GROUP 26

FRONT AXLE

CONTENTS

GENERAL INFORMATION

M2260000100819

For the front axle, a double-row angular contact ball bearing with an integral oil seal is adopted as a wheel bearing, and EBJ-ETJ type constant velocity joint as a driveshaft.
It has the following features:

- The driveshaft incorporates lightweight and compact EBJ-ETJ type constant velocity joints.
- Lead-free grease for the constant velocity joint is adopted.
- Hexavalent chromium is eliminated from the dust cover material.
- The number of parts is reduced by integrating the magnetic encoder for ABS wheel speed detection into the wheel bearing. <Vehicles with ABS>

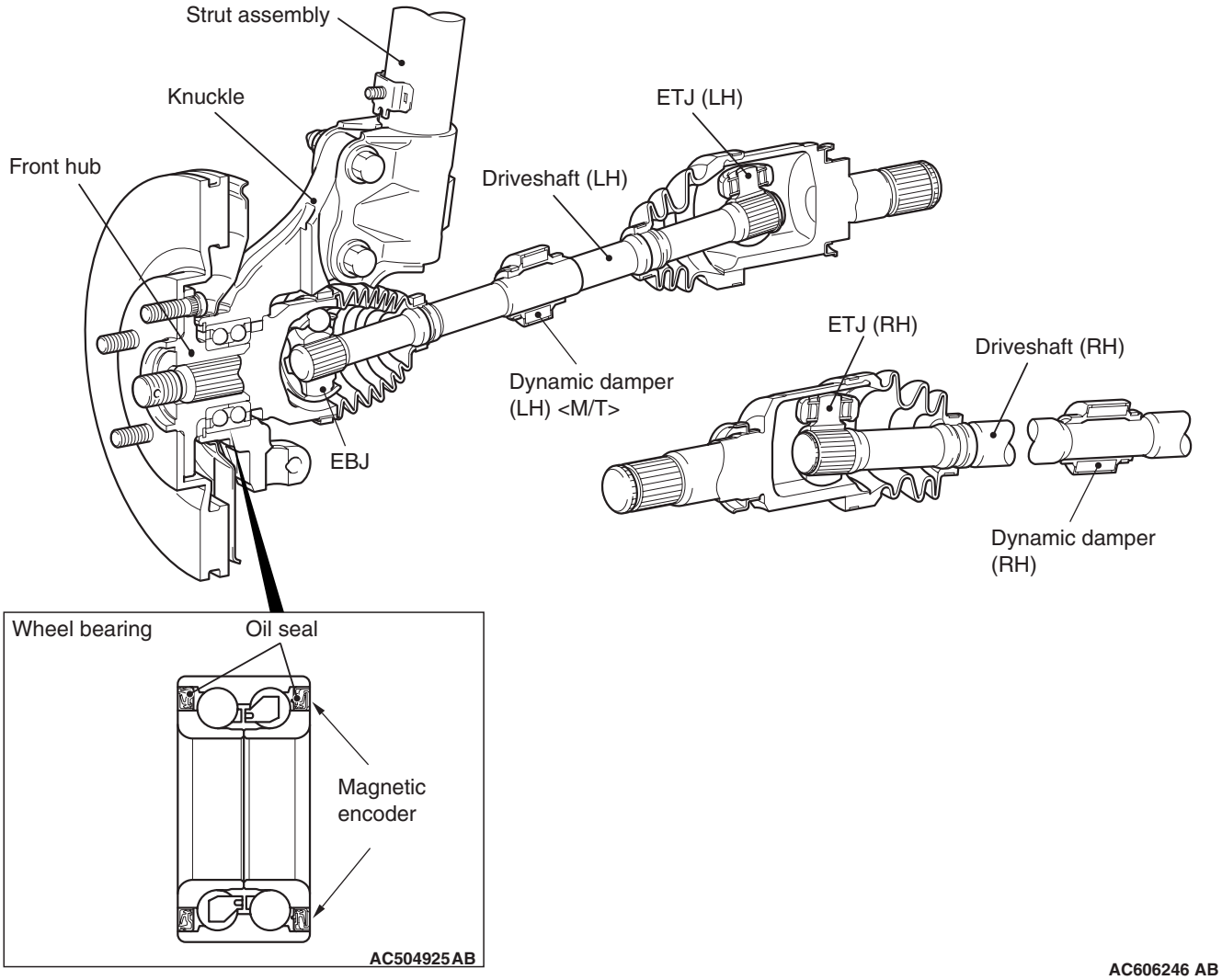
NOTE:
ETJ (High Efficiency Compact Tripod Joint): the lighter and smaller constant velocity joint compared with the conventional TJ has been installed.
EBJ (High Efficiency Compact Birfield Joint): the lighter and smaller constant velocity joint compared with the conventional BJ has been achieved by adopting the eight small balls.

SPECIFICATIONS

Item			Specification
Wheel bearing	Bearing type		Unit bearing (double-row angular contact ball bearing)
	Bearing (Outer diameter x inside diameter) mm (in)		80 × 43 (3.15 × 1.69)
Driveshaft	Joint type	Outside	EBJ
		Inside	ETJ
	Shaft length* x shaft diameter mm (in)	M/T-LH	380.5 × 24.5 (15.0 × 1.0)
		M/T-RH	715 × 28 (28.1 × 1.1)
		CVT-LH	399.5 × 24.5 (15.7 × 1.0)
		CVT-RH	715.0 × 28 (28.1 × 1.1)

*NOTE: *: Indicates the distance between each joint center.*

CONSTRUCTION DIAGRAM



NOTES

GROUP 36

PARKING BRAKES

CONTENTS

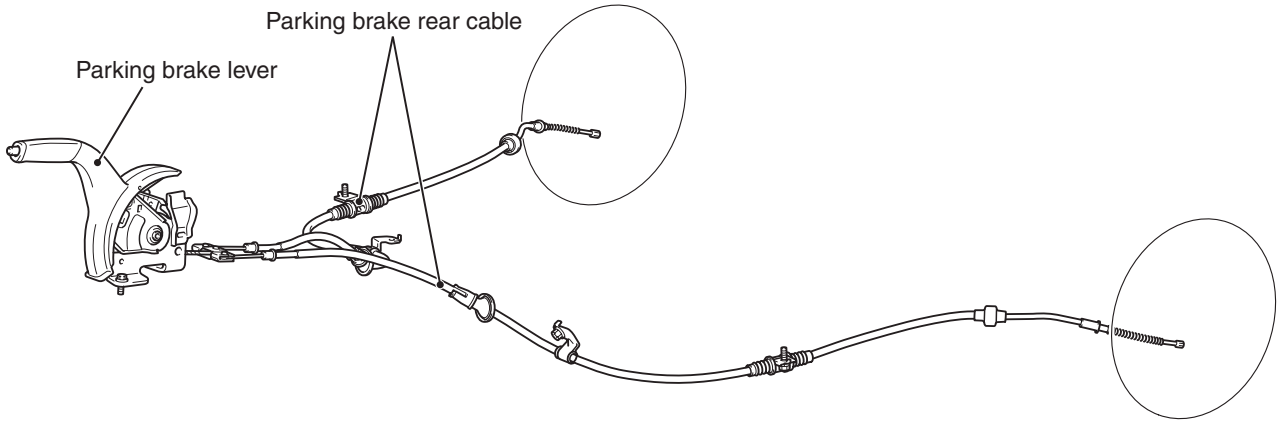
GENERAL INFORMATION

M2360000100753

A parking brake lever is used to operate the mechanical rear-wheel acting type parking brake.

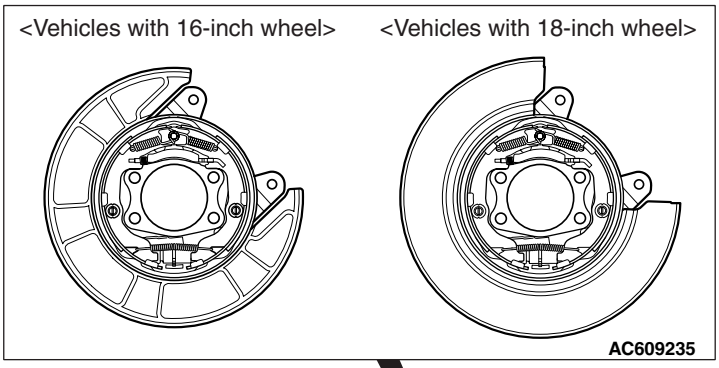
CONSTRUCTION DIAGRAM

<Vehicles with rear drum brake>

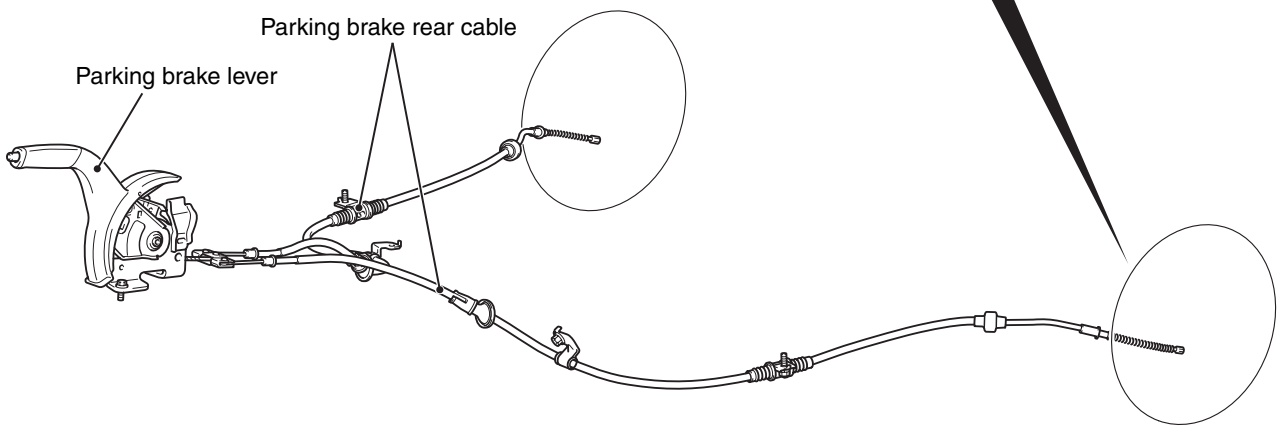


AC609233AC

<Vehicles with rear disc brake>



AC609235



AC609234AB

GROUP 35A

BASIC BRAKE SYSTEM

CONTENTS

GENERAL

M2350000100956

Brake systems with higher reliability and durability have achieved distinguished braking performance.

FEATURES

IMPROVEMENT OF BRAKING PERFORMANCE

- A 10-inch single brake booster with the variable boost ratio mechanism has been used to assure maximum braking force with less pedal pressure in case of emergency. <Vehicles with ABS>
- In addition to the 10-inch single brake booster, a small and long stroke-type master cylinder has been adopted to achieve downsizing and secure assist force.
- 15-inch or 16-inch ventilated disc brakes have been adopted for the front.
- 8-inch leading trailing-type drum brake, 14-inch or 16-inch solid disc brake has been adopted for the rear.

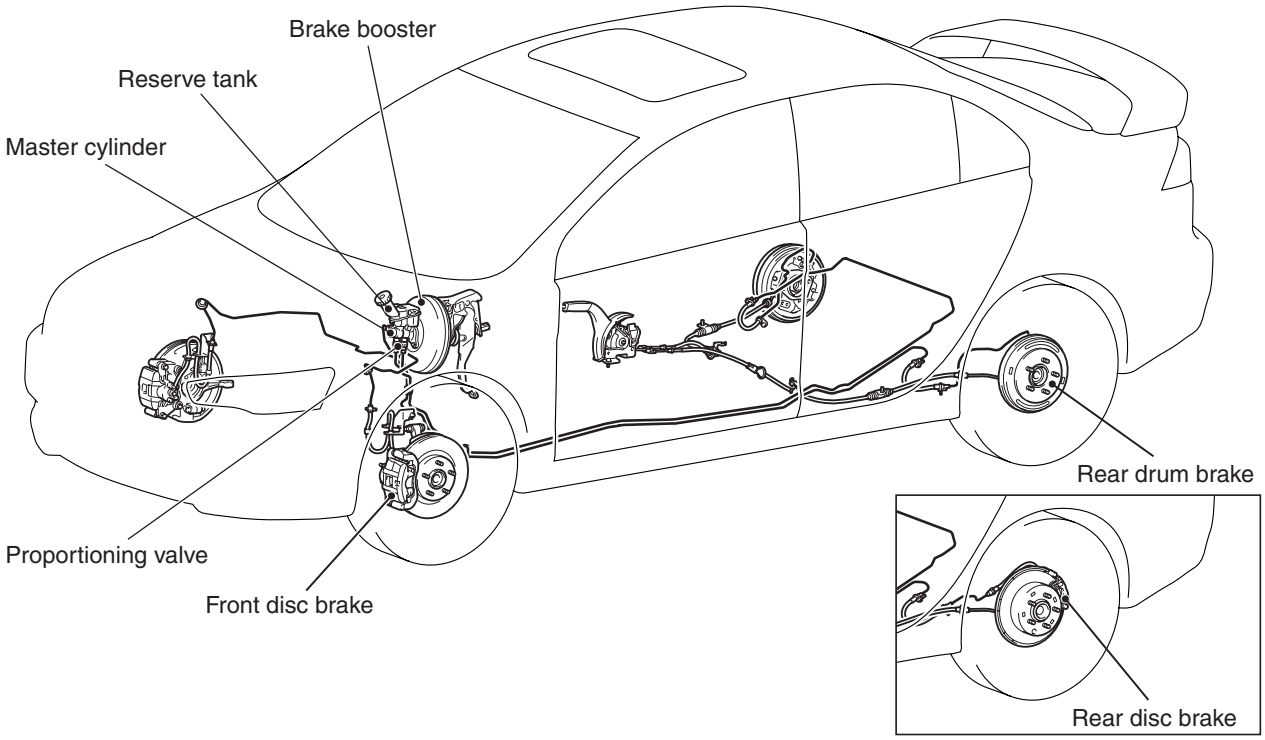
IMPROVEMENT IN SAFETY

- The 4-wheel anti-lock brake system (4ABS) has been installed to prevent slippage resulting from the wheel lock and assure stable vehicle posture and driveability.<Vehicles with ABS>
- A rear wheel early lock-prevention proportioning valve has been used. <Vehicles without ABS>
- Electronic control braking force distribution system (EBD) has been adopted to assure the maximum braking force independently of the passenger's position in the vehicle. <Vehicles with ABS>
- X-type piping of brake lines have been adopted for the front and rear wheels.
- Audible wear indicators are used on the front and rear brake pads to warn the driver of wear limit.

SERVICE QUALITY IMPROVEMENTS

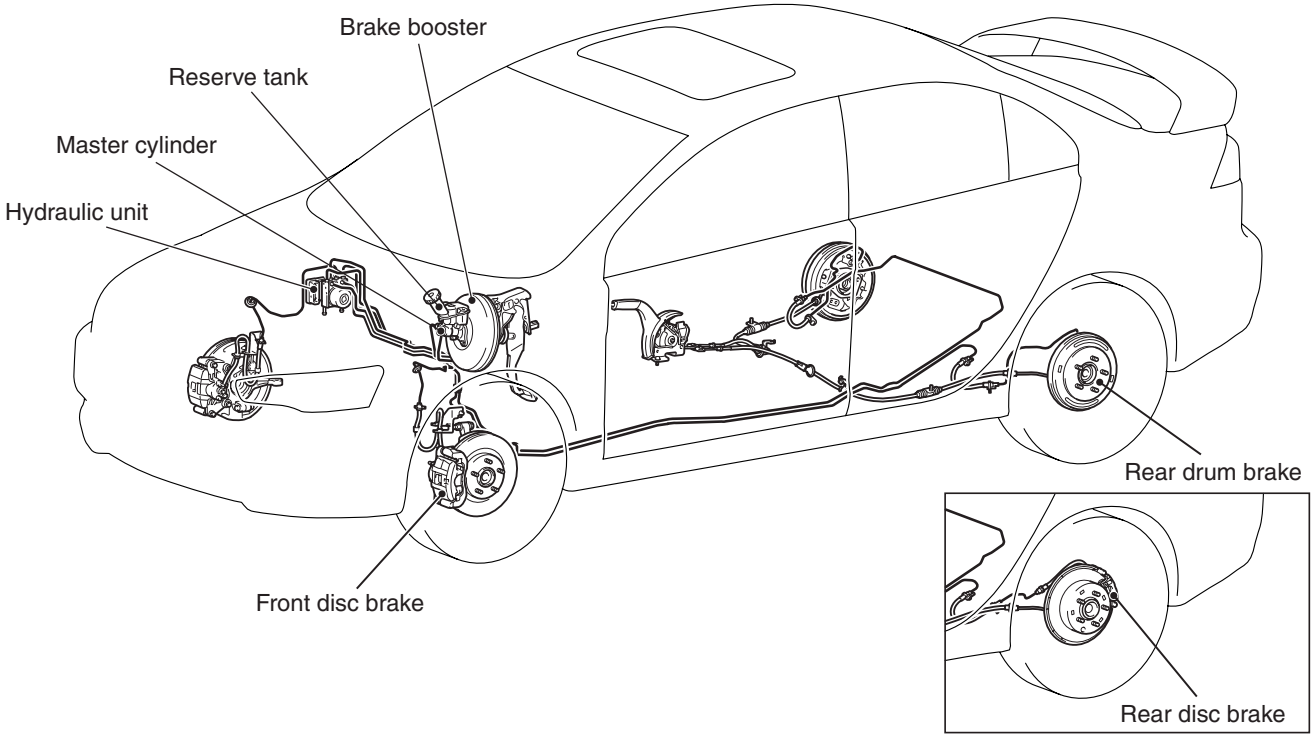
- Diagnostic function has been adopted to ABS for easier inspection. <Vehicles with ABS>
- Brake fluid reservoir, master cylinder, and brake booster have been integrated for downsizing and better serviceability.

<Vehicles without ABS>



AC609311AB

<Vehicles with ABS>



AC609312AB

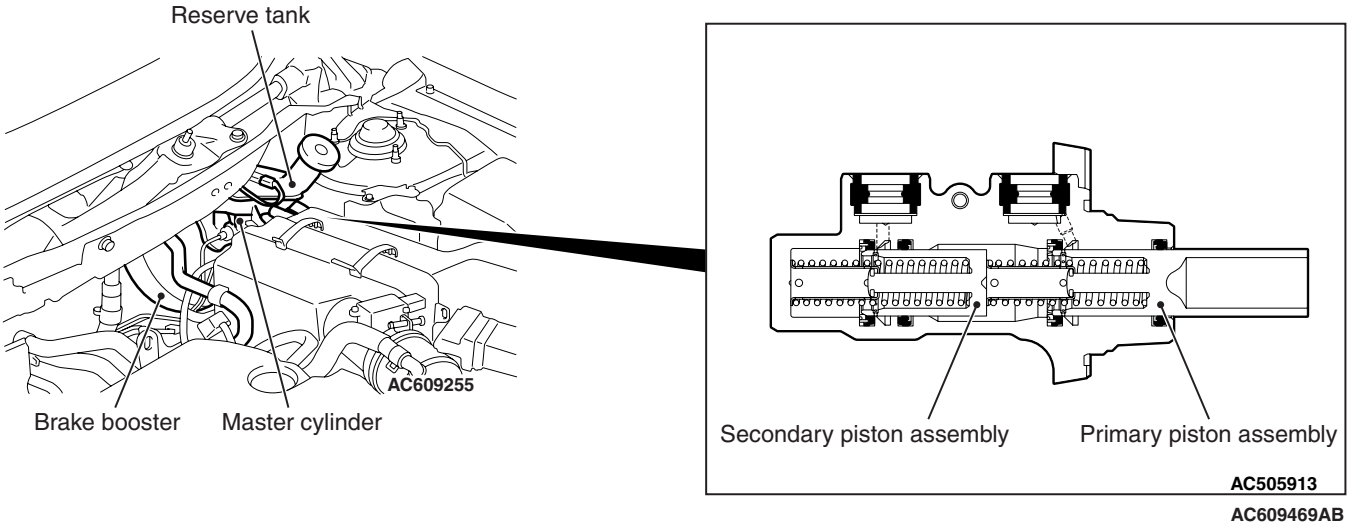
SPECIFICATIONS

Item			Specifications
Master cylinder	Type		Tandem type
	I.D. mm (in)		20.6 (0.81)
Brake booster	Type		Vacuum type, single
	Effective dia. of power cylinder mm (in)		254 (10.0)
	Boost ratio	Vehicles without ABS	6.5 (Pedal pressure: 188N)
		Vehicles with ABS	6.5 (Pedal pressure: 92N) 8.5 (Pedal pressure: 156N)
Rear wheel hydraulic control type		Vehicles without ABS	Proportioning valves
		Vehicles with ABS	Electronic control braking force distribution system (EBD)
Front disc brake	Type	Vehicles with 16-inch wheel	Floating caliper 1 piston ventilated disc (V5-S57)
		Vehicles with 18-inch wheel	Floating caliper 1 piston ventilated disc (V6-S57)
	Disc effective dia × thickness mm (in)	Vehicles with 16-inch wheel	222 × 26 (8.7 × 1.02)
		Vehicles with 18-inch wheel	241.6 × 26 (9.5 × 1.02)
	Cylinder I.D. mm (in)		57.1 (2.25)
	Pad thickness mm (in)		10.0 (0.39)
	Clearance adjustment		Automatic adjustment
Rear drum brake	Type		Leading trailing drum
	Drum I.D. mm (in)		203 (8.0)
	Wheel cylinder I.D. mm (in)		19.0 (0.75)
	Lining thickness mm (in)		4 (0.157)
	Clearance adjustment		Automatic
Rear disc brake	Type	Vehicles with 16-inch wheel	Floating caliper 1 piston solid disc (S4-S35)
		Vehicles with 18-inch wheel	Floating caliper 1 piston solid disc (S6-S35)
	Disc effective dia × thickness mm (in)	Vehicles with 16-inch wheel	226 × 10 (8.9 × 0.39)
		Vehicles with 18-inch wheel	258 × 10 (10.2 × 0.39)
	Cylinder I.D. mm (in)		34.9 (1.37)
	Pad thickness mm (in)		10.0 (0.39)
	Clearance adjustment		Automatic adjustment

CONSTRUCTION DESCRIPTION

MASTER CYLINDER

M2350001000576

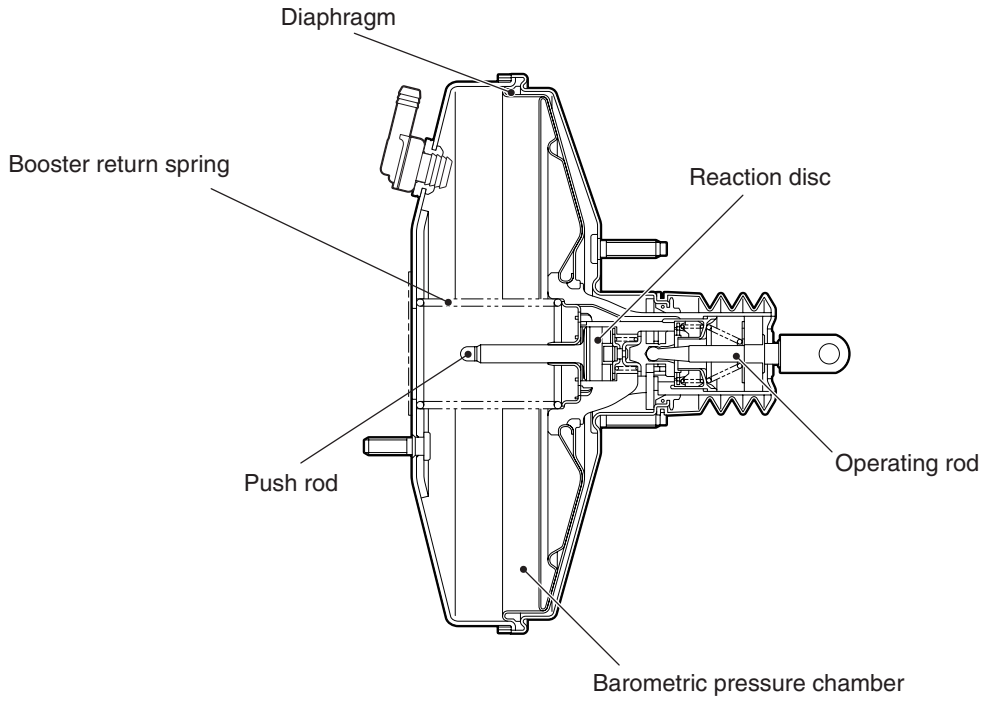


AC609469AB

The master cylinder is a tandem type and is integrated with the brake fluid reservoir with the level switch.

BRAKE BOOSTER

M2350002000698



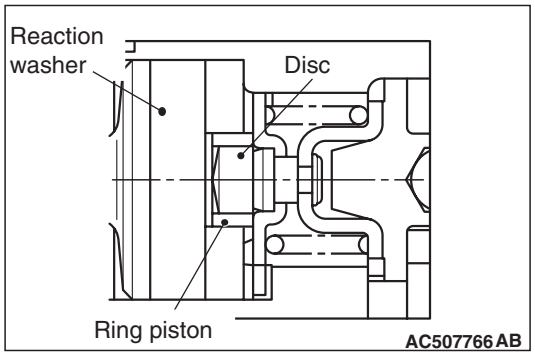
AC505931AB

A 10-inch single brake booster has been installed. The variable boost ratio mechanism which increases the brake booster gain has been adopted.

VARIABLE BOOST RATIO MECHANISM

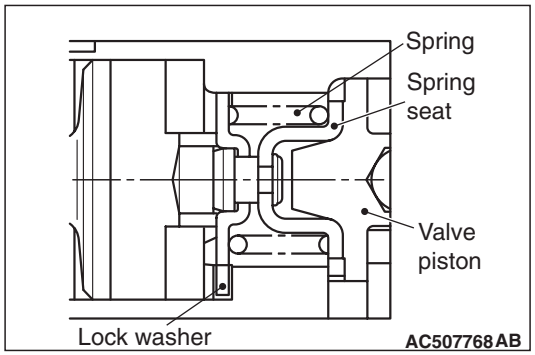
The variable boost ratio mechanism changes the input/output characteristics of the brake booster in two phases by changing the reaction force applied to the valve plunger during the assist phase.

AT INITIAL ASSISTING

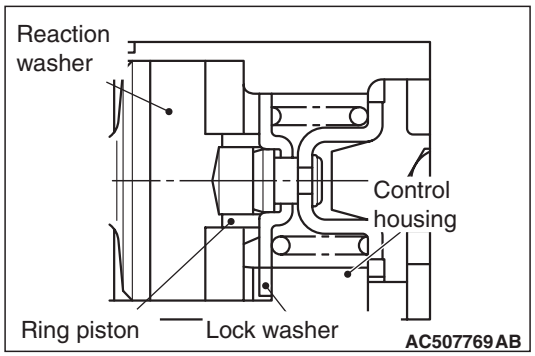


1. When the brake pedal is not depressed (no input load applied), the reaction washer is not deformed.
2. When the brake pedal is depressed, the reaction washer is deformed to reach the ring piston and disc, then the first input characteristics begin (Ratio 1).

AT AN INCREMENT OF ASSIST RATIO



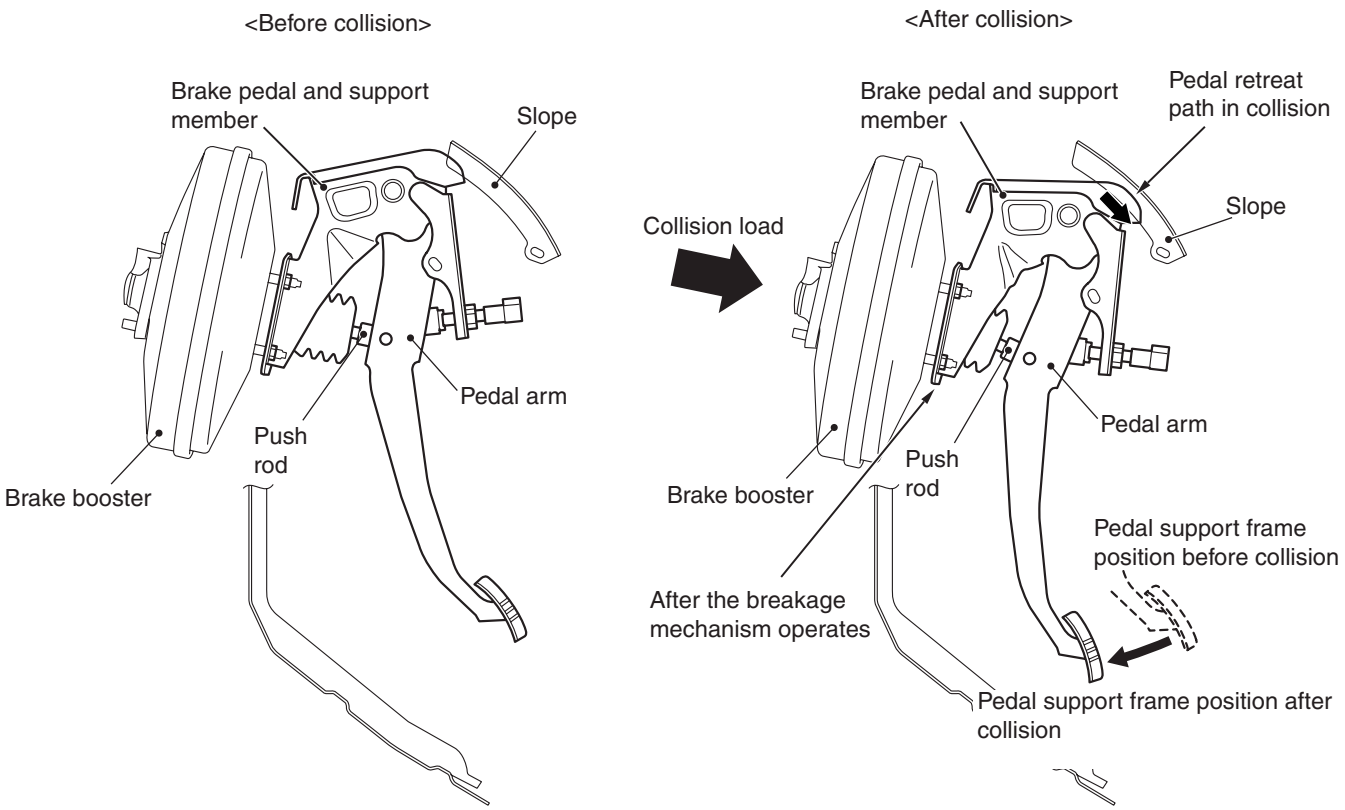
1. The reaction washer is further deformed and pushes down the ring piston and lock washer, deflecting the spring. All the force pushing the ring piston and disc is transferred to the brake pedal via spring seat and disc as the reaction force.



2. The reaction washer is then further deformed, and when the lock washer makes contact with the control housing, the input characteristics change. All the force applied from the reaction washer to the ring piston is now transferred to the control housing via the lock washer, so no force is applied to the brake pedal. The second input characteristics (Ratio 2) begin.

BRAKE PEDAL

M2350007000422



AC611958AB

The brake pedal retreat suppression mechanism that restraints the retraction of the brake pedal surface during a frontal collision has been adopted in order to reduce the shock to the driver's feet.

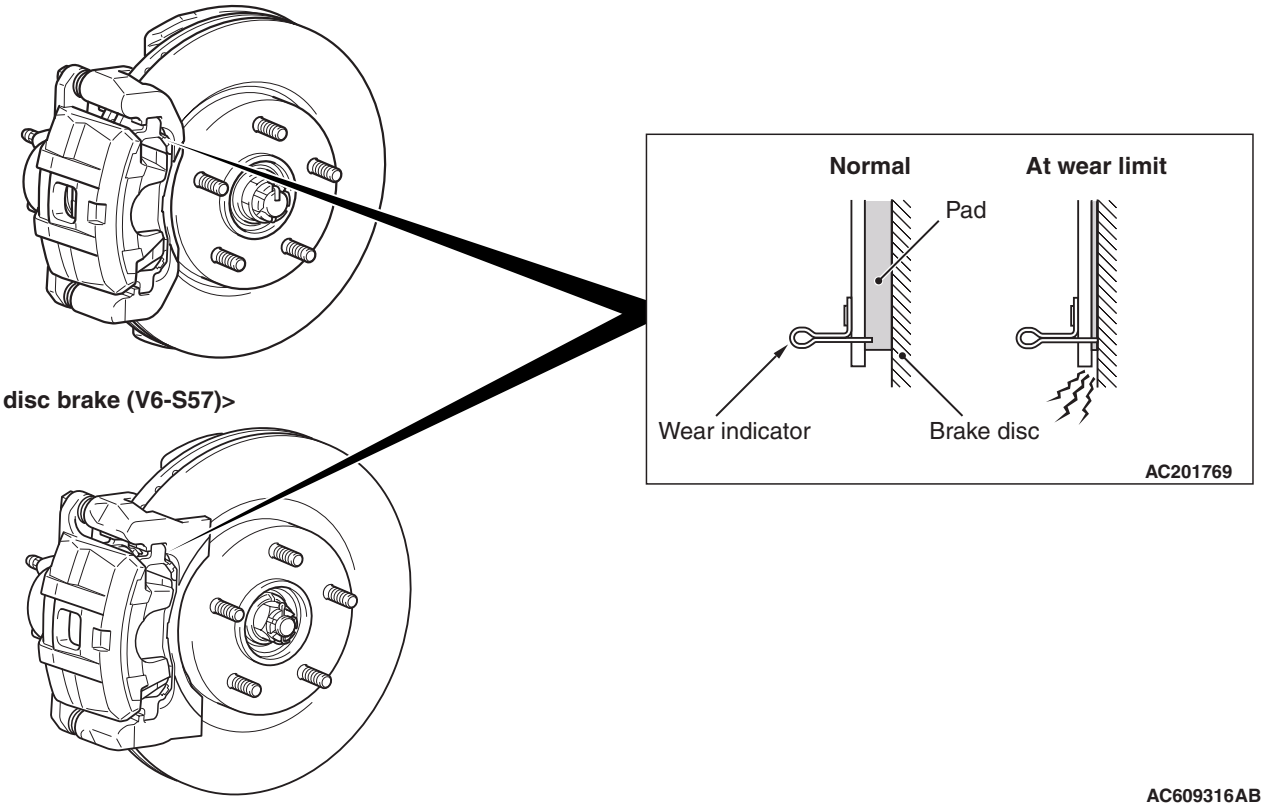
When the brake booster is crushed rearward by the engine retreat during a frontal collision, the installation surface of the brake pedal is retreated. In this case, the end of the pedal support is forcibly slid down and back by the interference with the slope mounted on the front deck crossmember assembly. At the same time, the linkage comprised of the pedal support, pedal arm, and push rod moves the brake pedal pad surface forward.

FRONT BRAKE

M2350003000602

<15-inch disc brake (V5-S57)>

<16-inch disc brake (V6-S57)>

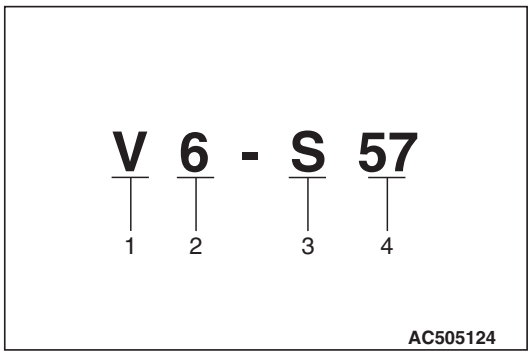


AC609316AB

Brakes with the following specifications have been adopted for the front brakes.

- The 1-piston ventilate disc brake (V5-S57 <Vehicles with 16-inch wheel> or V6-S57 <Vehicles with 18-inch wheel>) has been adopted.
- An audible wear indicator that informs the driver of application limit has been adopted onto the front brake LH pads.
- The outer disc type brake disc which can be tightened together with the wheel has been introduced for better serviceability.

DISC BRAKE DESIGNATION

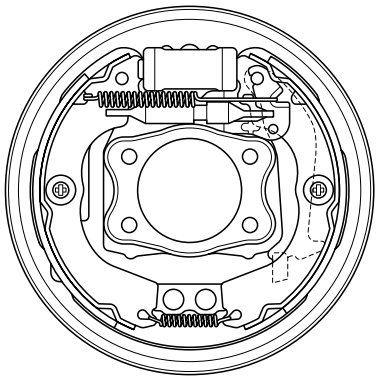


No.	Item	Contents
1	Brake disc type	V: Ventilated S: Solid
2	Brake size (Minimum applicable disc wheel)	4: 14" 5: 15" 6: 16"
3	Number of pistons	S: 1 (Floating type)
4	Piston size (Rounded integral value)	35: ϕ34.9 mm 57: ϕ57.1 mm

REAR BRAKE

M2350004000616

<Vehicles with rear drum brake>



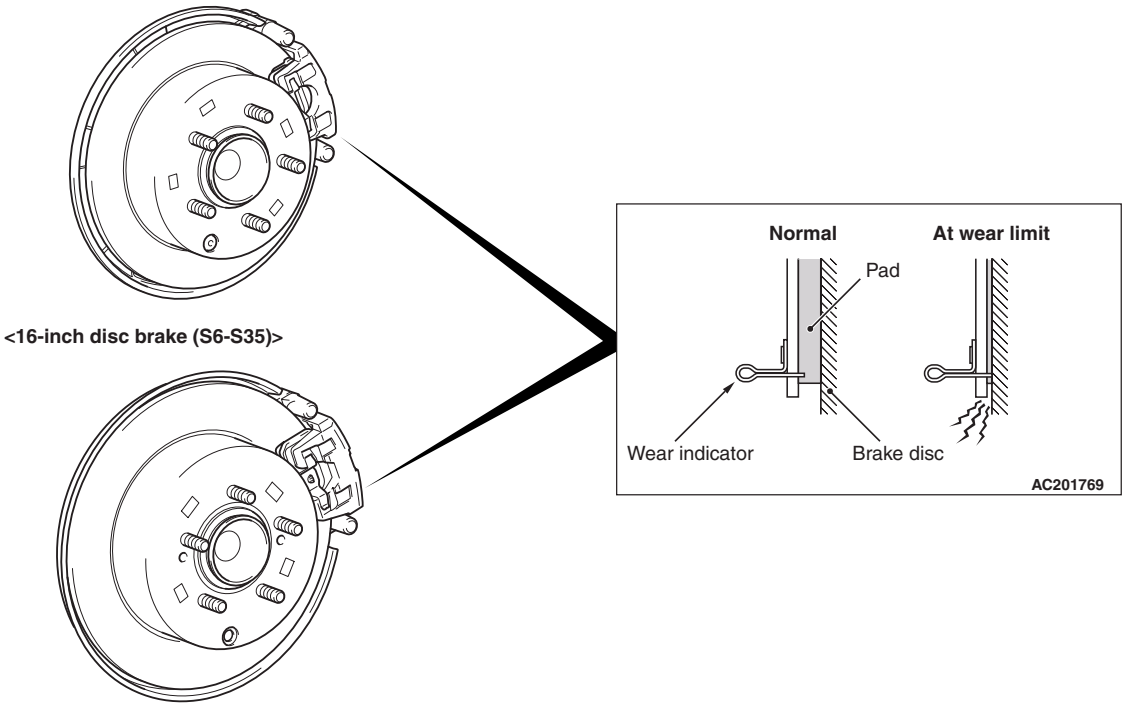
AC609282

8-inch leading trailing-type drum brakes have been adopted for the rear brakes in order to provide stable braking force at all times both when moving forward and reverse.

<Vehicles with rear disc brake>

<14-inch disc brake (S4-S35)>

<16-inch disc brake (S6-S35)>



AC609315AB

Brakes with the following specifications have been adopted for the rear.

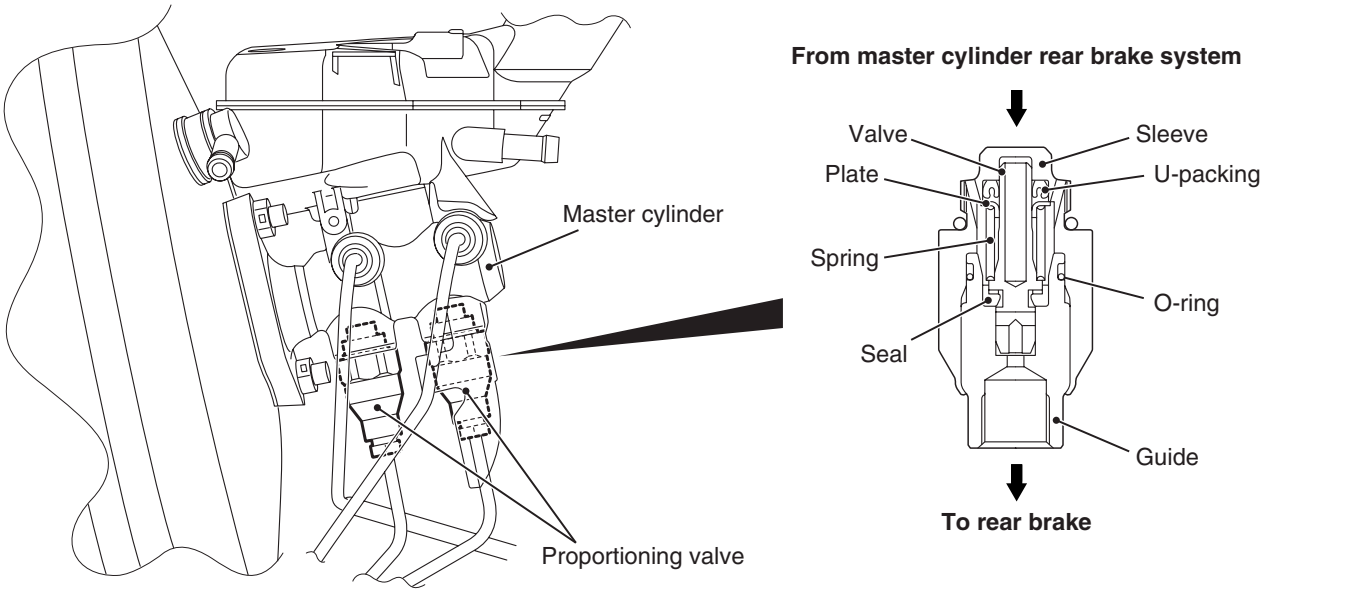
- The 1-piston solid disc brake (S4-S35 <Vehicles with 16-inch wheel> or S6-S35 <Vehicles with 18-inch wheel>) has been adopted.*
- An audible wear indicator that informs the driver of application limit has been adopted onto the brake pads.
- The outer disc type brake disc which can be tightened together with the wheel has been introduced for better serviceability.

*NOTE: *For the brake disc name, refer to FRONT BRAKE P.35A-8.*

BRAKE LINE

M2350005000266

PROPORTIONING VALVE <Vehicles without ABS>



AC609305AB

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

GROUP 35B

FOUR-WHEEL ANTI-LOCK BRAKE SYSTEM (4ABS)

CONTENTS

GENERAL INFORMATION

M2351000100830

The ABS that ensures directional stability and controllability during hard braking. ABS is standard equippment on the ES and GTS models but is optional.
This ABS uses a 4-sensor system that controls all four wheels independently of each other, and has the following features:

- EBD *1 (Electronic Brake-force Distribution system) control that can obtain ideal rear wheel brake force has been employed.
- The magnetic encoder for detecting the wheel speed has been installed instead of the rotor as the wheel speed sensor.
- For wiring harness saving and secure data communication, CAN *2 bus has been adopted as a tool of communication with other ECUs.

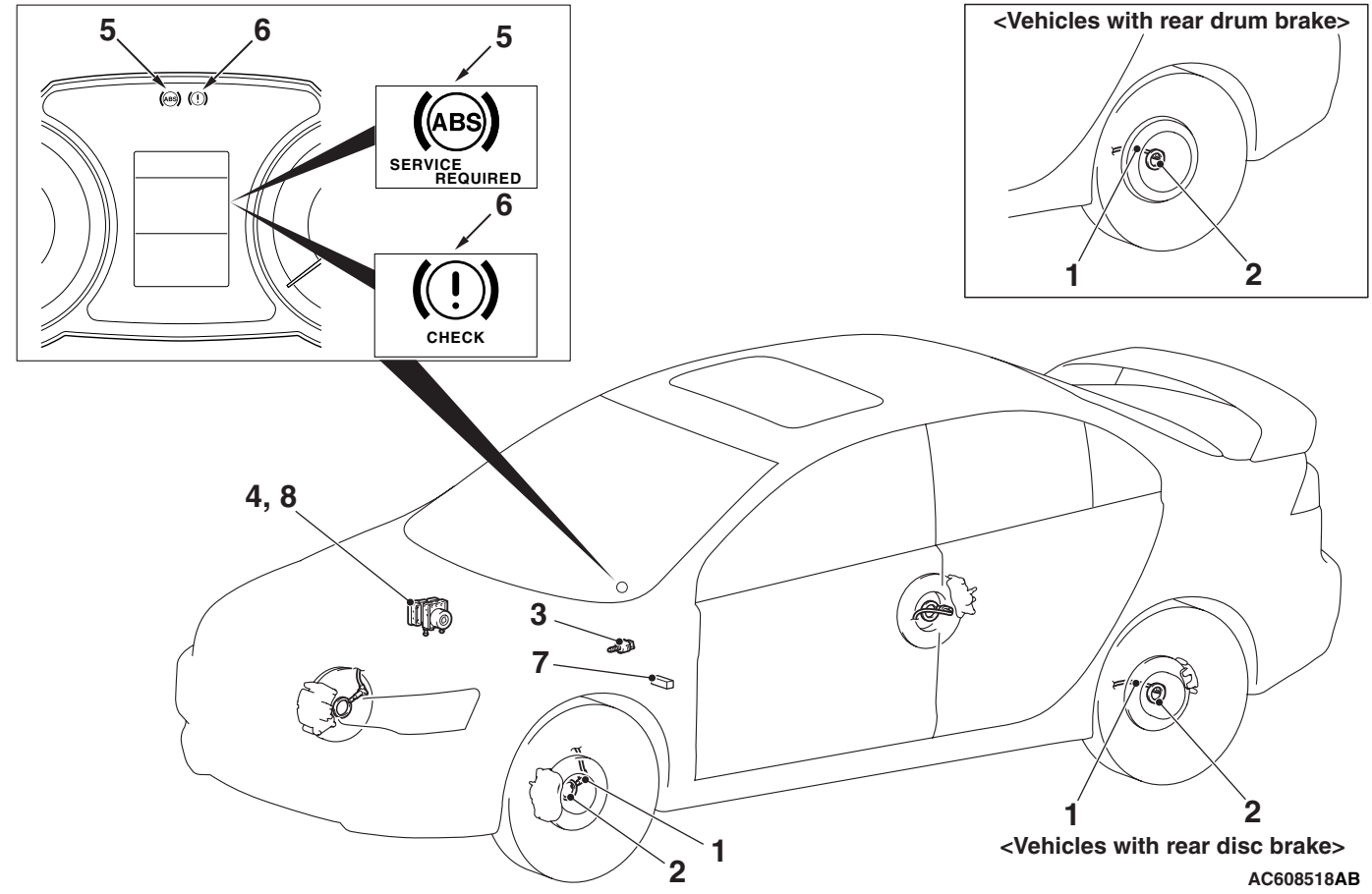
NOTE:

- **1: EBD (Electronic Brake-force Distribution)*
- **2: For more information about CAN (Controller Area Network), refer to GROUP 54C P.54C-2.*

SPECIFICATIONS

Item			Specifications
ABS control type			4 sensors
Wheel speed sensor	Magnetic encoder	Front	86 (N pole: 43, S pole: 43)
		Rear	86 (N pole: 43, S pole: 43)
	Type		Semiconductor

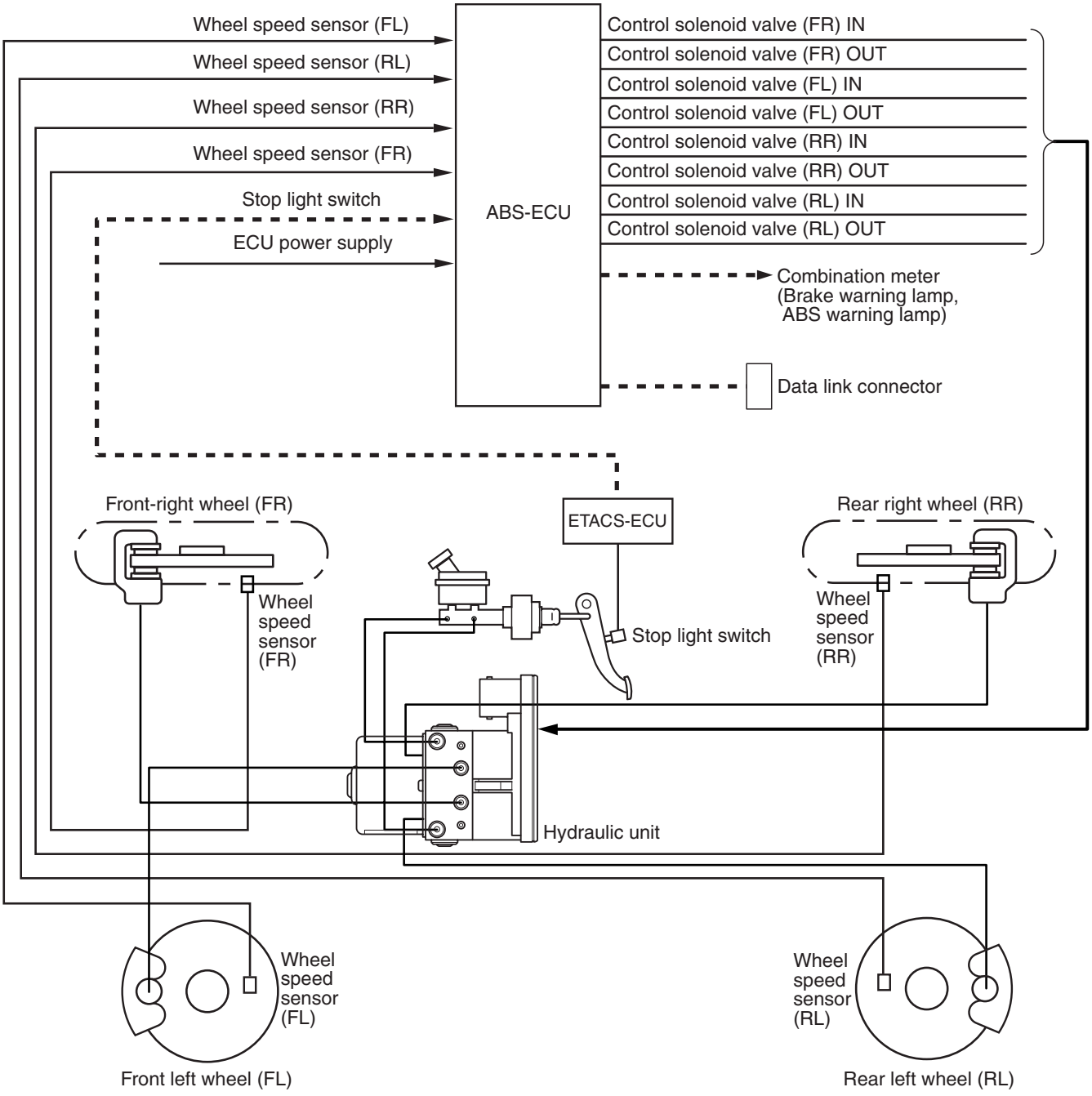
CONSTRUCTION DIAGRAM



MAIN COMPONENTS AND FUNCTIONS

Parts name		No.	Functional description
Sensor	Wheel speed sensor	1	Outputs the frequency signal in proportion to the rotation speed of each wheel to ABS-ECU.
	Magnetic encoder for wheel speed detection	2	The wheel speed sensor is a pulse generator. When the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) rotates, it outputs frequency pulse signal in proportion to each wheel speed.
	Stop light switch	3	Outputs the signal indicating whether the brake pedal is depressed or not through ETACS-ECU to ABS-ECU via the CAN line.
Actuator	Hydraulic unit	4	Drives the solenoid valve using the signal from ABS-ECU, and controls the brake fluid pressure for each wheel.
	ABS warning light	5	Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ABS-ECU.
	Brake warning light	6	Used as the warning light for the parking brake, brake fluid level, and EBD control. Informs the driver of the system status by illuminating or turning off the warning light according to the signal from ABS-ECU, ETACS or combination meter.
Data link connector		7	Establishes the communication with scan tool.
ABS control unit (ABS-ECU)		8	Controls the actuators (described above) based on the signals coming from each sensors.
			Controls the self-diagnostic functions and fail-safe functions.
			Controls diagnostic function (Compatible with scan tool).

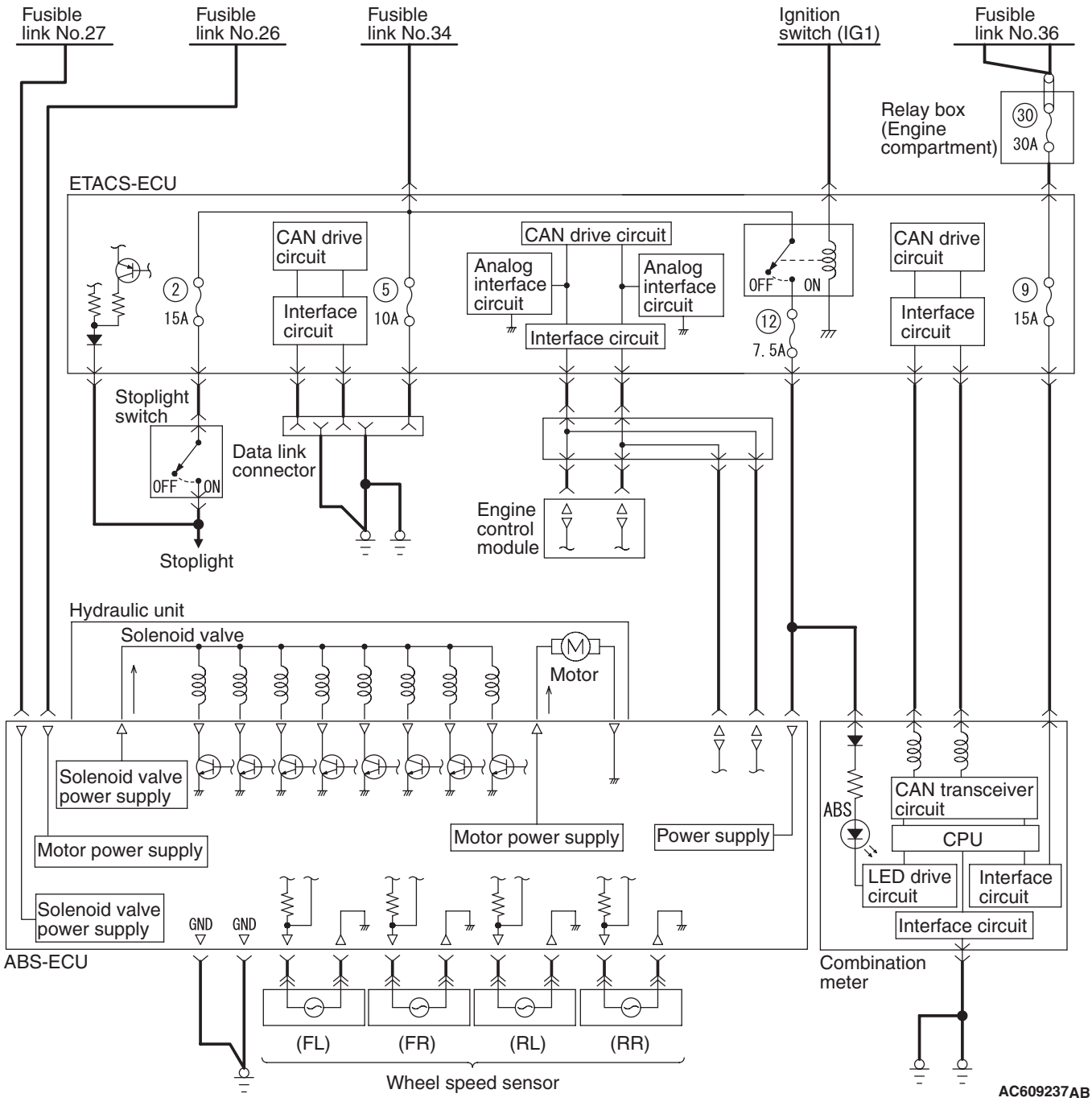
SYSTEM CONFIGURATION



AC608528AB

NOTE: Dashed lines indicate the CAN bus communication lines.

ABS ELECTRICAL DIAGRAM



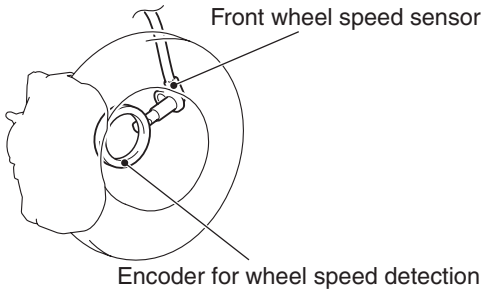
CONSTRUCTION DESCRIPTION

SENSOR

M2351001000494

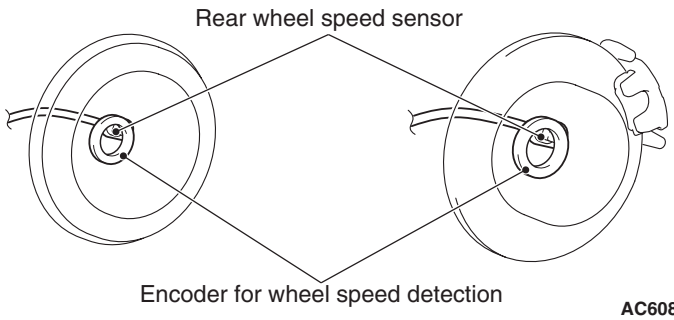
Wheel speed sensor

FRONT



REAR

<Vehicles with rear drum brake> **<Vehicles with rear disc brake>**



AC608548AB

The wheel speed sensor is a kind of a pulse generator. It consists of the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) which rotates at the same speed of the wheel and the wheel speed sensor (semiconductor sensor). This sensor outputs frequency pulse signals in proportion to the wheel speed.

The front wheel speed sensor consists of the front wheel speed sensor mounted on the knuckle and the magnetic encoder for wheel speed detection which is press-fitted together with the oil seal to the front wheel bearing. The rear wheel speed sensor consists of the rear wheel speed sensor mounted on the trailing arm assembly and the magnetic encoder for wheel speed detection which is press-fitted together with the oil seal to the rear wheel bearing.

ACTUATORS

M2351002000356

ABS warning light, Brake warning light

The ABS system informs the driver of the ABS system status by illuminating, extinguishing, or flashing the ABS warning light and brake warning light as follows.

ABS warning light

- Turns ON when a system malfunction occurs.

Brake warning light

- Turns ON when an EBD system malfunction occurs.

  NOTE:
  - *Turns ON when the brake fluid level in the reservoir tank becomes the specified value or lower.*
  - *Turns ON when the parking brake lever is pulled and the brake is activated.*

ABS warning light and brake warning light illumination or flashing pattern

State		ABS warning light	Brake warning light
Normal	Correct	–	–
Faulty	ABS failure	Illuminates	–
	EBD failure	Illuminates	Illuminates
When scan tool is connected	Actuator not operated	–	–
	Actuator operated	Flash (2Hz)	–
	After actuator operated*	Illuminates*	Illuminates*

*NOTE: *:ABS and brake warning lights remain illuminated until the ignition is switched off.*

ABS-ECU

M2351003000520

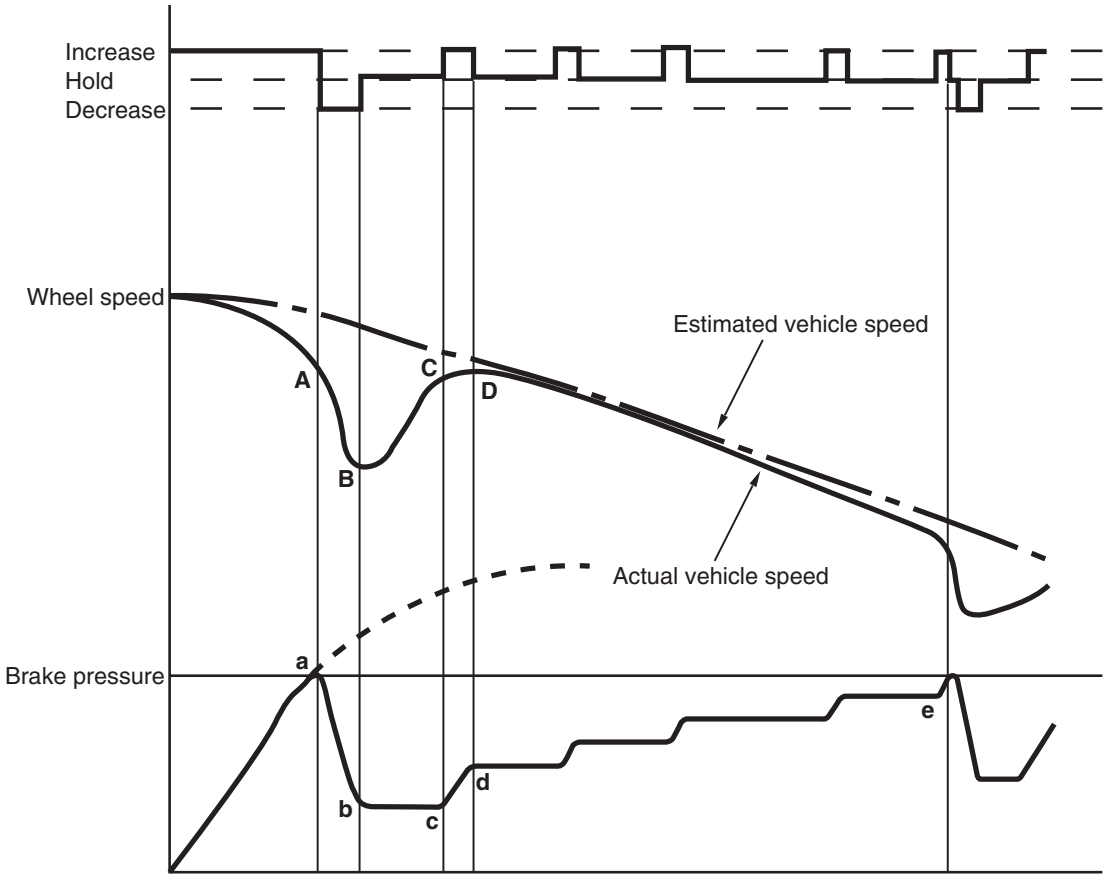
- By integrating ABS-ECU into the hydraulic unit, no wiring harness for sending drive signal of the solenoid valve and pump motor is required, assuring higher reliability.
- Self-diagnostic and memory functions are integrated into ABS-ECU. If any malfunction is detected by the self-diagnostic function, ABS-ECU activates a fail-safe function and illuminates the ABS warning light and brake warning light*.

*NOTE: *: The brake warning light is used as the EBD control warning light.*

- ABS-ECU detects vehicle speed from the signals of the wheel speed sensor and its recognizes the wheel rotation status, estimates the wheel slip condition based on the preprogrammed algorithm, and then controls the solenoid valve in the hydraulic unit so that the wheels do not lock.

ABS hydraulic pressure control

ABS control cycle



1. The ABS-ECU calculates the speed and deceleration of each wheel based on the signals from the four wheel speed sensors, and estimates the vehicle speed at that time.
2. When the brake pedal is depressed, the brake fluid pressure applied to the wheel cylinder increases, and the wheel speed decreases. When the difference between the wheel speed and vehicle speed increases, and the vehicle deceleration goes below the specified value (Point A), ECU determines that the wheels are about to be locked. At this time, ECU reduces the brake fluid pressure by outputting the pressure decrease signal to the solenoid valves (IN, OUT). (between a and b)
3. When the vehicle deceleration and wheel speed begin recovery, and the vehicle speed reaches the point B, ECU outputs the pressure hold signal to maintain the wheel cylinder fluid pressure. (between b and c)

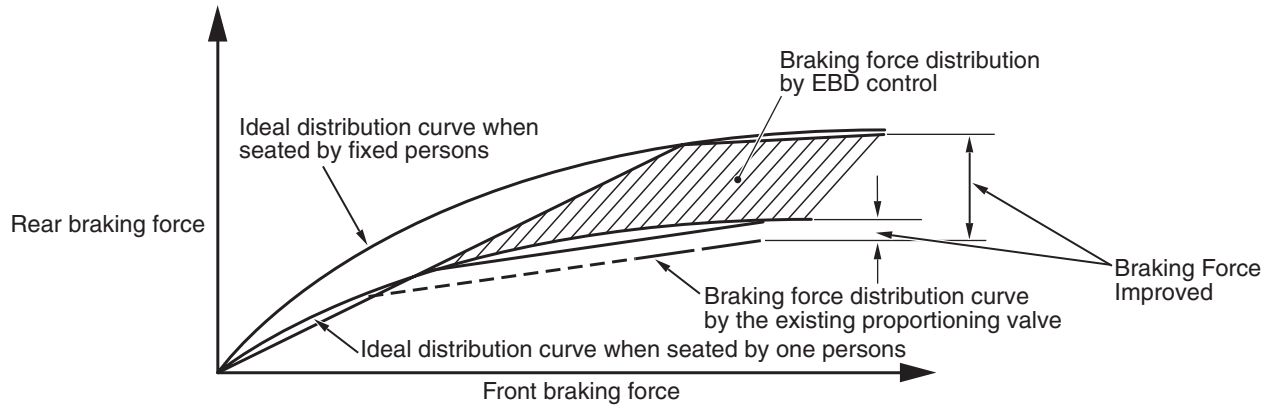
4. When the wheel speed deceleration is further recovered and overpasses the point C, ECU determines that the wheel lock possibility has been eliminated and increases the brake fluid pressure by outputting the pressure increase signal again. (between c and d)
5. Brake fluid pressure is controlled by repeating the increase and hold of the pressure. (between d and e)
6. When the wheel deceleration goes below the threshold again, ABS-ECU controls the brake fluid pressure by repeating the cycle (Step 2 to 5).

Four-wheel control

ABS fluid pressure is controlled independently for four wheels.

EBD fluid pressure control

EBD operating conceptual design



AC208548AB

EBD control is activated in a range with lower slip ratio where ABS is disabled. EBD calculates vehicle deceleration and slip amount of the four wheels based on the wheel speed sensor signal. If the rear wheel speed differs from the vehicle speed by a certain level or more, EBD increases, holds, and decreases the pressure at the rear wheel control solenoid valve in the hydraulic unit, and then adjusts rear wheel brake fluid pressure fairly close to an ideal distribution curve.

INITIAL CHECK

ABS-ECU performs the following initial checks using the diagnostic functions. ABS-ECU illuminates the ABS warning light for 3 seconds (including the initial check) * after the ignition switch is turned ON. If any malfunction is detected, ABS-ECU continues illuminating the ABS warning light and disables ABS control.

*NOTE: *: The ABS warning light may stay on after the ignition switch is turned ON until the startup vehicle speed reaches approximately 10 km/h (6 mph). As the ABS-ECU memorizes any diagnostic trouble code related to the wheel speed sensor malfunction recorded during the previous ignition ON status, ABS-ECU continues illuminating the ABS warning light until it verifies that the malfunction for that code is resolved (startup check).*

INITIAL CHECK

Performs self-diagnosis in ABS-ECU.

STARTUP CHECK

When the startup vehicle speed reaches approximately 10 km/h (6 mph), ABS-ECU performs the following checks.

1. Motor, solenoid valve check (Initial startup* only)

   Turns ON the motor relay in ECU, and checks the pump motor operation. At the same time, ABS-ECU sequentially energizes each solenoid valve in a very short period and checks the valve operation.

   *NOTE: *: Initial startup indicates a first startup after the system has started.*
2. Wheel speed sensor check

   ABS-ECU checks for any wheels that have not received wheel speed sensor signal from the startup.

CONSTANT CHECK

ABS-ECU constantly checks the following items.

1. ABS-ECU

   Performs self-diagnosis in ECU.
2. ECU power supply

   Checks if ECU power supply voltage stays within the operational range.
3. Wheel speed sensor
   (1) Monitors the output voltage of the sensor signal wiring harness and checks for abnormal output voltage (open/short circuit).
   (2) Checks for any wheels that do not send pulse signal while the vehicle is in motion.
   (3) Checks if wheel speed which is abnormally higher or lower than the vehicle speed is input.
4. Pump motor, solenoid valve

   Checks that the ABS-ECU output signal and the operating conditions of the pump motor and solenoid valve agree with each other.

CAN COMMUNICATION

ABS-ECU outputs the ABS warning light and the EBD warning light* illumination request signals to the combination meter through CAN communication.

*NOTE: *: The brake warning light is used as EBD control warning light.*

FAIL-SAFE FUNCTION

If any malfunction is detected by the self-diagnostic function, ABS-ECU illuminates the ABS warning light and brake warning light*, and it disables ABS and EBD control.

*NOTE: *: The brake warning light is used as EBD control warning light.*

DTC No.	Item	Countermeasures for failure			
		EBD control	ABS control	Brake warning light	ABS warning light
C100A	Abnormality in FL wheel speed sensor circuit	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1015	Abnormality in FR wheel speed sensor circuit				
C1020	Abnormality in RL wheel speed sensor circuit				
C102B	Abnormality in RR wheel speed sensor circuit				
C1011	Abnormality in FL wheel speed sensor signal	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C101C	Abnormality in FR wheel speed sensor signal				
C1027	Abnormality in RL wheel speed sensor signal				
C1032	Abnormality in RR wheel speed sensor signal				

DTC No.	Item	Countermeasures for failure			
		EBD control	ABS control	Brake warning light	ABS warning light
C1014	Mutual monitoring of FL wheel speed sensor	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C101F	Mutual monitoring of FR wheel speed sensor				
C102A	Mutual monitoring of RL wheel speed sensor				
C1035	Mutual monitoring of RR wheel speed sensor				
C1041	Abnormality in periodical signal for FL wheel speed sensor	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1042	Abnormality in periodical signal for FR wheel speed sensor				
C1043	Abnormality in periodical signal for RL wheel speed sensor				
C1044	Abnormality in periodical signal for RR wheel speed sensor				
C1046	FL wheel speed sensor control phase time exceeded	Executed (Prohibited when two or more wheels are faulty.)	Prohibited	Extinguished*2	Illuminated*3
C1047	FR wheel speed sensor control phase time exceeded				
C1048	RL wheel speed sensor control phase time exceeded				
C1049	RR wheel speed sensor control phase time exceeded				
C104B	Abnormality in FL wheel inlet valve system	Prohibited	Prohibited	Illuminates	Illuminates
C104F	Abnormality in FR wheel inlet valve system				
C1053	Abnormality in RL wheel inlet valve system				
C1057	Abnormality in RR wheel inlet valve system				
C105F	Abnormality in FL wheel outlet valve system	Prohibited	Prohibited	Illuminates	Illuminates
C1063	Abnormality in FR wheel outlet valve system				
C1067	Abnormality in RL wheel outlet valve system				
C105B	Abnormality in RR wheel outlet valve system				
C2104	Malfunction of valve power supply circuit	Prohibited	Prohibited	Illuminates	Illuminates
C1073	Malfunction of motor drive circuit	Executed	Prohibited	Extinguished	Illuminated*3

DTC No.	Item		Countermeasures for failure			
			EBD control	ABS control	Brake warning light	ABS warning light
C2116	Abnormality in pump motor power supply voltage		Executed	Prohibited	Extinguished	Illuminated*3
C1000	Abnormality in stop light switch circuit		Executed	Executed	Extinguished	Extinguished
C2200	Abnormality in ABS-ECU		Prohibited	Prohibited	Illuminates	Illuminates
C2100	Battery voltage problem (low voltage)	9.7 ±0.3 V or less*1	Executed	Prohibited	Extinguished	Illuminates
		8.0 ±0.5 V or less *1	Prohibited	Prohibited	Illuminates	Illuminates
C2101	Battery voltage problem (high voltage)	18.0 ±1.0 V or more	Prohibited	Prohibited	Illuminates	Illuminates
C1395	Brake fluid filling not completed		Executed	Executed	Extinguished	Flashes (1 Hz)
C2203	VIN not written		Executed	Executed	Extinguished	Illuminates
C1608	Implausible diagnosis data		Executed	Executed	Extinguished	Extinguished
U0001	Bus off		Executed	Executed	Extinguished	Extinguished
U0100	Engine time-out error		Executed	Executed	Extinguished	Extinguished
U0141	ETACS time-out error		Executed	Executed	Extinguished	Extinguished
U1415	Variant coding not implemented		Executed	Prohibited	Extinguished	Illuminates
U1417	Invalid variant coding value (including wrong assembly)		Executed	Prohibited	Extinguished	Illuminates

NOTE:

- **1 This diagnostic trouble code is not set within the vehicle speed of 20 km/h (12 mph) or less.*
- **2 Turns ON when two or more wheels are faulty.*
- **3 Stays ON until the vehicle speed reaches 10 km/h (6 mph) when the ignition switch is turned to ON next time.*

DIAGNOSTIC FUNCTION

ABS-ECU has the following functions for easier system checks. The following items can be diagnosed using scan tool.

- Diagnostic trouble code set
- Service data output
- Actuator test

DIAGNOSTIC TROUBLE CODE SET

There are 43 diagnosis items. Since all the diagnostic results are recorded in volatile memory (EEPROM*), they are stored in the memory even though the battery terminals are disconnected.

NOTE:

- **EEPROM (Electrical Erasable & Programmable ROM): Special type of memory that can be programmed or erased electrically*
- *For each diagnosis item, refer to Service Manual.*

SERVICE DATA OUTPUT

Using scan tool, the input data sent from the sensors and switches can be read.

NOTE: For service data items, refer to Service Manual.

ACTUATOR TEST

Using scan tool, the actuators can be forcibly operated.

NOTE:

- *When ABS-ECU is disabled, the actuator test cannot be performed.*
- *The actuator test can be performed only when the vehicle is stationary. When the vehicle speed reaches 10 km/h (6 mph), the forcible actuator operation is disabled.*
- *During actuator test, the ABS warning light flashes in 2Hz, and ABS control is prohibited.*
- *For the actuator test specification, refer to Service Manual.*

GROUP 34

REAR SUSPENSION

CONTENTS

GENERAL INFORMATION

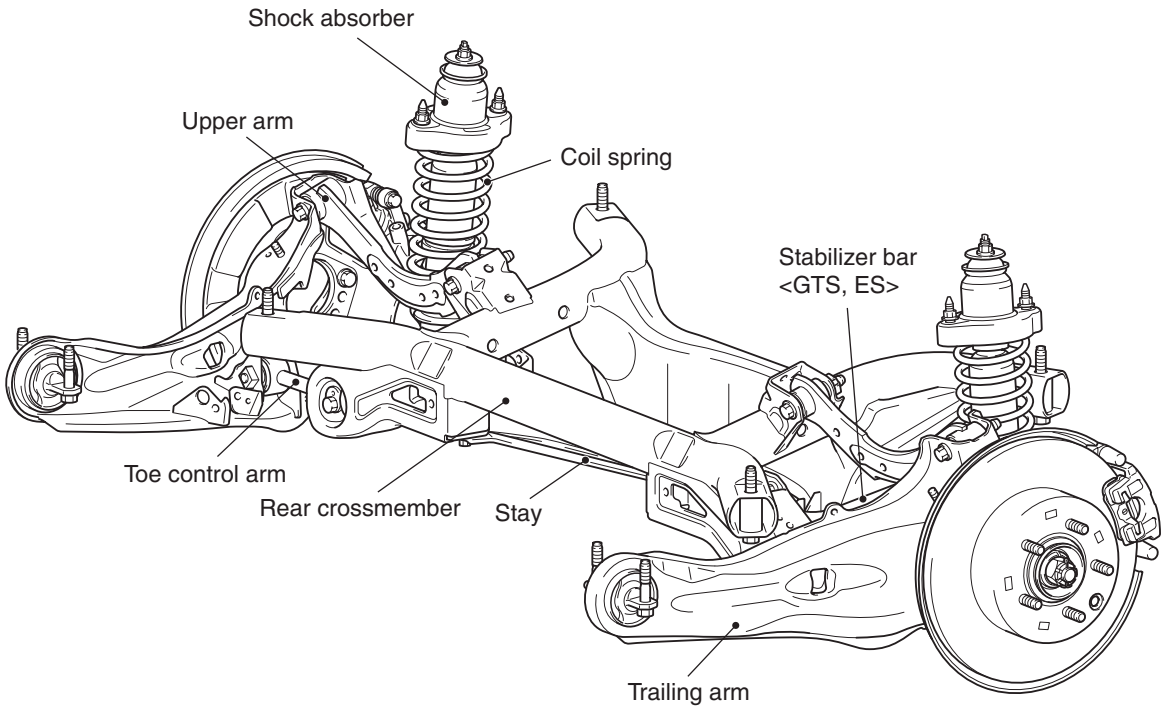
M2340000100977

The trailing arm type multi-link suspension is adopted.

MAIN FEATURES

- The wheel tread is increased to improve cornering ability.
- The roll center height is modified to improve the steering ability.
- A double crossmember is adopted and the upper arm, lower arm, toe control arm are joined to the crossmember to improve suspension alignment accuracy and maintenance performance.
- Improvement of arms installation accuracy eliminates the camber adjustment to improve maintenance performance.
- The trailing arm bushings are installed in the upper position to improve the movement of the suspension when the vehicle negotiates bumps and increase riding comfort.
- Twin tube type shock absorber is adopted to secure optimum rolling rigidity and improve the steering ability.
- A high efficiency ball joint type stabilizer link is adopted to improve steering ability.
- The toe control arm is installed in the lower position to increase toe and camber rigidity and improve steering ability.

CONSTRUCTION DIAGRAM



AC606248 AB

SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension type	Trailing arm type multi-link

WHEEL ALIGNMENT

Item	Specification
Camber	-0° 55'
Toe-in mm (in)	3 (0.12)

COIL SPRING

Item	Specification	
	DE, ES	GTS
Wire diameter mm (in)	11 (0.4)	11 (0.4)
Mean diameter of coil mm (in)	91 (3.6)	91 (3.6)
Free length mm (in)	351 (13.8)	334 (13.1)

NOTES

GROUP 33

FRONT SUSPENSION

CONTENTS

GENERAL INFORMATION

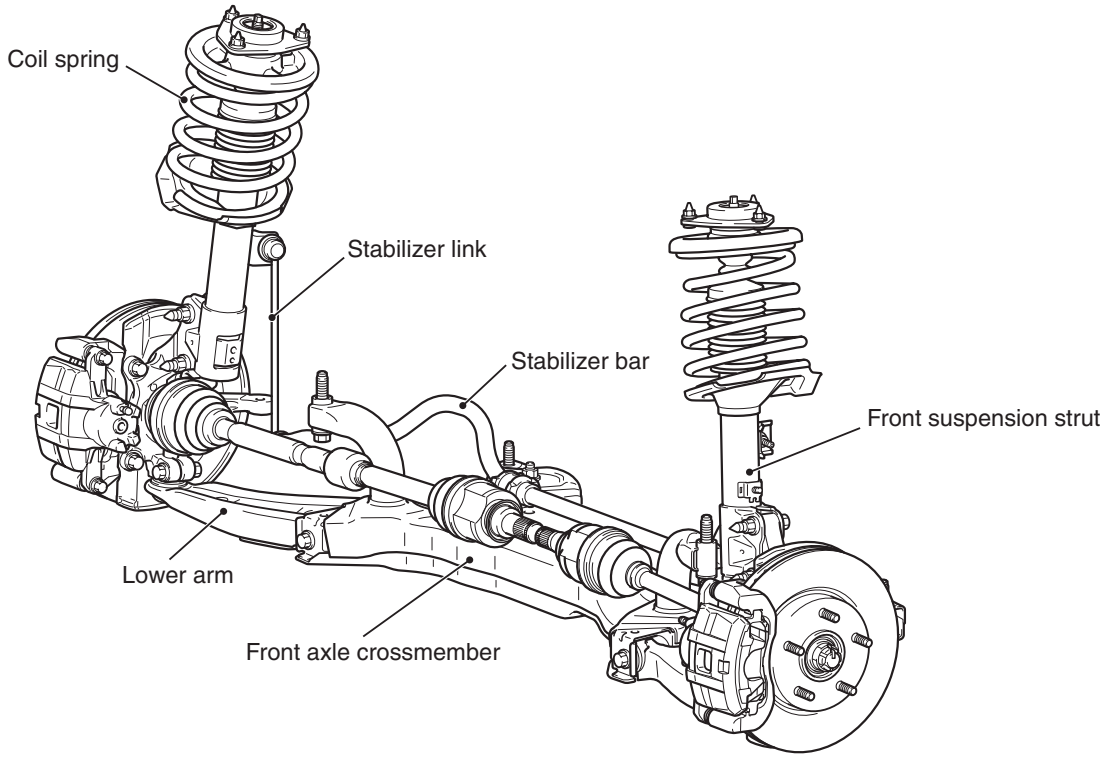
M2330000100965

The MacPherson strut type suspension is adopted.

MAIN FEATURES

- The wheel tread is increased to improve cornering ability.
- The roll center height is modified to improve the steering ability.
- Increased suspension stroke improves road holding quality, and secures good adhesion even on bumpy-rough roads to reduce shocks received when the vehicle negotiates bumps.
- The fully flattened crossmember improves the left/right direction rigidity of installation points of the lower arms for high steering ability.
- Tuning of the lower arm bushes improves the steering ability and riding comfort.
- The stabilizer bar is joined to the strut for high efficiency to secure the optimum rolling rigidity, and improves the steering ability.
- Total tuning of struts, springs, and bump rubbers improves the steering ability and riding comfort.

CONSTRUCTION DIAGRAM



AC607283 AB

SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension type	MacPherson strut with coil spring

WHEEL ALIGNMENT

Item	Specification
Camber	-0° 05'

Item	Specification
Caster	2° 40'
Kingpin inclination	13° 30'
Toe-in mm (in)	1 (0.04)

COIL SPRING

Item		Specification	
		DE, ES	GTS
Wire diameter mm (in)		14 (0.6)	
Average outside diameter mm (in)		159 (6.3)	
Free length mm (in)	5MT	331 (13.0)	316 (12.4)
	CVT	338 (13.3)	322 (12.7)

NOTES

GROUP 31

WHEEL AND TIRE

CONTENTS

GENERAL INFORMATION

M2310000100941

- The wheels and tires of the following specifications have been established.
- Adopt the Tire Pressure Monitoring System (TPMS).
  - Warns driver of low tire pressure by illuminating the TPMS warning light on the combination meter.
  - Warns driver of TPMS probrems by flashing* the TPMS warning light on the combination meter.

  *NOTE: *: Change to continuous illumination after flashing for about 1 minute.*

SPECIFICATIONS

ROAD WHEEL AND TIRE

Item		DE	ES	GTS
TPMS warning pressure kPa (psi)	Warning ON	174 (25.2) or less	174 (25.2) or less	174 (25.2) or less
	Warning OFF	189 (27.4) or less	189 (27.4) or less	189 (27.4) or less
Wheel	Type	Steel type or Aluminium type*	Aluminum type	Aluminum type
	Size	16 × 6 1/2JJ	16 × 6 1/2JJ	18 × 7JJ
	Amount of wheel offset mm (in)	46 (1.8)	46 (1.8)	46 (1.8)
	PCD mm (in)	114.3 (4.50)	114.3 (4.50)	114.3 (4.50)
Tire	Size	P205/60R16 91H	P205/60R16 91H	P215/45R18 89V

SPARE WHEEL AND TIRE

Item		Specification
Wheel	Type	Steel type
	Size	16 × 4T
	Amount of wheel offset mm (in)	40 (1.6)
	PCD mm (in)	114.3 (4.50)
Tire	Size	T125/70D16 96M

NOTE:

- *The * mark indicates optional item.*
- *PCD indicates the pitch circle diameter of the wheel installation holes.*

TIRE PRESSURE MONITORING SYSTEM (TPMS)

M2310000200067

Refer to GROUP 42B –Keyless Operation System (KOS) P.42B-20 or GROUP 42C –Wireless Control Module (WCM) P.42C-9.

GROUP 27

REAR AXLE

CONTENTS

GENERAL INFORMATION

M2270000100478

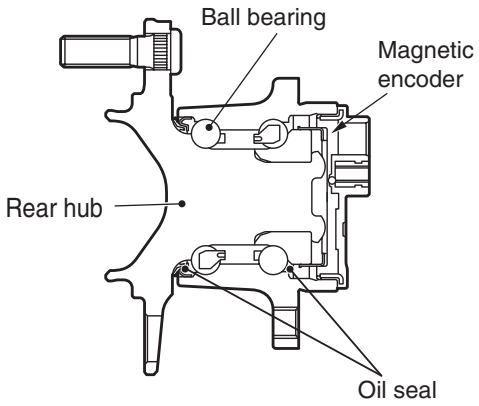
The rear axle has the following features:

- The wheel bearing is a unit ball bearing (double-row angular contact ball bearing) which incorporates the oil seals and is highly resistant to thrust loads.
- The number of parts has been reduced by integrating the magnetic encoder for ABS wheel speed detection into the wheel bearing. <Vehicles with ABS>

SPECIFICATIONS

Item		Specification
Wheel bearing	Type	Unit ball bearing (double-row angular contact ball bearing)

CONSTRUCTION DIAGRAM



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GROUP 37

POWER STEERING

CONTENTS

GENERAL INFORMATION

M2370000101003

FEATURES

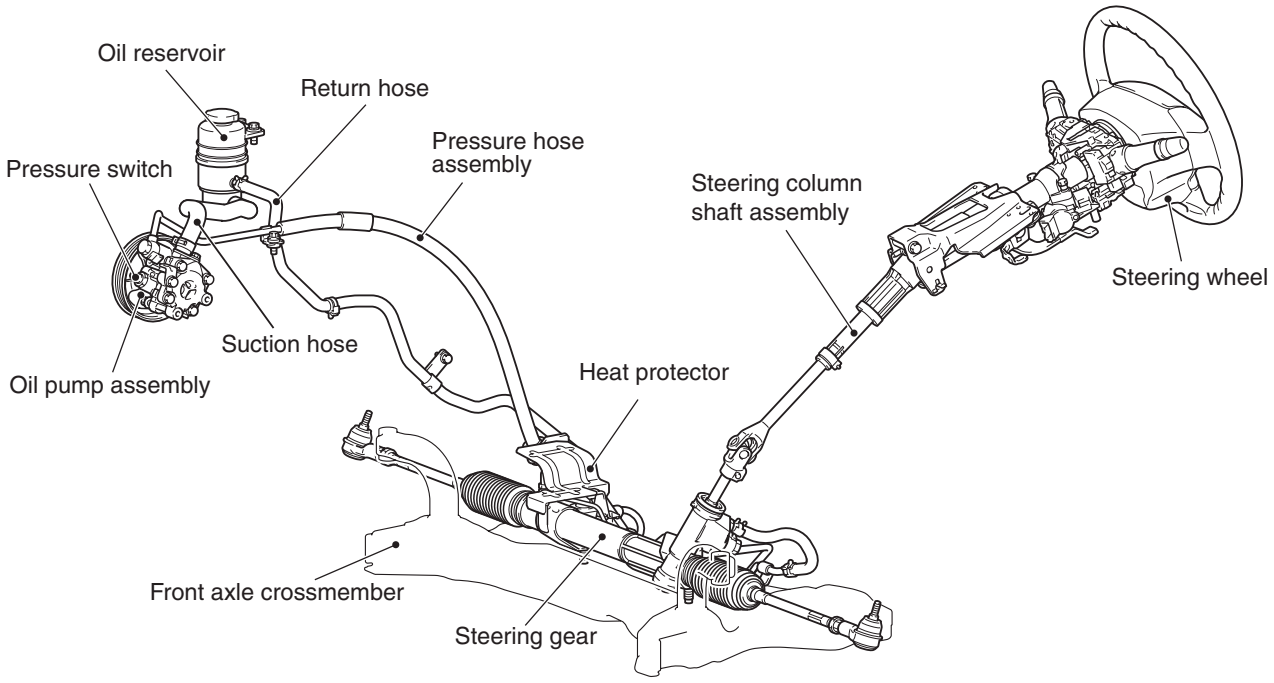
A hydraulic power steering system has been adopted to all models.
This steering system offers the following features:

- The support method of the steering gear to the crossmember is realised by the left and right internal bushings with inner cylinders. This support method achieves higher rigidity of the steering gear and improves the steering feeling.
- Configuring the optimum flow characteristics and gear valve feature improves the handling stability.
- Appropriate application of friction to the steering gear cuts off the disturbance from the road surface and improves the stability during the straight-ahead driving.
- Optimisation of the flexible tube in the high pressure hose reduces the pump noise.

SPECIFICATIONS

Items		**Specifications**
Steering wheel	Type	Three-spoke type
	Outside diameter mm (in)	375 (14.7)
	Maximum number of turns	3.16
Steering column	Column mechanism	Shock absorbing mechanism and Tilt steering mechanism
Power steering type		Integral type (Engine speed-dependent type)
Oil pump	Type	Vane type with fluid flow amount control system
	Basic discharge amount cm^3/rev. (cu in/rev)	8.1 (0.49)
	Relief pressure MPa (psi)	8.8 (1,276)
	Reservoir type	Separate type (Resin made)
Steering gear	Type	Rack and pinion type
	Stroke ratio (Rack stroke/Steering wheel Maximum turning radius) mm/rev (in/rev)	45.58 mm/rev (1.79 in/rev)
	Rack stroke mm (in)	144
Steering angle	Inner wheel	40° 50’
	Outer wheel	33° 50’
Power steering fluid	Specified lubricants	GENUINE MITSUBISHI POWER STEERING FLUID
	Quantity dm^3 (qt)	Approximately 1.0 (1.06)

CONSTRUCTION DIAGRAM



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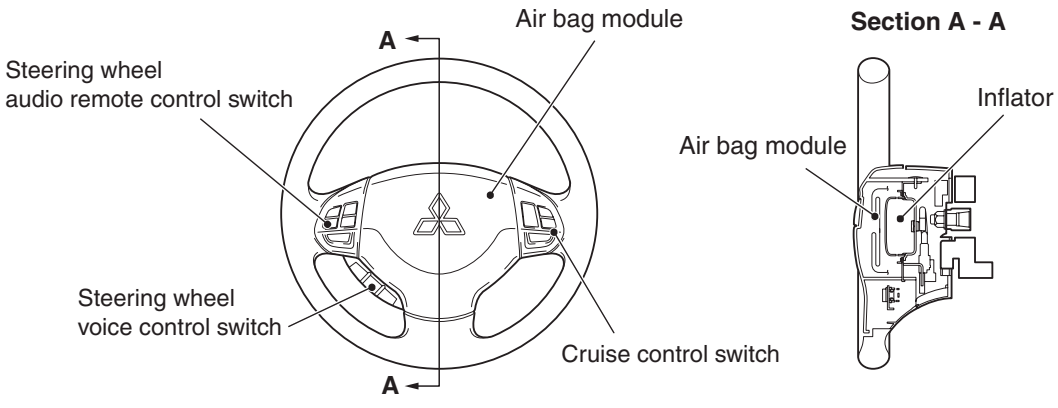
STEERING WHEEL

M2370001000761



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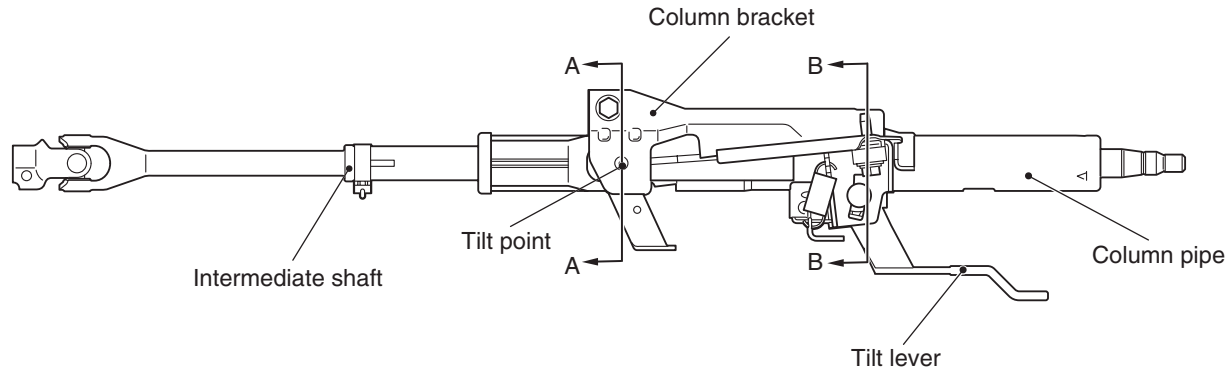
The steering wheel is designed to improve operability, safety and maintainability and has the following features:

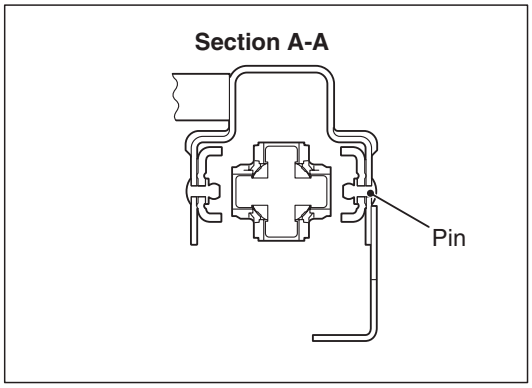
- Newly designed Three-spoke type has been adopted. For DE and ES, the steering wheel made of urethane has been adopted. For GTS, the steering wheel made of genuine leather has been adopted.
- Audio remote control, voice control, and cruise control switches are available on some models.
- Sporty and thick type grip shape has been adopted.
- Rigid core metal reduces steering wheel vibration.
- It incorporates an SRS airbag to protect the driver in the event of a frontal collision.
- The airbag module is equipped with an inflator that does not contain sodium azide.
- Optimisation of the airbag specifications reduces the risk of injury to the passengers in a collision.

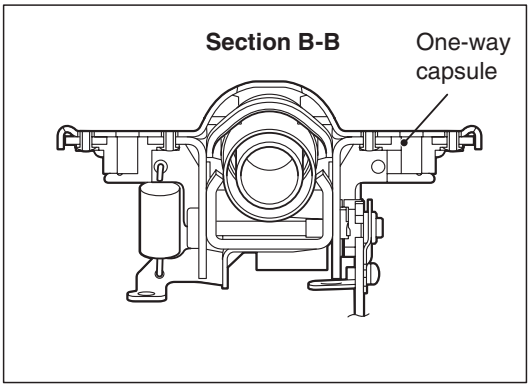
STEERING SHAFT AND COLUMN

M2370002000667

- To improve the feeling of steering (reduction of torque fluctuation) covering the whole tilting range, the steering column layout has been optimised by focusing the tilting function.
- Tilt steering mechanism that the desired driving position is obtained has been employed on all models (Tilt-up amount: 20mm/Tilt-down amount: 25mm).
- To reduce the separation load during a collision, the sliding resistance reduction member has been installed to the column bracket.







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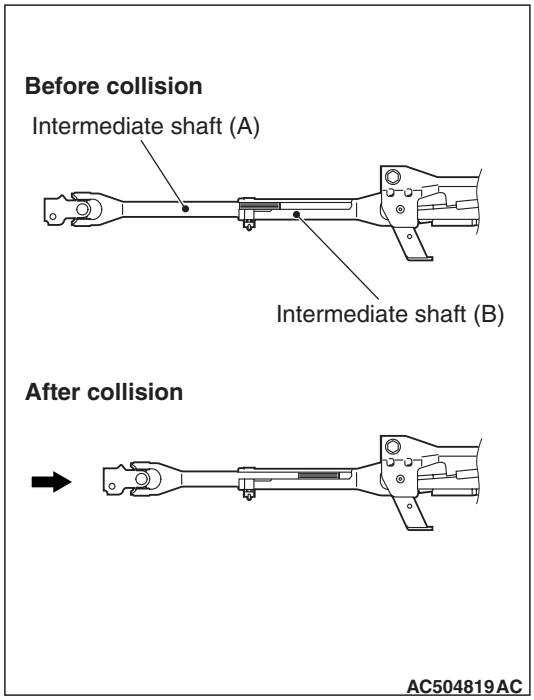
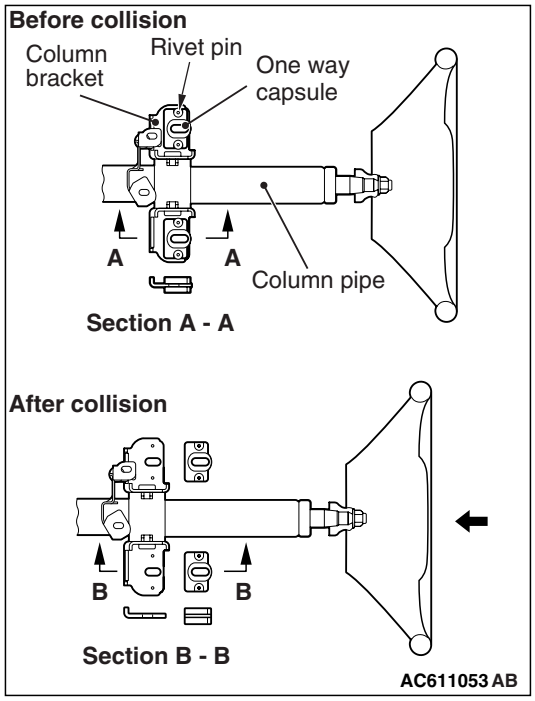
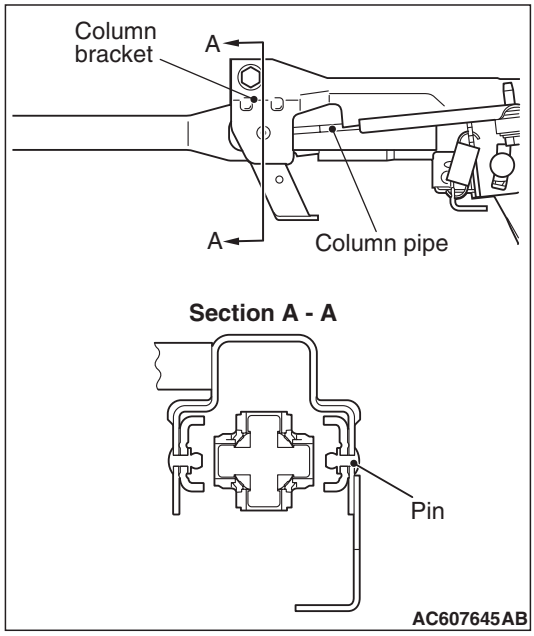
IMPACT-ABSORBING MECHANISM

Primary collision

If the vehicle is involved in a crash and impact energy is transmitted to the lower shaft from the gearbox side, the intermediate shaft (A) will be pushed into intermediate shaft (B) to absorb impact energy. Thus, the steering column will not be projected into the passenger compartment.







Secondary collision

When the driver's body falls against the steering wheel via the deployed air bag, the column bracket moves forward by deforming the rivet pin of the one-way capsule, and simultaneously the steering column assembly frees from the pin of column bracket to move forward and downwards.

OIL PUMP

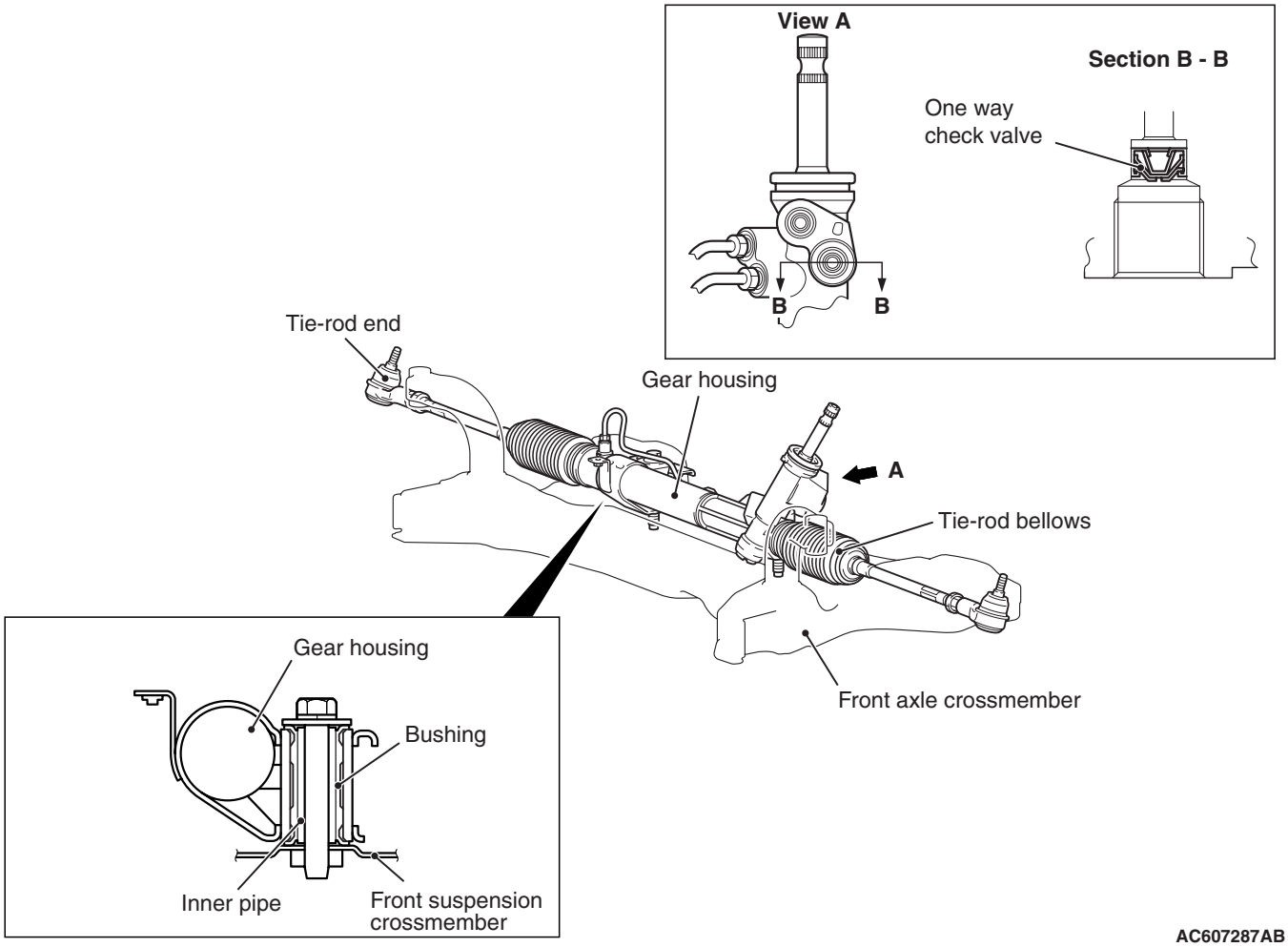
M2370004000373

The oil pump is a vane type with a fluid flow control system which functions so the steering wheel turning effort will be reduced at low engine speeds and increase at higher speeds.

The oil pump is essentially the same as the conventional one in construction.

STEERING GEAR

M2370003000499

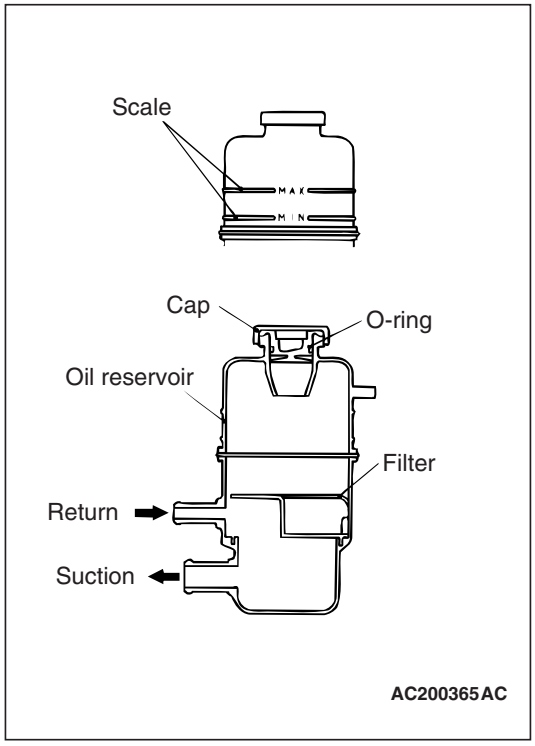


AC607287AB

- The steering gear and linkage is mounted on the suspension crossmember via two bushings with inner cylinders.
- The inner bushing with inner cylinder supports the steering gear and linkage in the vertical and fore-and-aft direction with high rigidity, improving the feeling of steering considerably.
- One-way check valve for the power steering fluid has been added in the steering gear. By reducing the kickback due to the disturbance from the uneven road surface, the handling stability has been improved.

OIL RESERVOIR

M2370005000376



The resin oil reservoir is used to reduce weight. The oil reservoir is translucent and has fluid level marks (MAX and MIN lines), facilitating inspection.