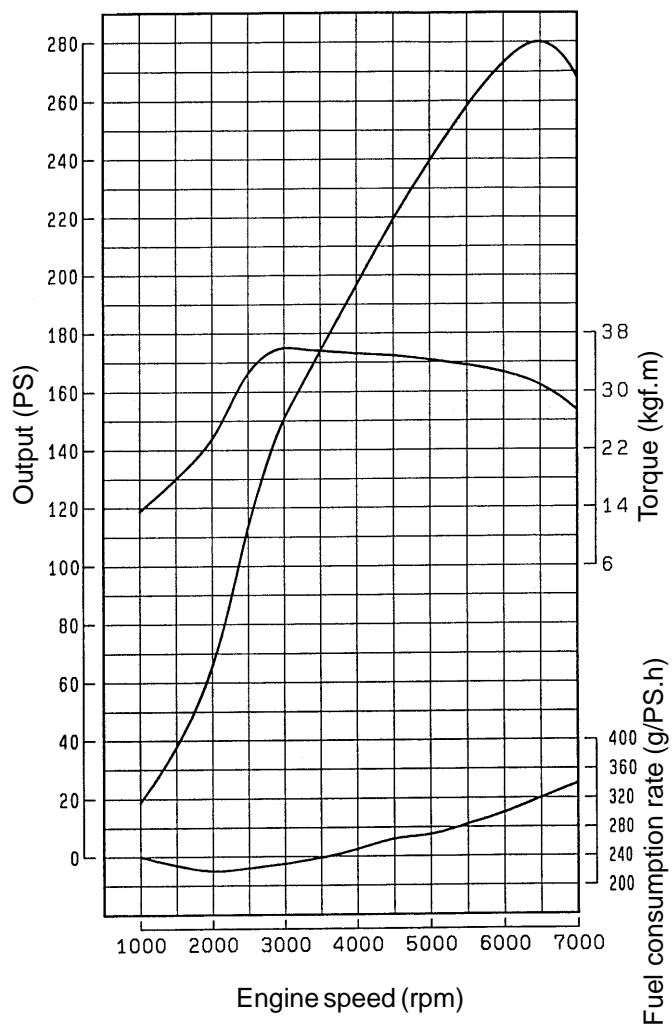
MAJOR SPECIFICATIONS <EVOLUTION-V>

Items	4G63-DOHC-T/C
Displacement (cc)	1,997
Cylinder bore × stroke (mm)	85.0 × 88.0
Compression ratio	8.8
Valve mechanism	DOHC 16-valve
Fuel	Unleaded premium gasoline
Max. output (PS/rpm)	280/6,500
Max. torque (kgf·m/rpm)	38.0/3,000
Fuel supply	Electronically controlled MPI
Ignition timing	Electronically controlled

ENGINE PERFORMANCE CURVES

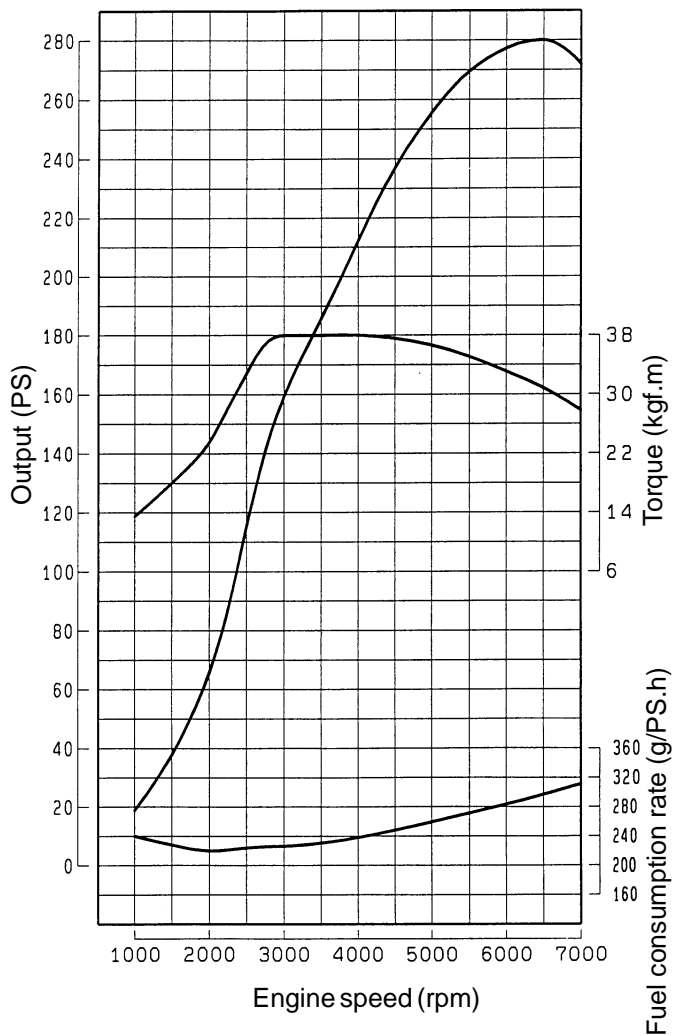
<EVOLUTION-IV>

4G63 DOHC with Turbocharger



<EVOLUTION-V>

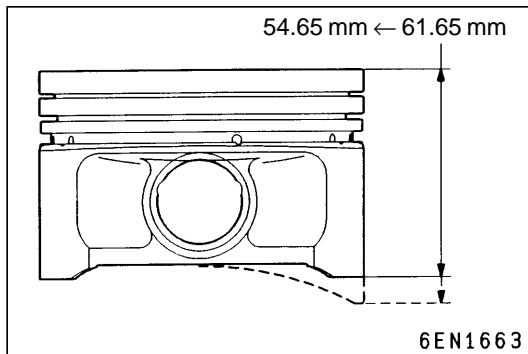
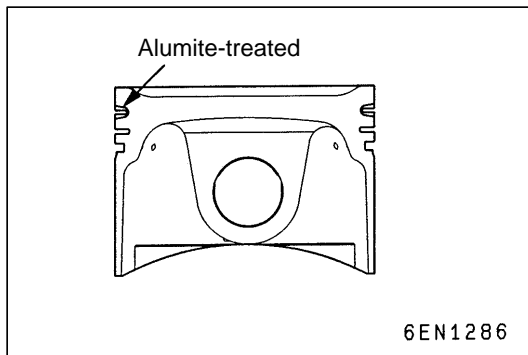
4G63 DOHC with Turbocharger



MAIN UNIT

PISTONS

- (1) A revised production method enhances the pistons' fatigue strength.
- (2) The No. 1 ring grooves are alumite-treated.

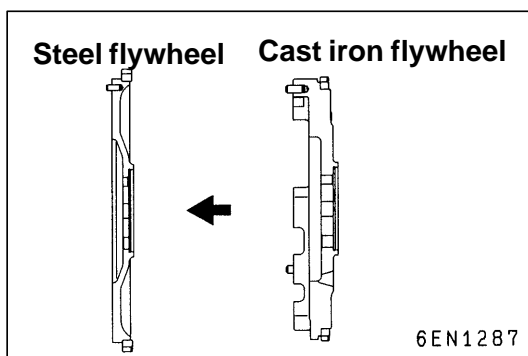


<EVOLUTION-V>

Reduced weight enhances engine responsiveness.

CONNECTING RODS

Shot blasting is performed again after coining, giving the connecting rods approximately 15% more fatigue strength than the connecting rods used in the EVOLUTION-III.



FLYWHEEL

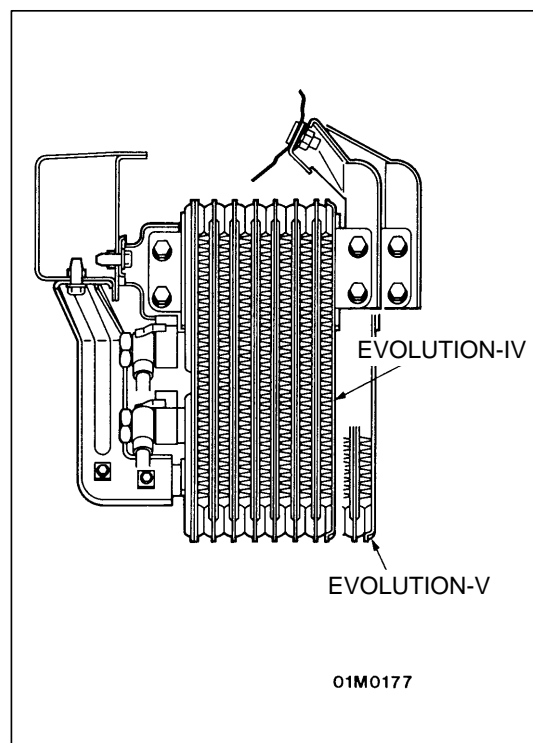
For lightness, the flywheel is made from steel instead of the earlier cast iron.

LUBRICATION SYSTEM

ENGINE OIL COOLER

<EVOLUTION-IV>

A corrugated-fin-type air-cooled engine oil cooler is utilized.



<EVOLUTION-V>

The oil cooler core has increased dimensions, and an air duct has been added to the front bumper to improve the efficiency with which the engine oil is cooled.

Specifications

Item	Specification	
	EVOLUTION-IV	EVOLUTION-V
Type	Drawn-cup	←
Core dimensions (width × height × depth) (mm)	200 × 100 × 32	200 × 130 × 32
Engine oil cooler oil capacity (cc)	160	210
Heat release (kW {kcal/h})	4.7 {4,080}	5.1 {4,380}

COOLING SYSTEM

As compared with the EVOLUTION-IV's cooling system, the EVOLUTION-V' system incorporates the following modifications for further enhancement of cooling performance:

- Revised radiator cap valve opening pressure (88 kPa {0.9 kgf/cm²} → 108 kPa {1.1 kgf/cm²})
- Modified radiator fan assembly
- Intercooler water spray system plus new radiator water spray system

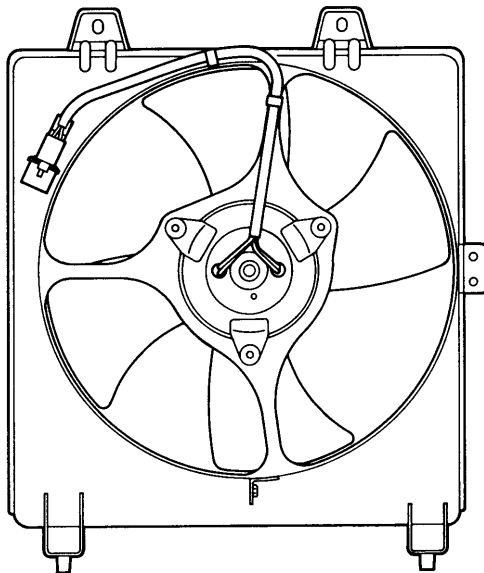
RADIATOR FAN ASSEMBLY

For improved cooling performance, the radiator fan's shape has been modified and the motor specifications have been revised.

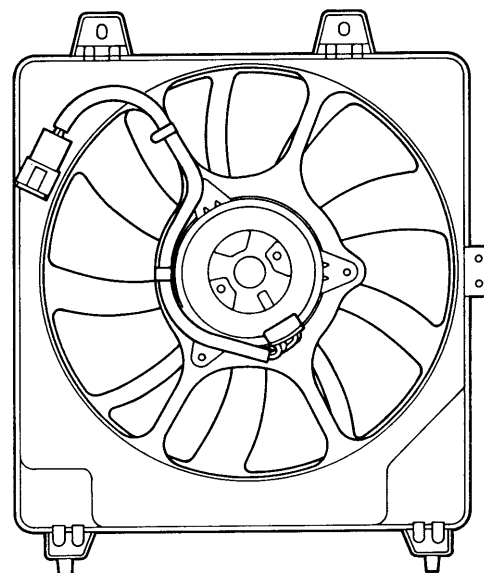
Specifications

Item		EVOLUTION-IV	EVOLUTION-V
Radiator fan motor	Manufacturer	Calsonic	←
	Type	Direct-current ferrite	←
	Rated load torque (Nm {kgf·m})	LOW: 43.1 {4.4}	LOW: 31.4 {3.2}
		HI: 53.2 {5.4}	HI: 53.9 {5.5}
	Speed (r/min)	LOW: 1,750 ± 250	LOW: 1,900 ± 250
		HI: 2,100 ± 250	HI: 2,200 ± 250
	Current (A)	LOW: 12.0 (or lower)	LOW: 13.3 (or lower)
		HI: 15.5 (or lower)	HI: 16.7 (or lower)

<EVOLUTION-IV>



<EVOLUTION-V>

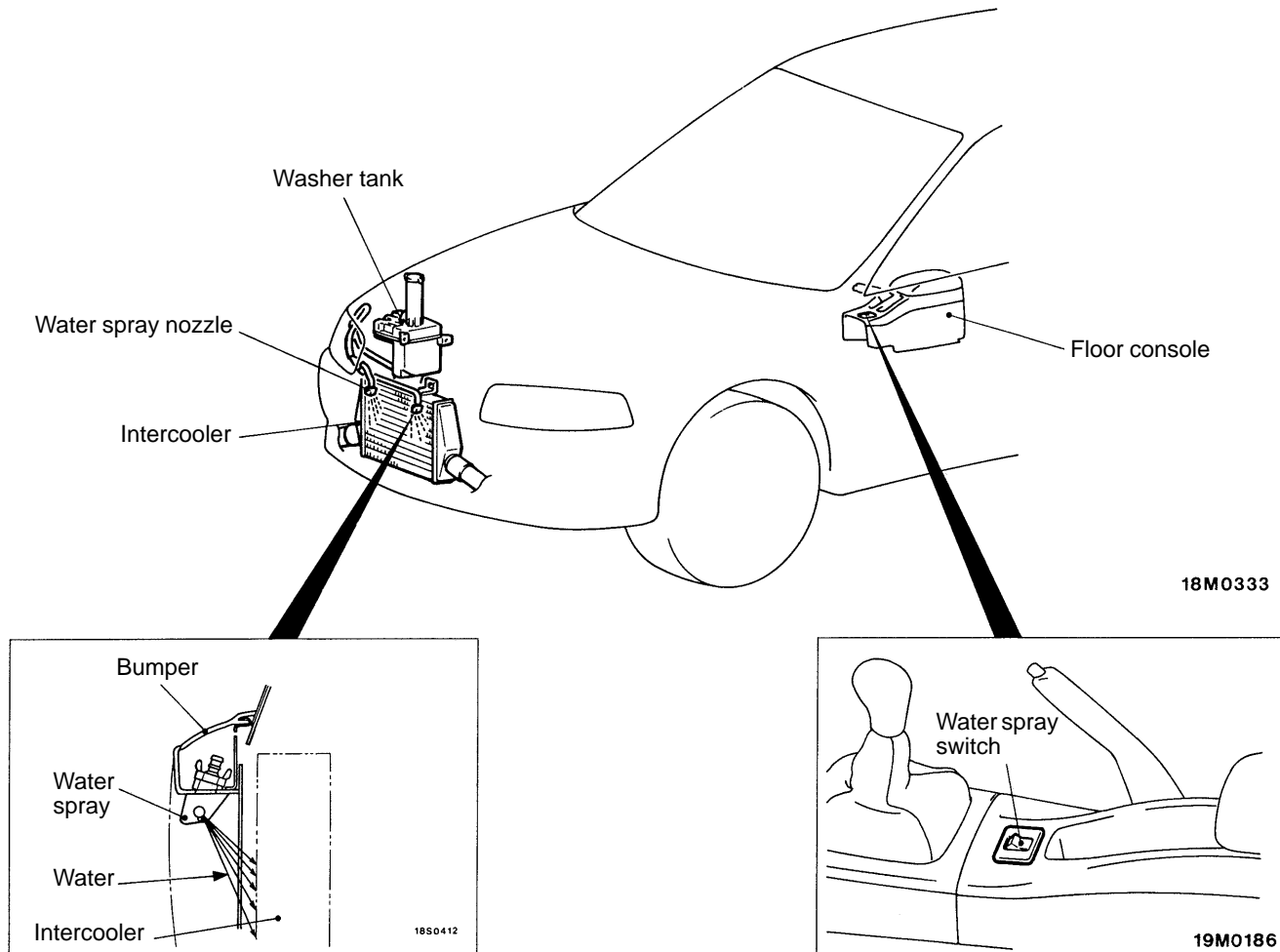


04M0056

INTERCOOLER AND INTERCOOLER WATER SPRAY SYSTEM

A large intercooler is utilized to improve cooling performance. An intercooler water spray system sprays water from the washer tank onto the intercooler's front surface to lower the intercooler's temperature. The intercooler water spray system is basically the same as that used on the EVOLUTION-III.

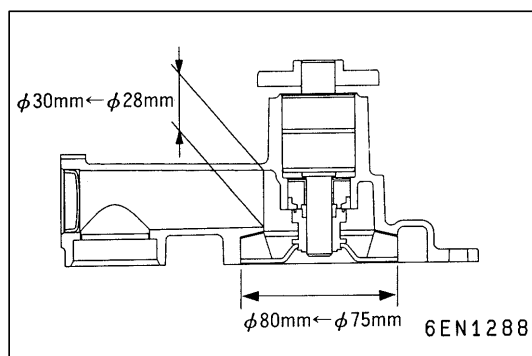
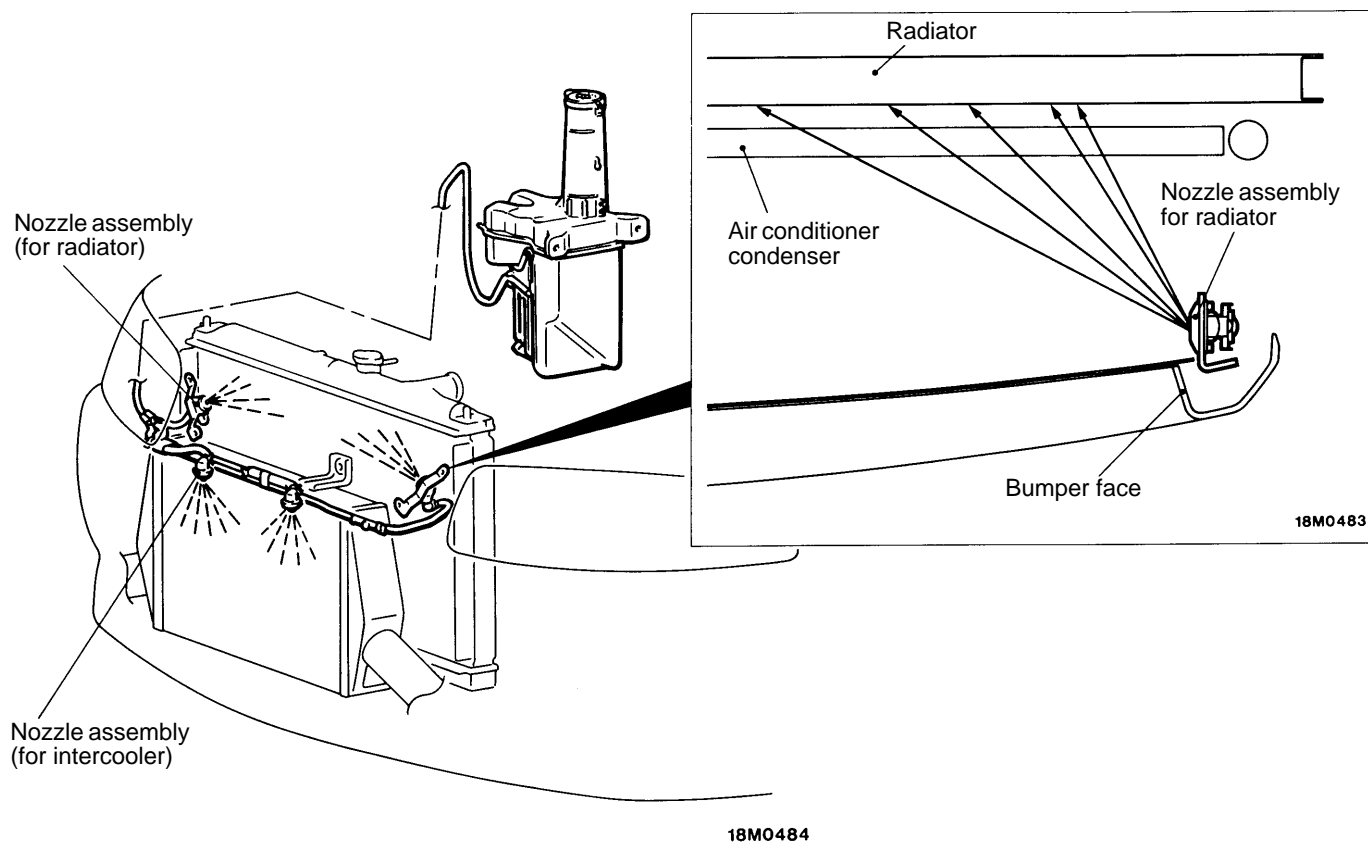
Construction



INTERCOOLER AND RADIATOR WATER SPRAY SYSTEM

<EVOLUTION-V>

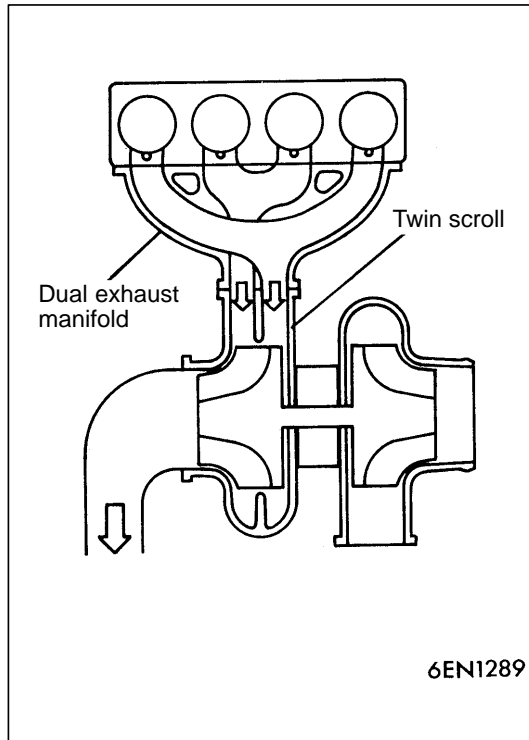
The EVOLUTION-V is provided with a new radiator water spray system in addition to the intercooler water spray system.



WATER PUMP

The water pump's inlet diameter and impeller diameter have been increased to improve cooling performance.

INTAKE AND EXHAUST SYSTEMS



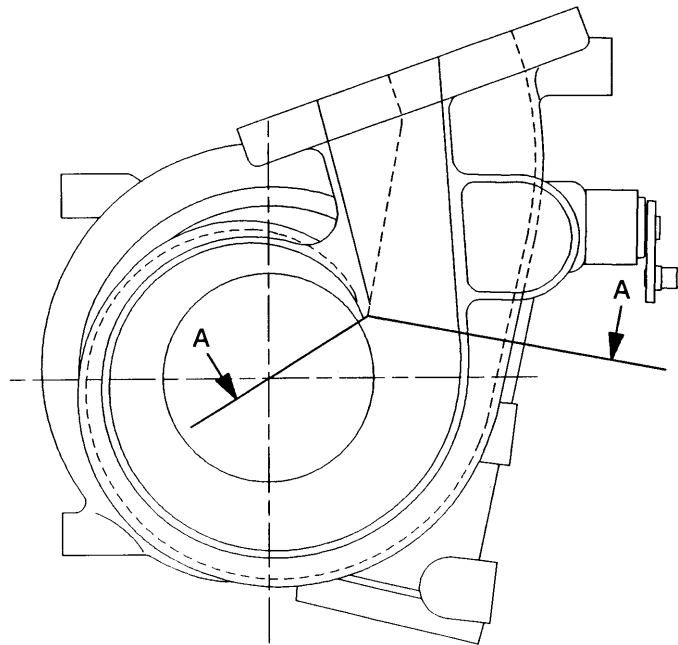
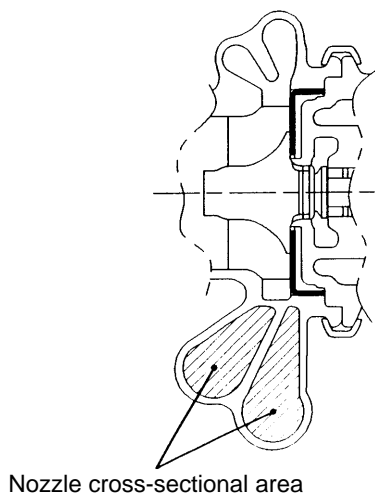
TURBOCHARGER

Low-speed performance and responsiveness are improved by a twin-scroll turbocharger with a dual passage arrangement from the exhaust manifold to the turbine.

<EVOLUTION-V>

The nozzle cross-sectional area has been increased for improved performance at mid-range and high speeds.

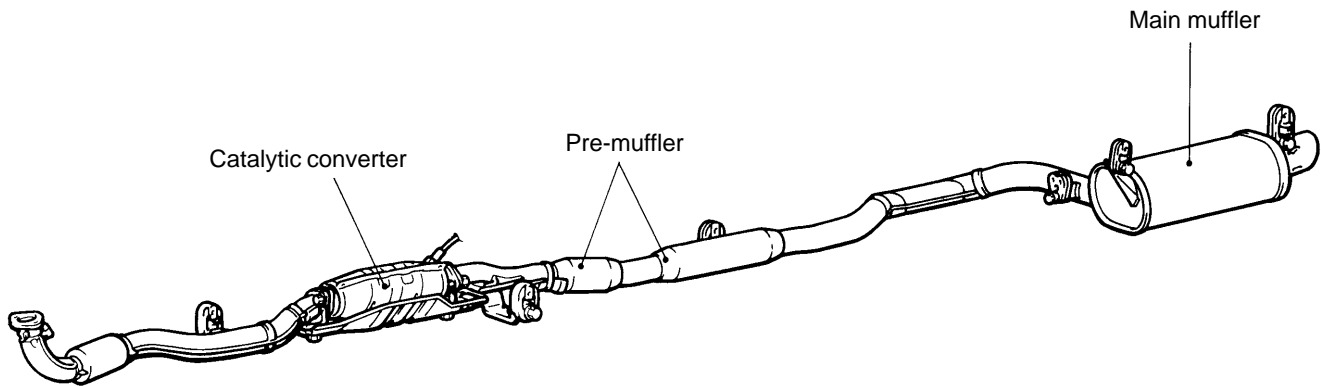
Section A-A



EXHAUST PIPE**EVOLUTION-IV**

The exhaust pipe is constructed in three parts. It has the following key features:

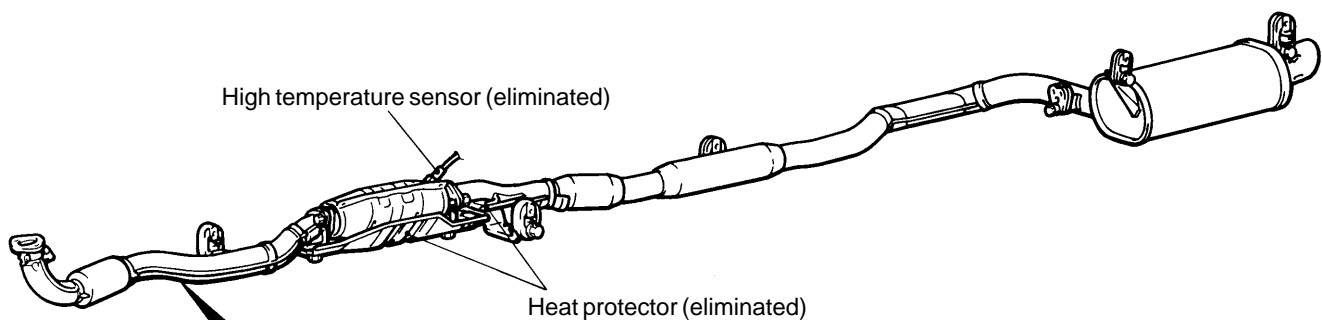
- Large, sound-absorbing pre-mufflers that reduce the high-frequency components of exhaust noise;
- A stainless steel main muffler that is highly resistant to corrosion;
- A heat-retaining cover on the front pipe that enhances the catalytic converter's effectiveness.

Construction

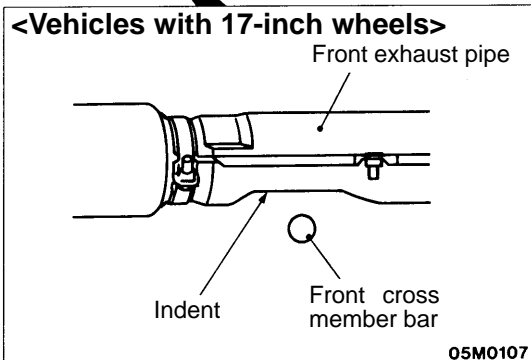
05M0083

EVOLUTION-V

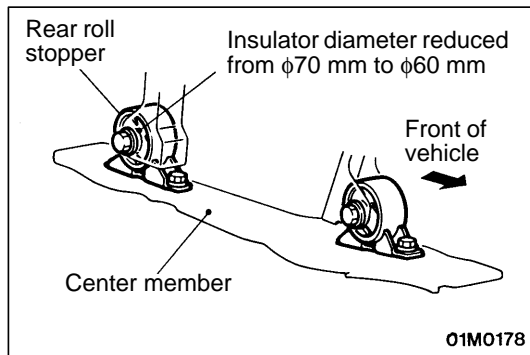
- In accordance with revised safety regulations, the high temperature sensor and heat protectors have been eliminated.
- In accordance with the addition of a front cross member bar (see "Suspension" in Group 3) the front exhaust pipe has been provided with an indent to prevent interference <vehicles with 17-inch wheels>.



05M0083



05M0107



MOUNTING

REAR ROLL STOPPERS <EVOLUTION-V>

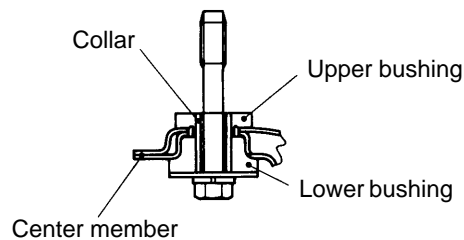
The insulator diameter has been reduced from $\phi 70$ mm to $\phi 60$ mm to reduce engine roll.

CENTER MEMBER <EVOLUTION-V>

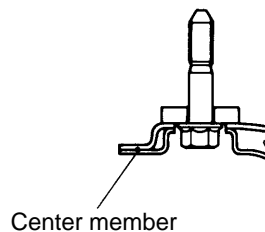
- Rigid mounting of the center member (achieved using added spacers) decreases engine roll.
- In accordance with the addition of a front cross member bar (see "Suspension" in Group 3) a bracket has been added to the lower reinforcement to protect the heads of the front cross member bar's mounting bolts and a front cross member bar mounting nut has been added <vehicles with 17-inch wheels>.

Center Member Mounting

<EVOLUTION-IV>



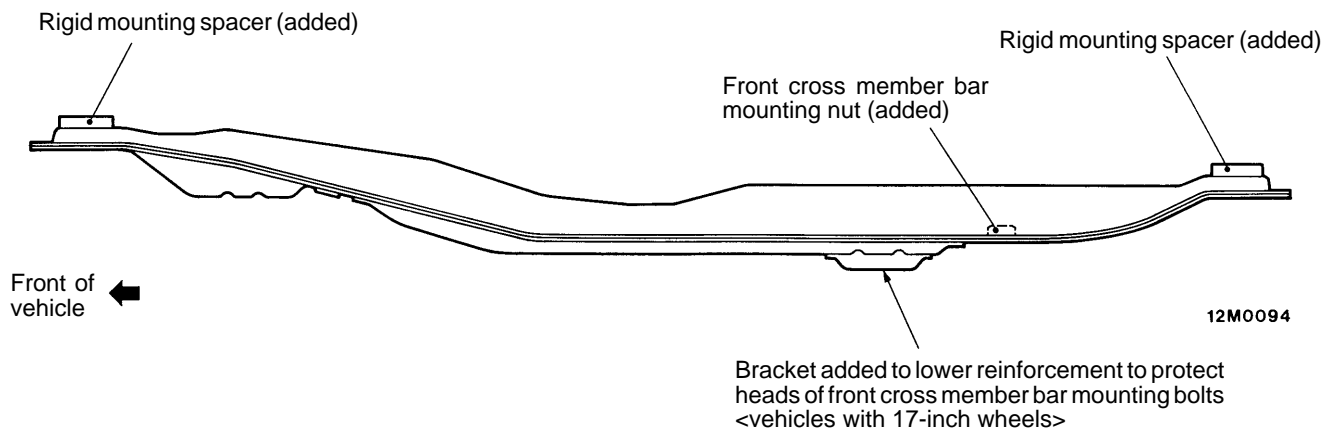
<EVOLUTION-V>



12M0095

NOTE:

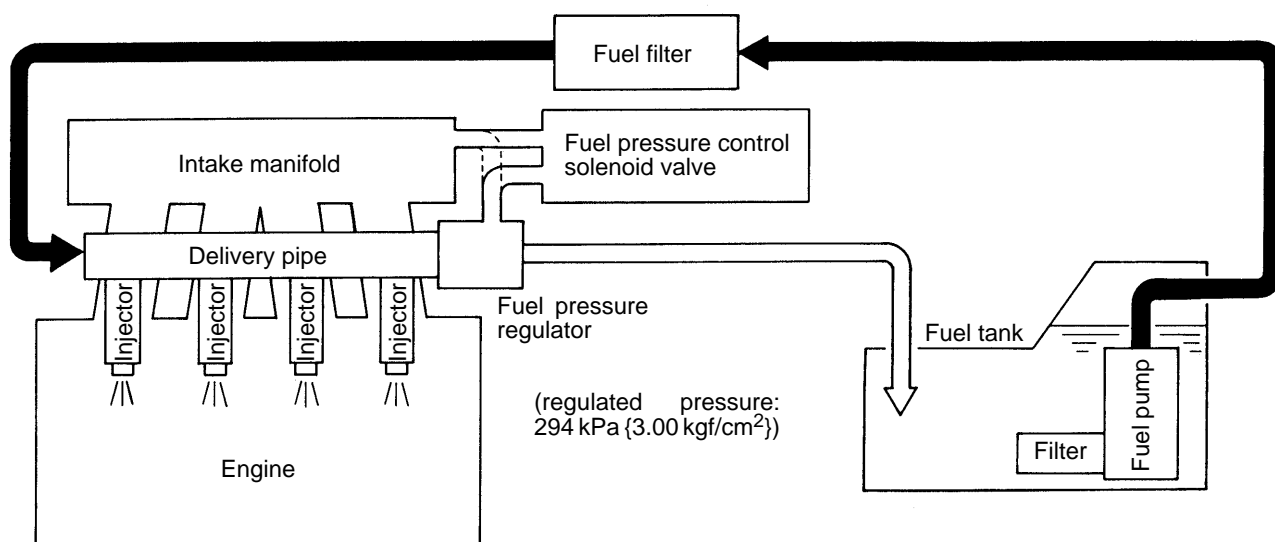
This drawing shows the front mounting. The rear mounting is similar.



12M0094

FUEL SYSTEM

The fuel system is basically the same as that of the 4G63 DOHC turbocharged engine used in the EVOLUTION-III.

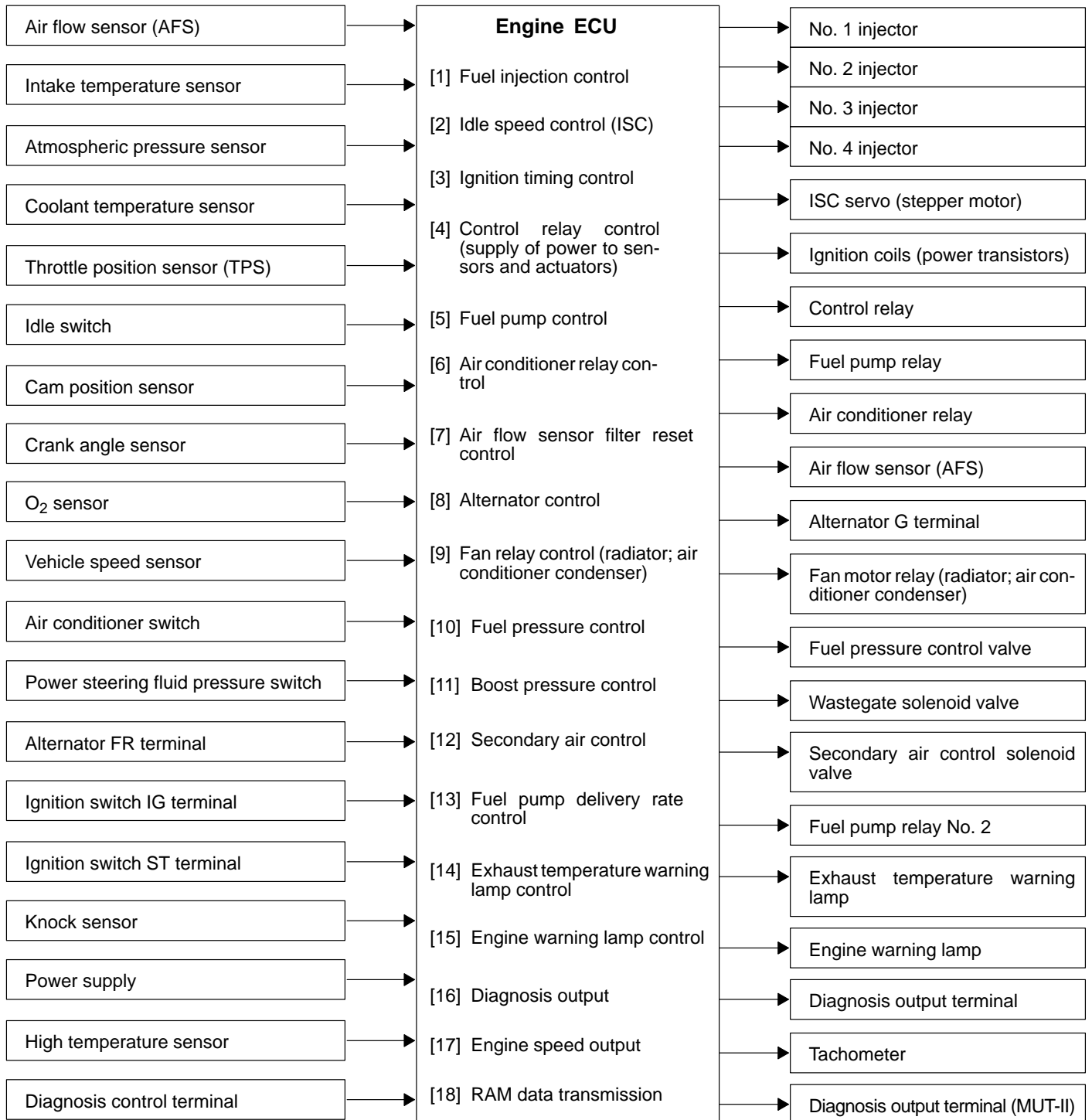


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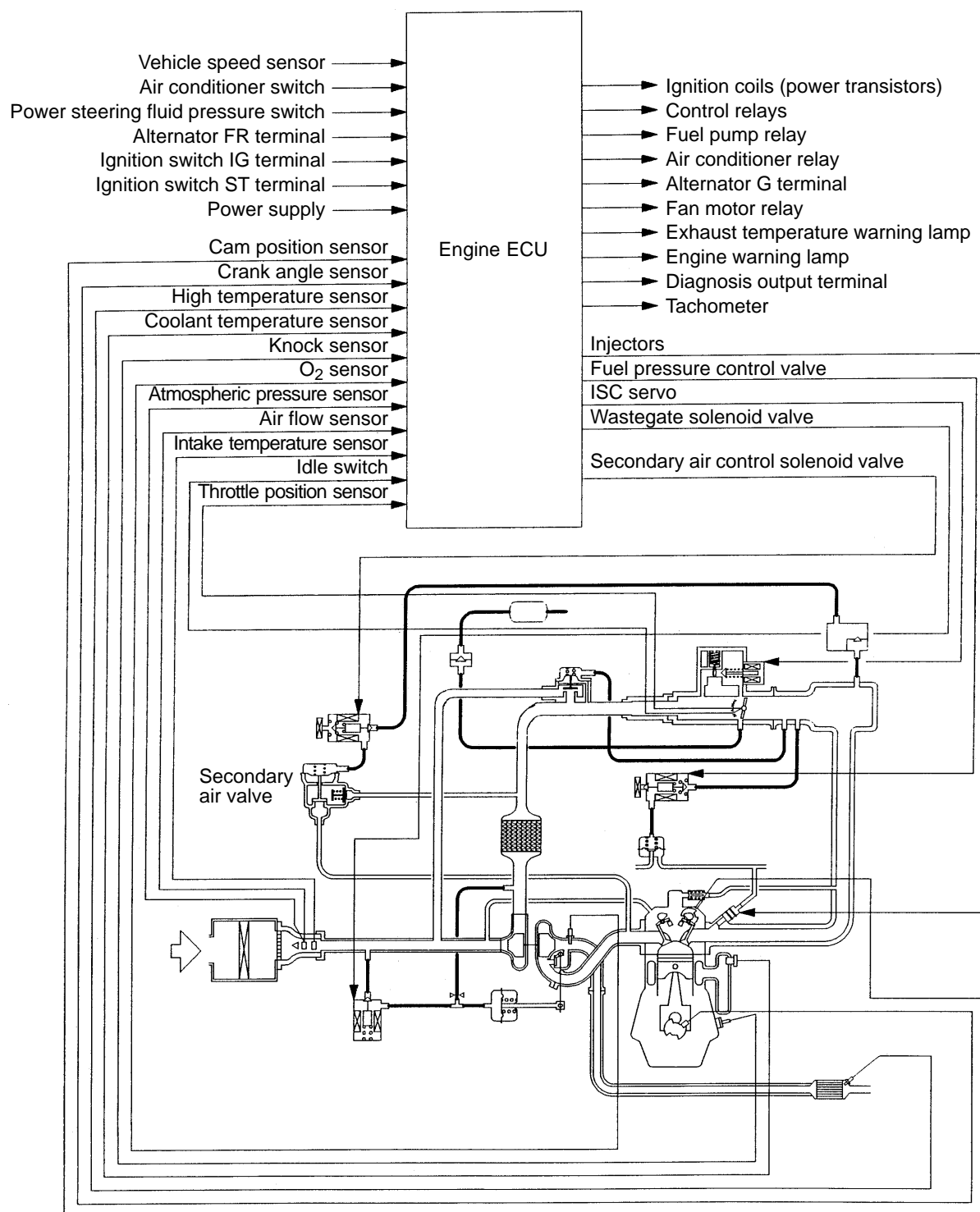
CONTROL SYSTEM

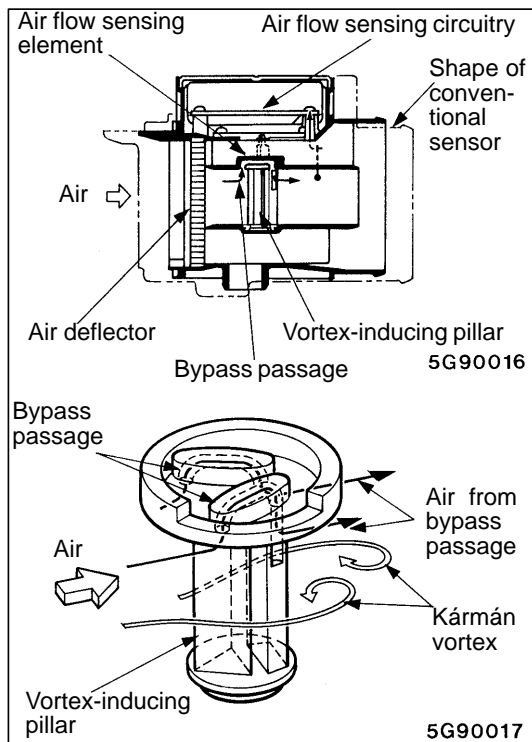
The control system is based on that of the 4G63 DOHC turbocharged engine used in the EVOLUTION-III. For enhanced torque and output, it incorporates the following improvements:

- (1) A new type of air flow sensor significantly reduces air intake resistance.
- (2) A flow-limiter-type idle speed control system provides superior control over the engine's idle speed during warm-up.
- (3) The crank angle sensor is attached directly to the crankshaft to enhance accuracy.
- (4) A stick-type cam position sensor is used.
- (5) The ignition system utilizes plug-top coils with built-in power transistors for enhanced ignition performance.
- (6) An alternator control system enhances fuel efficiency while the engine is idling.
- (7) A high/low two-speed fan control relay is utilized.
- (8) The engine control relay and fuel pump control relay are located separately to enable simpler circuitry.
- (9) A secondary air system has been added to enhance acceleration response.
- (10) The ignition timing adjustment connector has been eliminated.
- (11) The air conditioner refrigerant medium pressure switch has been eliminated.



<4G63 DOHC with Turbocharger>



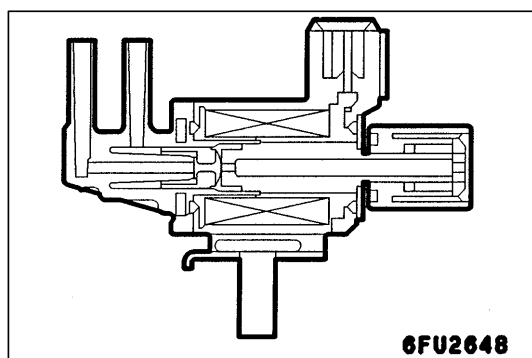


SENSORS

Air Flow Sensor (Incorporating Atmospheric Pressure Sensor)

To reduce pressure losses and thus improve performance, Mitsubishi Motors developed a new air flow sensor known as MUKAS. In contrast with a conventional sensor, which senses Kármán vortices downstream of a vortex-inducing pillar using a pressure-sensitive element, the MUKAS sensor counts Kármán vortices in a bypass passage using a hot-wire arrangement.

Pressure losses reduced by 50%	Increased sensitivity at low air flow rates enables the use of a larger air inlet. Thus, pressure losses are reduced.
Size and weight reduced by 20%	A more condensed circuit layout and a new, compact connector enable a significant reduction in overall length.
Improved resistance to contamination and noise	Only a small amount of air flows through the bypass passage, so contamination is greatly reduced. Also, Kármán vortices are measured digitally in accordance with the difference in signals received from left and right hot-wire arrangements, so the sensor is resistant to noise and to changes in the components that occur over time.

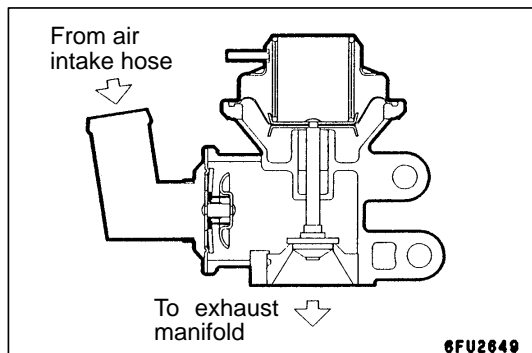


ACTUATORS

Secondary Air Control Solenoid Valve

The secondary air control valve is an ON/OFF solenoid valve. It switches the pressure applied to the secondary air valve between the intake manifold vacuum pressure and the atmospheric pressure.

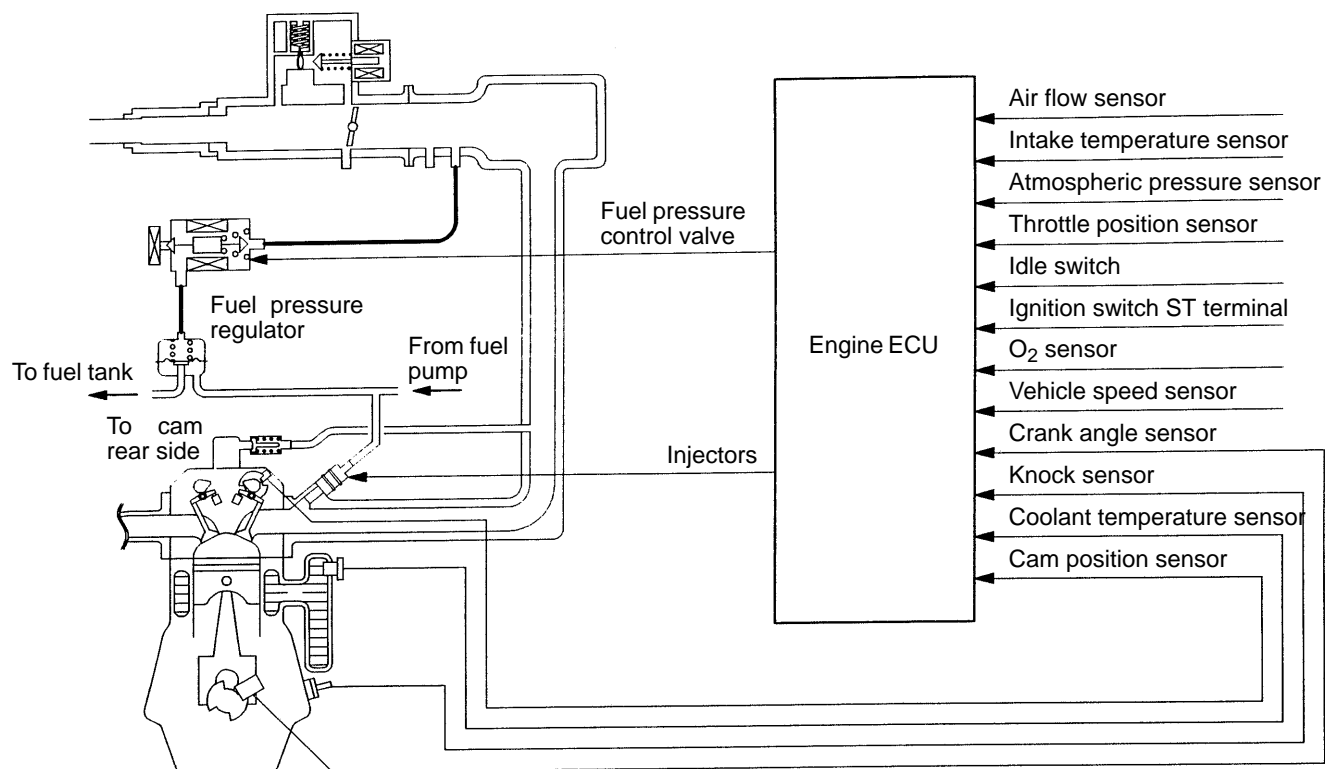
When the coil is not energized, continuity exists between the X-nipple and ambient air. When the coil is energized, continuity exists between the X-nipple and Y-nipple.



Secondary Air Valve

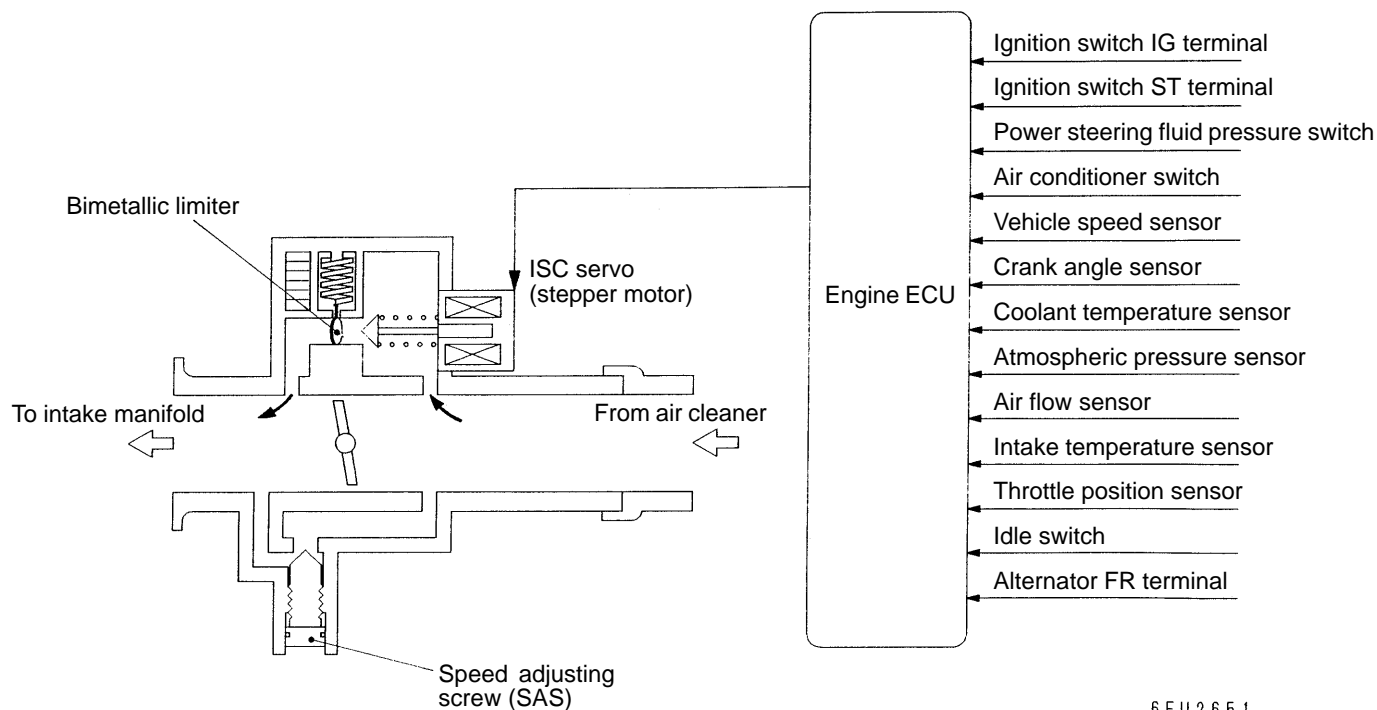
The secondary air valve turns ON and OFF the secondary air supply by opening and closing in accordance with the vacuum pressure applied to the diaphragm chamber.

FUEL INJECTION CONTROL



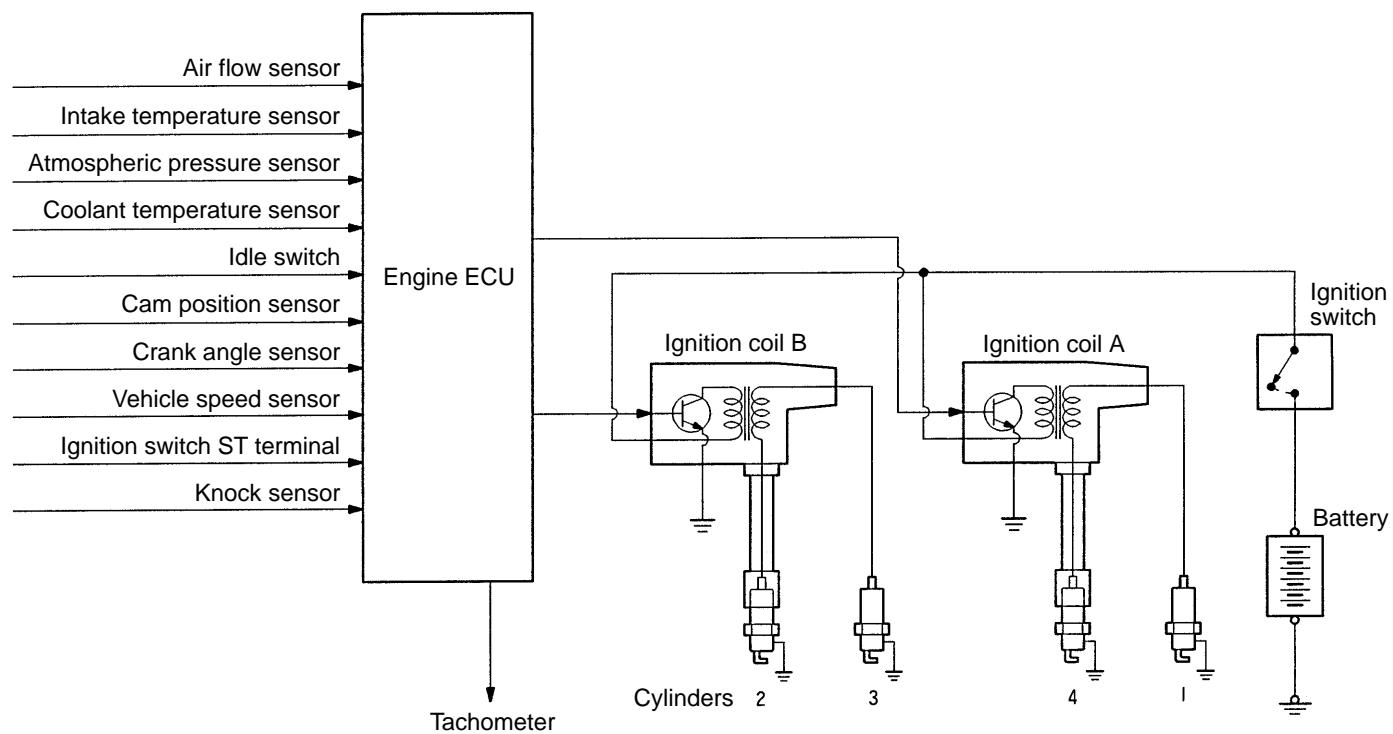
6FU2650

IDLE SPEED CONTROL

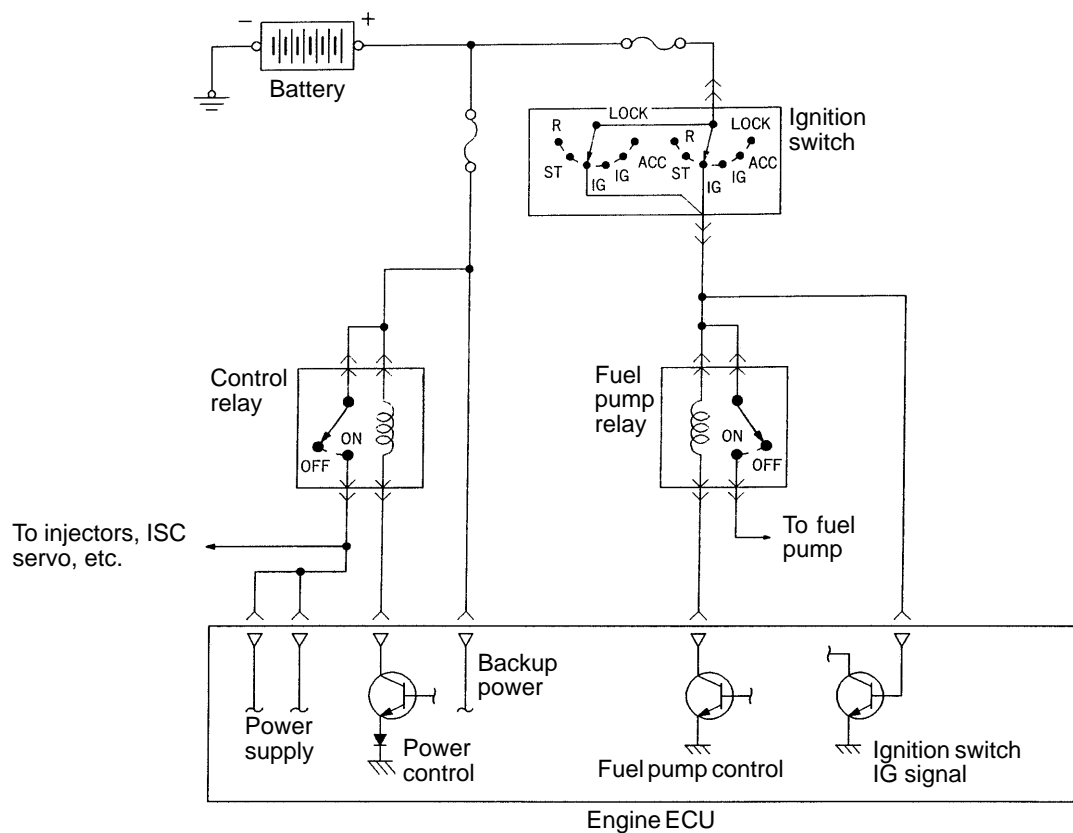


6FU2651

IGNITION TIMING AND ENERGIZATION TIME CONTROL



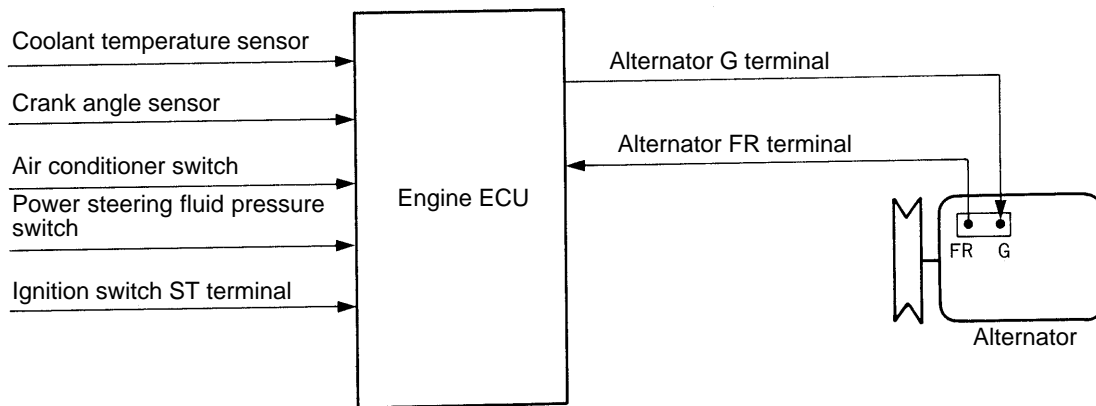
6FU2652

POWER SUPPLY AND FUEL PUMP CONTROL

6FU2653

AIR CONDITIONER RELAY CONTROL; AIR FLOW SENSOR FILTER RESET CONTROL; FUEL PRESSURE CONTROL; BOOST PRESSURE CONTROL; EXHAUST TEMPERATURE WARNING LAMP CONTROL

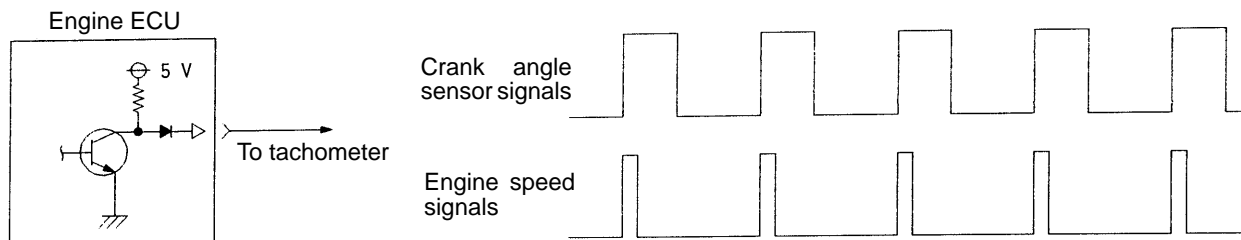
The control arrangement is the same as that used with the 4G63 DOHC turbocharged engine of the EVOLUTION-III.

ALTERNATOR CONTROL

1FU0907

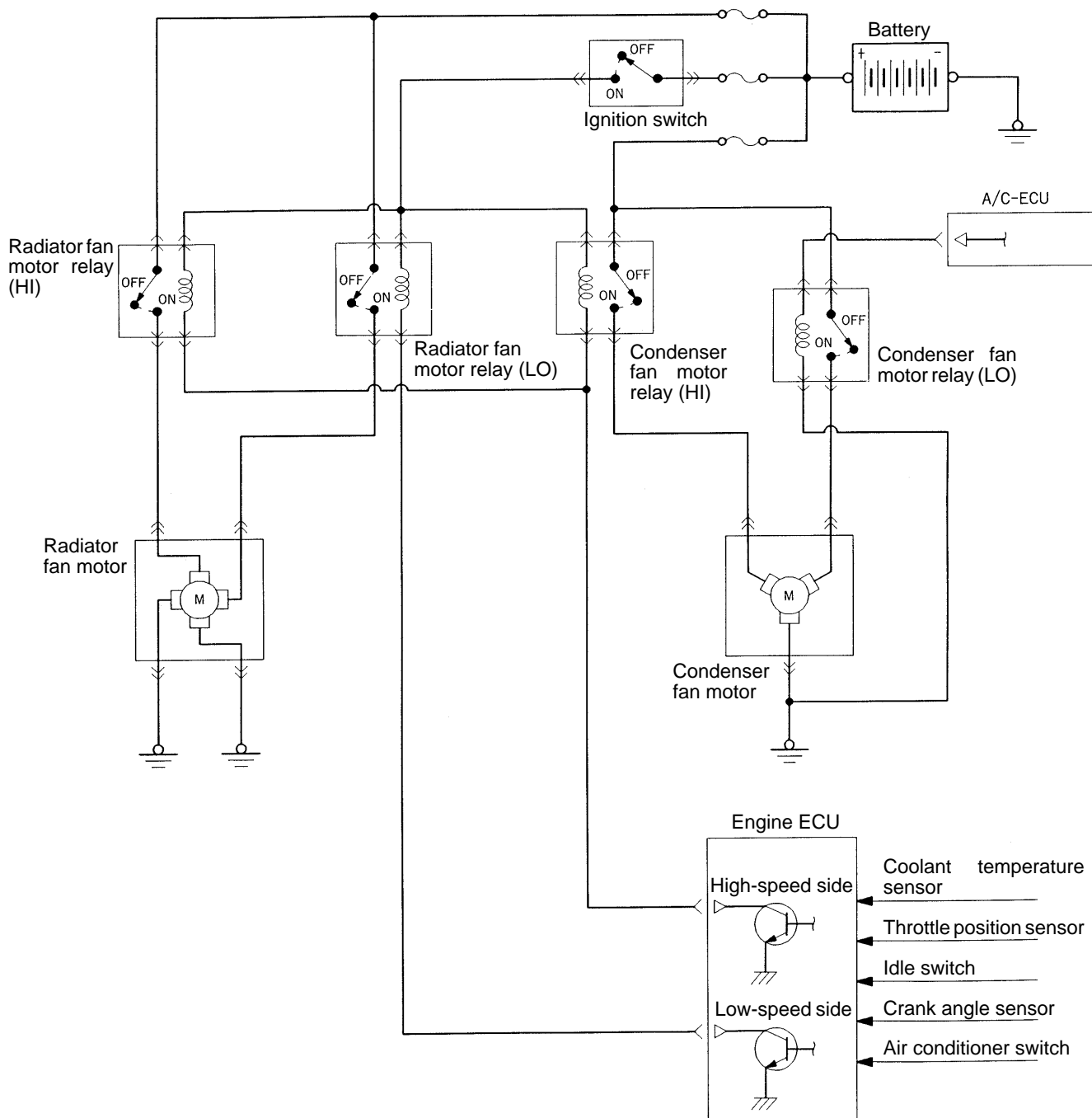
ENGINE SPEED OUTPUT

Engine speed signals are issued in synchronization with crank angle sensor signals.



6FU2654

FAN MOTOR RELAY (RADIATOR FAN; AIR CONDITIONER CONDENSER FAN) CONTROL

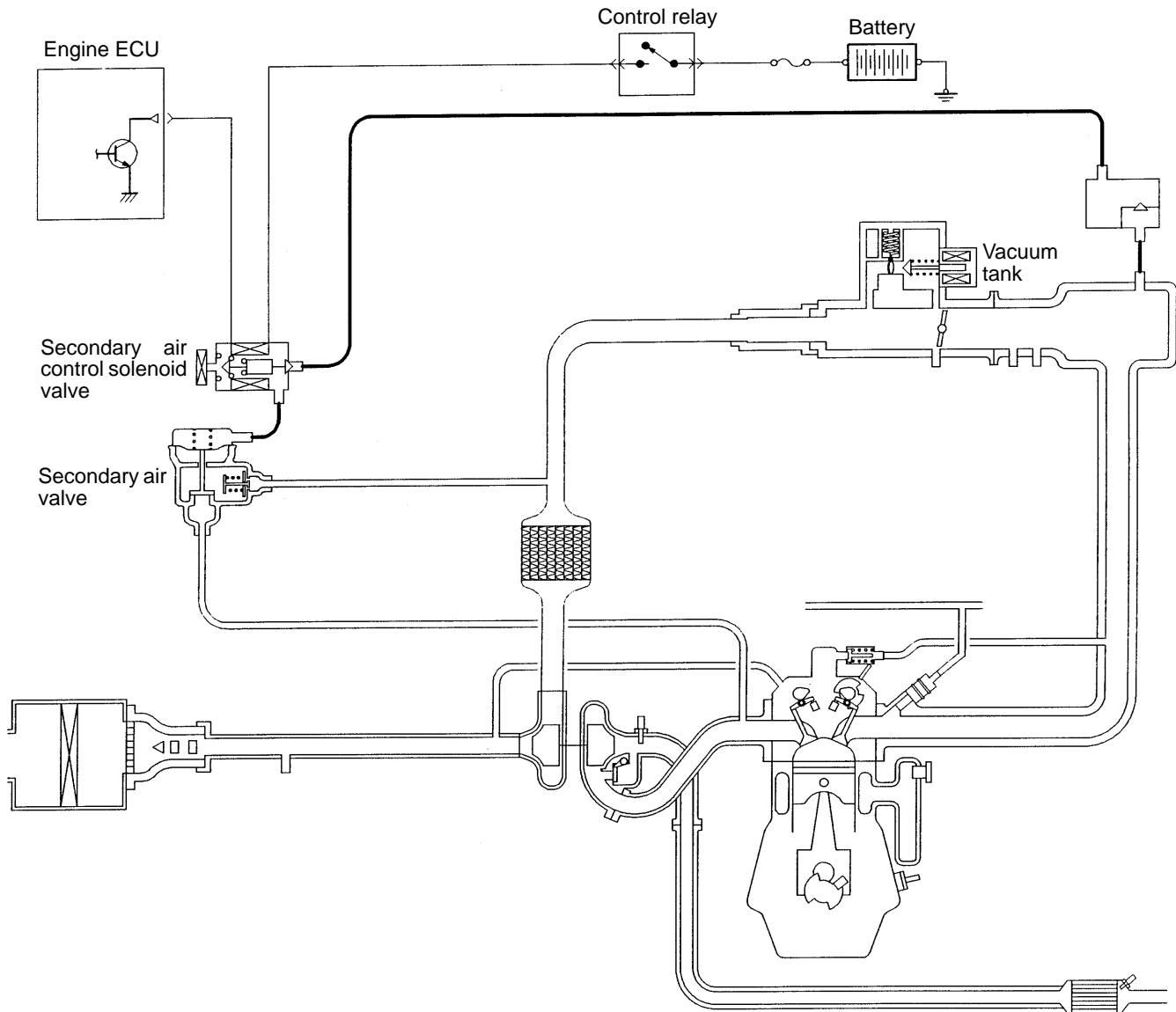


9FU0651

Air conditioner switch	Engine coolant temperature (°C)	Power transistor (low-speed side)	Power transistor (high-speed side)	Radiator fan operation	Condenser fan operation
OFF	Below approx. 95	OFF	OFF	Stationary	Stationary
	Approx. 95 to 105	ON	OFF	Low speed	Low speed
	Above approx. 105	ON	ON	High speed	Low speed
ON	Below approx. 105	ON	OFF	Low speed	Low speed
	Above approx. 105	ON	ON	High speed	High speed

SECONDARY AIR CONTROL

During deceleration from a high speed, secondary air is introduced upstream of the turbocharger. This operation prevents the turbine's speed from dropping and thus enhances responsiveness when the driver next wishes to accelerate. For maximum effectiveness, secondary air is introduced into the exhaust manifold immediately downstream of each cylinder.

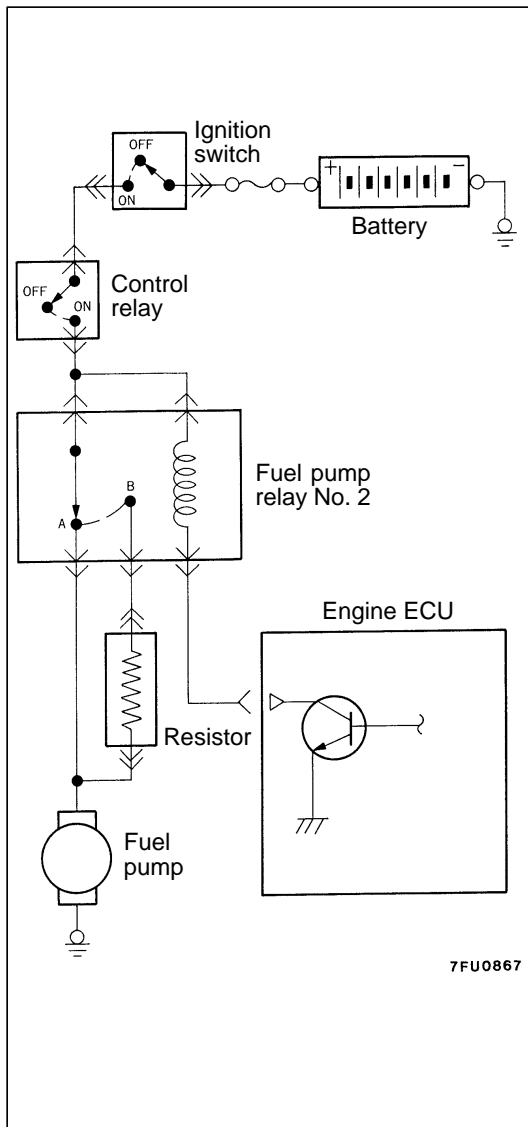


6FU2855

Secondary air is introduced for approximately three minutes when both of the following conditions are satisfied:

- The engine speed is 4,000 rpm or higher.
- The engine speed drops sharply after at least three seconds of full-throttle acceleration.

FUEL PUMP DELIVERY RATE CONTROL



SELF-DIAGNOSIS SYSTEM**Engine Warning Lamp (Check Engine Lamp) Control**

The engine warning lamp illuminates in the event of an abnormality in any of the items shown in the following table.

Air flow sensor	Atmospheric pressure sensor
Intake temperature sensor	Knock sensor
Throttle position sensor	Injectors
Coolant temperature sensor	Ignition coils; power transistor units
Crank angle sensor	Engine ECU
Cam position sensor	

Diagnosis Function

Diagnosis items are shown in the following table.

Code No.	Diagnosis item	Main fault(s) diagnosed	Dealer mode diagnosis
12	Air flow sensor	Open/short circuit in sensor-related circuitry	No
13	Intake temperature sensor	Open/short circuit in sensor-related circuitry	No
14	Throttle position sensor	Abnormal sensor output	No
21	Coolant temperature sensor	<ul style="list-style-type: none"> ● Open/short circuit in sensor-related circuitry ● Increased contact resistance in connector 	No
22	Crank angle sensor	Abnormal sensor output	No
23	Cam position sensor	Abnormal sensor output	No
24	Vehicle speed sensor	Open/short circuit in sensor circuitry	No
25	Atmospheric pressure sensor	Open/short circuit in sensor-related circuitry	No
31	Knock sensor	Abnormal sensor output	No
41	Injectors	Open/short circuit in injector-related circuitry	No
44	Ignition coils; power transistor units	Abnormality in ignition system (failure in one out of two coils)	No
64	Alternator FR terminal	Open circuit in sensor circuitry	No
—	Normal state	—	—

Service Data Output

Service data output items are shown in the following table.

Item No.	Service data item	Unit
11	O ₂ sensor	mV
12	Air flow sensor output	Hz
13	Intake temperature sensor output	°C
14	Throttle position sensor output	mV
16	Battery voltage	V
18	Cranking signal (ignition switch ST terminal)	ON-OFF
21	Coolant temperature sensor output	°C
22	Crank angle sensor output	RPM
25	Atmospheric pressure sensor output	kPa
26	Idle switch	ON-OFF
27	Power steering fluid pressure switch	ON-OFF
28	Air conditioner switch	ON-OFF
41	Injector energization time	ms
44	Ignition advance angle	°BTDC, °ATDC
45	ISC stepper motor position	STEP
49	Air conditioner relay	ON-OFF

Actuator Tests

Actuator test items are shown in the following table.

Item No.	Actuator test item
01	No. 1 injector: OFF
02	No. 2 injector: OFF
03	No. 3 injector: OFF
04	No. 4 injector: OFF
07	Fuel pump: ON
09	Fuel pressure control valve: ON
12	Wastegate solenoid valve: ON
13	Fuel pump relay No. 2: ON (current supplied via resistor)
17*	Ignition timing: 5°BTDC
20	Radiator fan (high), air conditioner condenser fan (high): high-speed operation
21	Radiator fan (low), air conditioner condenser fan (low): low-speed operation
30*	ISC servo: locked in reference step during SAS adjustment

*: Continues for 27 minutes unless cancelled by depression of clear key.

EXHAUST EMISSION CONTROL SYSTEM

System Diagram

