MITSUBISHI MOTORS

RALLIART

TECHNICAL INFORMATION MANUAL

LANCER
EVOLUTION-VII

Pub. No. N0104CT9A

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LANCER EVOLUTION-VII

TECHNICAL INFORMATION MANUAL

FOREWORD

This manual has been prepared as an introduction to the specifications, features, construction, functions, etc. of the newly developed LANCER EVOLUTION-VII. Please read this manual carefully so that it will be of assistance for your service activities.
Please note that the following service manuals are also available and should be used in conjunction with this manual.

WORKSHOP MANUAL S0105CT9A

All information, illustrations and product descriptions contained in this manual are current as of the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.

The EVOLUTION-VII is sold exclusively through RALLIART Inc. Since the EVOLUTION-VII is a rally-based model, it will not be warranted and will not be homologated for general production. Therefore, any service matters on the EVOLUTION-VII should be inquired to RALLIART Inc. as usual.

GROUP INDEX

MITSUBISHI MOTORS CORPORATION

RALLIART INC.

April 2001

NOTES

GENERAL

CONTENTS

HOW TO USE THIS MANUAL

MODEL INDICATIONS

The following abbreviations are used in this manual for identification of model types.
MPI: Indicates the multipoint injection, or engine equipped with the multipoint injection.
DOHC: Indicates an engine with the double overhead camshaft, or models equipped with such an engine.
M/T: Indicates the manual transmission, or models equipped with the manual transmission.
A/C: Indicates the air conditioner.

TARGETS OF DEVELOPMENT

A new competitive device in addition to technology established in the previous motor sport events to improve potential performance as well as outward and inward appearance with a sophisticated view to represent a high performance sedan of the next generation has been featured to improve the image of Mitsubishi brand.
Furthermore, enhancement of competitiveness as well as driving performance in various motor sport events has been sought.

PRODUCT FEATURES

Outward and inward appearance to represent a high performance sedan of the next generation

(1) Exterior with sophisticated and fearless expression
- Multi-lighted headlamp and rear combination lamp exclusively used for EVOLUTION-VII
- Front bumper with large cooling air inlet
- Incorporate blister fender and overwhelming large-sized tyre
- Large-sized and light weight rear spoiler with variable elevation angle that can be adjusted at 4 points
- Front bumper extension and side sill extension
- Large-sized under cover equipped (for improvement of aerodynamic and cooling performance in drive system)

(2) Interiors with athletic feeling
- Light weight backet newly designed by RECARO seat (adoption of silk waving cloth with functionality)
- Steering wheel newly designed by MOMO
- Multi-functional sports meter (with permanent illumination to be visible in the day light)

The most outstanding engine and power performance in the class

(1) Fine tuned engine that provides improved output at all ranges:Maximum output 280 PS (206 kW) and maximum torque 39 kgf•m (383 N•m)
- mprovement of turbo charger
- Enlarged Intercooler and oil cooler
- Automatic injection control 3-nozzle intercooler spray

(2) Drive system with high reliability to deal with increased engine torque
- Reinforcement of transfer, propeller shaft, and drive shaft

Further improvement in handling performance made by enhancement of the marginal performance

(1) Mitsubishi original revolutionary technology with all wheel control
- Newly developed active center differential system (ACD) (to be compatible with steering response to cornering and rising traction performance)
- Improvement of marginal performance in cornering made by integrated control of ACD{active yawing control (AYC)

(2) Optimally tuned suspension to be adjusted to the new dimensions has improved cornering performance.
- Extended length of wheel base (+115 mm), enlarged width of treads (front: +5 mm, rear: +10 mm)
- Increased suspension stroke in the compression side (front:+15 mm, rear: +5 mm)
- 235/45ZR17 tyres adopting half-radial structure and newly developed high performance high grip compounds

NOTE
Figures in the parentheses indicate the numbers compared with those of EVOLUION-VI.

(3) High rigidity body to sustain high marginal performance (bend rigidity: increased by 50 %, torsion rigidity: equal to that of EVOLUTION-VII)
- Suspension mounting, fortification of body frame connections, addition of reinforcements (approximately 20 locations), and addition of welding spots
- High rigidity 3-point mounting strut tower bar
- Rear end cross bar<RS>
- Aluminum hood and fender attached

Revolutionary braking system to correspond with high marginal performance

(1) Sporty type 4ABS (improved braking stability derived from braking control in both sides at driving in sports mode)
(2) EBD system for EVOLUTION-VII (improvement in deceleration performance)
(3) Featuring Brenvo made front 17-inch ventilated disc (opposite differential diameter 4-piston type) and rear 16-inch ventilated disc (opposite 2-piston type)

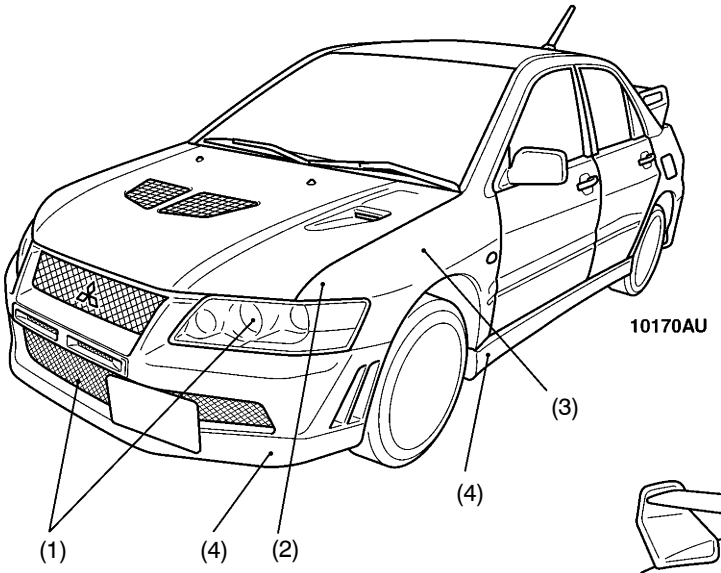
TECHNICAL FEATURES

EXTERIOR

DESIGN FEATURES

The 7th generation EVOLUTION has acquired the image of “high performance sports sedan” equipped with guaranteed quality and fearless determination as “high quality driving sedan” in addition to the rally image of the previous generations.

(1) Aggressive and overwhelming front mask with multi-lighted headlamps, large-sized inlet bumper grill, and side outlet
(2) Improved maneuvering capability of the vehicle at the corners by cutting a large portion of the front corner
(3) Exclusive blister fender to appeal good road hanging (traction characteristics) and brisk driving capability
(4) Front-side sill extension and wing-type rear spoiler to emphasize the high aerodynamic performance
(5) Clear type rear combination lamp to appeal sporty feeling and guaranteed quality
(6) Attaching the newly designed “EVOLUTION VII” emblem with sharp and sporty image



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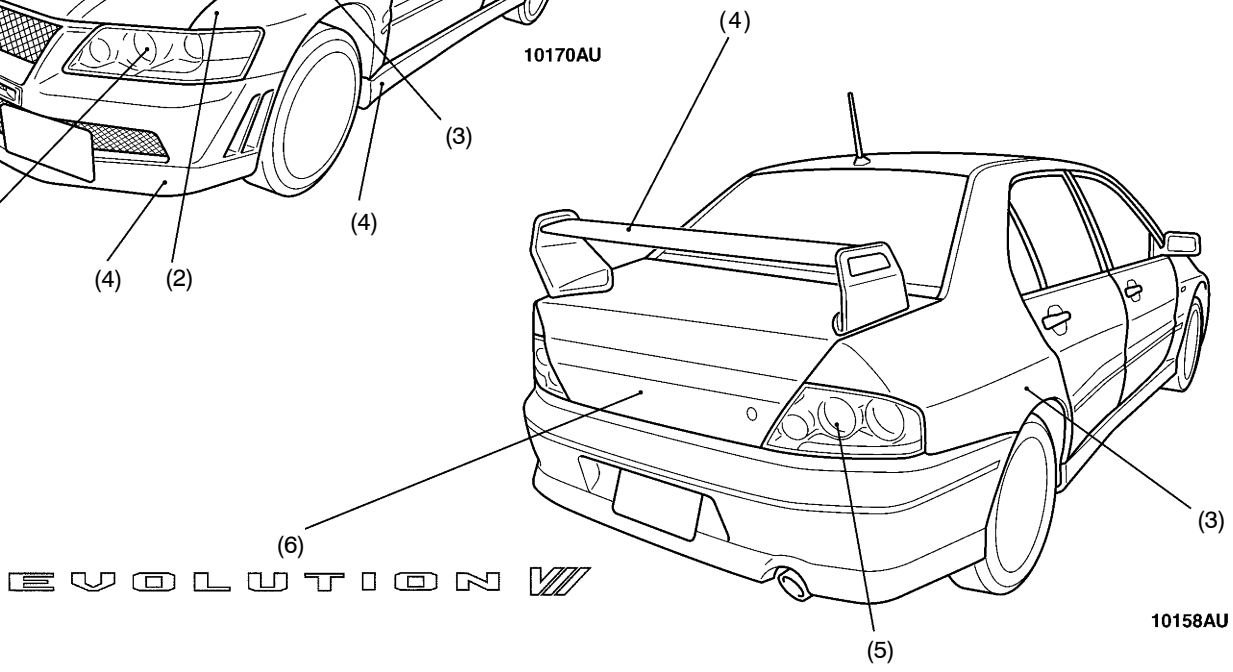

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INTERIOR

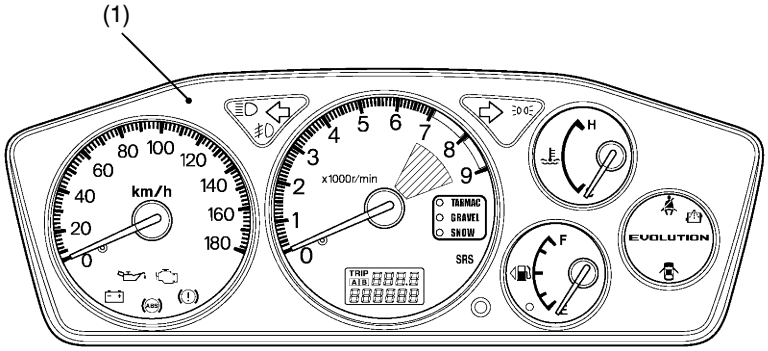
DESIGN FEATURES

High performance interior to provide an impression of sports minded vehicle as the 7th generation EVOLUTION

(1) Combination meter exclusively for EVOLUTION-VII with a configuration of a circular tachometer in the center and thick bezels (partitions between meters) with discreet design create appeal for fearless determination and sporty feelings.

(2) The Mitsubishi original design made by MOMO used for the steering has the same design used for horn pad as the shift lever to express integration of the image and high performance interior.

(3) The Mitsubishi original design made by Recaro used for the front seat has a sewing line surrounding circumference of the sides to emphasize the good holding.



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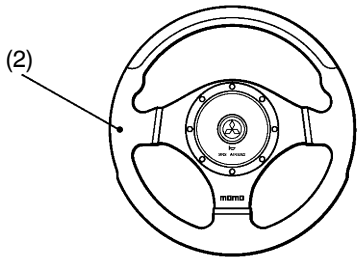

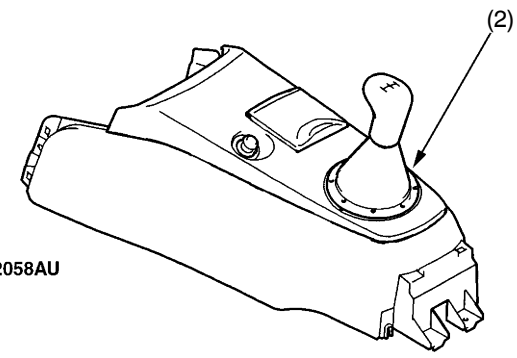

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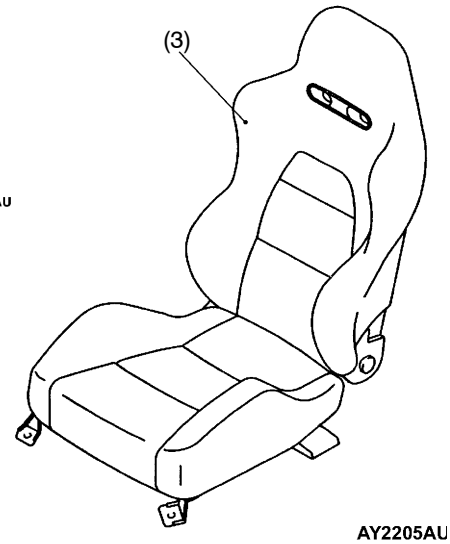

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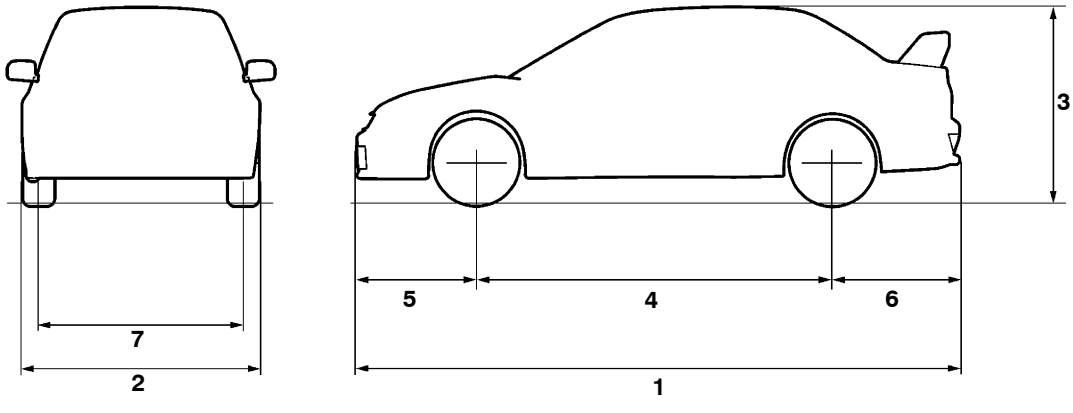
BODY DIMENSIONS AND SPACIOUS CABIN

Body Dimensions

The dimensions of the EVOLUTION-VII except for the overall width have been altered in comparison with those of EVOLUTION-VI.



No.	Item	Dimensions mm	No.	Item		Dimensions mm
1	Overall length	4 455 (+105)	6	Rear overhang		935 (- 15)
2	Overall width	1 770 (±0)	7	Tred <Vehicles with 235/45ZR17tyres>	Front	1 515 (+5)
3	Overall height	1 450 (+45)			Rear	1 515 (+10)
4	Wheel base	2 625 (+115)		Tred <Vehicles with 205/65R15tyres>	Front	1 500 (+5)
5	Front overhang	895 (+5)			Rear	1 500 (+10)

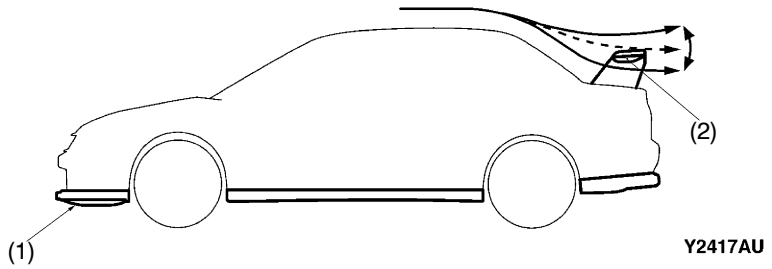
NOTE
Figures in the parentheses indicate the values in comparison with those of EVOLUTION-VI.

AERODYNAMIC PERFORMANCE

Deterioration of aerodynamic performance accompanied with enlargement of the body size has been suppressed by attaching a large-sized under cover on the lower part of the engine compartment, optimizing elevation angle setting of rear spoiler.

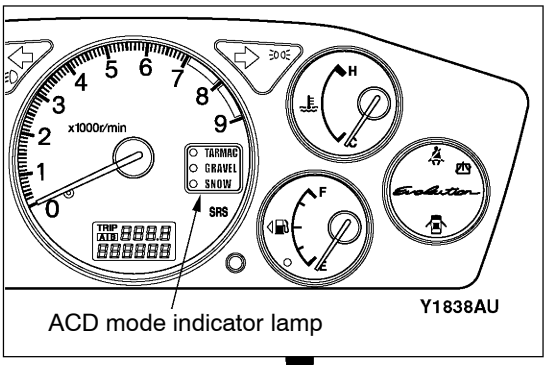
(1) Under cover
A large-sized under cover is designed for compatibility of reduction of air resistance and reduction of lift.

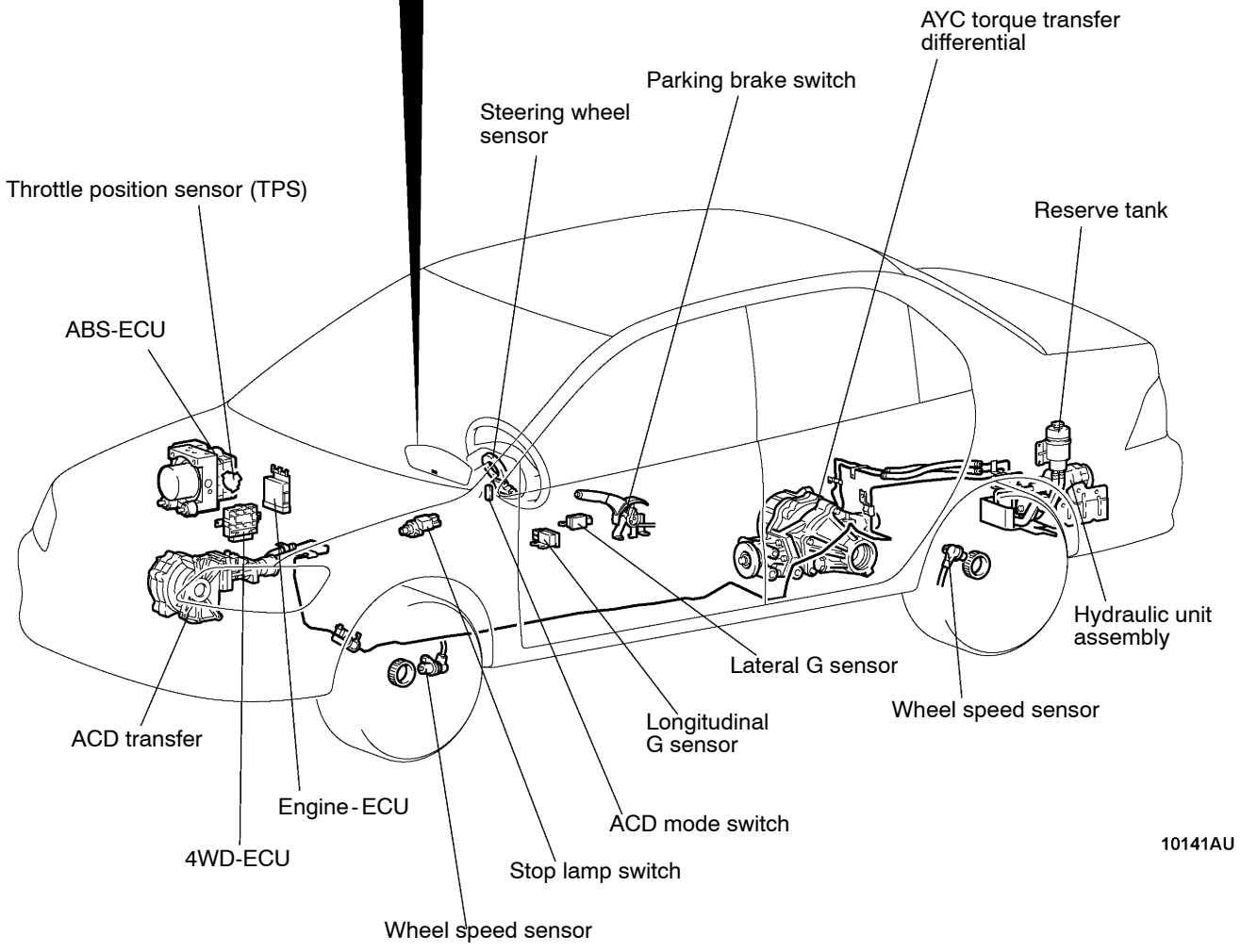
(2) Rear spoiler
Lift control by attaching elevation angle adjustable rear spoiler and optimizing attached position of the spoiler are designed for reduction of air resistance.



ACTIVE CENTER DIFFERENTIAL (ACD), ACTIVE YAW CONTROL (AYC)

ACD, which is designed for improving drive characteristics by electronically controlling center differential movement, and AYC, which has been adopted since EVOLUTION-IV are featured by combing two systems for integrated control so that further improvements in driving performance can be achieved.





ENGINE

The turbo charger specifications have been optimized by reducing the size of the turbine nozzle diameter to increase the engine torque at low-middle speed range as well as high speed range.

Since adoption of magnesium diecasting rocker cover and hollow camshaft is intended for light weight of the upper part of the engine, vibration of engine-transmission at acceleration can be reduced to improve the response of the body.

TRANSMISSION

Implementation of fortifying each part to deal with the increased engine torque and revision of the gear ratio of the standard transmission are intended for further improvement in power performance.

ALL-WHEEL INDEPENDENT SUSPENSIONS

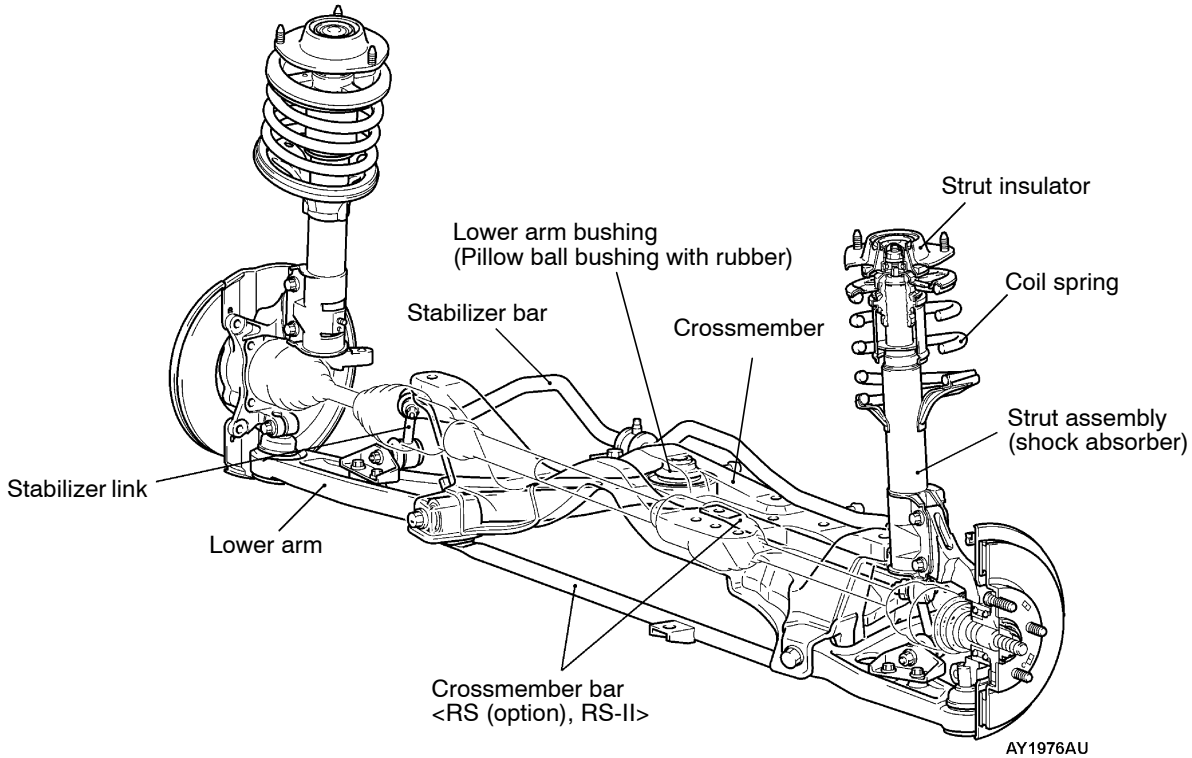
While the popular and rally-proven McPherson strut front and multi-link rear suspension systems have basically been retained, they were optimized for the new model.

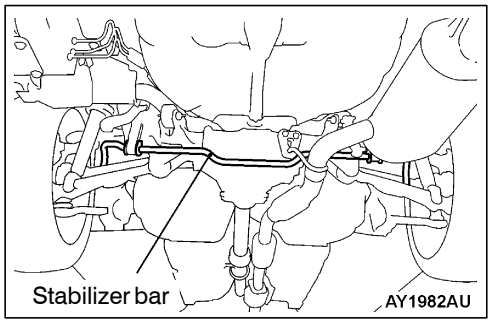
The improvements to the front include adding a crossmember brace to the lower arm mount for more rigidity, flattening the chassis crossmember, and realigning the roll center to an ideal height. As a result, the suspension delivers enhanced handling and straight-line stability, ride comfort, grounding characteristics, and roll feel, as well as less vibrations and noise.

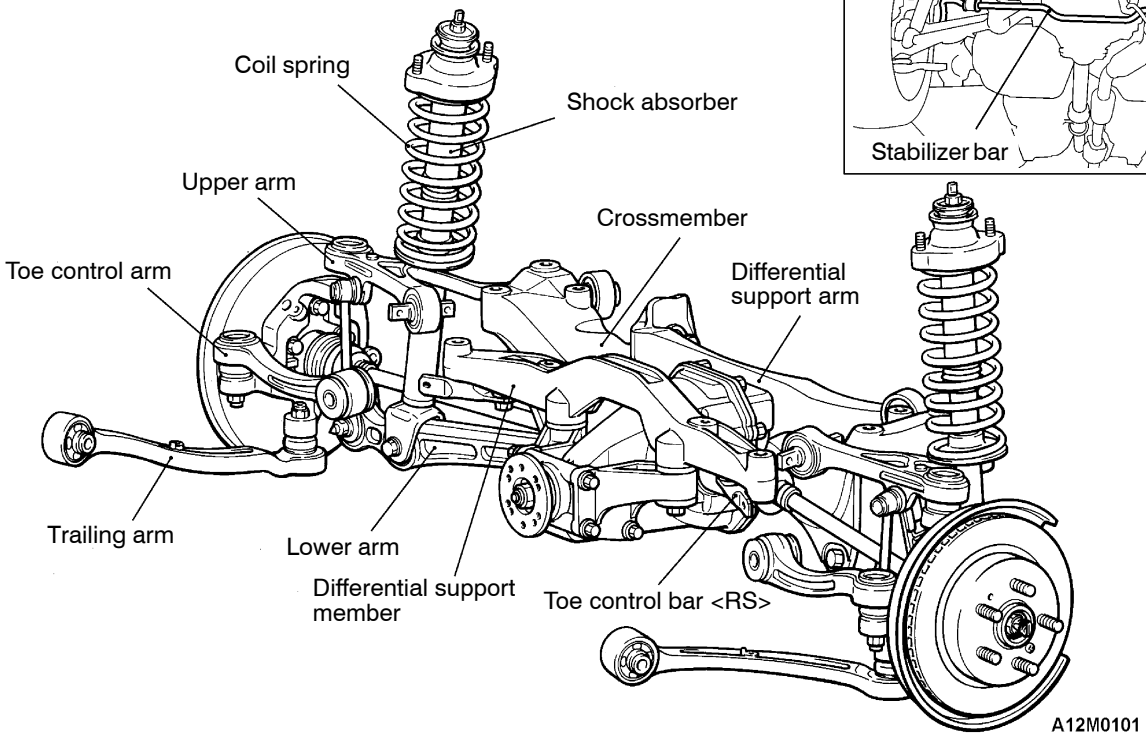
The steering gear's optimal position ensures predictably linear toe-in changes.

Each arm of the rear multi-links with trailing arms, as well as its linkage point and length, was reevaluated to achieve optimal alignment.

Combined with the wider tracks, higher body rigidity, and improved damping characteristics of the bushings and bump rubbers, the suspensions deliver a supple ride with superb handling stability for relaxing, effortless control.


Strut insulator
Lower arm bushing
(Pillow ball bushing with rubber)
Coil spring
Stabilizer bar
Crossmember
Strut assembly
(shock absorber)
Stabilizer link
Lower arm
Crossmember bar
<RS (option), RS-II>
AY1976AU


Stabilizer bar
AY1982AU


Coil spring
Shock absorber
Upper arm
Crossmember
Toe control arm
Differential
support arm
Trailing arm
Lower arm
Differential support
member
Toe control bar <RS>
A12M0101

SAFETY

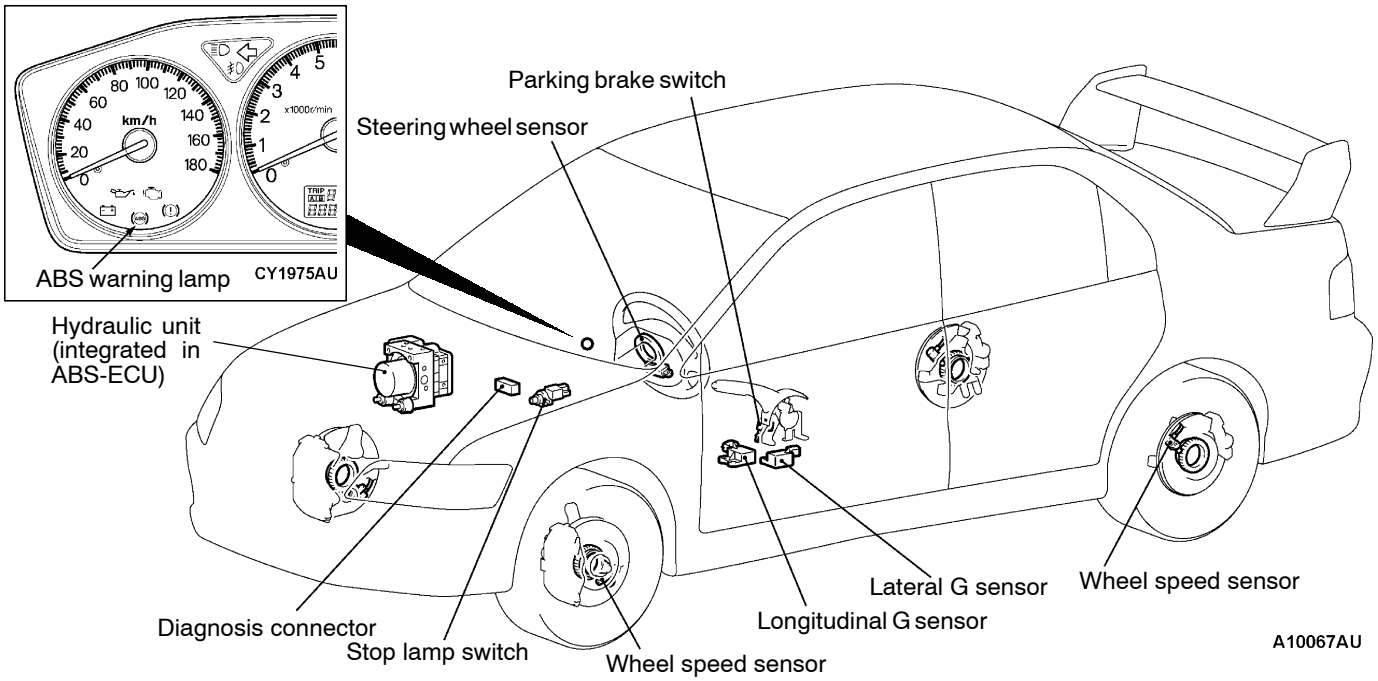
ACTIVE SAFETY

BRAKING SYSTEM

All models feature fade-resistant 14-inch ventilated discs up front and rear 8-inch drums for sure, linear stopping power.

A 4-sensor, 3-channel ABS (Anti-lock Braking System) with EBD (Electronic Brake-force Distribution) is available. ABS adjusts the braking pressure of the front wheels independently and rear wheels together for controlled emergency braking.

New for the Lancer, EBD works with the ABS computer to evenly modulate each channel's braking pressure for ideal braking force regardless of load or surface conditions at all times.

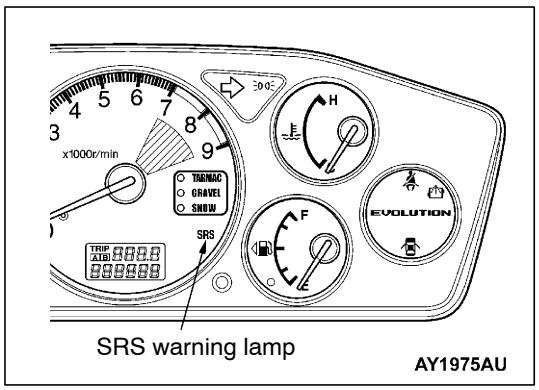


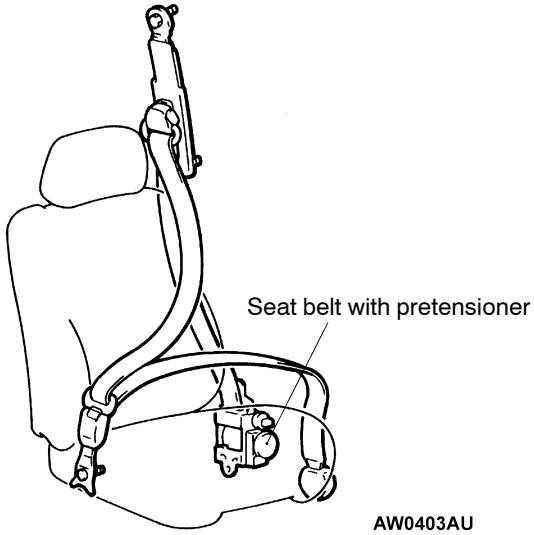
PASSIVE SAFETY

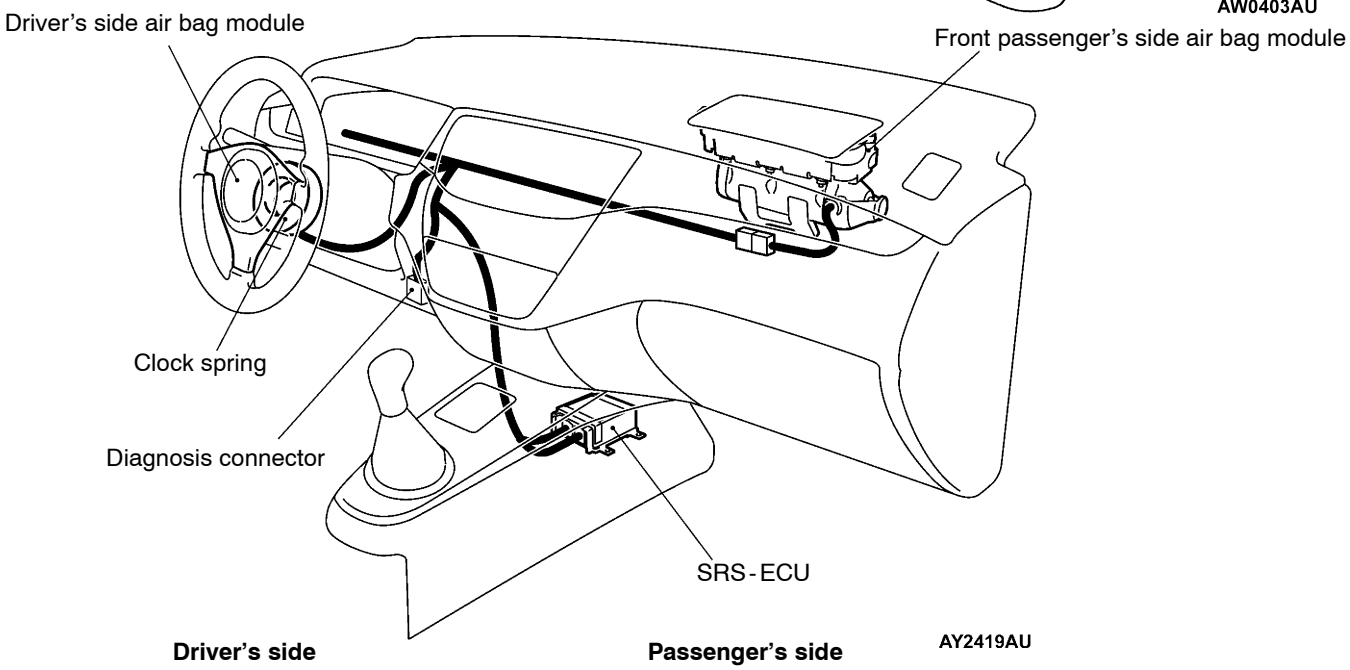
SRS AIR BAGS

Dual SRS (Supplemental Restraint System) front airbags deploy only upon detection of frontal impact. When used in combination with the 3-point ELR seatbelts, they significantly mitigate head and upper torso injury to front-seat occupants.

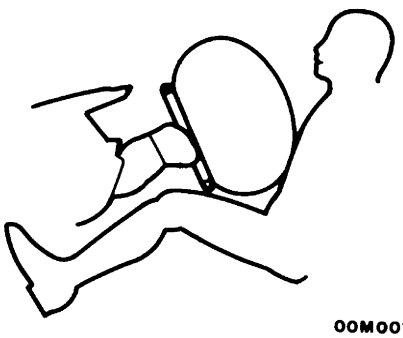
Seat belt with pretensioner featured for the driver's and front passenger's seats is designed for instantly taking up the slack in the seat belt at the time of impact to improve restraint effect on a passenger. It is activated approximately at the same time as SRS airbag is activated to improve protection effect on a passenger.



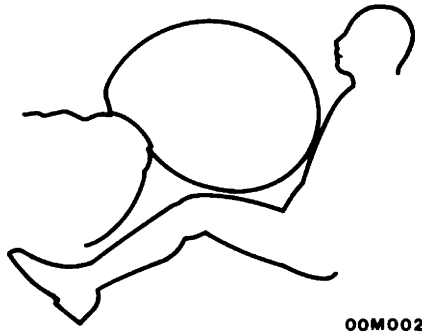




Driver's side



Passenger's side



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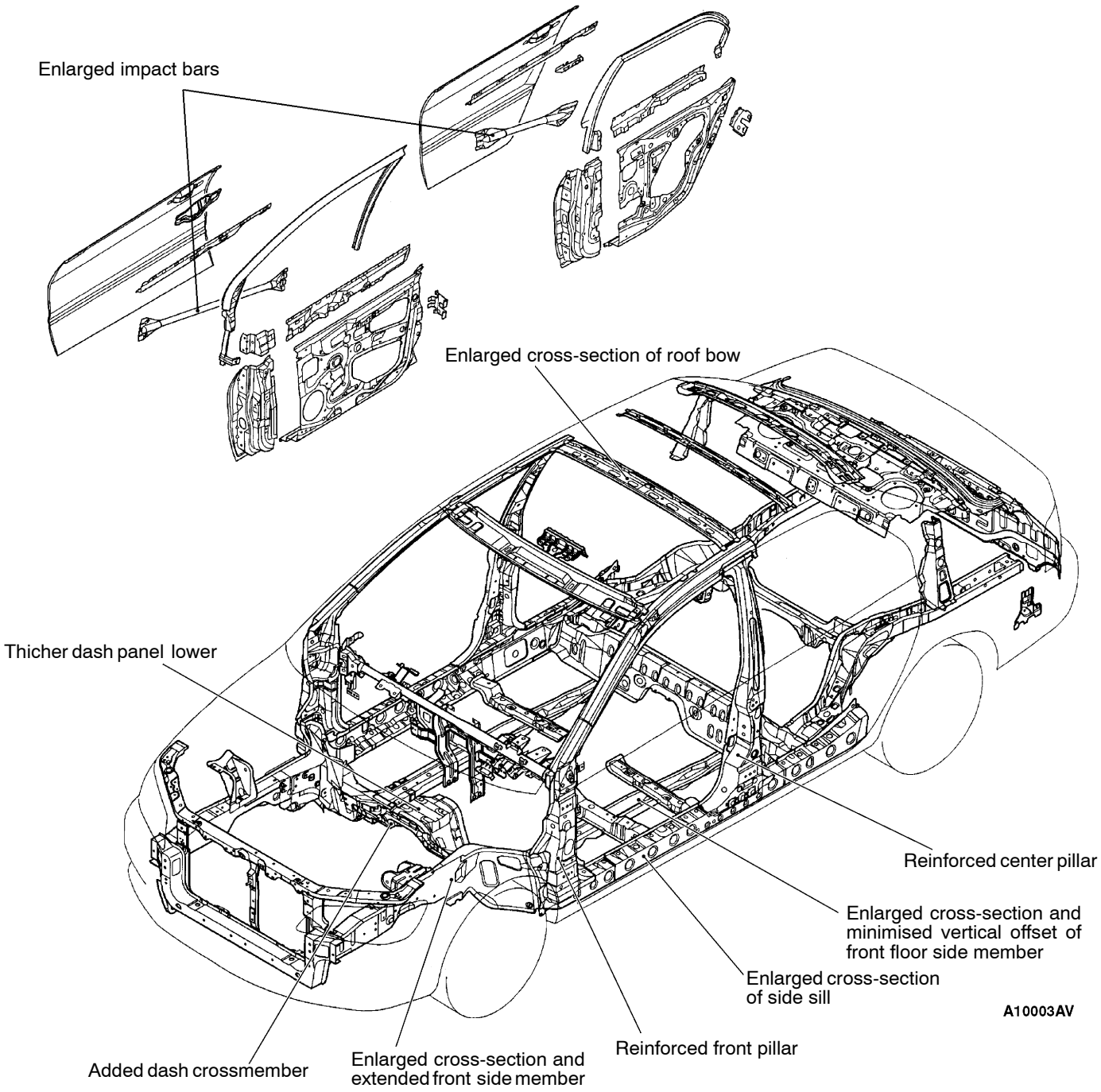
BODY CONSTRUCTION

The EVOLUTION-VII safety-enhanced body structure comprises front and rear crushable zones that effectively absorb the impact energy of front and rear collisions.

Adding to all-round occupant protection is a deformation-resistant, highly rigid cabin structure that features strategic reinforcements plus large side-door impact bars.



SAFETY-ENHANCED FRONT SEATS

The front seats are designed to minimise the risk of whiplash in a collision from the rear.
The headrestraints have been ideally angled forward, while the seat frame was moved toward the rear.
In-house tests show a roughly 40% improvement in occupant injury figures.

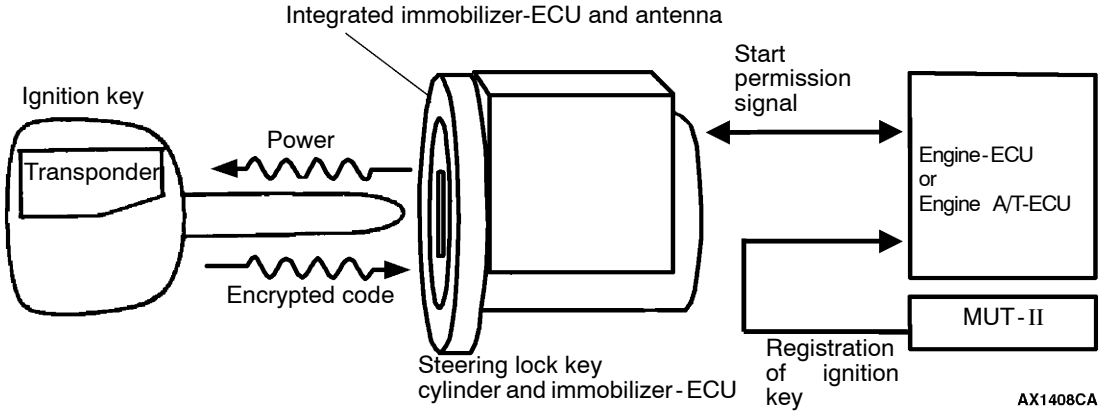
OTHER SAFETY FEATURES

- 3-point ELR seatbelts
- Front fog lamps
- Child-protection rear door locks

EQUIPMENTS

IMMOBILIZER SYSTEM

This system lets the engine be started only when an encrypted code that is recorded in the ignition key is the same as an encrypted code that is recorded in the immobilizer-ECU. Immobilizer system is equipped as an option.



SERVICEABILITY AND RELIABILITY

MAINTENANCE-FREE FEATURES

- Adoption of an auto-tensioner eliminates the need for timing belt adjustment
- Adoption of auto lash adjusters eliminates the need for valve clearance adjustment

ENHANCED DIAGNOSIS SYSTEM

Diagnosis functions have been included for the following systems, so that it is possible to use the MUT-II to read the diagnosis codes and service data and to carry out actuator tests. In addition, it is also possible to read the diagnosis codes by the flashing of the warning lamp in some systems.

- MPI
- ACD
- AYC
- 4ABS
- SRS air bag
- Simplified Wiring System (SWS)

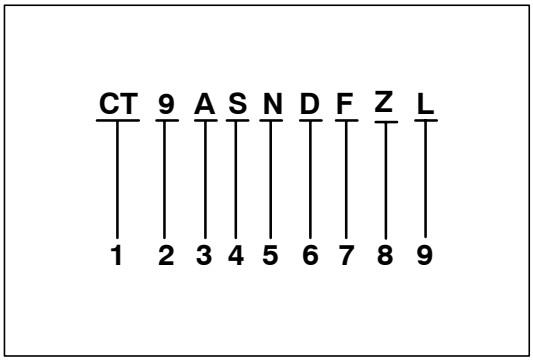
IMPROVED SERVICEABILITY AND HANDLING

- A one-touch joint type plastic tube has been adopted for fuel main lines, which makes removal and installation easier.
- A small wiper module, which includes wiper motor and linkage, has been adopted to facilitate removal and installation.

VEHICLE IDENTIFICATION

MODELS

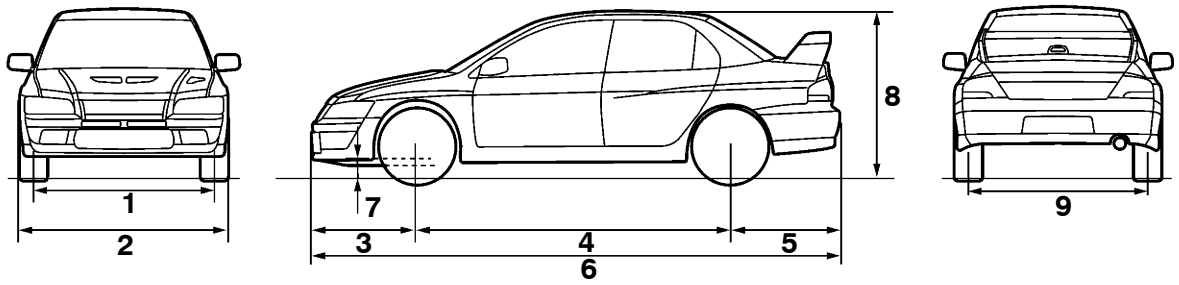
Model code	Class code	Grade	Engine model	Transmission model	Fuel supply system
CT9A	SNDFZL/R	RS	4G63 (1,997 mL-DOHC-16 valves-intercooler turbo)	W5M51 <4WD-5M/T>	MPI
	SNGFZL/R	RS-II			



MODEL CODE

No.	Items	Contents
1	Development	CT: MITSUBISHI LANCER EVOLUTION-VII
2	Engine type	9: 1,997 mL petrol engine
3	Sort	A: Passenger car
4	Body style	S: 4-door sedan
5	Transmission type	N: 5-speed manual transmission
6	Trim level	D: RS G: RS-II
7	Specification engine feature	F: MPI-DOHC
8	Special feature	Z: 4WD
9	Steering wheel location	L: Left hand R: Right hand

MAJOR SPECIFICATIONS



Items			CT9A	
			SNDFZL/R	SNGFZL/R
Vehicle dimensions mm	Front track	1	1,500, 1,515 *1	
	Overall width	2	1,770	
	Front overhang	3	855	
	Wheel base	4	2,625	
	Rear overhang	5	975	
	Overall length	6	4,455	
	Ground clearance (unladen)	7	140	
	Overall height (unladen)	8	1,450	
	Rear track	9	1,500, 1,515 *1	
Vehicle weight kg	Kerb weight		1,380	1,420
	Max. gross vehicle weight		1,655	1,695
	Max. axle weight rating-front		950	970
	Max. axle weight rating-rear		705	725
Seating capacity			5	
Engine	Model No.		4G63	
	Total displacement mL		1,997	
Transmis-sion	Model No.		W5M51	
	Type		5-speed manual	
Fuel System	Fuel supply system		MPI	

NOTE
*1: Vehicles with 17 inch wheels.

NOTES

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.

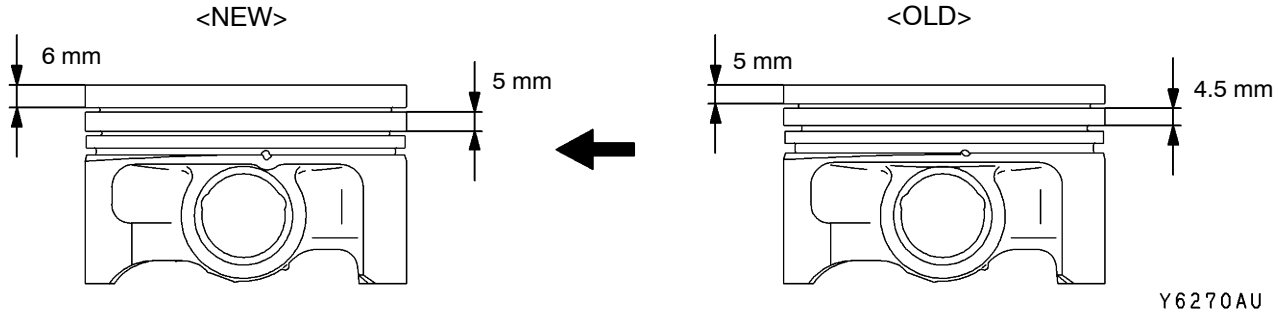
MAJOR SPECIFICATIONS

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

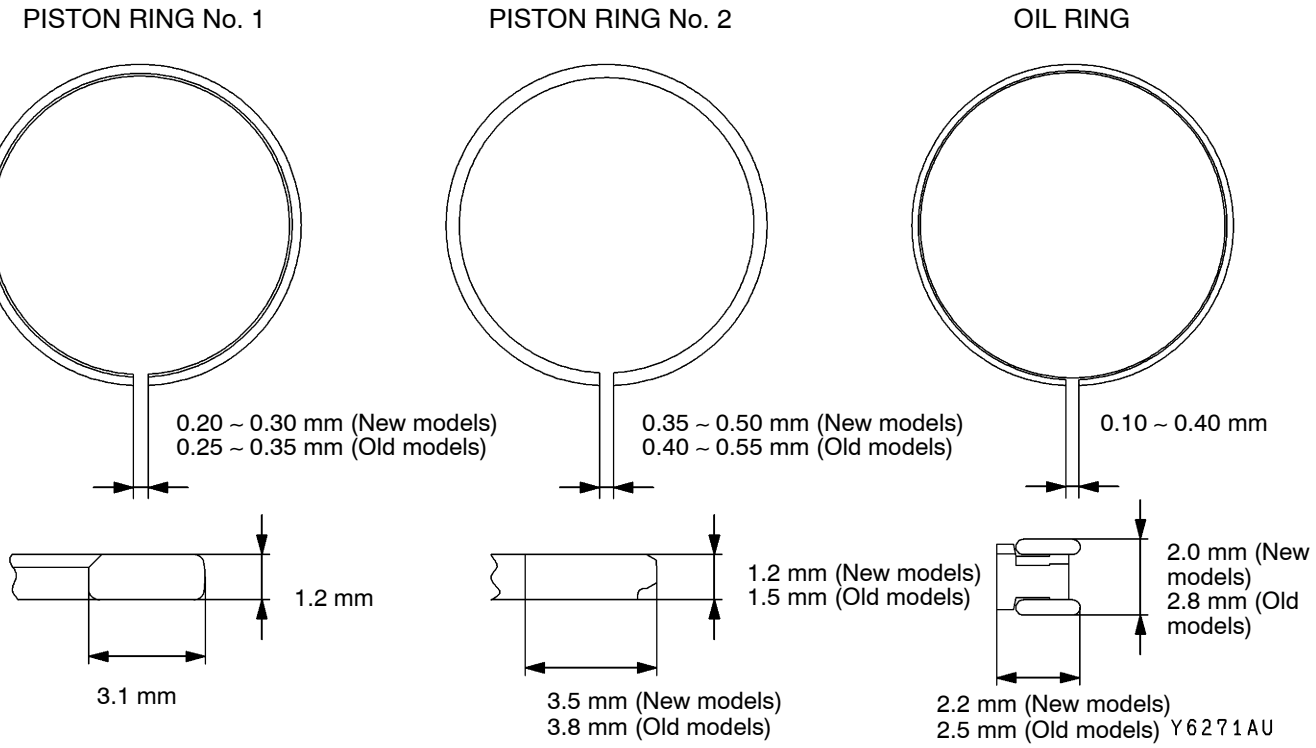
The top land height has been changed from 5 mm to 6 mm, and the second land height has been changed from 4.5 mm to 5 mm.



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

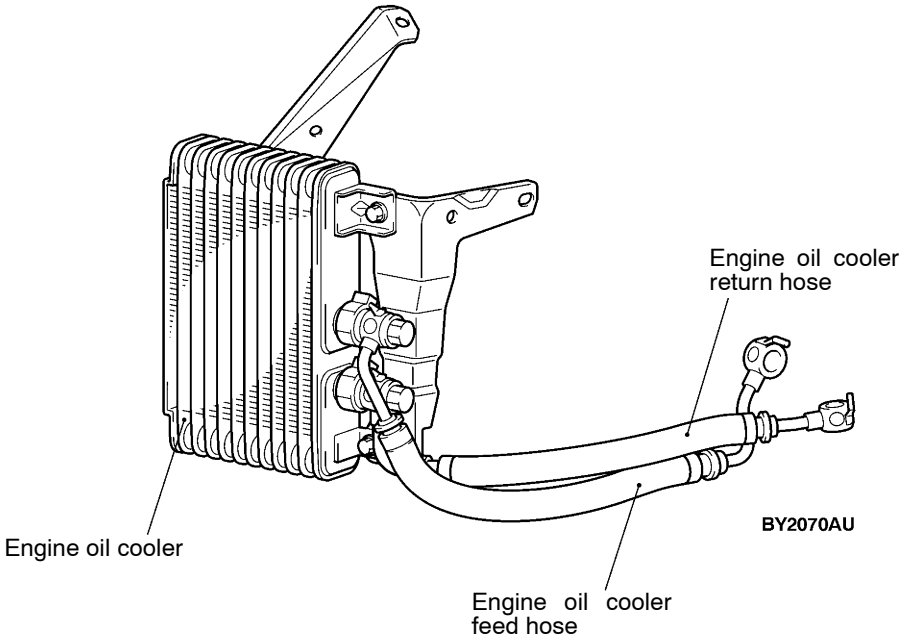
ENGINE OIL COOLER

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

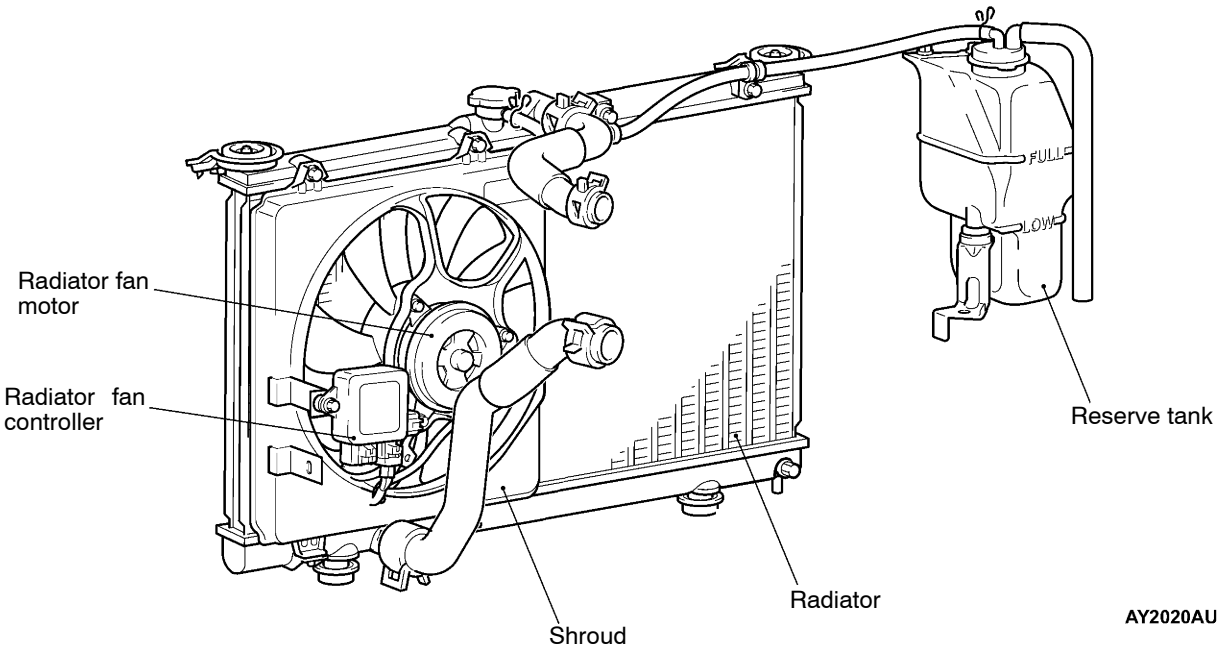
The cooling system is a water-cooled pressurized, forced circulation type which offers the following features.

- 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

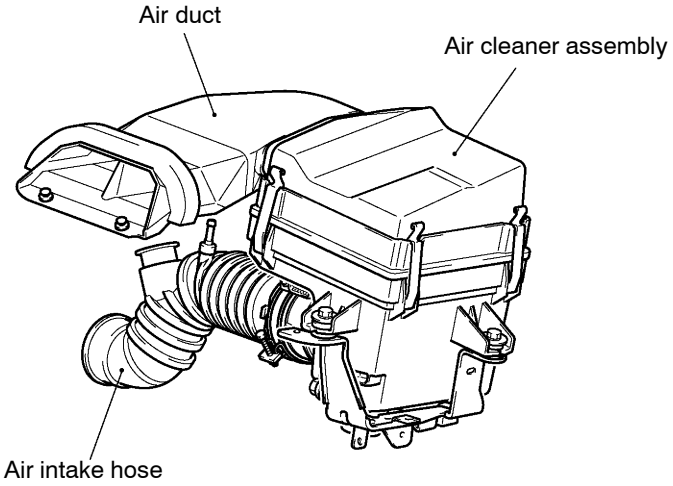
AIR DUCT, AIR CLEANER

- 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

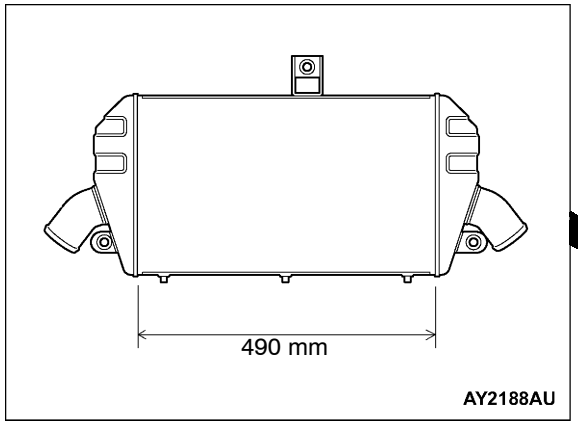


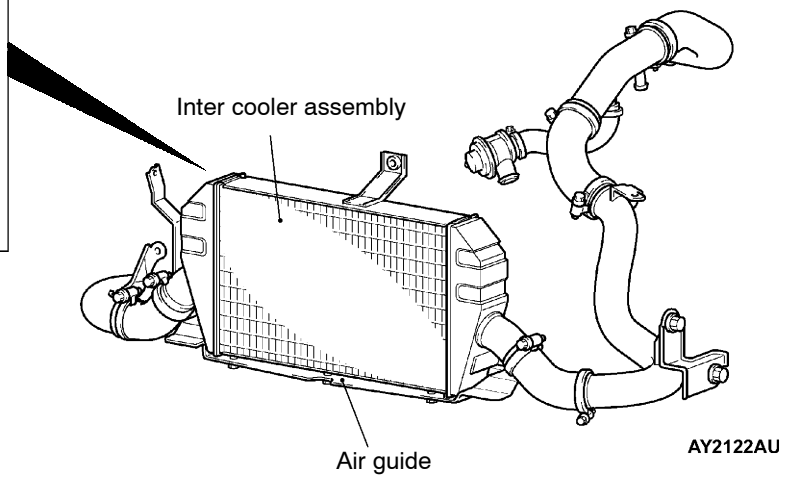
INTER COOLER

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

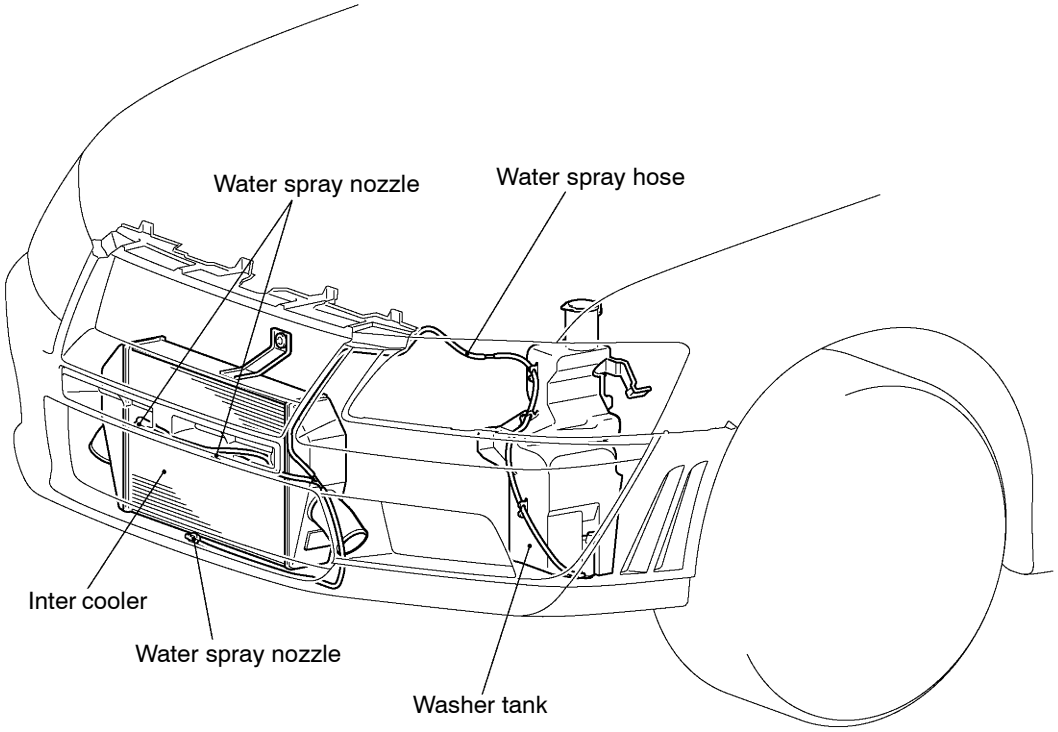
To complement the intercooler efficiency in ranges where the cooling efficiency of the air cooled intercooler is insufficient, and attain high performance in various operating environments, a system which cools by spraying water from a special washer tank for the intercooler to the front of the intercooler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

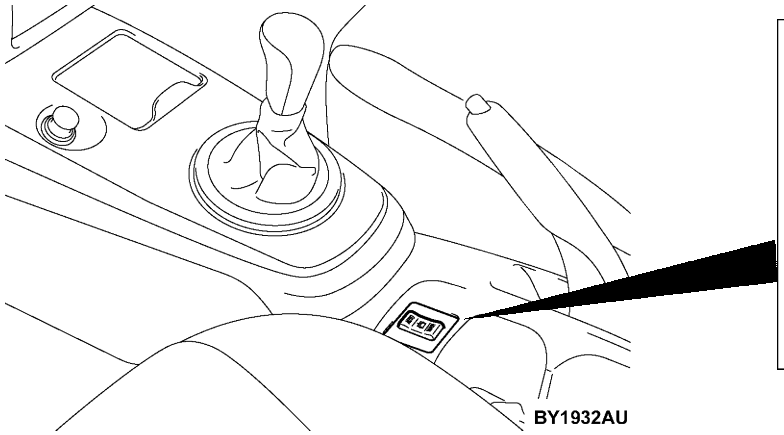
CONSTRUCTION DIAGRAM

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



AY2221AU

<Water Spray Switch>



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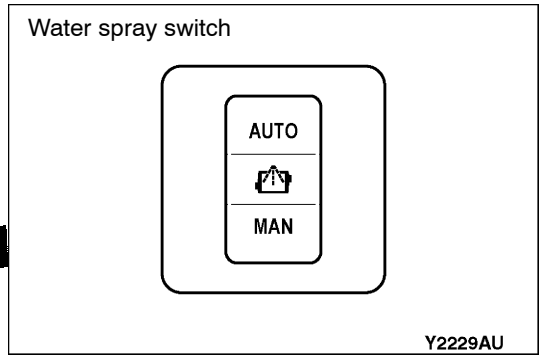

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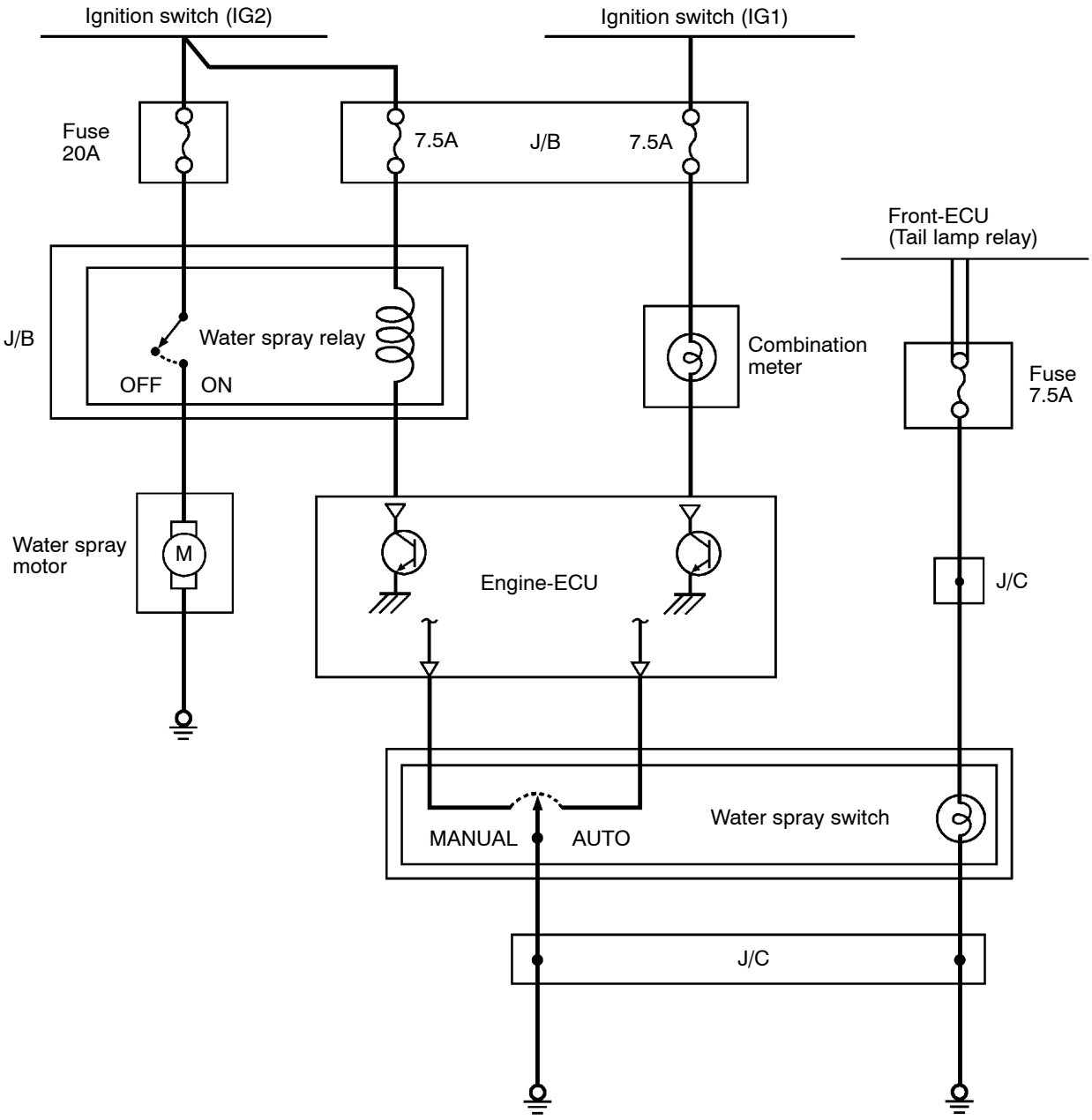
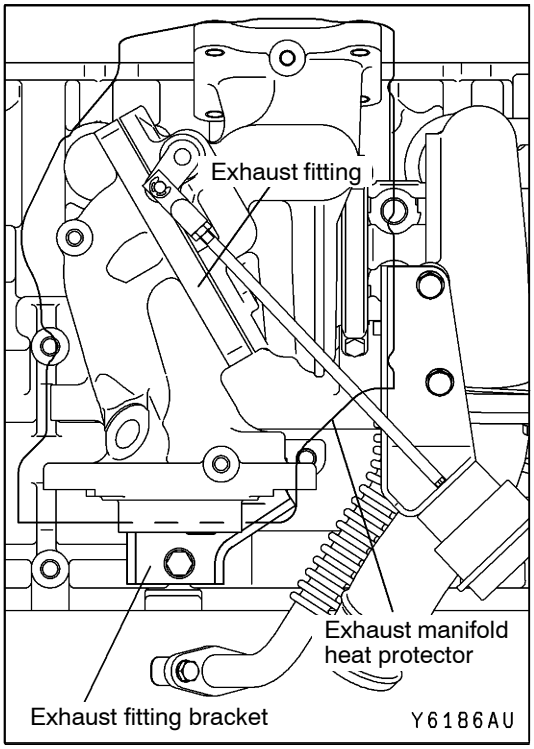
SYSTEM DIAGRAM





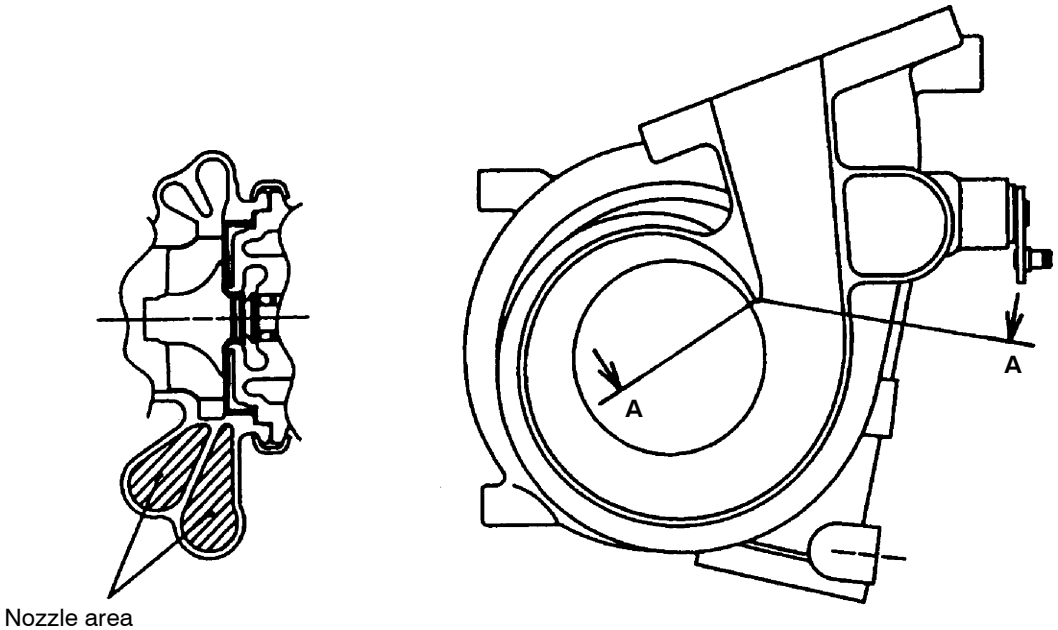
EXHAUST SYSTEM

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.

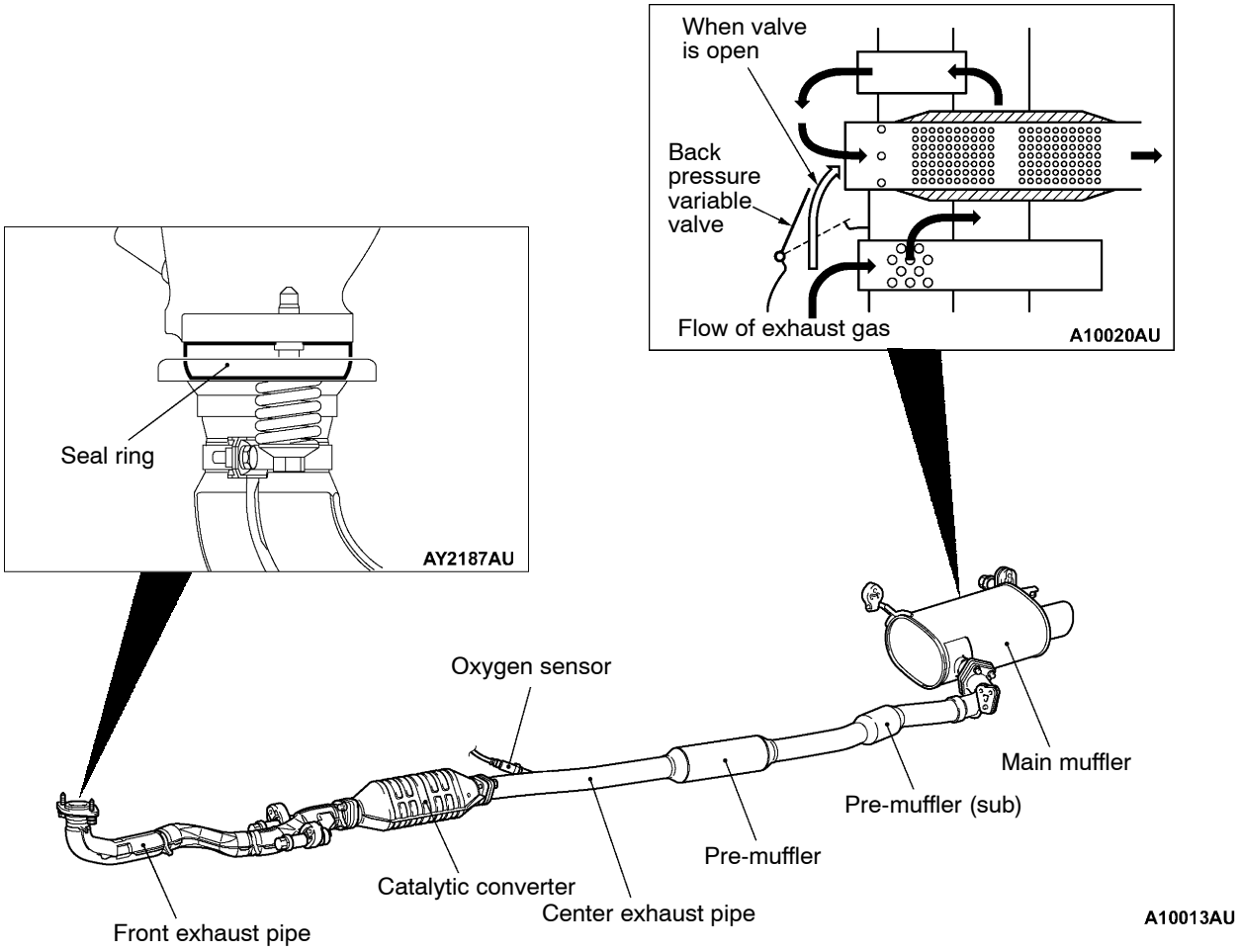


EXHAUST PIPE AND MUFFLER

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



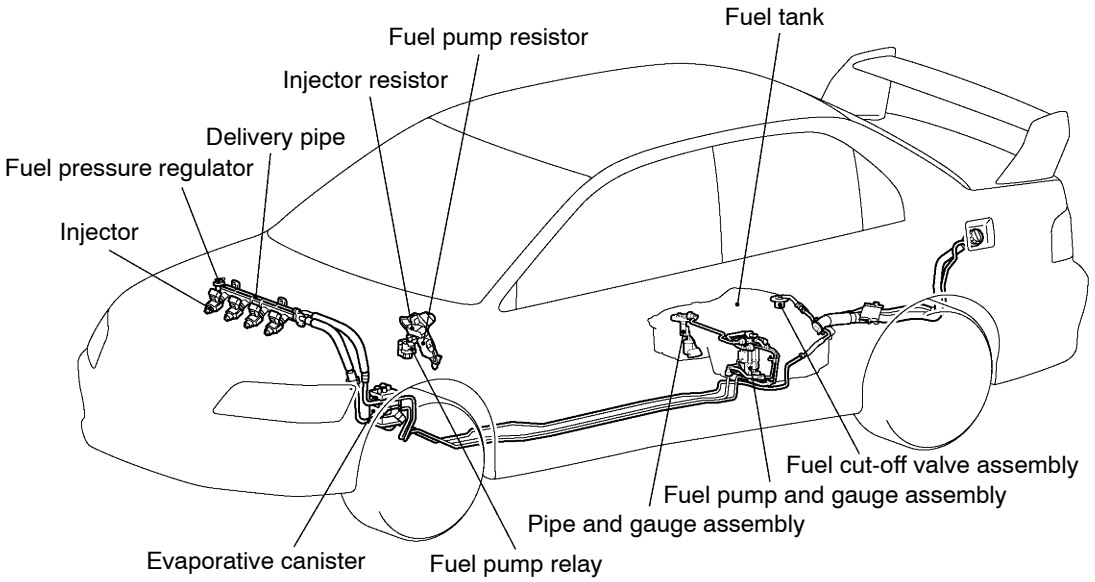
FUEL SYSTEM

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

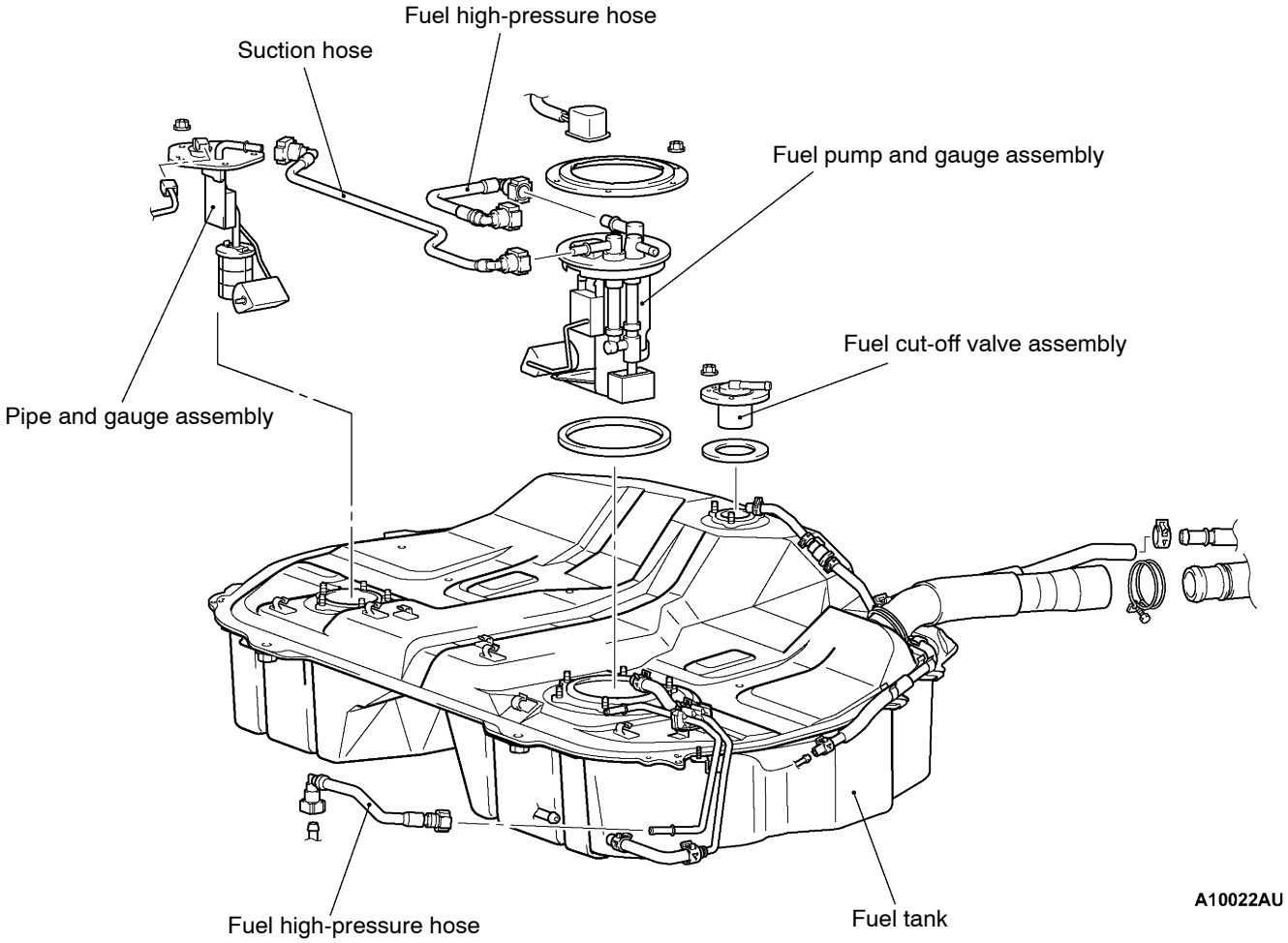


FUEL TANK

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

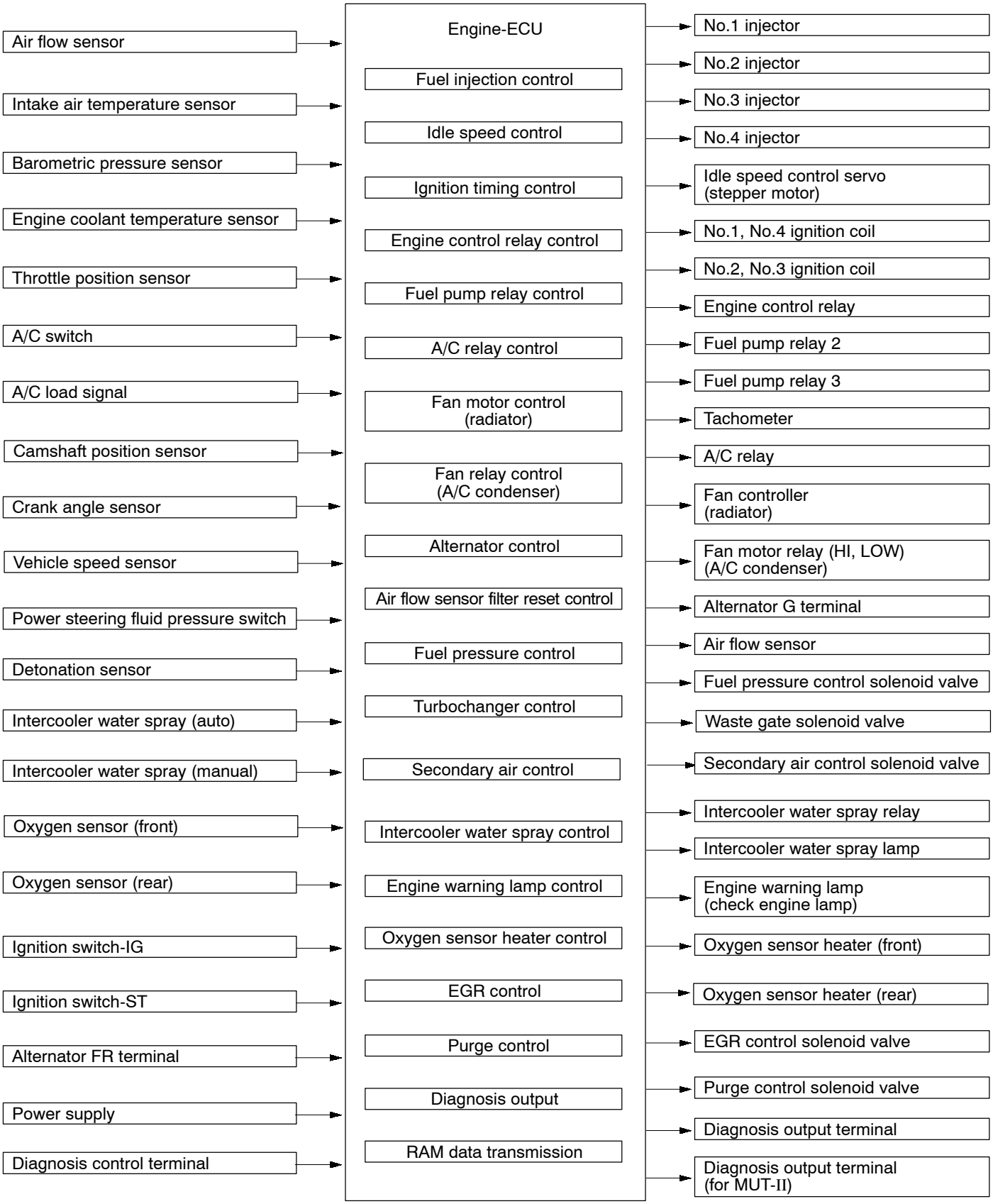


CONTROL SYSTEM

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

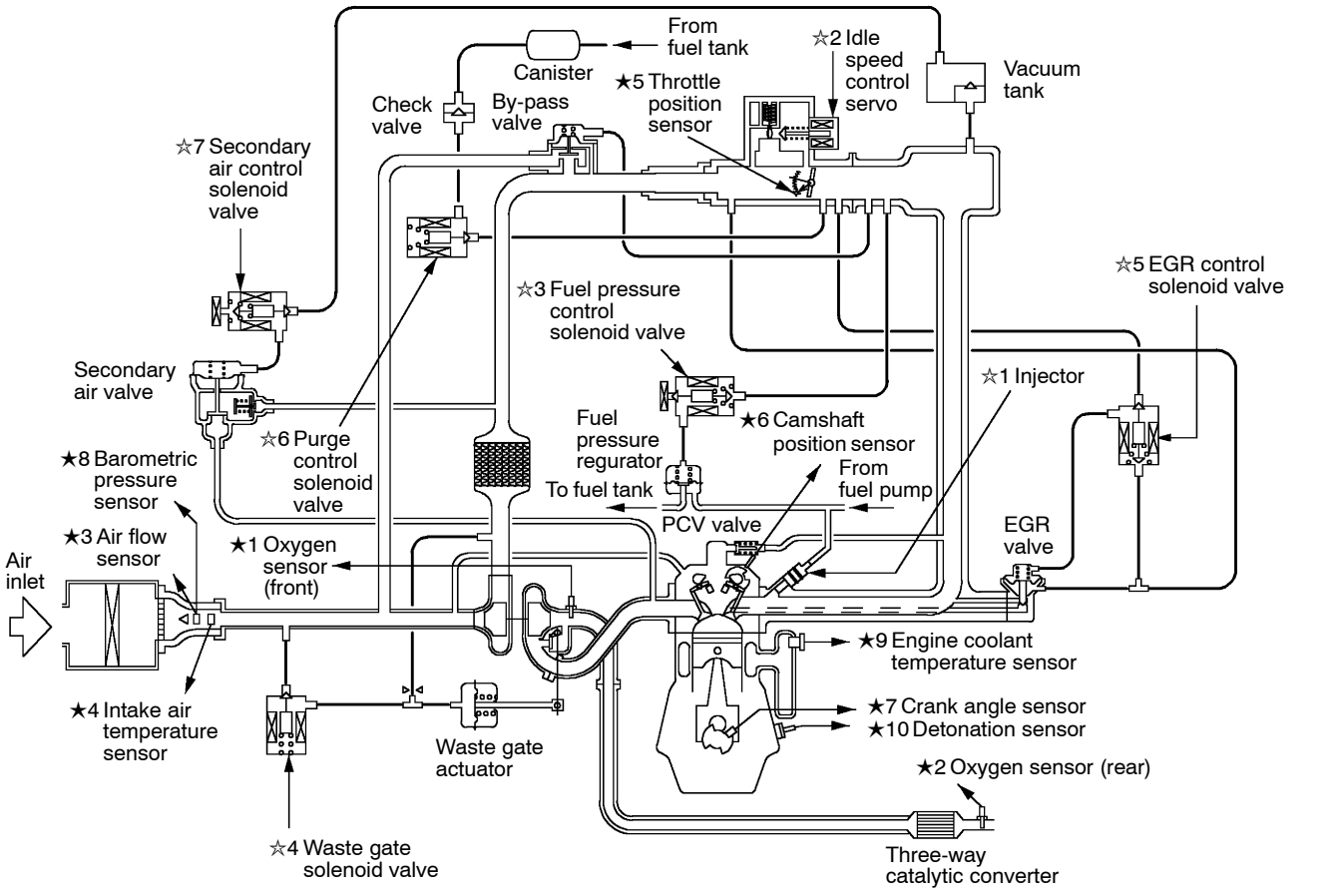
★1 Oxygen sensor (front)
★2 Oxygen sensor (rear)
★3 Air flow sensor
★4 Intake air temperature sensor
★5 Throttle position sensor
★6 Camshaft position sensor
★7 Crank angle sensor
★8 Barometric pressure sensor
★9 Engine coolant temperature sensor
★10 Detonation sensor

- 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.

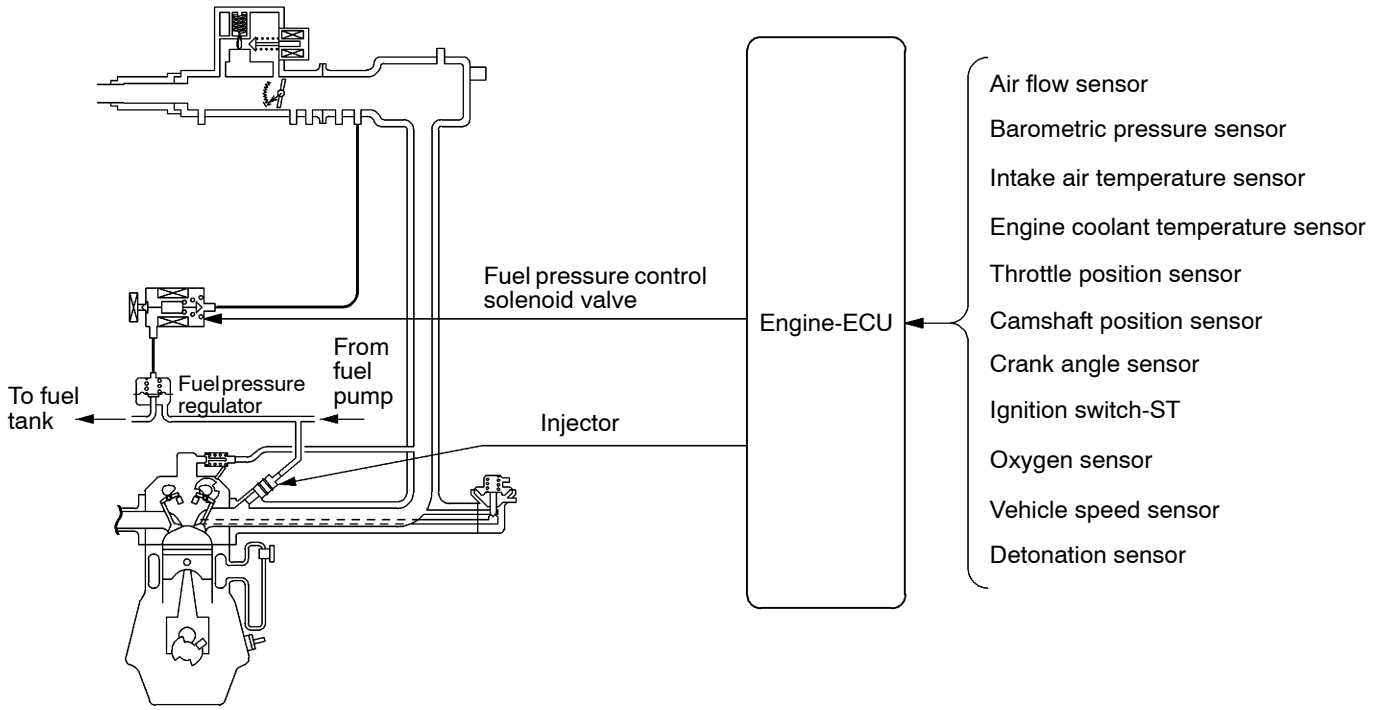
Name		Function
Sensors	A/C load signal	Inputs the compressor drive state (low load/high load) to the engine-ECU. The engine-ECU controls the A/C idle-up revolution speed using this signal.
	Intercooler water spray switch (automatic)	Sprays water when certain driving conditions are satisfied.
	Intercooler 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.

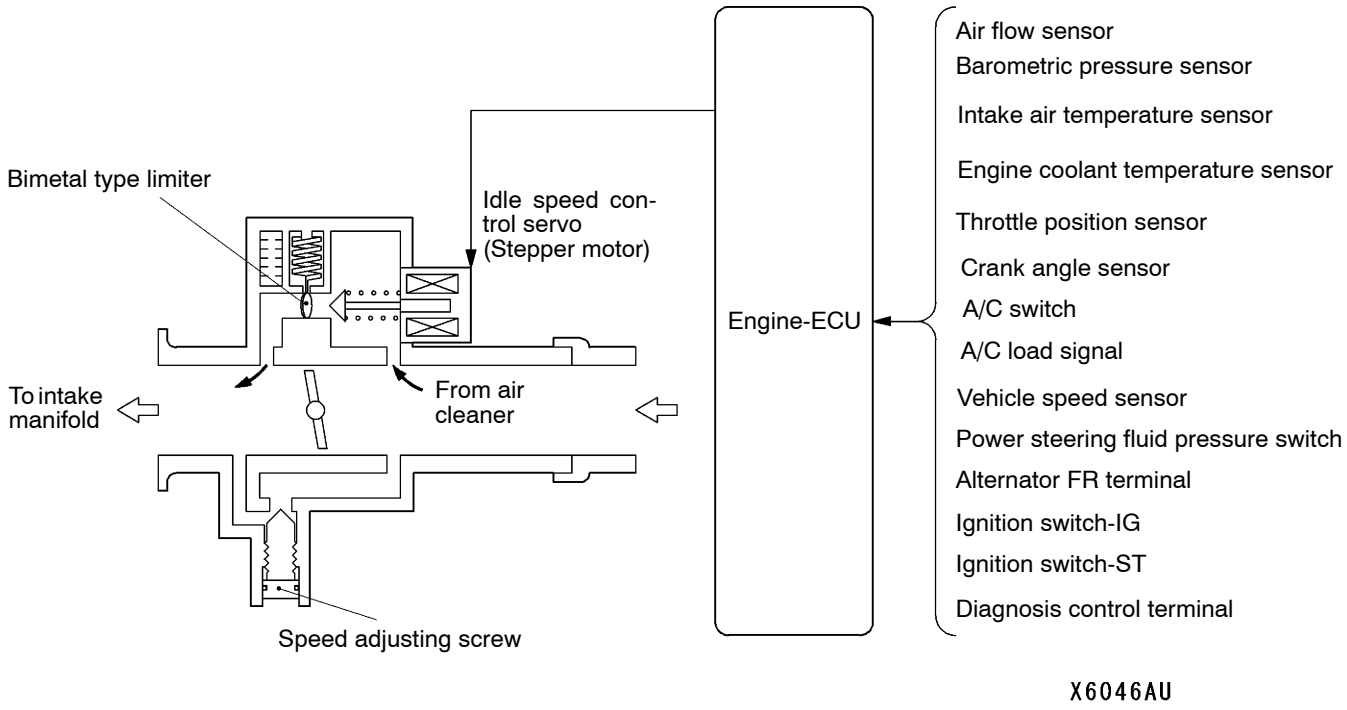
SYSTEM CONFIGURATION DIAGRAM



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.

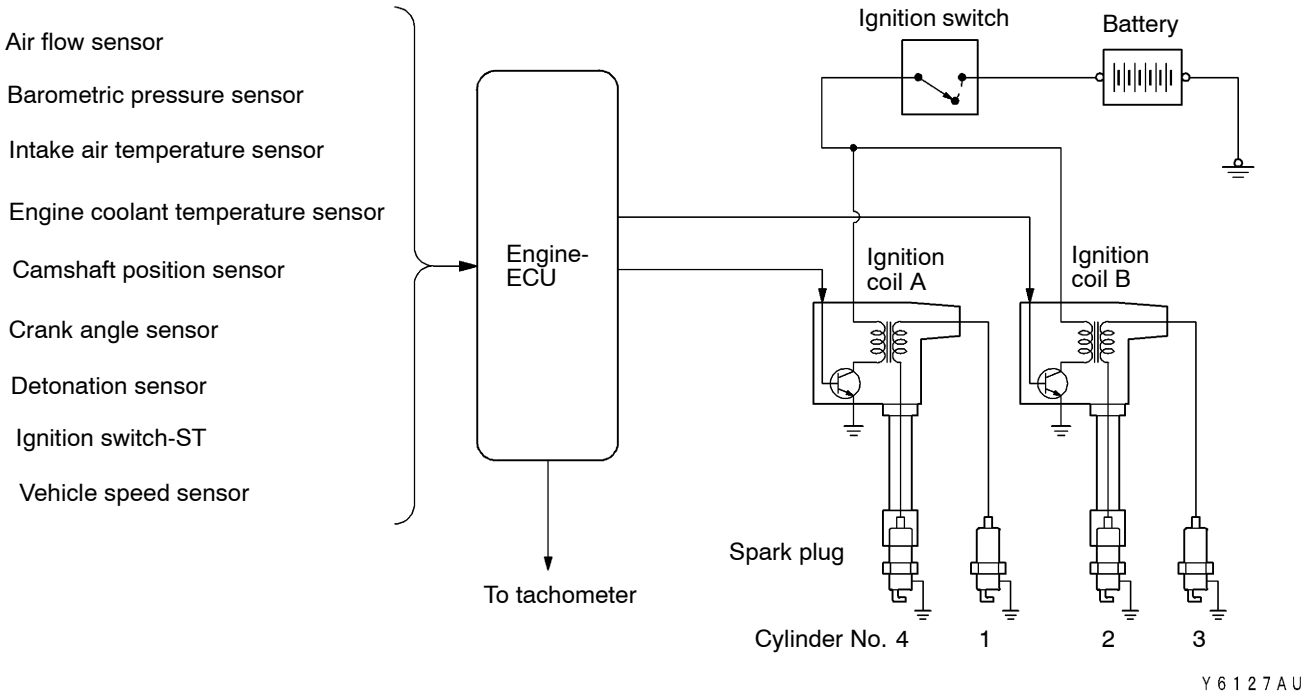
SYSTEM CONFIGURATION DIAGRAM



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

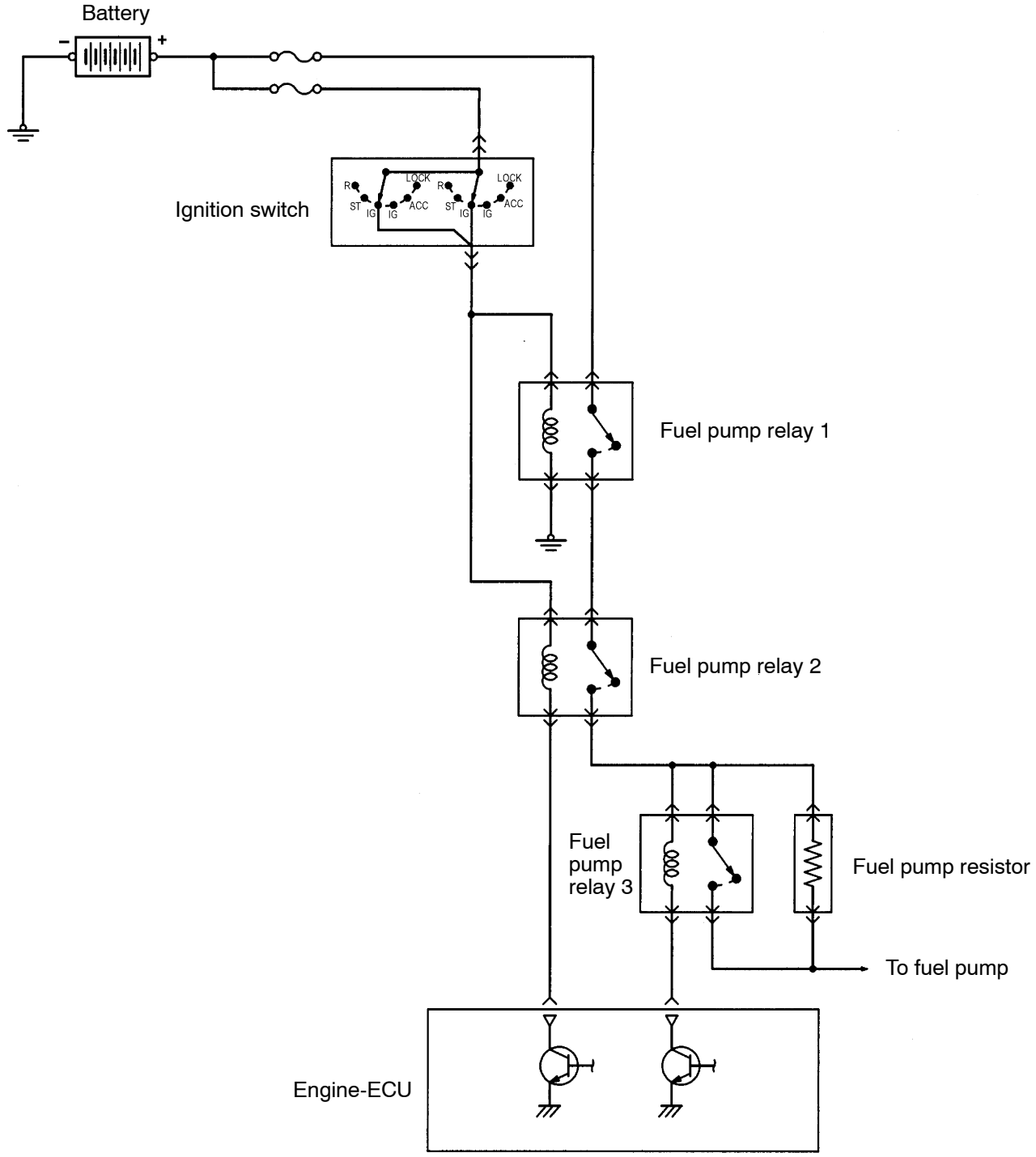
The radiator fan motor control system is basically the same as the control system for 4G6-MPI engine installed in the GALANT.

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.

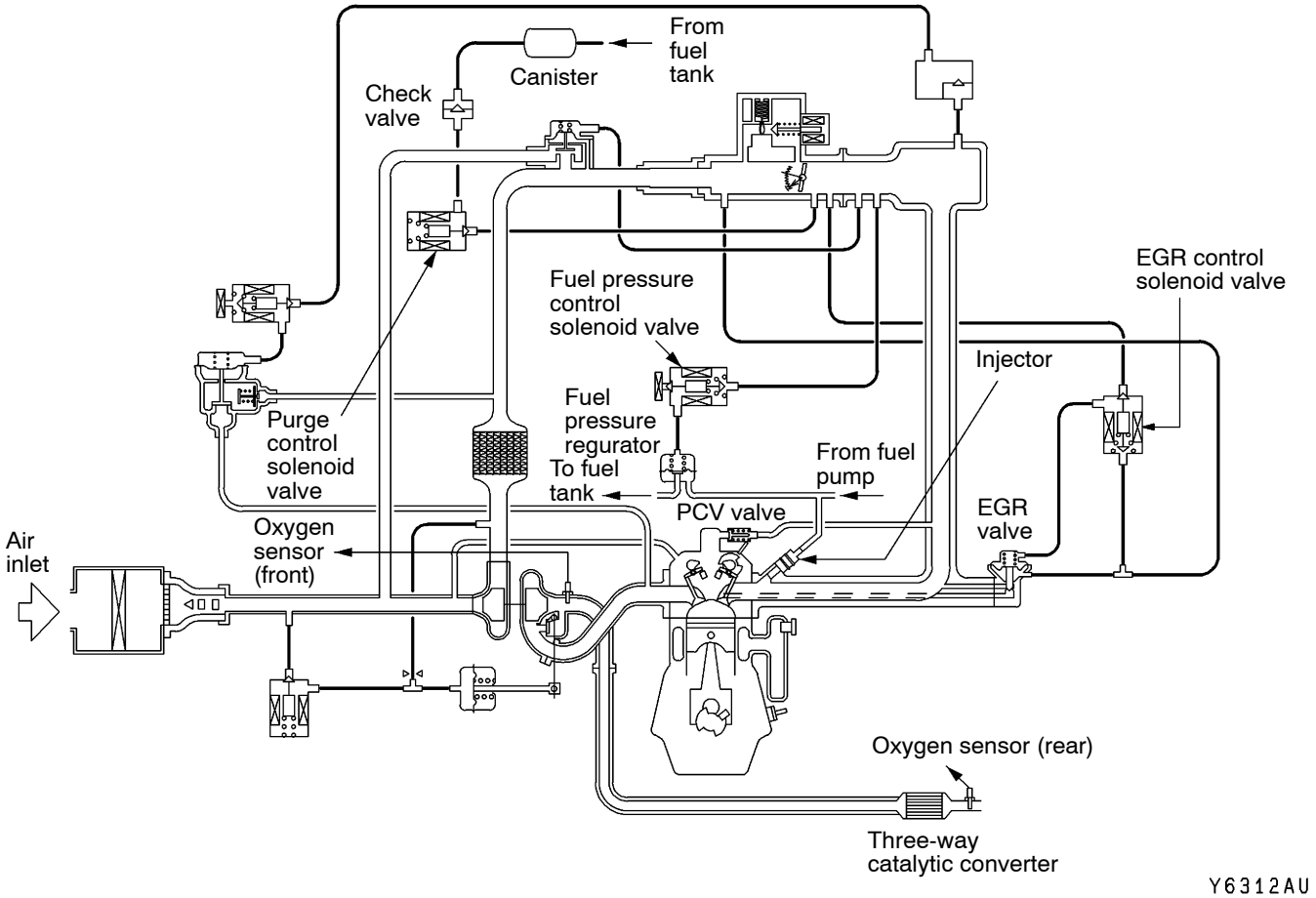
EMISSION CONTROL SYSTEM

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



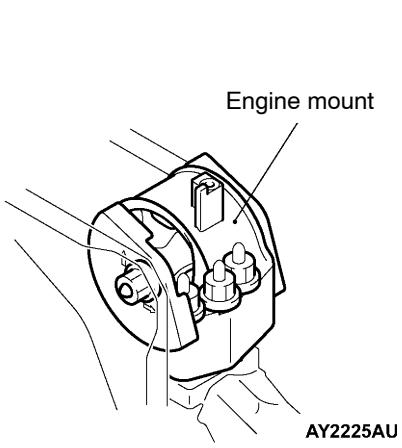
MOUNT

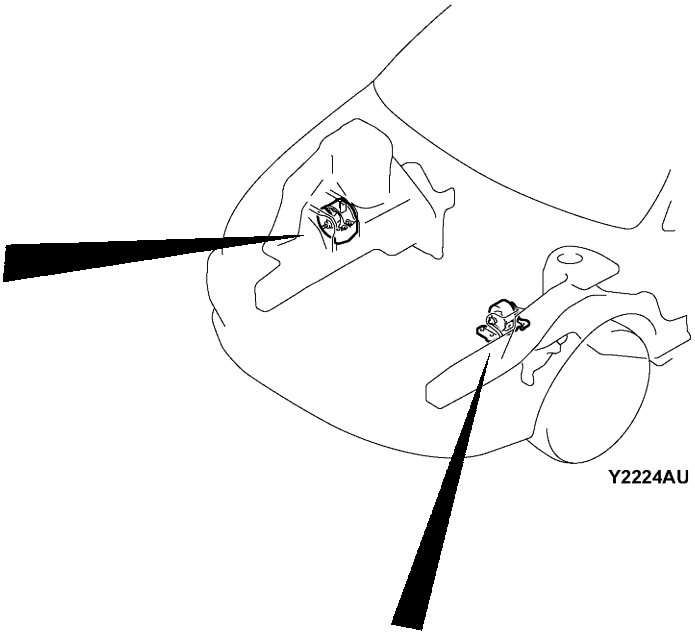
The inertia axial system based on the past achievements in COLT/LANCER has been adopted for the engine mount system.

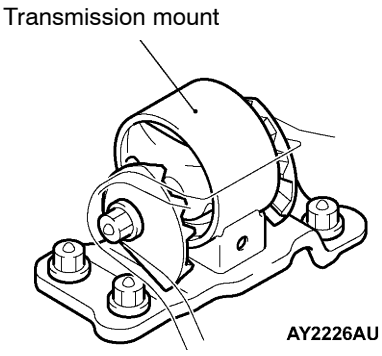
- Longitudinal installation type of cylindrical liquid-filled engine mount has been adopted for reduction of idle vibration and improvement of ride feeling.
- The liquid-filled mount system has been adopted for transmission mount to improve ride feeling by optimizing the insulator.
- Installation of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

CONSTRUCTION DIAGRAM

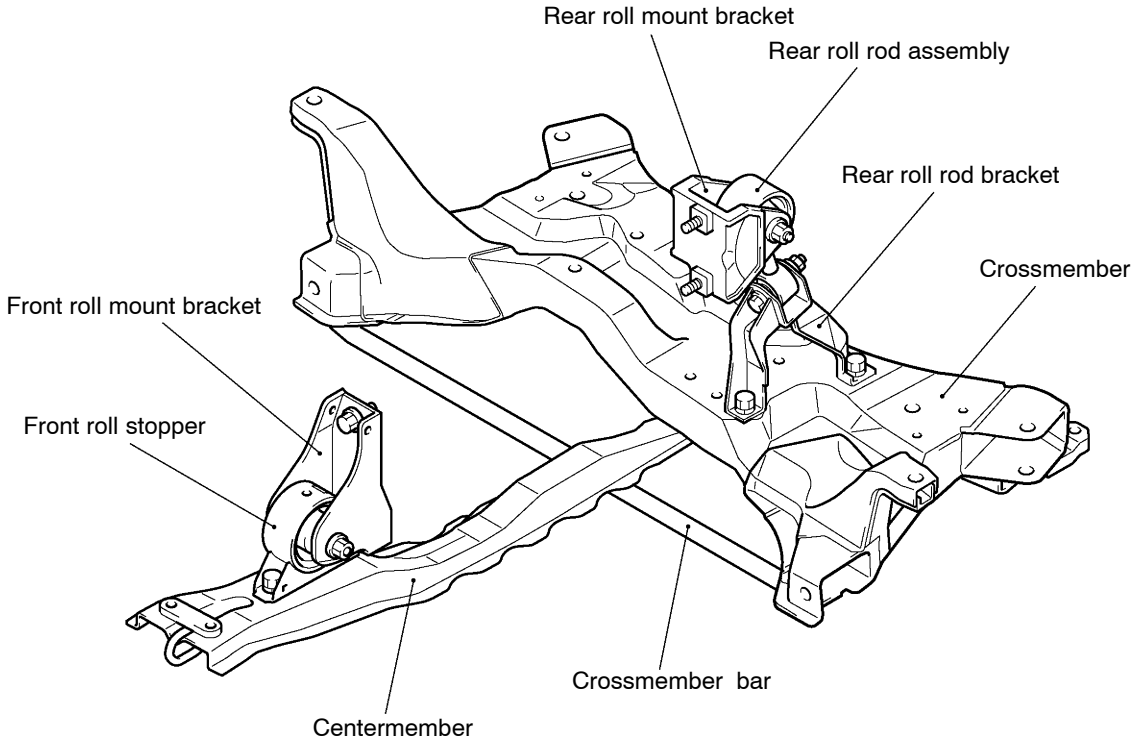
<Engine mount/Transmission mount>



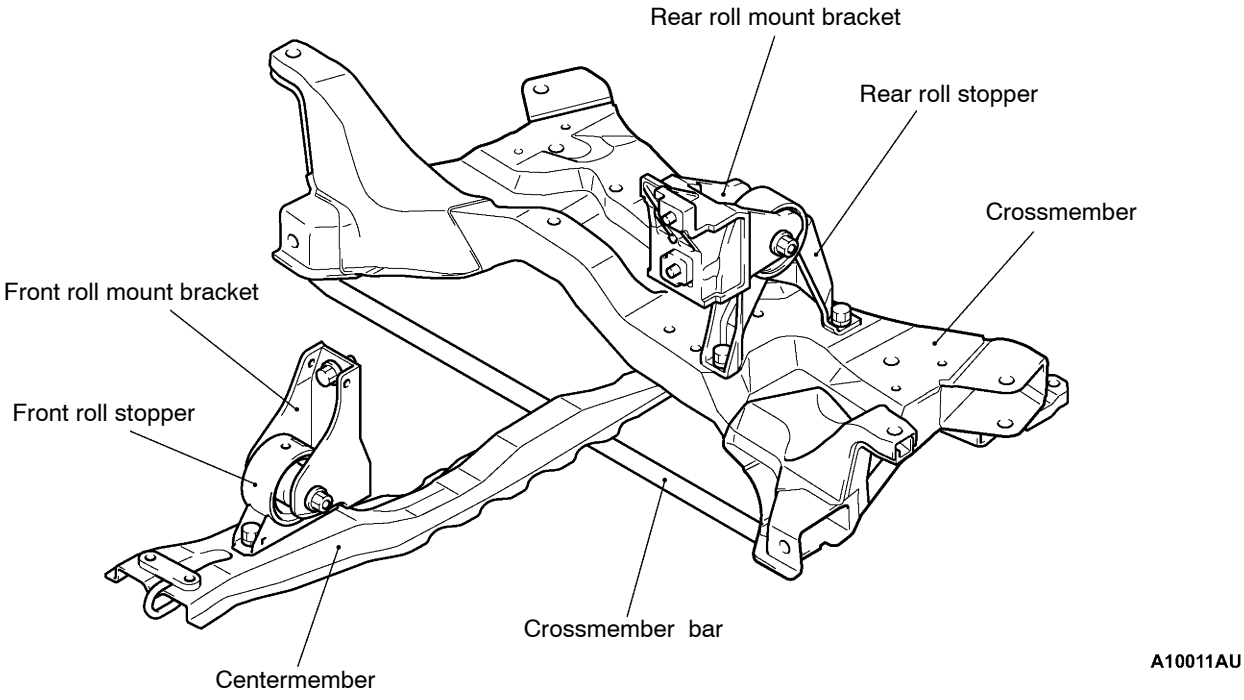




<Engine roll stopper/Crossmember/Centermember : L.H. drive vehicles>



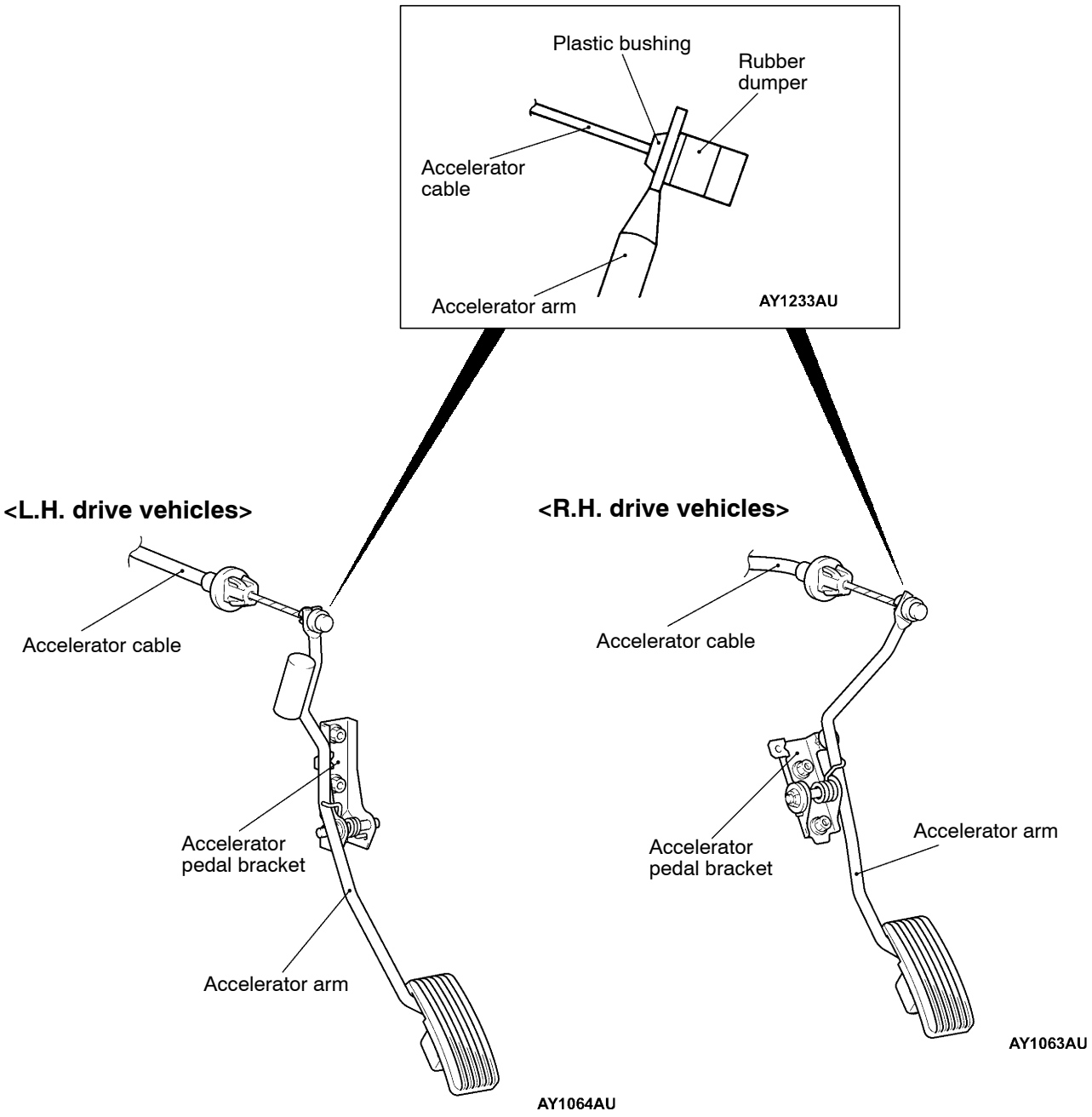
<Engine roll stopper/Crossmember/Centermember : R.H. drive vehicles>



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



POWER TRAIN

CONTENTS

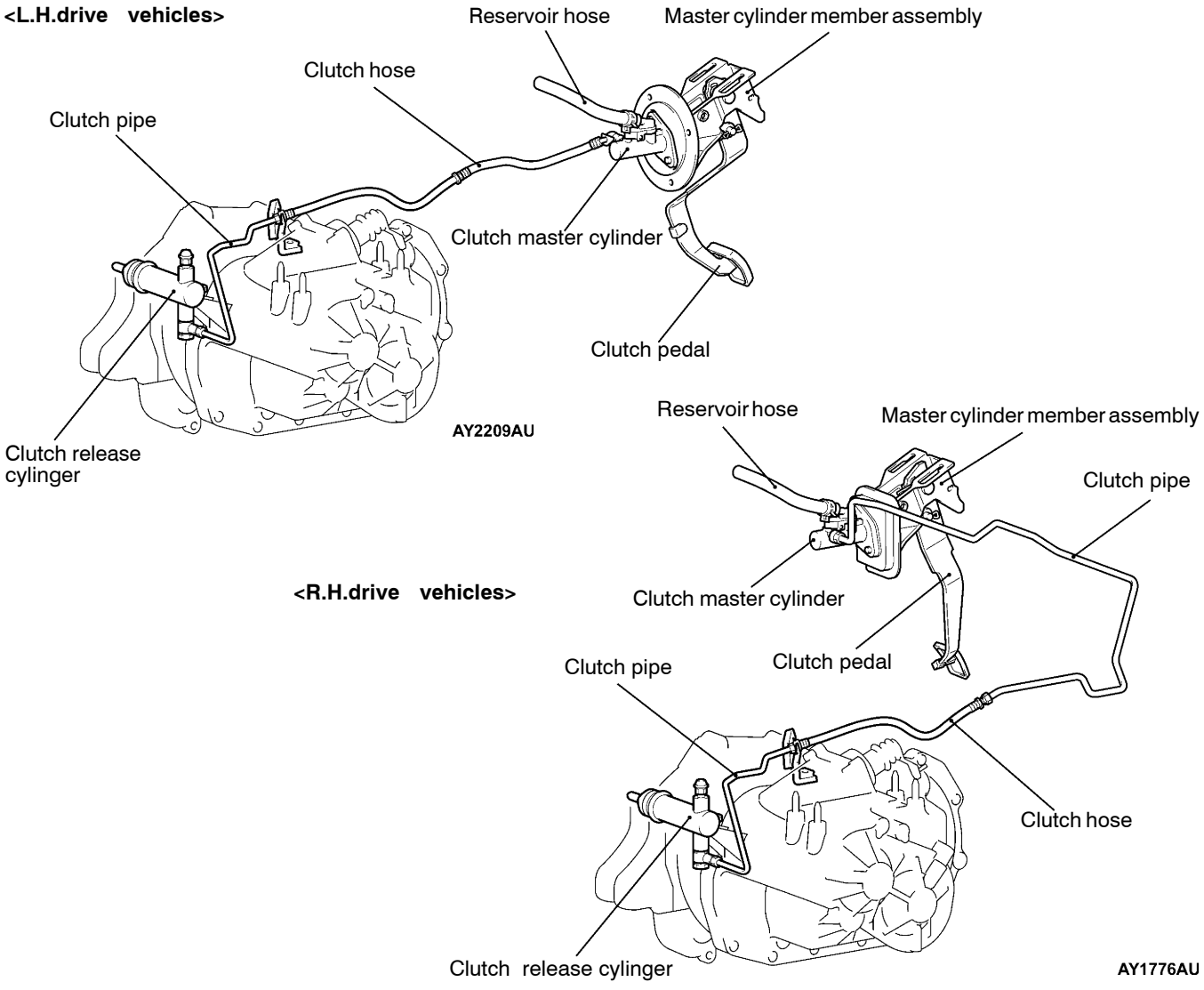
CLUTCH

SPECIFICATIONS

Items	Specifications
Engine model	4G63-DOHC-Intercooler Turbocharger
Clutch disc type	Dry single plate type
Clutch disc facing diameter O.D.×I.D. mm	240×160
Clutch cover type	Diaphragm spring pull type
Clutch cover set load N	9,320 ± 750
Control system	Hydraulic type
Release cylinder I.D. mm	20.64
Master cylinder I.D. mm	15.87
Clutch fluid	Brake fluid DOT 3 or DOT 4

CLUTCH CONTROL CONFIGURATION

<L.H.drive vehicles>



<R.H.drive vehicles>

MANUAL TRANSMISSION

The manual transmission is a W5M5 transmission. This transmission incorporates the following changes from the F5M4 type transmission mounted to GALANT.

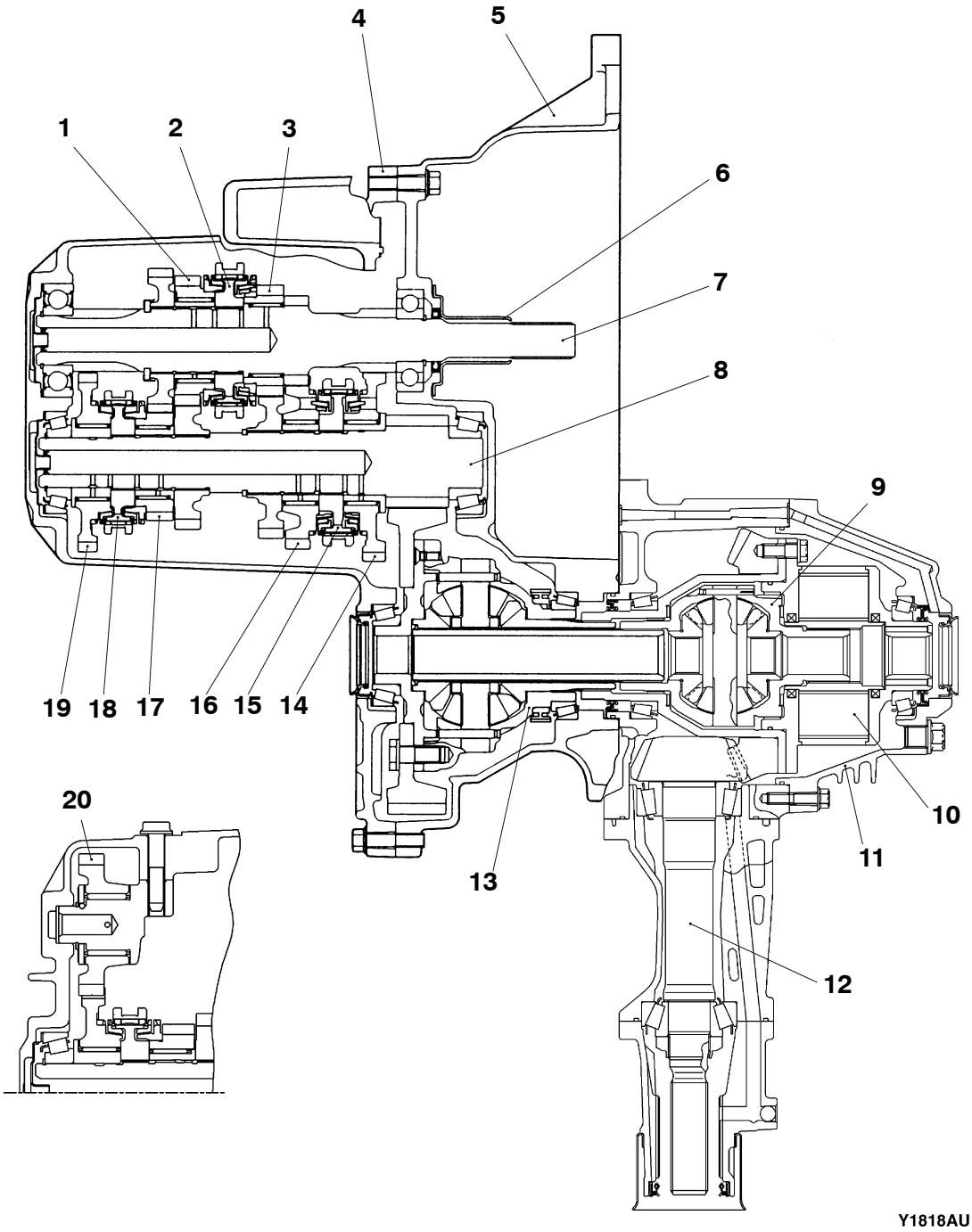
- With the incorporation of 4WD, the center differential has been positioned at the front differential of the 2WD, and the front differential has been positioned inside the transfer.
- The kinetic performance has been improved by setting a helical gear LSD for the front differential. <RS, RS II: Option>
- With the adoption of the active center differential (ACD), an hydraulic multi plate clutch has been adopted for the transfer limited slip differential. <RS, RS II: Option> (Refer to P.2-17 for details of the hydraulic multi plate clutch.)

SPECIFICATIONS

Item		Specifications	
Classification		RS, RS II	RS, RS II (Super cross gear specifications)
Transmission type		W5M51	
Engine type		4G63-DOHC-T/C	
Transmission type		5 steps forward, 1 step reverce, always in contact)	
Gear ratio	1st	2.785	←
	2nd	1.950	←
	3rd	1.407	1.444
	4th	1.031	1.096
	5th	0.720	0.825
	Reverse	3.416	←
Final deceleration ratio		4.529	←
Helical gear LSD (Front differential)		No	Yes
Transfer	Deceleration ratio	3.307	←
	Limited slip differential	VCU or hydraulic multi plate clutch (ACD)	←

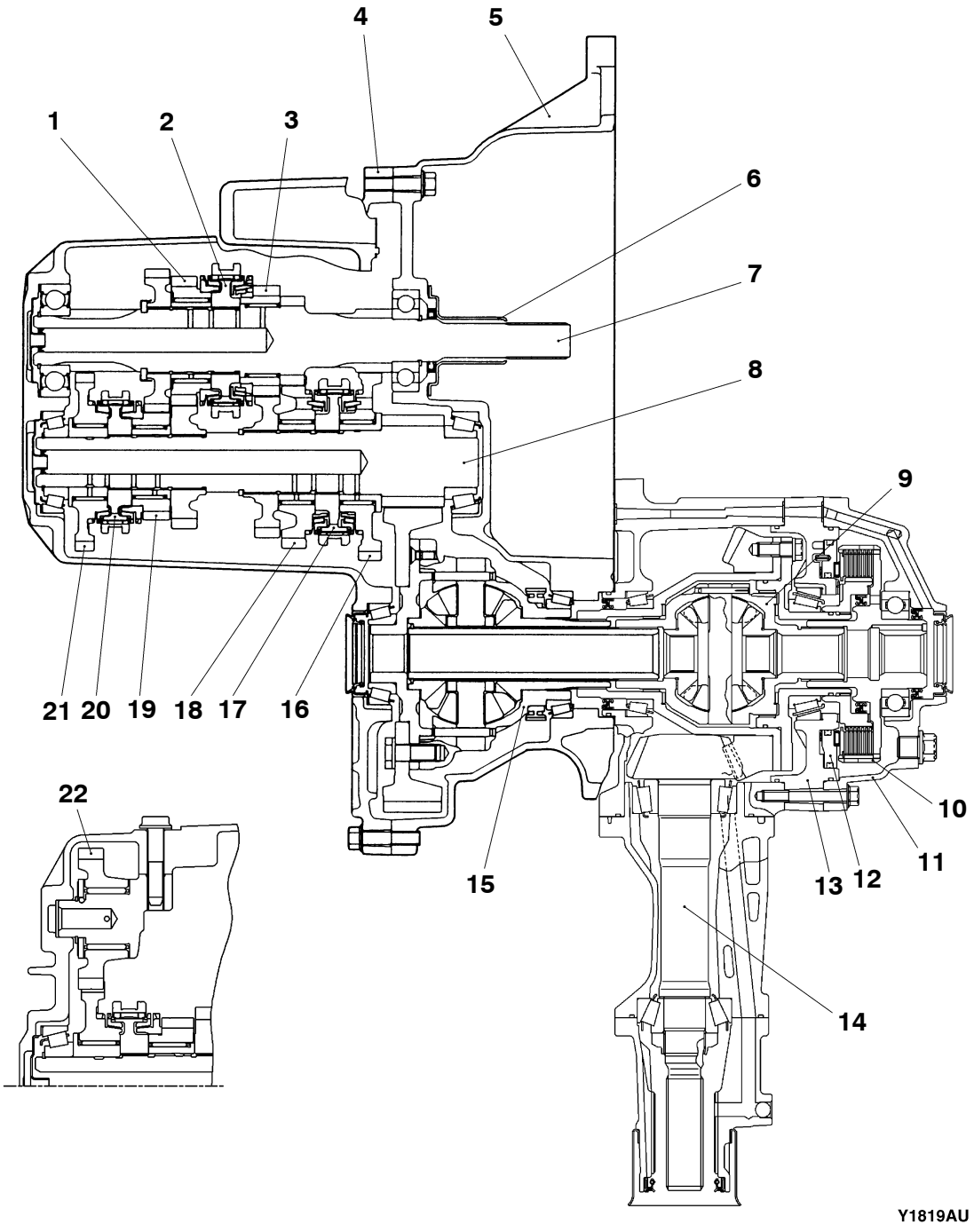
SECTIONAL VIEW

W5M51 <Vehicle with VCU>



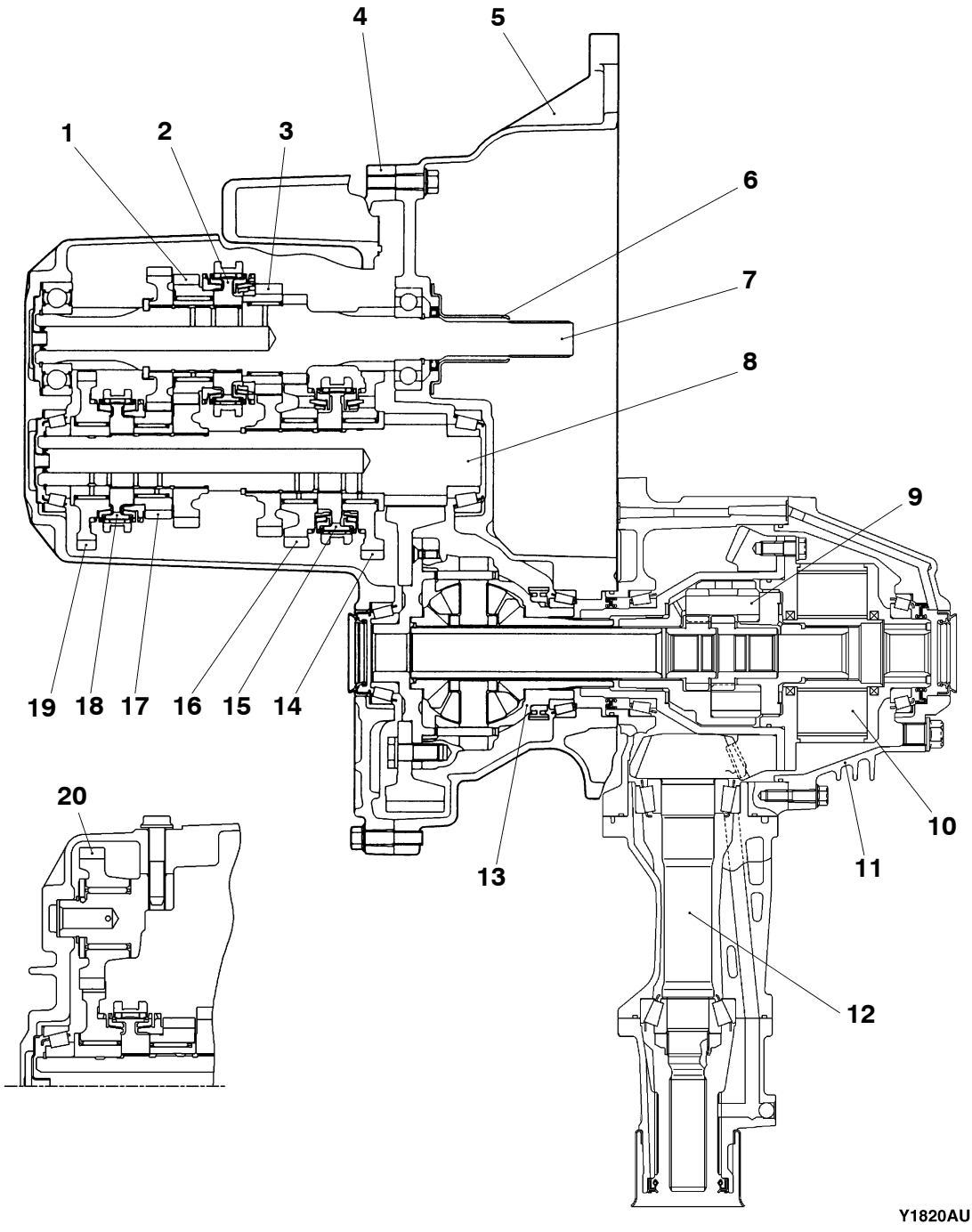
1. 4th gear
2. 3rd - 4th synchronizer
3. 3rd gear
4. Transmission case
5. Clutch housing
6. Clutch release bearing retainer
7. Input shaft
8. Output shaft
9. Front differential
10. Viscous coupling unit (VCU)
11. Transfer cover
12. Hypoid pinion
13. Center differential
14. 1st gear
15. 1st - 2nd synchronizer
16. 2nd gear
17. 5th gear
18. 5th - reverse synchronizer
19. Reverse gear
20. Reverse idler gear

W5M51 <Vehicle with ACD>



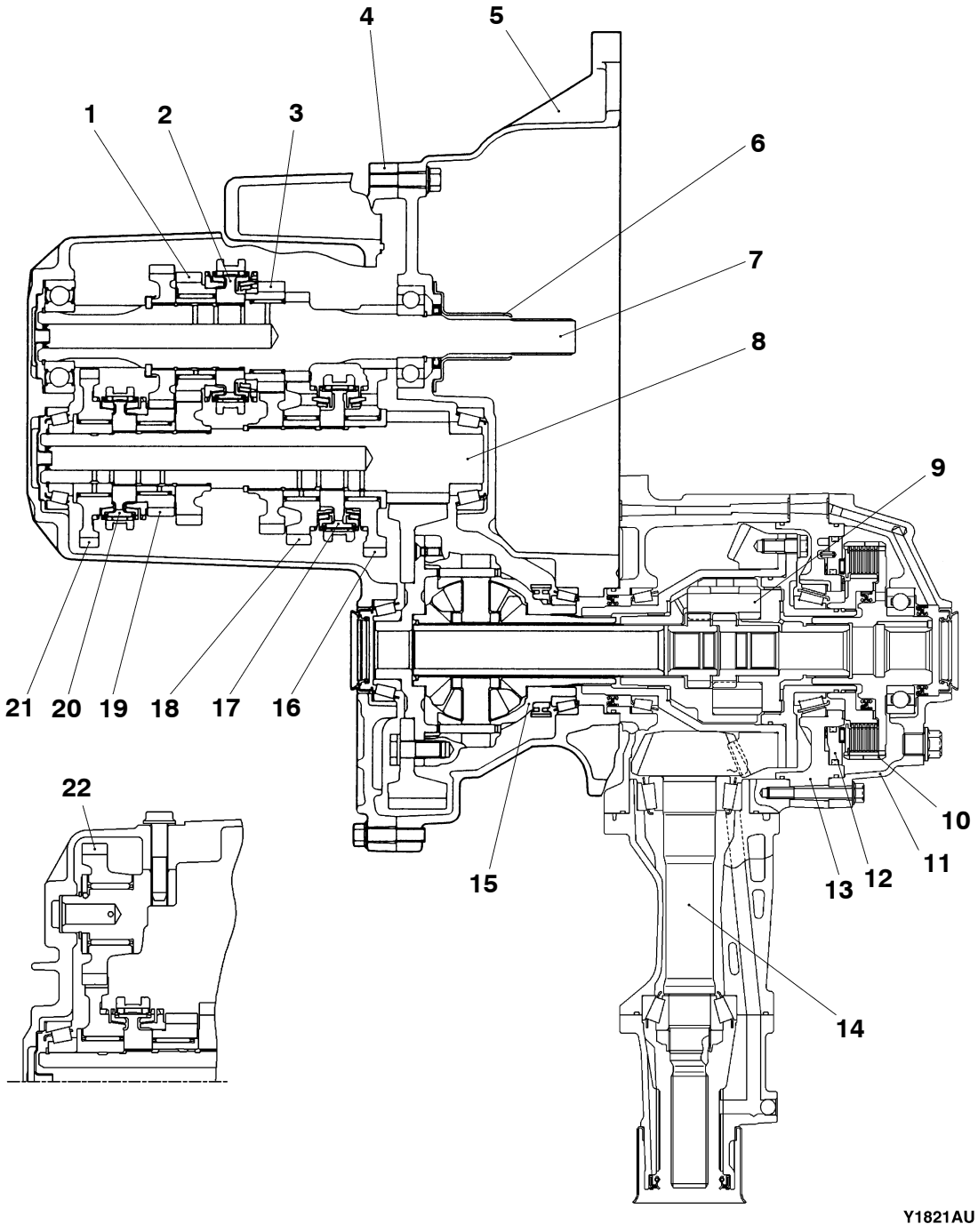
1. 4th gear
2. 3rd - 4th synchronizer
3. 3rd gear
4. Transmission case
5. Clutch housing
6. Clutch release bearing retainer
7. Input shaft
8. Output shaft
9. Front differential
10. Clutch housing
11. Transfer cover
12. Piston
13. Transfer hydraulic case
14. Hypoid pinion
15. Center differential
16. 1st gear
17. 1st - 2nd synchronizer
18. 2nd gear
19. 5th gear
20. 5th - reverse synchronizer
21. Reverse gear
22. Reverse idler gear

W5M51 <Vehicle with Helical Gear LSD and VCU>



1. 4th gear
2. 3rd - 4th sychronizer
3. 3rd gear
4. Transmission case
5. Clutch housing
6. Clutch release bearing retainer
7. Input shaft
8. Output shaft
9. Front differential (Helical gear LSD)
10. Viscous coupling unit (VCU)
11. Transfer cover
12. Hypoid pinion
13. Center differential
14. 1st gear
15. 1st - 2nd sychronizer
16. 2nd gear
17. 5th gear
18. 5th - reverse synchronizer
19. Reverse gear
20. Reverse idler gear

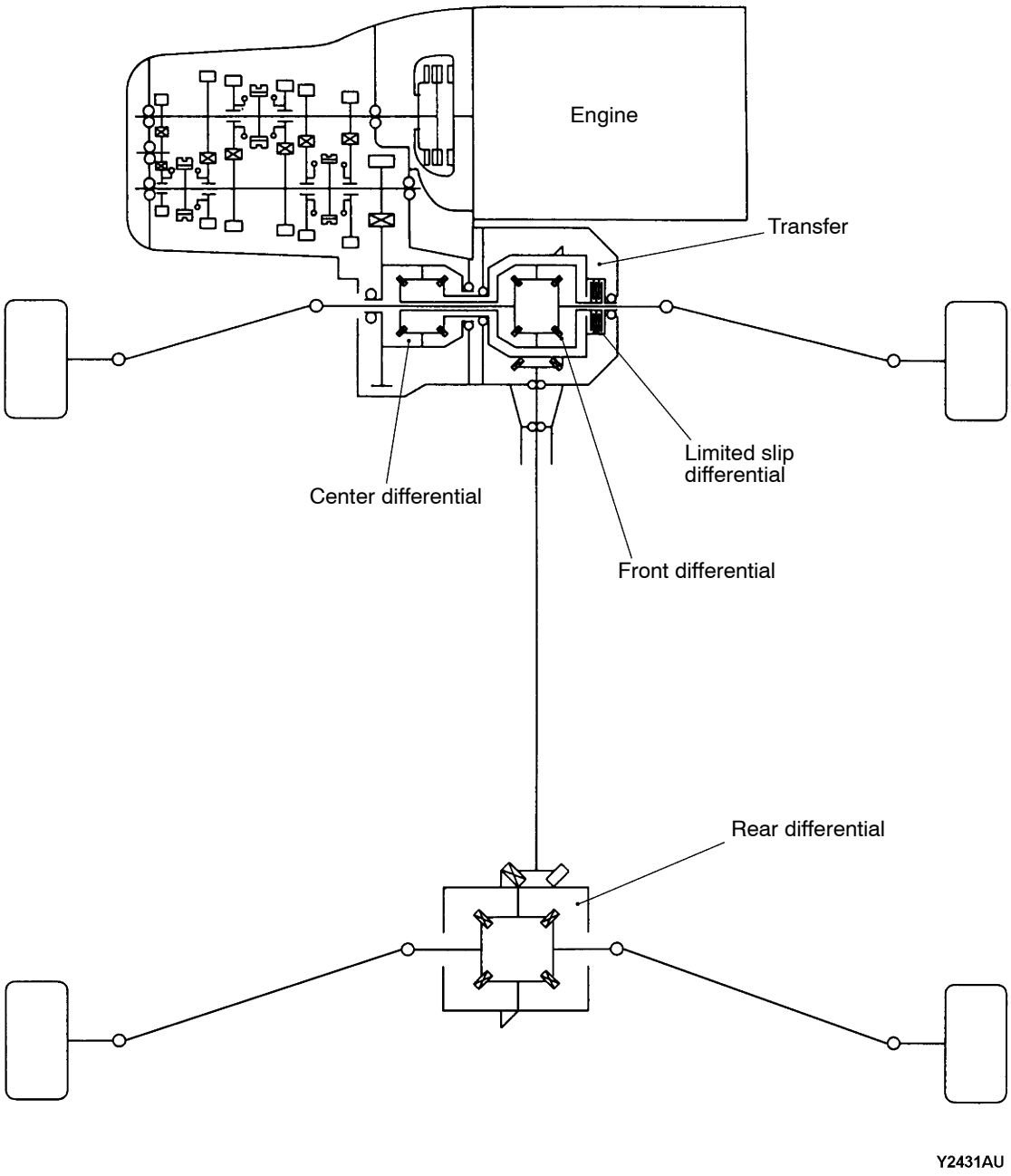
W5M51 <Vehicle with Helical Gear LSD and ACD>



1. 4th gear
2. 3rd - 4th sychronizer
3. 3rd gear
4. Transmission case
5. Clutch housing
6. Clutch release bearing retainer
7. Input shaft
8. Output shaft
9. Front differential (Helical gear LSD)
10. Clutch housing
11. Transfer cover
12. Piston
13. Transfer hydraulic case
14. Hypoid pinion
15. Center differential
16. 1st gear
17. 1st - 2nd sychronizer
18. 2nd gear
19. 5th gear
20. 5th - reverse synchronizer
21. Reverse gear
22. Reverse idler gear

4WD SYSTEM

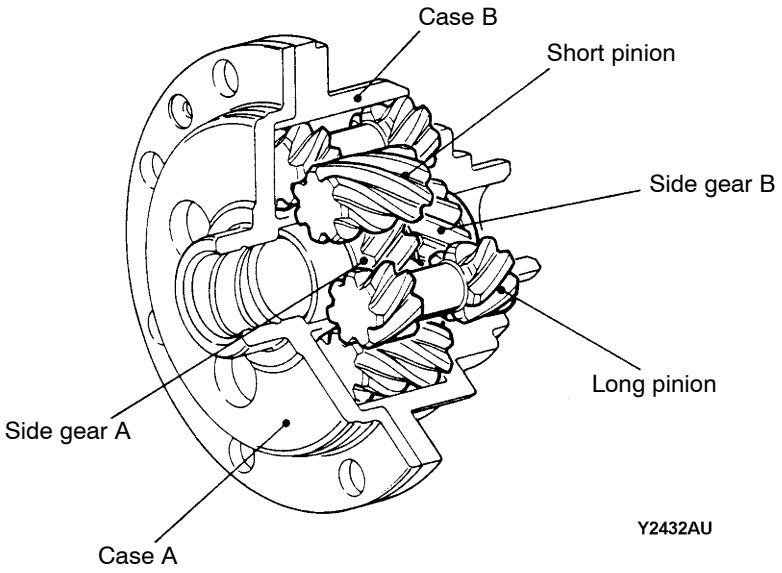
The 4WD system is a center differential full-time 4WD with limited slip differential.
The center differential has been positioned at the front differential of the 2WD transmission, and the front differential has been positioned inside the transfer. The limited slip differential of the center differential has been positioned at the back of the front differential in the transfer.
For the limited slip differential of the center differential, a viscous coupling unit (VCU) or active center differential (ACD) has been adopted.

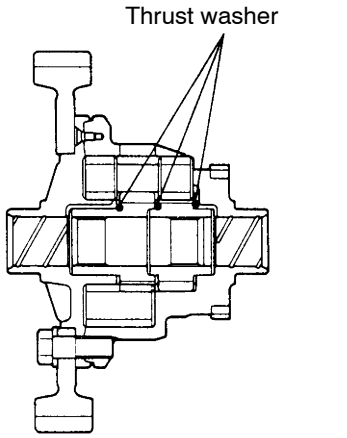


POWER TRAIN

Helical Gear LSD

The helical gear LSD is composed of four long pinions, four short pinions, three thrust washers, side gears A and B, and cases A and B.
The long pinions are in contact with the side gear B and short pinions, while the short pinions are in contact with the side gear A and long pinions.



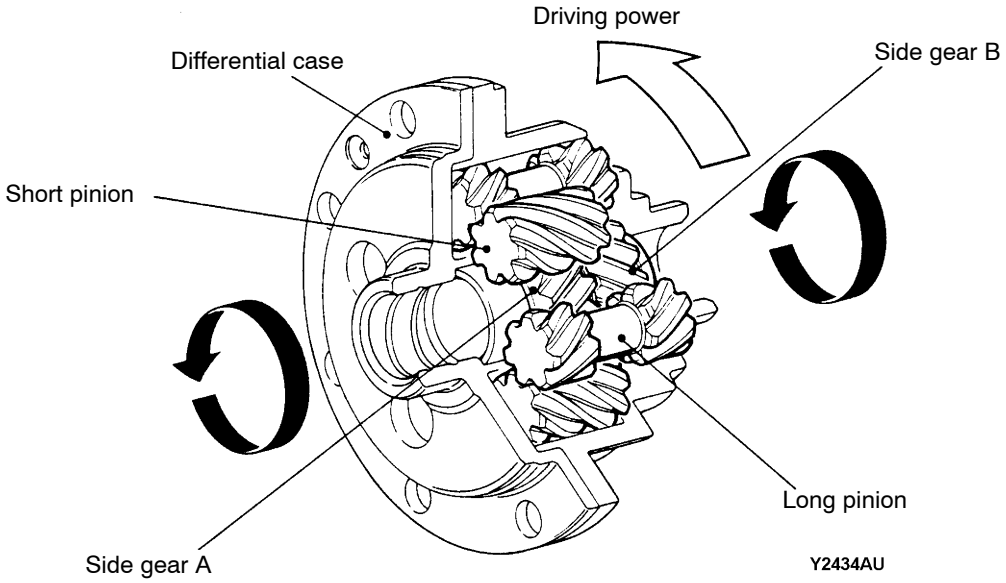


Power Flow

Operations in forward driving

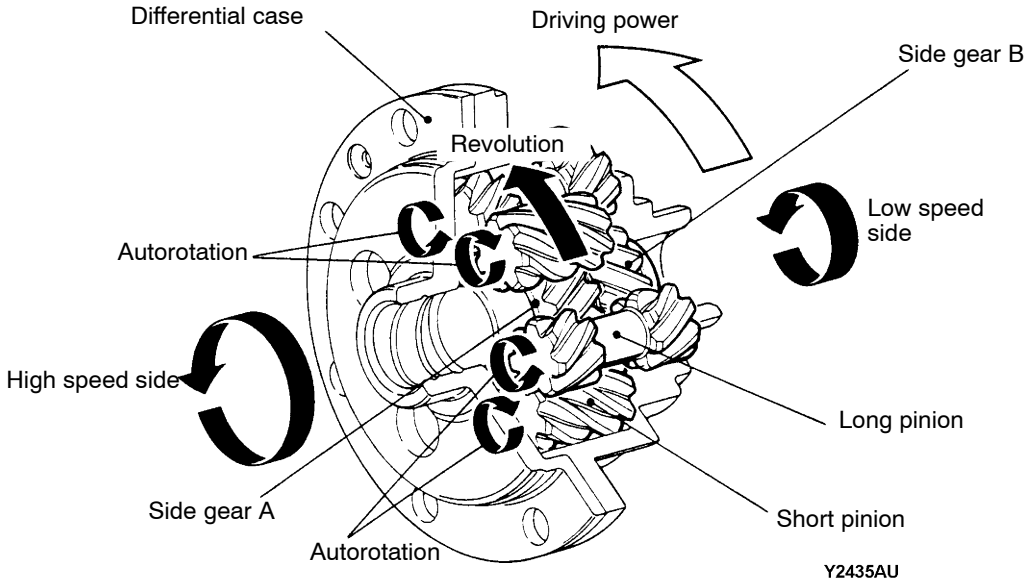
During forward driving, as the differential case and and drive shaft rotate at the same speed, they rotate at the assembly without the inside of the differential moving.
The driving force at this time will be transmitted as follows.

Differential case → Long and short pinions → Side gears A and B → Drive shaft



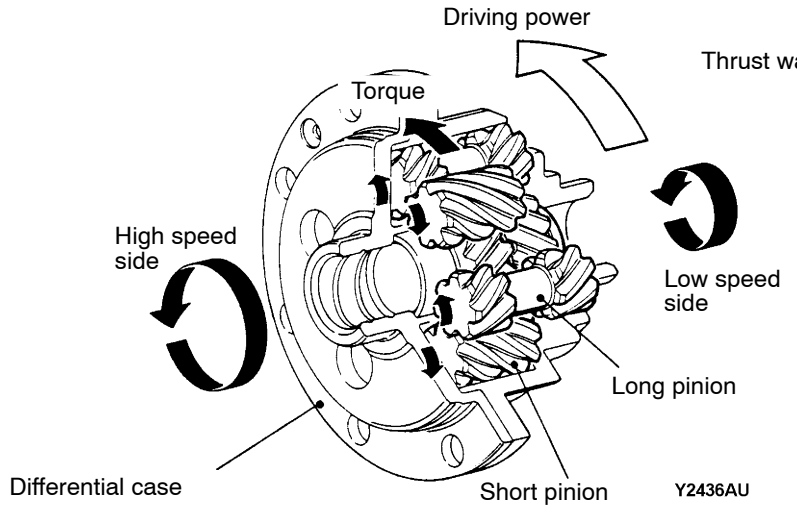
Operations during differential (when there is rotational difference between the left and right wheels)

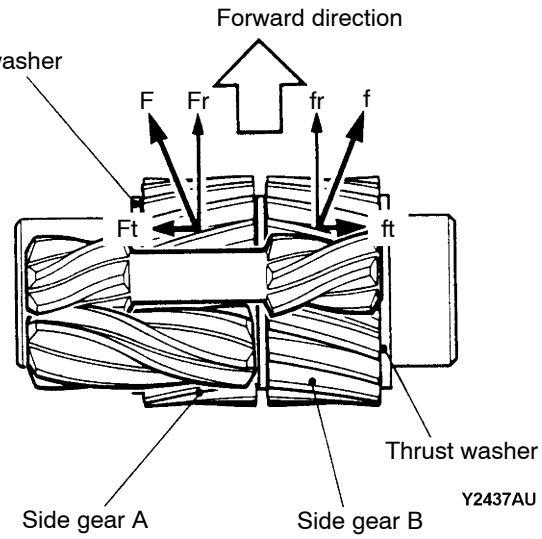
When the frictional coefficient of the left and right wheels are more or less equal, and a slight rotational difference occurs at the left and right wheels (normal turning), rotational difference will also occur between side gears A and B. In this case, while the long pinions and short pinions mutually rotate in the reverse direction, the vicinity of side gears A and B revolves and absorbs the speed difference. In this way, like normal differential, the high speed side accelerates for the revolved amount in respect to the revolution speed of the differential case,while the low speed side rotates in the decelerated state and performs differential.



Operations during Limited Slip Differential

When the loads of the left and right wheels become unbalanced due to changes in road surface conditions and sudden turning, the driving torque of side gears A and B will differ.
As mentioned earlier, because side gears A and B are in contact via the respective long and short pinions, the gears influence each other, resulting in contact reaction force (F and f) between the long pinion and side gear B, and the short pinion and side gear A.
The separating force (Ft and ft) in the axial direction of the contact reaction force causes side gears A and B to be pushed and extended. From this force, side gears A and B are pushed against the thrust washer (case) and friction occurs.
The separating force (Fr and fr) in the radial direction of the contact reaction force causes the long pinion and short pinion to be pushed against the differential case (cases A and B). This force generates a large friction between the long pinion, short pinion, and differential case (cases A and B).
Friction also occurs on the gear with the generation of contact reaction force (F and f) of the four gears (pinions).
These frictional forces cause the generation of frictional torque at each section according to the size of the driving torque input to the differential case, and the generation of limited slip differential torque proportionate to the input torque.

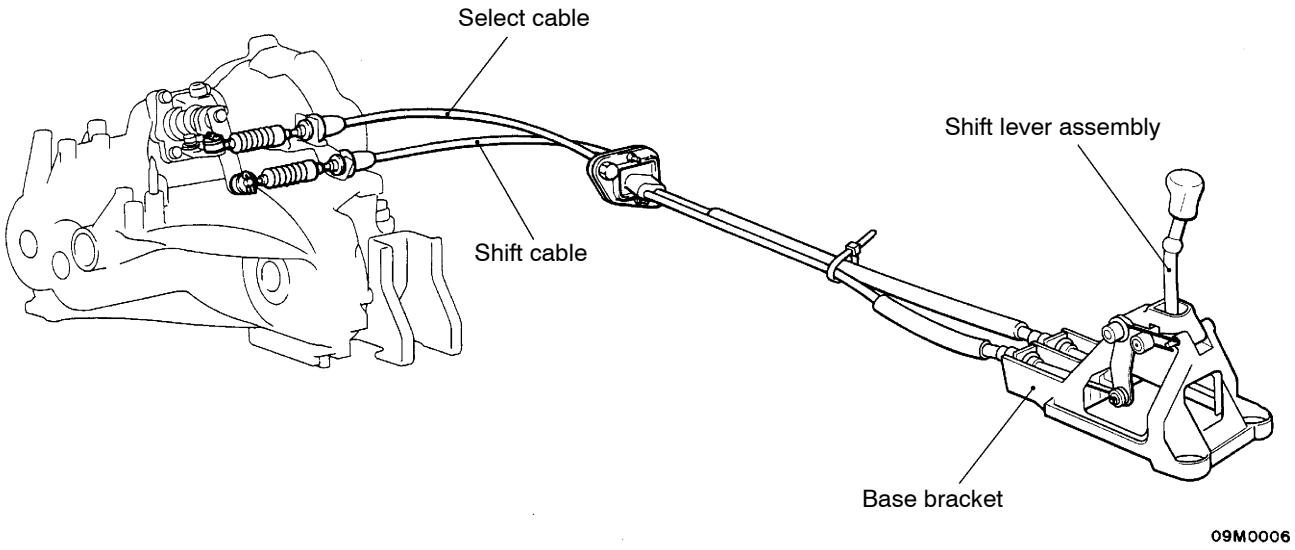




TRANSMISSION CONTROL

- The shift lever construction adopted the spherical rotary shaft fulcrum type to assure a non-rickety.
- The base bracket material adopted a synthetic resin for the weight reduction.
- The shift and select cable securing portions have been elastically supported to reduce contained sound.
- A mass-filled shift knob has been adopted to minimize the binding touch at the time of a shift.

CONSTRUCTION DIAGRAM



ACTIVE CENTER DIFFERENTIAL (ACD) AND ACTIVE YAW CONTROL (AYC)

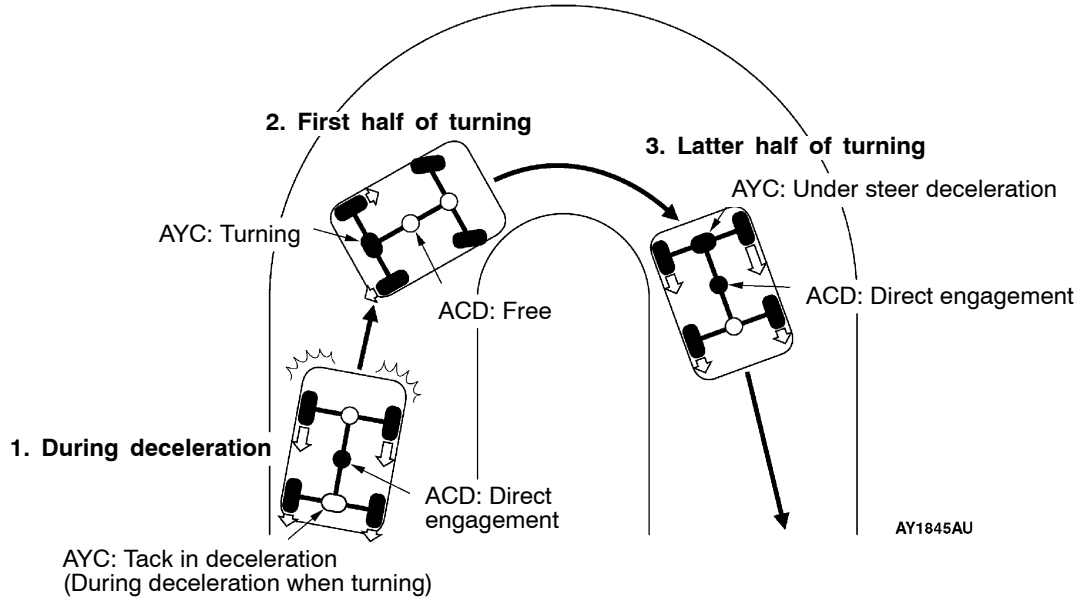
The LANCER EVOLUTION-VII adopts the newly developed active center differential (ACD).
The driving performance of the ACD has been improved by varying the center differential drive by electronic control.
The yaw moment is directly controlled by the active yaw control (AYC) adopted from EVOLUTION-V onwards to improve the turning performance.
By combining and integratedly controlling these two systems, the driving performance has been further improved.

	RS, RS II
ACD	Option
ACD and AYC	Option

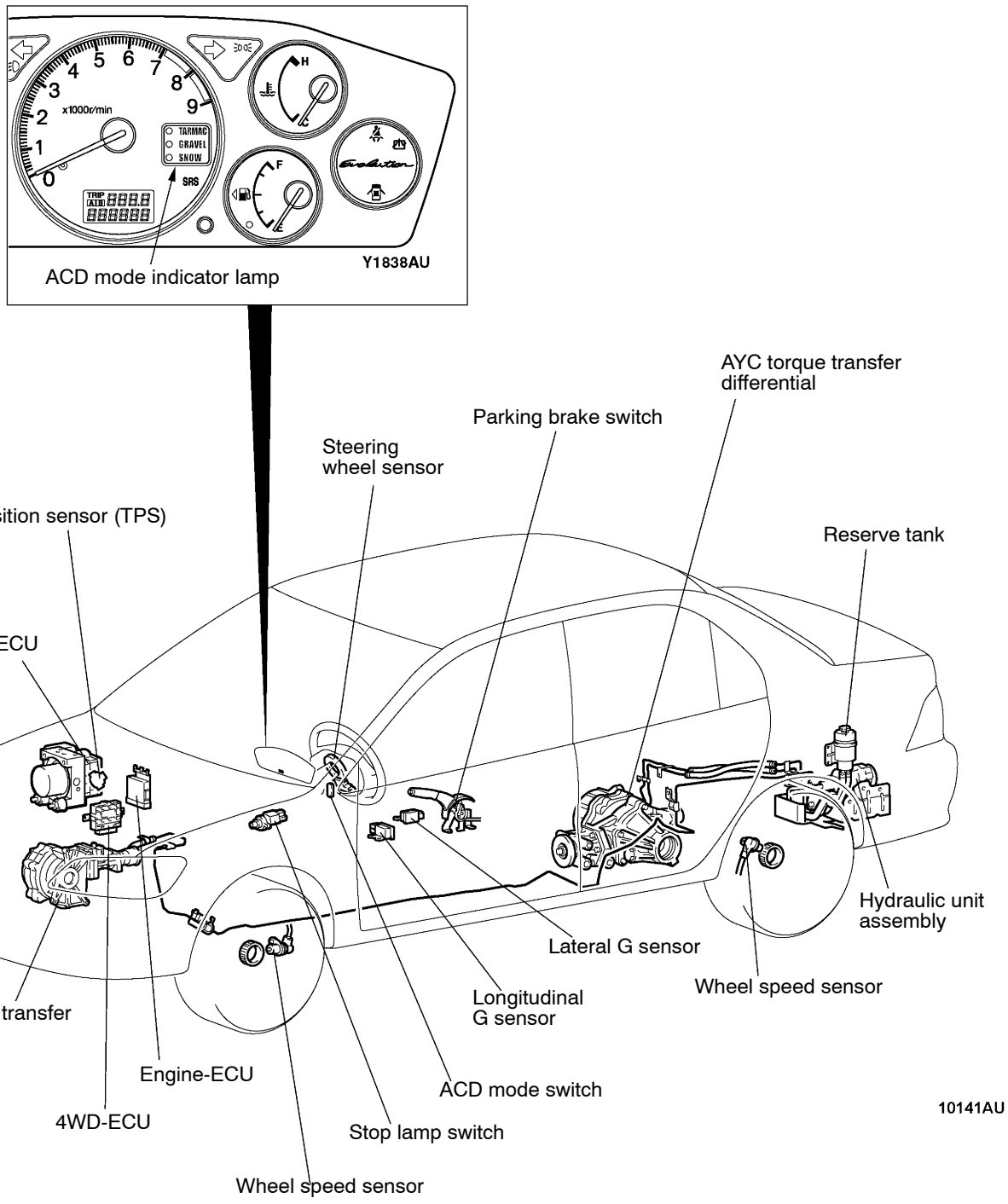
OUTLINE OF CONTROL

The following effects are obtained by equipping the ACD or ACD and AYC.

State of vehicle	ACD	AYC	Integrated control effects
1. During deceleration (Before corners)	Similar to the direct engagement 4WD by increasing the center differential during sharp deceleration to improve stability in deceleration.	[When decelerated during turning] The driving power is moved to the inside turning wheel to reduce the tack in.	Stability against various external influences such as poor road conditions and driver operations have been improved.
2. First half of turning (Corner entrance)	The center differential restriction is reduced according to the steering angle and operation speed to set the center differential as close as possible to the free state and improve turning performance.	The driving power is moved to the outside turning wheel according to the steering angle and operation speed to improve the turning performance.	The response to steering operations (brisk movement) is improved as much as possible.
3. Latter half of turning (Corner exit)	The center differential restriction is enhanced according to the amount the acceleration is stepped to set similar effects as the direct engagement 4WD and improve the acceleration performance.	The driving power is moved to the outside turning wheel according to the amount the acceleration is stepped to decrease the acceleration understeer and improve turning performance.	Two elements (acceleration and turning) have been improved simultaneously.



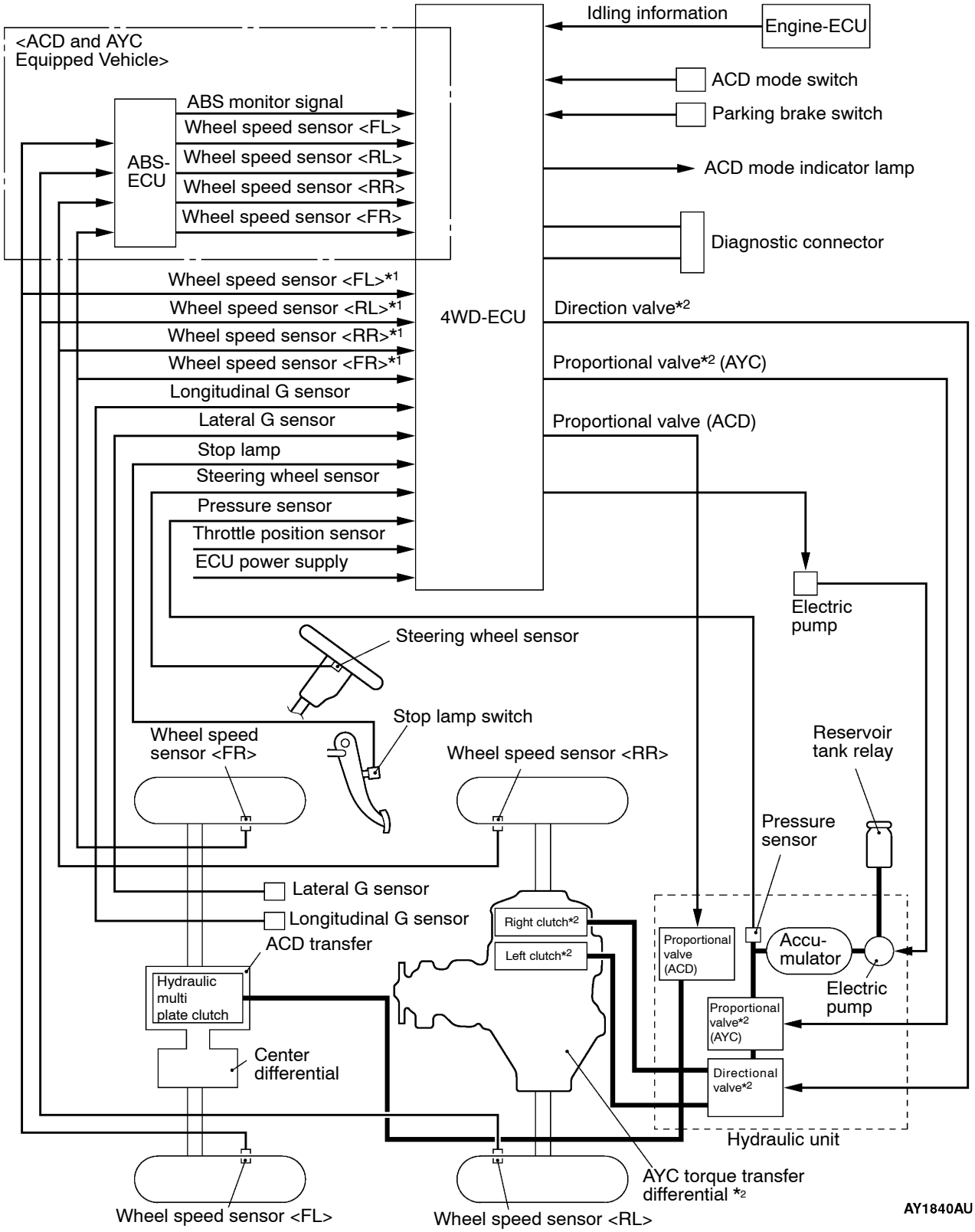
COMPONENT VIEW



LIST OF MAIN COMPONENTS

Components		Outline of function
ACD transfer		Controls the transmission torque of the hydraulic multi plate clutch by the hydraulic unit, and adjusts the center differential.
4WD-ECU		Processes information of various sensors and switches, calculates the hydraulic multi plate clutch transmission torque and amount of AYC torque movement and direction, and controls the hydraulic unit on the basis of them.
Engine-ECU		Sends the engine idling state to the 4WD-ECU.
ABS-ECU		Outputs the ABS monitor signal to the 4WD-ECU.
Throttle position sensor (TPS)		Sends the throttle valve opening angle to the 4WD-ECU.
Longitudinal G sensor		Sends the acceleration in the front and rear directions of the vehicle to the 4WD-ECU.
Lateral G sensor		Sends the acceleration along the side of the vehicle to the 4WD-ECU.
Steering wheel sensor		Sends the steering angle and neutral position to the 4WD-ECU.
Wheel speed sensor		Sends the wheel speed to the 4WD-ECU.
Stop lamp switch		Sends the brake operating state to the 4WD-ECU.
Parking brake switch		Sends the operating state of the parking brake to the 4WD-ECU.
ACD mode indicator lamp		Displays the ACD control mode (TARMAC, GRAVEL, SNOW).
		Lights the all mode lamp during fail. (Lights for about 1.5 seconds after the ignition switch is turned ON)
ACD mode switch		Switches the ACD control mode (TARMAC, GRAVEL, SNOW).
Hydraulic unit	Pressure sensor	Sends the pressure of the accumulator to the 4WD-ECU.
	Electric pump	Generates oil pressure for clutch operations.
	Directional valve	Controls whether to supply the oil pressure to the left or right AYC clutch.
	Proportional valve <ACD>	Controls hydraulic supplied to hydraulic multi plate clutch of the ACD.
	Proportional valve <AYC>	Controls oil pressure supplied to the AYC clutch.
Electric pump relay		Supplies the power to the electric pump.
AYC torque transfer differential		Controls the transmission torque of the left and right clutches according to the oil pressure from the hydraulic unit, and adjusts the left and right driving power difference of the rear wheels.

OUTLINE OF ACD AND AYC



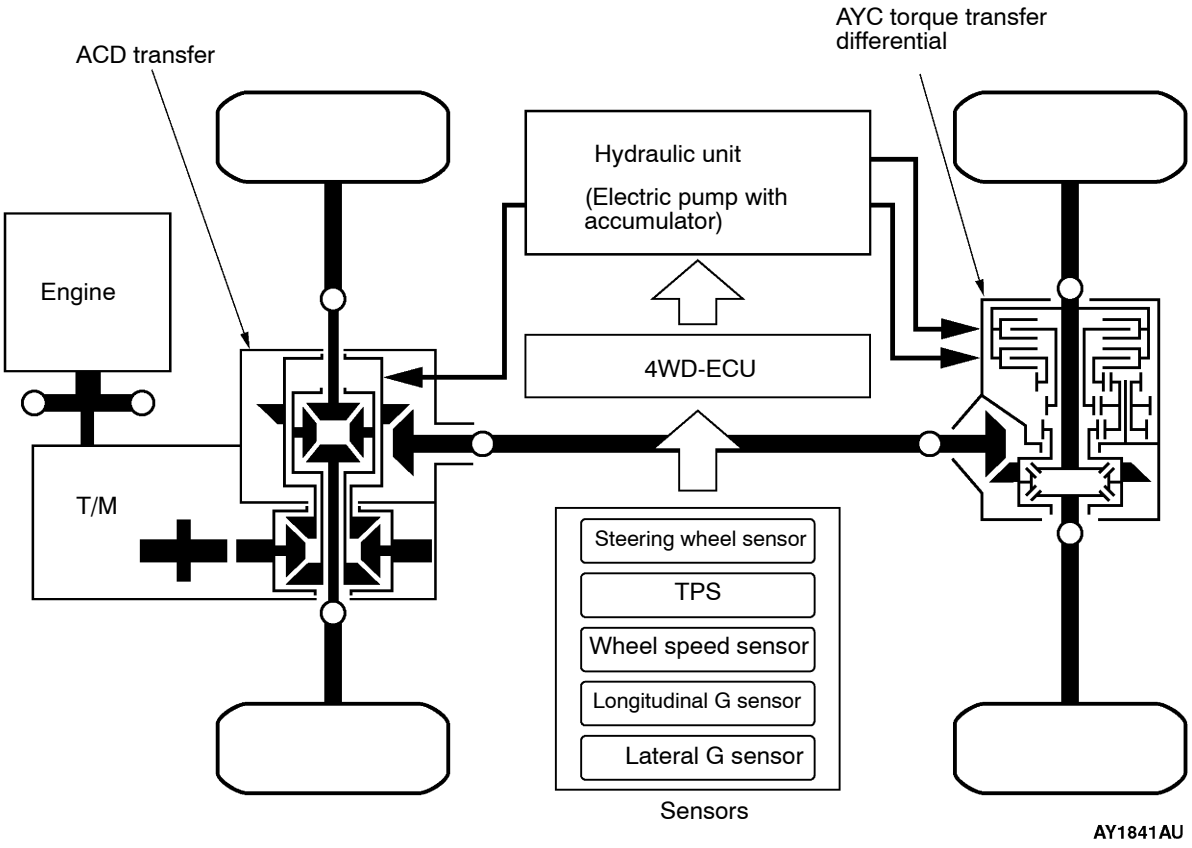
NOTE
1. *1 indicates equipped with only ACD.
2. *2 indicates equipped with ACD and AYC.

DESCRIPTION OF STRUCTURE AND OPERATIONS

The ACD system adopts a transfer limited slip differential as the hydraulic multi plate clutch, and electronically controls it using sensors, 4WD-ECU, and hydraulic unit.

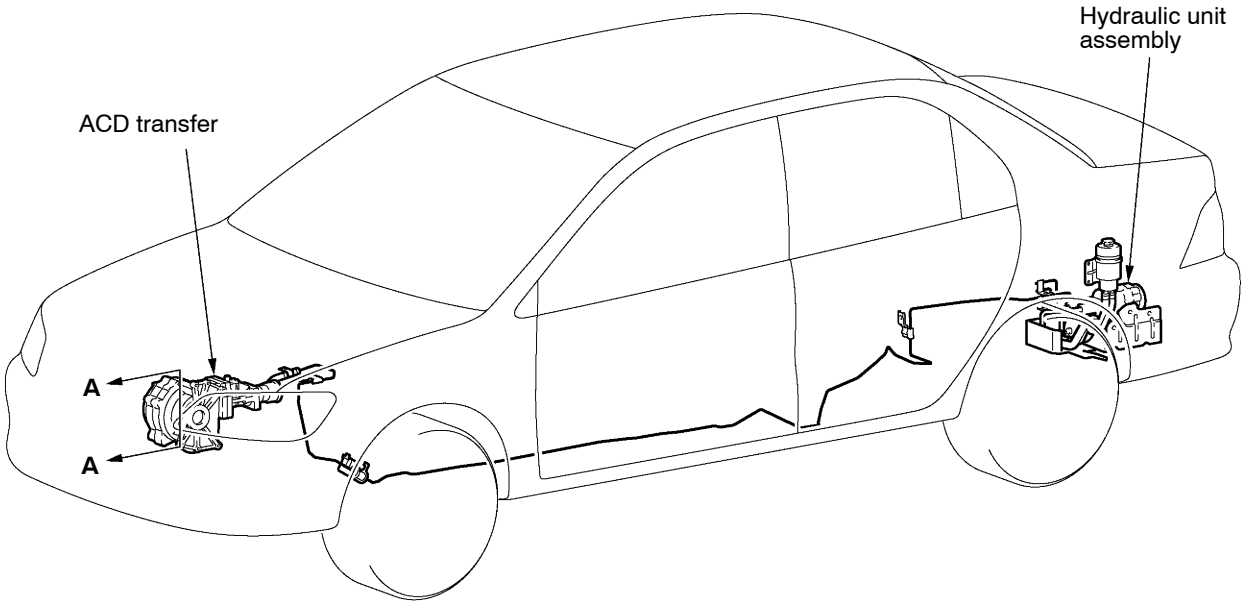
NOTE
Refer to P.2-30 for details on the AYC structure and operations.

SYSTEM STRUCTURE

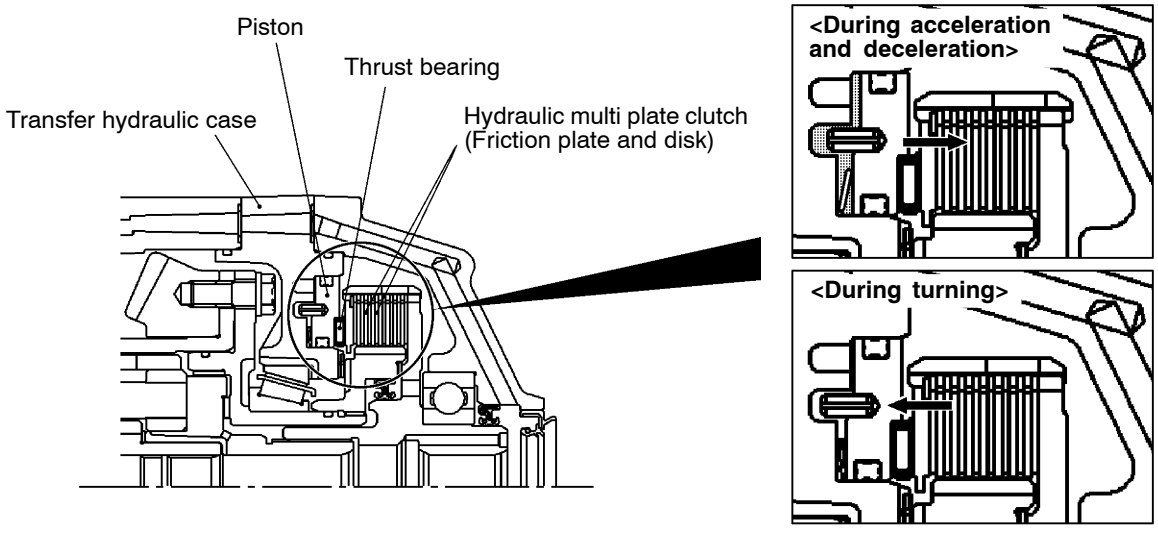


TRANSFER LIMITED SLIP DIFFERENTIAL

During acceleration and deceleration, the piston is moved in the right direction according to the oil pressure from the hydraulic unit to connect the hydraulic multi plate clutch (friction plate and disc) and set the center differential to the direct engagement state as much as possible. This improves the acceleration performance and stability during deceleration.
During turning, the oil pressure from the hydraulic unit stops, the piston operates in the left direction to release the hydraulic multi plate clutch and free the center differential to improve the turning performance.
If the parking brake is pulled while driving at a vehicle speed above 5 km/h, the hydraulic multi plate clutch will also be released and the center differential set as close as possible to the free state.



Section A - A



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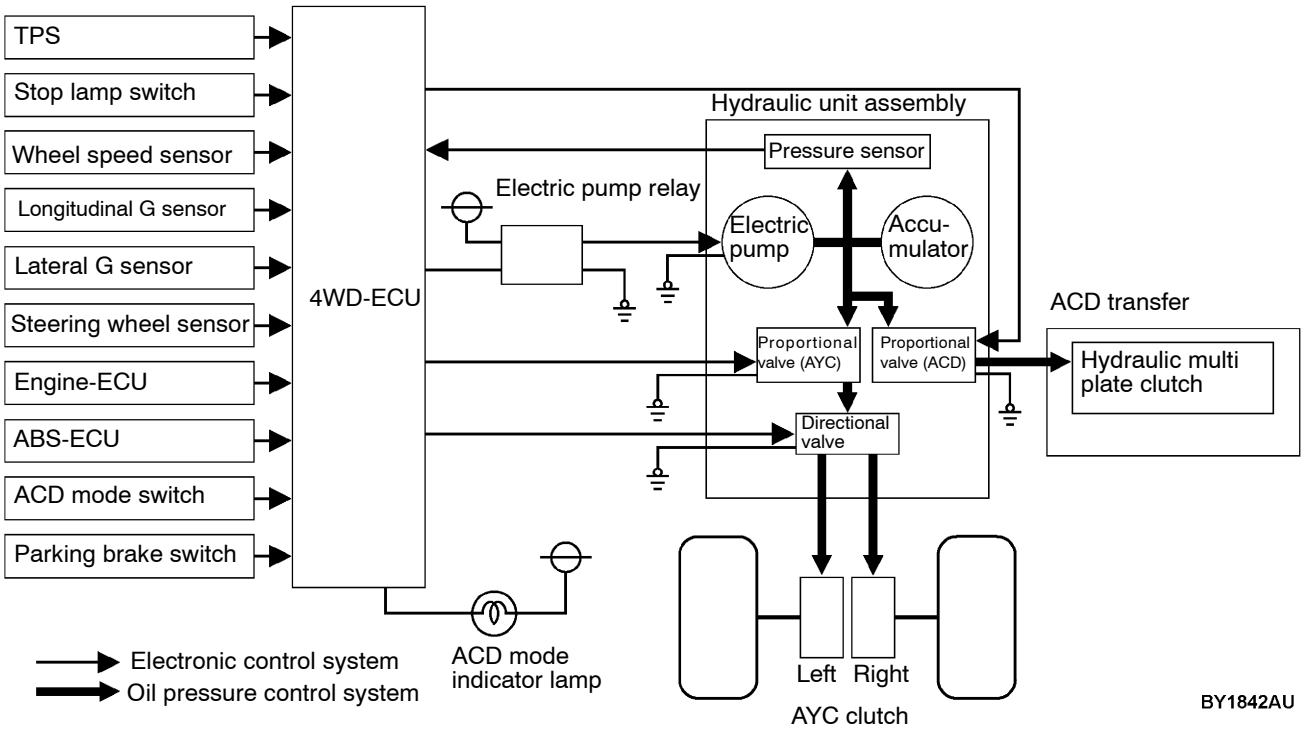
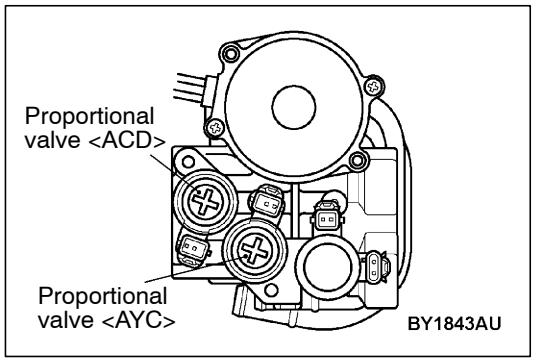
HYDRAULIC UNIT

The hydreaulic unit is composed of the accumulator (electric pump, pressure sensor, accumulator) and pressure controller (proportional valve, directional valve).
The pressure accumulator intermittently operates the pump, and accumulates the control pressure required in the accumulator.
The pressure controller operates the proportional valve and directional valve, and supplies the appropriate oil pressure to the ACD transfer or AYC torque transfer differential according to the signals from the 4WD-ECU.

SPECIFICATIONS

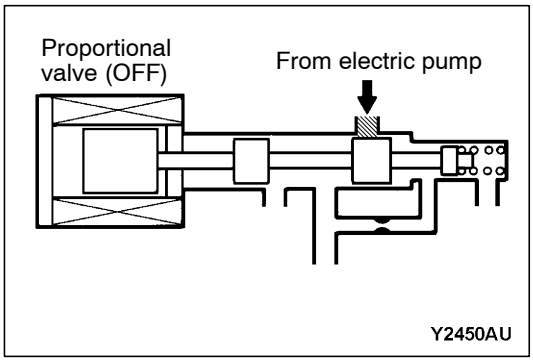
Specifications	Specifications
Electric pump	Trochoidal type
Operating oil	ATF SP III
Proportional valve	Current proportional control type
Directional valve	3 position electromagnetic switching method



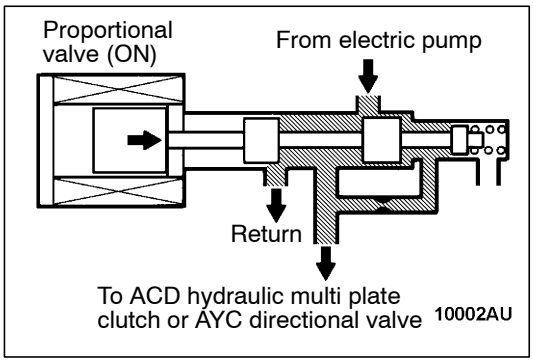


Proportional valve

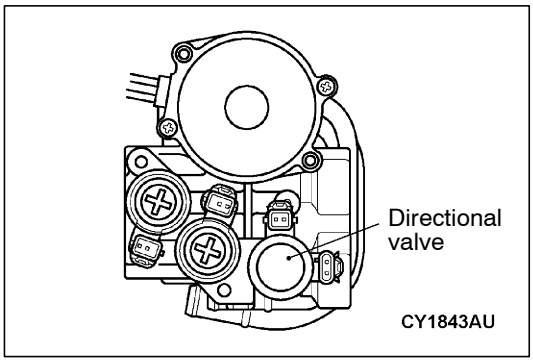
Supplies the oil pressure required for ACD or AYC control according to the instructions of the 4WD-ECU.



When the proportional valve is OFF, the oil pressure from the electric pump will be cut off by the proportional valve. For this reason, oil pressure will be supplied to the ACD or AYC and each system will be set into the non-operating state.

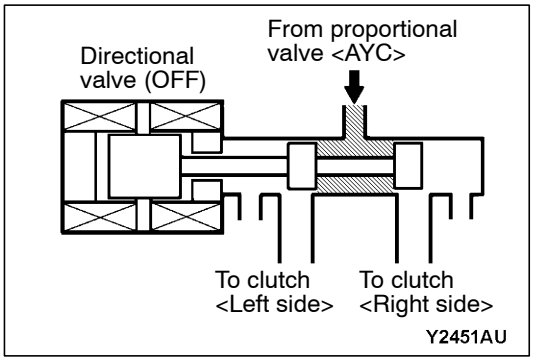


When the proportional valve turns ON, the proportional valve opens, and the oil pressure from the electric pump will be supplied to the ACD hydraulic multi plate clutch or AYC directional valve.

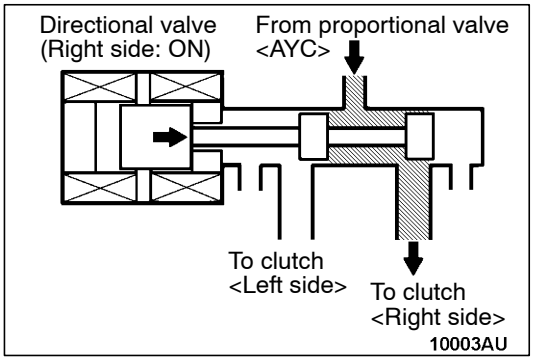


Directional valve

Supplies the oil pressure required for controlling the AYC clutch according to the instructions of the 4WD-ECU.



When the directional valve is OFF, the oil pressure from the proportional valve <AYC> will be cut off by the directional valve. For this reason, the clutch will set into the non-operating state without oil pressure supplied to each clutch of the AYC.



When oil pressure supply signal for the AYC clutch <Right side> is sent to the directional valve from the 4WD-ECU, the directional valve will move to the right. As a result, the oil pressure from the proportional valve <AYC> will be supplied to the AYC clutch <Right side>.
If the oil pressure supply signal to the AYC clutch <Left side> is sent to the directional valve, the directional valve will move to the left.

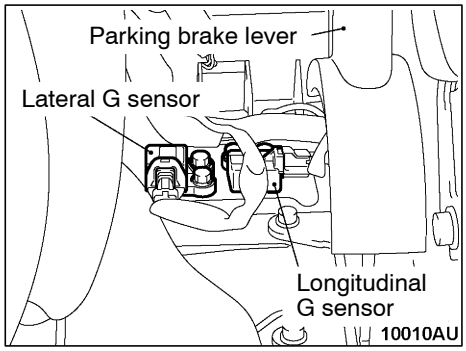
ELECTRONIC CONTROL SYSTEM

THROTTLE POSITION SENSOR

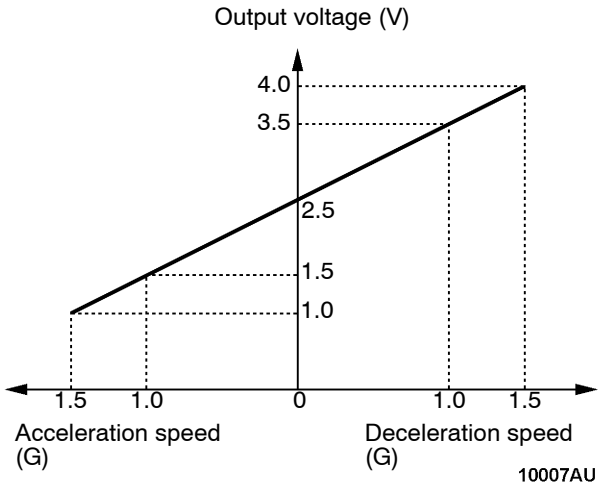
For detecting the throttle valve opening angle. Also used as throttle position sensor for engine control.

LONGITUDINAL G SENSOR/LATERAL G SENSOR

The longitudinal G sensor are sensors detecting the acceleration in the longitudinal directions of the vehicle, and are basically the same as those used conventionally.
The lateral G sensor is used for detecting the acceleration along the sides of the vehicle by changing the installing direction by 90°. The same sensor as the longitudinal G sensor is used.

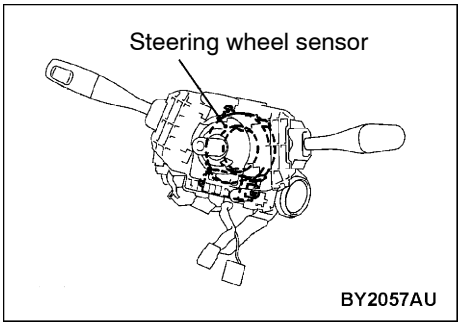


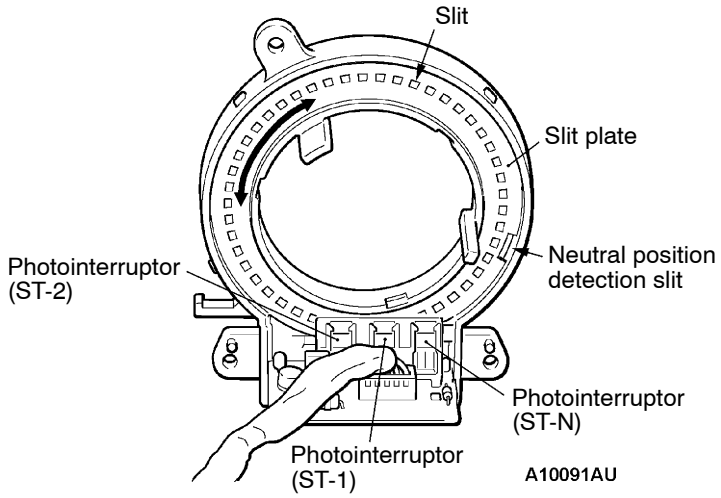
G-sensor output characteristics



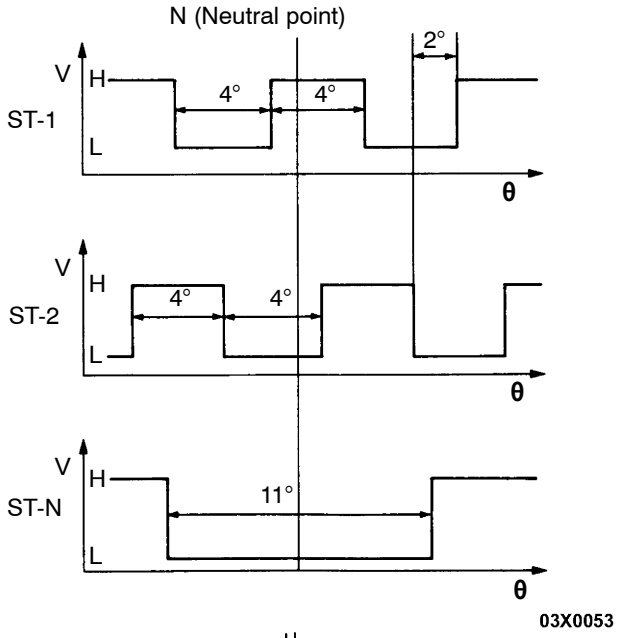
STEERING WHEEL SENSOR

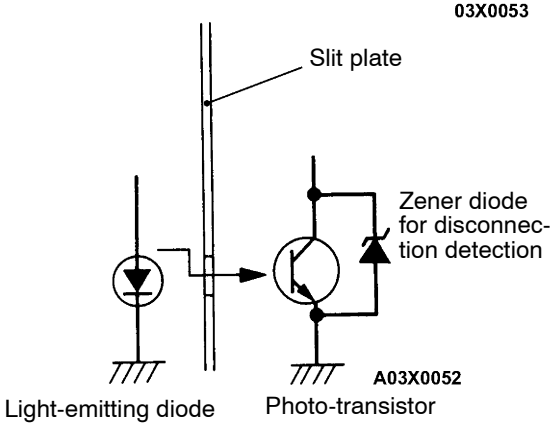
The steering wheel sensor is installed at the steering column, and is used to output steer angles to the 4WD-ECU as signals.
It is composed of the slit plate which rotates according to the movements of the handle and a three-set photointerruptor. The slit plate and photointerruptor have a sealed integrated structure to prevent the invasion of foreign particles as well as misoperations by external light. To detect malfunctions of the sensor output circuit, it is equipped with a zener diode for detecting disconnections parallel to the phototransistor.
The ECU calculates the steering angle by reading the signals of the steering wheel sensor after every certain period of time and calculating the total of the ST-1 signal and ST-2 signal.
The steering angle is obtained by taking the neutral position (ST-N output is L center) as 0°, and if there are changes, the steering angle is added with 2° for right and -2° for left. The output of the photointerruptor becomes L (low) when light passes through and H (high) when obstructed.

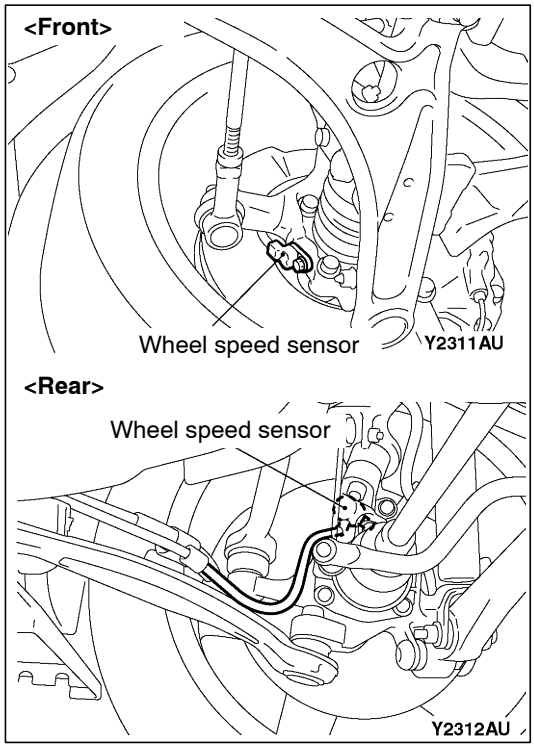




Output waveform of each sensor

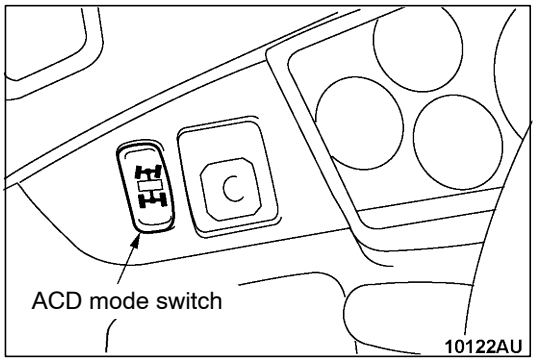






WHEEL SPEED SENSOR

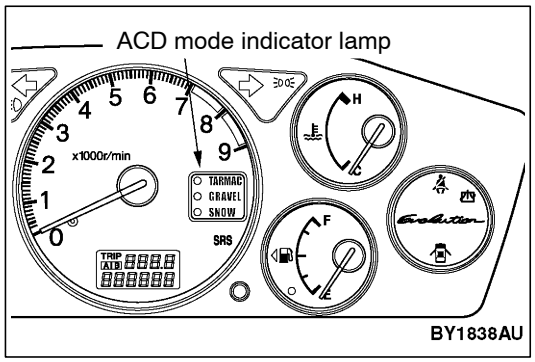
Sensor for detecting each wheel speed. It is the same as that conventionally adopted for the ABS. For vehicle with ACD and AYC, the wheel speed sensor signal waveform-shaped by the ABS-ECU is input to the 4WD-ECU.



ACD MODE SWITCH

When the ACD mode switch is pressed, the mode switches to TARMAC, GRAVEL, or SNOW.

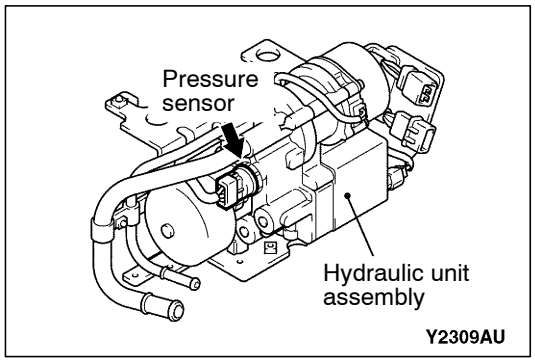
ACD mode	TARMAC	GRAVEL	SNOW
Good condition roads	Dry paved roads	Wet roads, gravel roads	Snowy roads



ACD MODE INDICATOR LAMP

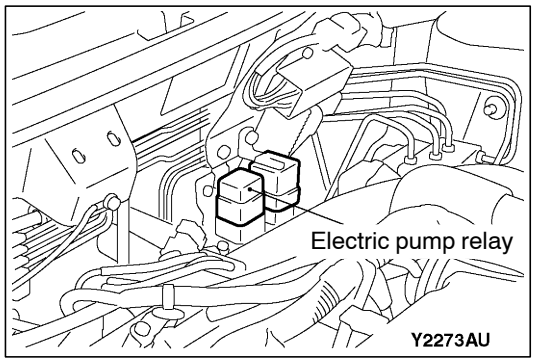
For about 1.5 seconds after the Ignition switch is turned ON, all ACD mode indicator lamps will light up. When the ACD mode switch is pressed, each mode (TARMAC, GRAVEL, SNOW) will light up alternately.
When the ACD or AYC malfunctions, all mode indicators will light up (until the ignition switch goes OFF*).

NOTE
*: When the vehicle is determined as having returned to normal according to the malfunction, the lamps will also be returned to their normal states.



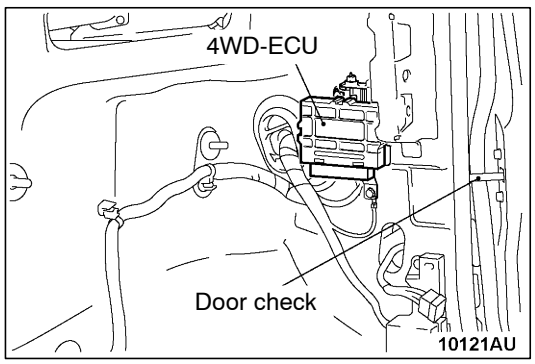
PRESSURE SENSOR

Detects the pressure of the accumulator, and sends the signal to the 4WD-ECU. The 4WD-ECU controls the operations of the electric pump on the basis of this signal.



ELECTRIC PUMP RELAY

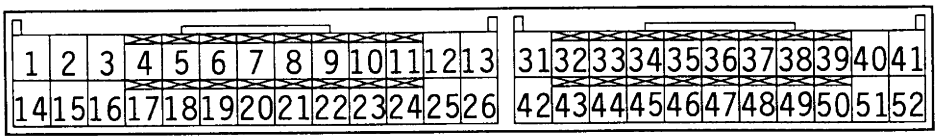
Supplies power to the electric pump according to the signal from the 4WD-ECU.



4WD-ECU

Determines the driving state, vehicle state, and road state according to the inputs of each sensor, idling information from the engine-ECU, and ABS monitor signal from the ABS-ECU to control the hydraulic unit.
The 4WD-ECU also has a diagnosis function which lights up all the ACD mode indicator lamps during malfunctions.

The terminals of the 4WD-ECU are arranged as follows.



Y2121AU

1. Proportional valve <ACD>
2. -
3. Proportional valve <AYC>*1
4. -
5. -
6. Wheel speed sensor <FL>
7. Wheel speed sensor <RR>
8. Wheel speed sensor <RL>
9. Wheel speed sensor <FR>
10. Pressure sensor earth
11. Lateral G sensor
12. -
13. 4WD-ECU power supply
14. Directional valve <Right>*1
15. Directional valve <Left>*1
16. Electric pump relay power supply
17. -
18. -
19. Wheel speed sensor earth <FL>*2
20. Wheel speed sensor earth <RR>*2
21. Wheel speed sensor earth <RL>*2
22. Wheel speed sensor earth <FR>*2
23. Longitudinal G sensor
24. Longitudinal G sensor and lateral G sensor earth *2
25. -
26. ECU earth
31. ECU backup power supply
32. Pressure sensor
33. Steering wheel sensor <ST-1>
34. Steering wheel sensor <ST-2>
35. Diagnosis data input/output
36. Idle switch
37. Parking brake switch
38. Stop lamp switch
39. TPS
40. ACD mode indicator lamp <TARMAC>
41. -
42. ECU earth
43. Pressure sensor power supply
44. Steering wheel sensor <ST-N>
45. -
46. Diagnostic control
47. ACD mode switch
48. -
49. ABS monitor *1
50. Earth*2
51. ACD mode indicator lamp <SNOW>
52. ACD mode indicator lamp <GRAVEL>

NOTE
1. *1 indicates that the terminal is omitted if only ACD is equipped.
2. *2 indicates that the terminal is added if only ACD is equipped.

DIAGNOSIS ITEMS

Code No.	Diagnosis Item	Mode indicator lamp (○: all lit, – : normally displayed)	Main diagnosis details
12	Power supply voltage (Valve power supply)	○	Open-circuit, short-circuit of power supply voltage system, or drop in voltage
13	Fail save relay	○	Open-circuit or short-circuit of ECU equipped fail save relay
21	Wheel speed sensor <FR>	○	Open-circuit or short-circuit of wheel speed sensor <FR> system
22	Wheel speed sensor <FL>	○	Open-circuit or short-circuit of wheel speed sensor <FL> system
23	Wheel speed sensor <RR>	○	Open-circuit or short-circuit of wheel speed sensor <RR> system
24	Wheel speed sensor <RL>	○	Open-circuit or short-circuit of wheel speed sensor <RL> system
25	Wheel speed sensor	-	Equipped with step-bore tire
26		○	Wheel speed sensor defect
31	Steering wheel sensor	○	Steering wheel sensor <ST-N,ST-1,ST-2> system opened or short-circuit

Code No.	Diagnosis Item	Mode indicator lamp (○: all lit, – : normally displayed)	Main diagnosis details
32	Steering wheel sensor <ST-N>	○	Steering wheel sensor <ST-N> system short-circuit
33		○	Fixing of steering wheel sensor <ST-N> system
34	Steering wheel sensor <ST-1, ST-2>	○	Short-circuit or fixing of output of steering wheel sensor <ST-1, ST-2> system
41	TPS	○	Open-circuit or grounding of TPS system
42		○	Short-circuit of TPS system
45	Pressure sensor	○	Open-circuit or short-circuit of pressure sensor system
46		○	Earth open-circuit of pressure sensor system
47		○	Power supply defect of pressure sensor system
51	Longitudinal G sensor	○	Open-circuit and short-circuit of longitudinal G sensor system
52		○	Longitudinal G sensor defect
56	Lateral G sensor	○	Open-circuit or short-circuit of lateral G sensor
57		○	Lateral G sensor defect
61	Stop lamp switch	○	Open circuit of stop lamp switch system
62	ACD mode switch	○	ACD mode switch is stuck
63	Parking brake switch	○	Short-circuit of parking brake switch or it has not been returned to designated position
65	ABS	○	Open-circuit of ABS monitor system or malfunction of ABS
71	Proportional valve <AYC>	○	Open-circuit or short-circuit of proportional valve <AYC> system
72	Directional valve <Right>	○	Open-circuit or short-circuit of directional valve <right> system
73	Directional valve <Left>	○	Open-circuit or short-circuit of directional valve <left> system
74	Proportional valve <ACD>	○	Open-circuit or short-circuit of proportional valve <ACD> system
81	Electric pump relay	○	Open-circuit or short-circuit of electric pump relay system
82		○	Electric pump malfunction or pressure sensor defect
84	AYC control	○	AYC control defect
85	ACD control	○	ACD control defect

SERVICE DATA

Item No.	Item	Unit
01	Wheel speed sensor <FR>	km/h (Displayed for every 1 km/h)
02	Wheel speed sensor <FL>	km/h (Displayed for every 1 km/h)
03	Wheel speed sensor <RR>	km/h (Displayed for every 1 km/h)
04	Wheel speed sensor <RL>	km/h (Displayed for every 1 km/h)
05	Wheel speed sensor <FR> (0.2 km/h)	km/h (Displayed for every 0.2 km/h)
06	Wheel speed sensor <FL> (0.2 km/h)	km/h (Displayed for every 0.2 km/h)
07	Wheel speed sensor <RR> (0.2 km/h)	km/h (Displayed for every 0.2 km/h)
08	Wheel speed sensor <RL> (0.2 km/h)	km/h (Displayed for every 0.2 km/h)
09	Vehicle speed	km/h
10	Battery voltage	V
11	Proportional valve current<ACD>	mA
12	Proportional valve current <AYC>	mA
13	TPS voltage	mV
14	Longitudinal G sensor voltage	V
15	Lateral G sensor voltage	V
16	Steering angle	deg
17	Steering angle speed	deg/s
18	Pressure sensor	MPa
19	Pressure sensor power supply	V
20	Valve power supply	V
21	Steering wheel sensor voltage <ST-1>	V
22	Steering wheel sensor voltage <ST-2>	V
23	Steering wheel sensor voltage <ST-N>	V
51	Idle switch	ON/OFF
52	Steering wheel sensor <ST-N>	ON/OFF
53	Steering wheel sensor <ST-1>	ON/OFF
54	Steering wheel sensor <ST-2>	ON/OFF
55	Steering wheel sensor learning <ST-N>	ON/OFF
56	Stop lamp switch	ON/OFF
57	Motor monitor	ON/OFF
58	Oil pressure state	HIGH/LOW
59	Directional valve <Right>	ON/OFF
60	Directional valve <Left>	ON/OFF
61	ABS monitor	ON/OFF
62	Parking brake switch	ON/OFF
63	ACD mode switch	ON/OFF

ACTUATOR TEST

Item No.	Content	Drive Specifications	Driving time	Check
01	Bleeding <ACD>	Outputs current to the proportional valve according to the steering angle.	5 minutes	Check that no air is discharged from the bleeder screw installed on the ACD transfer.
02	Bleeding <AYC>	Outputs current to the proportional valve according to the steering angle to operate the direction valve.	5 minutes	Check that no air is discharged from the bleeder screw installed on the AYC torque transfer differential.
03	Oil amount check	Operates the directional valve to the left and right.	20 seconds	Check the oil amount of the reservoir tank.
04	Electric pump drive	Operates the electric pump for 5 seconds.	To end of operations	Check the operating state from the operation sound of the electric pump.
05	ACD clutch operation check	Operates the proportional valve <ACD> to supply maximum oil pressure to the multi plate clutch.	1 minute	With the vehicle lifted up, check the operating state according to the speed difference between the front and rear wheels.
06	AYC clutch operation check <Left side>	Operates the directional valve, and supplies maximum oil pressure to the left side clutch.	1 minute	With the vehicle lifted up, check the operating state according to the speed difference between the front and rear wheels.
07	AYC clutch operation check <Right side>	Operates the directional valve, and supplies maximum oil pressure to the right side clutch.	1 minute	With the vehicle lifted up, check the operating state from the speed difference between the left and right rear wheels.
08	Control OFF	Turns OFF the electric pump relay, and ACD control and AYC control.	-	Check the difference between control ON and OFF in actual driving.

PROPELLER SHAFT

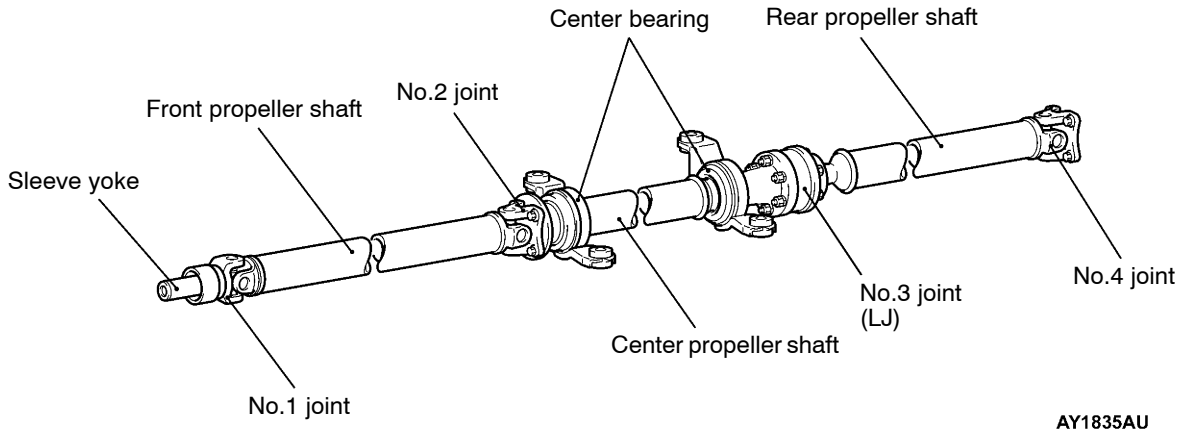
3 way split 4-joint type propeller shaft with center bearing is adopted.

SPECIFICATIONS

Item			Vehicles without AYC	Vehicles with AYC
Propeller shaft	Type		3 way split 4-joint type propeller shaft	
	Length × Outside diameter mm	Front	608.5 × 65	
		Center	551 × 65	
		Rear	750.5 × 65	768.5 × 65
Universal joint	Type	No.1	Cross type (caulking method)	
		No.2	Cross type (caulking method)	
		No.3	Constant velocity type (LJ)	
		No.4	Cross type (caulking method)	
	Bearing		Lubricationless type needle roller bearing	
	Journal diameter mm		16.3	

NOTE
The propeller shaft length indicates the length between the centre points of each joint.

CONSTRUCTION DIAGRAM



FRONT AXLE

The front axle consists of front hubs, knuckles, wheel bearings and drive shafts, and it has the following features.

- The wheel bearing is unit bearing (Double-row angular contact ball bearing) which is integrated with hub.
- The drive shaft incorporates B.J.-T.J. type constant velocity joints with high transmission efficiency and low vibration and noise.
- ABS rotors for detecting the wheel speeds are press-fitted to the B.J. outer wheels in vehicles with ACD or ABS.

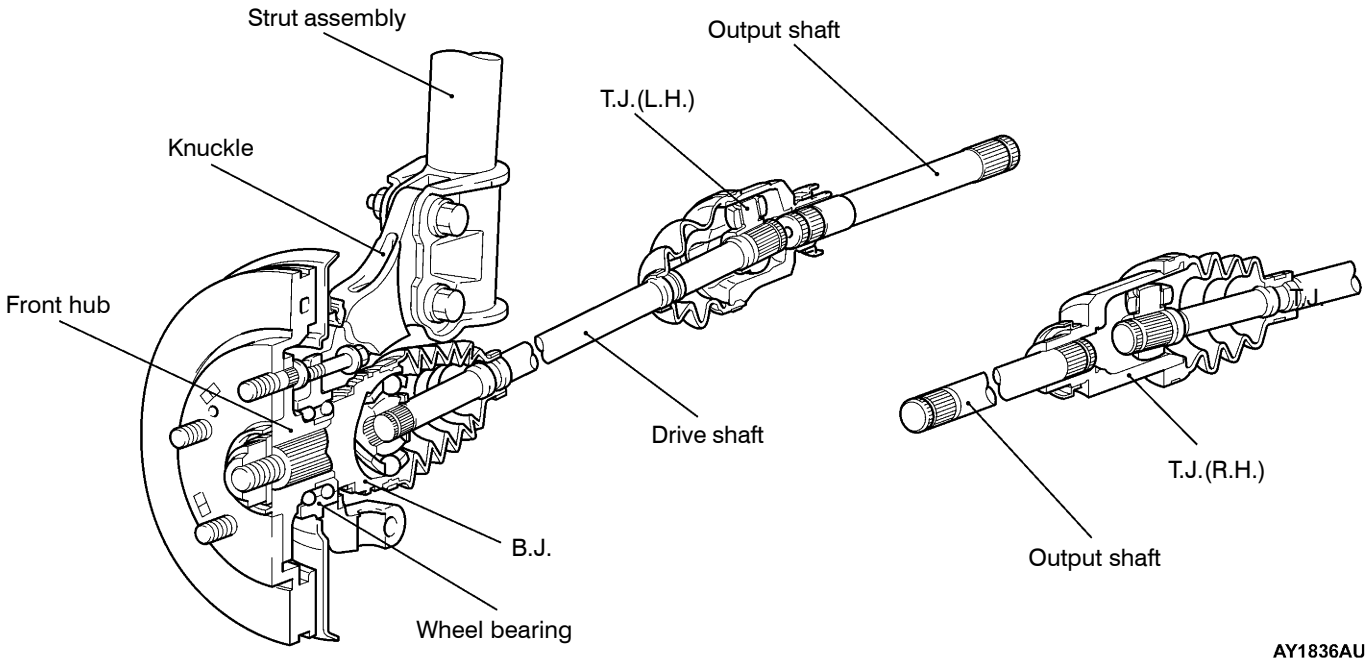
NOTE
1. B.J.: Birfield Joint
2. T.J.: Tripod Joint

SPECIFICATIONS

Item			Specifications
Wheel bearings	Wheel bearing type		Hub unit bearing (Double-row angular contact ball bearing)
	Bearing (outside diameter) mm		87*1
Drive shaft	Joint type	Outside	B.J.
		Inside	T.J.
	Shaft length*2 × Shaft diameter mm	Left	350 × 26
		Right	427 × 26

NOTE
*1: The wheel bearing is integrated with hub,only the outer diameter is shown.
*2: The shaft length indicates the length between the center points of each joint.

STRUCTURAL DIAGRAM



REAR AXLE

The rear axle consists of rear hubs, wheel bearings, drive shafts, and rear differentialand, it has the following features.

- The wheel bearing is a unit bearing (double-row angular contact ball bearing).
- The drive shaft incorporates B.J.-T.J. type constant velocity joints with high transmission efficiency and low vibration and noise.
- ABS rotors for detecting the wheel speeds are press-fitted to the B.J. outer wheels in vehicles with ACD or ABS.

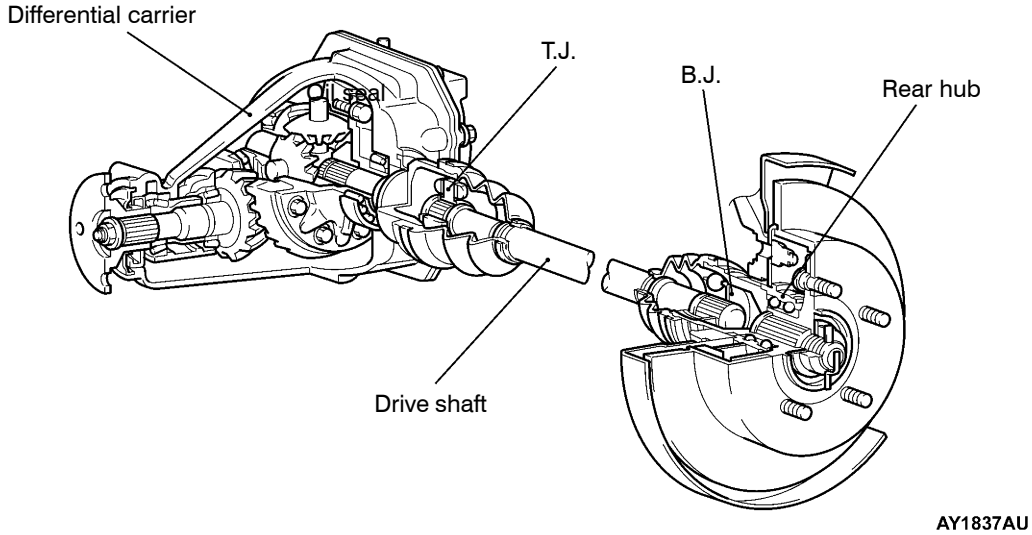
NOTE
1. B.J.: Birfield Joint
2. T.J.: Tripod Joint

SPECIFICATIONS

Item			Vehicles without AYC	Vehicles with AYC
Wheel bearings	Wheel bearing type		Unit bearing (Double-row angular contact ball bearing)	
	Bearing (outside diameter × inside diameter) mm		78 × 40	
Drive shaft	Joint type	Outside	B.J.	
		Inside	T.J.	
	Shaft length*1 × Shaft diameter mm	Left	483 × 25	426 × 25
		Right	573 × 25	446 × 25

NOTE
*1: The shaft length indicates the length between the center points of each joint.

STRUCTURAL DIAGRAM



DIFFERENTIAL

Mechanical type Limited Slip Differential <Vehicles without AYC> or Torque transfer differential <Vehicles with AYC> is adopted. About the structure of AYC, refer to P.2-3, manual transmission.

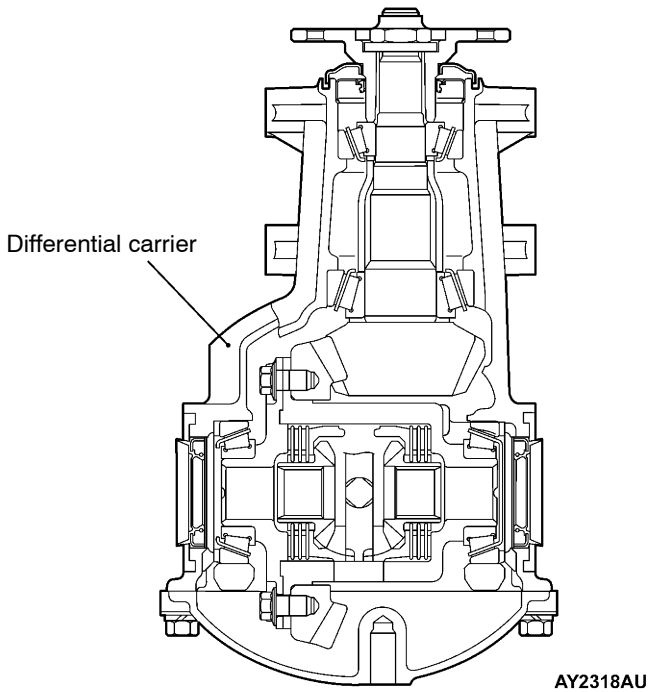
MECHANICAL LIMITED SLIP DIFFERENTIAL

SPECIFICATIONS

Item		Mechanical LSD
Reduction gear type		Hypoid gear
Reduction ratio		3.312
Differential gear type (Type × number of gears)	Side gear	Straight bevel gear × 2
	Pinion gear	Straight bevel gear × 4
Number of teeth	Drive gear	43
	Drive pinion	13
	Side gear	14
	Pinion gear	10
Bearings (Outside diameter × Inside diameter) mm	Side	72.0 × 35.0
	Front	62.0 × 25.0
	Rear	72.0 × 35.0

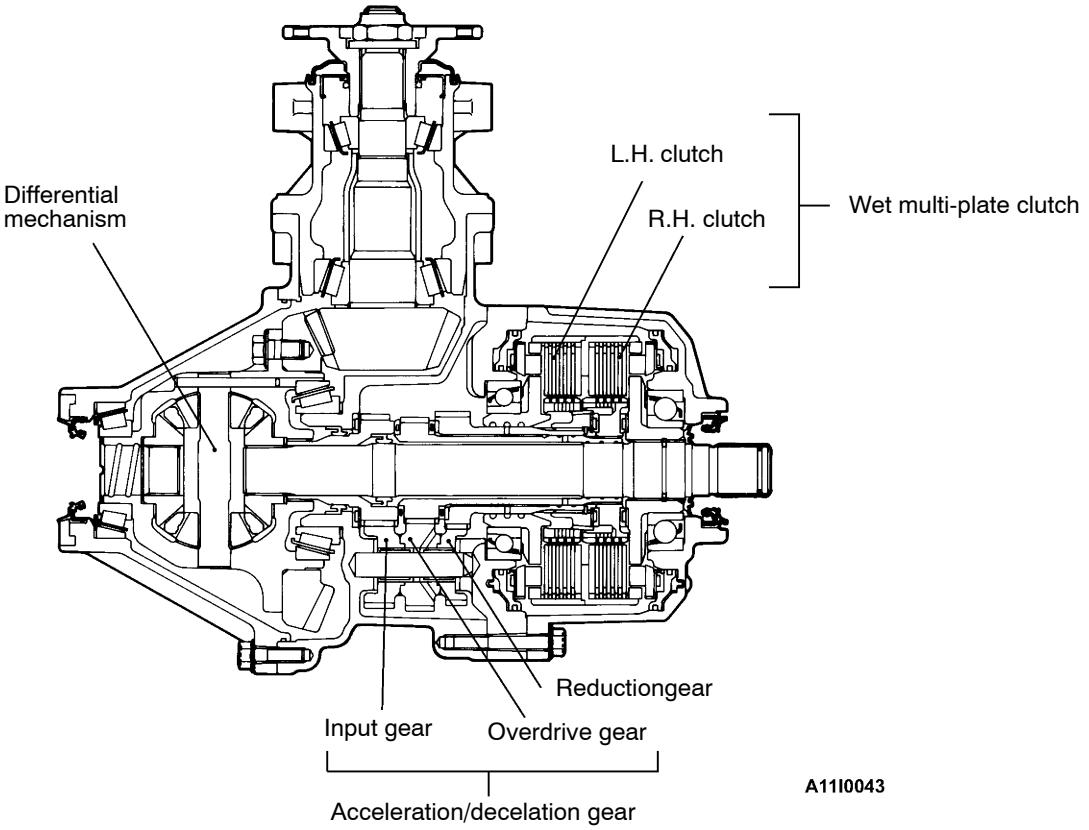
CONSTRUCTION DIAGRAM

<Mechanical LSD>



TORQUE TRANSFER DIFFERENTIAL

The torque transfer differential consists of differential mechanism,acceleration/decelation gear and two pairs of wet multi-plate clutch. The hipoid gear oil is used to lublicate differential part, ATF-SP III is used to lublicate torque movement part (acceleration/decelation gear and clutch).



DIFFERENTIAL MECHANISM

When the vehicle turns, admits the revolution difference between inner race and outer race.

ACCELERATION/DECELATION GEAR

Have the revolution speed of right and left wet multi-plate clutch to accelerate or decelate as oposed to the revolution speed of right wheel.

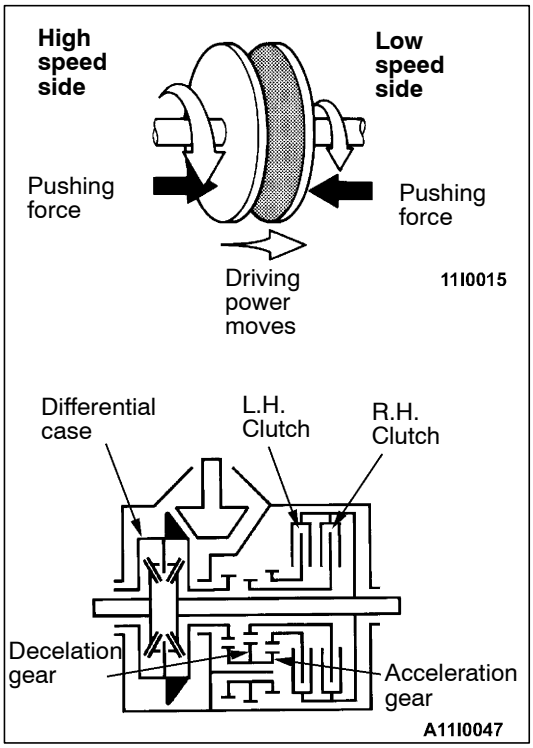
WET MULTI-PLATE CLUTCH

Have the torque to move from high speed wheel to low speed wheel.

L.H. clutch operate: decelation geer have the torque to move R.H. wheel to L.H. wheel.

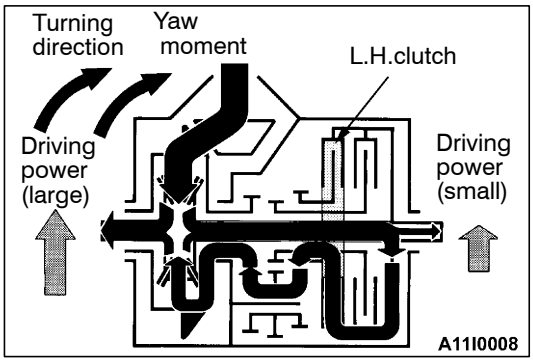
R.H. clutch operate: accelelation geer have the torque to move L.H. wheel to R.H. wheel.

The movement of torque is dependence on pushing force of the clutch.



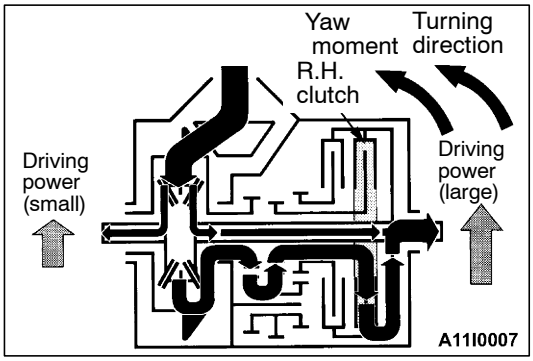
TORQUE TRANSFER DIFFERENTIAL MECHANISM

When high speed clutch is pushed, the driving power always moves from high speed side to low speed side, and controls the driving power with the aid of the property which the movement of driving power is proportional to the pushing force of clutch.
In torque transfer differential, acceleration/decelation gear always engages, and towerd to input speed from the differential case, L.H. clutch engaging decelation gear is revolutes in low speed, R.H. clutch engaging accelelation gear is revolutes in high speed.
In the other hand, the housing side of R.H/L.H. clutch is integlated to rear R.H. axle, if R.H. or L.H. clutch is opelated, the driving power can be moved to right or left.



THE FLOW OF DRIVING POWER

(1) L.H.CLUTCH OPERATE
In order to boost the driving power of L.H. wheel, when L.H.clutch is operated,a part of the driving power of R.H. wheel flows to the differential case, the driving power of L.H. wheel is boosted.
The result of this, the yaw moment occures in a right to the vehicle.



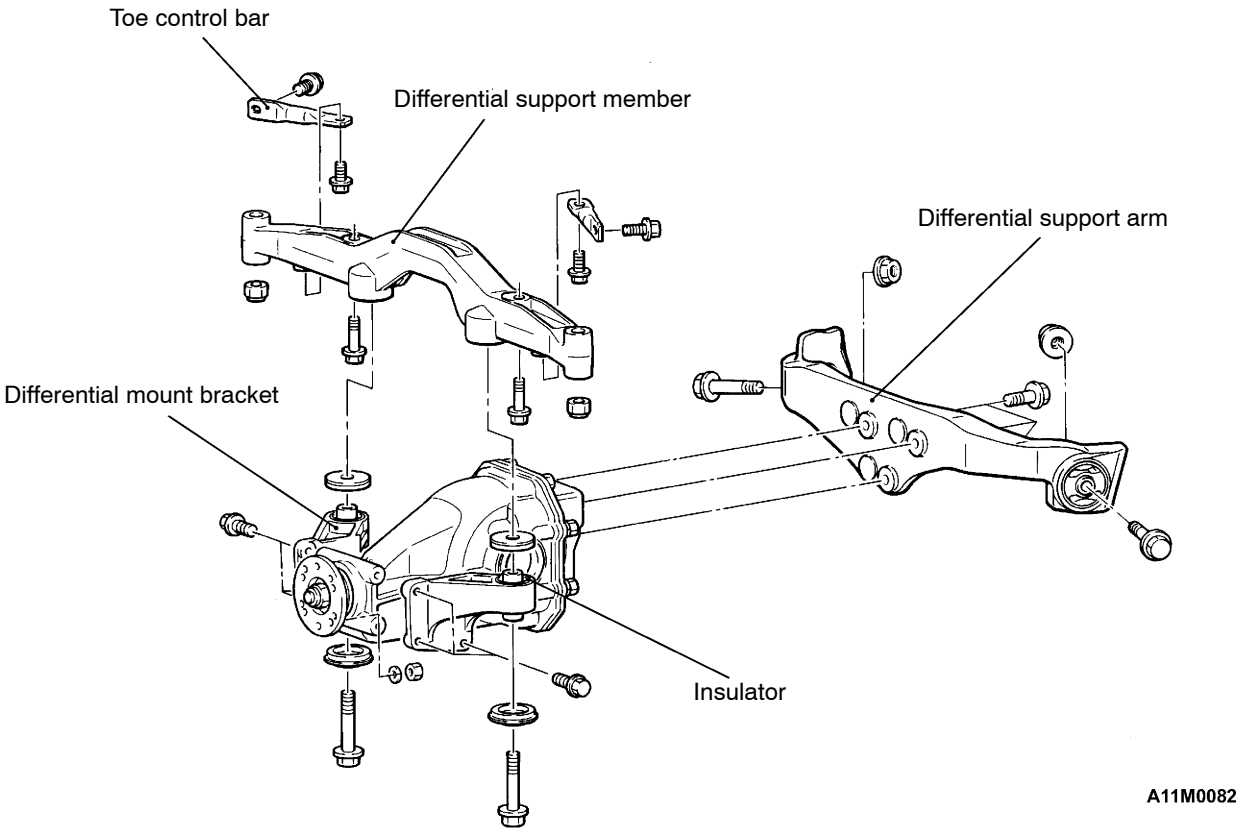
(2) R.H.CLUTCH OPERATE
In order to boost the driving power of R.H. wheel,when R.H.clutch is operated, a part of the driving power of L.H. wheel flows to the differential case, the driving power of R.H. wheel is boosted.
The result of this, the yaw moment occures in a left to the vehicle.

DIFFERENTIAL MOUNT

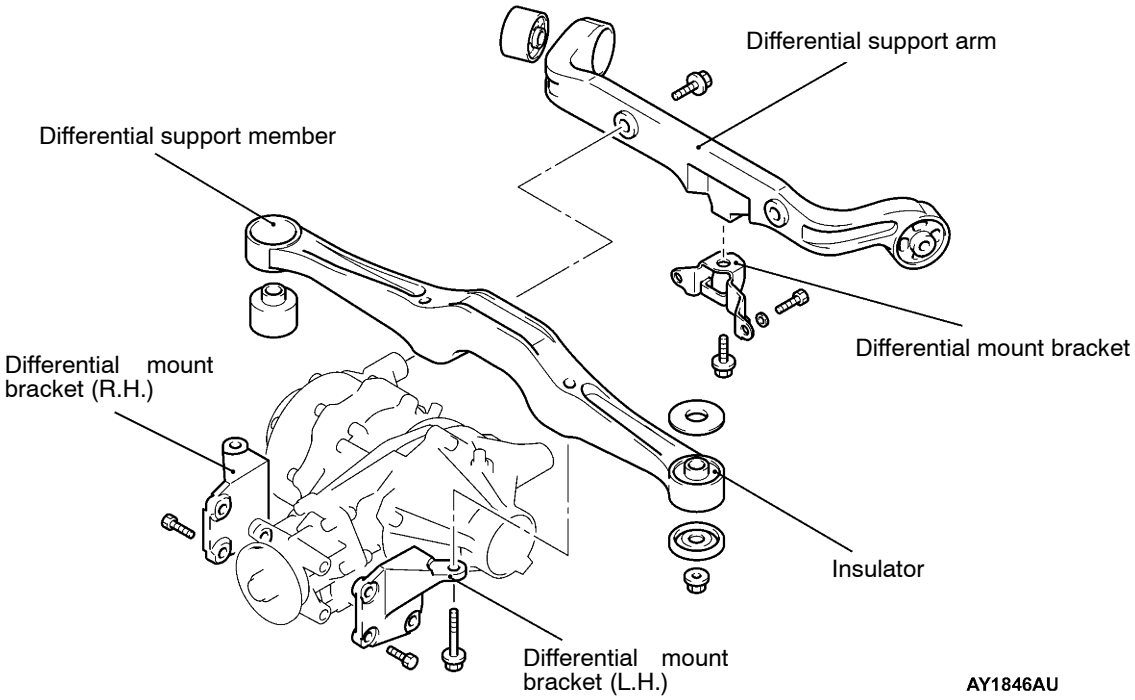
The front of differential carrier is suported with the differential support member via the differential mount bracket with insulator,and the rear is suported with the differential support arm. <Mechanical LSD>

The front of torque transfer differential is supported with the differential support member with insulator via the differential mount bracket,and the rear is supported with the differential mount bracket and the differential support arm. <AYC>

<Mechanical LSD>



<AYC>



NOTES

DRIVE-CONTROL COMPONENTS

CONTENTS

SUSPENSION

The suspension which has been adjusted to new body dimension with the optimal tuning has improved its cornering ability.

A McPherson strut-type suspension has been used at the front, and a multi-link suspension has been used at the rear.

FEATURES

High Steering Stability

1. Suspension geometry optimized by linearisation of toe change, etc.
2. Wider tread
3. Optimized the roll center height
4. Increased the suspension stroke of the compressed side
5. Increased the lateral rigidity equipped with crossmember bars and flatted crossmember
6. Damping forces of front struts and rear shock absorbers as well as their coil springs' characteristics optimized
7. Optimized suspension bushings

Enhanced Riding Comfort

1. Increased the suspension stroke of the compressed side
2. Damping forces of front struts and rear shock absorbers as well as their coil springs' characteristics optimized
3. Spring characteristics of bump rubber optimized
4. Characteristics of suspension bushings optimized

Reduced road noise

1. Increased the volume of stabilizer bushings
2. Adoption of two mounting bolts to the stabilizer bracket

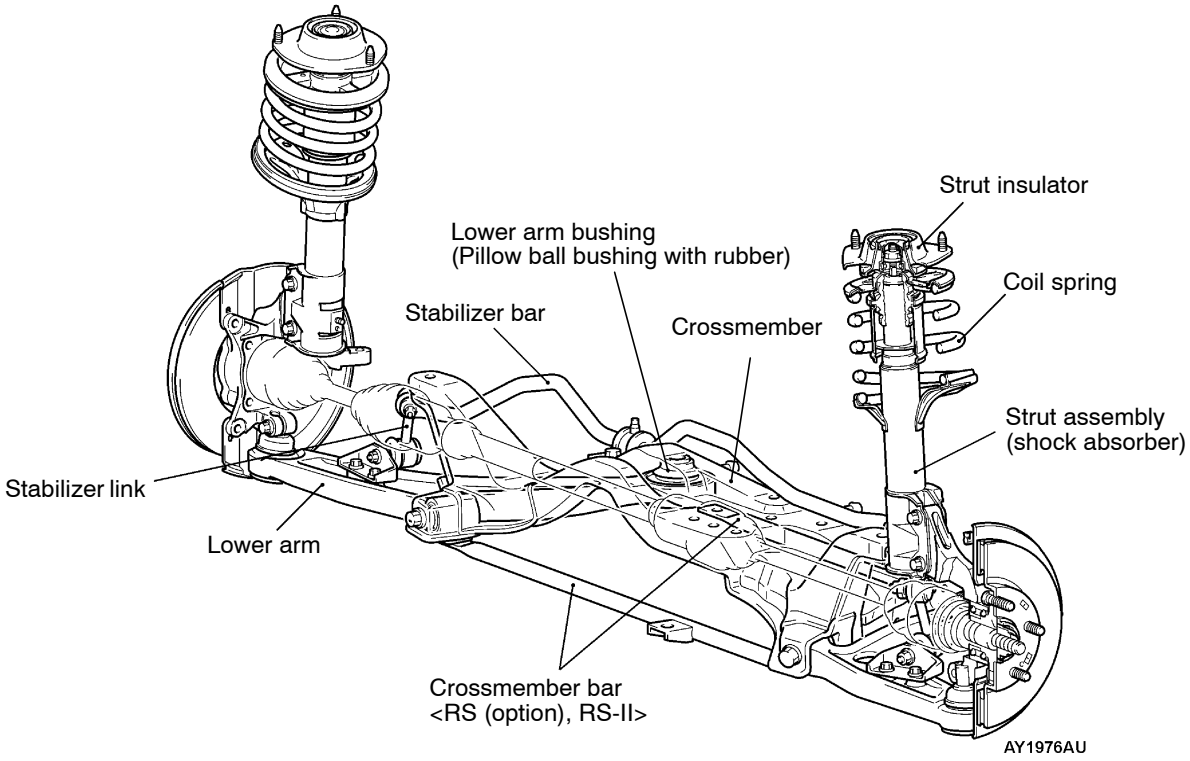
FRONT SUSPENSION

FEATURES

A McPherson strut independent suspension-type suspension has been adopted as the front suspension. It has improved its limitation of capacity as well as securing the sufficient lateral rigidity and rolling rigidity as a high performance vehicle.

- With widened tread and optimized roll center height, the cornering performance from initial responce to limited performance has been improved.
- Adopted the two-stage selectable structuare of camber angle according to driving mode like EVOLUTION-VI.
- Stabilized the vehicle behavior during cornering by lowering the installation position of the steering gear box with linear toe change.
- Increased the horizontal strength, improved the steering feeling and the rigidness at the time of cornering by making the cross member flat and connecting two reinforced bars (crossmember bar) at the installation part of the both right and left lower arms.
- Improved the cornering limitation with improved adhesion at the time of rolling by increasing bump strokes.
- Achieved the weight reduction being equipped with aluminium lower arm like EVOLUTION-VI.
- Improved reliability by making the size of mounting bolts larger at the front and rear bushing installation parts of lower arm.
- Improved the stroke feeling by replacing the rear bushings of the lower arm with the pillow ball bushing with rubber.
- Restricted the useless movement of lower arm equipped with stopper rubber at the front and rear bushing mounting parts of the lower arm.
- Improved the reliability and steering feeling by reducing friction as well as making the ball size of lower arm ball joint larger.
- Improved the camber rigidity by adopting an inverted strut like EVOLUTION-VI.
- Improved the steering stability by optimizing the damping force of shock absorbers and spring constants of coil springs.
- Adopted a strut insulaor with previous results like EVOLUTION-VI.
- Prevented the occurance of unusual noise by increasing the volume of stabilizer bushing.
- Prevented the occurance of unusual noise caused by lateral sliding of brackets with installation of two mounting bolts to the stabilizer bracket.

CONSTRUCTION DIAGRAM



SPECIFICATIONS

SUSPENSION SYSTEM

Items	Lancer EVOLUTION-VII	Lancer EVOLUTION-VI Tommi Makinen Edition
Suspension method	McPherson strut with coil springs	McPherson strut with coil springs

WHEEL ALIGNMENT

Items	Lancer EVOLUTION-VII	Lancer EVOLUTION-VI Tommi Makinen Edition	
		Tarmac suspension	Normal suspension
Camber (selectable from 2 options)	-1°00'* or -2°00'	-1°10'* or -2°10'	-1°00'* or -2°00'
Caster	3°55'	4°24'	3°54'
Kingpin inclination	13°45'	14°48'	14°18'
Toe-in	0	0	0

NOTE
*: The factory shipped camber value is indicated.

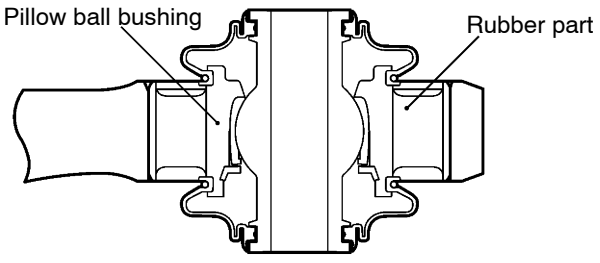
COIL SPRING

Item	Lancer EVOLUTION-**VII**		Lancer EVOLUTION-**VI** Tommi Makinen Edition	
	RS (standard), RS-II	RS (option)	Tarmac suspension	Normal suspension
Wire diameter mm	14	14	14	14
Average diameter mm	155	155	155	155
Free length mm	281	275	273	296

LOWER ARM

Like Lancer EVOLUTION-VI Tommi Makinen Edition, an aluminium forged lower arm has been adopted and the followings are improved.

- Enlarging the size of mounting bolts at the front and rear sides of crossmember mounting section on lower arm has increased reliability.
- Improved the stroke feeling by installing a pillow ball bushing with rubber at the rear bushing.
- Improved the reliability and steering feeling by reducing friction as well as making the ball size of the ball joint larger.
- Restricted the useless movement of lower arm equipped with stopper rubber at the front bushing mounting parts of the lower arm.



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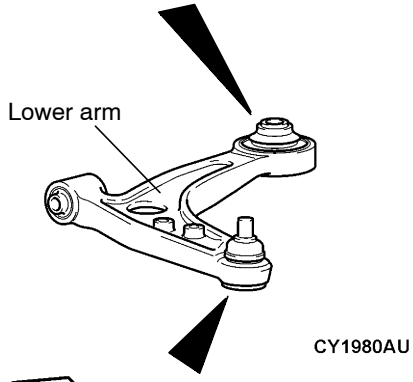

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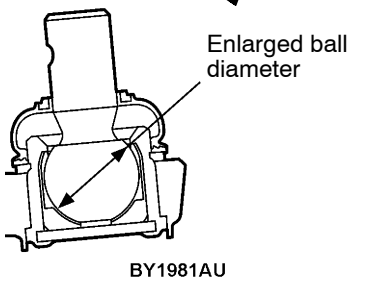

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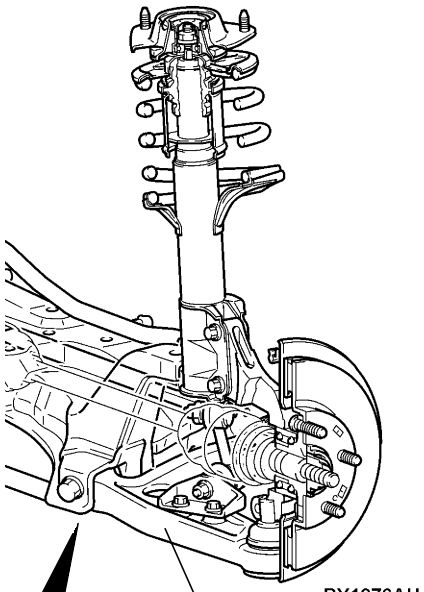

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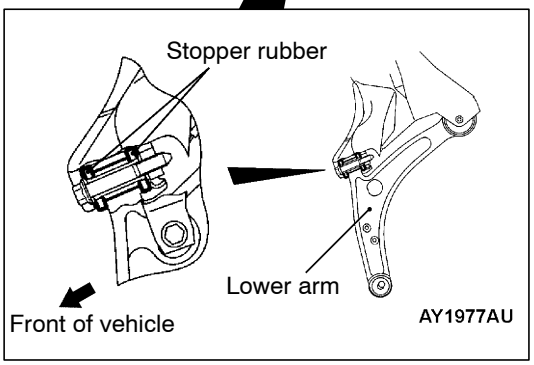

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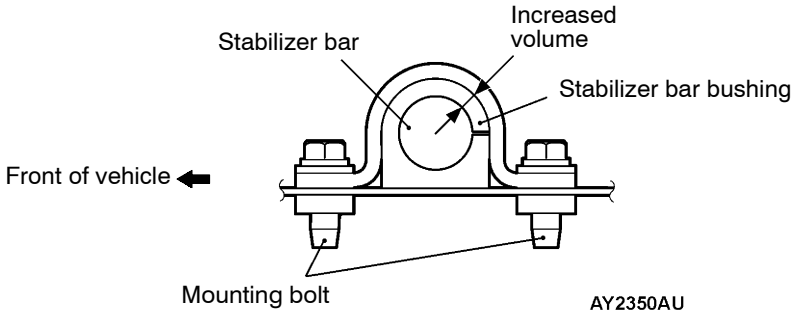
STABILIZER BAR

Following modifications have been made to Lancer EVOLUTION-VI Tommi Makinen Edition.

- Prevents the occurance of unusual noise by increasing the volume of stabilizer bushing.
- Prevents the occurance of unusual noise caused by lateral sliding of brackets with installation of two mounting bolts to the stabilizer bracket.



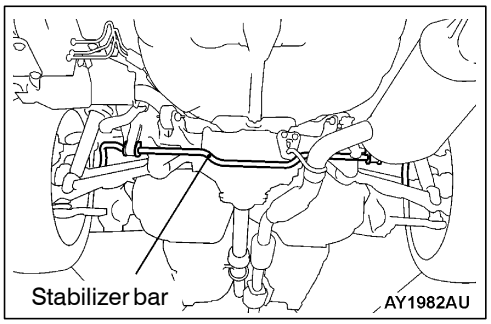
REAR SUSPENSION

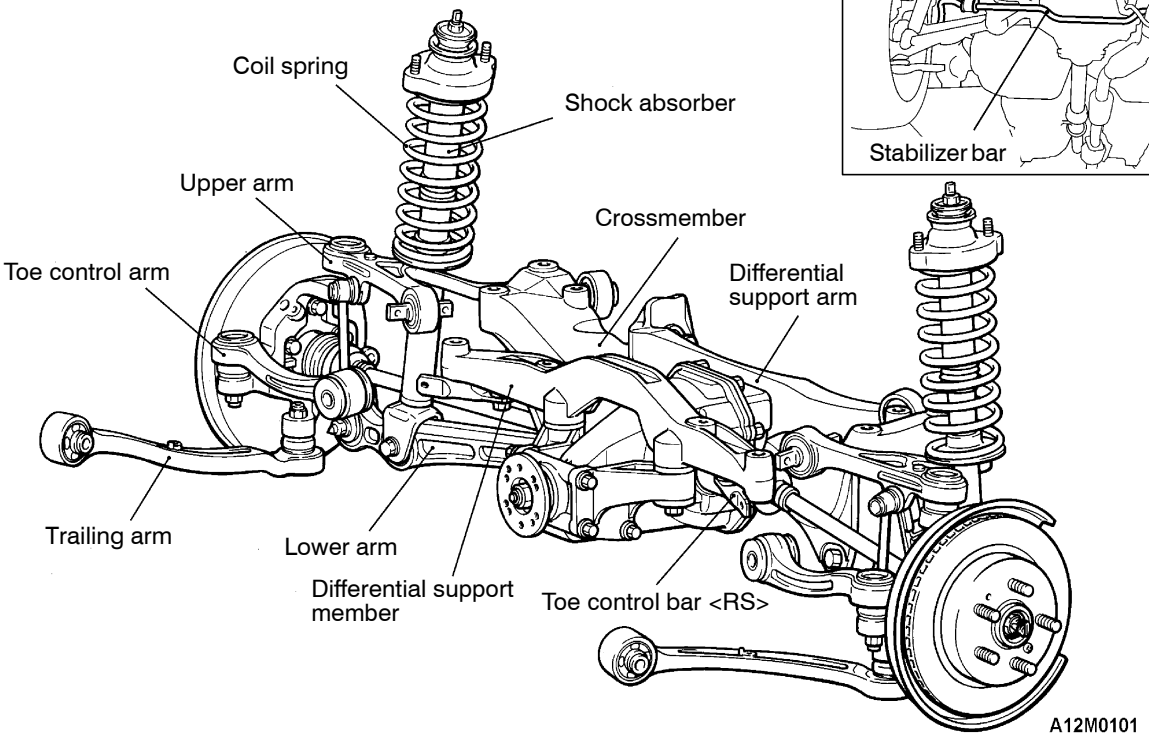
FEATURES

A multi-link suspension which is developed with intention of performance improvement for racing use has been adopted. Yet this suspension is basically the same type as current Lancer EVOLUTION-VI Tommi Makinen Edition, but the following points have been improved.

- By widening tread (10 mm) and optimizing roll center height, the cornering performance from initial responce to limited performance has been improved.
- By increasing bump strokes (10 mm) adhesion at the time of rolling and cornering limitation has been improved.
- By optimizing the damping force of shock absorbers, spring constants of coil springs and bushing characteristics, the cornering performance from initial responce upto limited performance has been improved.

CONSTRUCTION DIAGRAM





SPECIFICATIONS

SUSPENSION SYSTEM

Item	Lancer EVOLUTION-**VII**	Lancer EVOLUTION-**VI** Tommi Makinen Edition
Suspension method	Multi-link	Multi-link

WHEEL ALIGNMENT

Items	Lancer EVOLUTION-**VII**	Lancer EVOLUTION-**VI** Tommi Makinen Edition
Camber	- 1°00’	- 1°00’
Toe-in	3	3

COIL SPRING

Items	Lancer EVOLUTION-**VII**			Lancer EVOLUTION-**VI** Tommi Makinen Edition		
	Vehicles without AYC	Vehicles with AYC		Vehicles without AYC		Vehicles with AYC
	RS (standard)	RS (option)	RS-II	RS	RS-II (standard)	RS-II (option)
Wire diameter mm	9 - 12	12	12	9 - 12	10 - 12	10 - 12
Average diameter mm	88	88	88	88	88	88
Free length mm	287	281	284	284	274	279

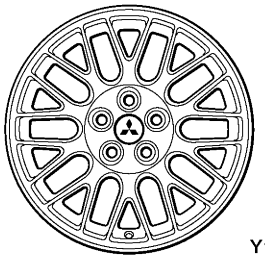
WHEEL AND TYRE

FEATURES

Following modifications have been made to Lancer EVOLUTION-VI Tommi Makinen Edition to improve the vehicle performance.

- Exclusively to EVOLUTION-VII 17-inch tyre has been newly developed by widening the tyre width from 225mm to 235mm and the limit performance has been improved by getting better grip at the time of high G cornering. <RS (option), RS-II>
- Equipped with 205/65R15 94H tyre <RS (standard)>
- Exclusively to EVOLUTION-VII 17-inch aluminium wheel has been newly deeveloped by widening rim width from 7 1/2JJ to 8JJ <RS (option), RS-II>
- Equipped with a strong type steel wheel with previous results <RS (standard)>

17-inch Aluminium Wheel (17 × 8JJ) <RS (option), RS-II>



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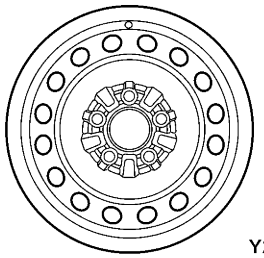
Steel Wheel (15 × 6JJ) <RS (standard)>



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SPECIFICATIONS

Items		Lancer EVOLUTION-**VII**		Lancer EVOLUTION-**VI** Tommi Makinen Edition	
		RS (standard)	RS (option), RS-II	Standard	Option
Wheel	Type	Steel type	Aluminium type	Steel type	Aluminium type
	Size	15 × 6JJ	17 × 8JJ	15 × 6JJ	17 × 7 1/2JJ
	Amount of wheel offset mm	46	38	46	38
	Pitch circle diameter (P.C.D.) mm	114.3	114.3	114.3	114.3
Tyre	Size	205/65R15 94H	235/45ZR17	205/60R15 91H	225/45ZR17
Spare wheel	Type	Steel type	Steel type	Steel type	Steel type
	Size	16 × 4T	17 × 4T	16 × 4T	16 × 4T
	Amount of wheel offset mm	40	30	40	40
	Pitch circle diameter (P.C.D.) mm	114.3	114.3	114.3	114.3
Spare tyre (High pressure)	Size	T125/70D16	T125/70D17	T125/70D16	T125/70D16

POWER STEERING

FEATURES

To improve steering feeling and response of the steering system, the following steering system has been adopted.

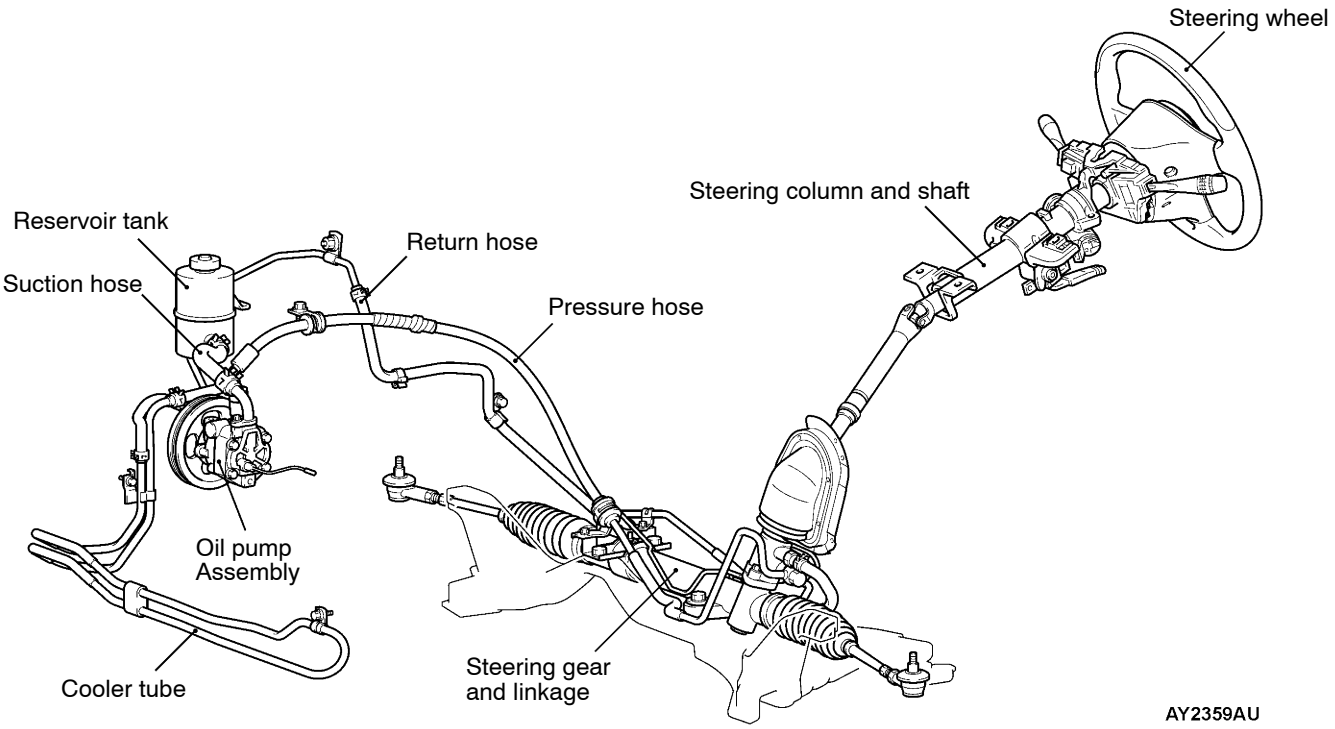
- The system has been equipped with the MOMO leather 3-spoke-type steering wheel with built-in SRS airbag.
- A steering column with a shock absorbing mechanism and a tilt steering mechanism has been adopted.
- Integral-type rack and pinion gear with high rigidity and excellent response has been adopted.
- A variable capacity pump has been adopted to reduce power losses and improve fuel consumption. When the engine speed increases, the pump chamber capacity is reduced proportionally so that only the necessary amount of power steering fluid is discharged.
- Improved the cooling efficiency of power steering fluid by adopting a cooler tube to the fluid line.

SPECIFICATIONS

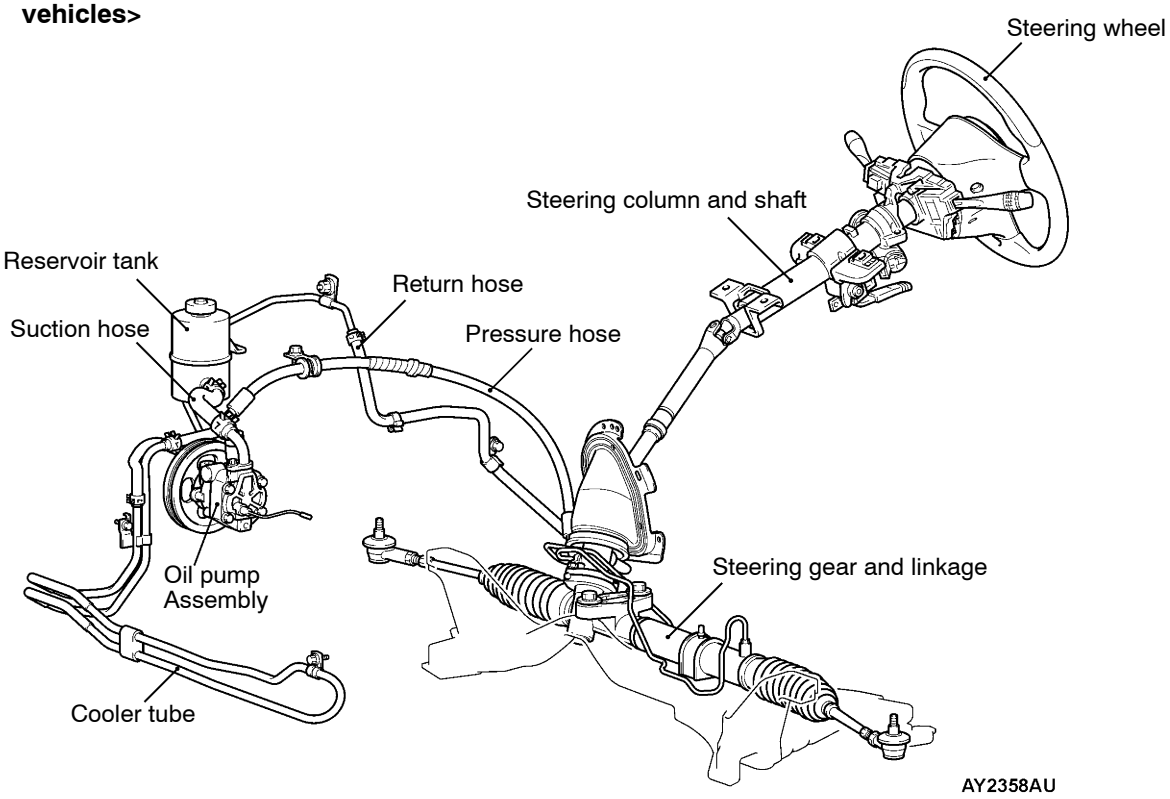
Items		Lancer EVOLUTION-**VII**	Lancer EVOLUTION-**VI** Tommi Makinen Edition
Steering wheel	Type	MOMO 3-spoke type	MOMO 3-spoke type
	Outside diameter mm	380 <RS (standard)>, 365 <RS(option), RS-II>	365 <RS>, 380 <RS-II>
	Maximum number of turns	2.1	2.1 <RS>, 2.3 <RS-II>
Steering column	Column mechanism	Tilt steering	Tilt steering
Power steering type		Integral type	Integral type
Oil pump	Type	Variable capacity type (vane pump)	Variable capacity type (vane pump)
	Basic discharge amount cm^3/rev.	9.6	7.2
	Relief pressure MPa	8.3 - 9.0	8.3 - 9.0
	Reservoir type	Separate type	Separate type
	Pressure switch	Equipped	Equipped
Steering gear and linkage	Type	Rack and pinion	Rack and pinion
	Stroke ratio (Rack stroke/ Steering wheel Maximum turning radius)	68.61	62.89
	Rack stroke mm	146	136
Steering angle	Inner wheel	32°	33°
	Outer wheel <for reference>	27°	28°
Power steering fluid	Specified lubricants	Automatic transmission fluid DEXRON II	Automatic transmission fluid DEXRON II
	Quantity dm^3	Approximately 1.0	Approximately 1.0

CONSTRUCTION DIAGRAM

<L.H. drive vehicles>



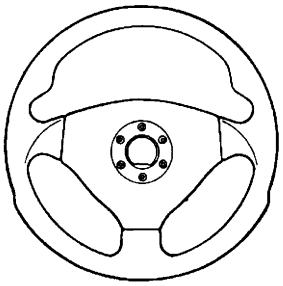
<R.H. drive vehicles>



STEERING WHEEL

There are two types of MOMO leather 3-spoke-type steering wheels (built-in SRS air bag) with different desigins.

<RS (standard)>



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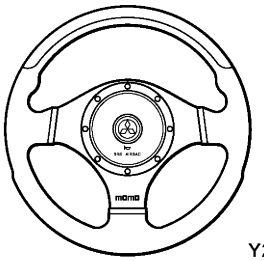
<RS(option), RS-II>



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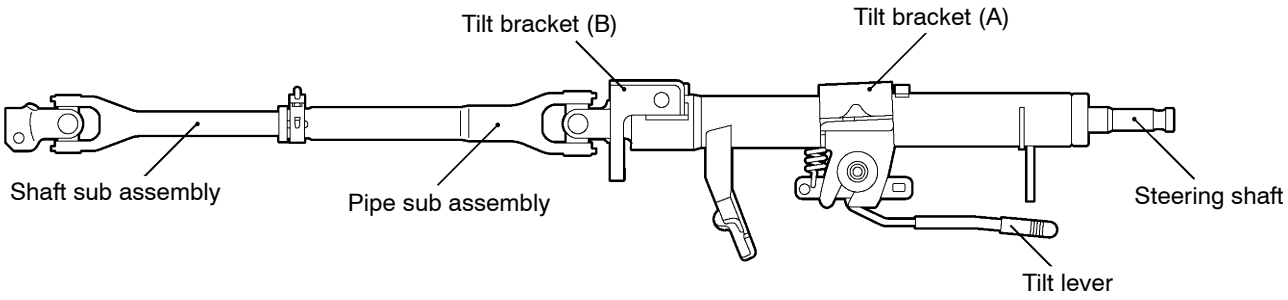
STEERING SHAFT AND COLUMN

For the steering column, an impact absorbing mechanism which absorbs impact energy in the event of a collision as well as a tilt steering mechanism which enables the driver to obtain an optimum driving position have been adopted.



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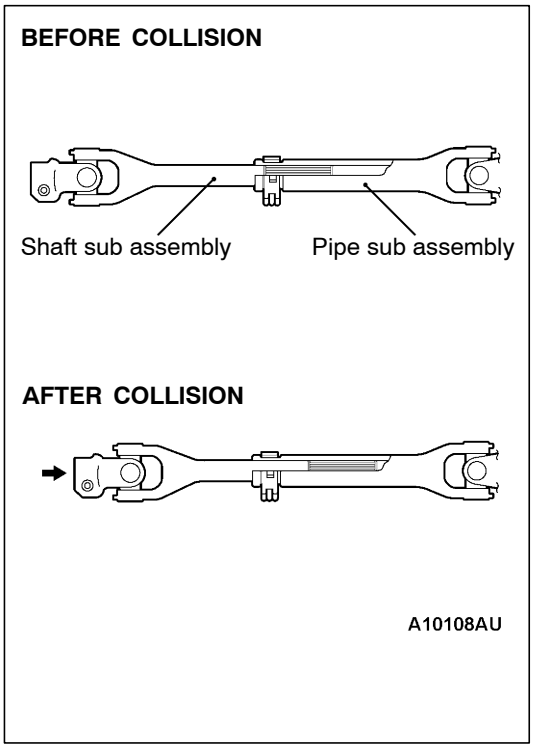
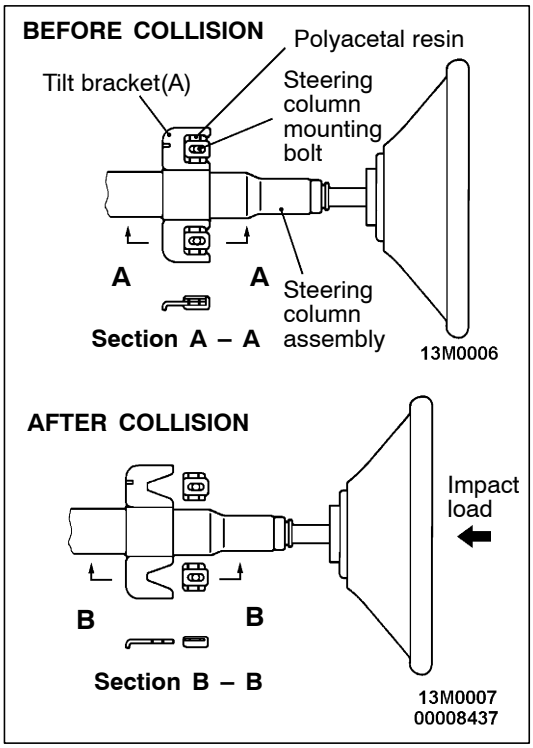


SHOCK ABSORBING MECHANISM

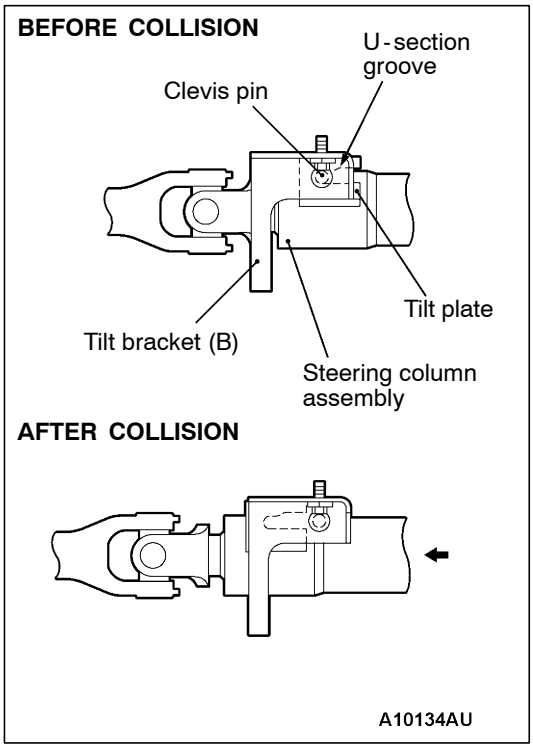
1. Primary impact

When the vehicle collides with something and there is a load added to the shaft sub assembly from the gearbox, the shaft sub assembly slides above the pipe sub assembly to absorb the shock load. This prevents the steering column from moving backwards during the impact.



2. Secondary impact

(1) When the driver falls against the developed air bag, the tilt bracket(A) moves forwards by shearing the polyacetal resin, causing the steering column assembly to move forward.

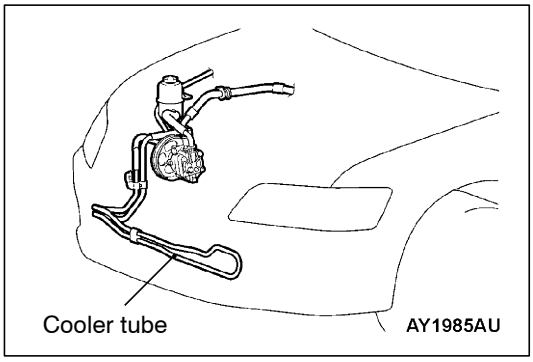


(2) At the same time that tilt bracket (A) separates, the clevis pin comes out of the U-section groove in the tilt plate, allowing the steering column assembly to move forward.

OIL PUMP

The oil pump is a vane type with a fluid flow control system which functions so that the steering wheel turning effort will be reduced at low engine speeds and it will be appropriately increased at higher speeds.
The following modifications have been made to Lancer EVOLUTION-VI Tommi Makinen Edition.

- By increasing the basic discharge amount from 7.2 cm^3/rev. to 9.6 cm^3/rev., the assist shortage at idle has been improved.
- By increasing the diameter of the pully shaft bearing and the pump body rigidity , the pump noise has been relieved reducing vibration occurance.

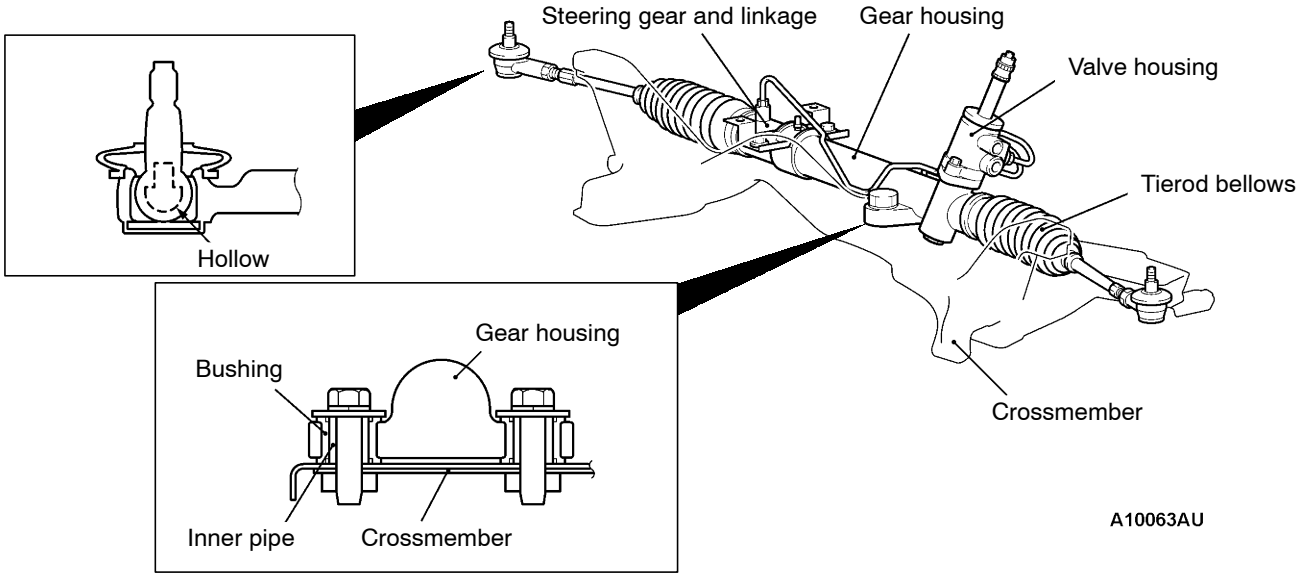


POWER STEERING FLUID COOLER TUBE

The cooling efficiency of power steering fluid has been improved by adopting a cooler tube to the fluid line.

STEERING GEAR

- Using the following parts have contributed to save weight; an aluminium steering gear and linkage valve housing, a plastic tie-rod bellows, and the hollow-type tie-rod stud.
- The installation accuracy, rigidity and steering stability have been improved by using an eye bushing, which secures the steering gear to the crossmember.



BRAKES

The brake system has been designed to give greater reliability and durability and to provide excellent braking performance.

FEATURES

Improved braking performance

1. A 8+9-inch brake booster has been adopted to provide large braking force with a small pedal depression force.
2. 15-inch ventilate disc brakes have been adopted to provide stable braking force and improved braking feel. <Vehicles without brembo braking system>
3. 17-inch front ventilate disc brakes have been adopted to provide stable braking force and improved braking feel. <Vehicles with brembo braking system>
4. 16-inch rear ventilate disc brakes have been adopted to provide stable braking force and improved braking feel. <Vehicles with brembo braking system>

Improved stability

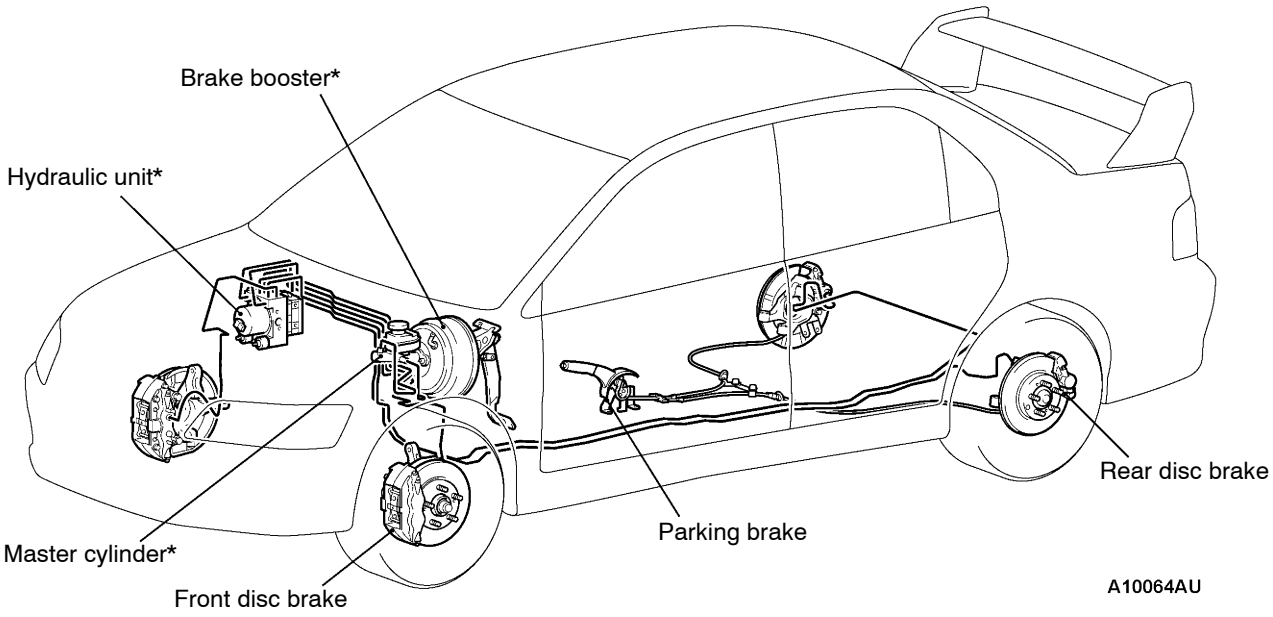
1. A 4-wheel anti-skid braking system (4ABS) has been adopted to prevent slipping caused by the vehicle wheels locking up in order to maintain an appropriate braking distance, and also to maintain a stable vehicle posture and steering performance. <Vehicles with ABS>
2. Adoption of an electronic brake-force distribution(EBD) which makes it possible to maintain the maximum amount of braking force even when the vehicle's load is unevenly distributed. <Vehicles with ABS>
3. A rear wheel early lock-prevention proportioning valve has been adopted. <Vehicles without ABS>
4. Front- and rear-wheel X-type brake line layout has been adopted.
5. Ventilated discs have been adopted in order to improve anti-fading performance.

Improved serviceability

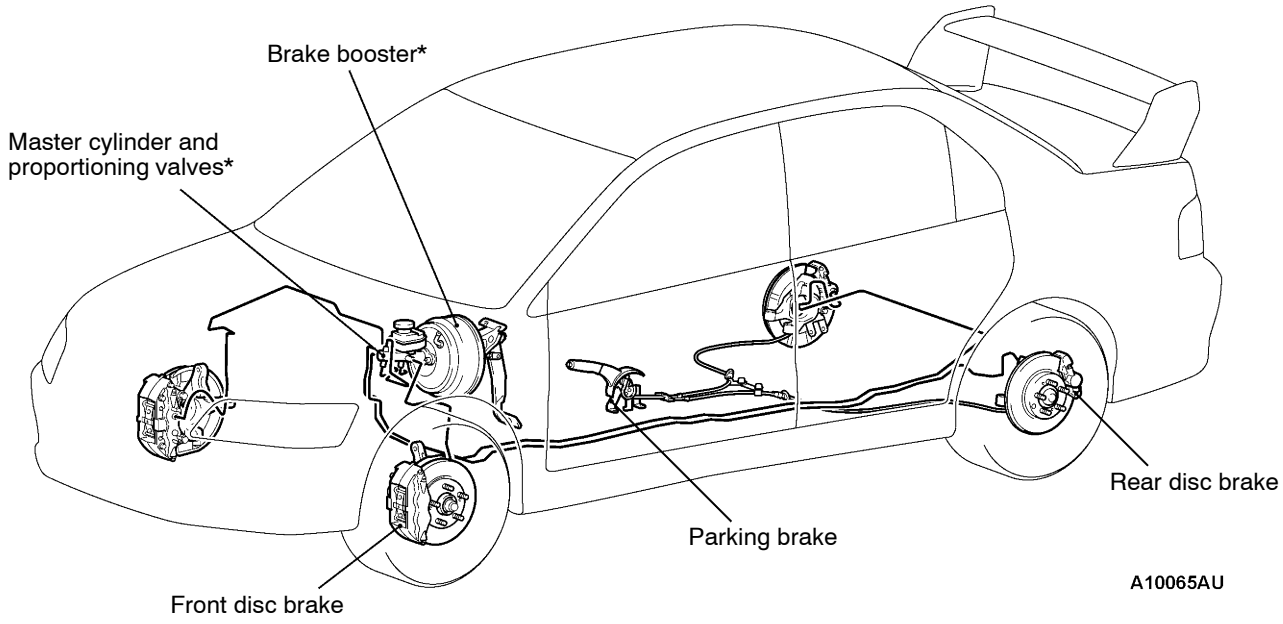
1. A diagnosis function has been adopted for the ABS system in order to make inspection easier. <Vehicles with ABS>
2. An outer disc method separated hub and rotor has been adopted to make removal and installation easier.
3. The master cylinder reservoir tank cap has been coloured white to make identification easier.
4. The ABS-ECU and hydraulic unit have been integrated to make them more compact and lightweight.

CONSTRUCTION DIAGRAM

<Vehicles with ABS>



<Vehicles without ABS>



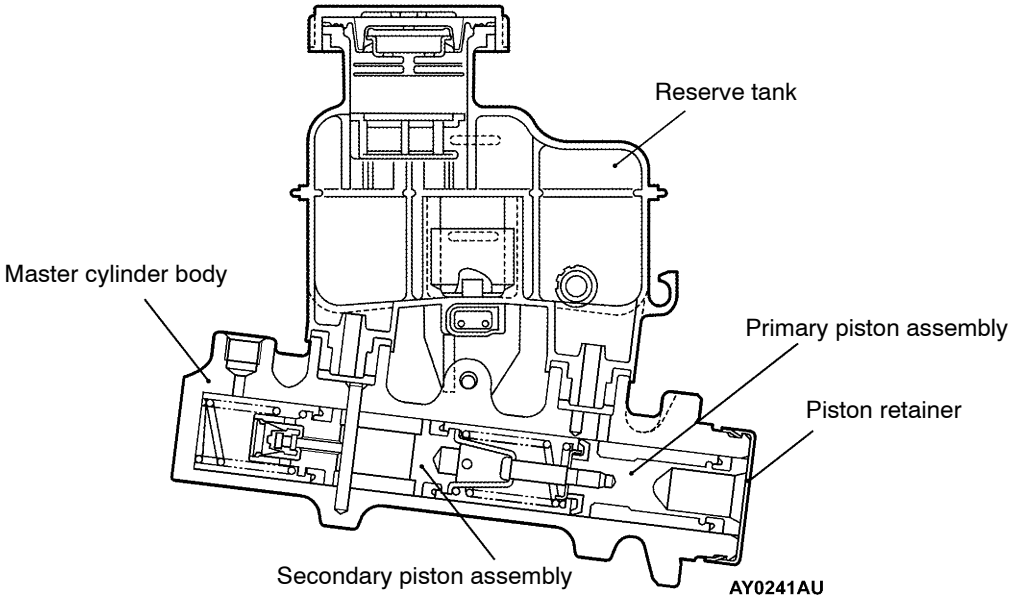
NOTE
For R.H. drive vehicles, only the position indicated by the * is symmetrical.

SERVICE BRAKES
SPECIFICATIONS

Items		Lancer EVOLUTION-VII	Lancer EVOLUTION-VI Tommi Makinen Edition
Master cylinder	Type	Tandem type	Tandem type
	I.D. mm	26.9	26.9
Brake booster	Type	Vacuum type, tandem	Vacuum type, tandem
	Effective dia. of power cylinder mm	205 + 230	180 + 205
	Boosting ratio	4.5 (Pedal depressing force: 230 N)	4.5 (Pedal depressing force: 230 N)
Rear wheel hydraulic control method		Electronic brake-force distribution (EBD) <Vehicles with ABS (RS, RS-II)> or Proportioning valves <Vehicles without ABS (RS)>	Proportioning valves
Front brakes <RS (standard)>	Type	Floating caliper, 2 piston, ventilated disc	Floating caliper, 2 piston, ventilated disc
	Disc effective dia. × thickness mm	227 × 24	227 × 24
	Wheel cylinder I.D. mm	42.9 (×2)	42.9 (×2)
	Pad thickness mm	10.0	10.0
	Clearance adjustment	Automatic	Automatic
Front brakes <RS (option), RS-II>	Type	4 opposed piston, ventilated disc <Brembo braking system>	4 opposed piston, ventilated disc <Brembo braking system>
	Disc effective dia. × thickness mm	263 × 32	263 × 32
	Wheel cylinder I.D. mm	40.0 (×2), 46.0 (×2)	40.0 (×2), 46.0 (×2)
	Pad thickness mm	10.0	10.0
	Clearance adjustment	Automatic	Automatic
Rear brakes <RS (standard)>	Type	Floating caliper, 1 piston, ventilated disc	Floating caliper, 1 piston, ventilated disc
	Disc effective dia. × thickness mm	237 × 20	237 × 20
	Wheel cylinder I.D. mm	34.9	34.9
	Pad thickness mm	10.0	10.0
	Clearance adjustment	Automatic	Automatic
Rear brakes <RS (option), RS-II>	Type	2 opposed piston, ventilated disc <Brembo braking system>	2 opposed piston, ventilated disc <Brembo braking system>
	Disc effective dia. × thickness mm	252 × 22	252 × 22
	Wheel cylinder I.D. mm	40.0 (×2)	40.0 (×2)
	Pad thickness mm	9.0	9.0
	Clearance adjustment	Automatic	Automatic
Brake fluid		DOT3 or DOT4	DOT3 or DOT4

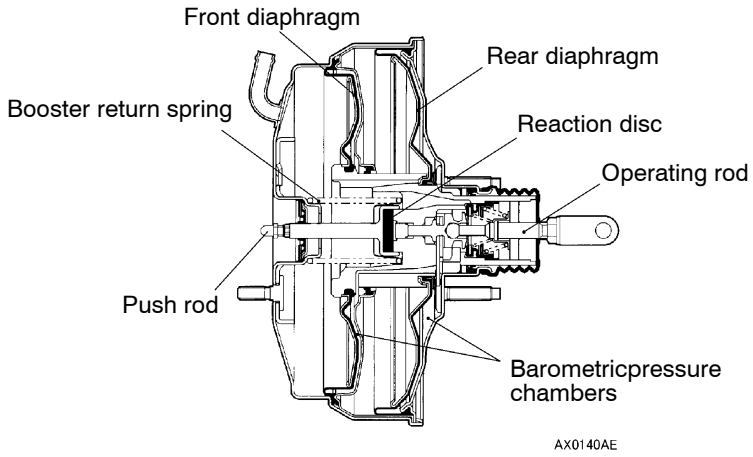
MASTER CYLINDER

The master cylinder is a tandem-type, with a structure that emphasises safety.



BRAKE BOOSTER

A 8+9-inch tandem-type brake booster has been adopted.



DISC BRAKES

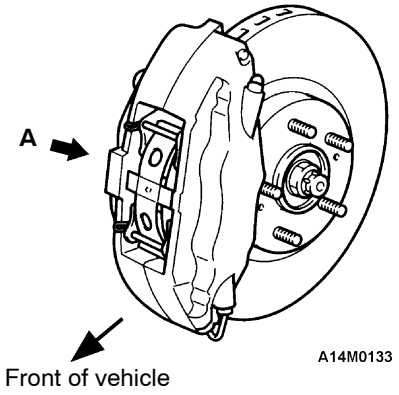
Brakes with the following specifications have been adopted.

- V5-W43 2-piston ventilate discs for front brakes <RS (standard)>
- V5-S35 1-piston ventilate discs for rear brakes <RS (standard)>
- Brembo V7-Z4046 4-opposed-piston ventilate discs for front brakes <RS (option), RS-II>
- Brembo V6-X40 2-opposed-piston ventilate discs for rear brakes <RS (option), RS-II>
- An outer disc method in which the wheels and discs are tightened together has been adopted to improve the ease of brake disc removal and installation.
- The brake pads are equipped with mechanical-type audible wear indicators to notify the driver when the usage limit (2 mm) has been reached.
- Split fins adopted as the disc fins to improve cooling performance

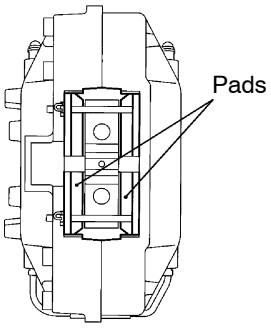
NOTE
Brembo is an italian component maker whose name and products are well known in the motorsports world.

DISC BRAKES <Brembo braking system>

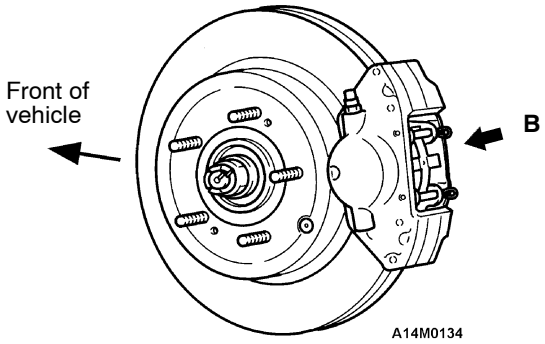
<Front>



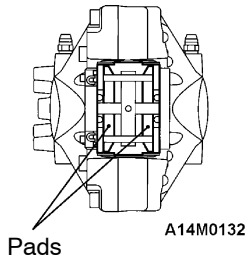
View A



<Rear>



View B



V 7 – Z 40 46
1 2 3 4

DISC BRAKE NOMENCLATURE

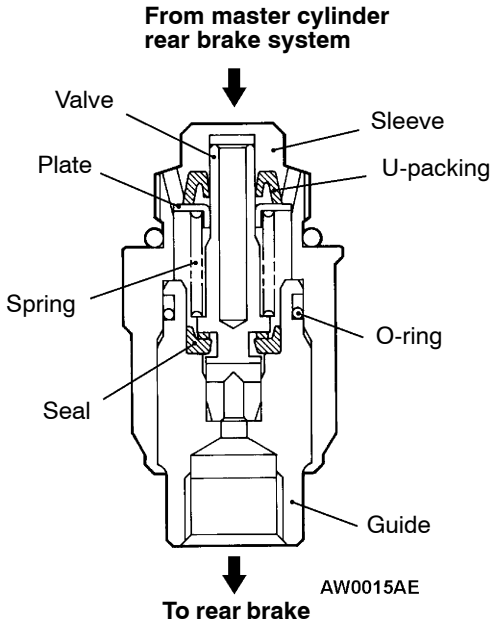
No.	Item	Contents
1	Brake disc type	V: Ventilated
2	Brake size (Minimum applicable disc wheel)	5: 15-inch 6: 16-inch 7: 17-inch
3	No. of pistons	S: 1 piston (floating type) W: 2 piston (floating type) X: 2 piston (opposed type) Z: 4 piston (opposed type)
4	Piston size (rounded to nearest integer)	35: ϕ35 mm 40: ϕ40 mm 43: ϕ43 mm 46: ϕ46 mm

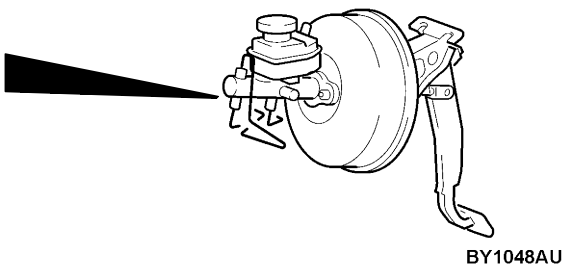
BRAKE LINE

PROPORTIONING VALVE <Vehicles without ABS (RS)>

A proportioning valve has been adopted to prevent early locking of the rear wheels, in order to provide improved stability during braking.

NOTE
In terms of structure and operation, the proportioning valve is basically the same as that of the 1999 SPACE RUNNER/SPACE WAGON.





4-WHEEL ANTI-SKID BRAKING SYSTEM (4ABS)

FEATURES

ABS has been adopted as optional equipment in RS-II to maintain directional stability and steering performance during sudden braking or braking on slippery road surfaces.
The ABS control method is a 4-sensor, 4-channel method which provides independent control for all wheels.
Following system for Lancer EVOLUTION-VII has been modified from Lancer EVOLUTION-VI Tommi Makinen Edition.

- By adding lateral G sensor, longitudinal G sensor and steering wheel sensor, optimized ABS control at the time of cornering.
- By inputting parking brake switch signal to ABS-ECU with pulling parking brake lever, ABS control has been optimized.
- ABS-ECU outputs ABS signal to 4WD-ECU.
- G sensor (lateral), steering wheel sensor and parking brake switch have been added to the diagnosis and service data.
- ABS-ECU connector has been changed.

EBD CONTROL

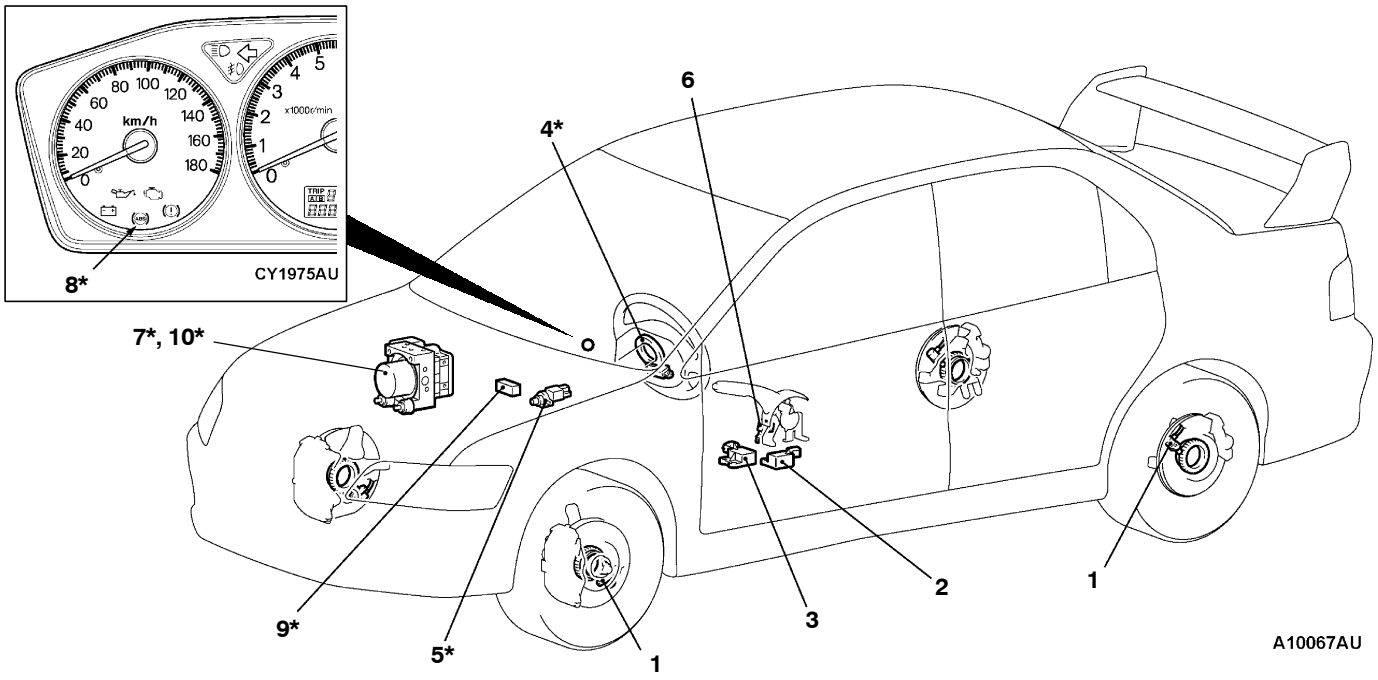
In ABS, electronic control method is used by which the rear wheel brake hydraulic pressure during braking is regulated by rear wheel control solenoid valves in accordance with the vehicle's rate of deceleration and the front and rear wheel slippage which are calculated from the each wheel speed sensor's signal. EBD control is a control system which provides a high level of control for both vehicle braking force and vehicle stability. The system has the following features:

- Because the system provides the optimum rear wheel braking force regardless of the vehicle laden condition and the condition of the road surface, the system reduces the required pedal depression force, particularly when the vehicle is heavily laden or driving on road surfaces with high frictional coefficients.
- Because the duty placed on the front brakes has been reduced, the increases in pad temperature can be controlled to improve the wear resistance characteristics of the pad, during front brakes applying.
- Control valves such as the proportioning valve are no longer required.

SPECIFICATIONS

Items		Lancer EVOLUTION-VII	Lancer EVOLUTION-VI Tommi Makinen Edition
ABS control method		4-sensor, 4-channel	4-sensor, 4-channel
No. of ABS rotor teeth	Front	43	43
	Rear	43	43
ABS speed sensor	Type	Magnet coil type	Magnet coil type
	Gap between sensor and rotor mm	0.85 <front (non-adjustable type)> 0.60 <rear (non-adjustable type)>	0.9 <front (non-adjustable type)> 0.9 <rear (non-adjustable type)>

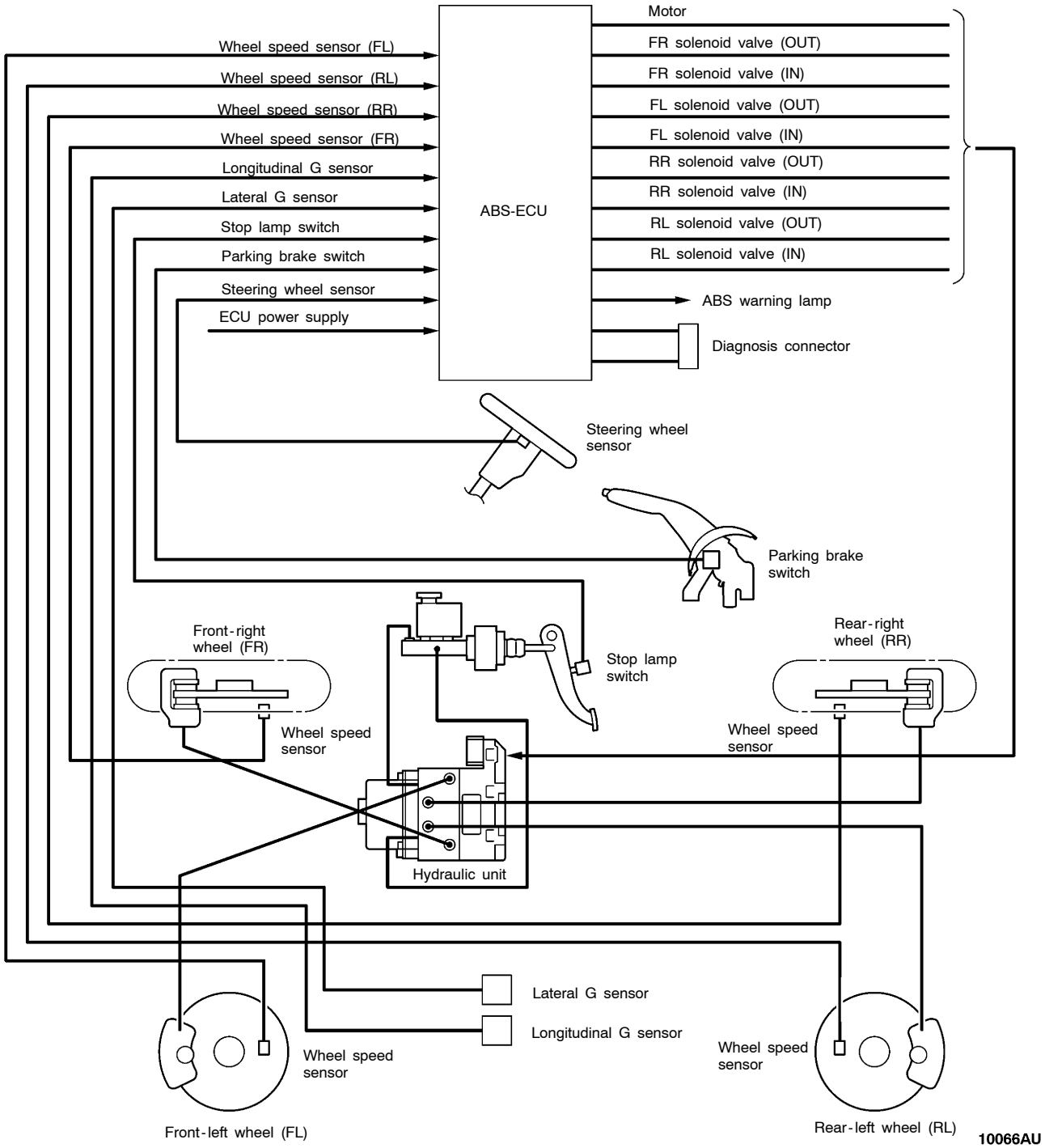
CONSTRUCTION DIAGRAM



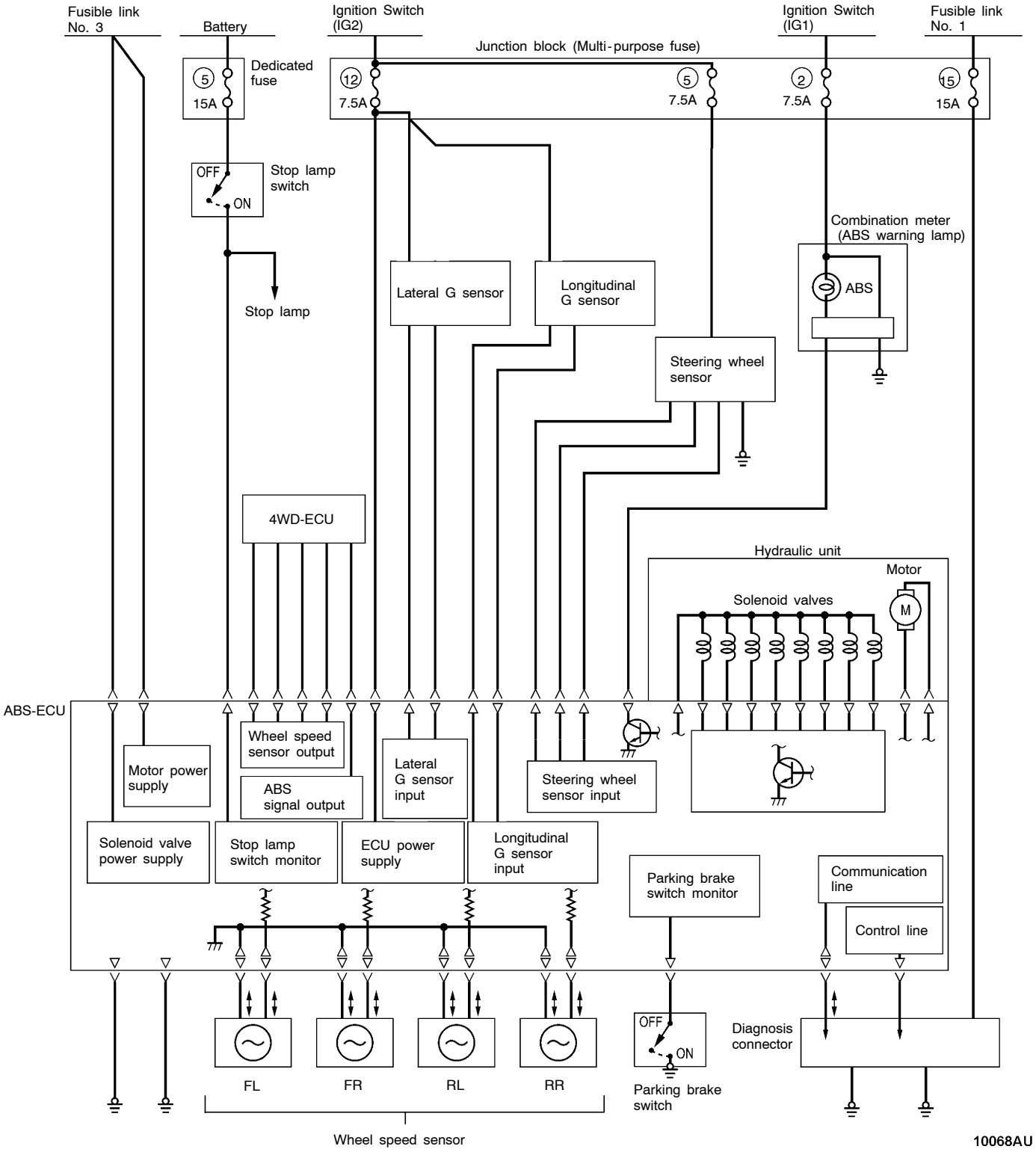
NOTE
For R.H. drive vehicles, only the position indicated by the * is symmetrical.

Name of part		Number	Outline of functions
Sensor	Wheel speed sensor	1	Send alternating current signals at frequencies which are proportional to the rotation speeds of each wheel to the ABS-ECU
	Lateral G sensor	2	Sends data on vehicle's rate of lateral acceleration to the ABS-ECU
	Longitudinal G sensor	3	Sends data on vehicle's rate of longitudinal acceleration to the ABS-ECU
	Steering wheel sensor	4	Sends data on steering wheel angle to the ABS-ECU
			Informs the ABS-ECU when steering wheel is in straight-ahead position
	Stop lamp switch	5	Sends a signal to the ABS-ECU to inform whether the brake pedal is depressed or not
	Parking brake switch	6	Sends a signal to the ABS-ECU to inform whether the parking brake lever is pulled or not
Actuator	Hydraulic unit	7	Drives the solenoid valves according to signals from the ABS-ECU in order to control the brake hydraulic pressure for each wheel
	ABS warning lamp	8	Illuminates in response to signals from the ABS-ECU when a problem happens in the system
Diagnosis connector		9	Outputs the diagnosis codes and allows communication with the MUT-II
ABS control unit (ABS-ECU)		10	Controls actuators (described above) based on the signals coming from each sensor
			Controls the self-diagnosis and fail-safe functions
			Controls the diagnosis function (MUT-II compatible)

SYSTEM CONFIGURATION DIAGRAM



ABS ELECTRICAL CIRCUIT DIAGRAM



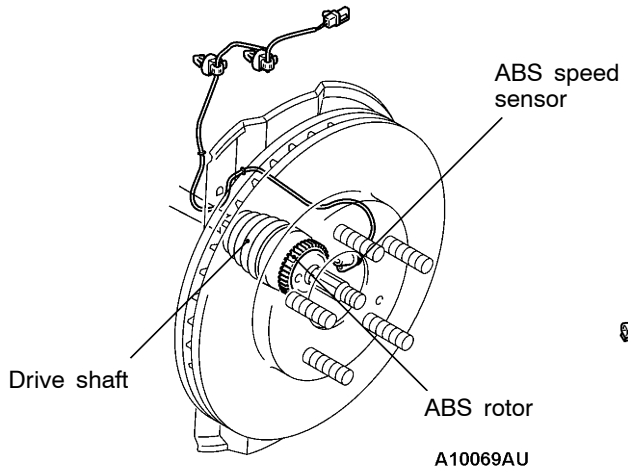
SENSORS

WHEEL SPEED SENSOR

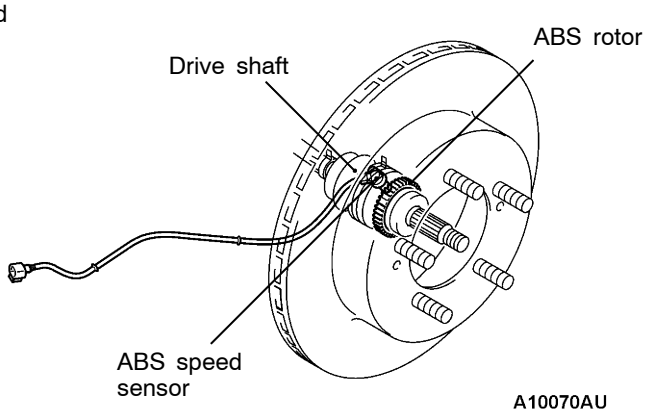
The wheel speed sensors consist of fixed ABS speed sensors and the ABS rotors that rotate at the same speed as the wheels, and output alternating current signals at frequencies which are proportional to the wheel speed.

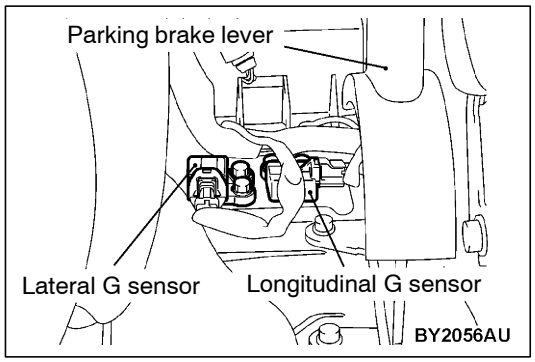
- The ABS rotors (43 teeth) are installed to the drive shafts, and the ABS speed sensors are installed to knuckles.
- The gap between the ABS rotors and the ABS speed sensors are non-adjustable at both the front and rear to improve serviceability.

Front



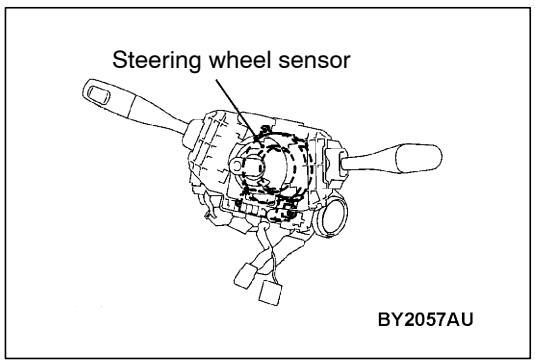
Rear





LATERAL G SENSOR/LONGITUDINAL G SENSOR

Refer to GROUP 2 - ACD and AYC.



STEERING WHEEL SENSOR

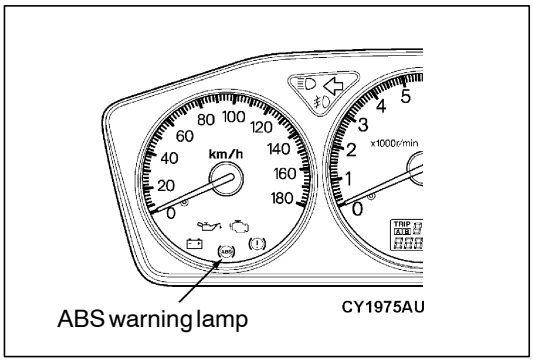
Refer to GROUP 2 - ACD and AYC.

STOP LAMP SWITCH

This switch turns on when the brake pedal is depressed, and turns off when the brake pedal is released. The ABS-ECU detects whether the stop lamp switch is on or off by means of fluctuations in voltage (ON: system voltage; OFF: Approximately 0 V). This data is used for ABS control.

PARKING BRAKE SWITCH

This switch turns on when the parking brake lever is pulled, and turns off when the parking brake lever is released. The ABS-ECU detects whether the parking brake switch is on or off by means of fluctuations in voltage (ON: less than 1V; OFF: system voltage). This data is used for ABS control.



ACTUATORS

ABS WARNING LAMP

The ABS-ECU controls the power transistor in ABS-ECU to turn on and causes the ABS warning lamp to illuminate in the following cases:

- During initial check when the ignition switch is at the "ON" position (for approximately 3 seconds)
- When a problem happens in the ABS/EBD system
- Poor ABS-ECU connector connection

HYDRAULIC UNIT

The hydraulic unit is basically the same as that of the 1999 PAJERO io <General Export>/2000 PAJERO PININ <Europe>.

ABS-ECU

The ABS-ECU is basically the same as that of the 1999 PAJERO io <General Export>/2000 PAJERO PININ <Europe> except for the followings:

FAIL-SAFE FUNCTION

Diagnosis code No.	Item
11	Open circuit or short-circuit in wheel speed sensor (FR)
12	Open circuit or short-circuit in wheel speed sensor (FL)
13	Open circuit or short-circuit in wheel speed sensor (RR)
14	Open circuit or short-circuit in wheel speed sensor (RL)
16	Abnormal drop or rise in ABS-ECU power supply voltage
21	Wheel speed sensor (FR) system
22	Wheel speed sensor (FL) system
23	Wheel speed sensor (RR) system
24	Wheel speed sensor (RL) system
32	Longitudinal G sensor system
41	Solenoid valve (FR) system
42	Solenoid valve (FL) system
43	Solenoid valve (RR) system
44	Solenoid valve (RL) system
51	Valve relay ON problem
52	Valve relay OFF problem
53	Motor relay OFF problem
54	Motor relay ON problem
55	Motor system
63	ABS-ECU abnormality
71	Lateral G sensor system
81	Steering wheel sensor (ST-1) system
82	Steering wheel sensor (ST-2) system
83	Steering wheel sensor (ST-N) system

DATA LIST REFERENCE TABLE

Item No.	Check item	Display unit or words
11	Front-right wheel speed sensor	km/h
12	Front-left wheel speed sensor	
13	Rear-right wheel speed sensor	
14	Rear-left wheel speed sensor	
21	Power supply voltage	V
29	Parking brake switch	ON/OFF
36	Stop lamp switch	ON/OFF
37	Steering wheel sensor straight ahead position memory	ON/OFF

Item No.	Check item	Display unit or words
71	Lateral G sensor	V
74	Steering wheel sensor (ST-N)	ON/OFF
75	Steering wheel sensor (ST-1)	
76	Steering wheel sensor (ST-2)	
86	Steering angle	° or OFF (When the steering angle is straight ahead position)

SYSTEM OPERATION

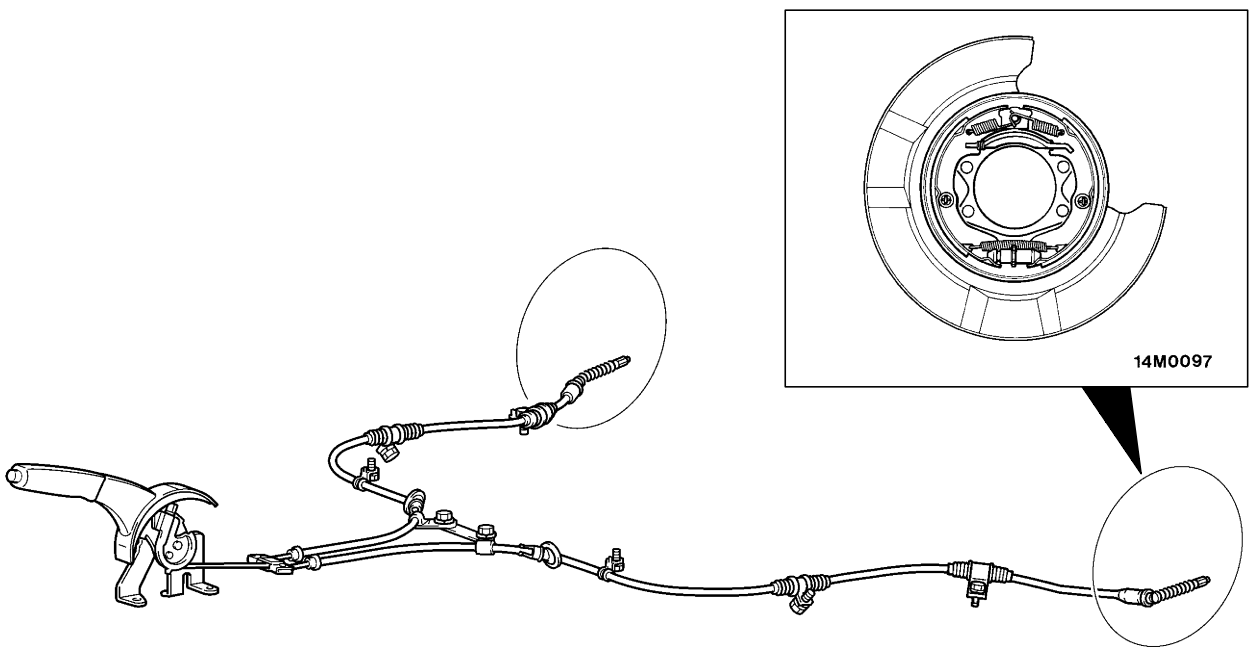
In terms of operation, the system is basically the same as that of the 1996 Colt/Lancer.

PARKING BRAKE

FEATURES

The parking brakes are a mechanical rear wheel brake design and controlled by a lever.

CONSTRUCTION DIAGRAM



Y2351AU

NOTES

BODY

CONTENTS

GENERAL DESCRIPTION

FEATURES

Weight reduction
1. Use of high-tensile steel panels and steel plate with uneven thickness
2. Use of aluminum for fender and hood

High rigidity
1. Use of high-tensile steel panels and steel plate with uneven thickness
2. Equipped with 3-point installing strut tower bar and rear end cross bar<RS>

Reduction of vibration, noise, and aerodynamic noise
Effective layout of acoustic materials and sound proof materials

Improvements in safety
1. Unbreakable resin materials at the door trim on the occasion of impact have been adopted to protect passengers from the side impact of the vehicle.
2. One-touch power windows with safety mechanism (with the function to be enabled after the ignition key is turned to the OFF position) have been installed. <RS: option, RS-II: standard>
3. Inside lock cables have been adopted at the front doors to improve safety on the occasion of impact.
4. Side door beams have been adopted to improve safety on the occasion of impact.

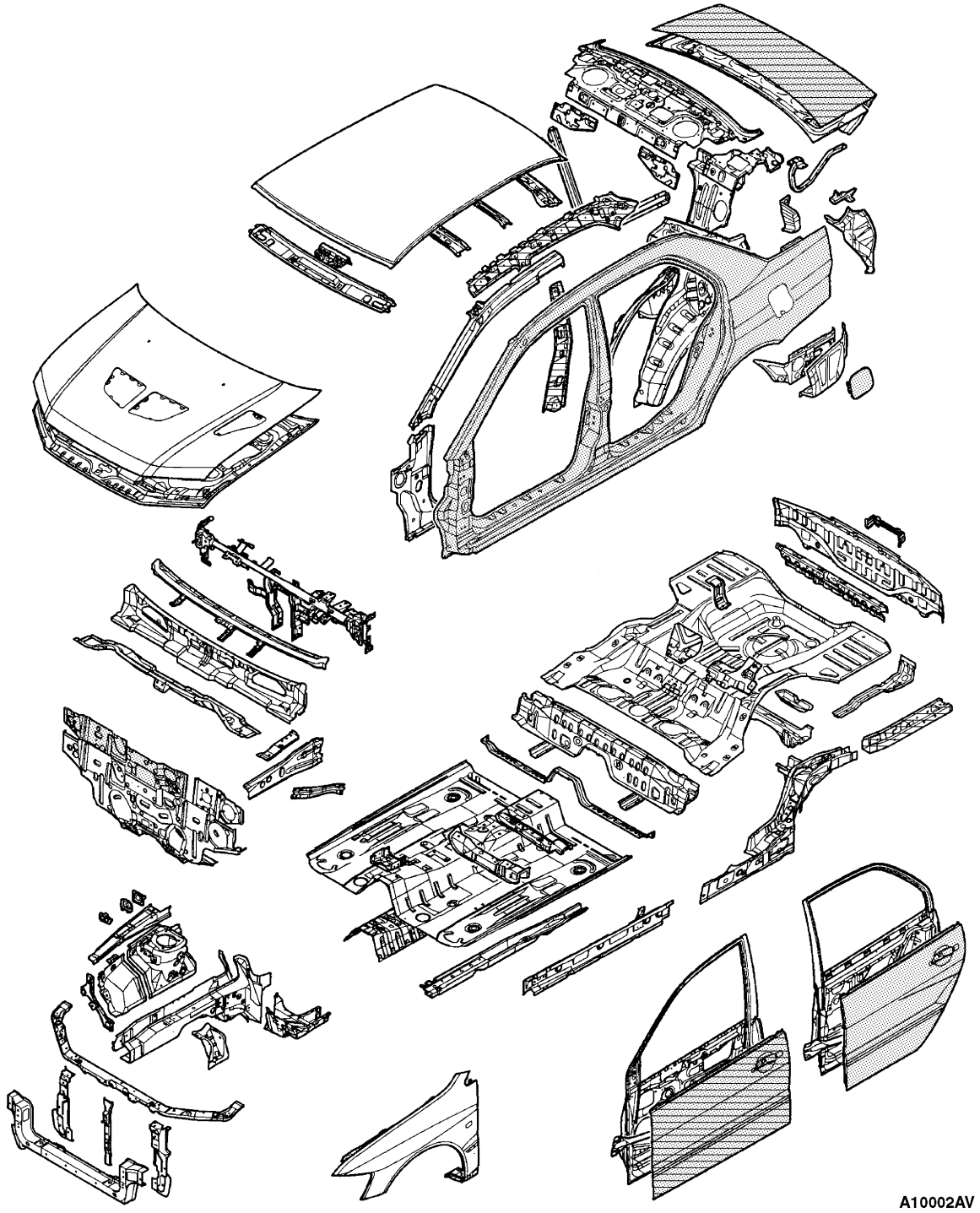
Improvements in operation quality
1. The central door lock system to lock/unlock all doors has been installed. <RS: option, RS-II: standard>
2. High rigidity in the suspension mounting part

Improvements in convenience
1. Hinge protrusion to the loading space has been reduced by reducing the size of the trunk lid hinge.
2. Adoption of larger front door pockets

MAIN BODY

BODY PANELING

The body has been given enhanced impact safety performance. It has been made lighter by adopting aluminum alloy panels for the hood panel and front fender.

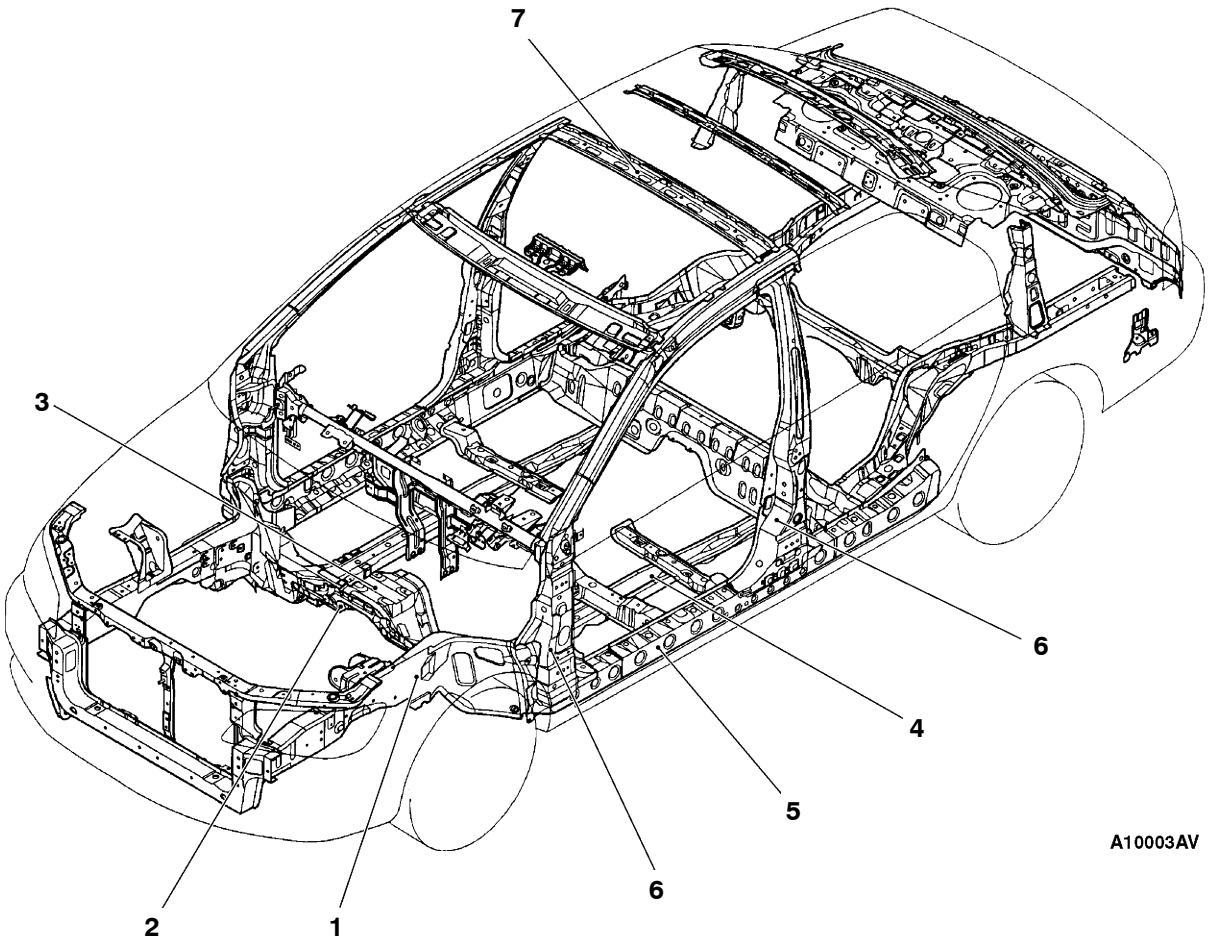


: Anti-corrosion steel panels
: High-tensile steel panels

BODY SHELL

IMPACT SAFETY BODY

The following structure ensures survival space during impact and facilitaty to rescue passengers.
1. Application of enlarged and linear cross section of front side member
2. Addition of dash panel cross member
3. Application of thicker dash panel lower
4. Application of enlarged cross section of front floor side member
5. Application of enlarged cross section of side sill outer reinforcement
6. Application of thicker front pillar reinforcement and center pillar reinforcement
7. Application of enlarged cross section of roof bow



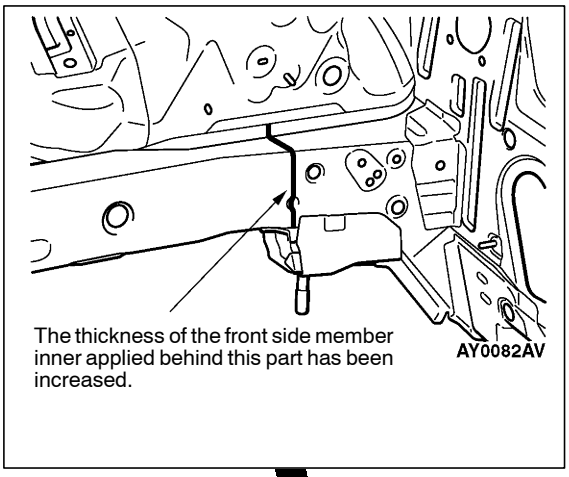
STEEL PLATE WITH UNEVEN THICKNESS

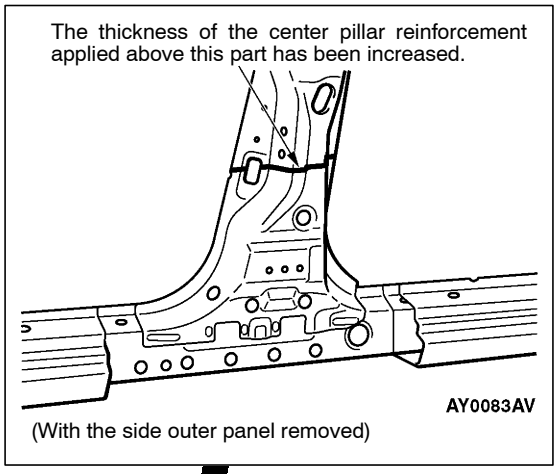
Due to the adoption of steel plate with uneven thickness* for the following parts, the incorporate structure of uneven thickness has improved impact safety and has reduced weight.

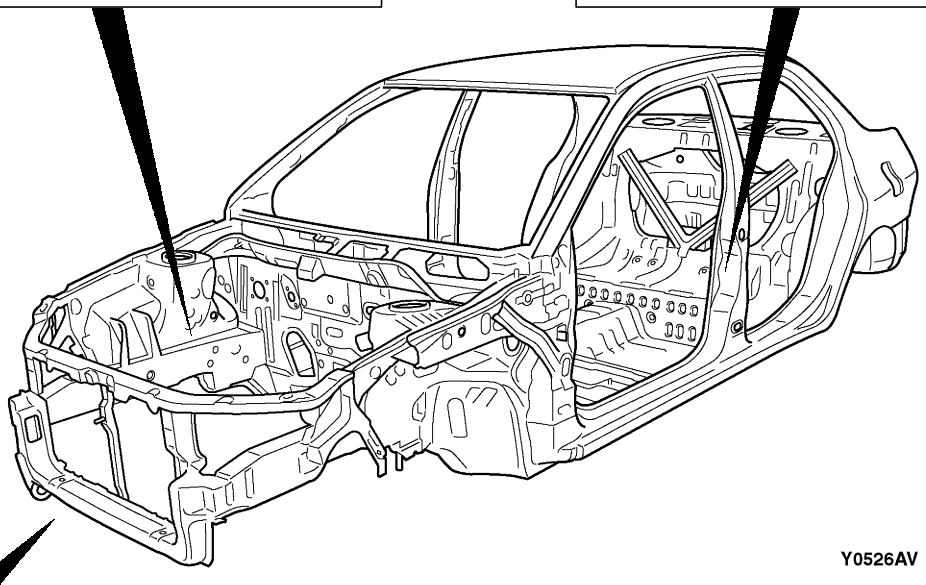
1. The thickness of the front end crossmember outer applied at the right side of the vehicle has been increased.
2. The thickness of the front side member inner applied at the rear has been increased.
3. The thickness of the center pillar reinforcement applied at the upper has been increased.

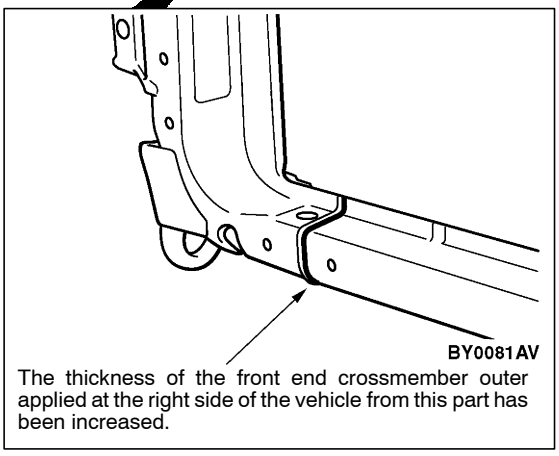
NOTE

*: Steel plates with different thickness welded together to make one steel plate





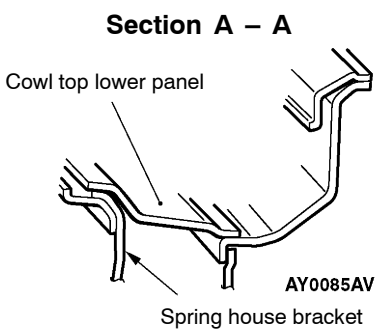


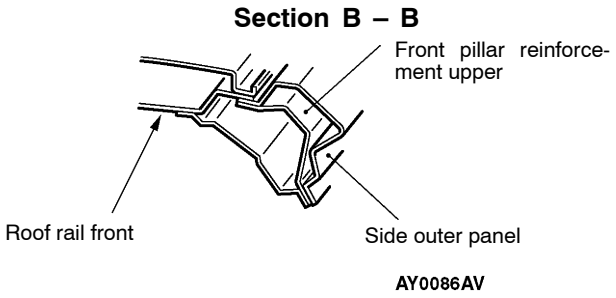


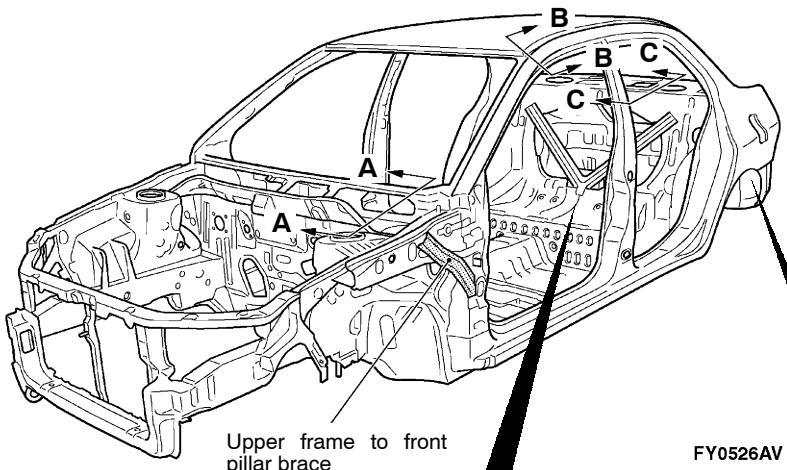
OPERATIONAL STABILITY

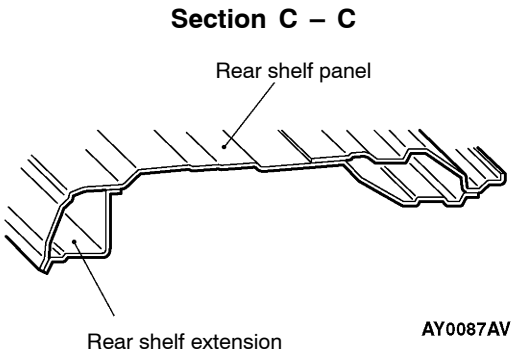
The adoption of the following structure to increase rigidity of the suspension mounting part has improved driving stability and has reduced noise from the road.

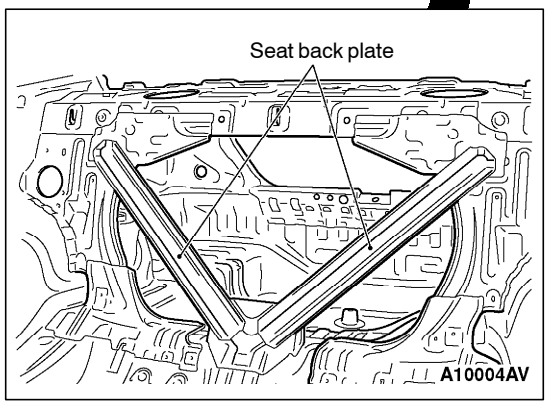
1. By directly joining a spring house bracket with increased thickness to the cowl top lower panel, and adding an upper frame to the front pillar brace, the rigidity of the top, bottom, left, and right sides of the front suspension has been improved.
2. The roof rail front, front pillar reinforcement upper, and side outer panel have been joined with each other to increase torsion rigidity.
3. A closed surface structure is given by adding a rear shelf extension to the front of the rear shelf, and the top of the rear shelf and rear wheel house have been additionally joined with a rear pillar reinforcement, and the rear shelf and rear floor with a seat back plate to improve twisting rigidity.
4. Additional welded position of the door opening improves twisting rigidity.

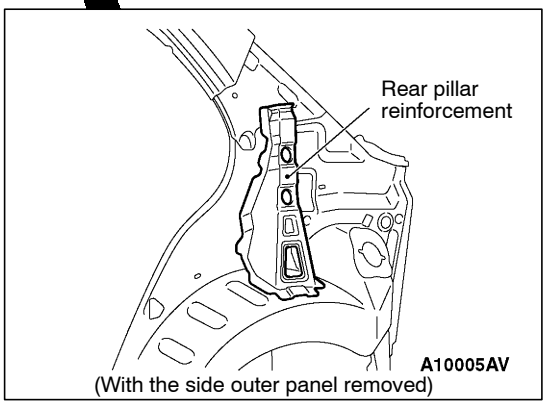








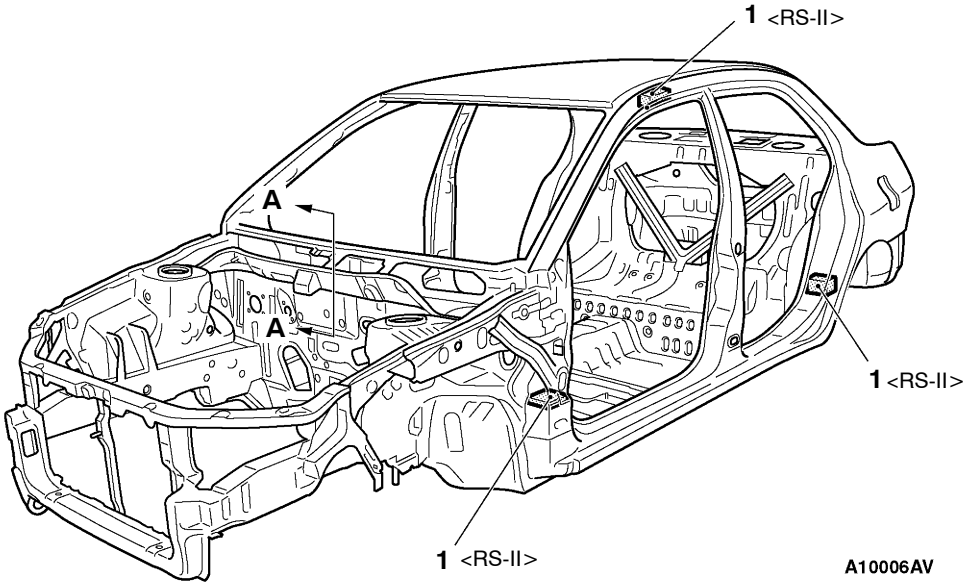




QUIETNESS

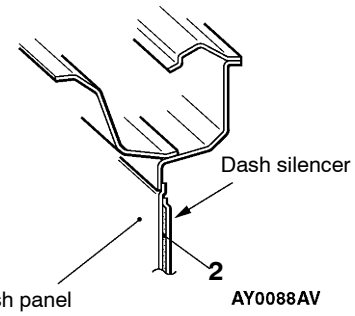
The adoption of the following items has improved quietness.

1. Foaming sound absorption materials have been filled into the front pillar, the roof side rail, the center pillar, the rear pillar, and the inside the wheel house arch to prevent noise getting inside the vehicle.
2. Steel plate restricted anti-vibration materials (silencer sandwiched inside the panel) has been adopted to suppress operating sound and the vibration from the engine.
3. Urethane foam has been inserted into the center pillar to prevent noise getting into the vehicle.

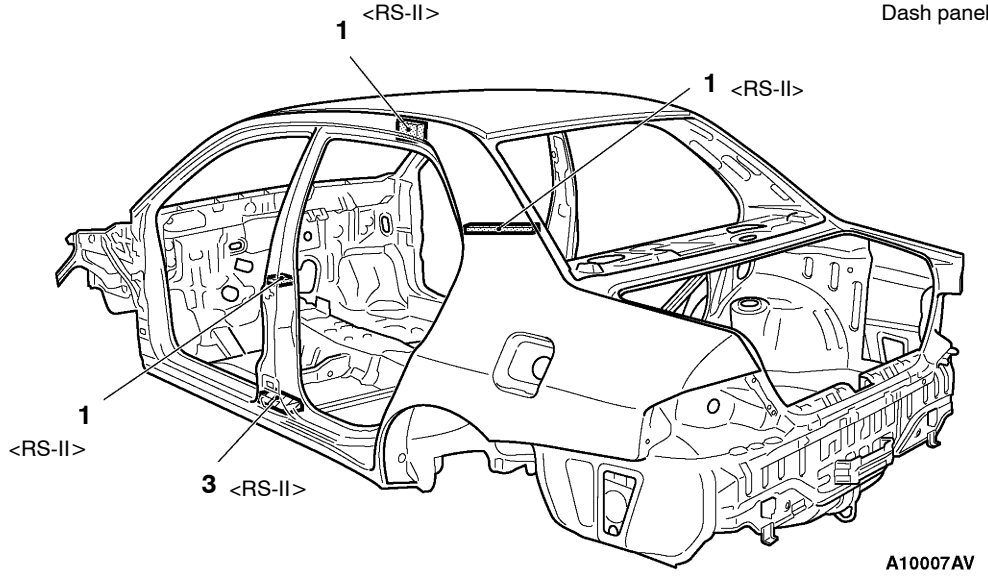


A10006AV

Section A – A



AY0088AV



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BODY COLOUR CHARTS

Colour	Body colour code	Colour number	Body colour name	Composition of film	Engine compartment and luggage compartment colour	
					Colour number	Colour name
SILVER	A69	AC11169	Satellite Silver	Metallic	AC10595	GRAY
BRIGHT BLUE	T10	CMT10010	French Blue	Solid	CMB17004	BRIGHT BLUE
BLACK	X42	AC11342	Amethyst Black	Interference Pearl	AC10903	BLACK
WHITE	W83	AC10983	Scotia White	Solid	AC10863	WHITE
RED	P85	AC11185	Palma Red	Solid	AC10795	RED
YELLOW	Y01	CMY10001	Dandelion Yellow	Solid	AC10911	YELLOW

NEW COLOUR NUMBER

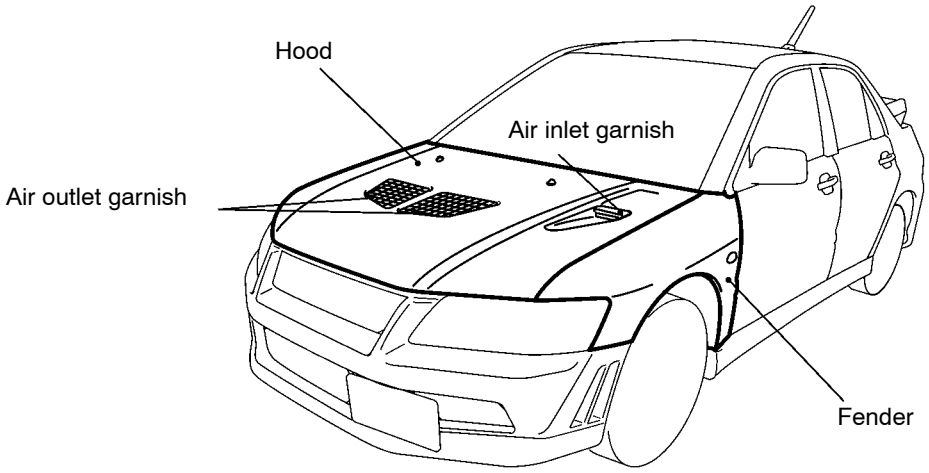
Example **C** **M** **T** **10** **010** **(Body colour code T10)**

1 2 3 4 5

No.	Item	Content
1	Identification code	C: The colour number is indicated.
2	Manufacture center code	M: Japan (Automobile Engineering Center) T: Japan (Truck and Bus Engineering Center)
3	System colour code	W (N): White H (A, U): Silver/Gray X (J): Black R (P): Red Y (C, S, E, M, K): Brown/Yellow (including Orange, Maroon, and Gold) G (F, L): Green/Olive B (T, D): Blue V: Purple ( ) Codes within the parenthesis can be also used.
4	Colour classification code	From 10 to 16: The body colour is indicated. 17: The body inner panel colour is indicated.
5	Specific number	Serial number numbering management

HOOD AND FENDER

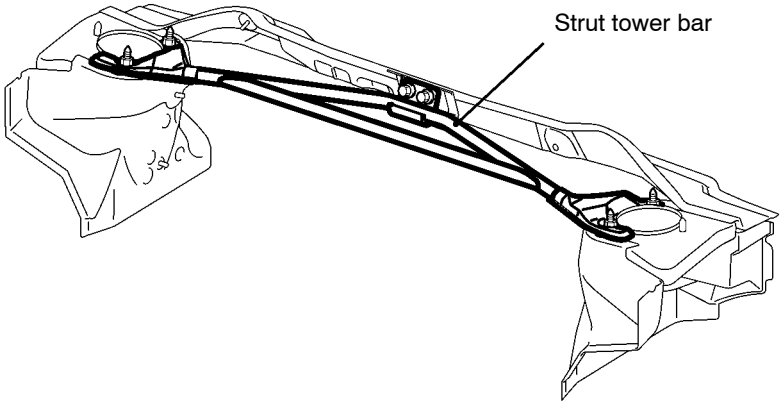
The body has been made lightweight with the use of aluminum hood and fender. The hood has also been equipped with the air outlet and air inlet garnish.



AY1874AU

STRUT TOWER BAR

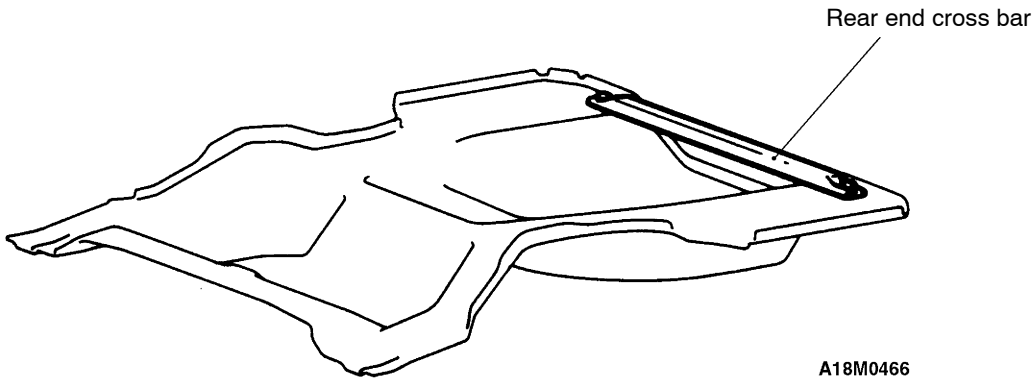
The strut installing portion has been equipped with a 3-point installing strut tower bar to improve body rigidity.



UY1895AU

REAR END CROSS BAR <RS>

The rear floor pan has been equipped with a rear end cross bar to improve body rigidity.



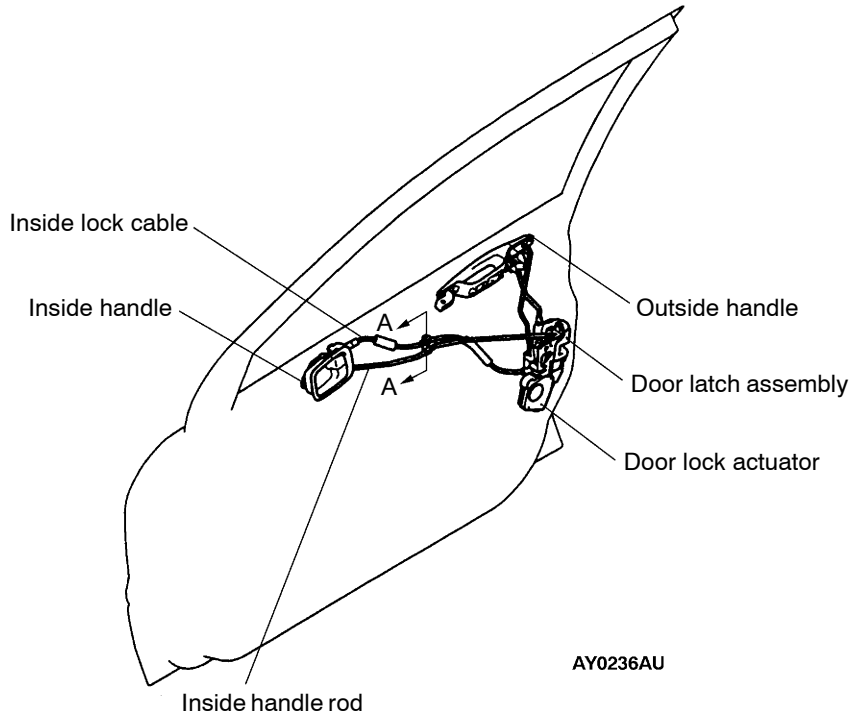
DOOR

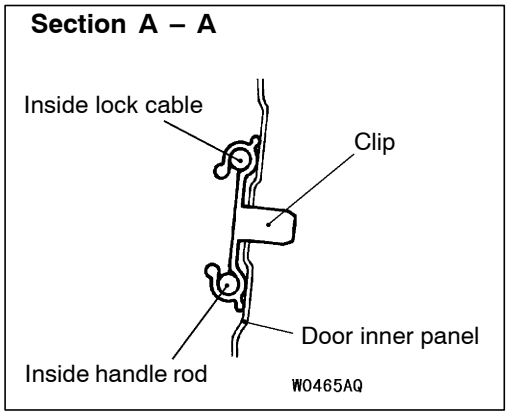
DOOR LOCK

The central door lock to lock/unlock all doors with a key cylinder at the driver's door has been installed. <RS: option, RS-II: standard>

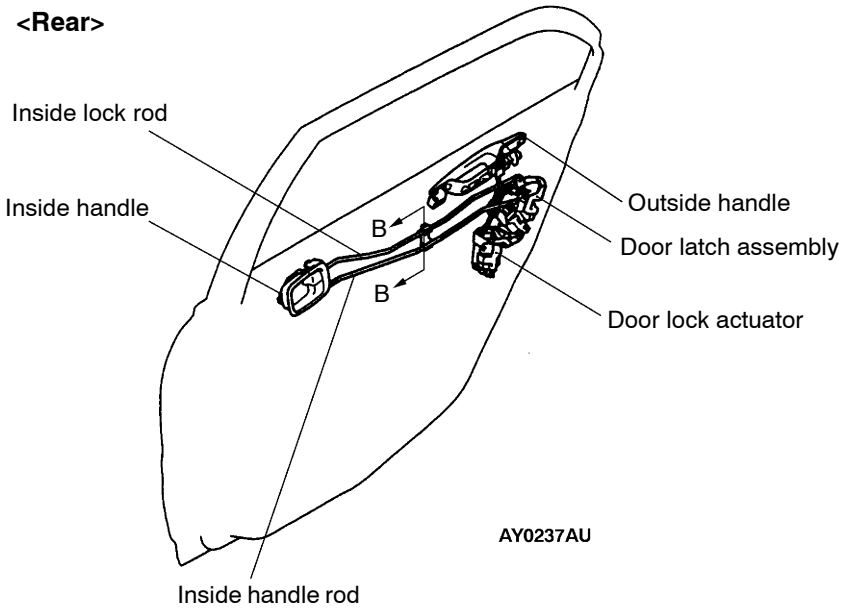
CONSTRUCTION DIAGRAM

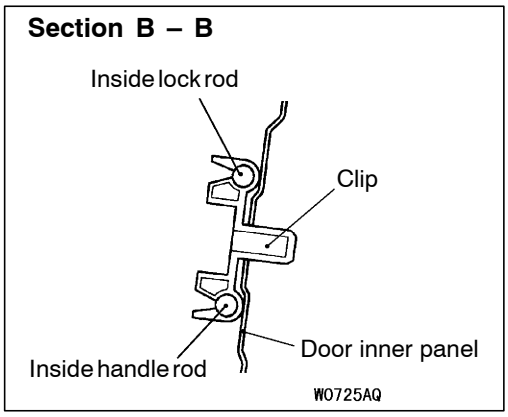
<Front>





<Rear>



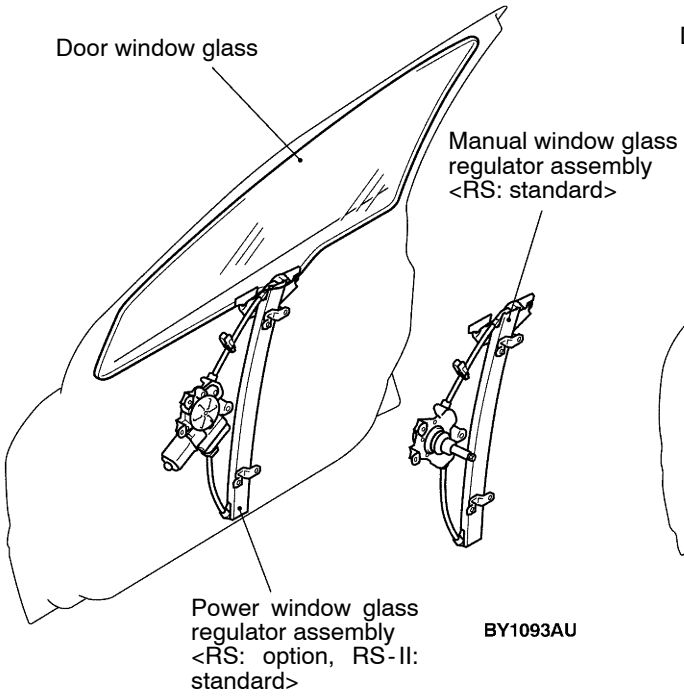


WINDOW GLASS REGULATOR

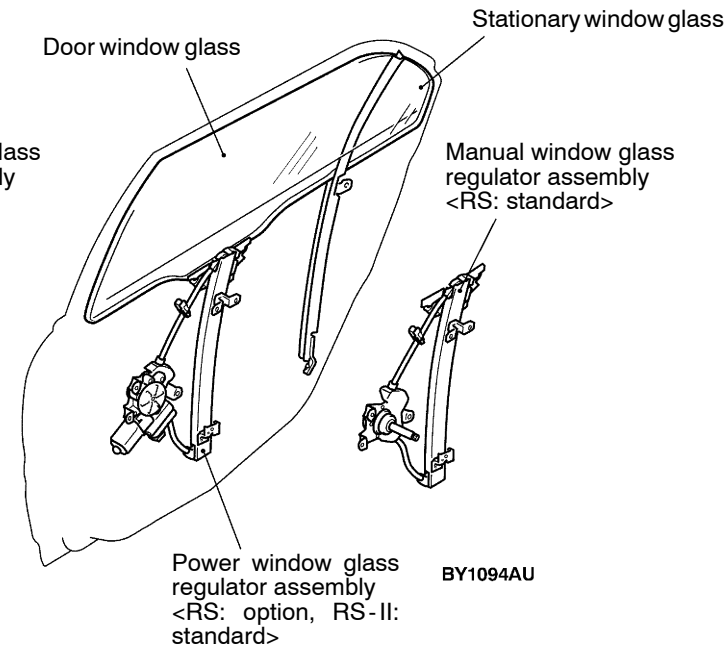
1. Small-size and lightweight wire winding style has been adopted for the window glass regulator.
2. The power window with the safety function to activate the descending movement of the door window glass for 150 mm when jammed hand or neck is detected during the ascending movement of the door window glass has been adopted to increase safety.
3. The operation method of the power window switch in which the switch knob is pressed to activate the descending movement of the door window glass and the pulled up to activate the ascending movement has been adopted to increase safety.
4. The one-touch mechanism to fully open and close windows has been adopted for the power window switch located at the driver's seat side. Furthermore, the lock switch to prevent the opening and closing operations of the door window glasses by the power window switches located at the passenger's seat side and rear seats has been featured.
5. Smart wiring system (SWS) has been adopted for signal transmission to the main switch at the power window. (Refer to GROUP 7 – SWS.)
6. After the ignition switch is turned to the LOCK (OFF) position, window glasses can be opened and closed with the timer function (30 seconds) of the power window. (If the driver's door is open during that particular time, window glasses can be opened and closed for another 30 seconds. However, as soon as the door is closed, the key off operation function is disabled.)

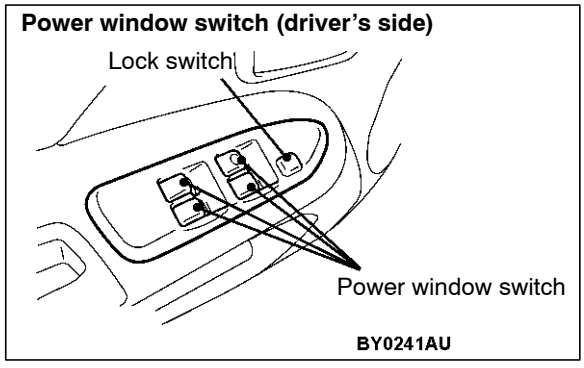
CONSTRUCTION DIAGRAM

<Front>



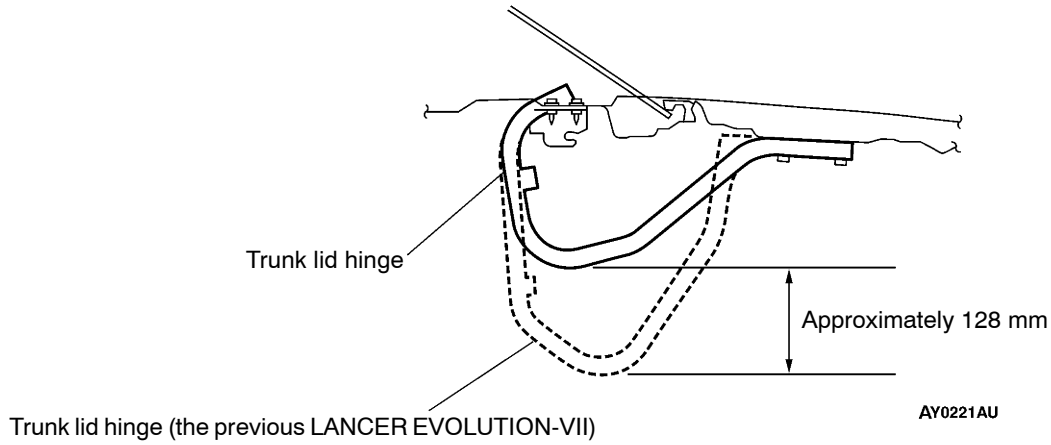
<Rear>





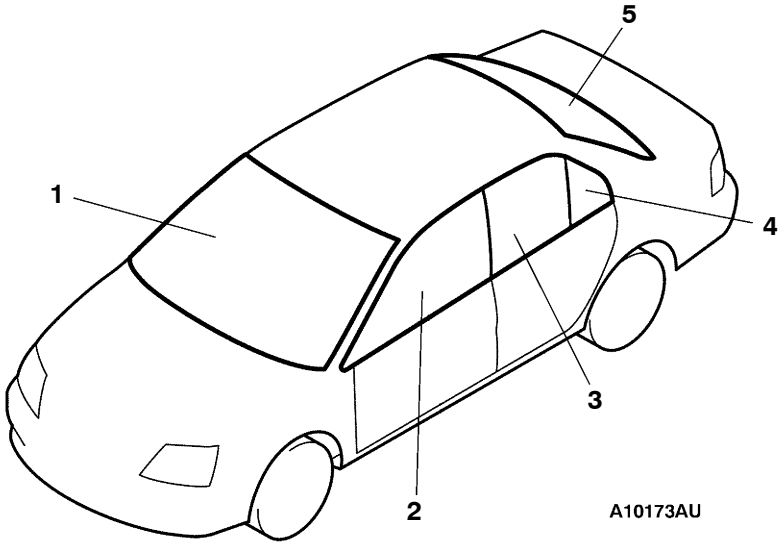
TRUNK LID

Downsizing of the trunk lid hinge and reduction of the hinge protrusion has increased practicality.



WINDOW GLASS

Laminated glasses for the windshield and tempered glasses for other areas have been used.



No.	Name	Type	Thickness (mm)	Coloration	Visible ray transmissivity rate (%)
1	Windshield	Laminated glass	4.3	Green	80.5
2	Front door window glass	Tempered glass	3.1	Green (UV shade glass)	82.0
3	Rear door window glass		3.1	Green	82.0
4	Rear stationary window glass		3.1	Green	82.0
5	Rear window glass		3.1	Green	82.3

NOTE

- The figure at the visible ray transmissivity is a reference value. There could be marginal errors.

NOTES

EXTERIOR

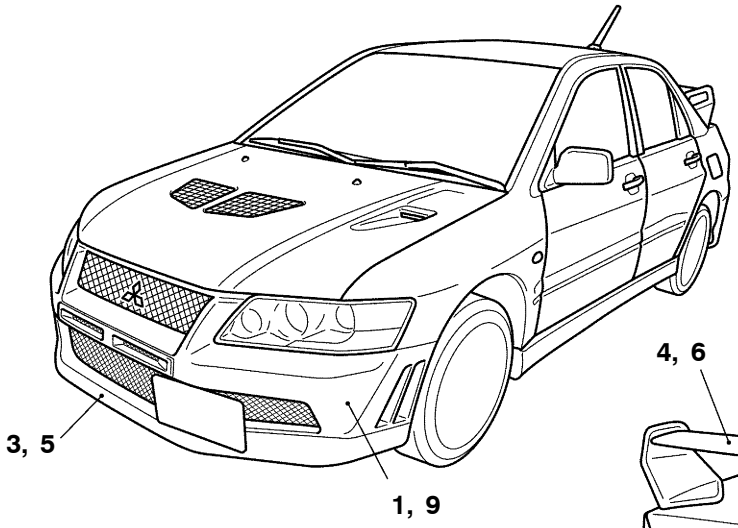
CONTENTS

SUMMARY OF EXTERIOR PARTS

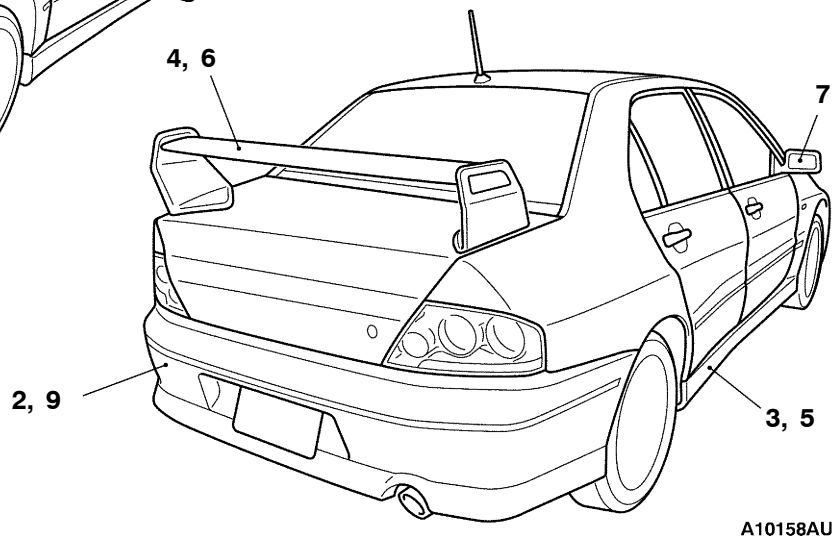
Sophisticated and bold exterior designs have been given to every detail.

FEATURE

Improvements in appearance	1.	A radiator grill integrated front bumper has been equipped.
	2.	An air dam integrated rear bumper has been equipped.
	3.	Air dams have been installed to the front, and side areas.
	4.	An elevation-adjustable large rear spoiler has been adopted.
Improvements in aerodynamic characteristics	5.	Air dams have been installed to the front, and side areas.
	6.	An elevation-adjustable large rear spoiler has been adopted.
Improvements in usability	7.	A power remote control type <RS-II>, or manual type <RS> outside mirror has been installed.
Measures for resource recycle	8.	Material identification mark engraving to resin parts and materials (PP) for easy recycling have been actively used.
Weight reduction	9.	PP has been used for bumper faces.



A10170AU

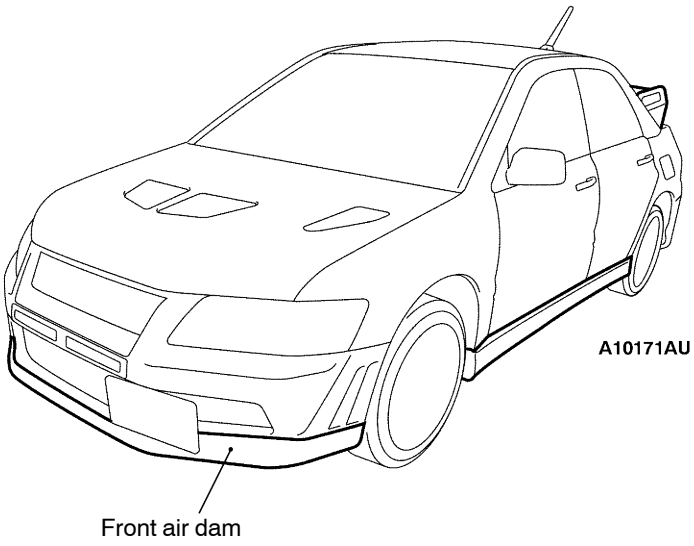


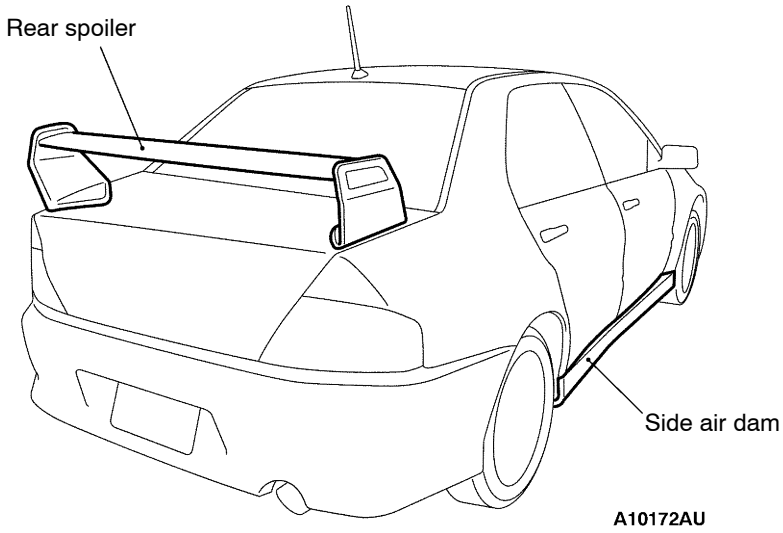
A10158AU

AERO PARTS

Installation of airdams and elevation-adjustable large rear spoilers have improved aerodynamic characteristics and appearance.

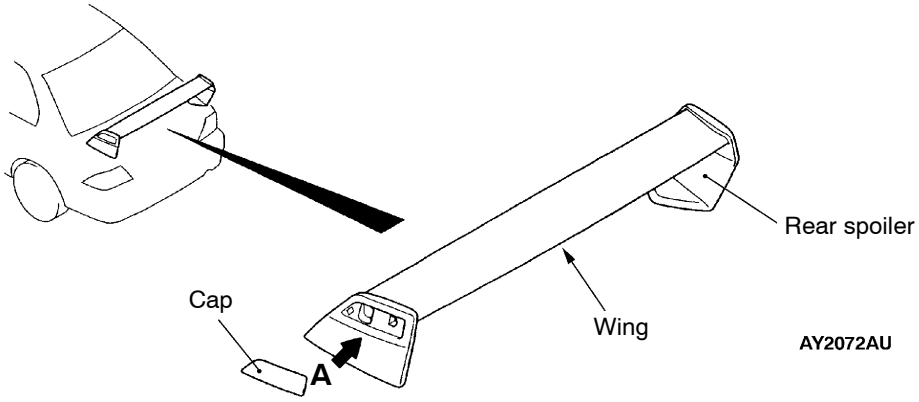
CONSTRUCTION DIAGRAM

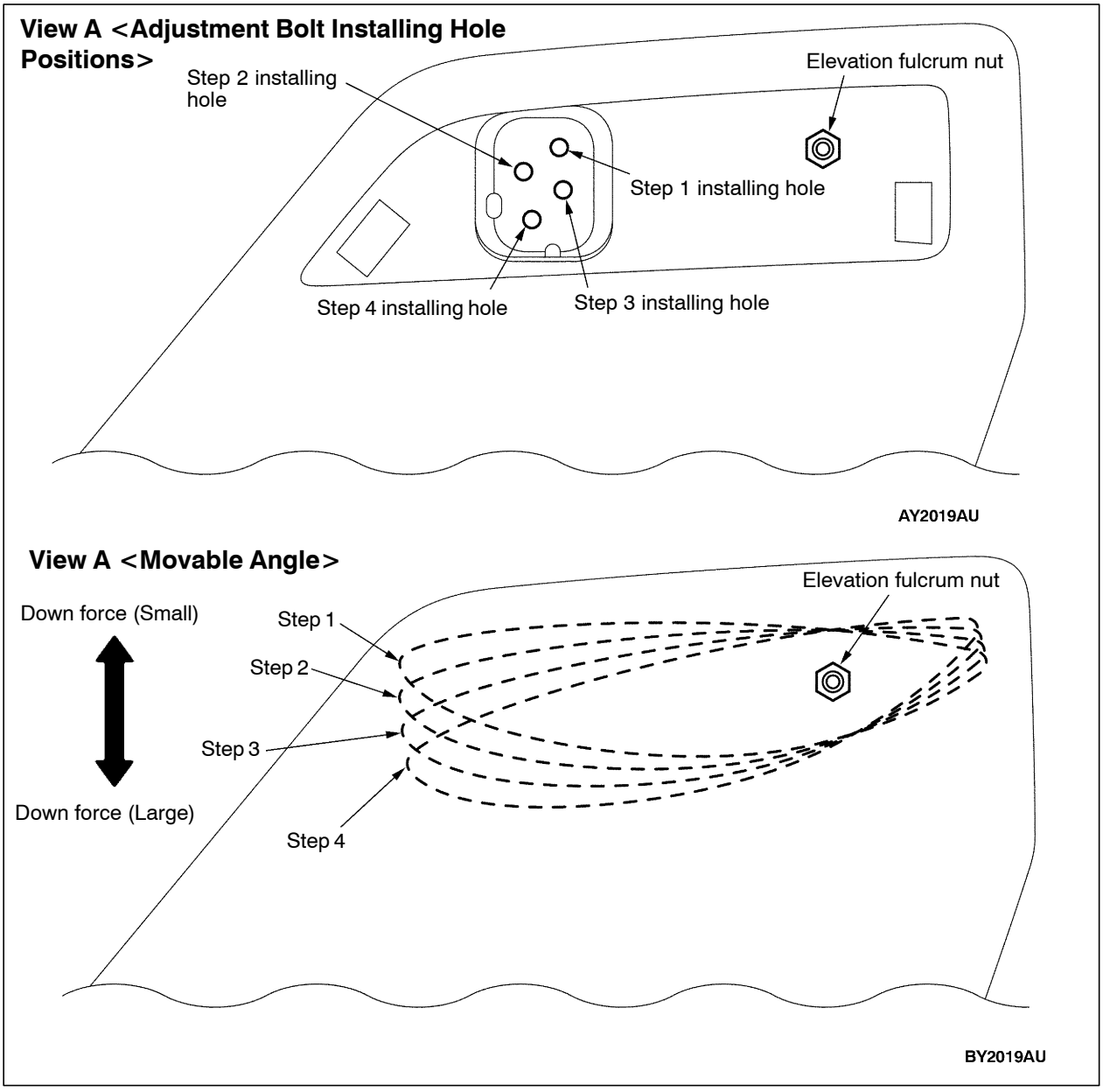




ELEVATION-ADJUSTABLE LARGE REAR SPOILER

Remove the cap of the rear spoiler, loosen the elevation fulcrum nut, and change the four installing holes of the adjustment bolts to adjust the elevation of the spoiler wing according to the driving conditions.

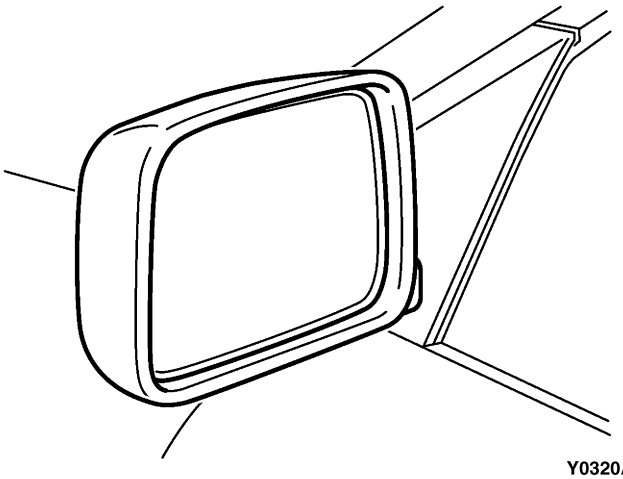




OUTSIDE MIRROR

A power remote control type <RS-II>, or manual type <RS> outside mirror has been installed.

CONSTRUCTION DIAGRAM



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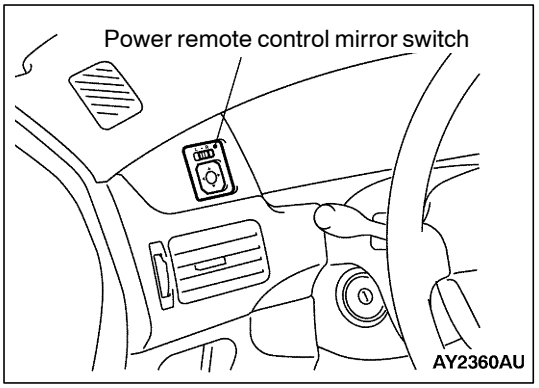
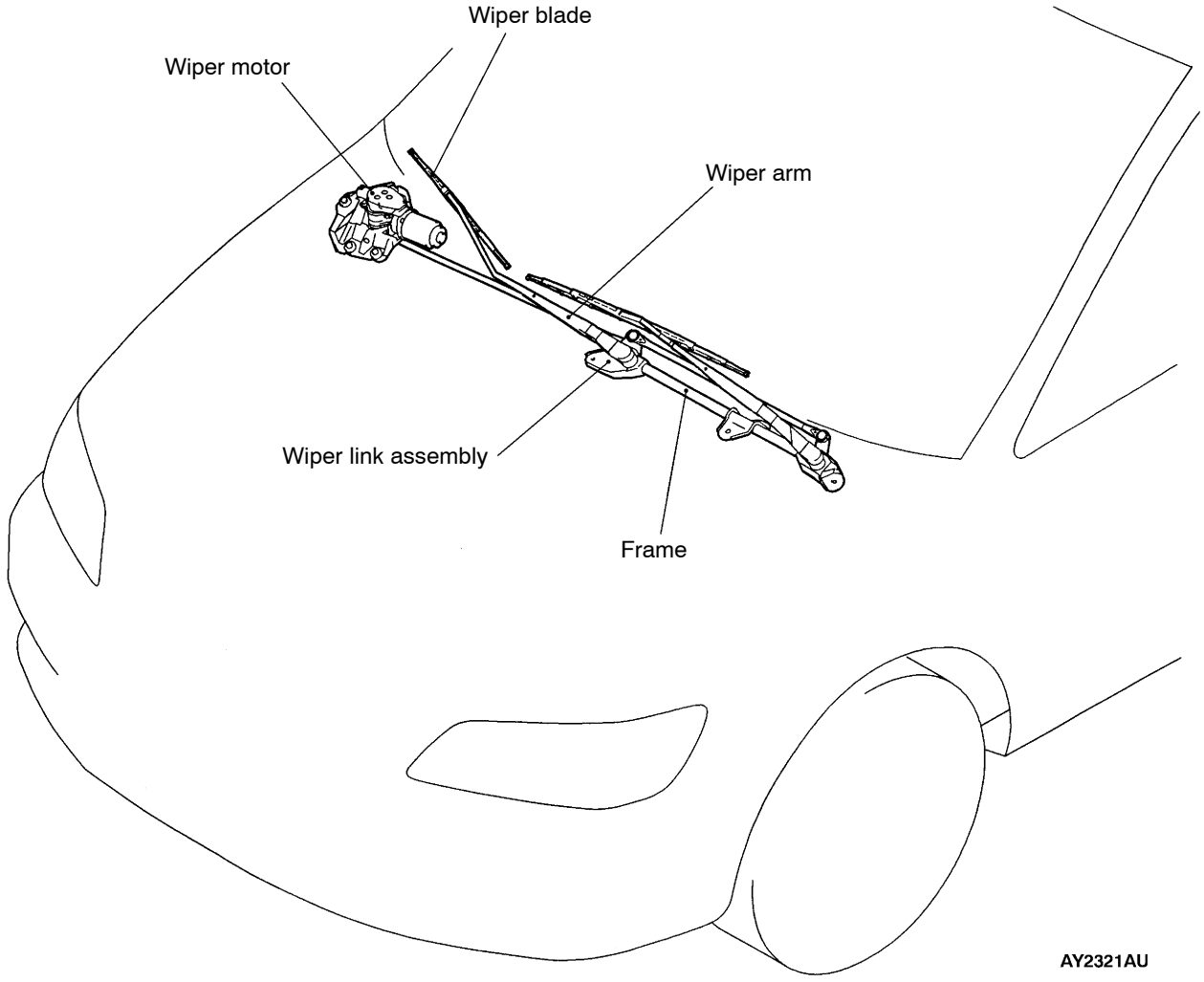


WIPER AND WASHER

WINDSHIELD WIPER

- Two-speed type windshield wipers to be operable in a low or high speed have been adopted.
- Intermittent wipers with the variable intermittent time have been adopted.
- Due to the installation of wiper link assembly with frames, higher rigidity of link assembly has achieved reduction of incomplete cleaning by smoother wiper operation and improvements in quiet wiper operation.
- The adoption of mist wiper function to turn the mist switch in the opposite direction of the wiper switch movement has improved easiness-to-use. The wipers operate in a high speed while the mist switch is turned to the ON position. When the mist switch is turned to the OFF position, the speed of wiper operation becomes slow and the wipers move to the stop position. When the mist switch is turned to the ON position for a moment, the wipers operate once in a low speed.

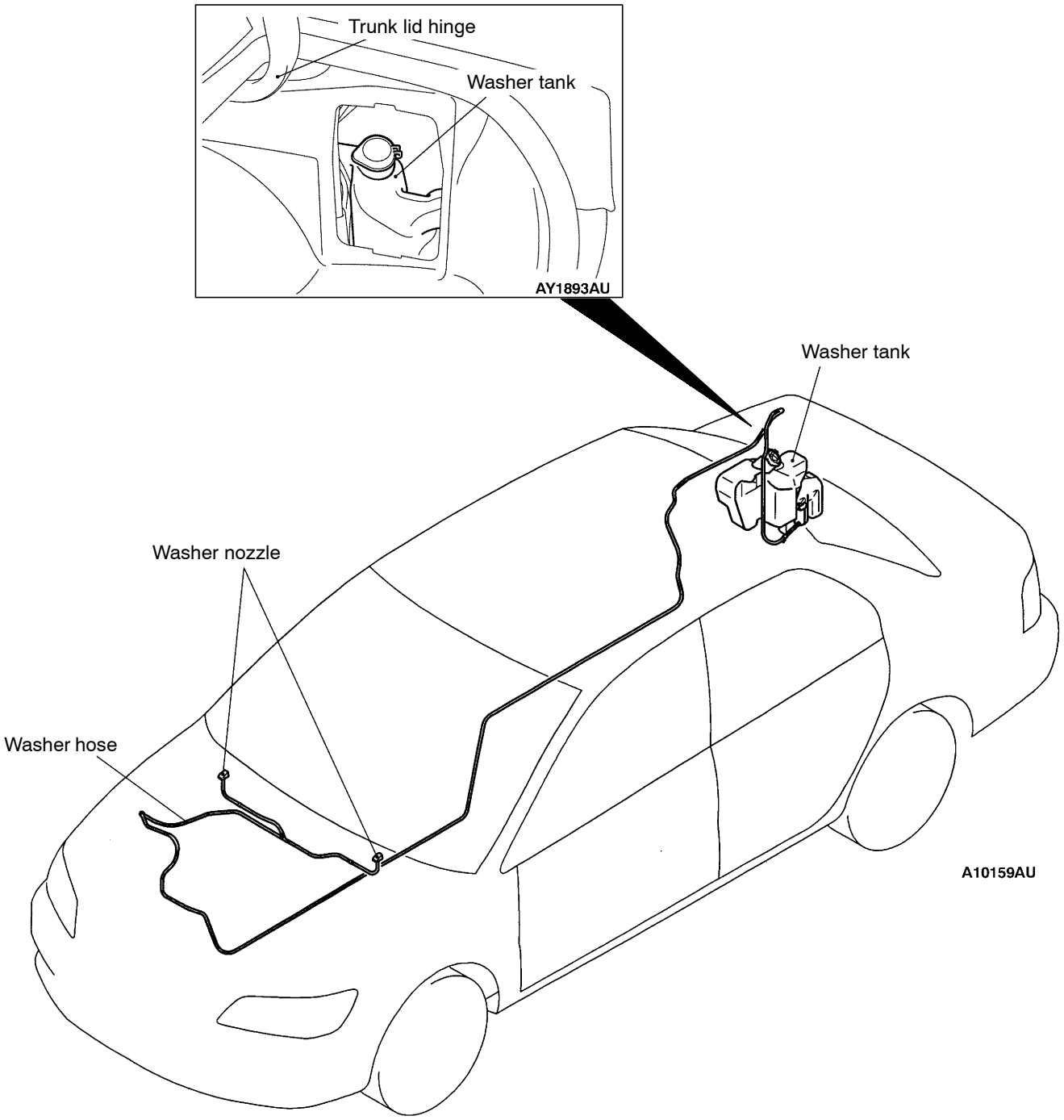
CONSTRUCTION DIAGRAM



WINDSHIELD WASHER

- 2-nozzle and 4-jet type indoor shield washers have been installed. Furthermore, the wiper related to washers function has been adopted.
- A washer tank has been installed in the trunk room.

CONSTRUCTION DIAGRAM



NOTES

INTERIOR

CONTENTS

GENERAL INFORMATION

The interiors to value functionality, habitation, and safety brings a new sense of good quality and security. Furthermore, it is also intended for getting actively involved with global environmental protection and natural resource recycling.

FEATURES

Improvements in quality	Fully trim-covered interior
Consideration for the most suitable riding posture	1. The adjustable seat belt anchor has been installed to the front seat belt. 2. RECARO seat have been equipped. <RS-II>
Improvements in safety	1. SRS air bags (driver's/front passenger's) are equipped as standard. 2. Installation of ELR 3-point seat belt (front seat) 3. ELR 3-point seat belt/seat belt with child seat fixing mechanism (ALR) switching function have been equipped (rear seat). 4. Seat belts with pretensioner force limiter mechanism have been equipped to the front seats. 5. Head impact reduction pillar trim 6. Folding assistant grip 7. Inflammable materials are used for instrumental panel, floor console, and trims.
Improvements in usability	Vanity mirror <RS-II>
Convenient storage	1. Glove box 2. Center panel box <RS-II> 3. Cup holder
Dealing with resource recycling	Display of material codes to resin parts

INSTRUMENT PANEL AND FLOOR CONSOLE

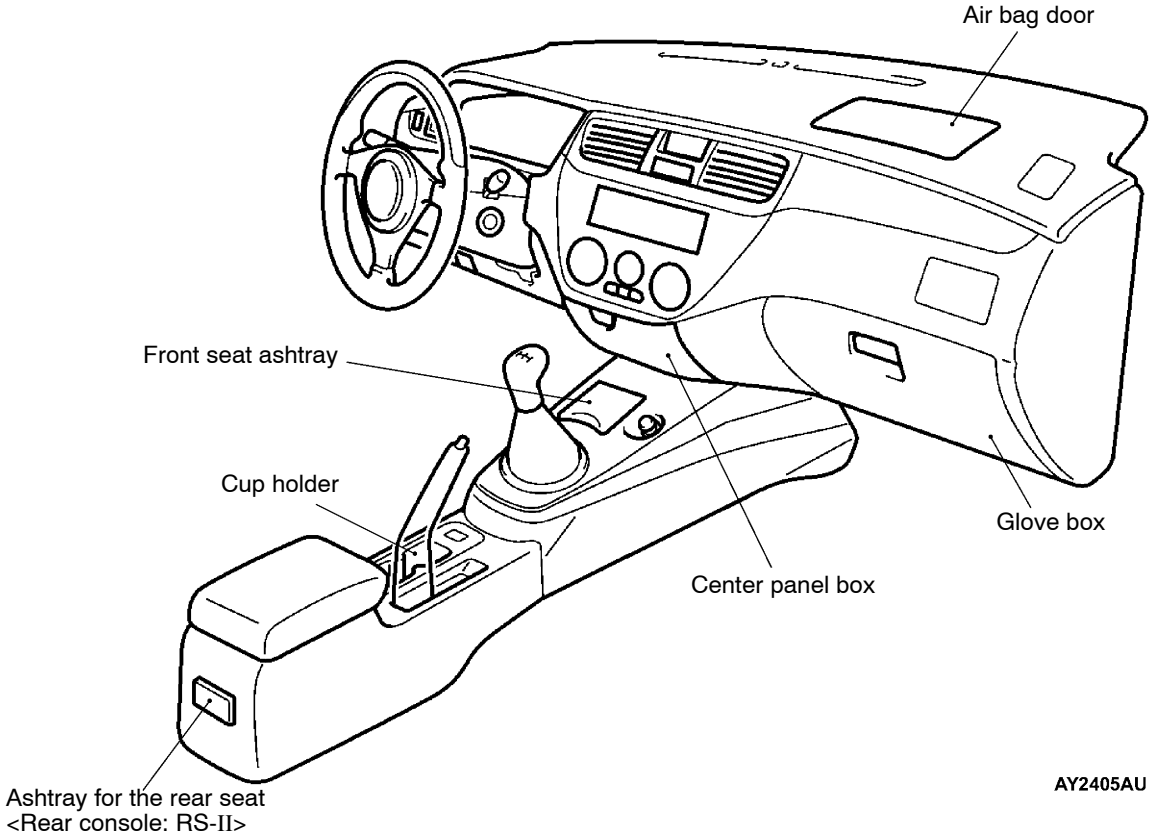
The instrument panel and the floor console have the following features:

- The center panel with a new sense of design incorporate the instrument panel has been adopted.
- The considerably tilted center panel has enhanced a sense of emancipation and operability.
- A center panel box convenient for storing accessories has been installed. <RS-II>
- The push-to-open type lid to the center panel box has been installed. <RS-II>
- Hair transplant has been done inside the center panel box to prevent the stored goods from being damaged. <RS-II>
- A pad incorporating the front passenger's air bag door has improved appearance.
- A glove compartment convenient for accessories has been installed.
- A cup holder has been installed to the floor console.
- Ashtrays have been installed to the front and the rear console. <Rear console: RS-II>

Inflammable materials are used for the instrument panel and the floor console to increase safety as interiors.

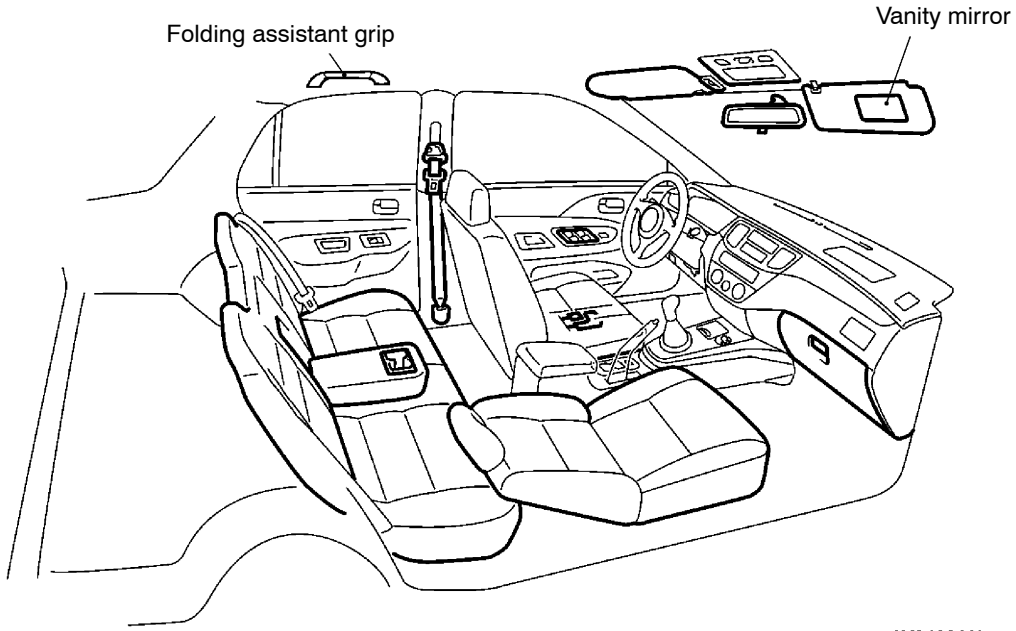
Also, material codes are indicated to deal with recycling easily.

CONSTRUCTION DIAGRAM



ACCESSORIES

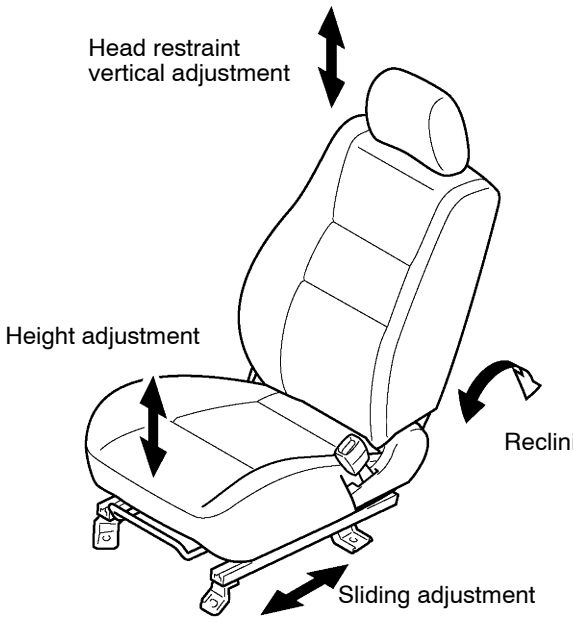
- A vanity mirror has been installed to improve usability. <RS-II>
- A folding assistant grip has been installed to improve safety.



SEAT

FRONT SEAT

- The most suitable driving position can be set by the sliding and reclining mechanism. <RS>
- Height adjustment function to secure the most suitable driving posture has been adopted at the driver's seat. <RS>
- RECARO seat adopting non-step adjustment slide and reclining mechanism have been equipped. <RS-II>



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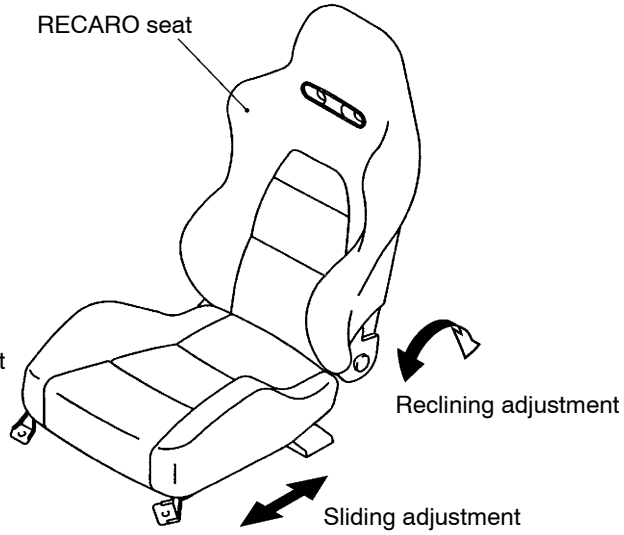
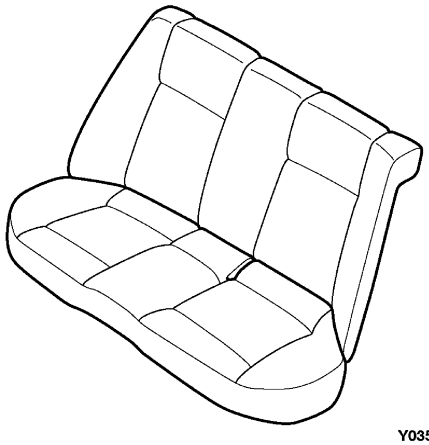


BY2205AU

REAR SEAT

- The rear seats have been set with the low back bench seat.

<Low back bench seat>



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SEAT BELT

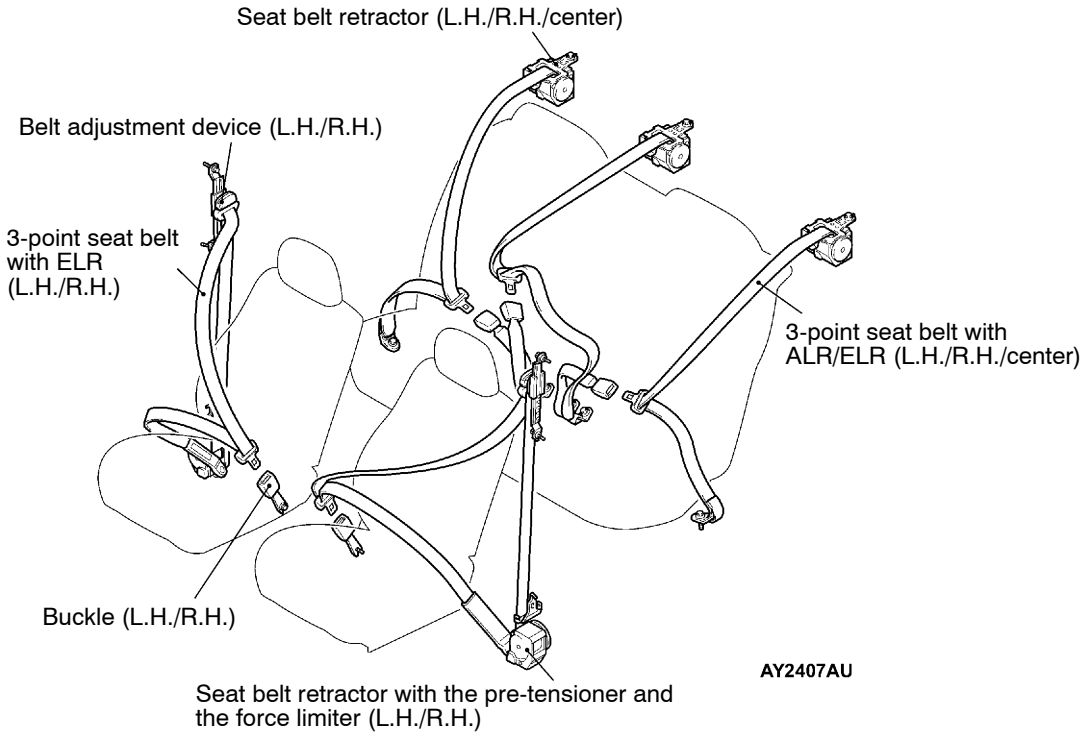
FRONT SEAT BELT

- The adoption of 3-point seat belt with ELR which has belt adjustment device for height and the buckle fixed at the seat have secured the most suitable fitting for the wearer.
- The seat belt retractor with the pre-tensioner and the force limiter for the driver's seat and the front passenger's seat has been adopted to improve safety.

REAR SEAT BELT

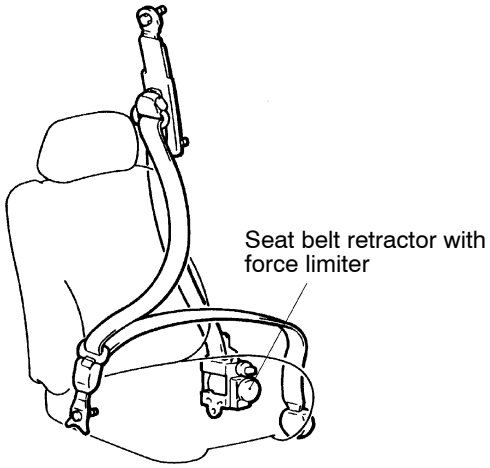
- 3-point seat belts with ALR/ELR (L.H./R.H./center) have been installed.

CONSTRUCTION DIAGRAM

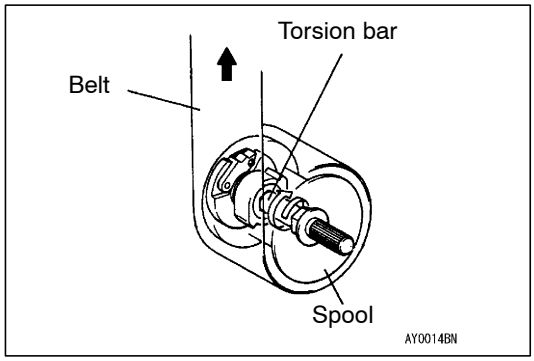


SEAT BELT RETRACTOR WITH FORCE LIMITER

The driver's/front passenger's seat belt retractor has been equipped with a force limiter. The force limiter is a device which operates when a predetermined force is applied, and limits the force.



AW0403AU



AY0014BN

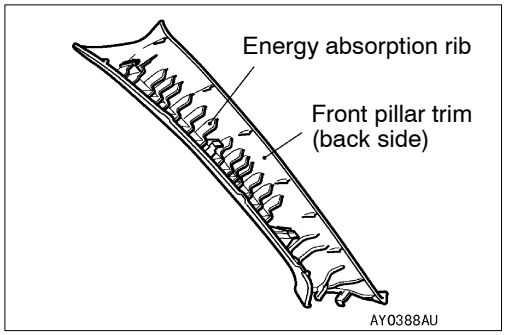
OPERATION

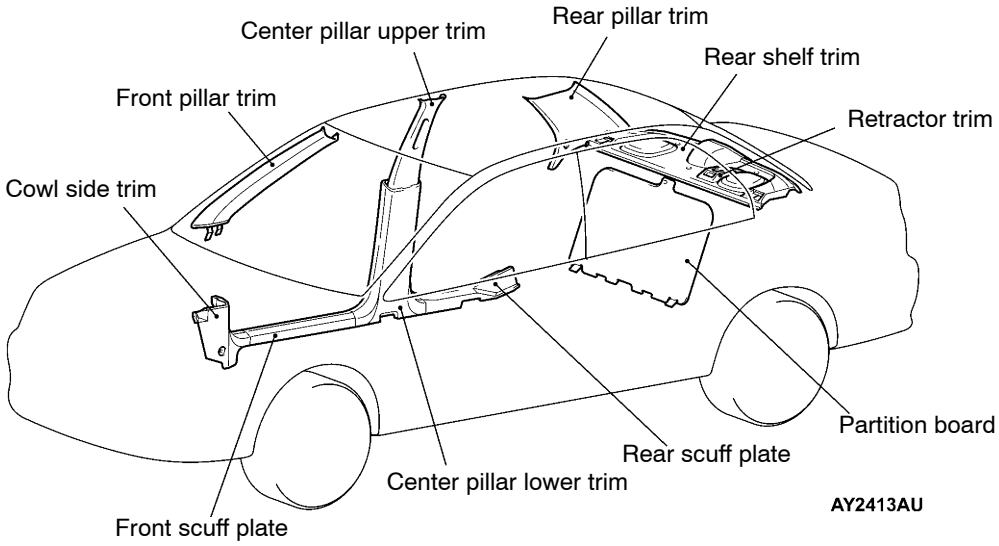
(1) If a collision energy is transmitted to the seat belt, the ELR mechanism will operate to lock the seat belt.
(2) Then, if the energy increases to a predetermined value, the torsion bar will be distorted. As the spool rotates together with the torsion bar, the seat belt webbing is pulled out, reducing impact on the occupants.

INTERIOR TRIMS

- The interiors are fully covered by trims to enhance product value.
- The adoption of the energy absorption rib mold located in the rear of the front pillar trim and the rear pillar trim to protect head from the side impact and the resin materials for the trims as unbreakable materials has increased safety as outstanding interiors.
- Use of inflammable materials for the trims has increased safety as outstanding interiors. Also, material codes are indicated to deal with recycling easily.

CONSTRUCTION DIAGRAM



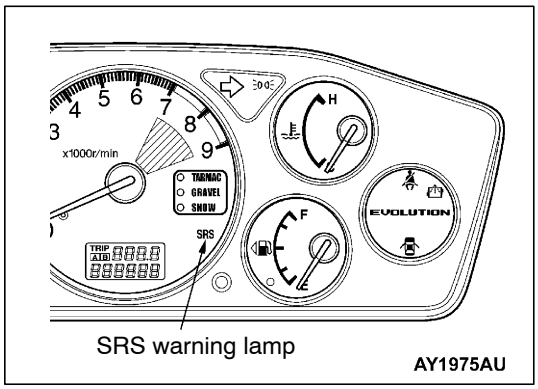


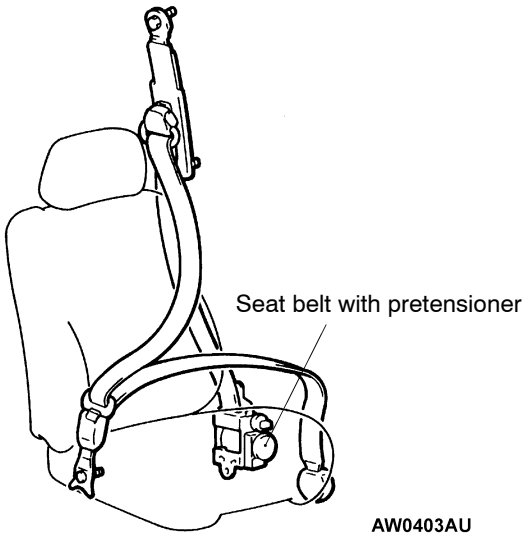
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

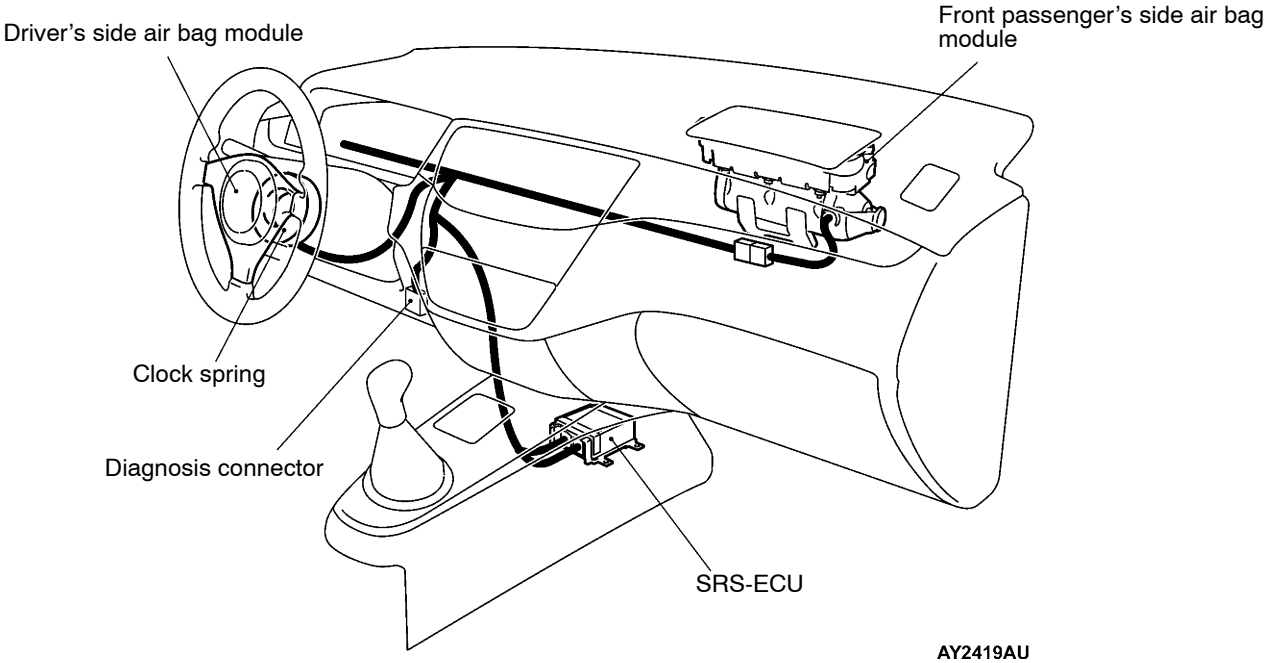
- SRS air bag is a system to be effective once the seat belt is worn. The system is designed to be a supplemental system of the seat belt. The system protects head and chest of a front seat passenger from the frontal collision by inflating the air bag to soften the impact when the impact applied from the front of the vehicle is greater than the set value.
- To enhance impact safety, all models are equipped with driver's/front passenger's SRS air bag as standard.
- An inflator that does not contain sodium azide has been adopted for all types of the air bag modules.
- Seat belt with pre-tensioner featured for the driver's and front passenger's seats is designed for instantly taking up the slack in the seat belt at the time of impact to improve restraint effect on a passenger. It is activated approximately at the same time as SRS airbag is activated to improve protection effect on a passenger.

Caution
Never disassemble the SRS air bag components. And never subject the SRS air bag components to impact.

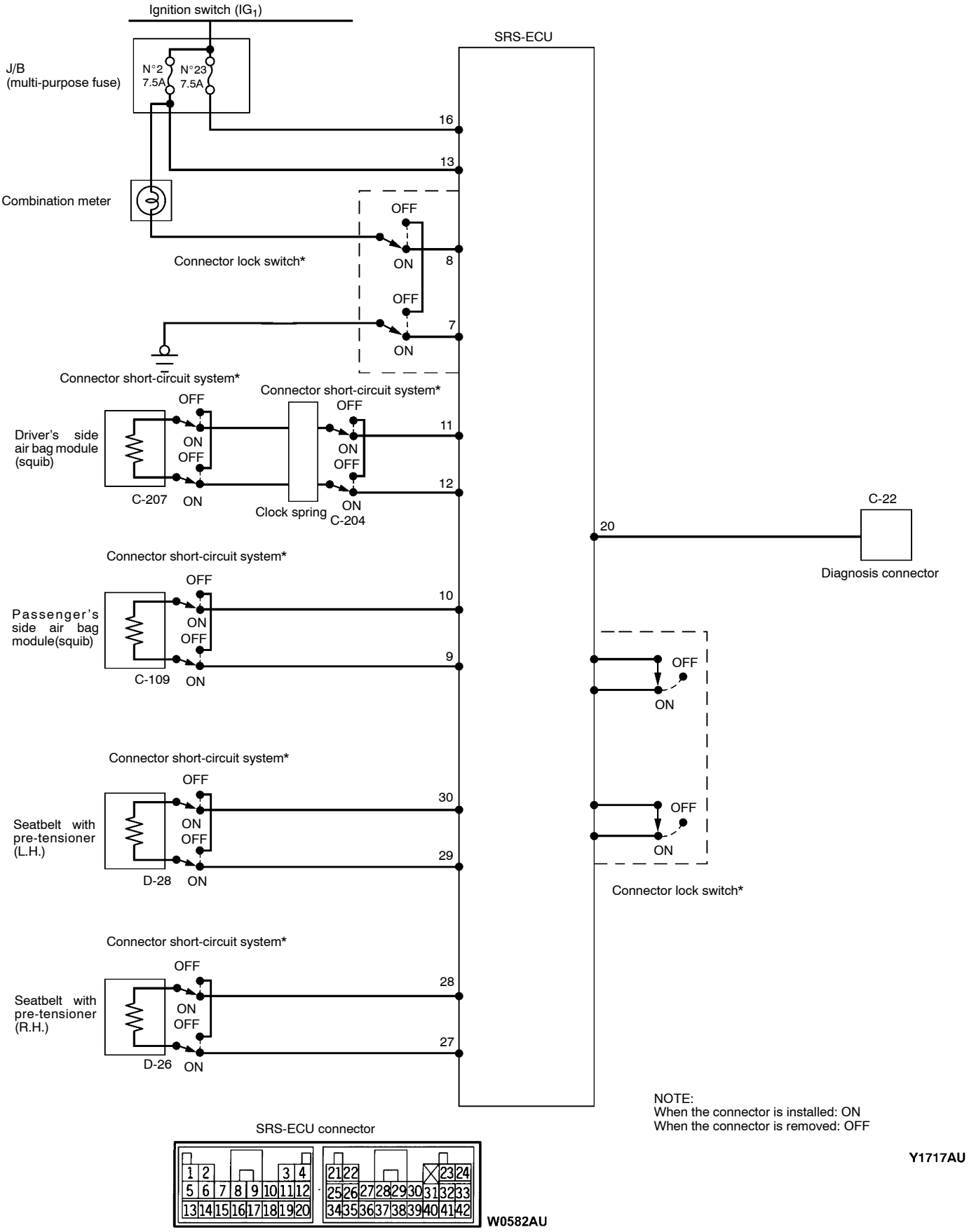
CONSTRUCTION DIAGRAM







SRS SYSTEM CIRCUIT DIAGRAM

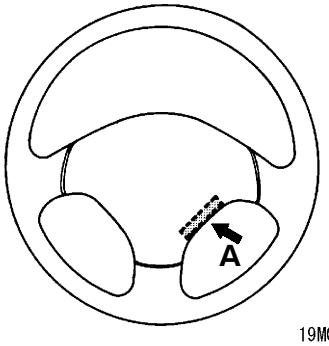


CAUTION LABELS

Labels to indicate cautions regarding the handling and the services of SRS air bag are attached on the position shown in the following illustration.

<TYPE 1>

Steering wheel



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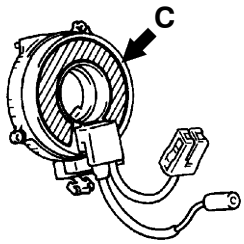
Clock spring



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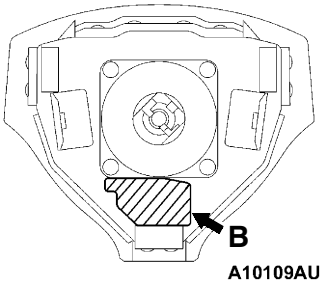
Driver's side bag module



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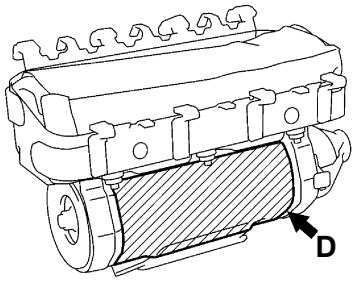
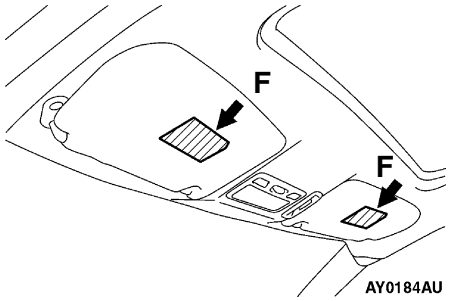
Front passenger's side air bag module



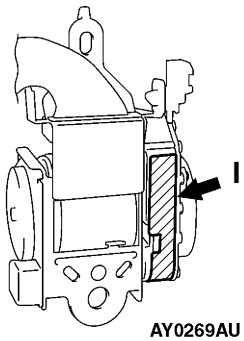
AY0182AU

Sun visor



AY0184AU

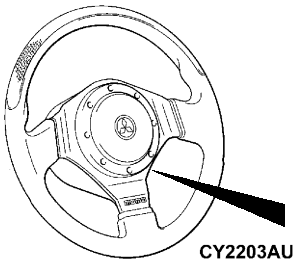
Seat belt with pretensioner



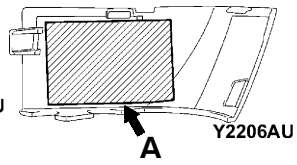
AY0269AU

<TYPE 2>

Cover

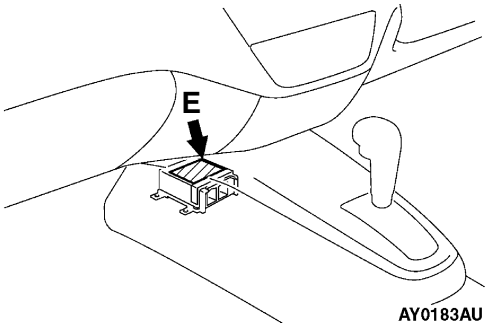


CY2203AU



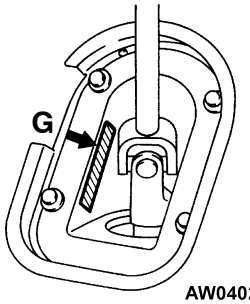
Y2206AU

SRS-ECU



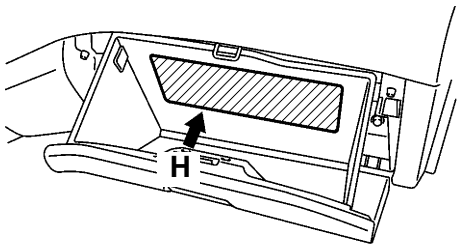
AY0183AU

Steering joint cover



AW0402AU

Glove box



AY1270AU

NOTE
(1) Type 1 : Steering wheel/air bag module separation type
(2) Type 2 : Steering wheel/air bag module integrated type

A. CAUTION: SRS
BEFORE REPLACING STEERING WHEEL, READ SERVICE MANUAL,THIS AIR BAG MODULE CANNOT BE REPAIRED. DO NOT DISASSEMBLE OR TAMPER.

B. DANGER
CONTENTS ARE EXTREMELY FLAMMABLE. DO NOT PROBE WITH ELECTRICAL DEVICES OR OTHER WISE TEMPER WITH IN ANY WAY.

C. CAUTION: SRS CLOCK SPRING
THIS IS NOT A REPAIRABLE PART. IF DEFECTIVE, REPLACE ENTIRE UNIT ACCORDING TO THE SERVICE MANUAL INSTRUCTIONS. TO RE-CENTER: ROTATE CLOCKWISE UNTIL TIGHT. THEN ROTATE IN OPPOSITE DIRECTION ROUGHLY 3 TURNS AND ALIGN ARROWS ▶◀.

D. WARNING: FLAMMABLE/EXPLOSIVE SRS AIR BAG MODULE TO AVOID SERIOUS INJURY:
- DO NOT REPAIR, DISASSEMBLE OR TAMPER.
- AVOID CONTACT WITH FLAME OR ELECTRICITY.
- DO NOT DIAGNOSE/USE NO TEST EQPT OR PROBES.
- STORE BELOW 200°F (93°C).
- BEFORE DOING ANY WORK INVOLVING MODULE, READ SERVICE MANUAL FOR IMPORTANT FURTHER DATA.

E. CAUTION:
DO NOT DISASSEMBLE OR DROP. IF DEFECT, REFER TO SERVICE MANUAL.

F. WARNING TO AVOID SERIOUS INJURY:
- THE AIR BAG DOES NOT SAFETY BELT.
- FOR MAXIMUM SAFETY PROTECTION IN ALL TYPES OF CRASHES,YOU MUST ALWAYS WEAR YOUR SAFETY BELT.
- DO NOT INSTALL REARWARD-FACING CHILD SEATS IN ANY FRONT PASSENGER SEAT POSITION.
- DO NOT SIT OR LEAN UNNECESSARILY CLOSE TO THE AIR BAG.
- DO NOT PLACE ANY OBJECTS OVER THE AIR BAG OR BETWEEN THE AIR BAG AND YOURSELF.
- SEE THE OWNER'S MANUAL FOR FURTHER INFORMATION AND EXPLANATIONS.

G. WARNING: SRS
FIX STRG. WHEEL AT TIRES STRAIGHT AHEAD BEFORE GEARBOX REMOVAL. OTHER WISE, MAY DAMAGE SRS CLOCK SPRING MAKING SRS SYSTEM INOPERATIVE, RISKING SERIOUS DRIVER INJURY.

H. AIR BAG SYSTEM INFORMATION
THIS VEHICLE HAS AN AIR BAG SYSTEM WHICH WILL SUPPLEMENT THE SEAT BELT IN CERTAIN FRONTAL COLLISIONS. THE AIR BAG IS NOT A SUBSTITUTE FOR THE SEAT BELT IN ANY TYPE OF COLLISION. THE DRIVER AND ALL OTHER OCCUPANTS SHOULD WEAR SEAT BELTS AT ALL TIME.

WARNING!
IF THE "SRS" WARNING LIGHT DOES NOT ILLUMINATE FOR SEVERAL SECONDS WHEN THE IGNITION KEY IS TURNED TO "ON" OR THE ENGINE IS STARTED, OR IF THE WARNING LIGHT STAYS ON WHILE DRIVING, TAKE THE VEHICLE TO YOUR NEAREST AUTHORIZED DEALER IMMEDIATELY. ALSO, IF VEHICLE FOR SERVICE IMMEDIATELY.
THE AIR BAG SYSTEM MUST BE INSPECTED BY AN AUTHORIZED DEALER TEN YEARS AFTER THE VEHICLE MANUFACTURE DATE SHOWN ON THE CERTIFICATION LABEL LOCATED ON THE LEFT FRONT DOOR-LATCH POST OR DOOR FRAME.
READ THE "SRS" SECTION OF YOUR OWNER'S MANUAL BEFORE DRIVING FOR IMPORTANT INFORMATION ABOUT OPERATION AND SERVICE OF THE AIR BAG SYSTEM.
WHEN YOU ARE GOING TO DISCARD YOUR GAS GENERATOR OR VEHICLE, PLEASE SEE YOUR DEALER.

I. DANGER: SEAT BELT PRETENSIONER
- DO NOT IMPACT. DISMANTLE OR INSTALL IT INTO ANOTHER VEHICLE.
- SERVICE OR DISPOSE OF IT AS DIRECTED IN THE REPAIR MANUAL.

CONSTRUCTION AND OPERATION

NOTE
Refer to '99 PAJERO in Technical Information Manual (Pub. No. PYJE9805) or '00 PAJERO PININ Technical Information Manual (Pub. No. IKRE00E1)

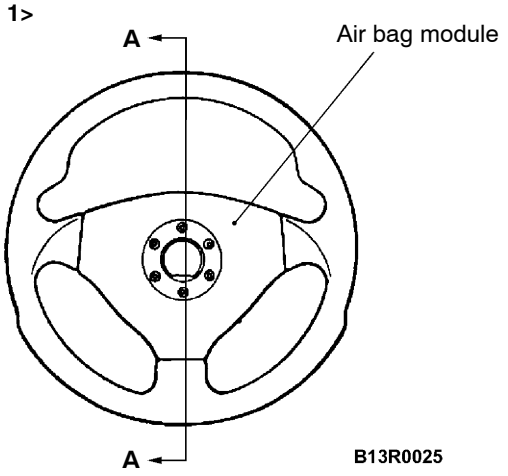
DRIVER'S SIDE AIR BAG MODULE

Both the type 1 and type 2 3-spokes (MOMO) 1are equipped. The driver's air bag module is an assembly part composed of an air bag, module cover, inflator, and their fixing parts. It is mounted to the steering wheel.
The air bag is made of nylon, and is inflated by gas generated from the inflator. As the passenger for more information regarding the inflator and the clock spring of the front passenger's side air bag module.

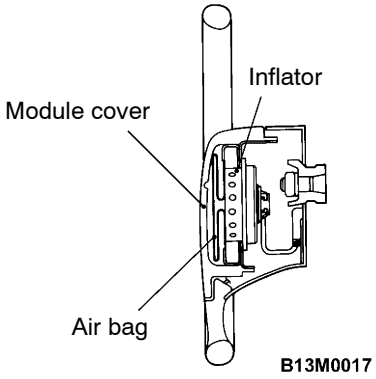
comes into contact with the air bag, the air bag starts to deflate while gas is discharged from the two vents at the back to ease the impact.
The inflator contains no sodium azide.

Caution
Never disassemble the air bag module. And never subject it to impact.

<TYPE 1>



Section A - A



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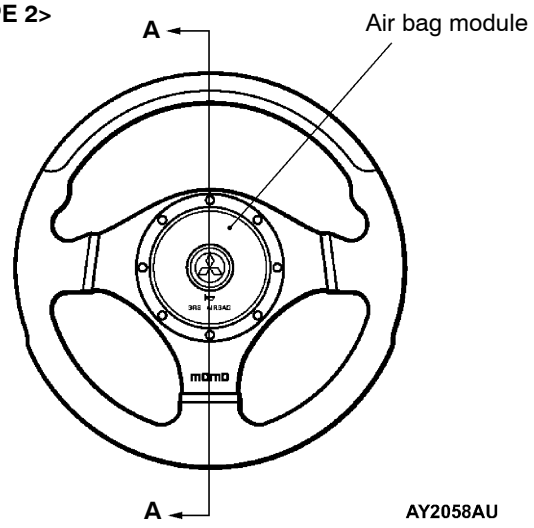
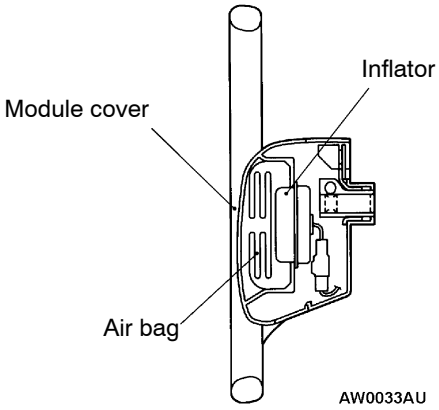


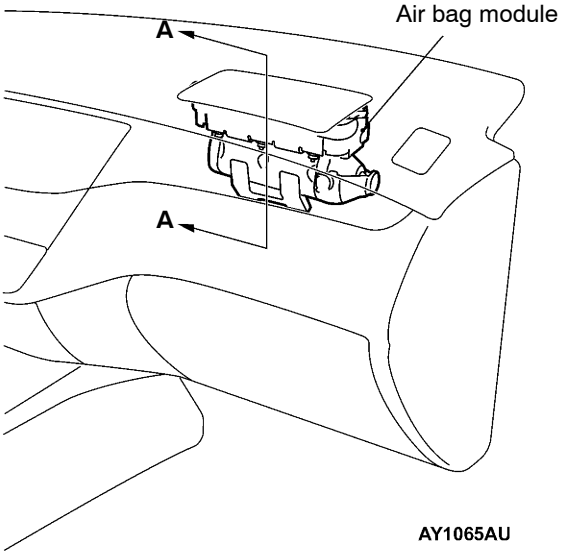
Section A - A



FRONT PASSENGER'S SIDE AIR BAG MODULE

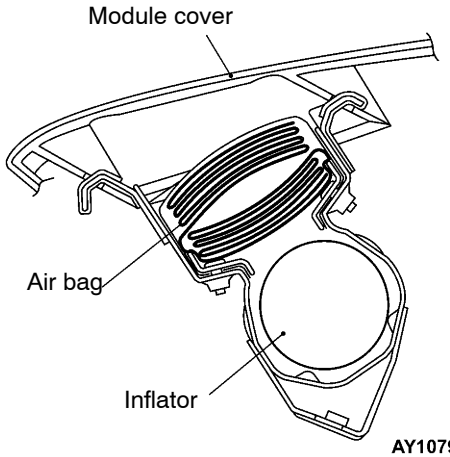
The front passenger's side air bag module consists of air bag, inflator, module cover (incorporating the instrument panel pad), and the fixing gear related to those parts.
The air bag is made from nylon and inflates by the gas generating from the inflator. As a passenger is being pressed to the air bag, it deflates discharging gas from two bores at the rear of the air bag to reduce the shock from the impact.
An inflator that does not contain sodium azide has been adopted for all types of the air bag modules.

Caution
Never disassemble the air bag module. And never subject it to impact.



AY1065AU

Section A - A

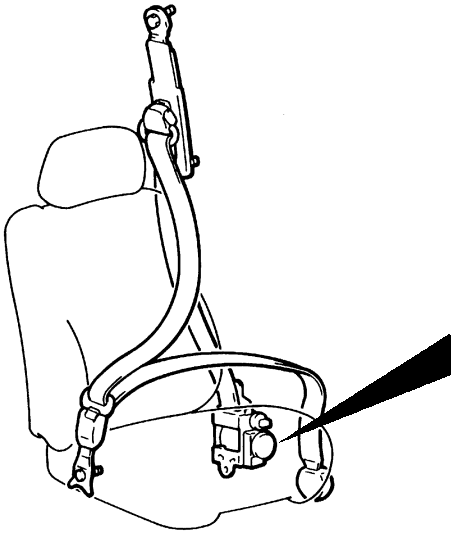


AY1079AU

SEAT BELT WITH PRETENSIONER

Seat belt with pre-tensioner is designed for instantly taking up the seat belt at the time of impact to improve restraint on a passenger. When the G sensor in the SRS-ECU detects impact above a certain level, the heater for ignition heats up according to the signal from the SRS-ECU to ignite the igniter and generate gas. The strip is pushed outwards by the gas pressure. As the strip wound around the clutch sleeve is pulled out, the clutch sleeve rotates at high speed. The clutch sleeve rotates to wind the waving.

Caution
Never disassemble the seat belt with pretensioner. And never subject it to impact.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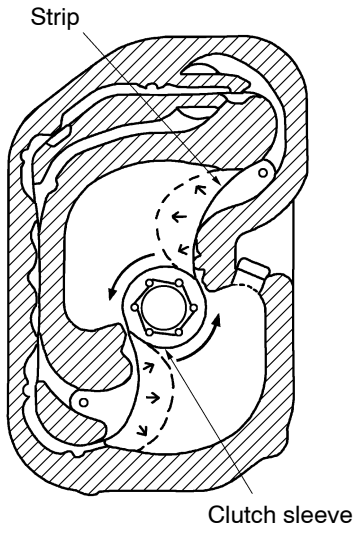


AW0576AU

SRS-ECU

The SRS-ECU incorporates an analog G sensor and safing G sensor for frontal collisions.
In frontal collisions, the driver's and front passenger's air bags deploy only when both the analog and safing G sensors detect simultaneously a collision-induced G of a level exceeding the threshold as in the case with the conventional system.
Like the conventional system, the SRS-ECU is provided with the following capabilities:

- Backup power supply in case of power failure in collisions
- Boosting function in case of battery voltage drop
- Self-diagnosis function to avoid system's operation errors and improve its reliability

Caution
Never disassemble the SRS-ECU. And never subject it to impact.

DIAGNOSIS FUNCTION

The SRS-ECU has the following functions to make system checking using MUT-II easy.

- Diagnosis code output
- Service data output

DIAGNOSIS CODE OUTPUT

The SRS-ECU diagnoses the following items and stores a diagnosis code in the non-volatile memory (EEPROM*1) when a problem is detected.

Therefore, the memory is not deleted after a battery terminal is disconnected. (The diagnosis code memory can be deleted by the MUT-II.)

Code No.	Major Contents of Diagnosis
14	Frontal collision analog G sensor failure
15	Frontal collision safing G sensor short-circuited
16	Frontal collision safing G sensor open-circuited
21*3	Driver's side front air bag squib short-circuited
22*3	Driver's side front air bag squib open-circuited
24*3	Front passenger's side front air bag squib short-circuited
25*3	Front passenger's side front air bag squib open-circuited
26*3	Driver's side front seat belt pretensioner short-circuited
27*3	Driver's side front seat belt pretensioner open-circuited
28*3	Front passenger's side front seat belt pretensioner short-circuited
29*3	Front passenger's side front seat belt pretensioner open-circuited
31	Capacitor voltage rises
32	Capacitor voltage drops
34*2	Connector locking mechanism malfunction
35	Ignition of the air bag completed
41*2	Power supply voltage (IG1 voltage) drops abnormally.
42*2	Power supply voltage (IG1 voltage) drops abnormally.
43*2	SRS warning lamp circuit open-circuited
44*2	Defective SRS warning lamp circuit
45	Defective SRS-ECU
49	Air bag fully deployed
51	Driver's side front air bag squib activating circuit short-circuited

Code No.	Major Contents of Diagnosis
52	Driver's side front air bag squib activating circuit open-circuited
54	Front passenger's side front air bag squib activating circuit short-circuited
55	Front passenger's side front air bag squib activating circuit open-circuited
56	Driver's side front seat belt pretensioner activating circuit short-circuited
57	Driver's side front seat belt pretensioner activating circuit open-circuited
58	Front passenger's side front seat belt pretensioner activating circuit short-circuited
59	Front passenger's side front seat belt pretensioner activating circuit open-circuited
61	Driver's side front air bag squib drive circuit (power supply side) short-circuited
62	Driver's side front air bag squib drive circuit (earth side) short-circuited
64	Front passenger's side front air bag squib drive circuit (power supply side) short-circuited
65	Front passenger's side front air bag squib drive circuit (earth side) short-circuited
66	Driver's side front seat belt pretensioner drive circuit (power supply side) short-circuited
67	Driver's side front seat belt pretensioner drive circuit (earth side) short-circuited
68	Front passenger's side front seat belt pretensioner drive circuit (power supply side) short-circuited
69	Front passenger's side front seat belt pretensioner drive circuit (earth side) short-circuited

NOTE
*1: Electrically Erasable Programmable ROM
*2: This diagnosis code memory will be automatically cleared from the memory and the SRS warning lamp will be switched off when the system returns to normal condition.
*3: The diagnosis codes will remain in memory and the SRS warning lamp will be switched off if the system returns to normal.

SERVICE DATA OUTPUT

When the SRS-ECU detects a problem, it stores a diagnosis code and the duration of the problem has lasted in the non-volatile memory. In addition, how often a diagnosis code and duration are cleared by the MUT-II are stored in the non-volatile memory as a reference for service work. The data which is stored can be read by the MUT-II.

No.	Service Data Item	Applicability
92	Number indicating how often the memory is cleared	Maximum time to be stored: 250
93	How long a problem has lasted (How long takes from the occurrence of the problem till the first air bag squid Igniting signal)	Maximum time to be stored: 9999 minutes (approximately 7days)
94	How long a problem has lasted (How long it takes from the first air bag squib igniting signal signal till now)	

EQUIPMENT

CONTENTS

GENERAL DESCRIPTION

The adoption of new accessories and functions has enhanced a lineup of equipment.

FEATURES

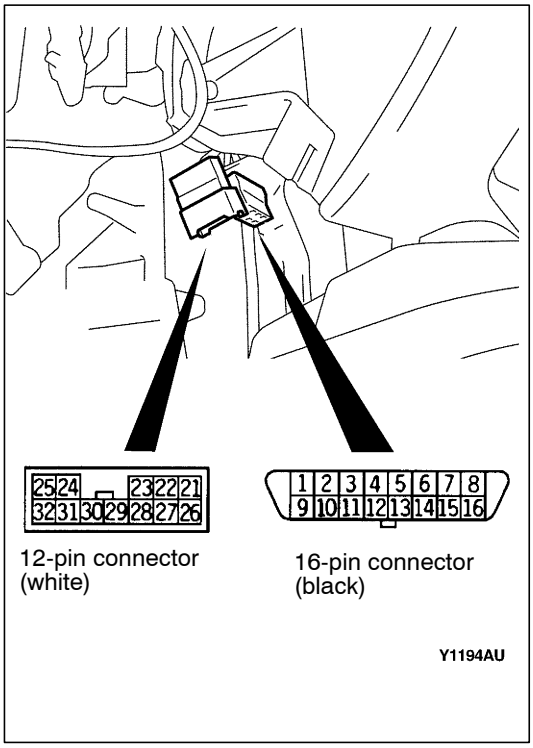
Enhanced reliability	1. Adoption of waterproof connector in the engine compartment 2. Installation of fuse box and relay box
Enhanced visibility and safety Enhanced ease-of-use and convenience	1. Adoption of headlamp with leveling function 2. Installation of front turn signal lamp with outstanding visibility using an aluminum metal evaporated reflector 3. Installation of rear combination lamps with large tail and stop lamp emitter blending with the body design 4. Installation of high mount stop lamps 5. Installation of rear fog lamps with outstanding visibility 6. Equipped with an immobilizer system
Improvements in service quality	1. Installation of diagnostic connectors (two) for MUT-II inspection 2. Addition of ignition timing inspection function to the MUT-II 3. Adoption of Smart Wiring System (SWS) to reduce weight and complexity of harnesses
Improvements in commercial value	Installation of Smart Wiring System (SWS) with new functions such as headlamp auto-cut and lamp on reminder function, ETACS-ECU, and front-ECU

NOTE
Refer to P.7-20 for general information and features of the heater and air conditioner.

DIAGNOSTIC SYSTEM

Service quality has been improved by fitting diagnostic connectors for MUT-II inspection near the left knee area of the driver's seat on the instrument panel.

Diagnostic function	MPI	ABS	Immobilizer	SRS air bag	SWS		
					ETACS	Column switch	Front ECU
Diagnosis code output	●	●	–	●	●	●	●
Diagnosis code output by voltmeter	–	–	–	–	●	●	●
Output of service data	●	●	–	●	–	–	–
Actuator test	●	●	–	–	–	–	–
Diagnostic output by warning lamp and indicator lamp	–	● (ABS warning lamp)	–	–	–	–	–
Diagnosis record storage	●	●	●	●	–	–	–
Erasure of diagnosis code by MUT-II	●	●	●	●	–	–	–
Pulse check by MUT-II	–	–	–	–	●	●	●
Pulse check by sounding buzzer	–	–	–	–	●	●	●



DIAGNOSIS CONNECTOR

Diagnosis connector (Black)	
1	Diagnosis control
2, 3	–
4	Grounding
5	Grounding
6	–
7	MPI, ABS, immobilizer and SRS air bag
8	–
9	ETACS
10	–
11	
12	–
13	–
14	–
15	–

Diagnosis connector (Black)	
16	Battery
Diagnostic connector (White)	
21 - 25	–
26	MPI
27 - 32	–

BATTERY

Light and compact batteries have been adopted.

Item	Specifications
	44B20L
Voltage V	12
Capacity (5-hour rate Ah)	34
Electrolytic fluid specific gravity (fully charged state at 20°C)	1.280

IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine-ECU.
The ignition key has a built-in transponder as the oscillator. The key ring antenna is installed on the steering lock key cylinder. Only the registered ignition key permits the engine to start, therefore, the engine can never be started by means of a forged key or by connecting the ignition wiring directly. The system is significantly safe and reliable against theft. In addition, the driver has only to turn the ignition switch to the “ON” position to activate the immobilizer system. If the ignition key is lost or another ignition key is added, all the keys must be registered again by using the scan tool MB991502 (MUT-II) for security reasons.

CONSTRUCTION DIAGRAM

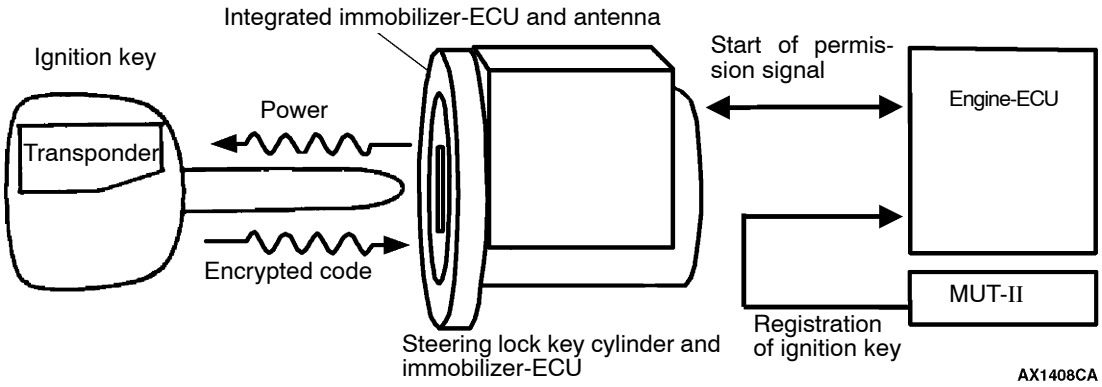
The system prevents the engine from being started deviously to protect the vehicle from theft. The operation is as follows.

1. When the ignition switch is turned “ON” position,the engine-ECU sends a requirement for the encrypted code to the immobilizer-ECU (at this time, the engine is remobilized).
2. When the immobilizer-ECU receives the requirement from the engine-ECU transponder inside the ignition key via the antenna. The energized transponder sends the encrypted code back to the immobilizer-ECU via the antenna.
3. The immobilizer-ECU judges the encrypted code with its code logic in itself. If they are identical, the immobilizer-ECU sends the encrypted code to the engine-ECU.
4. If the engine-ECU can not receive the encrypted code, the engine will be immobilized.

DISPOSITION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

To replace immobilizer related parts, observe the table below. When the ignition key is re-registered with the MUT-II, the originally registered ignition key registration information will be lost.

	Engine-ECU	Immobilizer-ECU	Ignition key
When replacing engine-ECU	–	Replacement required	Replacement and re-registration are required.
When rewriting engine-ECU	–	Replacement not required	Replacement not required, re-registration not required
ECU	Replacement not required	–	Replacement not required, registration are required
When adding ignition key newly	Replacement not required	Replacement not required	Register an additional ignition key and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement not required	re-register all other ignition keys except the lost one.



LIGHTING

EXTERIOR LAMPS

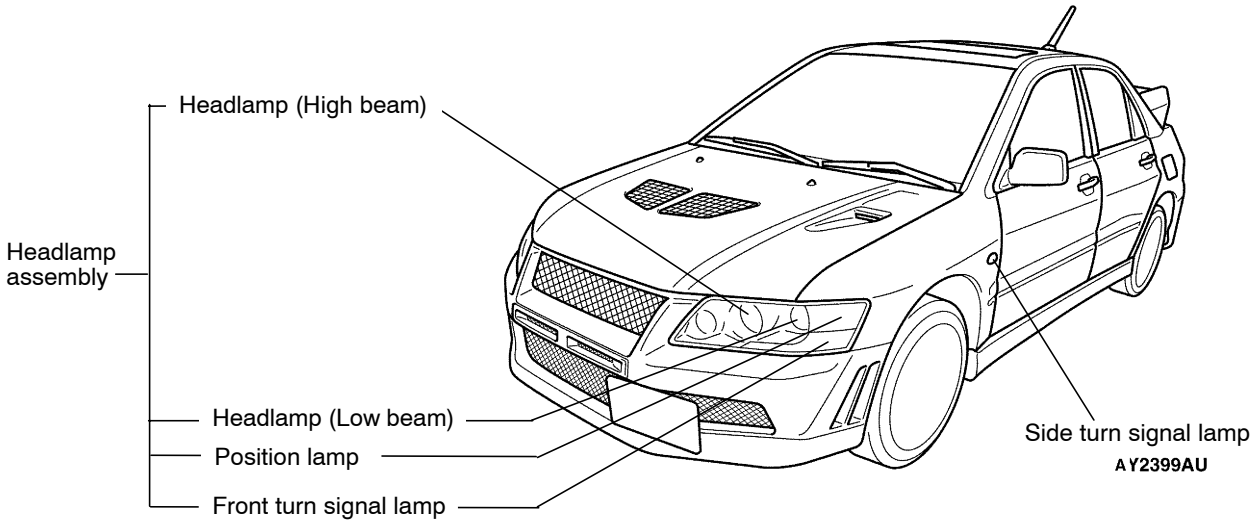
- The large lens adjusted to the exclusive body has been equipped with model specific 4 bulb type headlamp incorporating front turn signal lamp, position lamp. The low beam is a projector type used as a compact but efficient wide light distributor.
- The front turn signal lamp adopts an aluminum metal evaporated reflector to improve visibility.
- The tail lamp and stop lamp make use of complementary colors to emit white color from the red lens to improve visibility.
- The inner lens of the tail lamp has been set with a reflex reflector to improve appearance.
- Rear fog lamps with outstanding visibility have been installed.
- A high mount stop lamp has been installed to the rear shelf.
- The lighting system is provided with headlamp auto-cut.

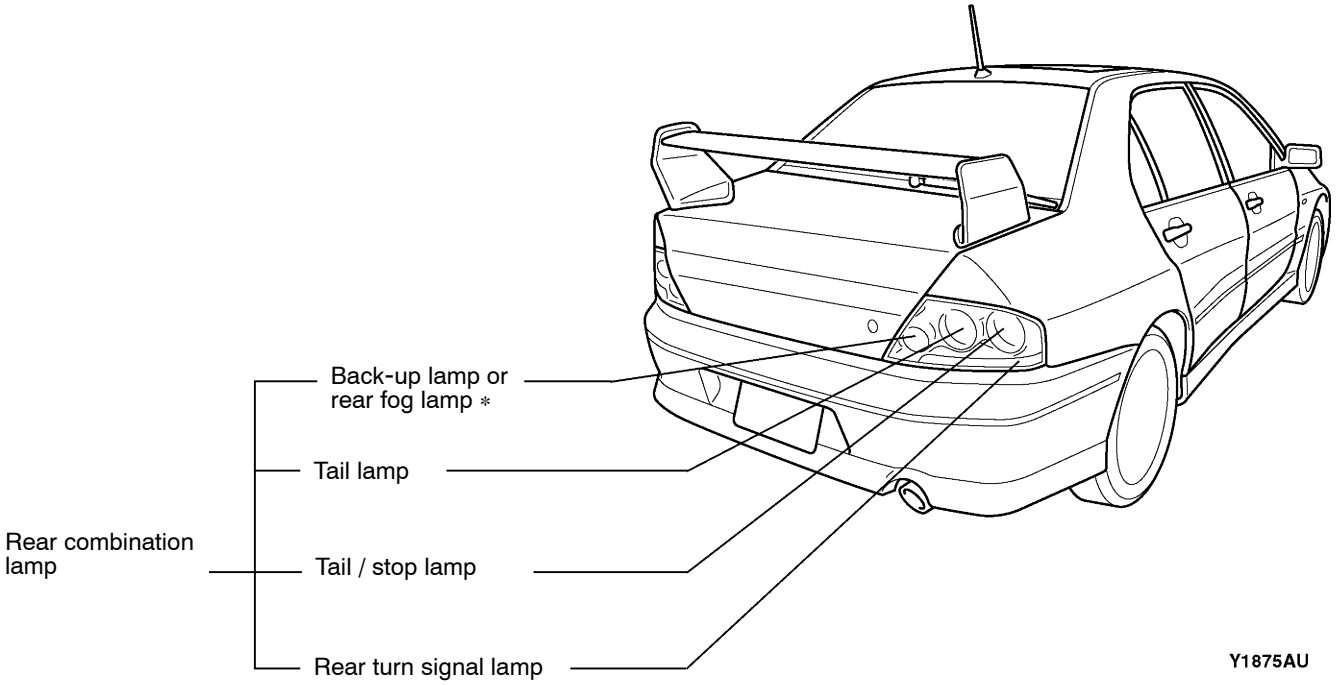
SPECIFICATIONS

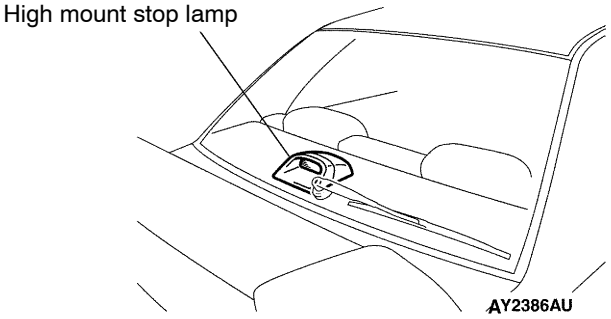
Item		Specifications
Headlamp assembly	High beam (Halogen bulb) W	60 (HB3)
	Low beam (Halogen bulb) W	51 (HB4)
Headlamp assembly	Position lamp W	5
	Front turn signal lamp W	21
Side turn signal lamp W		5
Rear combination lamp	Tail/stop lamp W	5/21
	Turn signal lamp W	21
	Backup lamp W	21
	Rear fog lamp W	21
High mount stop lamp W		21
License plate lamp W × number		5 × 2

NOTE
The brackets ( ) show the bulb type.

CONSTRUCTION DIAGRAM







NOTE
*: The driver's side is installed with a rear fog lamp, while the passenger's side is installed with a back-up lamp.

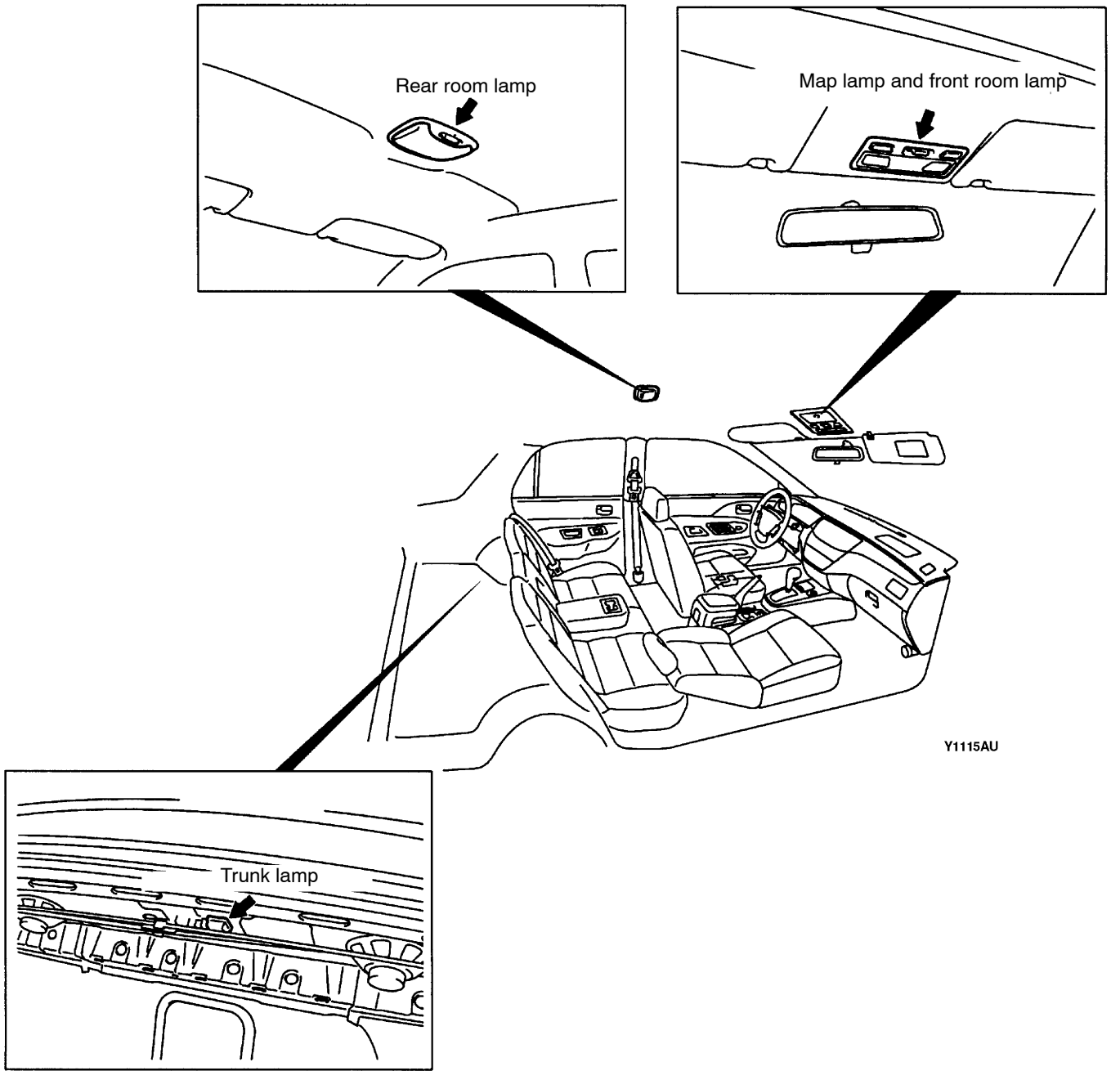
INTERIOR LAMPS

- A map lamp serving also as front room lamp which can be used at both the driver's seat and passenger sea is provided.
- A rear room lamp to light the backseat and trunk lamp to light the trunk are provided.

SPECIFICATIONS

Item	Specifications
Map lamp W × quantity	7.5 × 2
Front room lamp W	7.5
Rear room lamp W	8
Trunk lamp W	5

CONSTRUCTION DIAGRAM

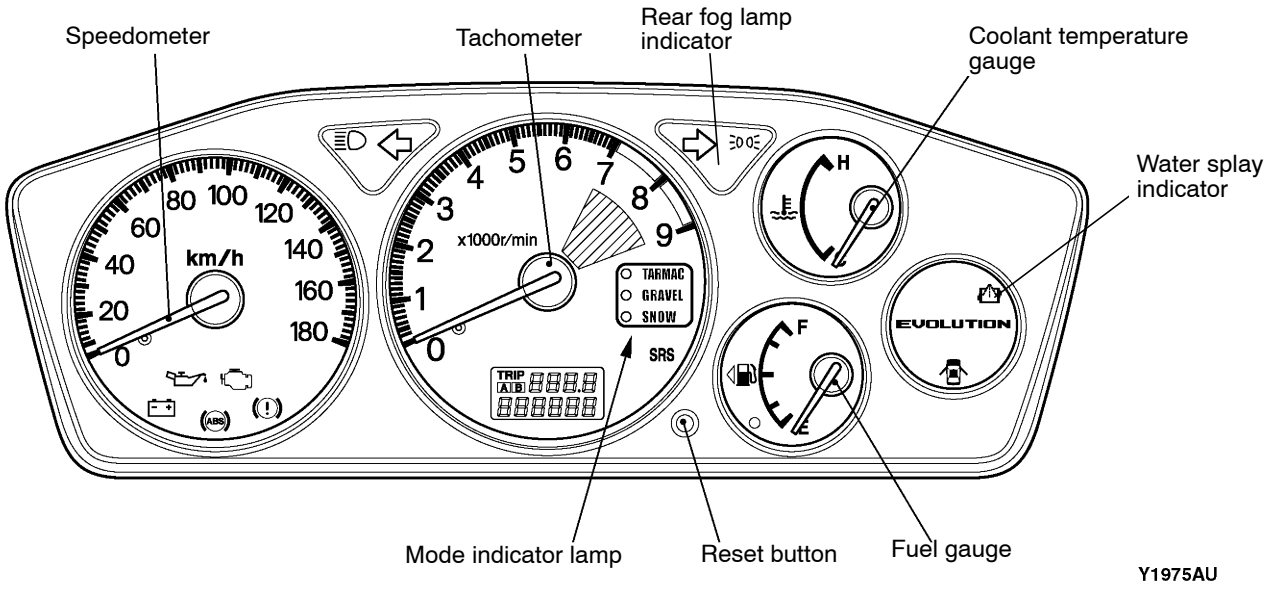


COMBINATION METER

The combination meter is an easy-to-read pointer type meter. At the center is a tachometer, on the left side a speedometer, on the right side a fuel meter, engine coolant thermometer, and indicator lamp. It has a sport and efficient design to allow the driver to read the meters clearly.

- The tachometer displays the conditions of the current road using three indicators TARMAC, SNOW, and GRAVEL. [Refer to GROUP 2-Active Center Differential (Active Control System.)]
- A water spray indicator which lights up when the water splay switch is set to AUTO has been adopted.
- The speedometer is an electronic type speedometer which operates by the pulse signal generated by the speed sensor.
- A large and clear LCD type odo-tripmeter is provided. The odometer continuously displays values while the tripmeter adopts a twin-trip (trip A, trip B) function which is switched by a reset button. (Standard meter)
- The fuel gauge is provided with a triangular mark indicating the location of the fuel filler door to show clearly that the fuel filler door is on the left side of the car.

CONSTRUCTION DIAGRAM

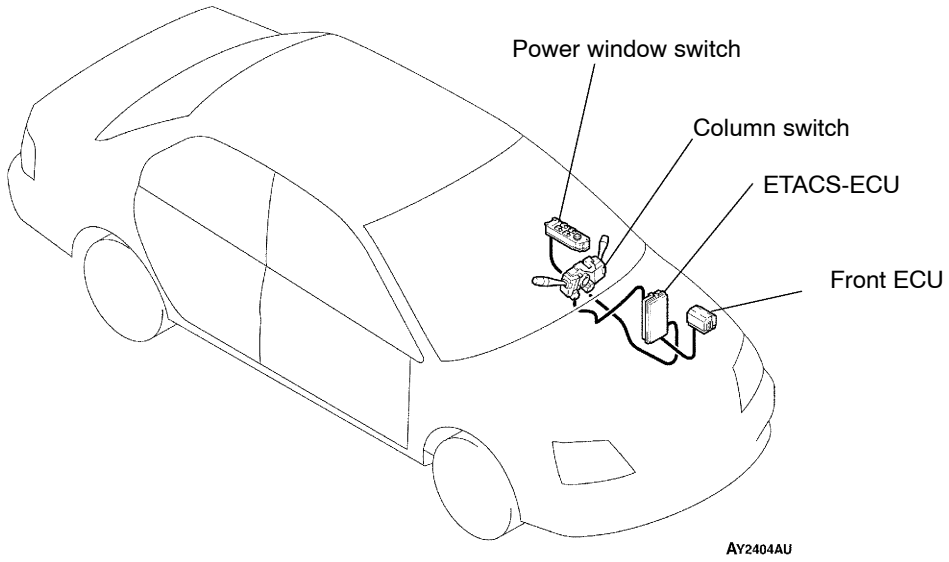


SMART WIRING SYSTEM (SWS)

SWS is a minimal line system which transmits numerous signals using one wiring to control against increased weight and complication of harnesses which result from the increase in electronic accessories. Basically the same as the new SPACE RUNNER.
To transmit numerous signals, the ETACS-ECU*, column switch, front ECU, power window main switch (power window switch of the driver's seat side) incorporate multi-distribution circuits to carry out communication between control units.

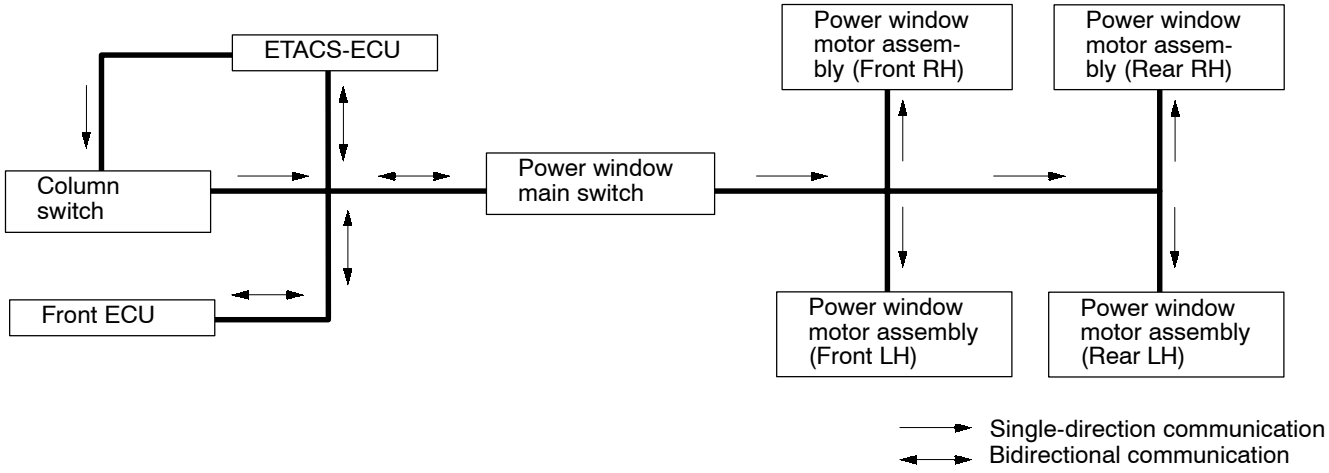
NOTE
*: ETACS (Electronic Time and Alarm Control System)

CONSTRUCTION DIAGRAM



COMMUNICATION METHOD

The exclusive signal lines for transmitting the multi-distribution data are connected as follows between the ETACS-ECU, column switch (incorporated inside the column ECU), front ECU, power window main switch (incorporated inside the power window ECU) and power window motor assemblies (incorporated inside the power window motor ECU) for internal communication.

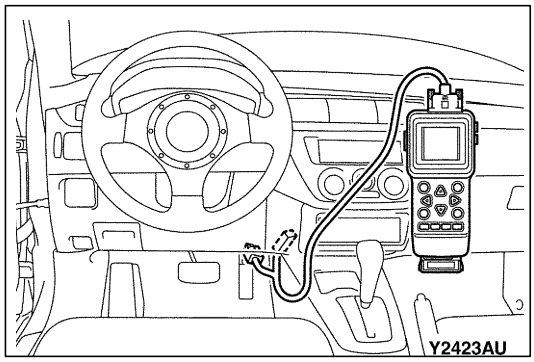


MULTI-DISTRIBUTION INPUT/OUTPUT BY CIRCUIT

Multi-distribution is employed by the following circuits. The relation of the input switches, sensors, ECUs connected by multi-distribution lines, and outputs are also shown below.

Circuit and input switch and sensor	ECUs and switches connected by multi-distribution	Output side
1. Buzzer ● Lamp still ON reminder warning function ● Ignition switch (IG1) ● Driver's seat door switch	ETACS-ECU Column switch (Lighting switch)	Buzzer (built-in ETACS-ECU)
2. Power window ● Power window timer function ● Ignition switch (IG1) ● Driver's seat door switch	ETACS-ECU Power window main switch Power window motors	Power window relay

Circuit and input switch and sensor	ECUs and switches connected by multi-distribution	Output side
3. Windshield wiper washer ● Windshield mist wiper ● Windshield low speed wiper ● Windshield high speed wiper ● Windshield washer		
Column switch	ETACS-ECU Column switch)	
Ignition switch (ACC)	Front ECU	Windshield wiper motor Windshield washer motor
4. Lighting ● Headlamp, tail lamp ● Headlamp auto-cut function ● Rear fog lamp		
Ignition switch (IG1) Driver's seat door switch Vehicle speed signal Rear fog lamp switch	ETACS-ECU Column switch (Lighting switch)	Combination meter (High beam or rear fog lamp indicator) Illumination lamps Rear fog lamp
Ignition switch (IG2)	Front ECU	Headlamp Taillamps Rear fog lamp
5. Flasher ● Turn signal lamp ● Hazard warning lamp		
● Ignition switch (IG1) ● Hazard warning lamp switch	ETACS-ECU Column switch (Turn signal lamp switch)	Combination meter (Turn signal indicator) Turn signal lamps



DIAGNOSTIC FUNCTION

DIAGNOSIS CODE SET

The ETACS-ECU sends diagnosis codes if the communication line is faulty when the MUT-II is connected.
NOTE Refer to the Workshop Manual for details of the diagnostic items.

SWS INPUT SIGNAL CHECK BY MUT-II

When the MUT-II is connected to the diagnostic connector, and switches input for the SWS are operated, the buzzer in the MUT-II sounds, indicating whether the operations of the switches are satisfactory or not.

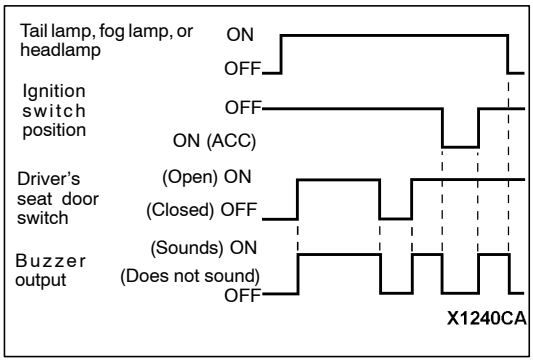
INPUT SIGNALS THAT CAN BE CHECKED

Input signal		Conditions for sounding buzzer
Ignition switch (ACC)		When the switch is turned from the LOCK (OFF) position to ACC
Ignition switch (IG1)		When the switch is turned from ACC to the ON position
Hazard warning lamp switch		When the switch is turned from the OFF to the ON position
Rear fog lamp switch		When the switch is turned from the OFF to the ON position
Driver's seat door switch		When the driver's seat door is opened from the closed state
Various door switches		When one of the closed doors is opened
Driver's seat door lock actuator		When the key cylinder or door lock knob of the driver seat is turned from LOCK to UNLOCK position, or from UNLOCK to LOCK position
Speed signal		When the speed changes from less than 10 km/h to more than 10 km/h
Column switch	Tail lamp switch	When the lighting switch is turned from one position to the tail lamp position
	Headlamp switch	When the lighting switch is turned from one position to the headlamp position
	Dimmer switch	When the switch is turned from the OFF to the ON position
	Passing switch	
	Turn signal lamp LH switch	
	Turn signal lamp RH switch	
	Windshield mist wiper switch	
	Windshield intermittent wiper switch	
	Windshield low speed wiper switch	
	Windshield high speed wiper switch	
	Windshield washer switch	
Multi-purpose fuse No.17 load		When the multi-purpose fuse No. 17 is used as the power supply load

FUNCTIONS AND CONTROL OF SWS ECUS

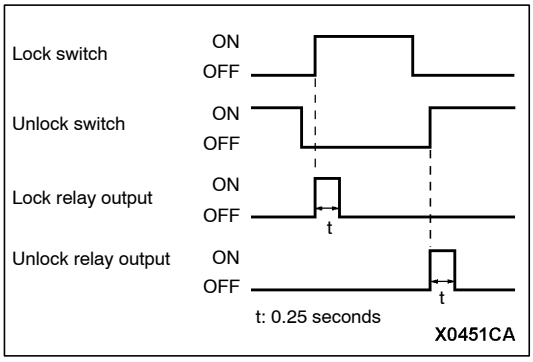
The following functions are controlled by the SWS ECUs:

No.	Functions	Control ECU
1	Lamp still ON reminder warning function	ETACS-ECU, column switch
2	Central door lock control function	ETACS-ECU
3	Power window timer function	ETACS-ECU, power window main switch
4	Windshield wiper washer control function	ETACS-ECU, front ECU, column switch
5	Headlamp auto-cut function	ETACS-ECU, front ECU, column switch
6	Flasher timer function	ETACS-ECU, column switch
7	Rear fog lamp function	ETACS-ECU
8	Dimmer type room lamp control function	ETACS-ECU



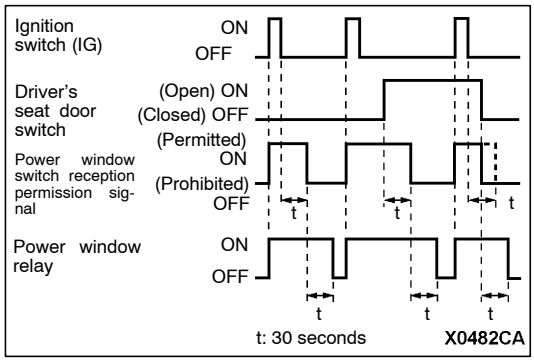
LAMP STILL ON REMINDER WARNING FUNCTION

When the tail lamp, fog lamp, or headlamp is ON, if the ignition switch is in "OFF" position and the driver's door is opened, a buzzer will sound continuously to warn that the lamp is illuminated. However, if the tail lamp or headlamp has been turned off by the headlamp auto-cut function, the buzzer will not sound.



CENTRAL DOOR LOCK CONTROL FUNCTION

When the driver's seat door is locked (after the unlock switch in the driver's seat door lock actuator is turned OFF, the lock switch is turned ON), the ETACS-ECU activates the lock relay output for 0.25 seconds and locks all doors. Next, when the driver's seat door is unlocked (after the lock switch in the driver's seat unlock actuator is turned OFF, the unlock switch is turned ON), the ETACS-ECU activates the unlock relay output for 0.25 seconds and unlocks all doors.



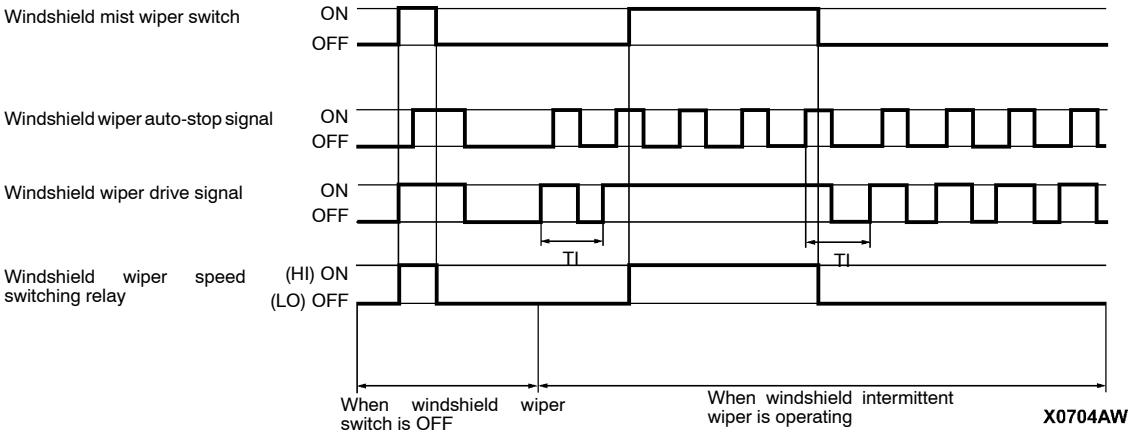
POWER WINDOW TIMER FUNCTION

When the ignition switch is turned to the ON position, the power window relay and power window switch reception permission signals (SWS signal sent from the ETACS) are turned ON. After the ignition switch is turned OFF, the system continues to turn ON the power window switch reception permission signal for about 30 seconds and to enable the opening and closing of the door window by the power window switch. The power window relay goes OFF about 30 seconds after the reception permission signal goes OFF. When the driver's seat door is opened while the timer is in operation, the reception permission signal will be turned ON for about 30 seconds from this point. However, if the driver's seat door is closed, the reception permission signal will be turned OFF. The power window relay goes OFF about 30 seconds after the reception permission signal goes OFF.

WINDSHIELD WIPER WASHER CONTROL FUNCTION

1. Mist wiper control

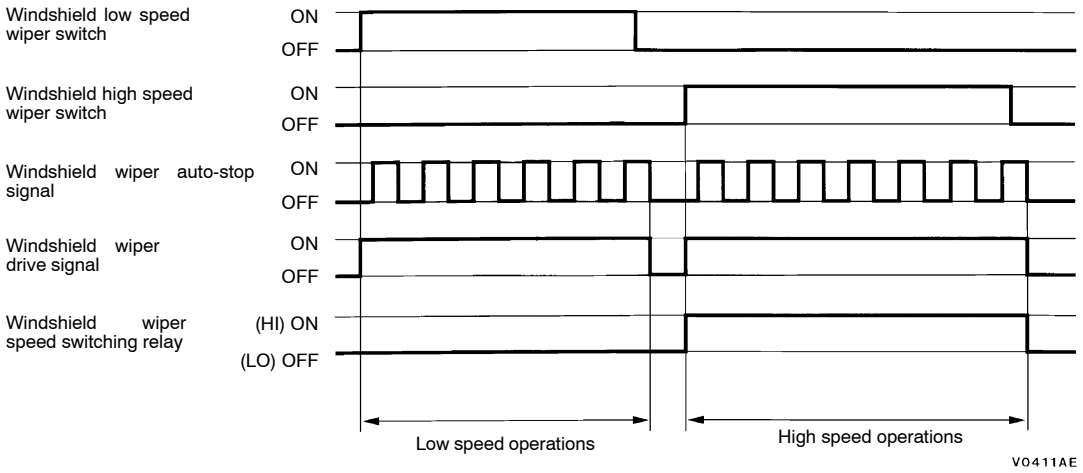
When the ignition switch is at the ACC or ON position, if the windshield mist wiper switch of the column switch is turned ON, the front ECU turns ON the windshield wiper drive signal. At the same time, the wiper speed switching relay is turned ON (HI), and while the windshield mist wiper switch is ON, the windshield wiper will operate at high speed. At the point the windshield mist switch is turned ON, if the windshield wiper has been operating intermittently, the same operations as the above will be performed while the windshield mist wiper switch is ON. After the windshield mist wiper switch goes OFF, the intermittent operations will be set again TI seconds after the windshield wiper auto-stop signal is turned ON last.



TI: Intermittent wiper intermittent time

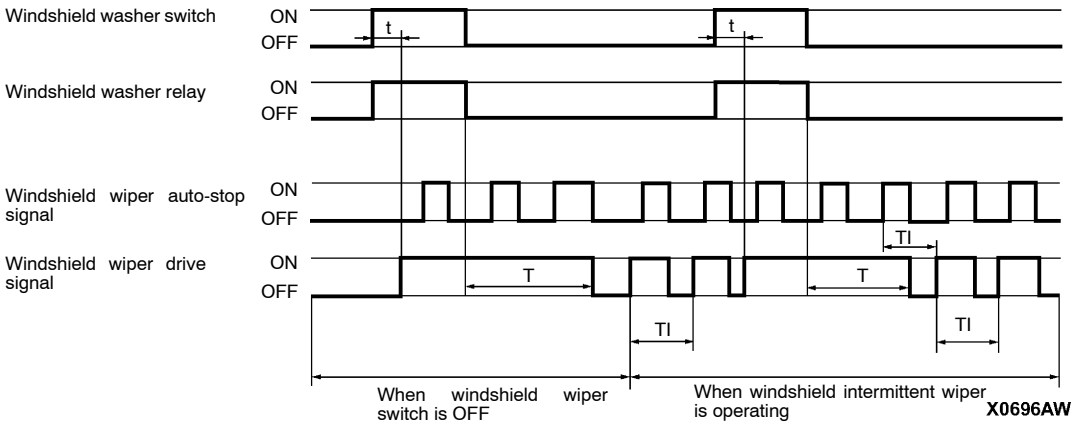
2. Low Speed Wiper, High Speed Wiper Control

When the ignition switch is at the ACC or ON position, if the windshield low speed wiper switch of the column switch is turned ON, the front ECU turns ON the windshield wiper drive signal, turns OFF (LO) the windshield wiper speed relay, and operates the windshield wiper at low speed. Next, when the windshield high speed wiper switch is turned ON, the windshield wiper drive signal is turned ON, the windshield wiper speed switching relay is turned ON (HI), and the windshield wiper is operated at high speed.



3. Washer control

When the ignition switch is at the ACC or ON position, if the windshield washer switch of the column switch is turned ON, the front ECU turns ON the windshield washer relay. The windshield wiper drive signal is turned ON in 0.3 seconds until 3 seconds after the windshield washer switch goes OFF (The wiper drive signal output time varies according to the conditions. Refer to the following table for details) to operate the windshield wiper continuously. When the windshield washer switch is turned ON, if the windshield wiper is operating intermittently, intermittent operations will be continued after continuous operations.



TI: Intermittent wiper intermittent time

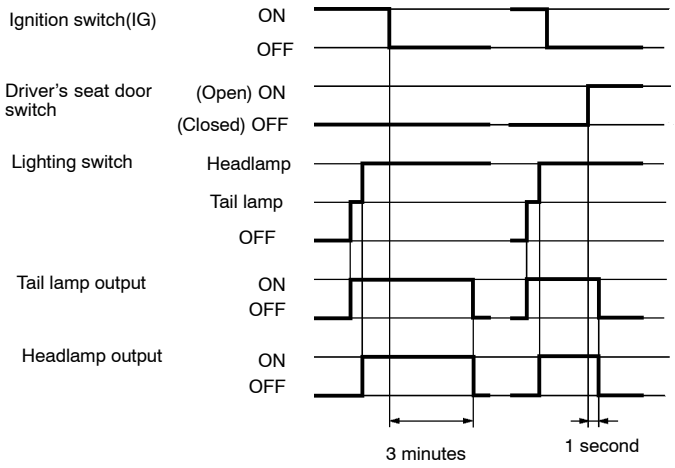
	When wiper switch is OFF				When wiper switch is INT				When wiper switch is LO or HI
t	0.3 seconds or less	0.3 - 0.5 seconds	0.5 - 0.7 seconds	0.7 seconds	Less than 0.2 seconds	0.3 - 0.5 seconds	0.5 - 0.7 seconds	0.7 seconds	-
T	0 second	1 second	2 seconds	3 seconds	0 second	1 second	2 seconds	3 seconds	3 seconds

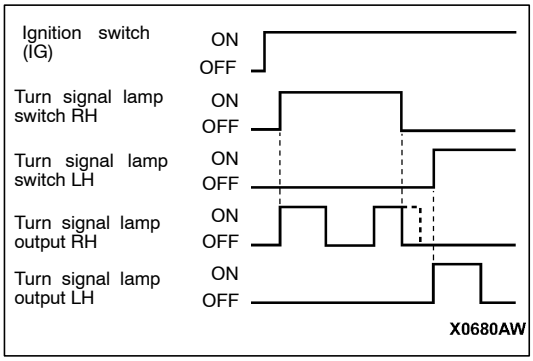
HEADLAMP AUTO-CUT FUNCTION

Even if the headlamp switch is ON, the head lamp will automatically go off in the following conditions to prevent the battery from discharging as a result of forgetting to turn off lights.

(1) When the ignition key is turned from ON to OFF with the headlamp switch turned ON, and this state continues for 3 minutes, the headlamp will automatically be turned off. If the driver's seat door is opened during these 3 minutes, the lamp will go off 1 second later. (During the one second until it goes off, the light still ON reminder warning buzzer will sound. However, if the driver's seat door is opened with the ignition key inserted, the key inserted reminder warning buzzer will function first.)
(2) When the tail lamp switch is turned ON with the ignition switch and lighting switch OFF, the lamp will not go off automatically.

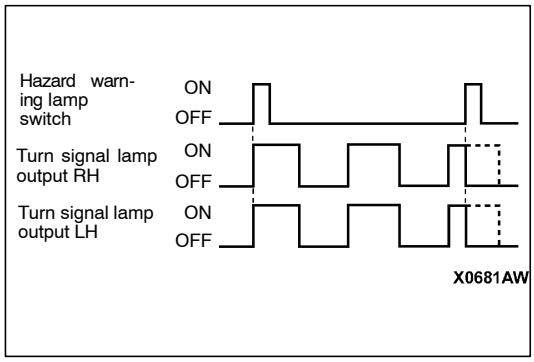
The headlamp auto-cut function is cancelled by turning ON the lighting switch (tail or headlamp switch) or ignition switch.





FLASHER TIMER FUNCTION

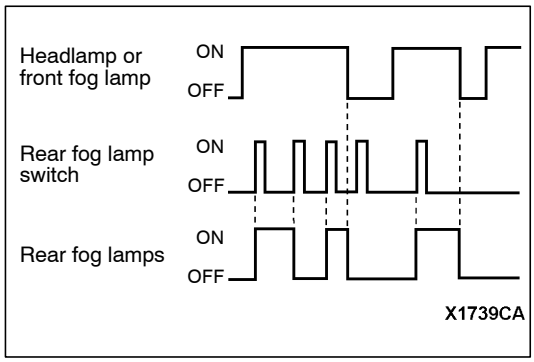
(1) The turn signal lamp output (flashing signal) is turned ON when the turn signal lamp ignition switch is ON and the turn signal lamp switch is ON (LH or RH). If the front turn signal lamp or rear turn signal lamp bulb has burned out, the flashing speed increases to indicate that the bulb has burned out.



(2) Detects the signal where the hazard warning lamp switch input changes from OFF to ON, and reverse the flashing state according to this signal. (Flashes when the hazard lamp is not flashing and turns off when flashing.)

NOTE

The hazard warning lamp switch is a push-return switch.



REAR FOG LAMP CONTROL FUNCTION

If the rear fog lamp switch is turned ON when the headlamp is turned ON, the rear fog lamp is switched ON and OFF alternatively.

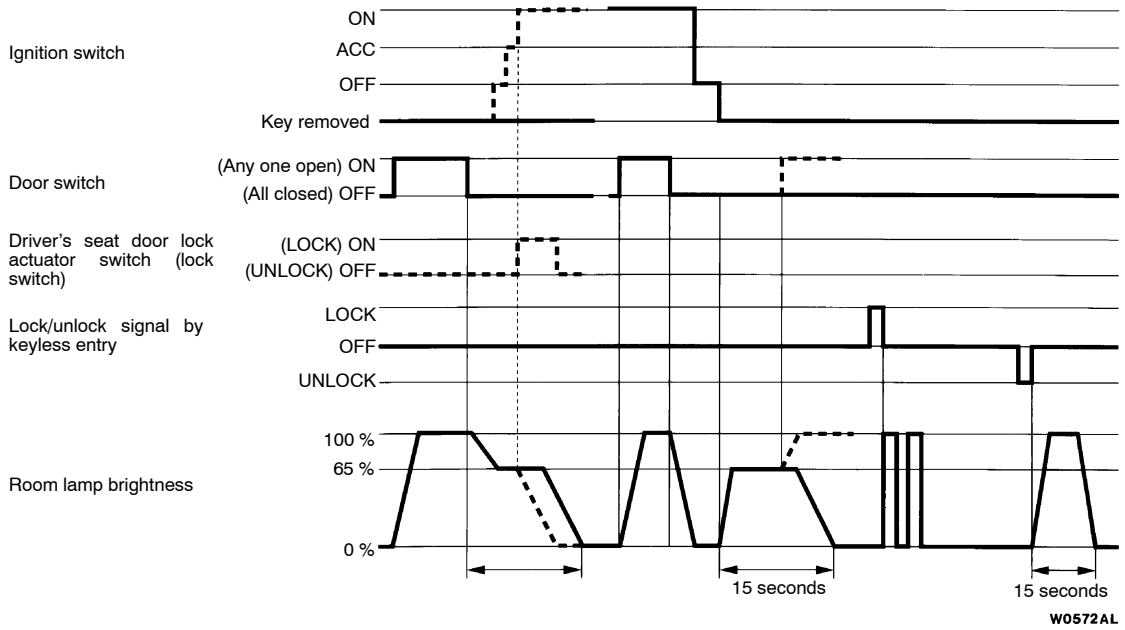
If the headlamp is turned OFF during lighting of the rear fog lamp, the rear fog lamp is turned OFF at the same time.

DIMMER TYPE ROOM LAMP CONTROL FUNCTION

When the room lamp switch is at the door position, the ETACS-ECU controls the lighting of the room lamp as follows.

(1) When a door is opened to get on or get off the vehicle (when the ignition switch is OFF), the lamp lights up (100%), when closed, the lamp dims (65%), and goes off 15 seconds later. However if the ignition switch is turned ON while the timer illuminates or if door is locked, the lamp will go off at that point.
(2) When a door is opened with the ignition switch ON, the lamp illuminates (100%), and goes off when closed.
(3) When the ignition key is removed with all doors closed
When the ignition key is removed with all doors closed, the lamp illuminates (65%) and goes off after 15 seconds. When the ignition key is inserted again while the lamp illuminates or when door is locked, the lamp goes off.

NOTE
The delay time until the room lamp goes off can be adjusted by the adjustment function. (Refer to P.7-29.)



NOTE
The dotted lines indicate that lighting mode when the ignition switch is turned ON, door is locked, or any door is opened during the timer illumination time.

HEATER AND AIR CONDITIONER

The heater and air conditioner system incorporating the heater and cleaning unit has reduced ventilation resistance to increase air volume and reduce noise.

FEATURES

Improvements in comfort
1. Installation of two-ray blow full air mix heater
2. Adoption of low noise, large air volume heater and air conditioner system
3. Improvement of heater performance using an in-air mixing dumper

Improvements in operation performance
1. Installation of dial type control with excellent operation performance on the heater and air conditioner control panel
2. Incorporation of rear defogger switch with timer into the control panel
3. Increase in panel display size

Reliable visual field (improvement in safety)
1. Achievement of ventilation system to defog windows by increasing the outside air intake duct area on the front deck and adopting a large air outlet
2. Windshield defogging speed improvement derived from increase in air volume and wind speed by adopting a blower type defroster and high performance heater

Improvements in fuel economy
1. Optimization of idle rotation speed according to air conditioner load
2. Installation of sub-cooling type condenser

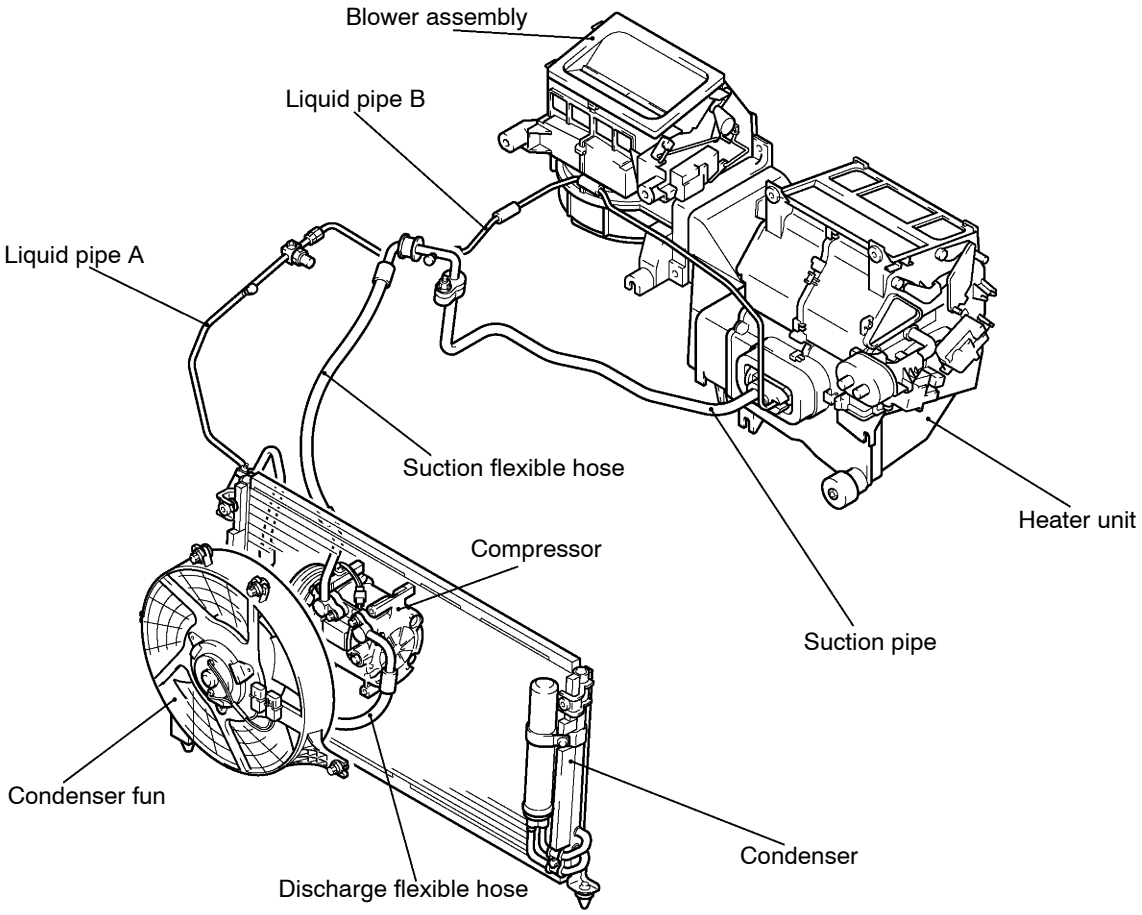
Global environment protection
Adoption of a new refrigerant system

Improvements in service quality
1. Improvement in service performance and reliability by adopting an O-ring dropout prevention structure for the refrigerant lines.
2. Reduction of gas leakage and improvement in service performance by incorporating condenser and receiver
3. Enhancement of the MUT-II compatible diagnostic function

SPECIFICATIONS

Item		Specifications
Heater unit type		Two-ray blow full air mix method
Heater control method		Dial type
Air conditioner switch type		Push button type
Compressor type		MSC90C
Refrigerant	Type	R134a (HFC-134a)
	Filled air volume g	550 ± 20

CONSTRUCTION DIAGRAM



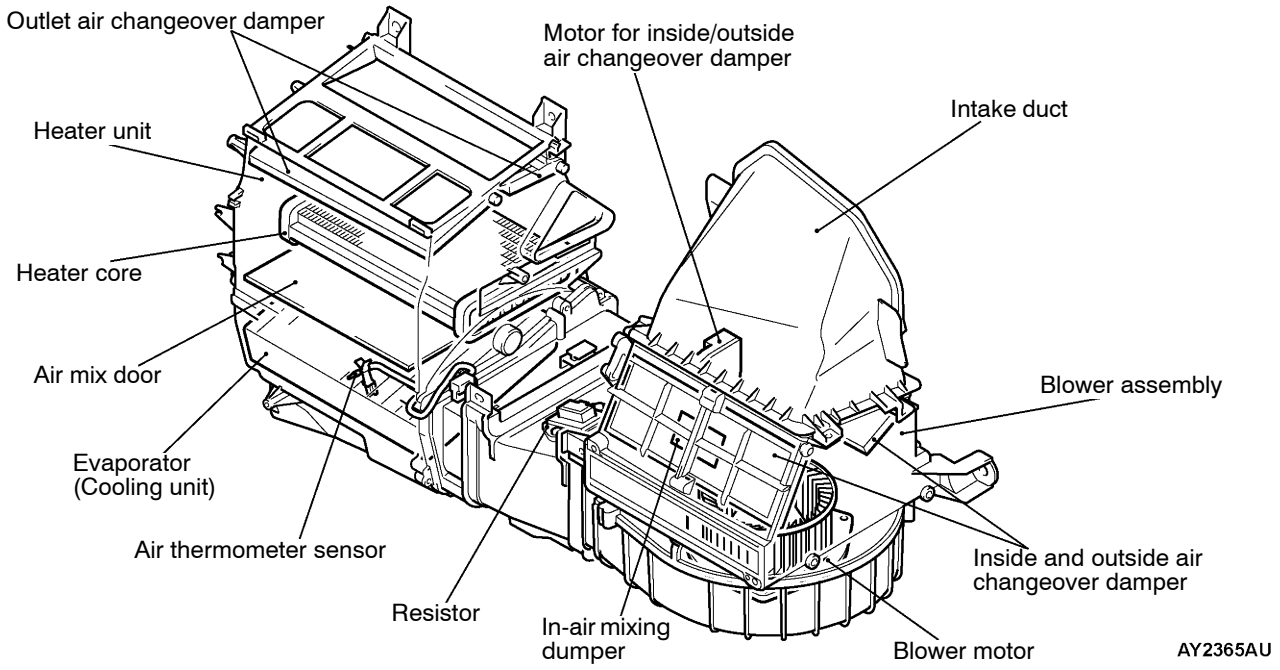
HEATER AND AIR CONDITIONER SYSTEM

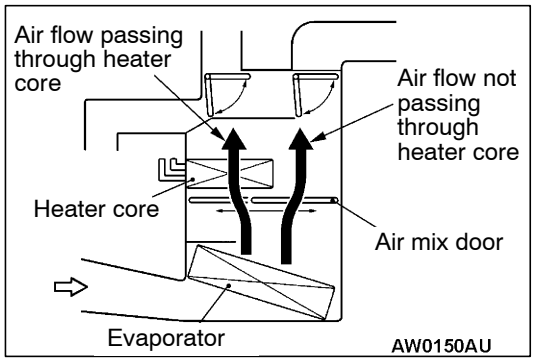
CONSTRUCTION AND DESCRIPTION

BLOWER ASSEMBLY AND HEATER UNIT

The following blower assembly and heater unit has been adopted to increase air volume, reduce noise, improve air-conditioning performance, as well as improve the car interior air environment.

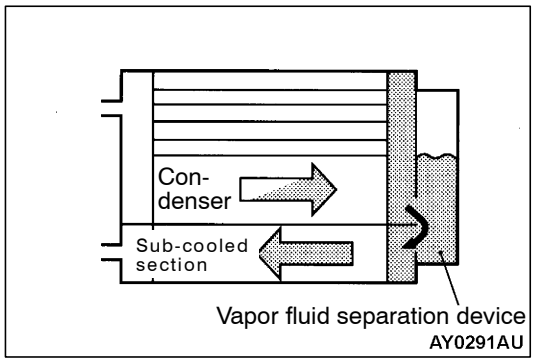
- Installation of two-ray blow full air mix heater
- Incorporation of heater and cleaning unit
- Increase in the outside air intake duct area size of the blower assembly and optimization of the shape
- Improvement of heater performance using an in-air mixing dumper





Two-Ray Blow Full Air Mix Heater

In the heater unit, there are two rays of air;one which passes through the heater core, and air which does not pass through the core. One air mix door is used for temperature control. The two-ray blow full mix heater with low ventilation resistance has increased air volume and has reduced noise.



CONDENSER

The heat exchange efficiency has been improved with the adoption of a sub-cooling type condenser added with a sub-cooled section. The reduction of line unions by incorporating the condenser and receiver has reduced a possibility of gas leakage and has increased service performance.

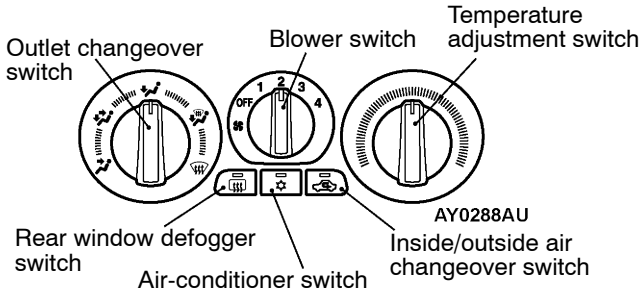
COMPRESSOR CLUTCH WITH TEMPERATURE FUSE

When the compressor is locked, friction heat generated by the contact of the compressor and the rotor melts the temperature fuse incorporated into the field core and causes the compressor clutch to be disengaged so that the compressor clutch with temperature fuse can prevent the drive belt from being damaged.

HEATER AND AIR CONDITIONER CONTROL

Adoption of the following heater and air conditioner control has improved operation performance and visual observation.

- Installation of dial type switch
- Incorporation of rear window defogger switch with timer
- Improved appearance by incorporating the center panel

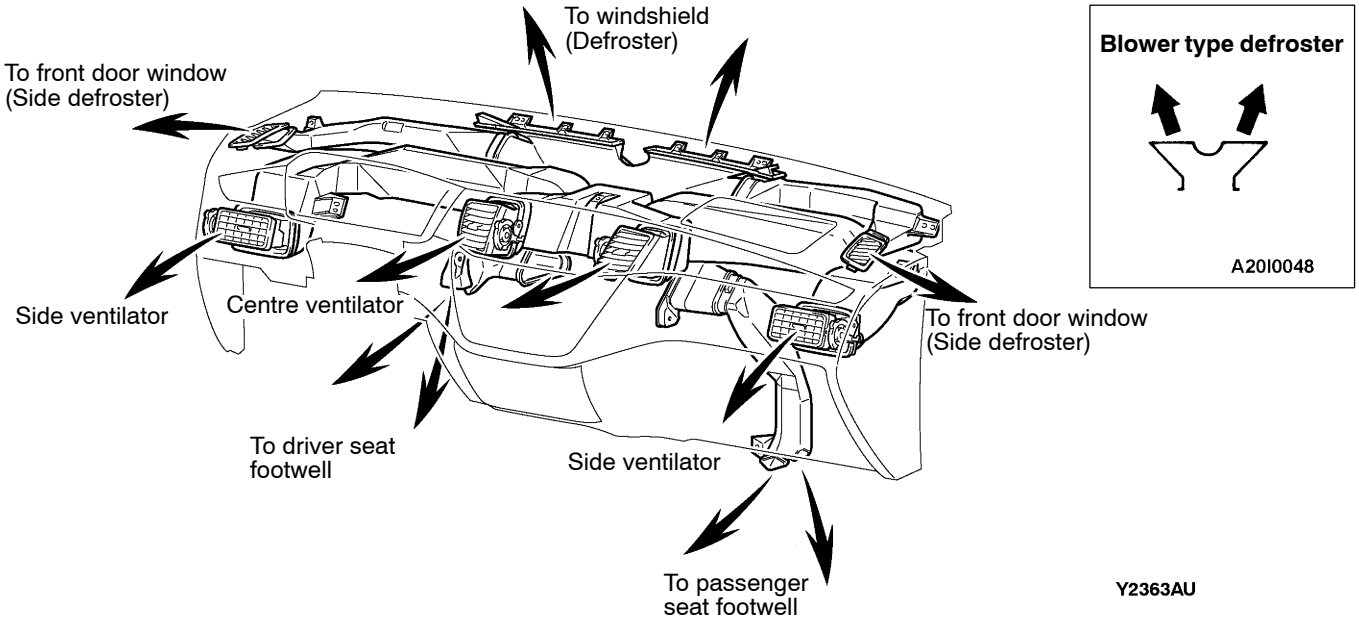


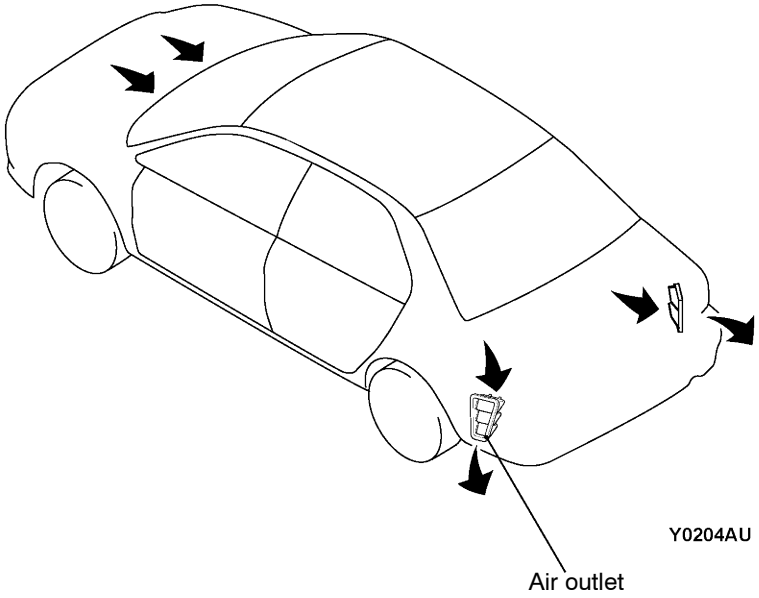
VENTILATION SYSTEM

DESCRIPTION OF STRUCTURE AND OPERATION

The adoption of the following mechanism has increased air volume for ventilation and has achieved a ventilation system for defogging windows.

- Increasing the outside air intake duct area
- Increasing the size of air outlet on the back of the rear bumper
- Installation of blower type defroster




Y0204AU
Air outlet

NOTES