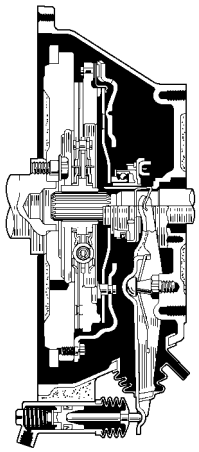
CHASSIS

CLUTCH

■DESCRIPTION

- A dry single plate clutch which is operated by hydraulic pressure is used.
- The clutch pedal has a turn-over mechanism to reduce clutch pedal effort on the models with 2C-T and 2C-TE engine.



145CH01

2C-T and 2C-TE Engine Model

▶ Specifications ◀

Item \ Engine Type		4A-FE 7A-FE	3S-FE	2C-T 2C-TE
Clutch	Type	Dry Type Single Plate Clutch Diaphragm Spring	←	←
	Operation	Hydraulic	←	←
Clutch Cover	Type	Set Rivet	←	←
	Size mm (in.)	212 (8.35)	224 (8.82)	←
	Installed Load N	4200	4700	5200
Clutch Disc	Facing Size* mm (in.)	212 x 140 x 3.4 (8.35 x 5.51 x 0.13)	224 x 150 x 3.4 (8.82 x 5.91 x 0.13)	←
	Facing Area cm^2 ($in.^2$)	199 (30.8)	217 (33.6)	←
Master Cylinder	Type	Conventional	←	←
	Cylinder Diameter mm (in.)	15.84 (0.62)	←	←
Release Cylinder	Type	Non-Adjustable	←	←
	Cylinder Diameter mm (in.)	20.64 (0.81)	22.2 (0.87)	20.64 (0.81)

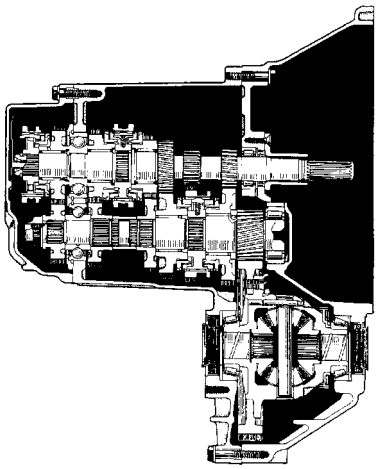
*: Outer Diameter x Inner Diameter x Thickness

CH

MANUAL TRANSAXLE

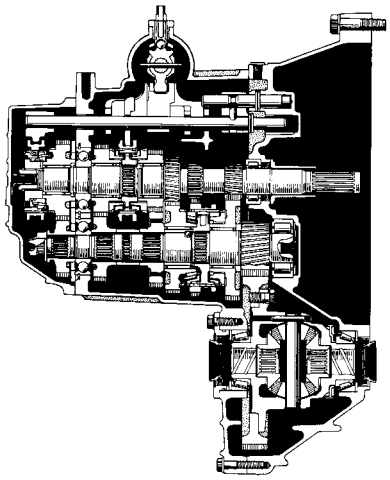
■DESCRIPTION

- 4A-FE engine model uses the C50 manual transaxle.
- 7A-FE engine model uses the C250 manual transaxle. The basic construction and operation are the same as in the C50 manual transaxle. However, the gear ratio is differed.
- 3S-FE engine model uses the S54 manual transaxle.
- 2C-T and 2C-TE engine models use the S50 manual transaxle.
- The S50 manual transaxle uses a triple-cone type synchromesh mechanism in the 2nd gear.



145CH07

C50 Series Manual Transaxle



145CH05

S50 Series Manual Transaxle

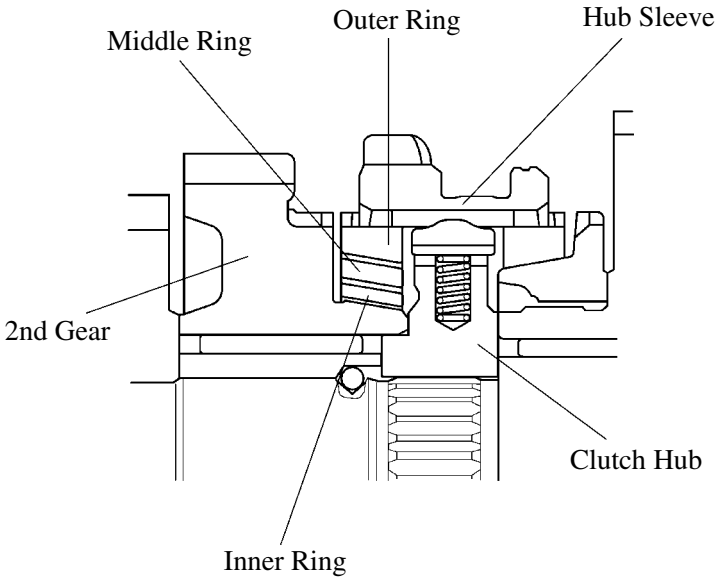
▶ Specifications ◀

Engine Type / Transaxle Type / Item		4A-FE	7A-FE	3S-FE	2C-T, 2C-TE
		C50	C250	S54	S50
Gear Ratio	1st	3.545	←	3.285	3.538
	2nd	1.904	←	1.960	2.041
	3rd	1.310	←	1.322	←
	4th	0.969	1.031	1.028	0.945
	5th	0.815	←	0.820	0.731
	Reverse	3.250	←	3.153	←
Differential Gear Ratio		4.058	3.941	3.944	3.736
Oil Capacity Liters (US qts, Imp. qts)		1.9 (2.0, 1.7)	←	2.2 (2.3, 1.9)	←
Oil Viscosity		SAE 75W-90	←	←	←
Oil Grade		API GL-4 or GL-5	←	←	←

■ TRANSMISSION GEAR

1. Triple-Cone Type Synchromesh Mechanism

The 2nd gear of the S50 manual transaxle has adopted a triple-cone type synchromesh mechanism to reduce the shift effort, to ensure a smoother shift operation, and to improve the durability of the synchromesh mechanism.
In the S54 manual transaxle, the triple-cone type synchromesh mechanism has already been adopted in the 2nd gear since the previous models.



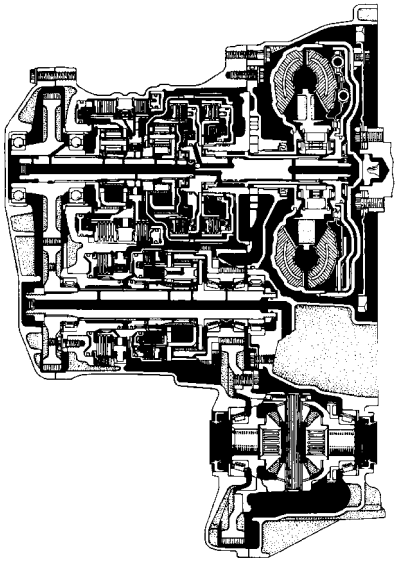
145CH14

AUTOMATIC TRANSAXLE

■ DESCRIPTION

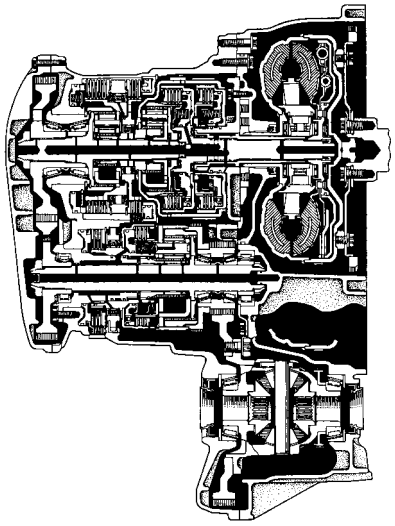
The A241E automatic transaxle is used on the 3S-FE engine model, the A245E automatic transaxle is used on the 4A-FE engine model, and the A246E automatic transaxle is used on the 7A-FE engine model. The pattern select switch is used in all automatic transaxles. Furthermore, the models for Europe are provided with a snow mode, and the LHD model for Europe is provided with a kick-down switch.
The basic construction and operation are the same as in the previous model, except for the following changes:

- The A241E has realized improvement in both drivability and fuel economy by revising the shift point and lock-up point in conjunction with the improvement of the low- to mid-speed range torque of the 3S-FE engine.
- The A246E has realized improvement in both drivability and fuel economy by revising the shift point, lock-up point, differential gear ratio, and torque converter in conjunction with the improvement of the low- to mid-speed range torque of the 7A-FE engine.
- An oil level gauge has been changed to plastic type from steel type on all automatic transaxles.
- These automatic transaxles support the M-OBD (Multiplex On-Board Diagnostic) system to enable the diagnostic codes to be accessed through the use of a hand-held tester.



145CH08

A241E Automatic Transaxle



145CH09

A246E Automatic Transaxle

▶ Specifications ◀

Engine Type / Transaxle Type / Item		A241E	A245E	A246E
		3S-FE	4A-FE	7A-FE
Gear Ratio	1st	3.643	←	4.005
	2nd	2.008	←	2.208
	3nd	1.296	←	1.425
	4th (Overdrive)	0.892	←	0.981
	Reverse	2.977	←	3.272
Differential Gear Ratio		3.178	2.962	←
Fluid Capacity Liters (US qts, Imp. qts)		8.0 (8.5, 7.0)*	7.6 (8.0, 6.7)*	←
Fluid Type		ATF D-II or DEXRON®III (DEXRON®II)	←	←

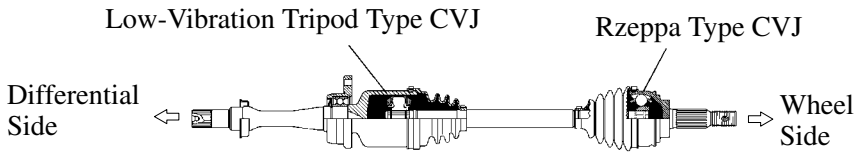
*: Differential Included

DRIVE SHAFT

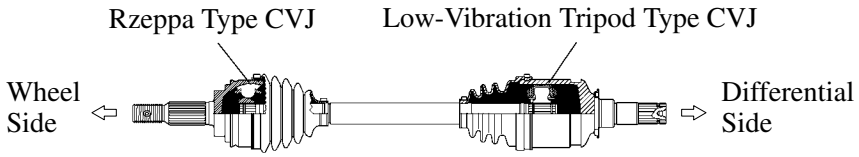
■ DESCRIPTION

The drive shaft uses the tripod type CVJ (Constant-Velocity Joint) on the differntial side, and Rzeppa type CVJ on the wheel side on all models. For the 2C-T and 2C-TE engine models a low-vibration tripod type CVJ is used on the differential side.

▶ 2C-T and 2C-TE Engine Model ◀



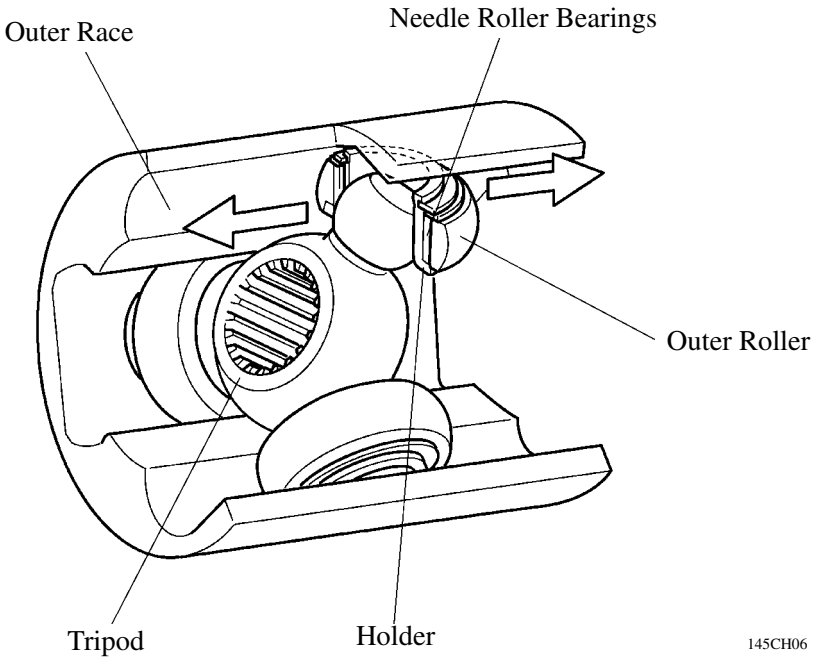
Right-Hand



Left-Hand

■ LOW VIBRATION TRIPOD TYPE CVJ

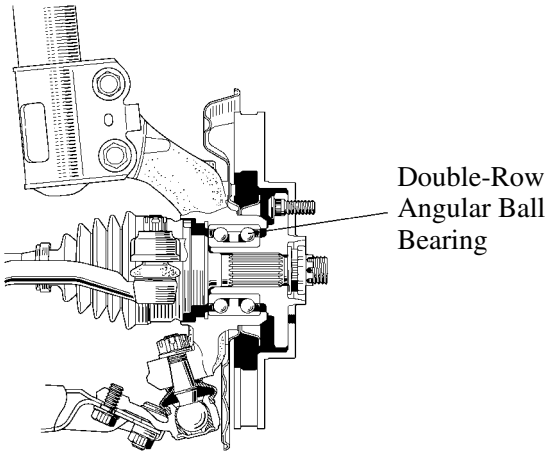
The low-vibration tripod type CVJ (Constant-Velocity Joint) consists of a tripod with a spherical tip and double rollers consisting of an outer roller and a holder.
Because the tip of the tripod is spherical, the double roller remains constantly parallel to the outer race even if the joint tilts (the illustration below shows the tripod tilted).
This design enablles the double roller to slide smoothly to realize low vibration at high installed angles.



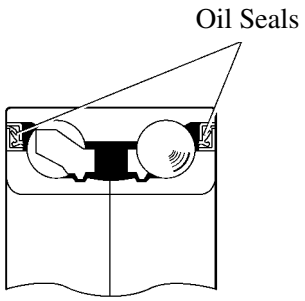
AXLES

■FRONT AXLE

The front axle uses a double-row angular ball bearing as in the previous model.
However, the bearing size has been changed.
The oil seal has been enclosed in the bearing for weight reduction.



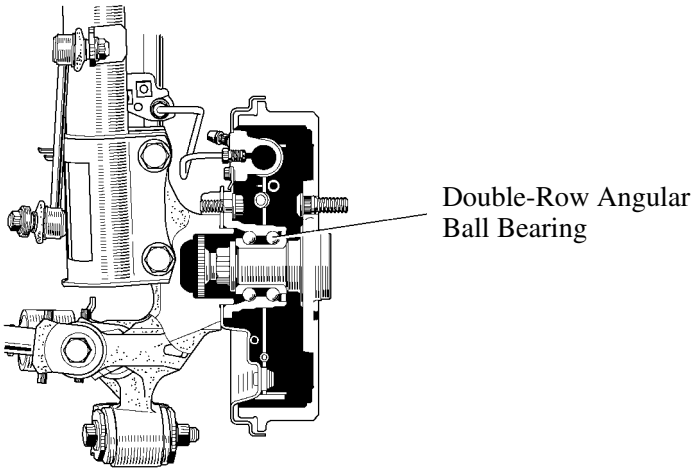
145CH15



145CH16

■REAR AXLE

As in the previous models, the rear axle uses a double-row angular ball bearing.



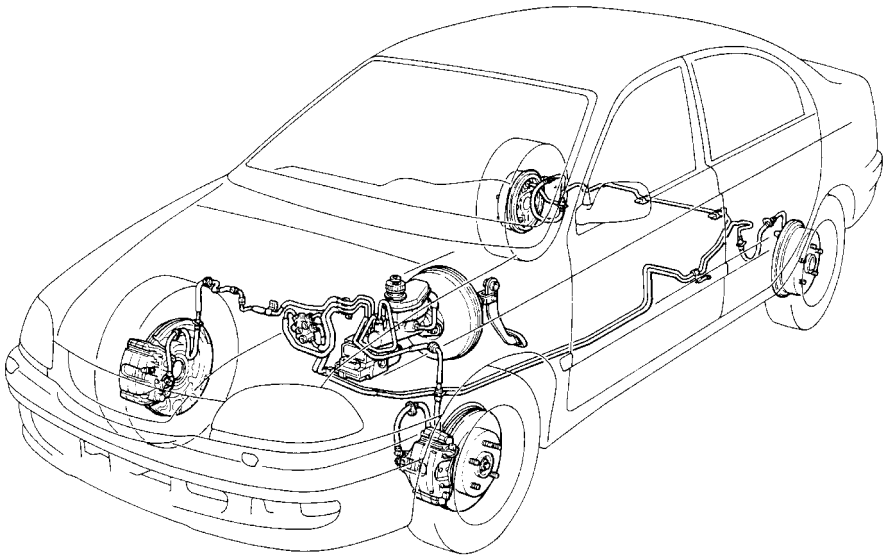
145CH17

BRAKES

■ DESCRIPTION

The ventilated disc brakes are used in the front and the leading trailing drum brakes are used in the rear as in the previous model. However, the following items have been changed.

- The master cylinder and brake booster have been changed.
- The type of the brake caliper and the size of disc rotor have been changed.
- The size of the drum brake has been changed.
- The dual proportioning valve is used on all models.
- The ABS actuator, ECU and relays are integrated.
- A mechanism that helps to prevent the brake pedal from retracting during a collision has been adopted.



145CH10

Sedan LHD Model

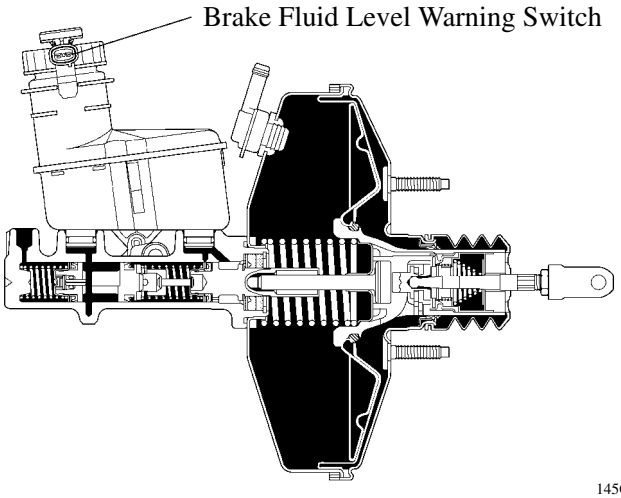
▶ Specifications ◀

Item \ Model		New	Previous
Master Cylinder	Type	Tandem (Center Port + Lockheed)	Tandem (Center Port + Lockheed*1 / Lockheed + Lockheed)
	Diameter mm (in.)	23.81 (0.94)	←
Brake Booster	Type	Single	←
	Size in.	9”	←
Front Brake	Type	Ventilated Disc	←
	Caliper Type	FN Type	PE Type
	Wheel Cylinder Diameter mm (in.)	57.00 (2.24)	57.22 (2.25)
	Rotor Size (D x T)*2 mm (in.)	260 x 25 (10.24 x 0.98)	255 x 28 (10.04 x 1.10)
Rear Brake	Type	Leading Trailing Drum	←
	Wheel Cylinder Diameter mm (in.)	20.64 (0.81)	←
	Drum Inner Diameter mm (in.)	228.6 (9.00)	200 (7.87)
Brake Control Valve	Type	Dual-P Valve	Dual-P Valve, Dual-LSPV*3
	Deflection Point of Hydraulic Pressure kPa (kgf/cm^2, psi)	2940 (30, 426)*1 3430 (35, 498)	3430 (35, 498)*4 2940 (30, 426)*5 3920 (40, 569)*1
	Pressure Reduction Gradient	0.25, 0.62*1	0.25, 0.37*3
Parking Brake	Type	Drum	←
	Size mm (in.)	228.6 (9.00)	200 (7.87)
	Lever Type	Floor Lever	←
ABS		STD*6, OPT*7	OPT*8

*1: Models with ABS
*2: D: Outer Diameter, T: Thickness
*3: Sedan with ABS, Liftback with ABS and Wagon Models
*4: Sedan and Liftback Models without ABS
*5: Wagon Model without ABS
*6: Models for Europe except 2C-T Engine Model
*7: LHD Model with 3S-FE Engine for General Countries
*8: Models for Europe

■MASTER CYLINDER AND BRAKE BOOSTER

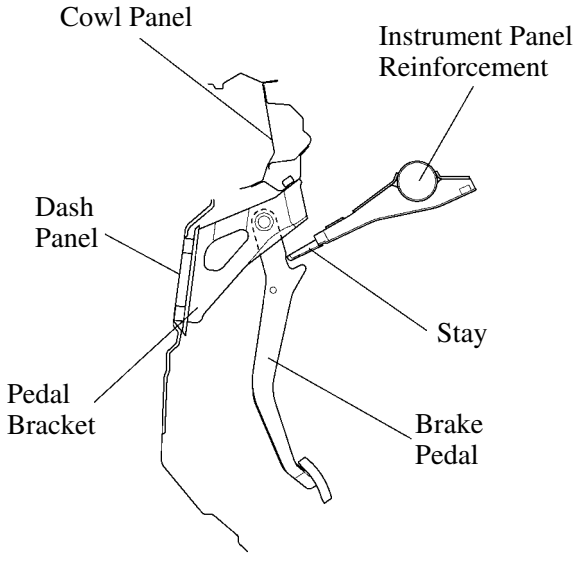
- On the previous models, those with ABS adopted a center port and Lockheed type tandem master cylinder, and those without ABS adopted a Lockheed and Lockheed type tandem master cylinder. However, on the new model, all models adopt a center port and Lockheed type tandem master cylinder regardless of whether or not they are equipped with ABS.
- The internal shape of the master cylinder and brake booster has been changed.
- The brake fluid level warning switch has been integrated with the cap.



145CH39

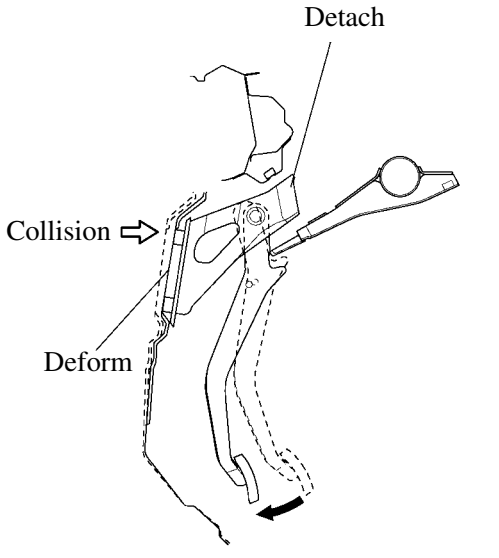
■BRAKE PEDAL

A brake pedal retract prevention mechanism has been adopted to help minimize reduction of the driver's footwell space during a collision.
If the dash panel deforms rearward in a collision, the brake pedal bracket detaches from the bracket of the cowl panel. Then, the stay of the instrument panel reinforcement causes the step surface of the brake pedal to move forward and downward.



145CH25

Before Collision

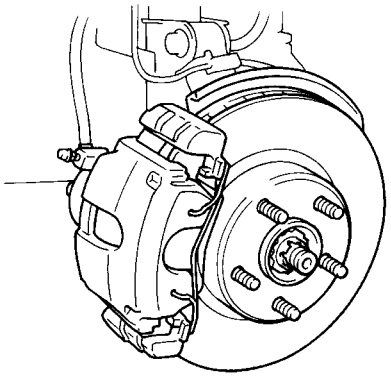


145CH26

After Collision

■ FRONT BRAKE

The front brake caliper has been changed to the FN type from the PE type.
Also, the disc rotor size has been changed.



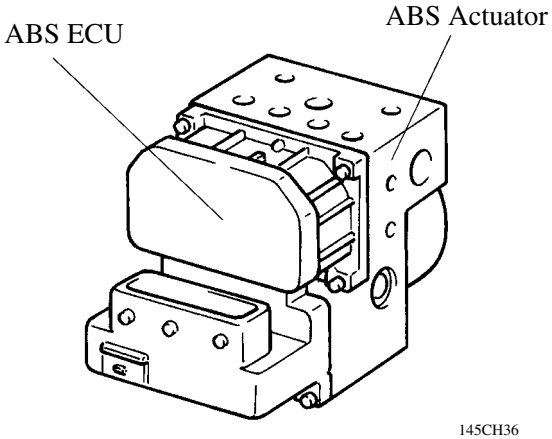
145CH27

FN Type Brake Caliper

■ ABS

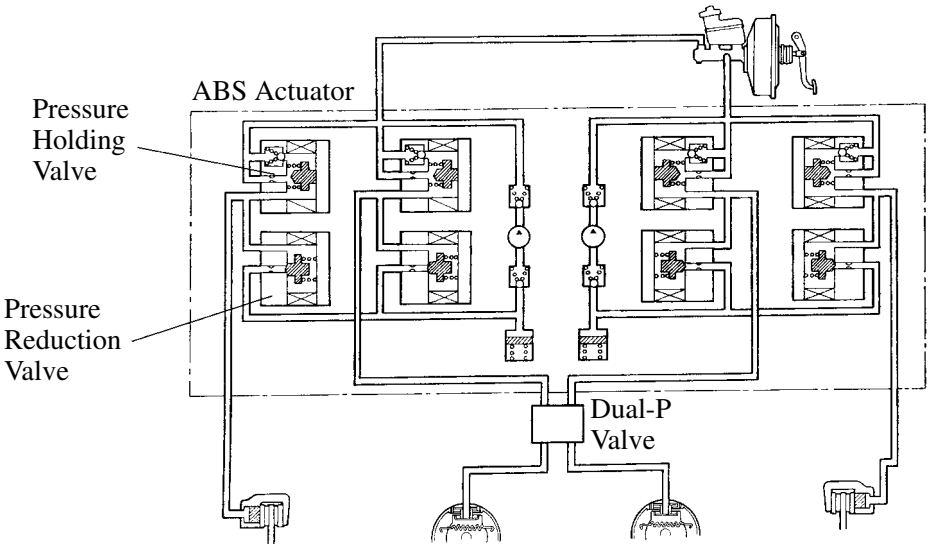
1. General

- The ABS actuator, ECU, and relays have been integrated for compactness and weight reduction.
- An ABS is standard equipment on the models for Europe except 2C-T engine model and optional equipment on the LHD model with 3S-FE engine for General Countries.



145CH36

2. Hydraulic Circuit

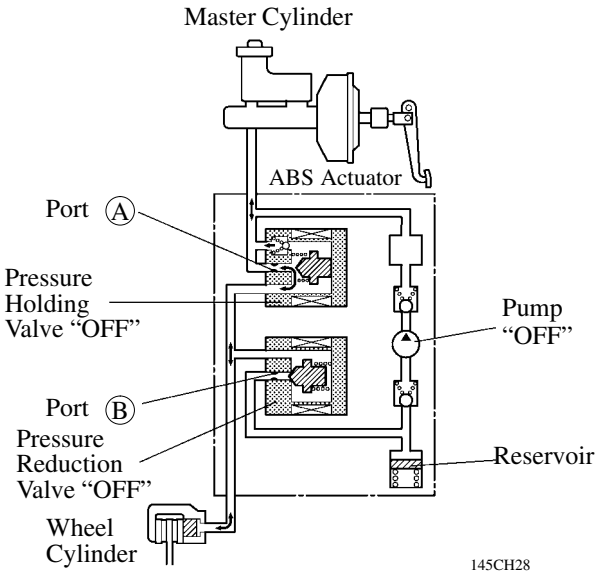


145CH38

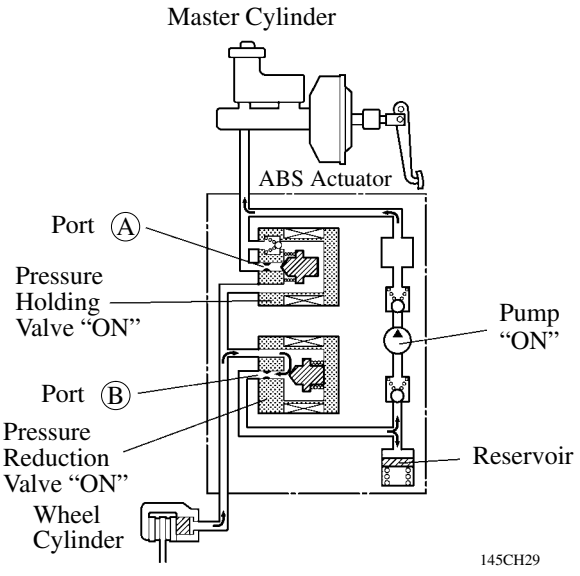
For RHD Model	Front Right Wheel Brake	Rear Left Wheel Brake	Rear Right Wheel Brake	Front Left Wheel Brake
For LHD Model	Front Left Wheel Brake	Rear Right Wheel Brake	Rear Left Wheel Brake	Front Right Wheel Brake

3. Operation

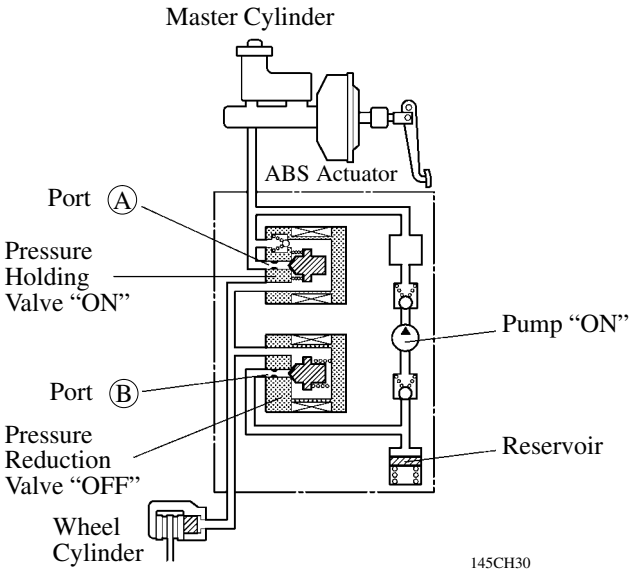
The brake control of each wheel during ABS activation is implemented by the following 3 modes: pressure reduction, pressure holding and pressure increase modes.
The ECU controls the fluid pressure of each of the front left and right wheels independently while the fluid pressure of the rear left and right wheels is controlled simultaneously for vehicle stability.



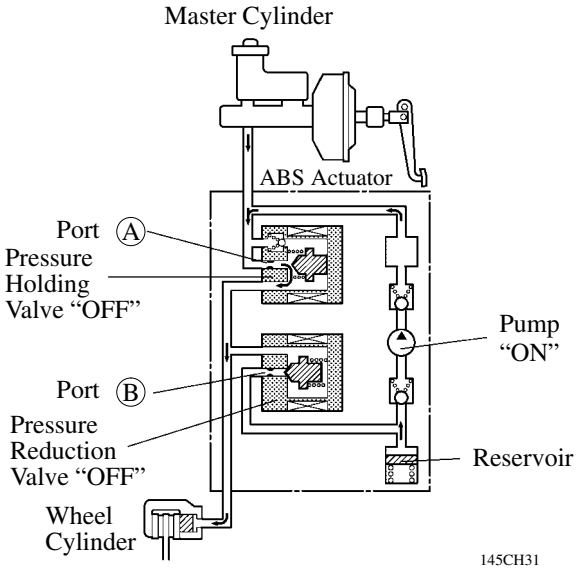
Normal Braking



Pressure Reduction Mode



Pressure Holding Mode



Pressure Increase Mode

▶ Condition of Each Valve ◀

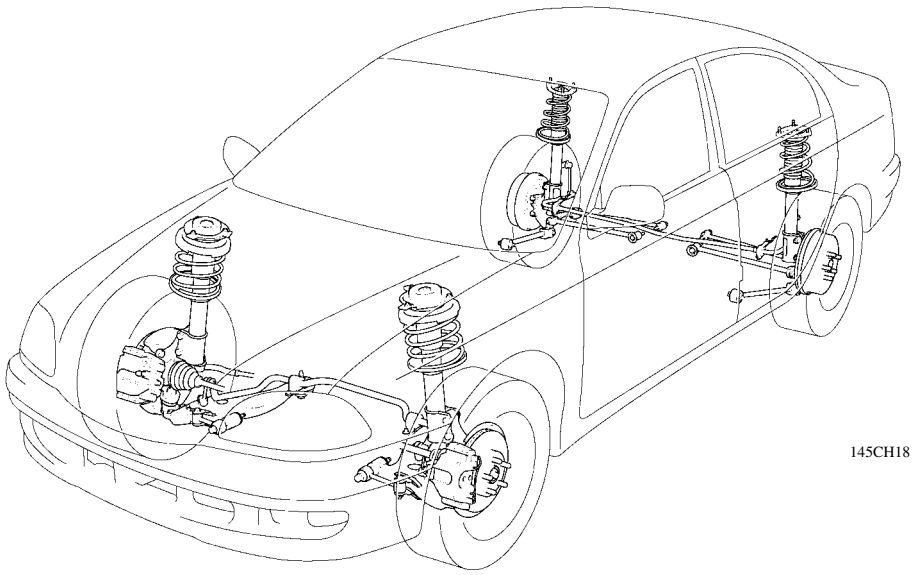
Mode / Valve	Normal Braking	ABS Activated		
		Pressure Reduction	Pressure Holding	Pressure Increase
Pressure Holding Valve (Port Ⓐ)	OFF (Open)	ON (Closed)	ON (Closed)	OFF (Open)
Pressure Reduction Valve (Port Ⓑ)	OFF (Closed)	ON (Open)	OFF (Closed)	OFF (Closed)

SUSPENSION

■ DESCRIPTION

The Macpherson strut type independent suspension is used both front and rear.
New model's suspension has the following features:

- As in the previous model, a fluid-filled suspension upper support and a suspension tower plate are used on the front suspension.
- An assist link is added on the front suspension for the manual transaxle model.
- The front suspension bushing has been changed.
- The location of the rear suspension arms has been changed.
- Rubber cushions have been adopted for mounting the suspension member onto the body.
- The shape of the rear suspension member has been changed.



Sedan Model with Manual Transaxle

▶ Specifications ◀

Model / Item			Normal Package		Rough Road Package	
			Sedan, Liftback	Wagon	Sedan, Liftback	Wagon
Front Suspension	Tread	mm (In.)	1480 (58.3)	←	1485 (58.5)	←
	Caster*	degrees	1°20'	1°21'	1°15'	←
	Camber*	degrees	−0°21'	←	−0°50'	←
	Toe-In*	mm (in.)	1 (0.04)	←	←	←
	King Pin Inclination*	degrees	13°22'	←	14°14'	←
Rear Suspension	Tread	mm (in.)	1450 (57.1)	←	1440 (56.7)	←
	Camber*	degrees	−0°31'	−0°25'	−0°18'	−0°25'
	Toe-In*	mm (in.)	2 (0.08)	←	←	←

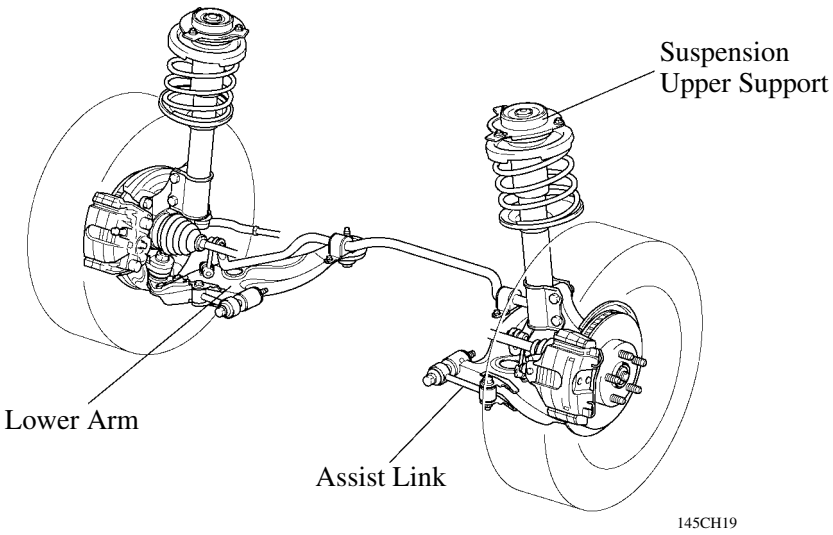
*: Unloaded Vehicle Condition

■ FRONT SUSPENSION

1. General

The front suspension is basically the same as that of the previous model. However, the following are changed.

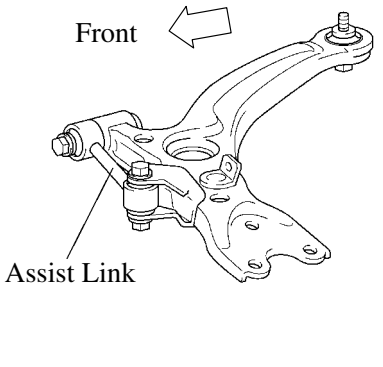
- An assist link has been added to the front of the lower arm of the manual transaxle model.
- The shape of the fluid-filled suspension upper support has been changed.

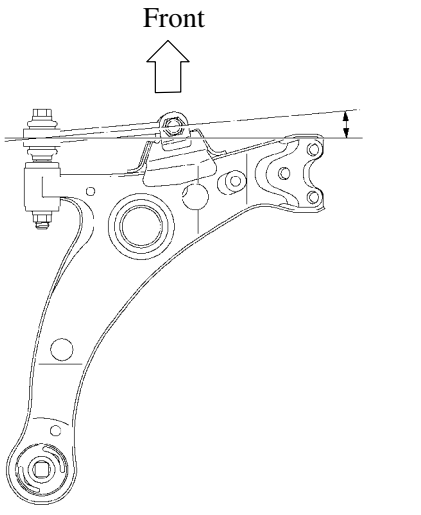


Manual Transaxle Model

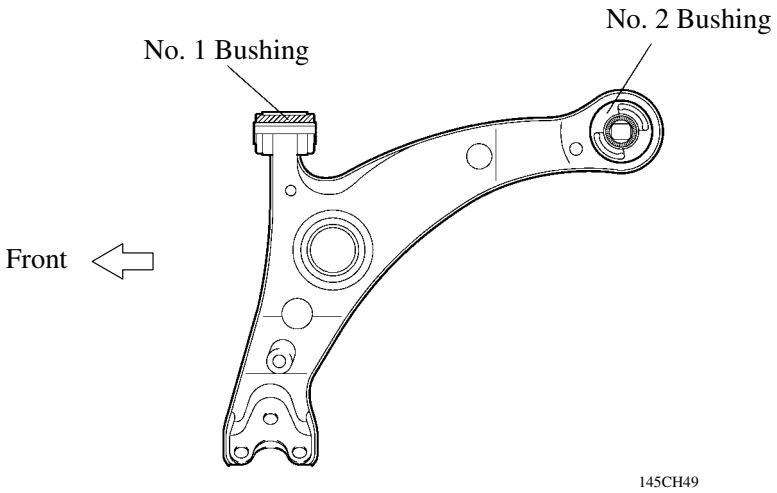
2. Lower Arm

- The assist link has been adopted in front of the lower arm on the manual transaxle model.
  By optimizing the installation angle of this assist link, optimal steering and compliance have been realized to provide an excellent steering feeling.





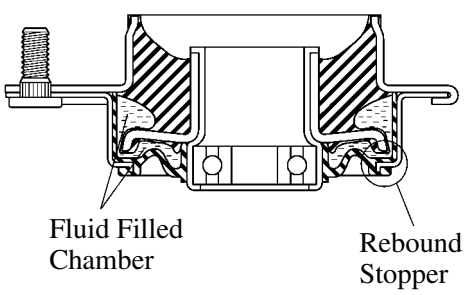
- The characteristics of the No. 1 and No. 2 bushings have been optimized to further improve the excellent riding comfort and to provide excellent stability and controllability.



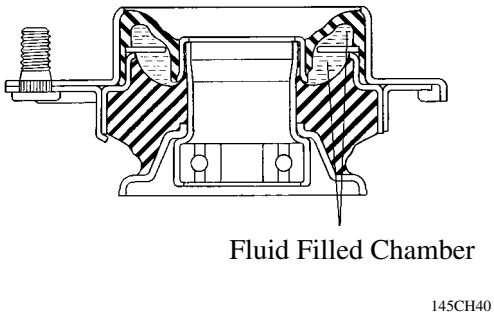
Automatic Transaxle Model

3. Suspension Upper Support

As in the previous model, a fluid-filled suspension upper support is used to restrain the noise and vibration that is transmitted from the suspension to the body.
However, the shape of the upper support has been changed to adopt a rebound stopper.



New

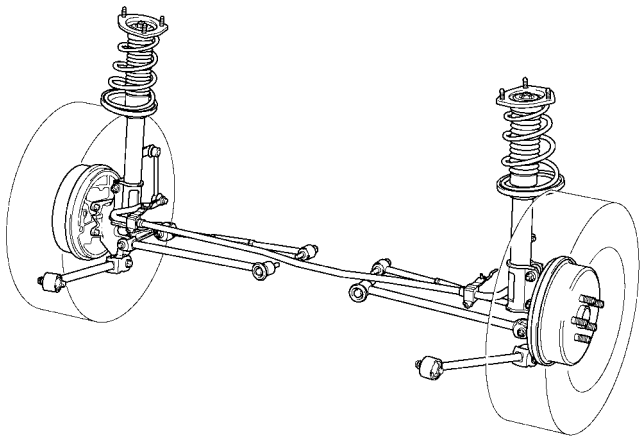


Previous

■REAR SUSPENSION

1. General

The position of the suspension arms has been changed to optimize the compliance steer that is applied by the lateral and longitudinal forces, thus providing excellent stability and controllability.

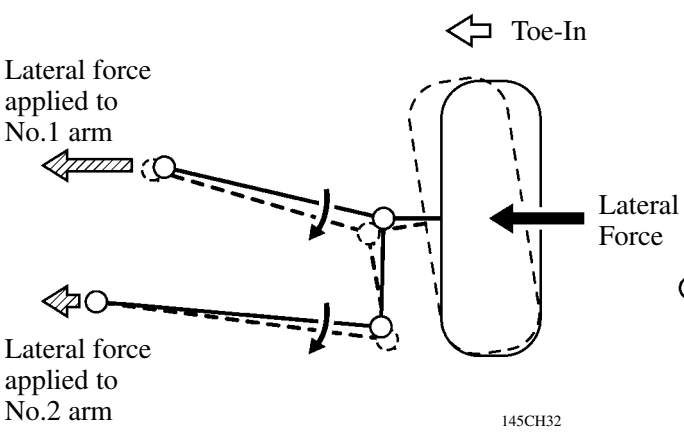


145CH20

2. Compliance Steer

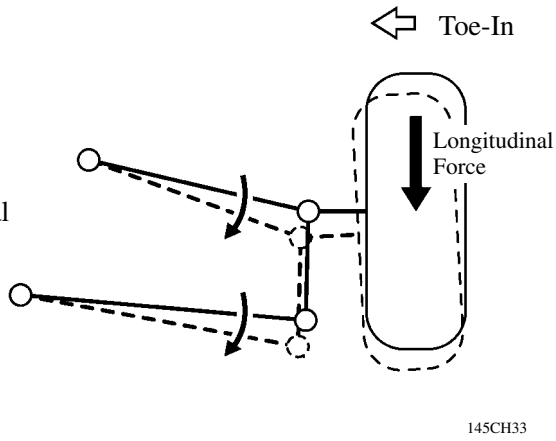
The location, length, mounting angle, and bushings of the suspension arms have been optimized to ensure that the tires always orient towards toe-in if a lateral force or longitudinal force is applied to the tires during cornering or braking, thus providing excellent stability and controllability.

▶ Type Drawing ◀



145CH32

During Lateral Force Application



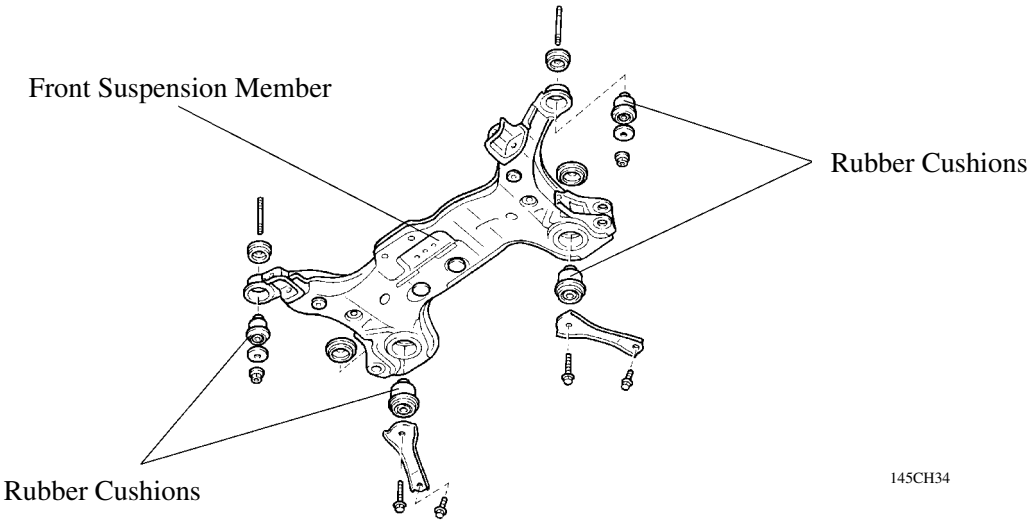
145CH33

During Longitudinal Force Application

■ SUSPENSION MEMBER

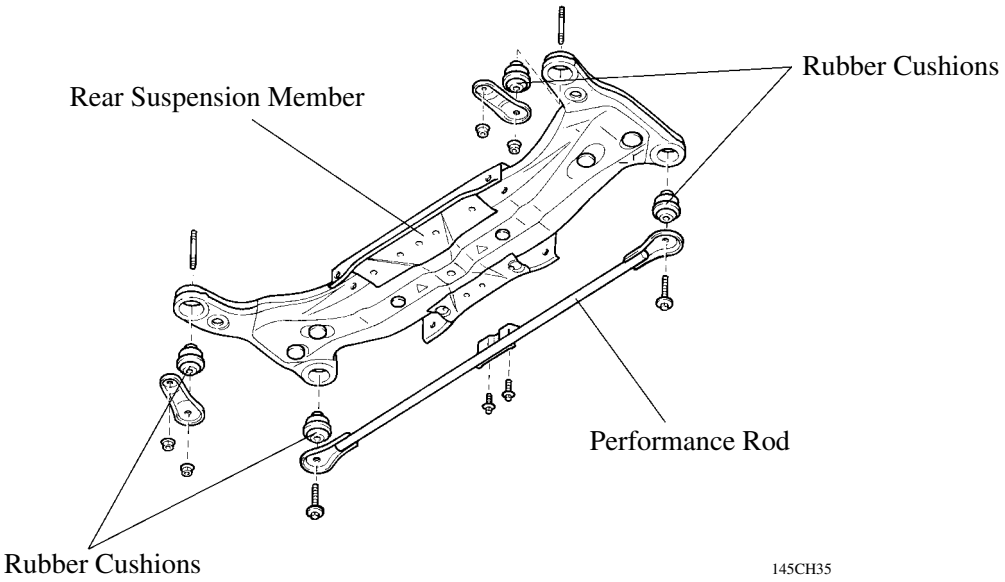
1. Front Suspension Member

Rubber cushions have been provided to the portion of the suspension member that mounts to the body in order to reduce the noise and vibration that are transmitted from the suspension to the body.



2. Rear Suspension Member

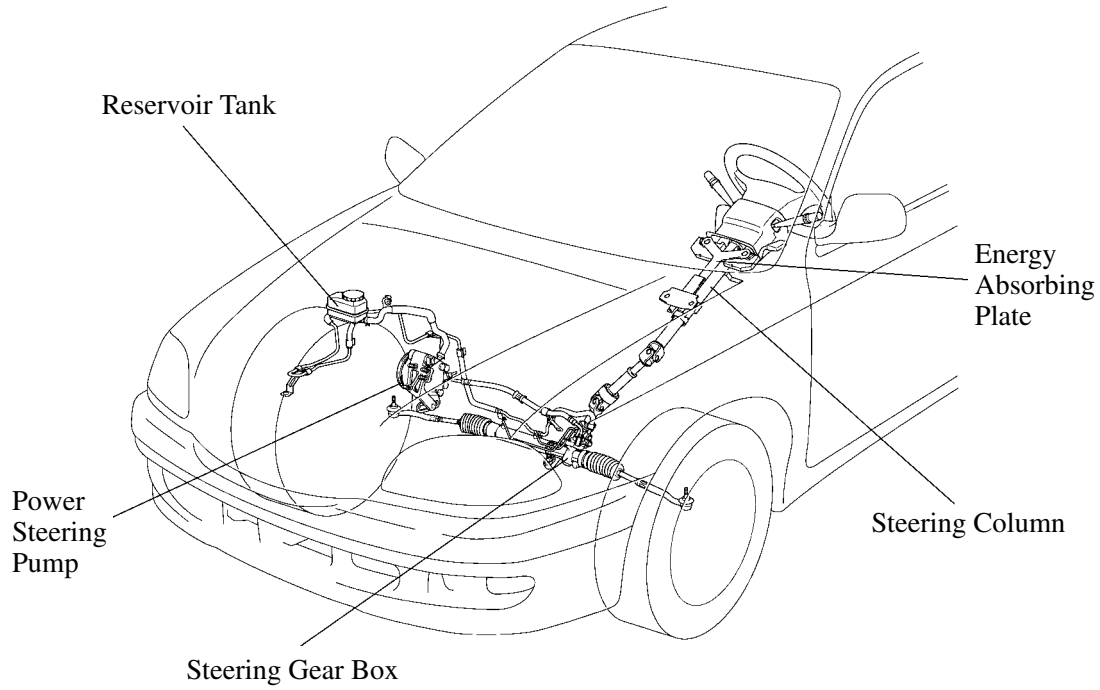
Similar to the front suspension member, rubber cushions have been provided to the portion of the rear suspension member that mounts to the body.
The shape of the suspension member has been changed and the position of the rubber cushions has been optimized. As a result, the amount of roll of the suspension member due to the lateral force that is applied to the suspension has been restrained.
Furthermore, a performance rod has been provided to increase the rigidity by securing the center of the rod against the body.
The above measures have been taken to improve riding comfort while providing excellent stability and controllability.



STEERING

■ DESCRIPTION

- A rack and pinion type steering gear is used. An engine revolution sensing type power steering is used on all models.
- A stepless tilt steering is used on all models.
- An energy absorbing plate is used on the energy absorbing mechanism for all models.
- A slide mechanism has been provided in the intermediate shaft to absorb the movement of the suspension member.
- The steering column hole cover has adopted a double-wall construction to improve its sound insulation capabilities.
- An energy absorbing rib has been provided on the column lower cover to help reduce the impact applied to the driver's knees in a collision.



LHD Model with 3S-FE Engine

▶ **Specifications** ◀

Gear Ratio (Overall)		17.39
No. of Turns Lock to Lock		3.04
Rack Stroke	mm (in.)	134 (5.28)
Fluid Type		ATF Type DEXRON®II or III

■POWER STEERING GEAR

1. General

- A compact and lightweigh rack and pinion type steering gear is used.
- A PCF (Positive Center Feel) mechanism has been provided in the torsion bar in the steering gear box to improve the steering response in the vicinity of the steering center.
- The hydraulic characteristics have been revised to realize optimal steering effort.

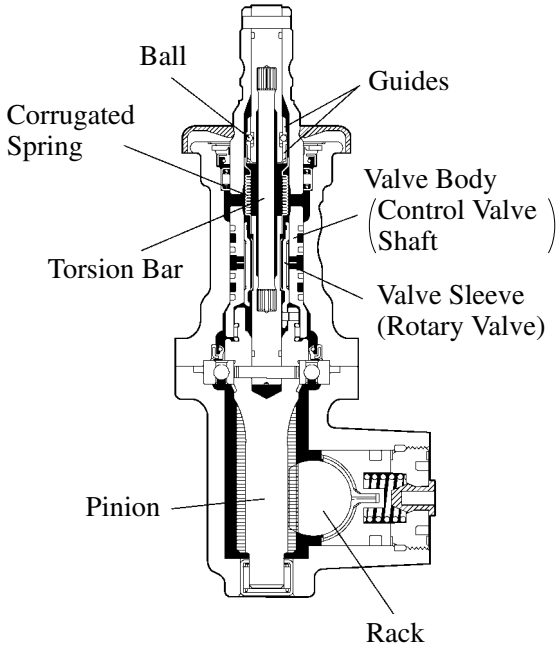
2. PCF Mechanism

General

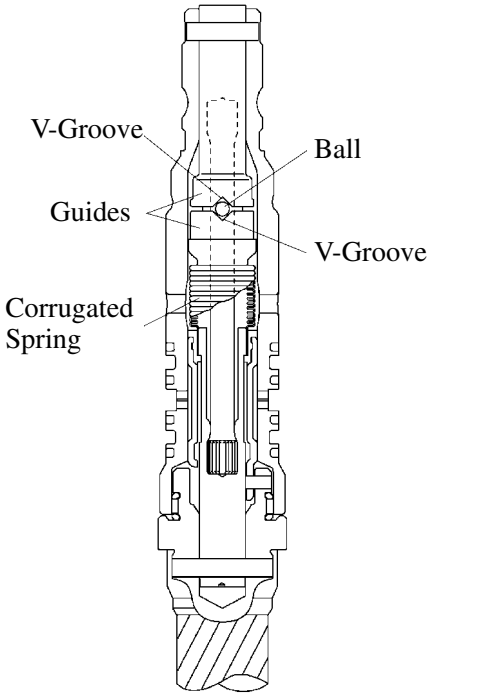
A PCF mechanism has been provided in the torsion bar to increase the spring constant of the torsion bar in the vicinity of the steering center in order to realize excellent steering feeling when driving through long corners.

Construction

The PCF mechanism consists of a corrugated spring, balls, V-groove guides, etc.



Gear Box Cross Section

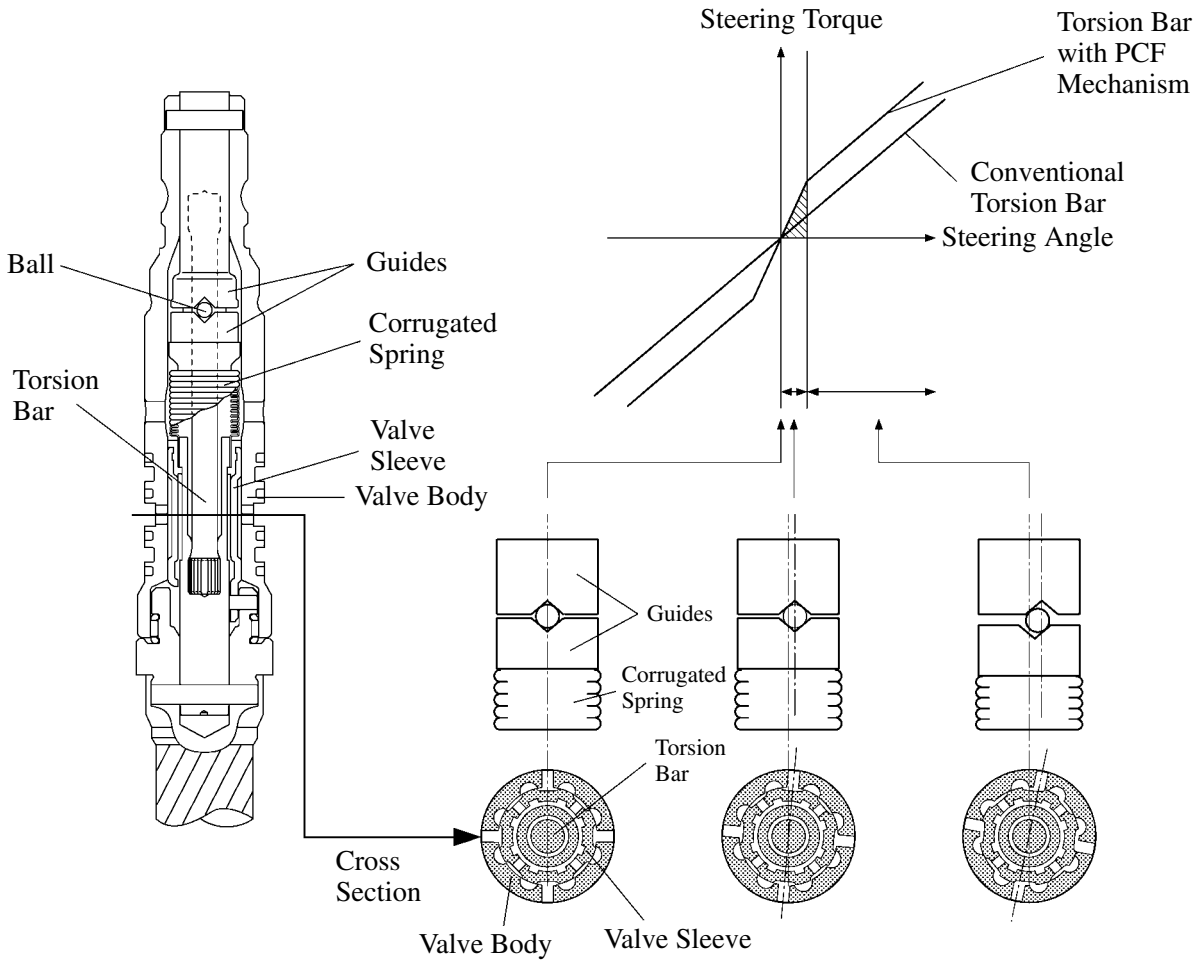


Type Drawing of PCF Mechanism

Operation

When the steering wheel is turned slightly, the spring force of the corrugated spring in the PCF mechanism causes the top and bottom guides to rotate in unison as illustrated in the center drawing below.
Accordingly, the torsion bar does not generate torsion, and no phase difference is created between the valve body and the valve sleeve. As a result, no hydraulic assist is provided to the steering effort.
When the steering wheel is turned further, the reaction force from the wheels overcomes the spring force of the corrugated spring, causing the top and bottom guides to shift from each other, as illustrated in the right drawing below.
This generates torsion in the torsion bar, thus causing the valve body and the valve sleeve to rotate relatively for the amount of torsion. As a result, hydraulic assist is provided to the steering effort.

▶ Conceptual Drawing ◀



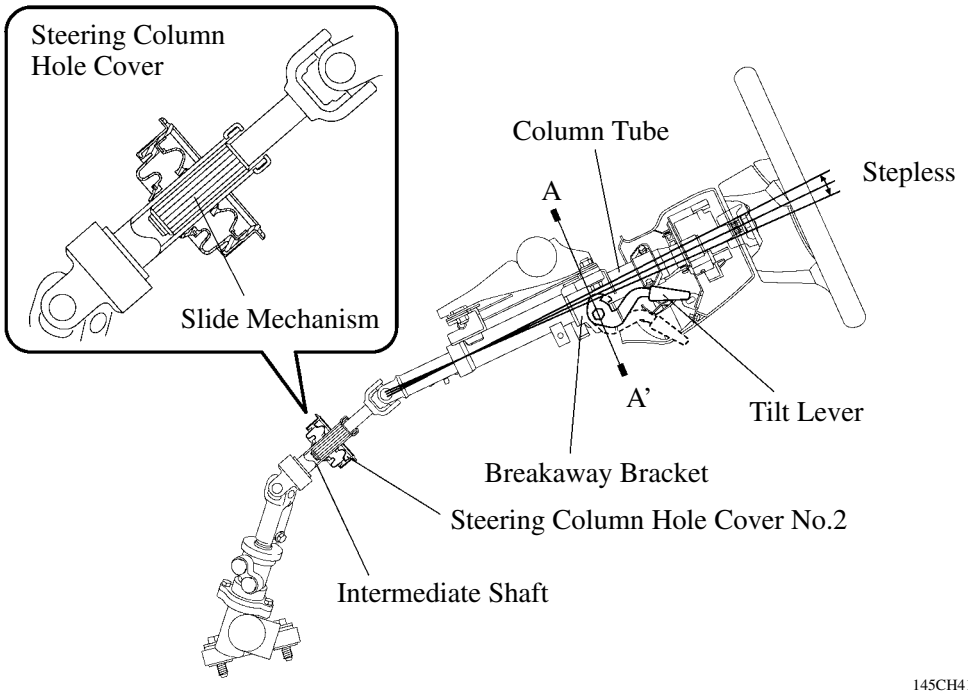
■STEERING COLUMN

1. General

- A stepless tilt steering is used on all models.
- A slide mechanism has been provided in the intermediate shaft to absorb the movement of the suspension member.
- The steering column hole cover has adopted a double-wall construction to improve its sound insulation capabilities.

2. Tilt Steering

The tilt mechanism consists of a tilt lever, column tube, breakaway bracket, tilt lever lock bolt, tilt steering adjusting nut and etc.
When the tilt mechanism is in its locked state, operating the tilt lever downward causes the tilt steering adjusting nut to loosen (because the tilt lever lock bolt has left-handed screw threads).
When the tilt mechanism is in its free state, operating the tilt lever upward causes the tilt steering adjusting nut to tighten.



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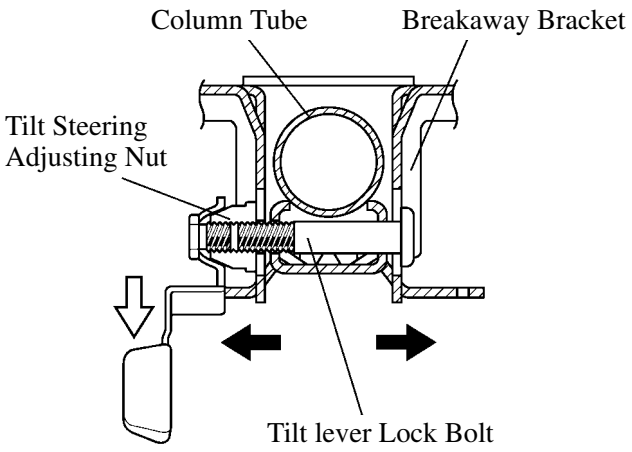
▶ A – A' Cross Section ◀



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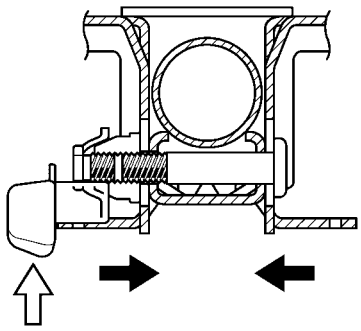
Free



145CH43

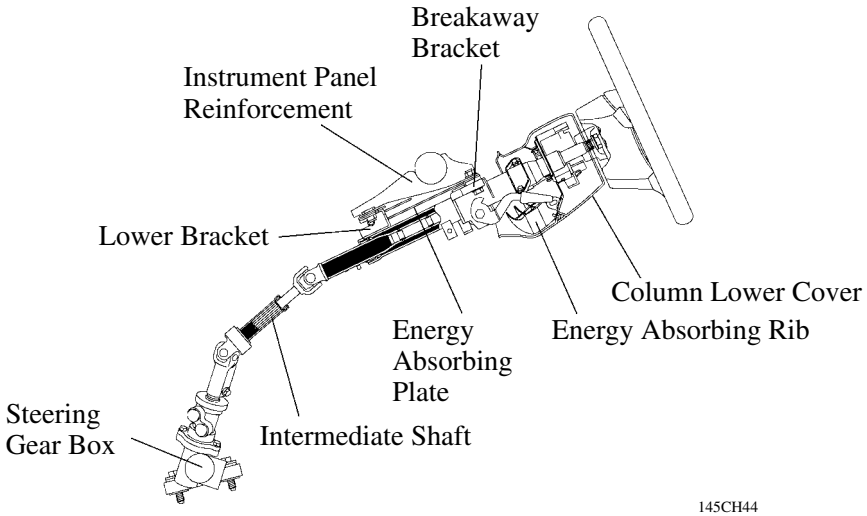
Lock

CH

■ ENERGY ABSORBING MECHANISM

1. Construction

The energy absorbing mechanism in the steering column consists of a lower bracket, breakaway bracket, energy absorbing plate and a contractile main shaft. The steering column is mounted onto the instrument panel reinforcement via a lower bracket and breakaway bracket which is supported via a capsule and energy absorbing plate. The steering column and the steering gear box are connected with an elastic intermediate shaft. In addition, energy absorbing ribs have been provided on the lower column cover to help reduce the impact applied to the driver's knees in a collision.



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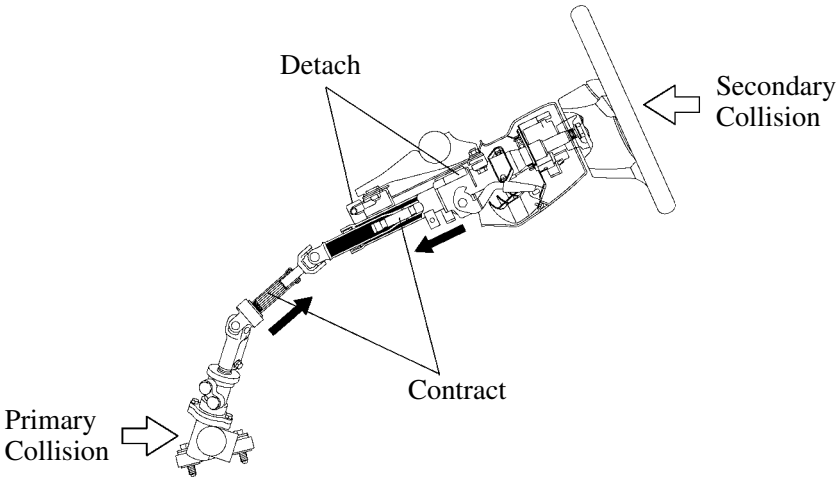
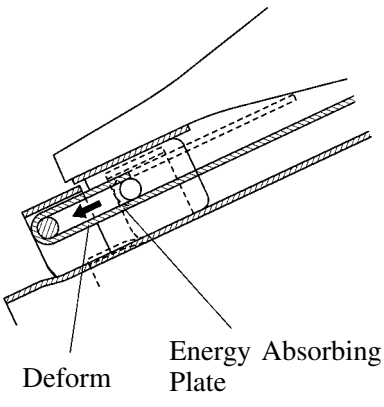
2. Operation

When the steering gear box moves during a collision (primary collision), the main shaft and intermediate shaft contract, thus preventing the steering column and the steering wheel from protruding into the cabin. When an impact is transmitted to the steering wheel in a collision (secondary collision), the steering wheel and the steering wheel pad help absorb the impact. In addition, the breakaway bracket and the lower bracket separate causing the entire steering column to move forward.
At this time, the energy-absorbing plate becomes deformed to help absorb the impact of the secondary collision.



145CH45



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