# FOREWORD

To assist you in your service activities, this manual explains the main characteristics of the new ES300, in particular providing a technical explanation of the construction and operation of new mechanisms and new technology used.

Applicable models: MCV20 series

This manual is divided into 4 sections.

1. **Introduction** — Development objectives of the new model and model line-up.
2. **New Model Outline** — Explanation of the product to give a general understanding of its features.
3. **Technical Description** — Technical explanation of the construction and operation of each new system and component.
4. **Appendix** — Major technical specifications of the vehicle.

**CAUTION, NOTICE, *REFERENCE*** and **NOTE** are used the following ways:

| | |
|---|---|
| **CAUTION** | A potentially hazardous situation which could result in injury to people may occur if instructions on what to do or not do are ignored. |
| **NOTICE** | Damage to the vehicle or components may occur if instructions on what to do or not do are ignored. |
| ***REFERENCE*** | Explains the theory behind mechanisms and techniques. |
| **NOTE** | Notes or comments not included under the above 3 titles. |

For detailed service specifications and repair procedures, refer to the following Repair Manuals:

| Manual Name | Pub. No. |
|---|---|
| ● 1997 LEXUS ES300 Repair Manual | RM511U |
| ● 1997 LEXUS ES300 Electrical Wiring Diagram | EWD284U |

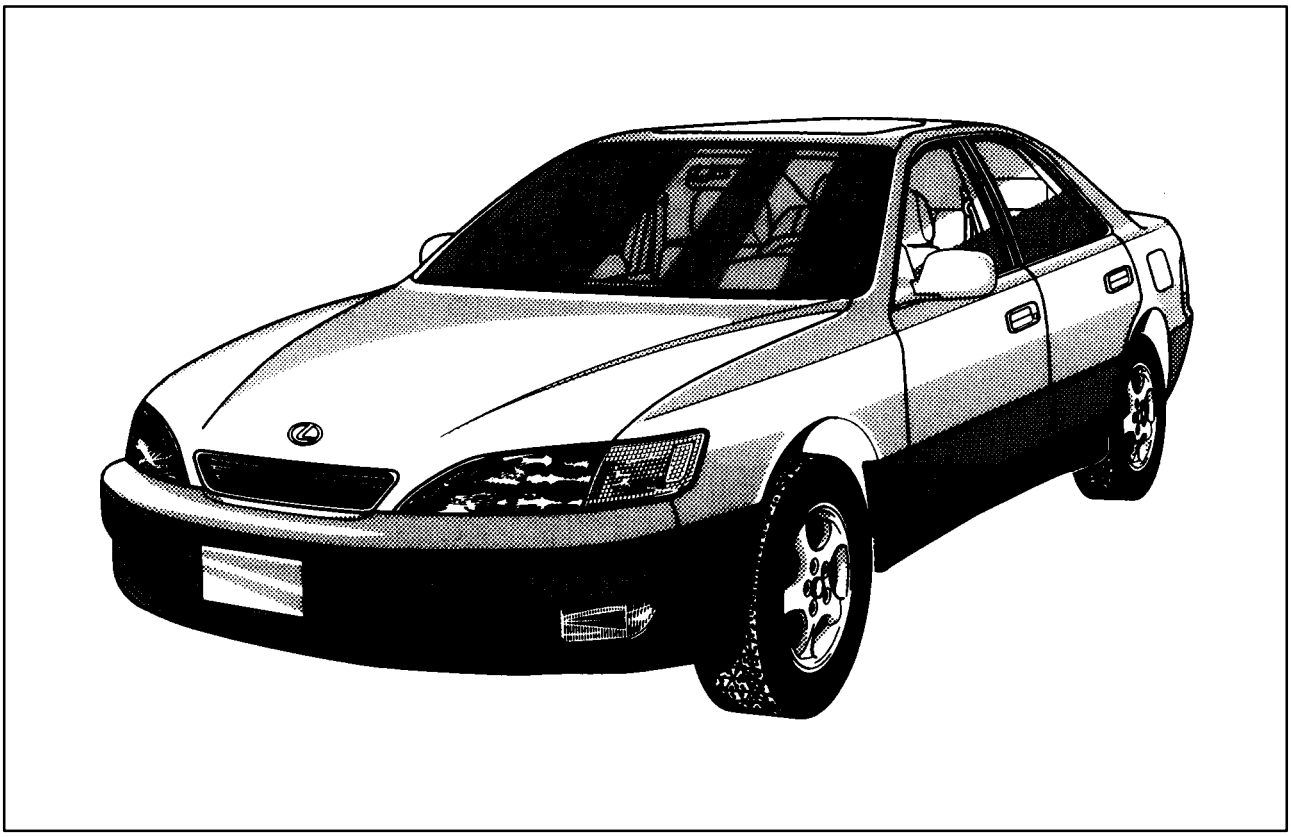
All information contained herein is the most up-to-date at the time of publication. We reserve the right to make changes without prior notice.

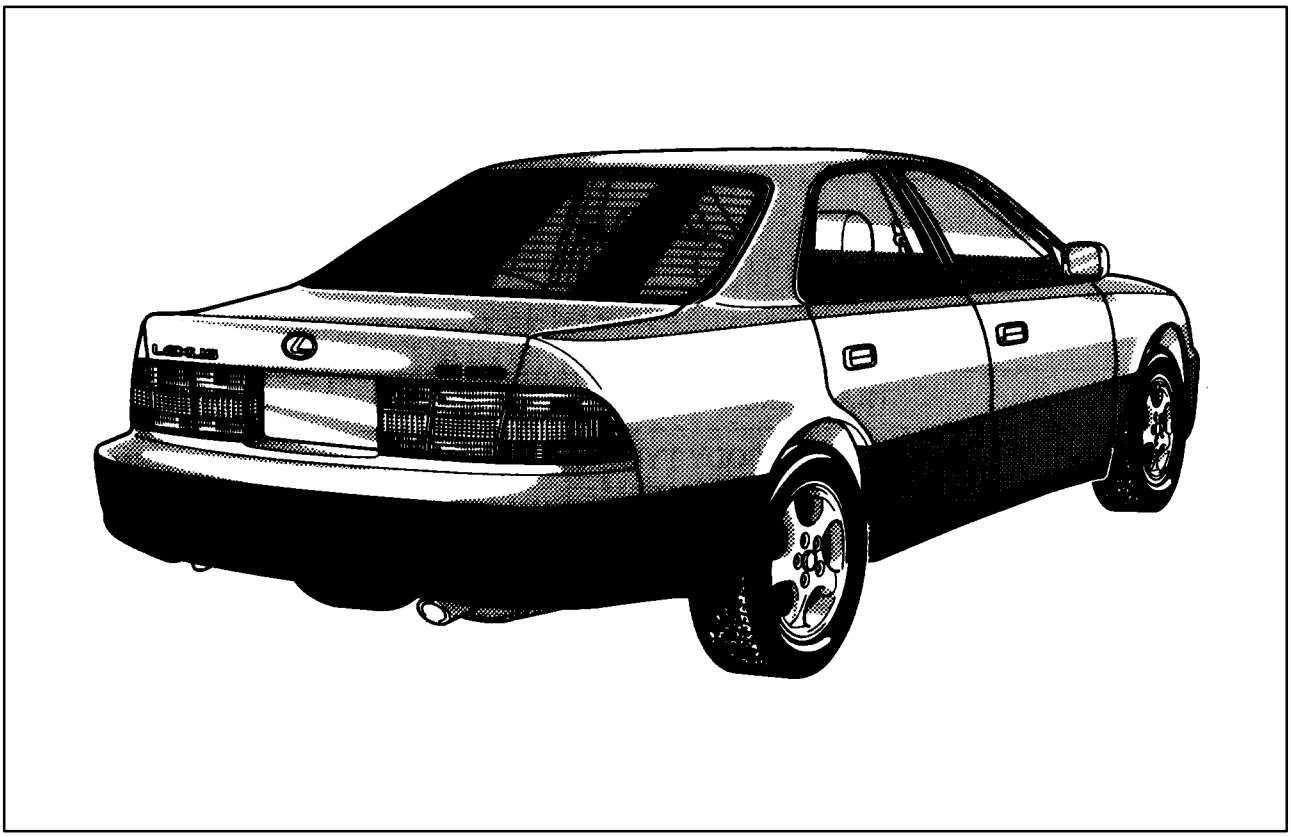
**TOYOTA MOTOR CORPORATION**

# DEVELOPMENT OBJECTIVES

The new ES300 aims to further strengthen its status as a Lexus entry vehicle through appealing more strongly to the young, quality minded drivers by creating more advanced, attractive designs and functions, and through obtaining a wider variety of users by adding more value to the car.

# EXTERIOR APPEARANCE





# MODEL CODE AND MODEL LINE-UP

## MODEL CODE

**MCV20 L - B T P G K A**

② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑧

| | |
|---|---|
| ② | **BASIC MODEL CODE** |
| | MCV20 : With 1MZ-FE Engine |

| | |
|---|---|
| ③ | **STEERING WHEEL POSITION** |
| | L : Left-Hand Drive |

| | |
|---|---|
| ④ | **MODEL NAME** |
| | B : ES 300 |

| | |
|---|---|
| ⑤ | **BODY TYPE** |
| | T : 4-Door Sedan |

| | |
|---|---|
| ⑥ | **GEARSHIFT TYPE** |
| | P : 4-Speed Automatic, Floor |

| | |
|---|---|
| ⑦ | **GRADE** |
| | G : — |

| | |
|---|---|
| ⑧ | **ENGINE SPECIFICATION** |
| | K : DOHC And SFI |

| | |
|---|---|
| ⑧ | **DESTINATION** |
| | A : U.S.A. |
| | K : Canada |

## MODEL LINE-UP

| TRANSAXLE | | | | 4-Speed Automatic |
|---|---|---|---|---|
| DESTINATION | ENGINE | BODY TYPE | GRADE | A541E* |
| U.S.A. | 1MZ-FE | 4-Door Sedan | — | MCV20L-BTPGKA |
| Canada | | | | MCV20L-BTPGKK |

* : Electronically Controlled Transmission with and intelligent control system

# MAJOR COMPONENTS

The basic components of the new and previous ES300 are as follows:

| Model | | New | Previous |
|---|---|---|---|
| Item | | FF (Front Engine, Front Wheel Drive) | ← |
| Drive System | | | |
| Engine | Type | 1MZ–FE: V6, 3.0–Liter | ← |
| | Displacement $cm^3$ (cu. in.) | 2995 (182.7) | ← |
| | Valve Mechanism | 24 Valves, DOHC | ← |
| | Fuel System | SFI | ← |
| | Max. Output [SAE–NET] kW @ rpm (HP @ rpm) | 149 @ 5200 (200 @ 5200) | 140 @ 5200 (188 @ 5200) |
| | Max. Torque [SAE–NET] N·m @ rpm (ft·lbf @ rpm) | 290 @ 4400 (214 @ 4400) | 275 @ 4400 (203 @ 4400) |
| Automatic Transaxle | | A541E; 4–Speed | ← |
| Brakes | Front | Ventilated Disc | ← |
| | Rear | Solid Disc | ← |
| Suspension | | 4–Wheel MacPherson | ← |
| Steering | Gear Type | Rack and Pinion | ← |
| | Power Steering | Engine Revolution Sensing Type | Vehicle Speed Sensing Hydraulic Reaction Type Electronically Controlled PPS* |

*: PPS (Progressive Power Steering)

# ENGINE

## ENGINE LINE-UP

The 1MZ-FE engine adopted in the ES300 is a V6, 3.0-liter, 24-valve, DOHC engine.

| Engine Type | Displace-ment | Max. Output [SAE-NET] | Max. Torque [SAE-NET] | Features |
|---|---|---|---|---|
| 1MZ-FE | 3.0 ℓ | 149 kW @ 5200 rpm (200 HP @ 5200 rpm) | 290 N m @ 4400 rpm (214 ft lbf @ 4400 rpm) | The engine performance has been improved with the adoption of a 2-way exhaust control system. |

### ° 1MZ-FE ENGINE

The 1MZ-FE engine is basically the same as the 1MZ-FE engine of the previous model.
However, its engine performance has been improved with the modification of each engine portion and the adoption of a 2-way exhaust control system and its exhaust emissions have been reduced with the adoption of the fuel returnless system and with a change in the EGR control system.

# CHASSIS

The new ES300 chassis provides outstanding steering stability and is built and laid out basically the same as the previous model. However its excellent drivability and comfort are further achieved through the improvement of various components, also excellent stability is realized.

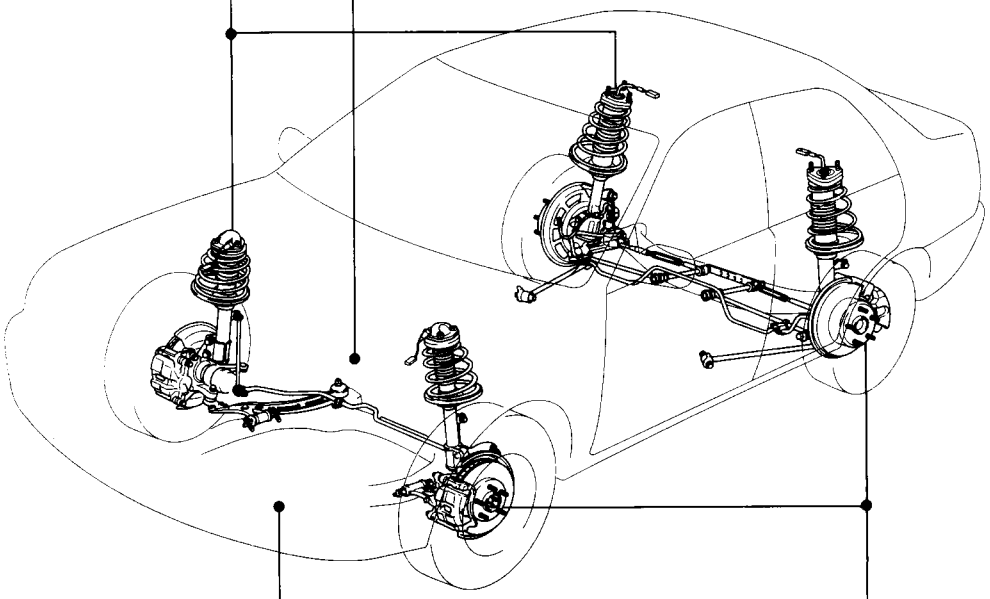
## MAJOR COMPONENTS

**Suspension**

- MacPherson strut independent suspension is used for all 4 wheels. The L-shaped lower arm type is used in the front and a dual link type is used in the rear.
- Electric modulated suspension is available as an option.

**Steering**

Engine revolution sensing type rack and pinion power steering is used.



**Transaxle**

4-speed ECT (Electronically Controlled Transaxle with an intelligent control system) A541E automatic transaxle is used.

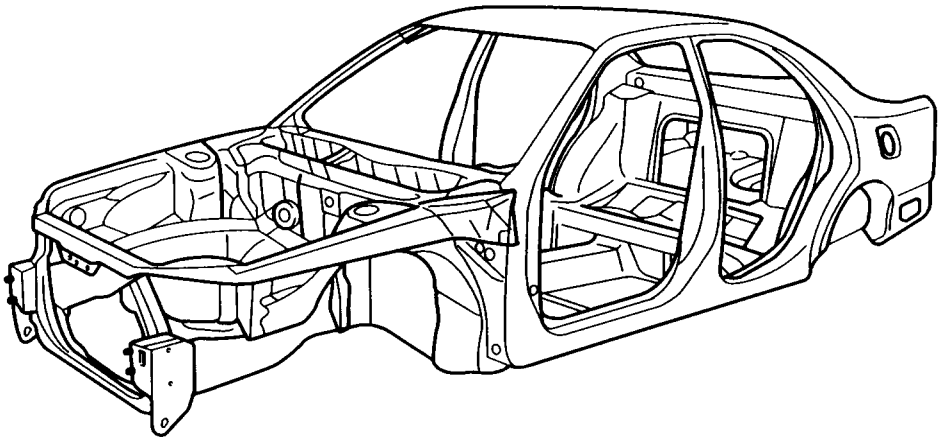
**Brakes**

- 4-wheel disc brakes are used. The front disc brakes are the ventilated type.
- The ABS is available as standard equipment on all models.
- The TRAC (Traction Control) system is available as an option for U.S.A. It is standard equipment for Canada.

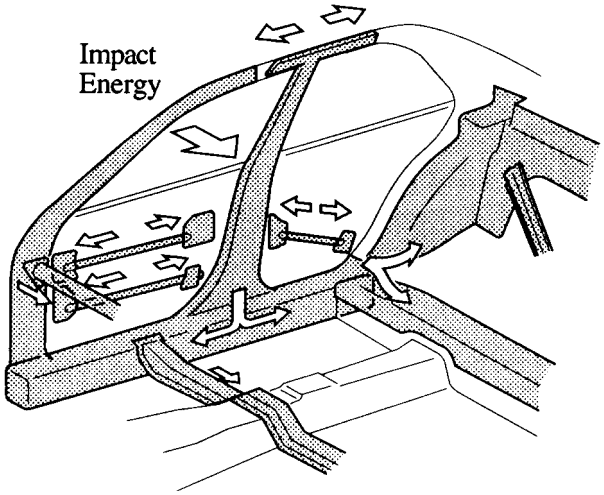
# BODY

A crash impact absorbing structure for side collisions is adopted in addition to that for frontal and, rear collisions. The body is made highly rigid and lightweight through the optimized allocation of materials and the generous application of high-strength sheet steel, etc. Furthermore, the vehicle creates less noise and vibration through the use of advanced noise insulation technology, and the application of anti-corrosion sheet steel produces a highly rest-resistant body.

**▶ Body Shell ◀**



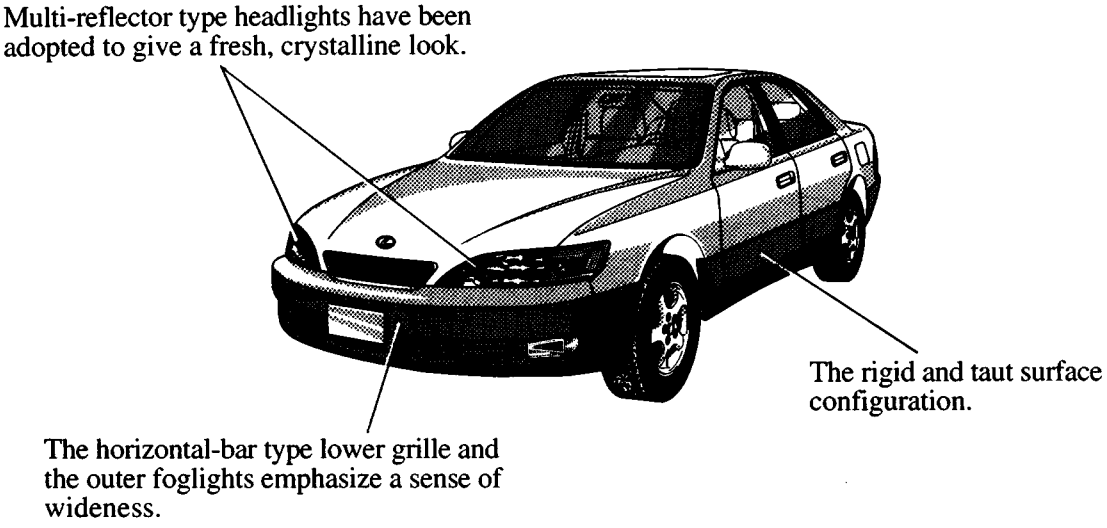
**▶ Impact Absorbing Structure for Side Collision ◀**

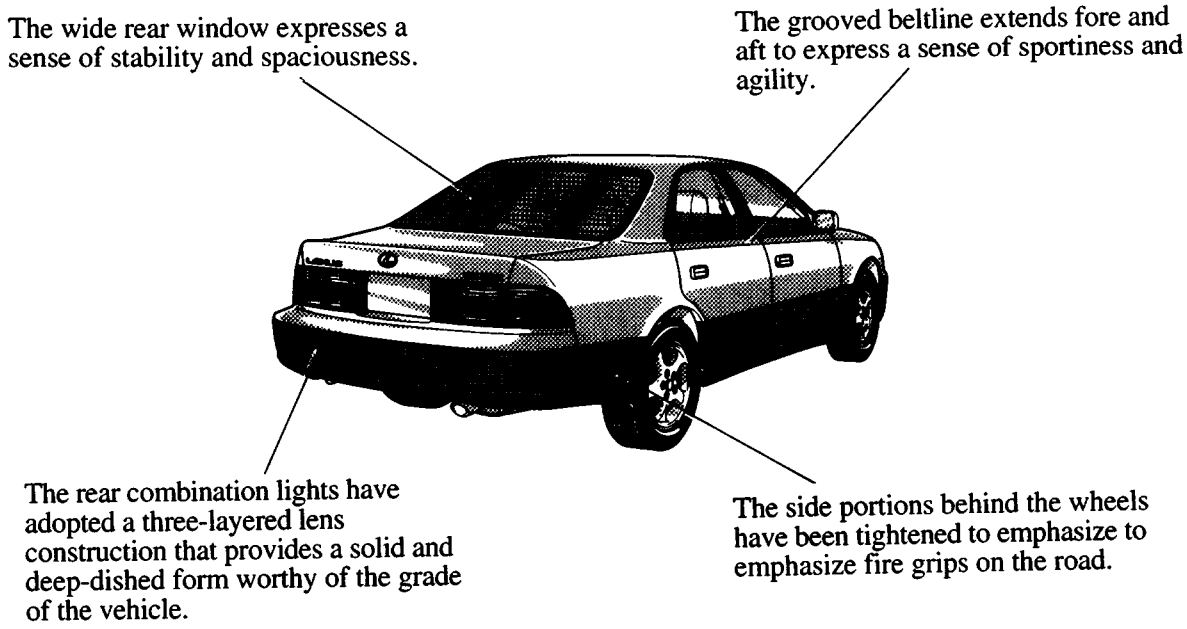


# EXTERIOR

## STYLING

The exterior styling pursues very ES300-1ike elegance and sportiness while expressing luxury in every detail. In addition to featuring the next-generation, sharp and rigid form, the new ES300 provides a longer wheelbase and a cab-forward configuration, thus realizing an exterior design that will carry the ES300 into the 21st century.



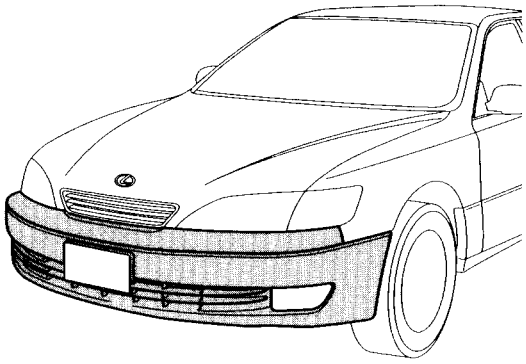



# EXTERIOR

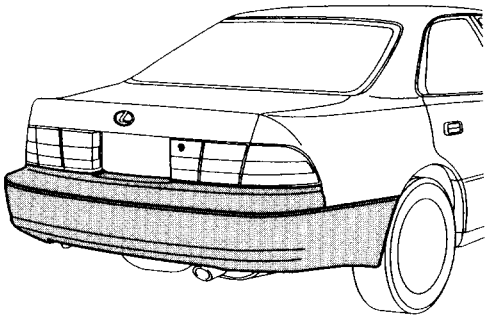
## EXTERIOR EQUIPMENT

### ◦ BUMPER

The Super Olefin Polymer, a material that is light, scratch resistant and highly recyclable, has been adopted in the front and rear bumpers.



**Front**



**Rear**

### ◦ LIGHTS

#### 1. Front Lights

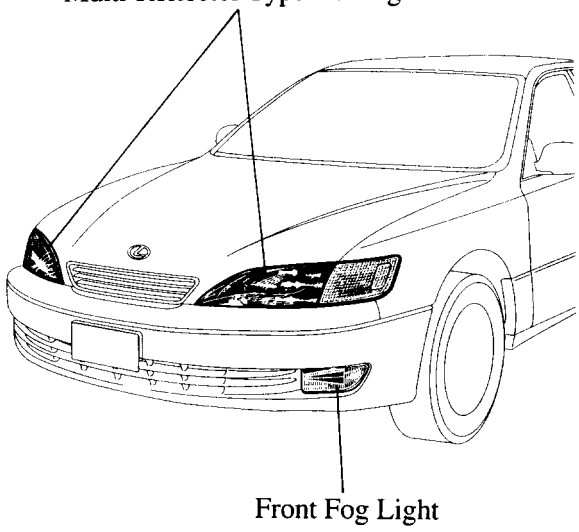
Four-light multi-reflector type headlights are used. The low beams use H7 bulbs that emit light that resembles natural light, thus providing excellent night-time visibility.

The front fog lights are standard equipment for all model.

The automatic light control system and the auto turn-off system are standard equipment for all model.

The daytime running light system is standard equipment on models for Canada.

Multi-Reflector Type Headlight



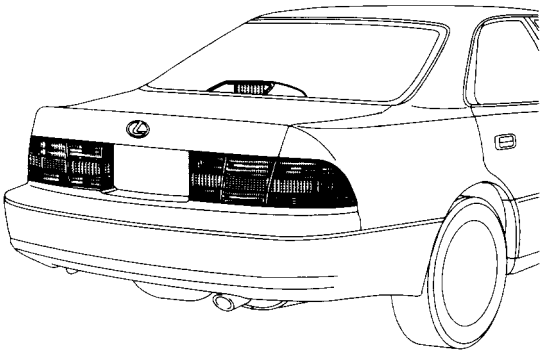
Front Fog Light

# EXTERIOR

## 2. Rear Lights

Vertically laid out rear combination lights that incorporate side marker lights have been adopted.

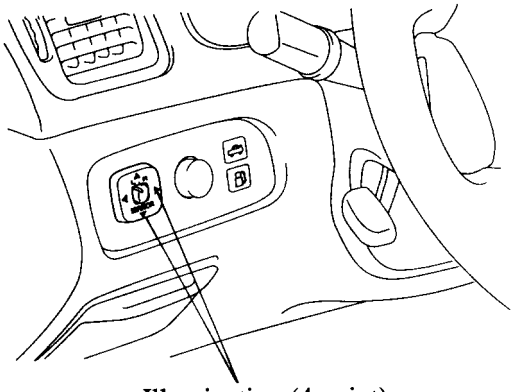
The high-mounted stop light is provided with a heating element of the rear window defogger. This prevents the deterioration of the visibility of the high-mounted stop light due to the fog or to snow on the glass.



### ◦ OUTSIDE REAR VIEW MIRRORS

Electrical remote-control mirrors are standard equipment and so are the mirror heaters.

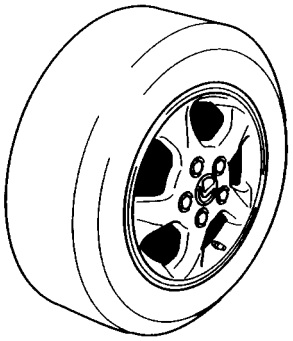
The control switch is provided with illumination to improve its ease of use at night.



Illumination (4 point)

### ◦ DISC WHEEL

15-inch 6JJ size, ultra-class chrome plated aluminum alloy disc wheels are optional equipment.



# EXTERIOR

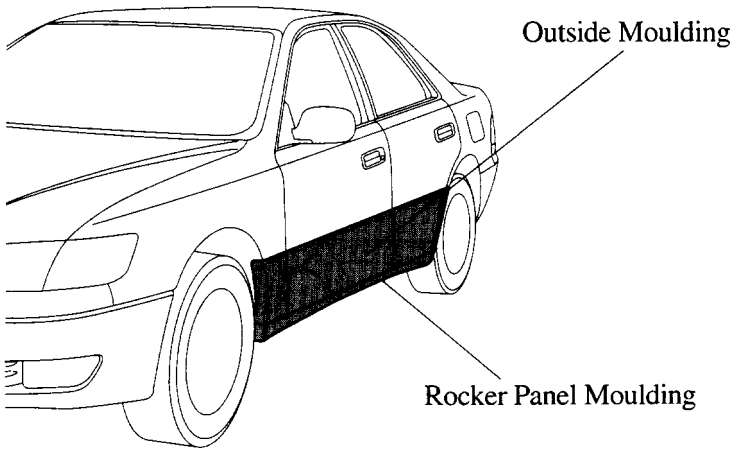
## ◦ MOON ROOF

A power tilt-up and sliding moon roof is optional equipment. A one-touch slide-open function is added.

## ◦ OUTSIDE MOULDING

In addition to the conventional outside moulding, a rocker panel moulding that improves the chip resistance and the vehicle's appearance has been adopted.

Both the outside moulding and rocker panel moulding are made of lightweight, scratch-resistant and highly recyclable super olefin polymer material.



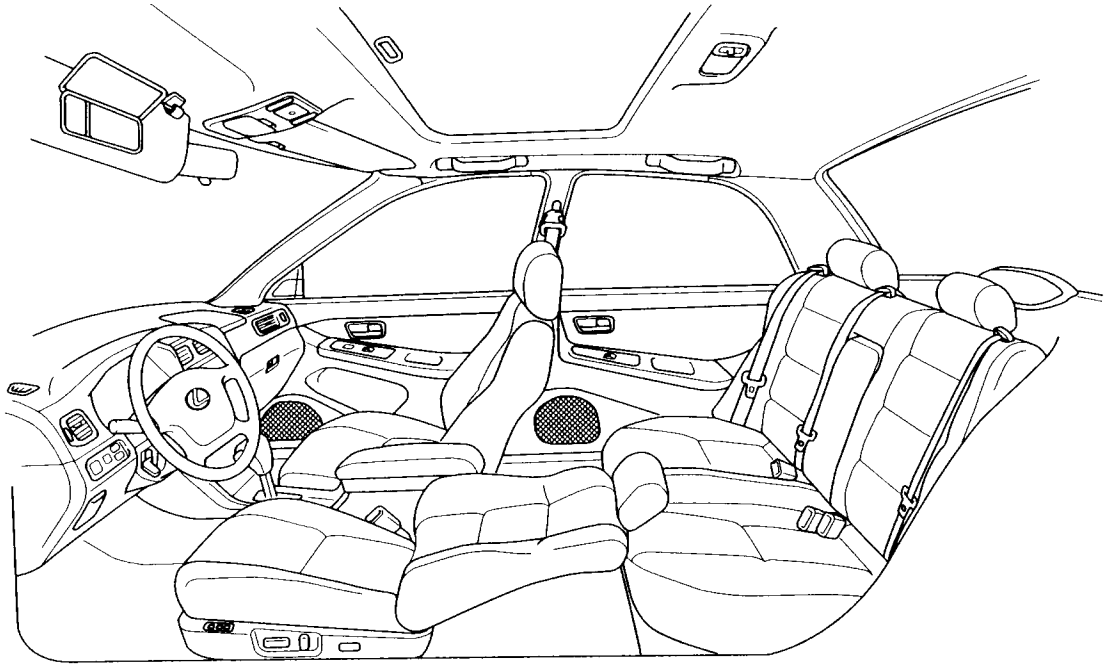

## ◦ WINDSHIELD GLASS AND WINDOW GLASS

The front windshield, the rear window, and all door windows use the type of glass that dramatically shuts out ultraviolet and infrared rays. As a result, sunburns from ultraviolet rays and heat from infrared rays have been reduced, and reduction of heat load of the air conditioning system.

# INTERIOR

## CABIN

Through the use of two-tone configuration that extends through the console, instrument panel, and the door trims, the new ES300's cabin provides a sporty yet luxurious space.



# INTERIOR

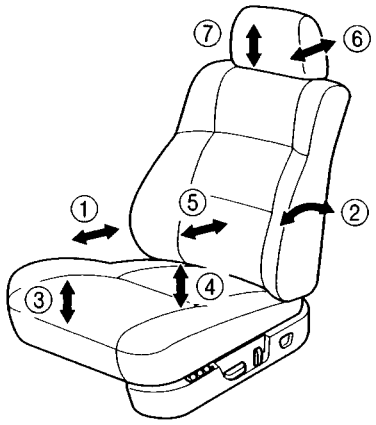
## ◦ SEATS

### 1. Front Seat

Power seats are standard equipment for the front seats. These seats include the following adjustment controls.

●: Power ○: Manual

| Adjustment Function | | Driver | Passenger |
|---|---|---|---|
| ① | Fore-and-Aft Slide | ● | ● |
| ② | Reclining | ● | ● |
| ③ | Front Vertical Height | ● | ● |
| ④ | Rear Vertical Height | ● | ● |
| ⑤ | Lumbar Support | ● | — |
| ⑥ | Headrest Fore-and-Aft Adjustment | ○ | ○ |
| ⑦ | Headrest Height | ○ | ○ |




**Driver's Seat**

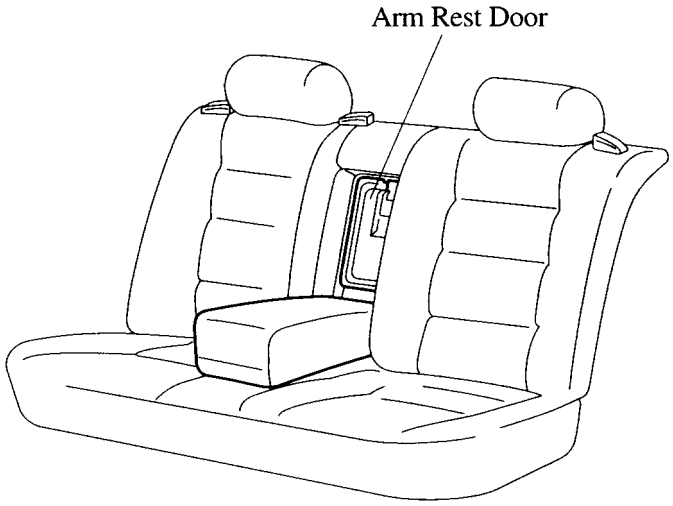
If the vehicle is equipped with the leather seat option, a memory system is provided for the driver's seat. This system adjusts the seat to a previously set position with a one-touch operation.

Front seat with seat heaters are an option for all models.

### 2. Rear Seat

The fixed type rear seat with arm rest is standard equipment.

Arm rest doors are provided for versatile access to the luggage compartment.



# INTERIOR

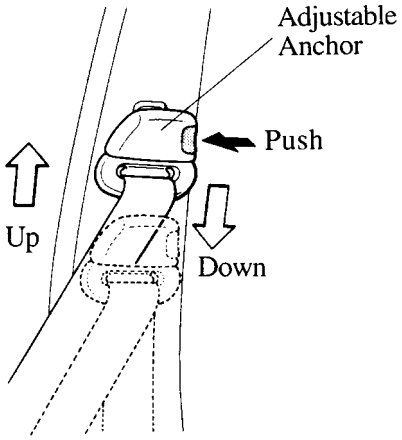
## ◦ SEAT BELTS

### 1. Front Seat Belts

3-point ELR (Emergency Locking Retractor) seat belts are provided. The passenger seat is additionally provided with an ALR (Auto-Locking Retractor) mechanism.

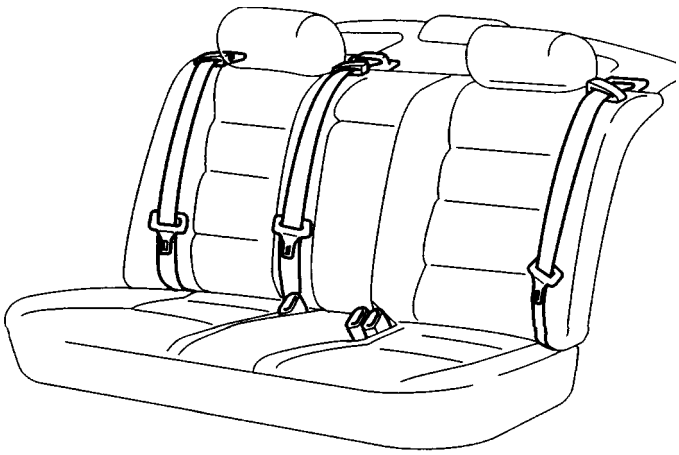
An adjustable shoulder belt anchor is provided on all models.

A seat belt pretensioner is provided on all models.




### 2. Rear Seat Belts

In addition to those on the outer seats, a 3-point ELR with ALR seat belt is provided for the center seat.



# INTERIOR

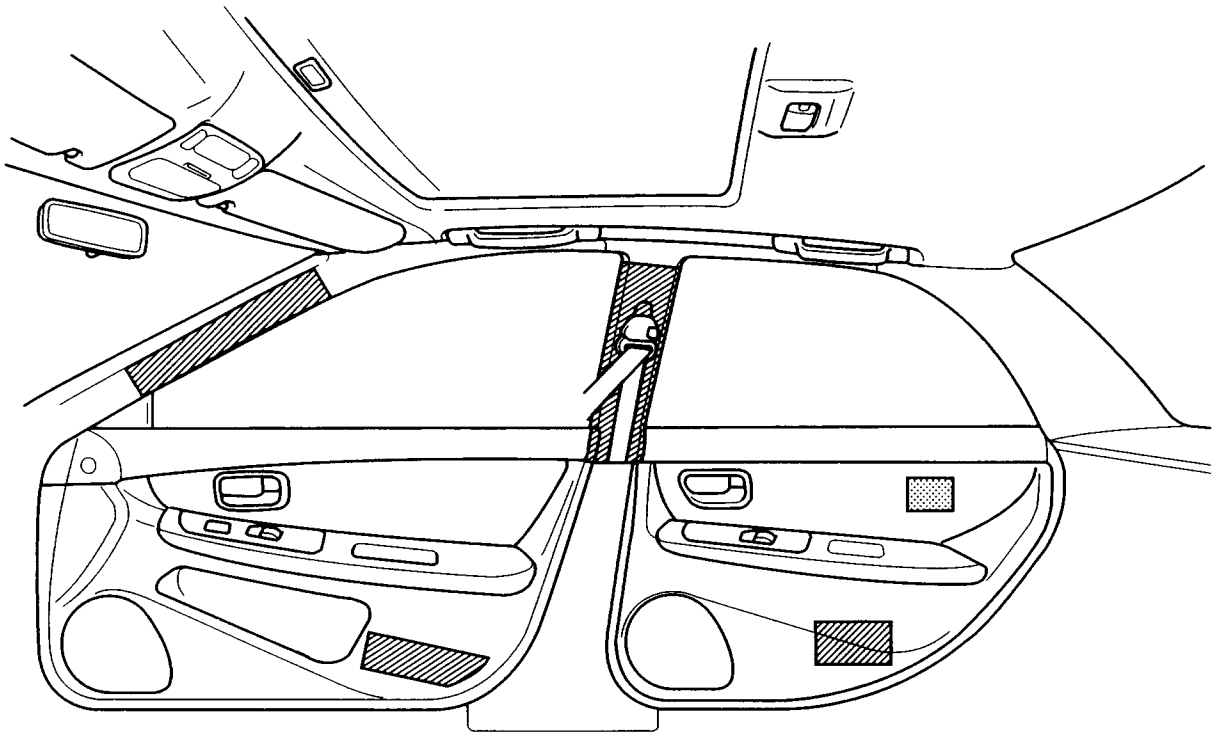
## ° TRIM AND GARNISH

The door trim design is adapted to the side collision impact absorbing structure. Impact energy absorbing ribs and high impact absorbing material are used at the inside of door trim.

The front pillar garnish and the center pillar garnish provide an impact-absorbing structure consisting of internal ribs that dampen the impact.

: **Impact Absorbing Rib**

: **Impact Absorbing Material**

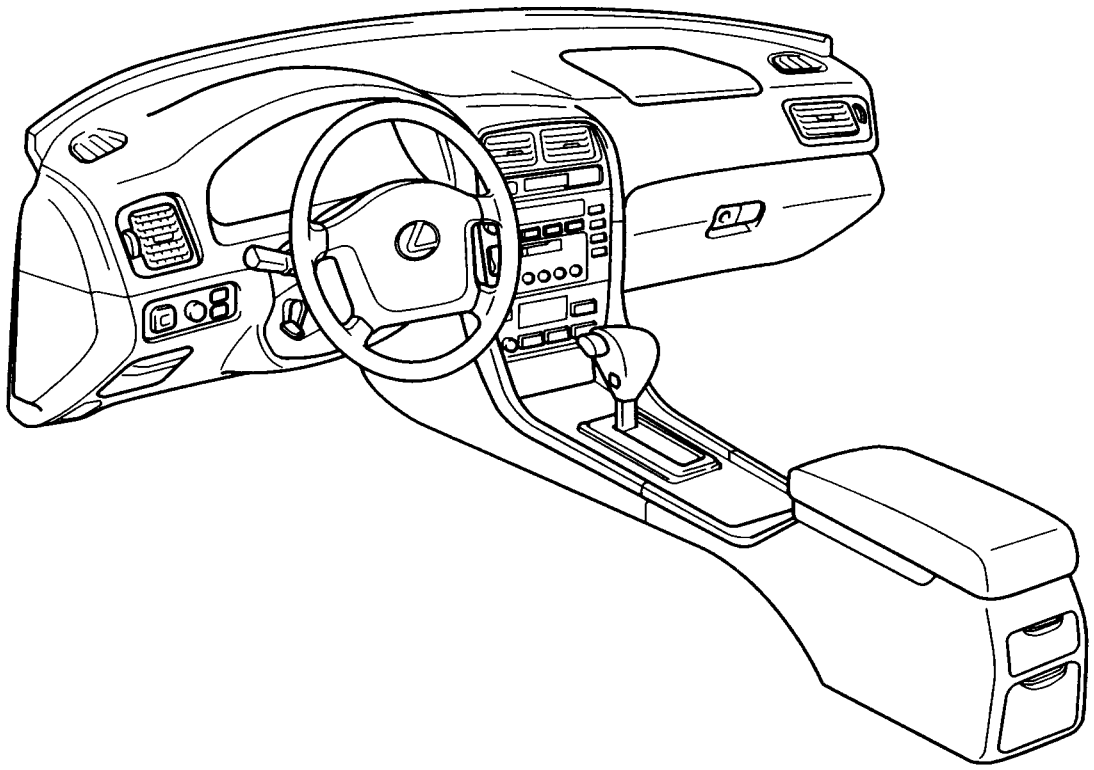


# INTERIOR

## INSTRUMENT PANEL, SWITCH LAYOUT AND EQUIPMENT

A two-tone parting line is used to give the upper portion a sense of agility and freedom, and the lower portion a sense of snugness and lower center of gravity.

The switches, the audio system, and the heater control panel are functionally laid out, thus improving their eases of use.



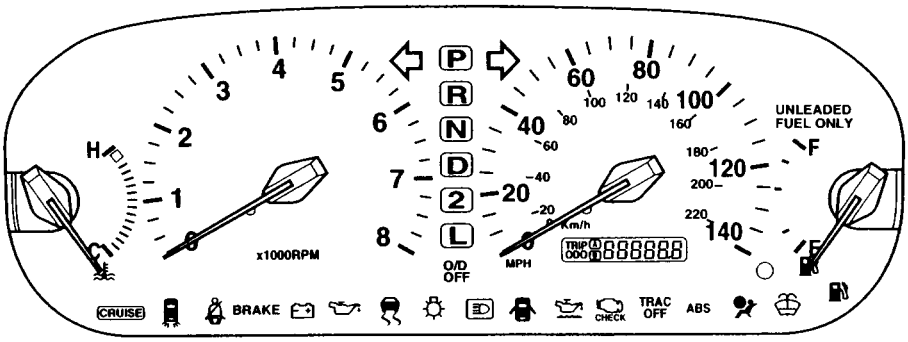
# INTERIOR

## ◦ COMBINATION METER

An electronic analog meter with superb visibility and high-tech appearance is used as well as in the LS400.

When the ignition switch is off, the meter panel is fully blacked out, giving a strong high-tech impression and a remote image from ordinary analog meters.

An electronic twin-trip meter and an electronic odometer are used for convenience and good visibility.




**Models for U.S.A.**

## ◦ AIR CONDITIONING

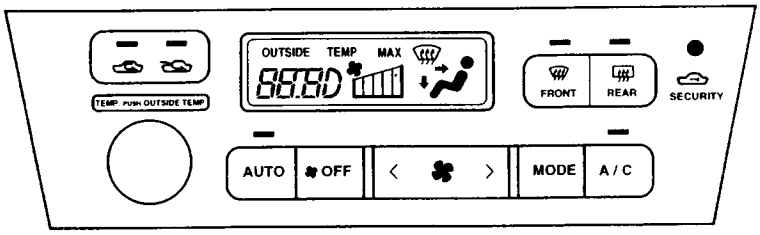
An ECU controlled automatic air conditioning system which has sufficient heating and cooling capacity as well as low fan noise is used.

The control panel is an easy-to-use dial and push button type panel.

The temperature and air flow status, etc. are displayed in the center of the air conditioner control panel, making adjustment and checking easy.

An outside temperature display function is provided.

The air conditioner ECU has a self-diagnosis function to increase serviceability.




**Control Panel**

# INTERIOR

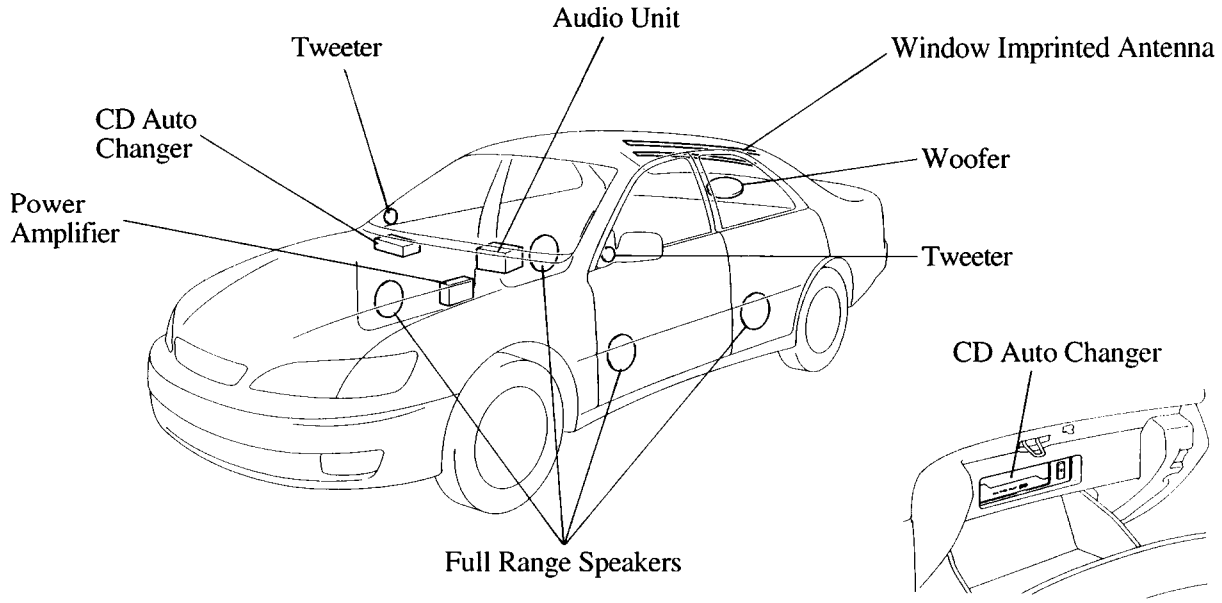
## ° AUDIO SYSTEM

An AM/FM multiplex ETR (Electronic Turning Radio) with cassette deck is standard, and a CD (Compact Disc) player with an automatic changer is available as an option. This CD auto changer is built into the glove box and accommodates 6 discs at the same time.

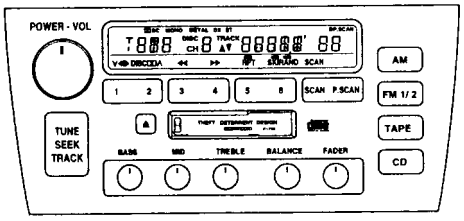
A 7-speaker system provides high quality sound across all ranges.

A diversity rear window imprinted antenna system is provided.

**▶ Layout of Audio System ◀**




**▶ Specifications ◀**

| Components | Specifications |
|---|---|
| Audio Unit | ● AM/FM ETR with Cassette Deck and CD Auto Changer (OPT)<br>● Separate Power Amplifier  |
| CD Auto Changer | ● Takes up to 6 Compact Discs.<br>● Use 12 cm (4.7 in.) discs only. |
| Power Amplifier | ● 35W (Max.) x 2 Channel (For Front Speakers)<br>● 35W (Max.) x 2 Channel (For Rear Speakers)<br>● 55W (Max.) x 1 Channel (For Woofer) |
| Full Range Speaker | ● Fr: 160 mm (6.3 in.), 35W, 2 Pieces<br>● Rr: 140 mm (5.5 in.), 35W, 2 Pieces. |
| Tweeter | ● 13 mm (0.5 in.), 35W, 2 Pieces |
| Woofer | ● 200 mm (7.9 in.) with Box, 60W, 1 Piece |

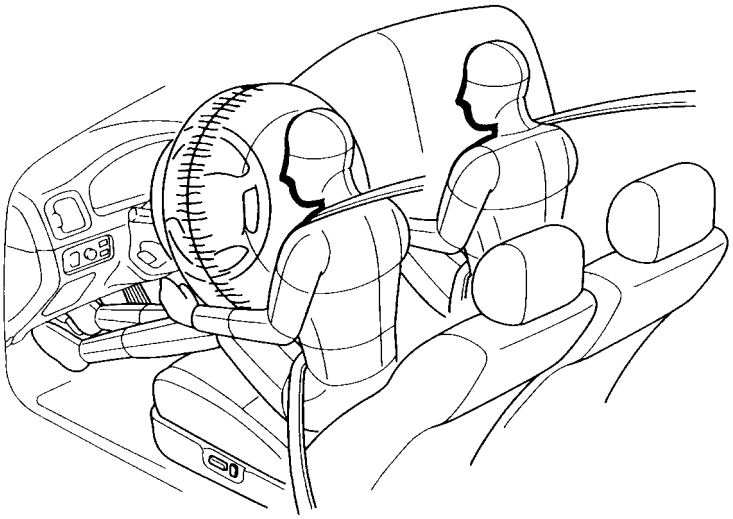
# INTERIOR

## ° SRS AIRBAG AND SEAT BELT PRETENSIONER

As standard equipment, there is an SRS airbag and seat belt pretensioner for the driver and the front passenger.

This is a supplemental restraint system which activates in the event of a frontal collision, if the shock is higher than a predetermined value. The airbags help to protect the head and chest from secondary impacts and injuries.

The pretensioners take the emergency locking concept one step further. When they sense the impact of severe frontal collision, they instantly rewind the seat belt.



## ° TILT STEERING

The tilt steering is standard on all models.

The steering wheel position can be changed to any of 6 positions.

## ° POWER WINDOW SYSTEM

A power window system is standard equipment. The power window system includes one-touch auto down and key-off operation functions. The one-touch auto down function automatically opens the driver’s side window fully. The key-off operation function makes it possible to operate the power windows for approximately 45 seconds after the ignition key is turned to the ACC or LOCK position, if the front doors are not opened.

# INTERIOR

## ◦ DOOR LOCK CONTROL SYSTEM

The door lock control system with 2-step unlock function is standard equipment. With the 2-step function, turning the key once in the driver's door unlocks the driver's door only. Turning it twice unlocks all the doors.

A key confinement prevention function is provided. When the door is opened and the door lock button is locked with the key still inserted in the ignition key cylinder, the key confinement prevention mechanism immediately turns the door lock button to UNLOCK. This prevents the key from being inadvertently locked inside the vehicle.

## ◦ WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

The multi-function type wireless door lock remote control system is standard equipment. With the wireless door lock remote control system, all the doors can be locked and unlocked by signals emitted by the transmitter.

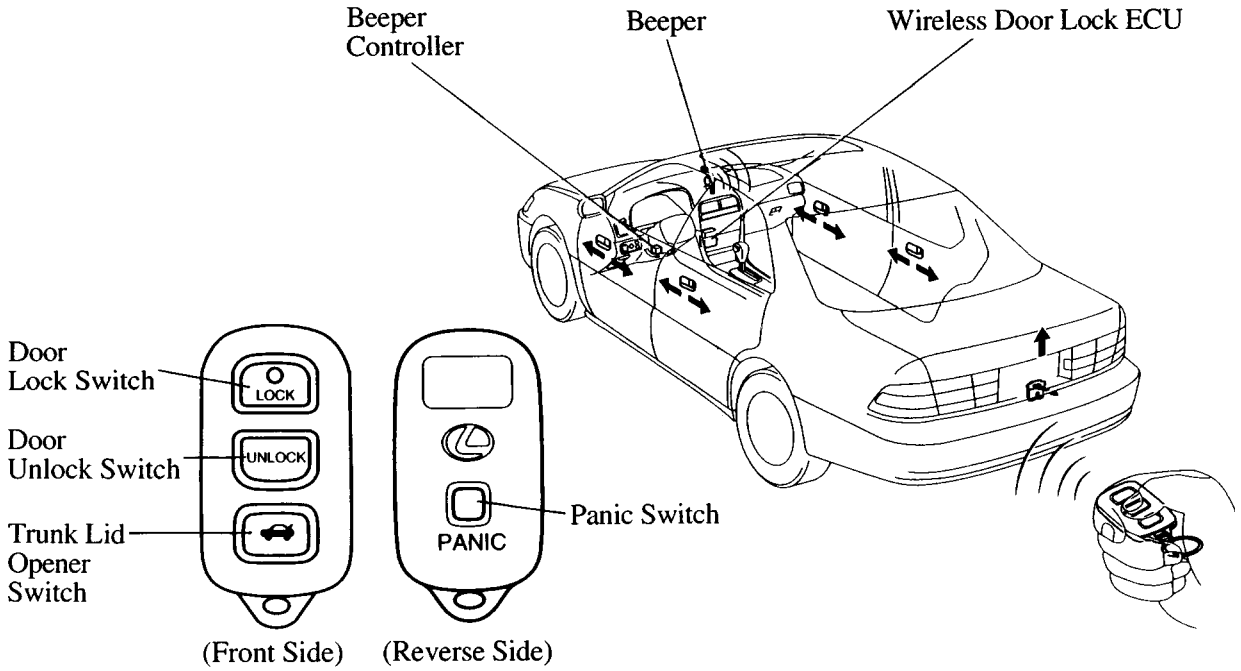
A 2-step unlock function is provided. When the unlock switch of the transmitter is pressed once, only the driver's door is unlocked. When it is pressed twice, all the doors are unlocked.

A trunk lid opener function is provided. The trunk lid can be opened by pressing the trunk lid opener switch of the transmitter.

Operation verification light and beeper function is provided. This makes it possible to check the operating condition of the wireless door lock from the outside of the vehicle.

A panic switch is provided in the transmitter to force the theft deterrent system siren to operate.

A wireless door lock ECU with EEPROM (Electrical Erasable Programmable ROM) is used so that the transmitter recognition code can be easily reprogrammed.




**Transmitter**

# INTERIOR

## ° THEFT DETERRENT SYSTEM

A theft deterrent system is used to prevent vehicle theft. When the system is set, the horn, headlights and taillights operate if the door, hood or trunk is forcibly opened.

## ° ILLUMINATED ENTRY SYSTEM

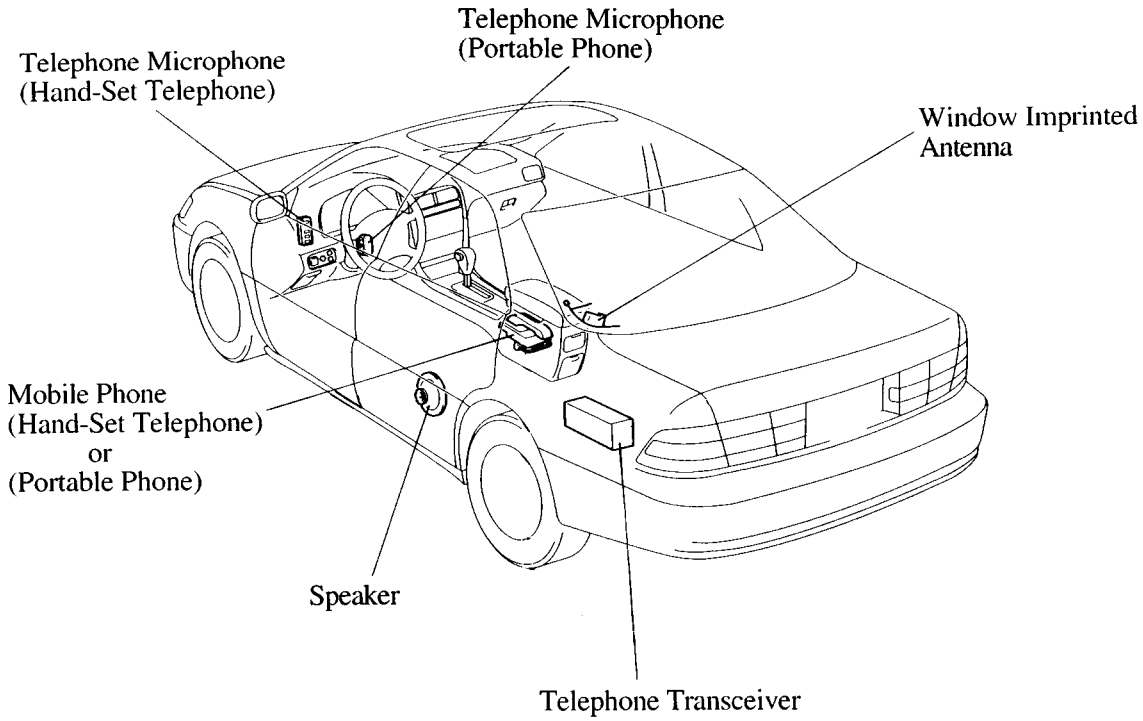
An illuminated entry system is standard equipment. This system makes it easy to let the ES300 in and out at night, etc.

The illuminated entry system turns on the dome light and ignition key illumination for 15 seconds after either door is closed when passengers am entering or leaving the vehicle. While these lights are on for 15 seconds, if the ignition switch is turned to the ACC or ON position, or if all doors am locked, the dome light and ignition key illumination go off immediately.

## ° CELLULAR MOBILE TELEPHONE

A cellular mobile telephone system is available as a dealer option. There are 2 types of operations to choose from; a hand-set telephone or a portable phone.

A mobile telephone antenna is imprinted on the rear window for improving looks and enhancing rear vision of rear field.



# INTERIOR

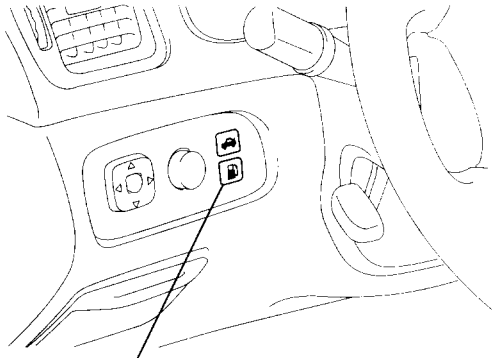
## ◦ KEY REMINDER SYSTEM

All vehicles have a key reminder system as standard equipment. When the ignition key is left inserted in the ignition key cylinder at ACC or LOCK position and the driver's door is opened, this system sounds a warning tone to remind the driver to remove the ignition key.

## ◦ ELECTRIC FUEL LID AND TRUNK OPENER

An electric fuel lid and trunk opener switch are located on the lower left part of the instrument panel.

A trunk opener cancel switch is provided in the glove box.



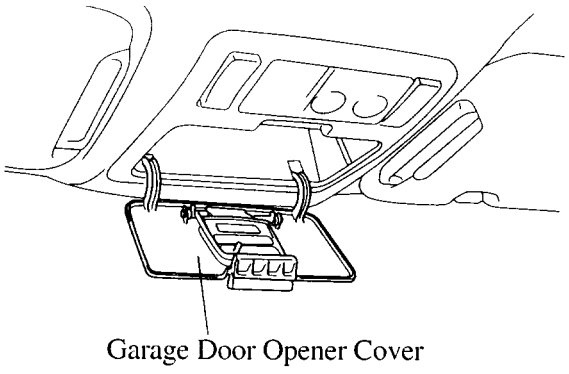

## ◦ CRUISE CONTROL SYSTEM

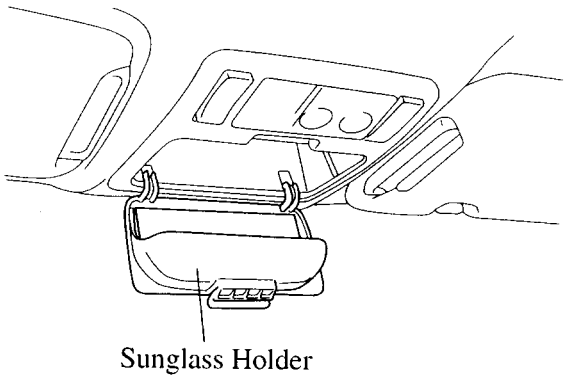
The cruise control system is standard equipment. The main switch and control switch are on a single lever, which is installed on the steering column and can be operated easily.

## ◦ OVERHEAD CONSOLE

An overhead console is provided in front of the map lamp to store a garage door opener transmitter. This console is constructed to enable the operation of a transmitter in its stored state.

Also, by changing its cover, the console can be used to store a pair of sunglasses.

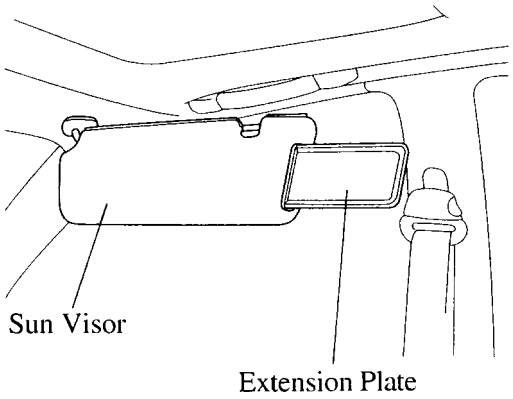


# INTERIOR

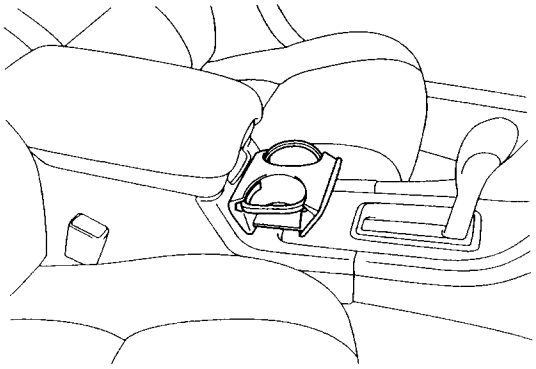
## ◦ SUN VISOR

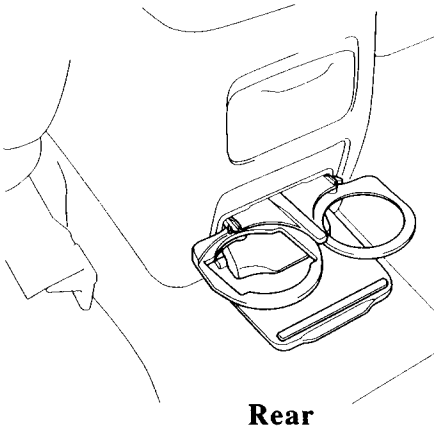
An extension plate has been added to reduce glare coming into the vehicle from the side.




## ◦ CUP HOLDER

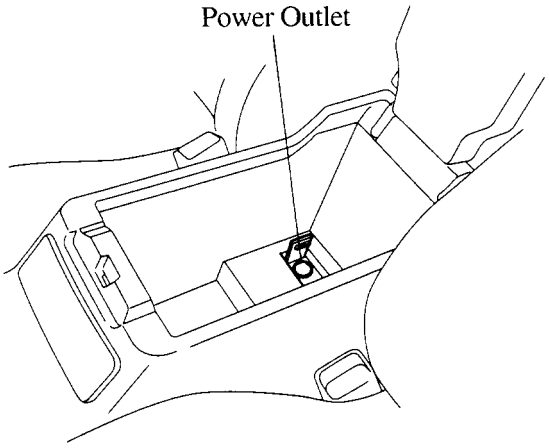
A push open type cup holder is located in the front of the rear console box. 2 cup holders for rear passenger are located in the rear of the rear console.


**Front**


**Rear**

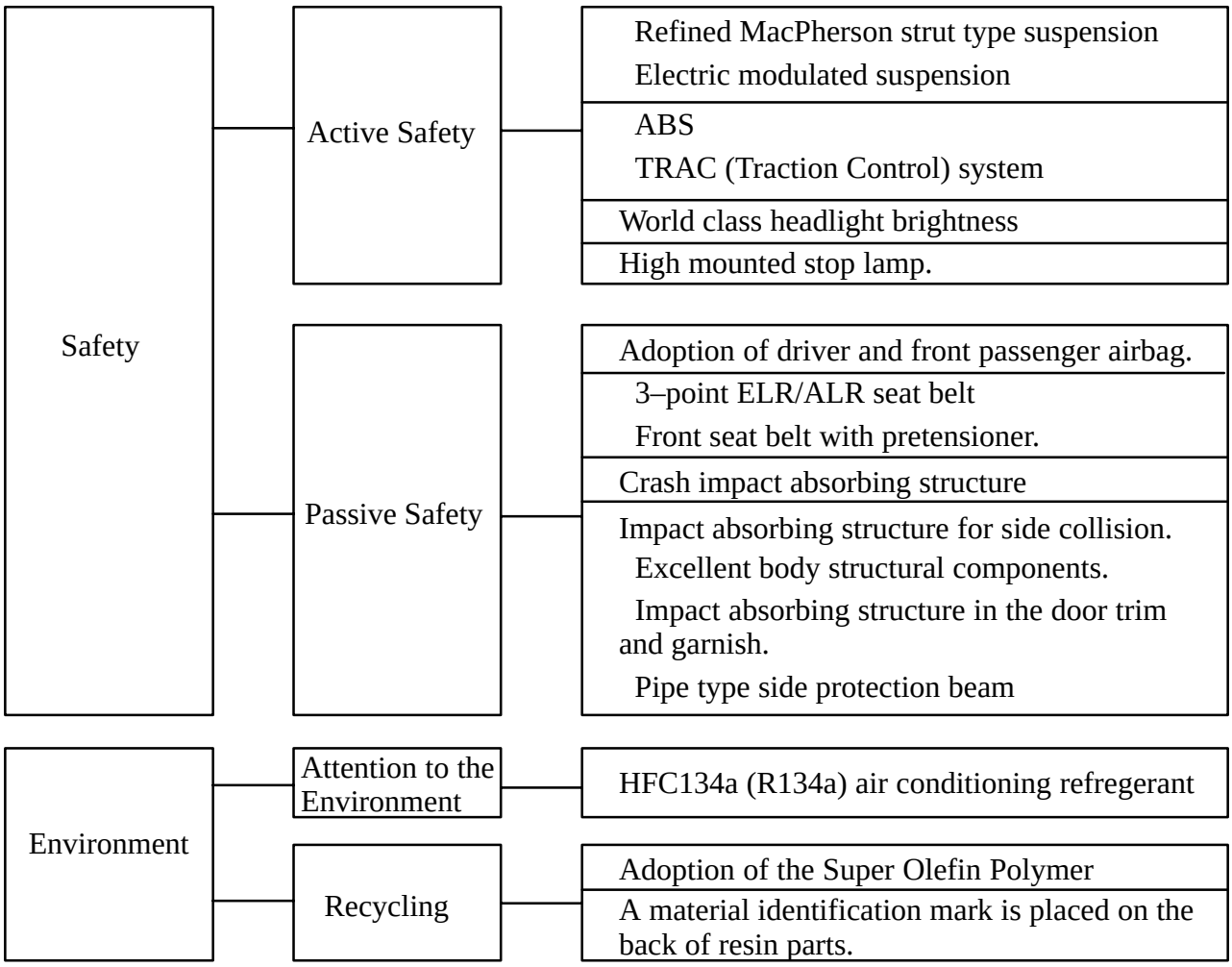
## ◦ POWER OUTLET

A power outlet is provided in the bottom of the console box. The power outlet can be used to supply power to various car accessories.



# SAFETY AND ENVIRONMENT

A variety of safety and environmental measures are provided based on the theme of ”Gentle to People and the Environment”.



# ENGINE

## 1MZ-FE ENGINE

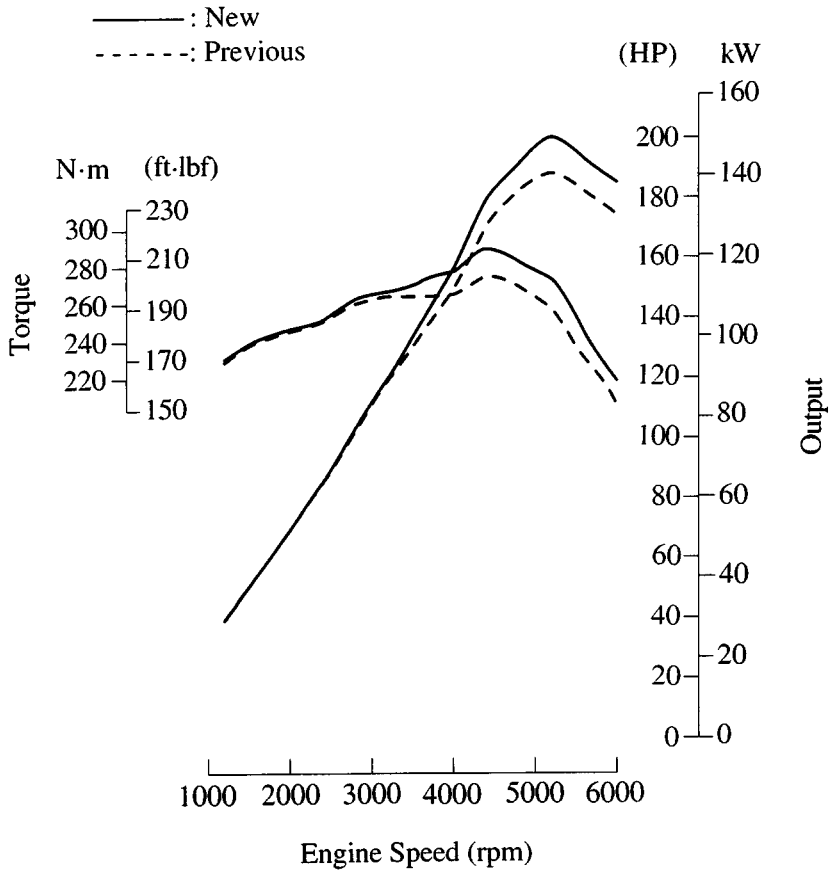
### ° DESCRIPTION

The performance of the 1MZ-FE engine has been improved through the adoption of the 2-way exhaust control system. In addition, its exhaust emissions have been reduced through the adoption of the fuel returnless system and the modification of the EGR control system.

### ° ENGINE SPECIFICATIONS AND PERFORMANCE CURVE

| Engine 1MZ–FE Engine / Item | | | New | Previous |
|---|---|---|---|---|
| No. of Cyls. & Arrangement | | | 6–Cylinder, V Type | ← |
| Valve Mechanism | | | 24–Valve DOHC, Belt & Gear Drive | ← |
| Combustion Chamber | | | Pentroof Type | ← |
| Manifolds | | | Cross–Flow | ← |
| Fuel System | | | SFI | ← |
| Displacement $cm^3$ (cu. in.) | | | 2995 (182.7) | ← |
| Bore x Stroke mm (in.) | | | 87.5 x 83.0 x (3.44 x 3.27) | ← |
| Compression Ratio | | | 10.5 : 1 | ← |
| Max. Output [SAE–NET] | | | 149 kW @ 5200 (200HP @ 5200) | 140 kW @ 5200 (188HP @ 5200) |
| Max. Torque [SAE–NET] | | | 290 N·m @ 4400 rpm (214 ft·lbf @ 4400 rpm) | 275 N·m @ 4400 rpm (203 ft·lbf @ 4400 rpm) |
| Valve Timing | Intake | Open | 4°BTDC | ← |
| | | Closed | 44°ABDC | ← |
| | Exhuast | Open | 46°BBDC | ← |
| | | Closed | 2°ADTC | ← |
| Fuel Octane Number RON | | | 91 or Higher | ← |
| Oil Grade | | | API SH EC–II, ILSAC or Better | ← |

Premium unleaded gasoline (96 RON) is used for the above specifications.




Premium unleaded gasoline is used for the above performance curve.

## ° MAJOR DIFFERENCES

Major differences between the new 1MZ-FE engine and previous engine are listed below.

| Item | Outline |
|---|---|
| Cooling System | ● An aluminum radiator core is used for weight reduction.<br>● An electric cooling fan has been adopted. The fan speed is controlled in 3 steps to improve cooling performance and reduce cooling fan noise. |
| Intake and Exhaust System | ● A 2-way exhaust control system has been adopted to improve engine performance and to ensure an even quieter operation.<br>● Through the optimized allocation of the exhaust pipe supports, the number of supports has been reduced from 5 to 4, thus reducing the noise and vibration which are transmitted to the vehicle body. |
| Fuel System | A fuel returnless system has been adopted to prevent the internal temperature of the fuel tank from rising, and to reduce evaporative emissions. |
| Engine Mounting | The characteristics of the engine mounts, torque rod, and absorber have been optimized to reduce noise and vibration. |
| Engine Control System | ● A communication circuit has been provided between the ECM and the ABS & TRAC ECU in conjunction with the adoption of the TRAC (Traction Control) system.*<br>● The fuel pressure control has been discontinued in conjunction with the adoption of the fuel returnless system.<br>● Instead of using the IDL signal input from the throttle position sensor, the ECM now uses the VTA signal to detect the completely closed state of the throttle valve.<br>● The power steering idle-up control has been changed from the system using an air control valve to the one using a pressure switch and an IAC valve.<br>● A new EGR system which uses a EGR valve position sensor is used.<br>● A communication method of the ECM and the hand-held tester has been changed from the SAEJ1962 to the ISO9141-2. |

*: Applicable only to Vehicles Equipped with the TRAC system.

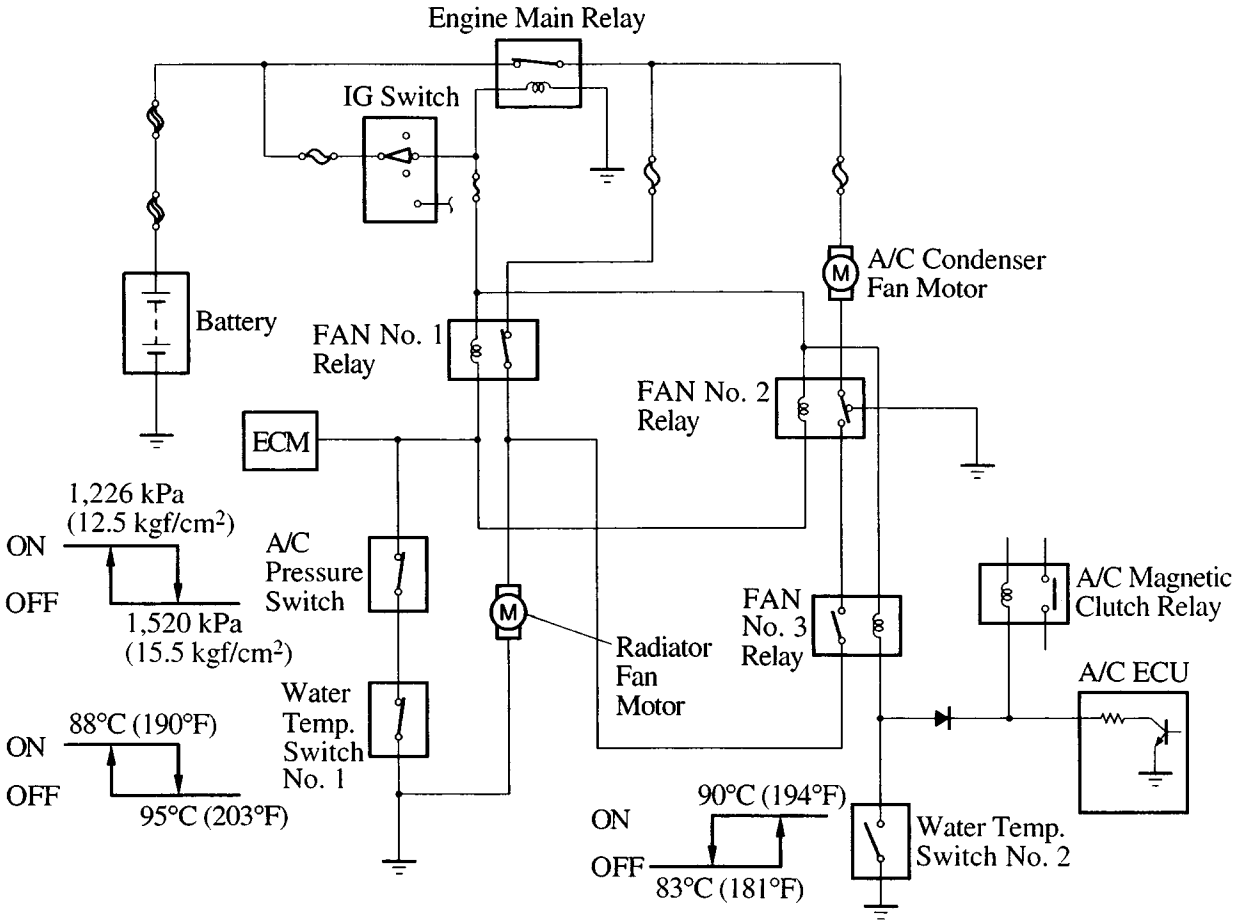
## ° COOLING SYSTEM

### 1. Cooling Fan System

The cooling system has been changed from the previous electronically controlled hydraulic cooling fan system to an electric cooling fan system.

The cooling fan controls the fan speed in 3 steps (OFF, Low, High) by using the 2 water temperature switches in accordance with the water temperature and the operating condition of the air conditioner and by turning the 3 fan relays ON and OFF and connecting 2 fan motors in a series or parallel circuit.

**▶ Wiring Diagram ◀**




**▶ Cooling Fan Operation ◀**

| Water Temperatue | | 90°C (194°F) or lower | 90°C (194°F) ~95°C (203°F) | 95°C (203°F) or higher |
|---|---|---|---|---|
| Water Temperature Switch | No. 1 | ON | ON | OFF |
| | No. 2 | OFF | ON | ON |
| A/C Condition | | | | |
| A/C OFF | | OFF | LOW | HIGH |
| A/C ON | Pressure Switch ON | LOW | LOW | HIGH |
| | Pressure Switch OFF | HIGH | HIGH | HIGH |

## ° INTAKE AND EXHAUST SYSTEM

### 1. 2-Way Exhaust Control System

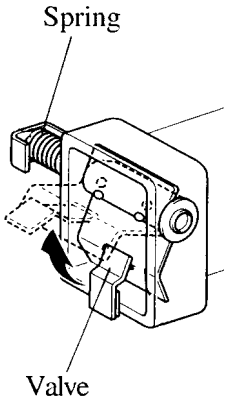
A 2-way exhaust control system is used. This system reduces the back pressure by opening and closing a variable valve that is enclosed in the main muffler, thus varying the exhaust gas passage.

The valve opens steplessly in accordance with the operating condition of the engine, thus enabling a quieter operation at lower engine speeds, and reducing back pressure at higher engine speeds.

#### Construction

**1) Control Valve**

The control valve is enclosed in the main muffler. When the exhaust gas pressure overcomes the spring pressure, the control valve opens steplessly in accordance with the exhaust gas pressure.



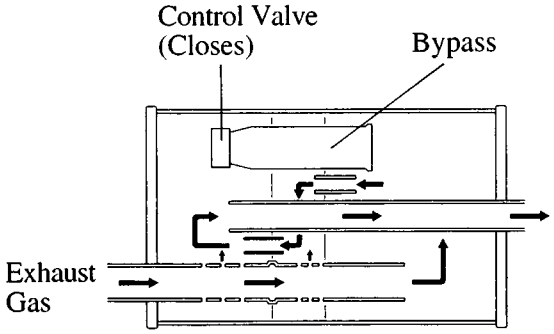

#### Operation

**1) When Control Valve is Closed (low engine speed)**

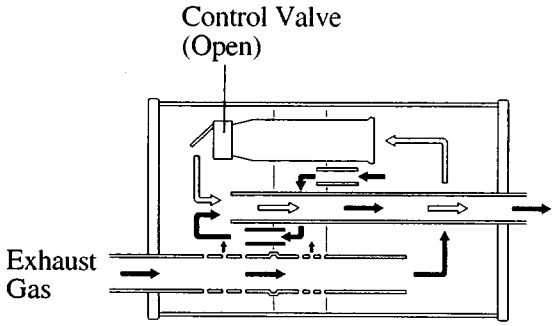
Since the pressure in the main muffler is low, the control valve is closed. Hence exhaust gas does not pass the bypass passage, and exhaust noise is decreased by the main muffler.

**2) When Control Valve is Opened (middle to high engine speed)**

The valve opens more as the engine speed and the back pressure in the muffler increase. This allows a large volume of exhaust gas to pass the bypass passage thereby substantially decreasing the back pressure.




**Control Valve Closed**

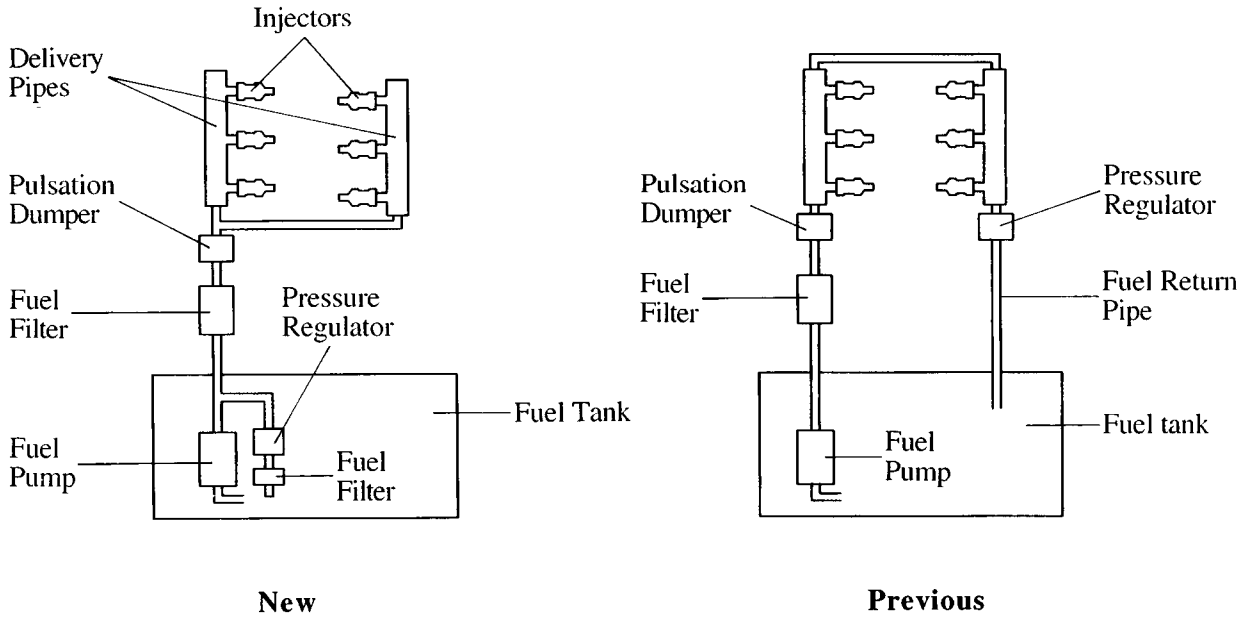



**Control Valve Open**

## ◦ FUEL SYSTEM

### 1. Fuel Returnless System

The new ES300 has adopted a fuel returnless system to reduce evaporative emissions. With the pressure regulator housed inside the fuel tank, this system eliminates the return of fuel from the engine area. This prevents the internal temperature of the fuel tank from rising, and reduces evaporative emissions.




## ◦ ENGINE MOUNTING

### 1. General

The internal orifice of the front mount has been modified to improve the tiding comfort and to ensure a quieter operation at idling.

The characteristics of the rear mount, left mount, torque rod, and absorber have been optimized.

## ° ENGINE CONTROL SYSTEM

### 1. General

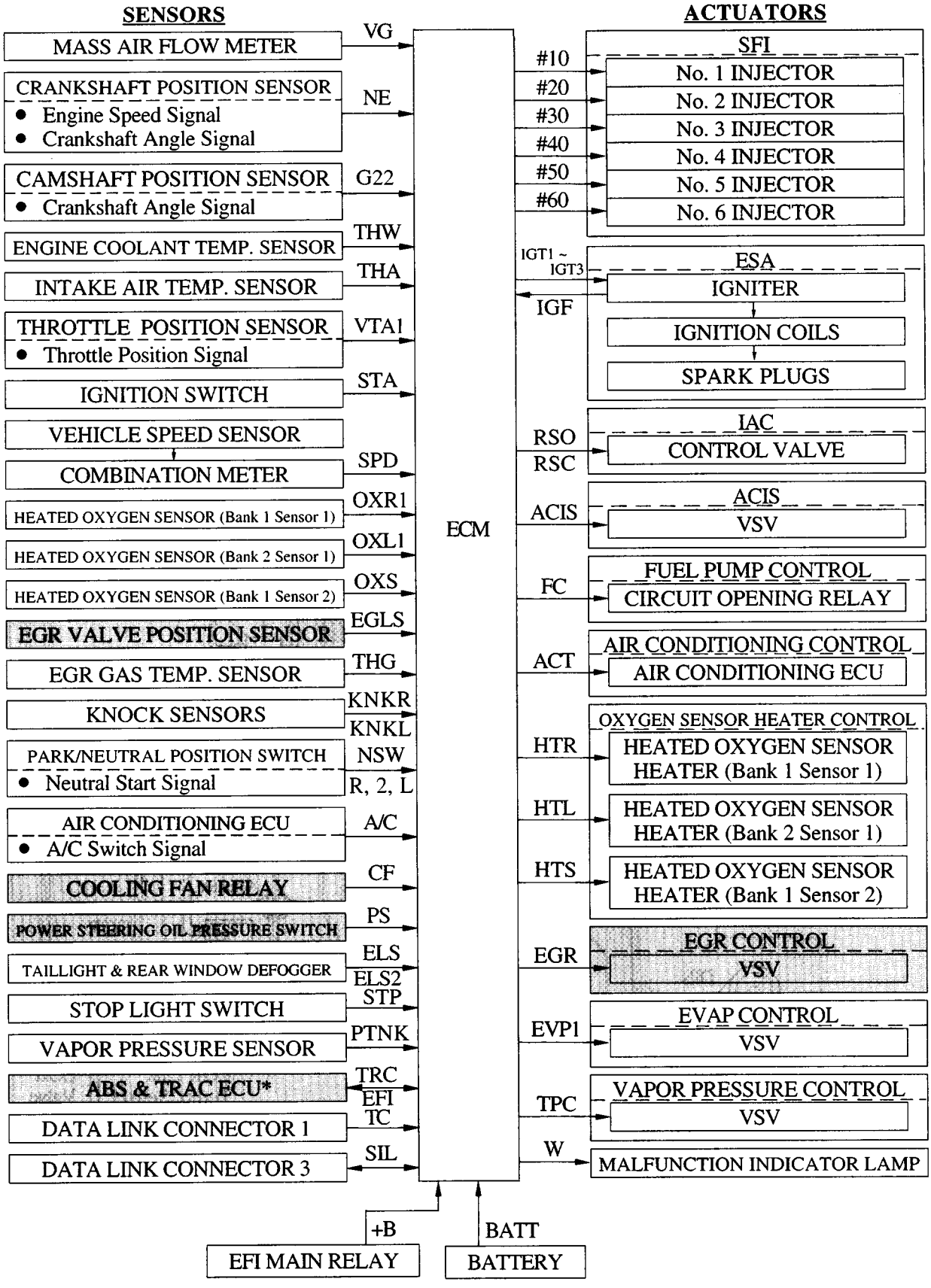
The engine control system of the new 1MZ-FE engine is basically the same in construction and operation as that of the previous 1MZ-FE engine. However, the fuel pressure control has been discontinued and the EGR control system has been changed.

The engine control system of the new 1MZ-FE engine and previous 1MZ-FE engine are compared below.

| System | Outline | New | Previous |
|---|---|---|---|
| EFI (Sequential Multiport Fuel Injection) | An L-type SFI system directly detects the intake air mass with a hot wire type mass air flow meter. | ○ | ○ |
| | The fuel injection system is a sequential multiport fuel rejection system. | ○ | ○ |
| ESA (Electronic Spark Advance) | Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking. | ○ | ○ |
| | 2 knock sensors are used to improve knock detection. | ○ | ○ |
| | Torque control correction during gear shifting has been used to minimize the shift shock. | ○ | ○ |
| IAC (idle Air Control) | A rotary solenoid type IAC valve controls the fast idle and idle speeds. | ○ | ○ |
| ACIS (Acoustic Control Induction System) | The intake air passages are switched according to the engine speed and throttle valve angle to increase performance in all speed ranges. | ○ | ○ |
| Fuel Pressure Control | In hot engine conditions, the fuel pressure is increased to improve restartability. | — | ○ |
| Oxygen Sensor Heater Control | Maintains the temperature of the oxygen sensors at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas. | ○ | ○ |
| EGR Cut-Off Control | Cuts off EGR according to the engine condition to maintain drivability of the vehicle and durability of the EGR components. | — | ○ |
| EGR Control | Uses the duty control type VSV and EGR valve position sensor, controlling the EGR volume in accordance with the engine condition. | ○ | — |
| Evaporative Emission Control | The ECM controls the purge flow of evaporative emissions (HC) in the charcoal canister in accordance with engine conditions. | ○ | ○ |
| Diagnosis | When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section. | ○ | ○ |
| | The diagnosis system includes a function that detects a malfunction in the evaporative emission control system. | ○ | ○ |
| Fail-Safe | When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in memory. | ○ | ○ |

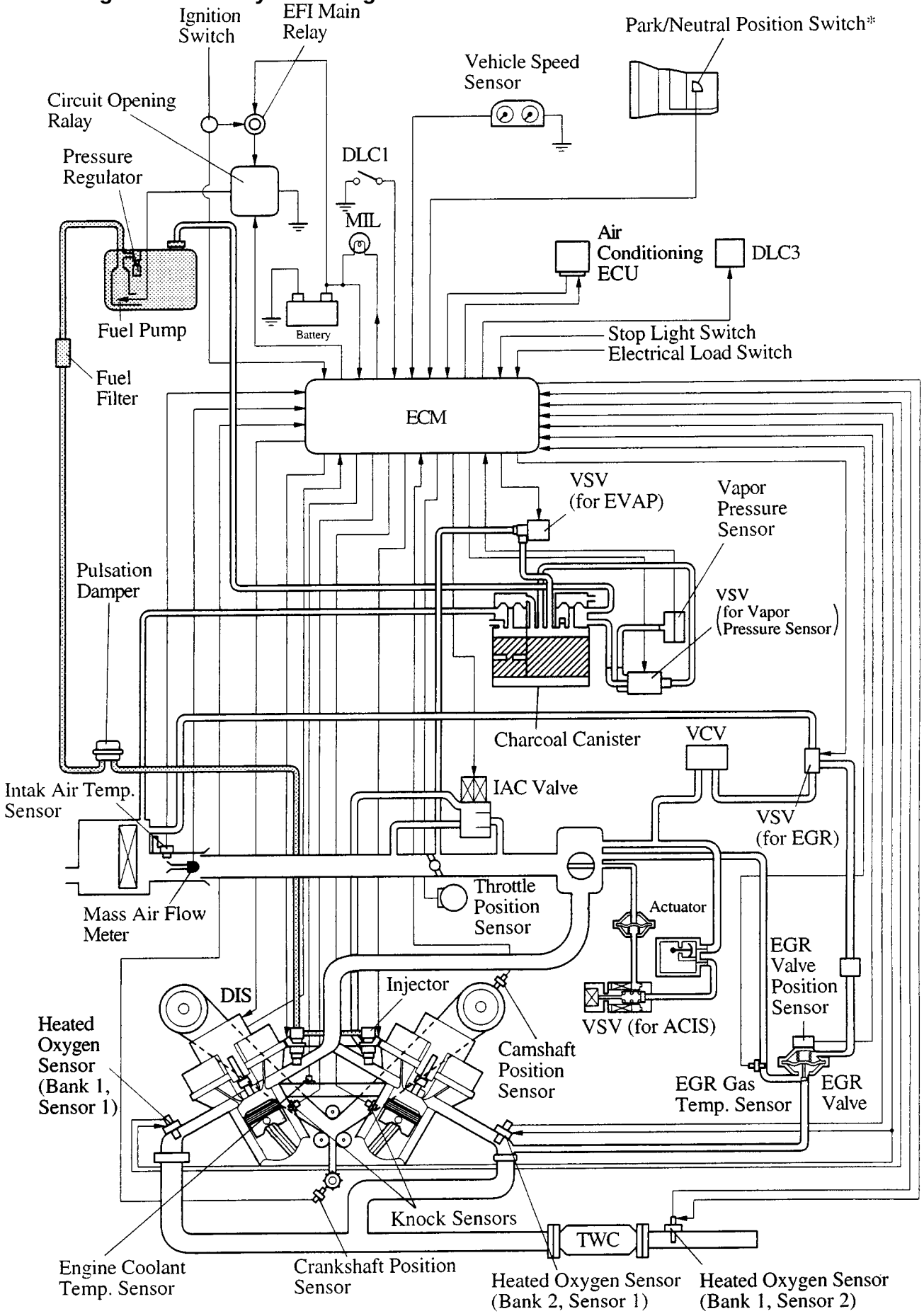
## 2. Construction

The configuration of the engine control system in the new 1MZ-FE engine is as shown in the following chart. Shaded portions differ from the previous 1MZ-FE engine.

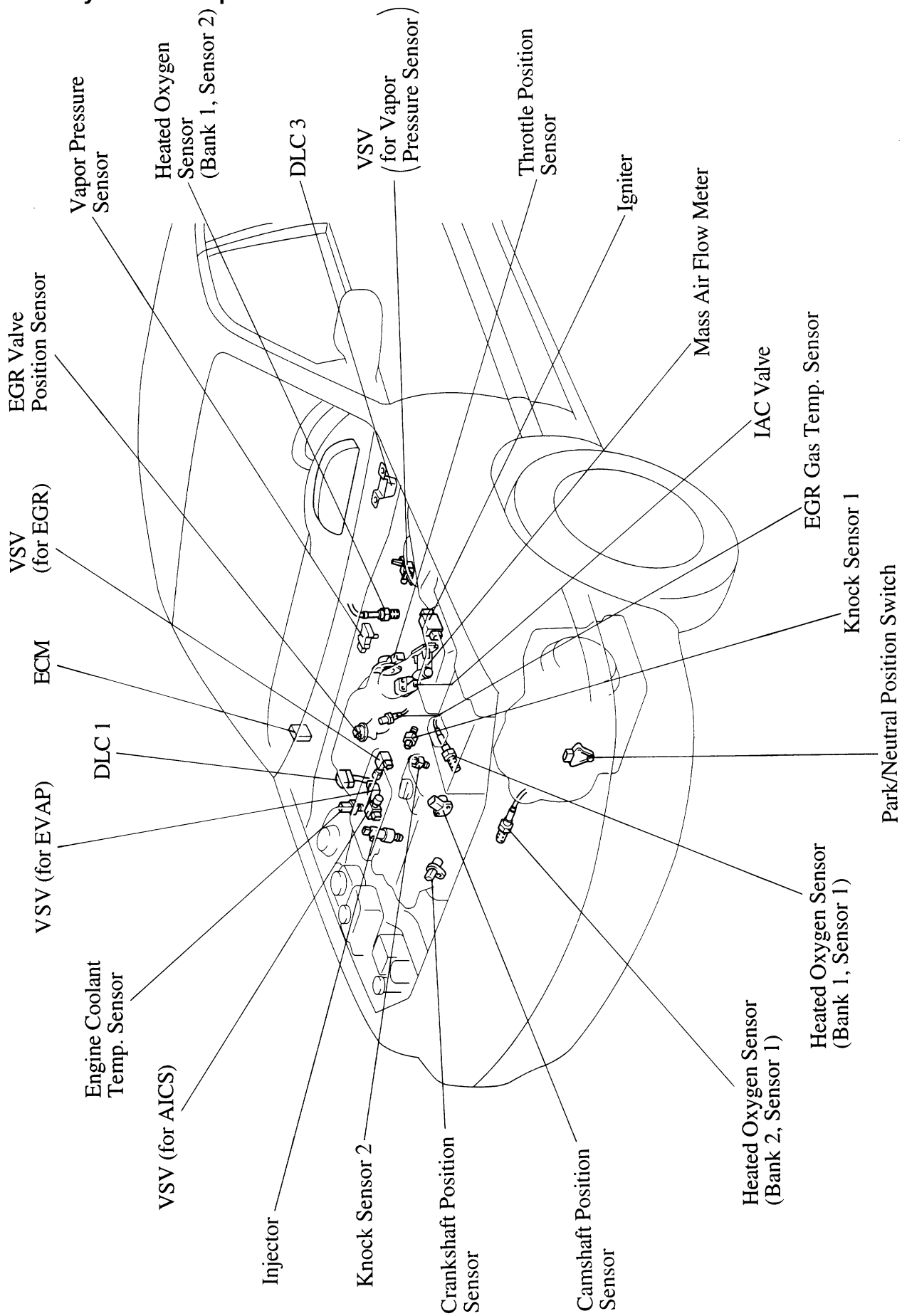



*: Applicable only to Vehicles Equipped with the TRAC system

## 3. Engine Control System Diagram



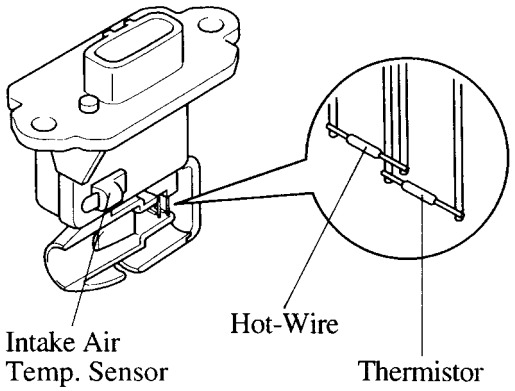
## 4. Layout of Components



## 5. Main Components of Engine Control System

### Mass Air Flow Meter

The hot wire type mass air flow meter has been changed to the plug-in type. Its basic operation is the same as that of the previous type.




## 6. IAC (Idle Air Control)

The idle speed has been changed in conjunction with the adoption of the electric cooling fan. When the cooling fan is at high speed while the air conditioner is operating, the idle speed has been increased from 700 rpm to 750 rpm, thus reducing the body vibration that is caused by the electrical load.

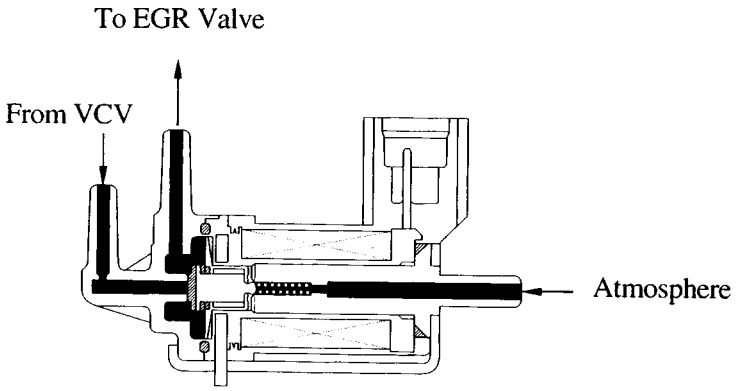
## 7. EGR Control

In the previous models, an EGR vacuum modulator or a VSV was used to control the EGR gas volume. In the new model. the ECM regulates the VSV to control the vacuum that is applied to the EGR valve, thus ensuring an optimal EGR gas volume according to the engine condition and improving drivability.

### Construction

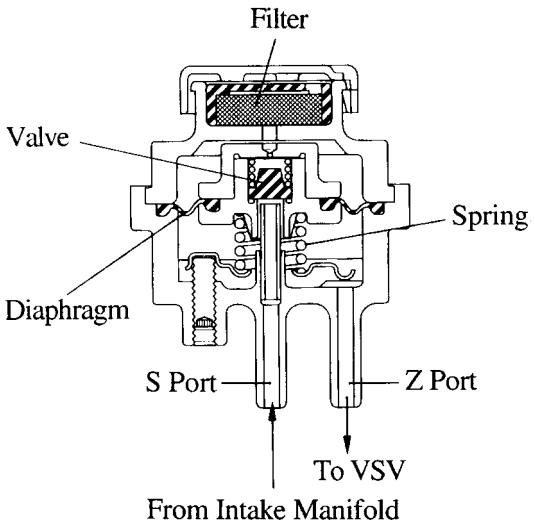
**1) VSV**

The VSV controls the vacuum from the VCV that is applied to the EGR valve, in accordance with the duty signals received from the ECM.



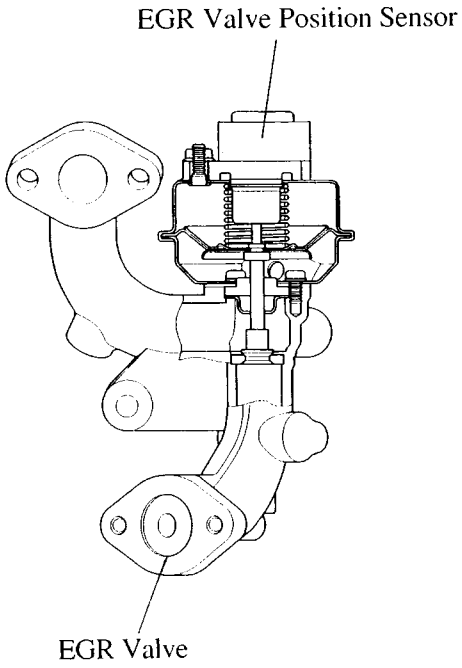
**2) VCV (Vacuum Control Valve)**

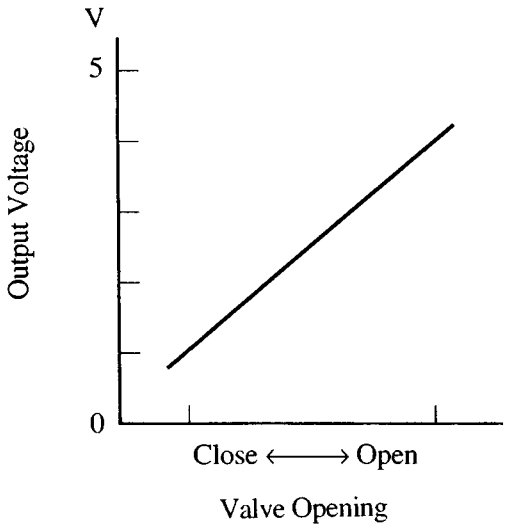
The VCV is a valve that regulates the intake manifold vacuum that is applied to the VSV to a constant level (-17 kPa, -130mm Hg). The intake manifold vacuum that is supplied through the S port is applied to the diaphragm. If this force becomes greater than the spring force, the diaphragm moves downward, allowing the valve to close the S port and the atmosphere supplied through the filter. Conversely, if the vacuum that is applied to the diaphragm becomes weaker, the diaphragm moves upward, causing the valve to open and to shut off the atmosphere and supply the intake manifold vacuum. This process is repeated to regulate the vacuum in the Z port to a constant level.




**3) EGR Valve Position Sensor**

The EGR valve position sensor is mounted on the EGR valve. This sensor converts the EGR valve opening into a voltage and sends it to the ECM as the EGR valve position signal.

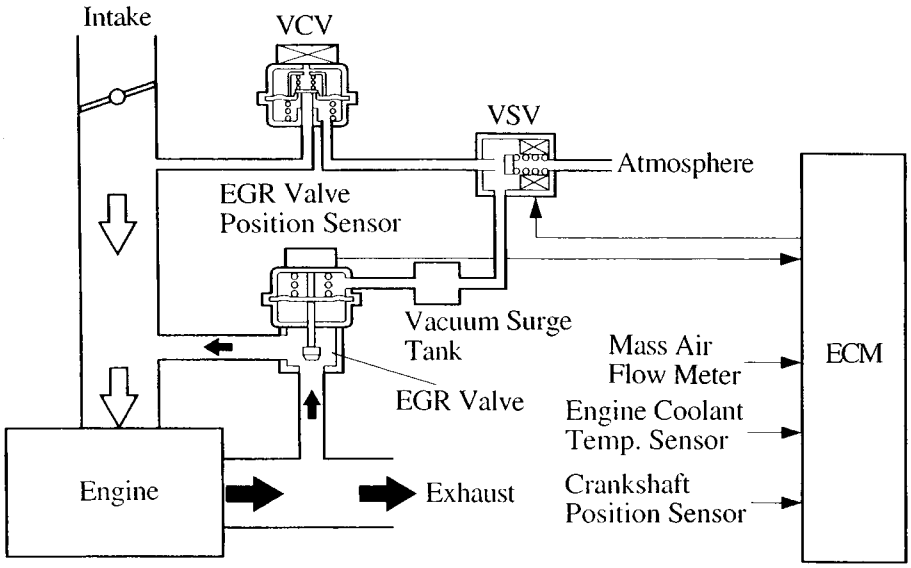



**Output Characteristics**

### Operation

The ECM executes duty control of the VSV to control the vacuum that has been regulated to a constant level by the VCV, thus controlling the vacuum that is applied to the EGR valve.
Also, the EGR valve position sensor in the EGR valve detects the EGR valve opening to provide feedback control to the ECM, thus achieving a target opening that is appropriate for the engine condition.




## 8. Others

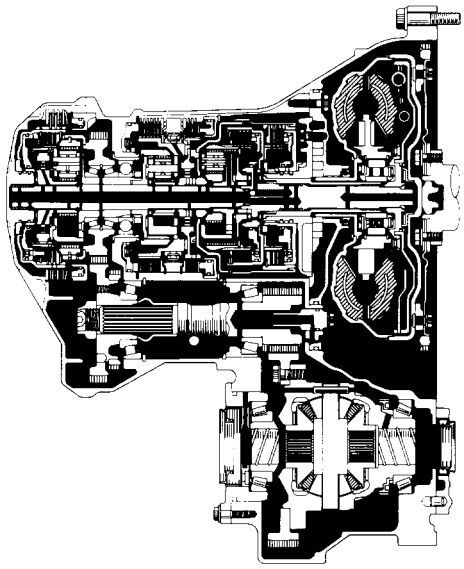
A communication circuit has been provided between the ECM and the ABS & TRAC ECU in conjunction with the adoption of the TRAC (Traction Control) system. The ECM sends signals such as the throttle position signal and the engine speed signal to the ABS & TRAC ECU. In addition, the ECM executes fuel cutoff in accordance with the request signals from the ABS & TRAC ECU.

# CHASSIS

## A541E AUTOMATIC TRANSAXLE

### • DESCRIPTION

The A541E automatic transaxle used in the previous model is also used in the new model. However, the pattern select switch has been discontinued.



**▶ Specifications ◀**

| Transaxle Type / Item | | A541E |
|---|---|---|
| Gear Ratio | 1st | 2.810 |
| | 2nd | 1.549 |
| | 3rd | 1.000 |
| | 4th (Overdrive) | 0.735 |
| | Reverse | 2.296 |
| Counter Gear Ratio | | 0.945 |
| Differential Gear Reduction Ratio | | 3.933 |
| Fluid Capacity liters (US qts, Imp. qt) | Transmission | 6.8 (7.2, 5.9 ) |
| | Differential | 0.9 (0.9, 0.8) |
| Fluid Type | | ATF D–II or DEXTRON° III (DEXTRON° II) |

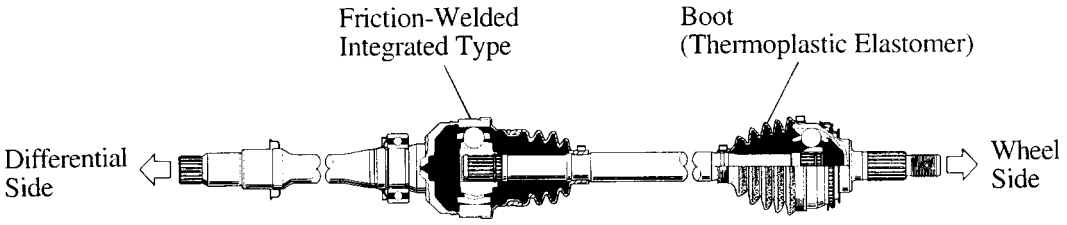
# DRIVE SHAFT

## • DESCRIPTION

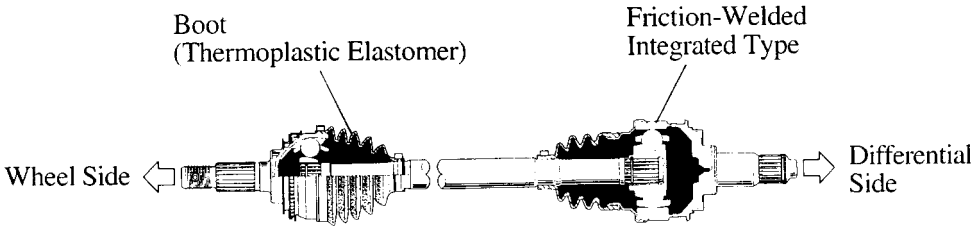
° The inboard joint of the drive shaft on the previous model was the bolt-mounted type. However, the new model has adopted a friction-welded integrated joint.

° The boot of the outboard joint are made of thermoplastic elastomer, which has superior durability.

**▶ New ◀**

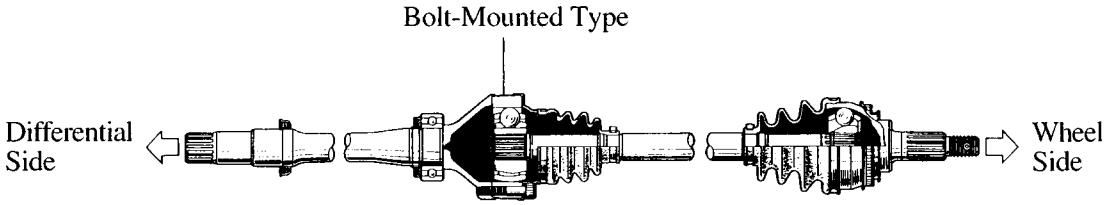



**Right-Hand**

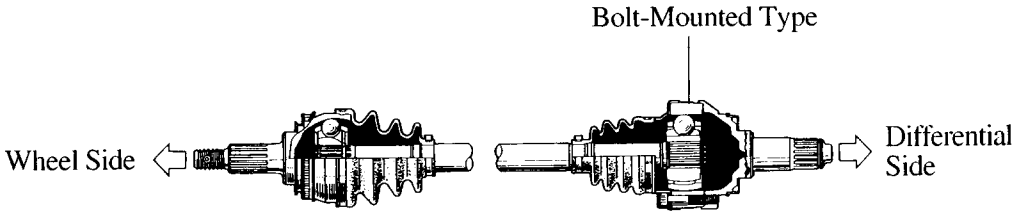



**Left-Hand**

**▶ Previous ◀**




**Right-Hand**

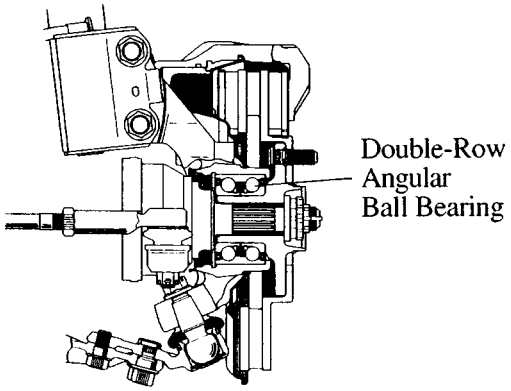



**Left-Hand**

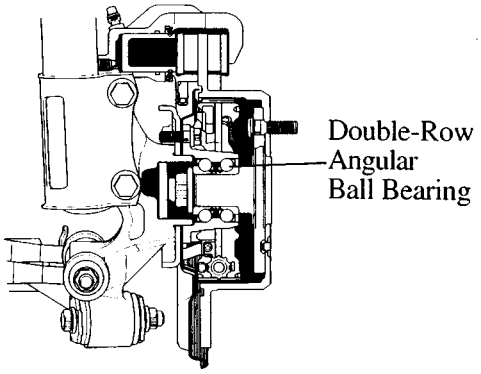
# AXLES

## ▶ DESCRIPTION

As in the previous model, a double-row angular ball bearing is used for both the front and rear axles in the new model.




**Front Axle**

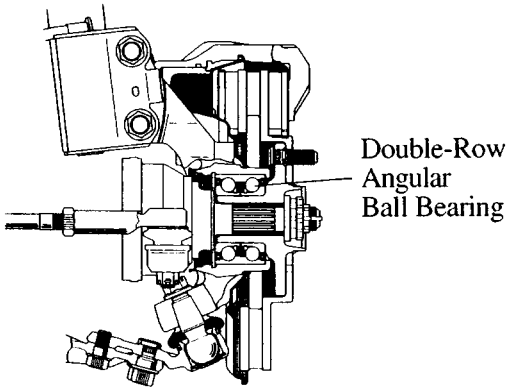



**Rear Axle**

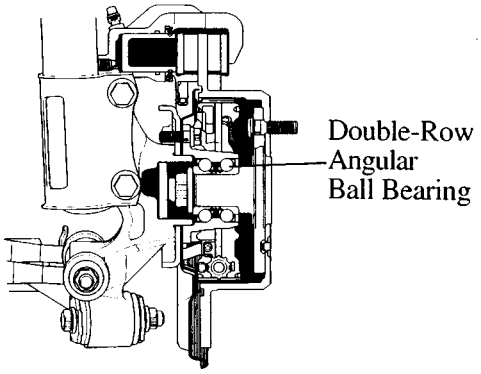
# AXLES

## • DESCRIPTION

As in the previous model, a double-row angular ball bearing is used for both the front and rear axles in the new model.




**Front Axle**

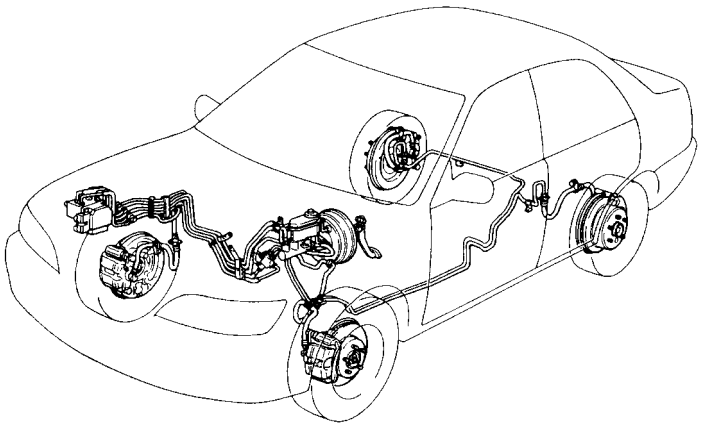



**Rear Axle**

# BRAKES

## • DESCRIPTION

- A ventilated disc brakes are used for the front, and a solid disc brakes are used for the rear.
- The front brake caliper has been changed from the 2-piston type to the single-piston type.
- As on the previous model, all models are provided with ABS as standard equipment. However, the ABS actuator has been changed to the 2-position solenoid valve type actuator.
- The ABS & TRAC system has been newly provided as standard equipment on models for Canada, and as optional equipment on models for the U.S.A.
- A portless and portless type master cylinder is used on the models with ABS & TRAC system.
- A pedal type parking broke lever has been adopted.



**Models with ABS & TRAC System**

**▶ Specifications ◀**

| Model / Item | | New | Previous |
|---|---|---|---|
| Master Cylinder | Type | Tandem | ← |
| | Diameter mm (in.) | 25.4 (1.00) | ← |
| Brake Booster | Type | Tandem | ← |
| | Size in. | 8.5” + 8.5” | 8” + 9” |
| Front Brake | Type | Ventilated Disc | ← |
| | Pad Area $cm^2$ ($in.^2$) | 44 (6.82) | 57 (8.84) |
| | Wheel Cylinder Dia. mm (in.) | 60.33 (2.38) | 42.9 (1.69) x 2 |
| | Rotor Size (D x T)*1 mm (in.) | 275 x 28 (10.83 x 1.10) | ← |
| Rear Brake | Type | Soid Disc | ← |
| | Pad Area $cm^2$ ($in.^2$) | 34 (5.27) | ← |
| | Wheel Cylinder Dia. mm (in.) | 34.9 (1.38) | ← |
| | Rotor Size (D x T)*1 mm (in.) | 269 x 10 (10.59 x 0.39) | 288 x 10 (11.34 x 0.39) |
| Brake Control Valve | Type | Dual–P Valve | ← |
| | Deflection Point of Hydraulic Pressure kPa ($kgf/cm^2$, psi) | 2942 (30, 427) | ← |
| | Pressure Reduction Gradient | 0.6 | 0.37 |
| Parking Brake | Type | Duo Servo | ← |
| | Size mm (in.) | 170 (6.69) | ← |
| | Lever Type | Pedal Type | Center Lever Type |
| ABS | | STD | STD |
| ABS & TRAC System | | STD*2, OPT*3 | — |

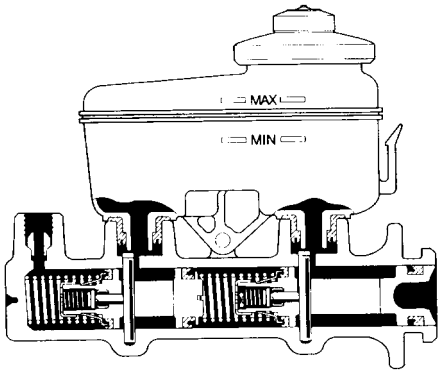
*1: D: Outer Diameter, T: Thickness,

*2: Models for Canada

*3: Models for Canada

## • MASTER CYLINDER

As in the previous model, the portless and lockheed type master cylinder is used on the models with ABS.
The portless and portless type master cylinder is used on the models with ABS & TRAC system.

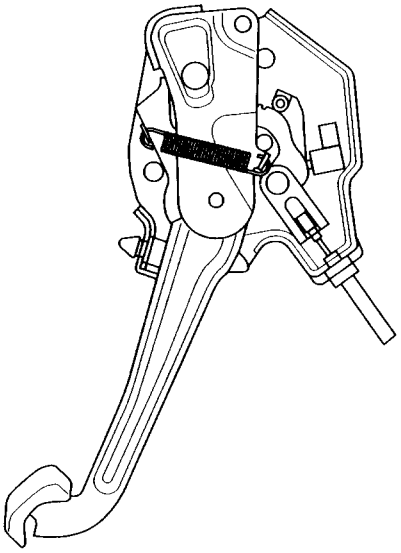



**Models with ABS & TRAC System**

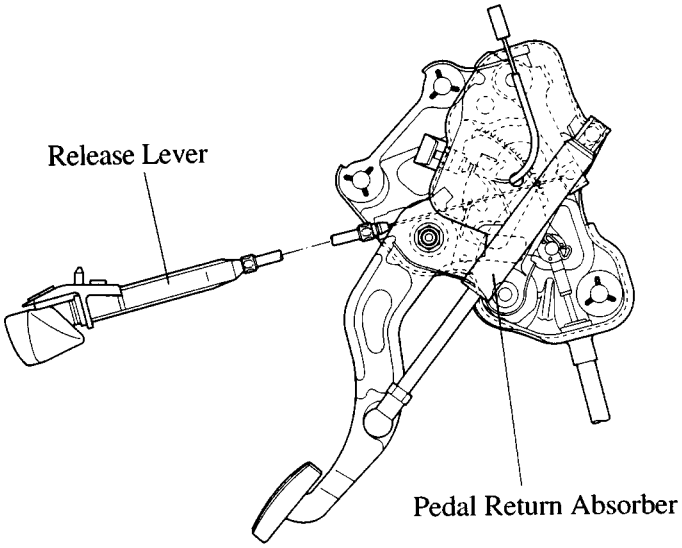
## ▶ PARKING BRAKE

### 1. General

As on the ’97 LS400, a pedal type parking brake has been adopted. However, the new ES300 uses a type of parking brake pedal that releases the parking brake by pressing the pedal further. Along with this change, the release lever and the pedal return absorber have been discontinued, resulting in weight reduction.



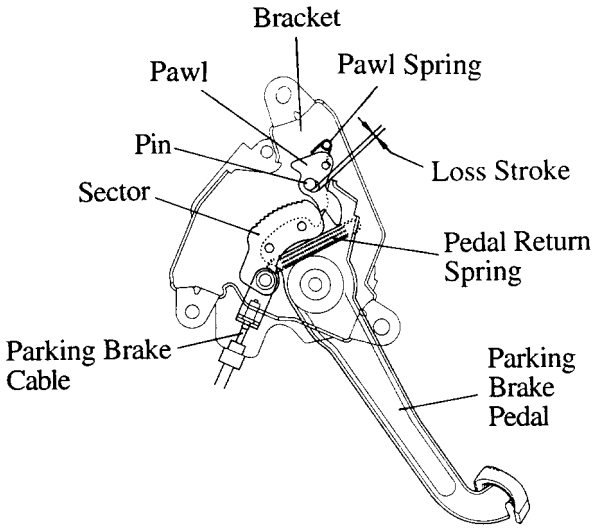
**'97 ES300**




**'97 LS400**

### 2. Construction

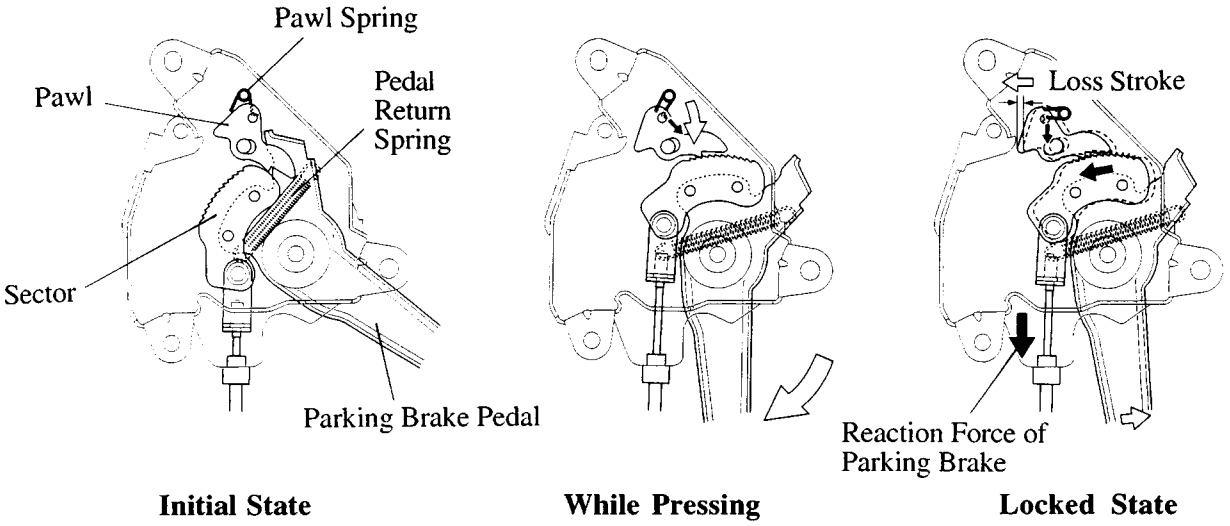
A pedal type parking brake lever consists of a parking brake pedal, sector, pawl, pawl spring, pedal return spring and etc.
The pedal and sector are integrated, and the parking brake cable is attached to the tip of the sector.
The sector is provided with a ratchet into which the pawl meshes.
The pawl and bracket are assembled with a pin. Also, the pawl has an oblong hole, which can realize a loss stroke.



## 3. Operation

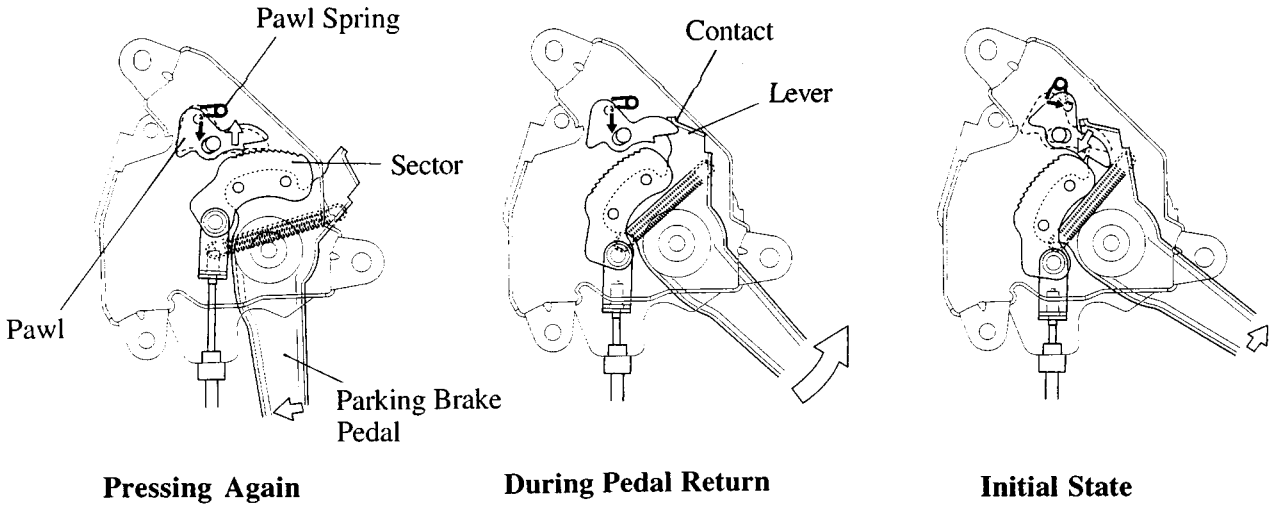
### During Applying

Pressing the parking brake pedal causes the sector's ratchet to engage with the pawl.
At this time, a clockwise force is applied to the pawl by the pawl spring.
Then, when the pressure on the brake pedal is released, the reaction force of the parking broke and the force of the pedal return spring cause the pawl and sector, which remain engaged, to return (only for the amount of the loss stroke). As a result, the parking brake becomes locked.
At this time, a counterclockwise force is applied by the pawl spring to the pawl. However, as the reaction force of the parking brake and the force of the pedal return spring are stronger, the pawl and the sector do not become disengaged.




### During Releasing

When the parking brake pedal is pressed again, as the reaction force of the parking brake and the force of the pedal return spring will not be applied to the pawl, the pawl spring causes the pawl to rotate counterclockwise. As a result, the pawl is released from the sector's ratchet.
Next, when the parking brake pedal returns to its initial point, the lever that is provided on the pedal will push the pawl downward. This force, along with the force of the pawl spring, causes the parking brake to revert to the initial state.



## • ABS

### 1. General

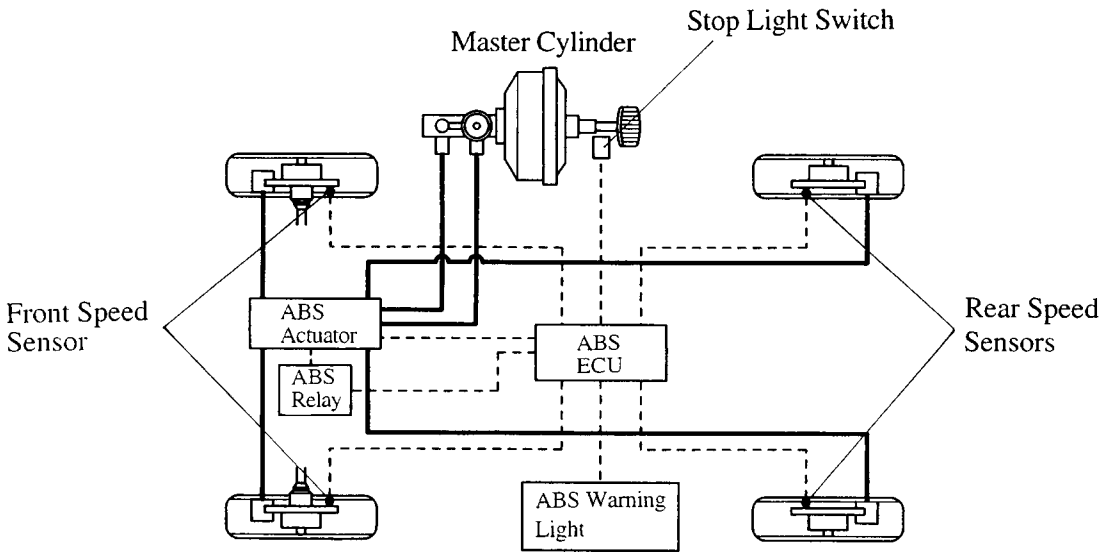
As in the previous model, the brake control of each wheel during ABS activation is implemented by the following three modes: pressure reduction, pressure holding, and pressure increase modes.

During ABS activation, the ECU controls the fluid pressure of each front left and right wheels independently while the fluid pressure of rear left and right wheels is controlled simultaneously. However, the ABS actuator has been changed from the 3-position solenoid valve type to the 2-position solenoid valve type for weight reduction. And, the diagnostic codes have been changed.

For the diagnostic code check method, diagnostic code, and diagnostic code clearance, see the 1997 ES300 Repair Manual (Pub. No. RM511U).

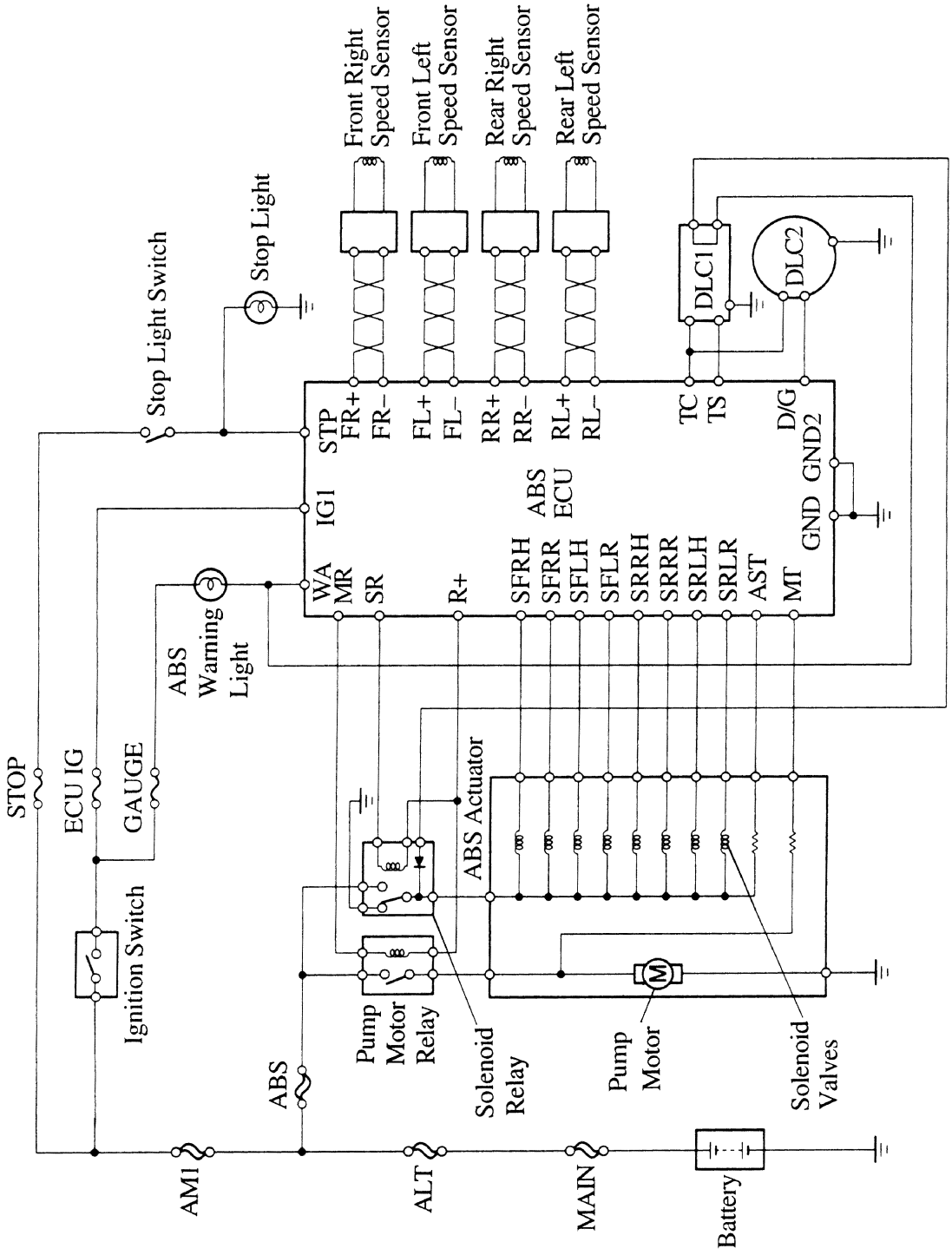
The operation of the ABS on models with ABS and on models with ABS & TRAC system are the same.

### 2. System Diagram

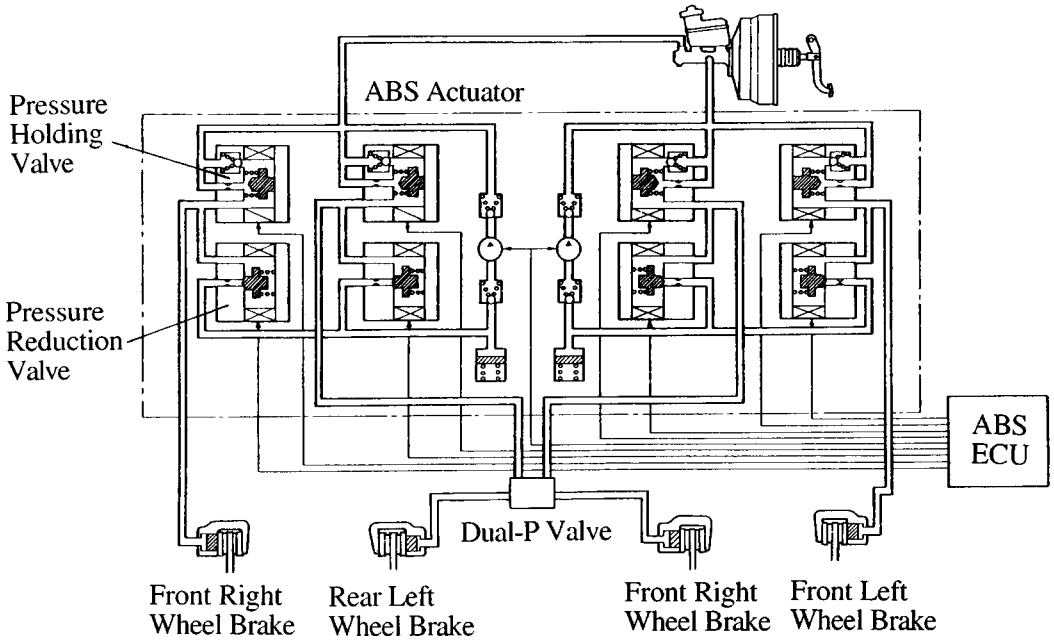



**Models with ABS**

### 3. Wiring Diagram



## 4. Hydraulic Circuit




**Models with ABS**

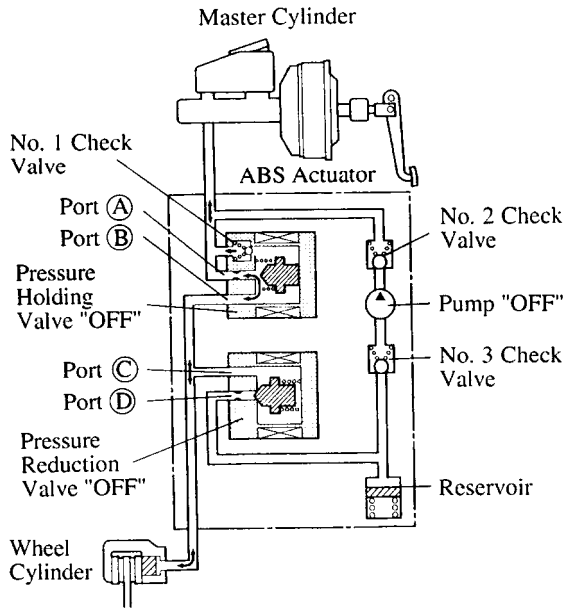
## 5. Operation

The hydraulic system of the ABS has 4 circuits. Although the hydraulic circuit described below is 1 circuit, it is applicable to other circuits as well.

### During Normal Braking (ABS not activated)

During normal braking, the ABS is not activated and the ECU dose not send control signal.
When the brake pedal is depressed, the fluid pressure in the master cylinder rises, brake fluid passes from port (A) to port (B), and then flows to the brake wheel cylinder. When the brake pedal is released, brake fluid returns from the brake wheel cylinder to the master cylinder through port (B) to port (A) and the No. 1 Check Valve.

**▶ Hydraulic Circuit ◀**




**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS ECU | Operation | |
|---|---|---|---|
| Pressure Holding Valve | OFF | Port (A) | Open |
| Pressure Reduction Valve | OFF | Port (D) | Closed |
| Pump Motor | OFF | Stop | |

## During Emergency Braking (ABS activated)

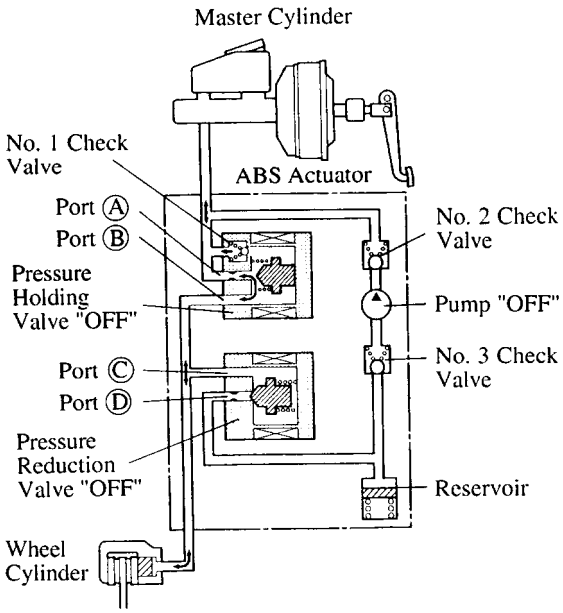
### 1) Pressure Reduction Mode

When the wheel is about to lock, the control signal from the ECU causes port (A) to close, port (D) to open, thus engaging the pressure reduction mode.
At this time, the brake fluid flows from the wheel cylinder, through ports (C) and (D), to the reservoir, reducing the wheel cylinder pressure. At the same time, the brake fluid is pumped and returned to the master cylinder.

**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS ECU | Operation | |
|---|---|---|---|
| Pressure Holding Valve | ON | Port (A) | Closed |
| Pressure Reduction Valve | ON | Port (D) | Open |
| Pump Motor | ON | Rotating | |

**▶ Hydraulic Circuit ◀**



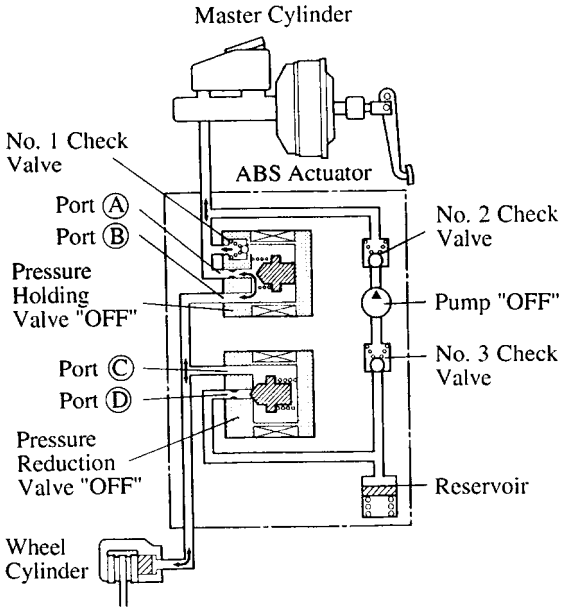

### 2) Pressure Holding Mode

After the fluid pressure in the wheel cylinder is reduced or increased to the required pressure, a control signal from the ECU causes ports (A) and (D) to close. As a result, the system engages in the pressure holding mode to maintain the fluid pressure in the wheel cylinder.

**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS ECU | Operation | |
|---|---|---|---|
| Pressure Holding Valve | ON | Port (A) | Closed |
| Pressure Reduction Valve | OFF | Port (D) | Closed |
| Pump Motor | ON | Rotating | |

**▶ Hydraulic Circuit ◀**



**3) Pressure Increase Mode**

When the fluid pressure in the wheel cylinder needs to be increased in order to apply more braking force, a control signal from the ECU causes port (A) to open, port (D) to close, thus engaging in the pressure increase mode.

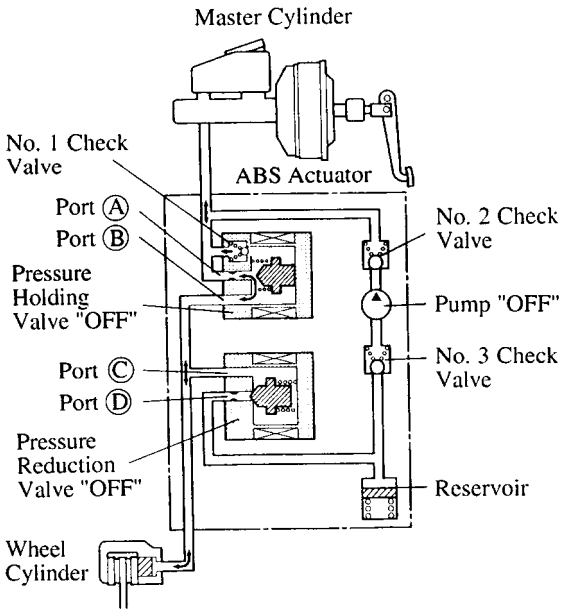
Accordingly, the circuit will be in the same state as in normal braking, in which the brake fluid is sent from the master cylinder to the wheel cylinder to increase the fluid pressure in the wheel cylinder.

The fluid pressure increase rate is controlled by repetition of the pressure increase and pressure holding mode.

**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS ECU | Operation | |
|---|---|---|---|
| Pressure Holding Valve | OFF | Port (A) | Open |
| Pressure Reduction Valve | OFF | Port (D) | Closed |
| Pump Motor | ON | Rotating | |

**▶ Hydraulic Circuit ◀**



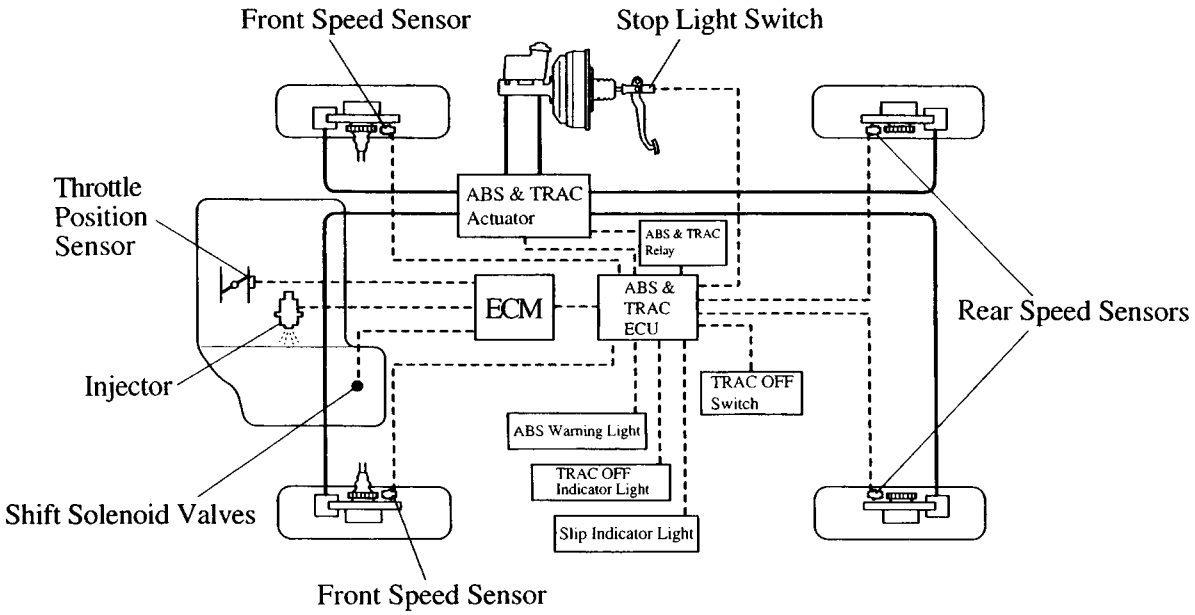
## ° ABS & TRAC SYSTEM

### 1. General

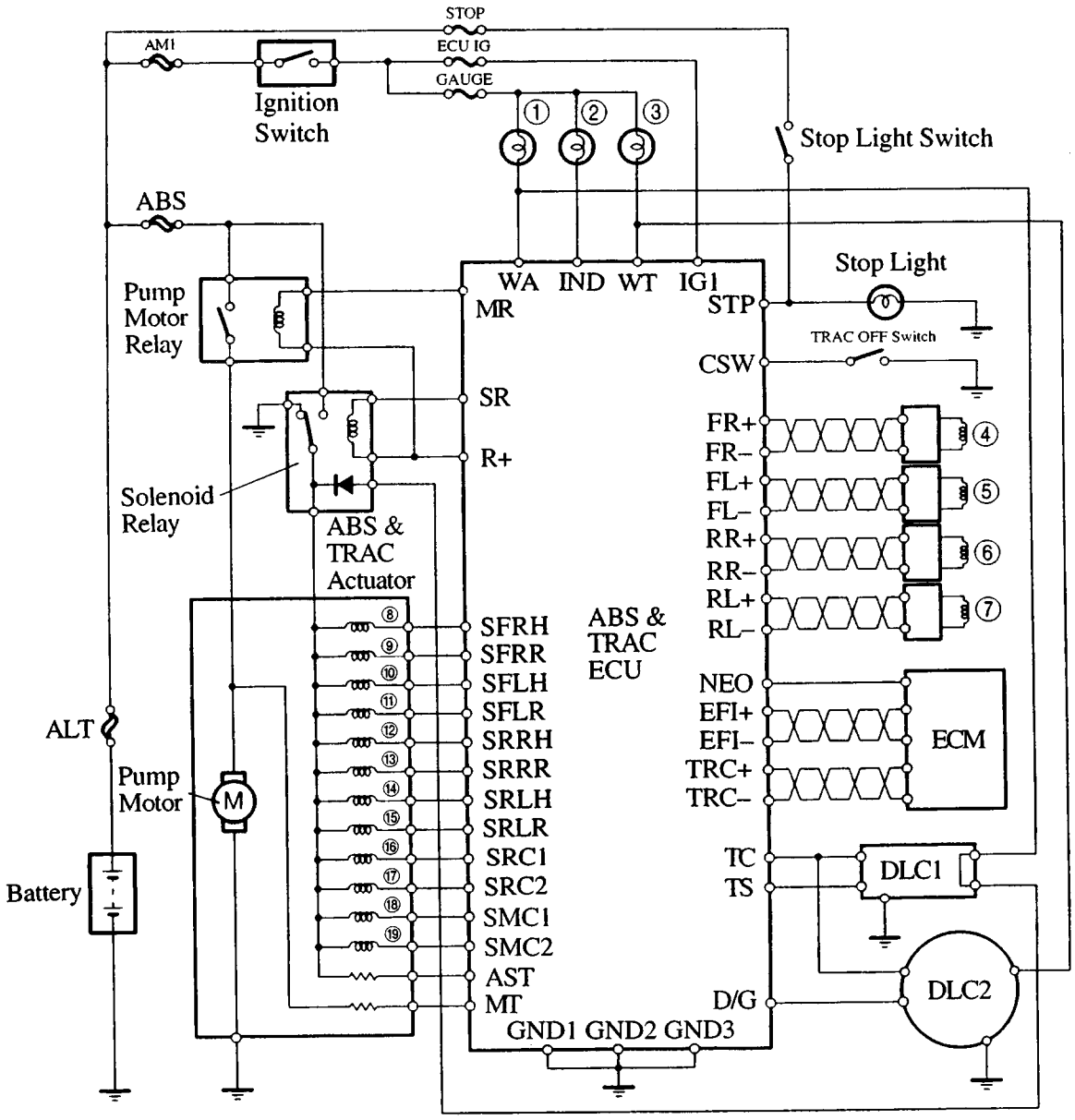
The ABS & TRAC system totally controls the engine torque control through the fuel cutoff and the braking of the driving wheels (front wheels). It helps to avoid slippage of the driving wheels that tends to happen during starting and acceleration and to maintain an optimal driving force according to the road surface conditions. The system eliminates the need for a subtle accelerator pedal operation and ensures vehicle stability when starting, accelerating or turning on slippery roads.

The operation of the ABS portion of the ABS & TRAC system is the same as that of the models with ABS.

### 2. System Diagram

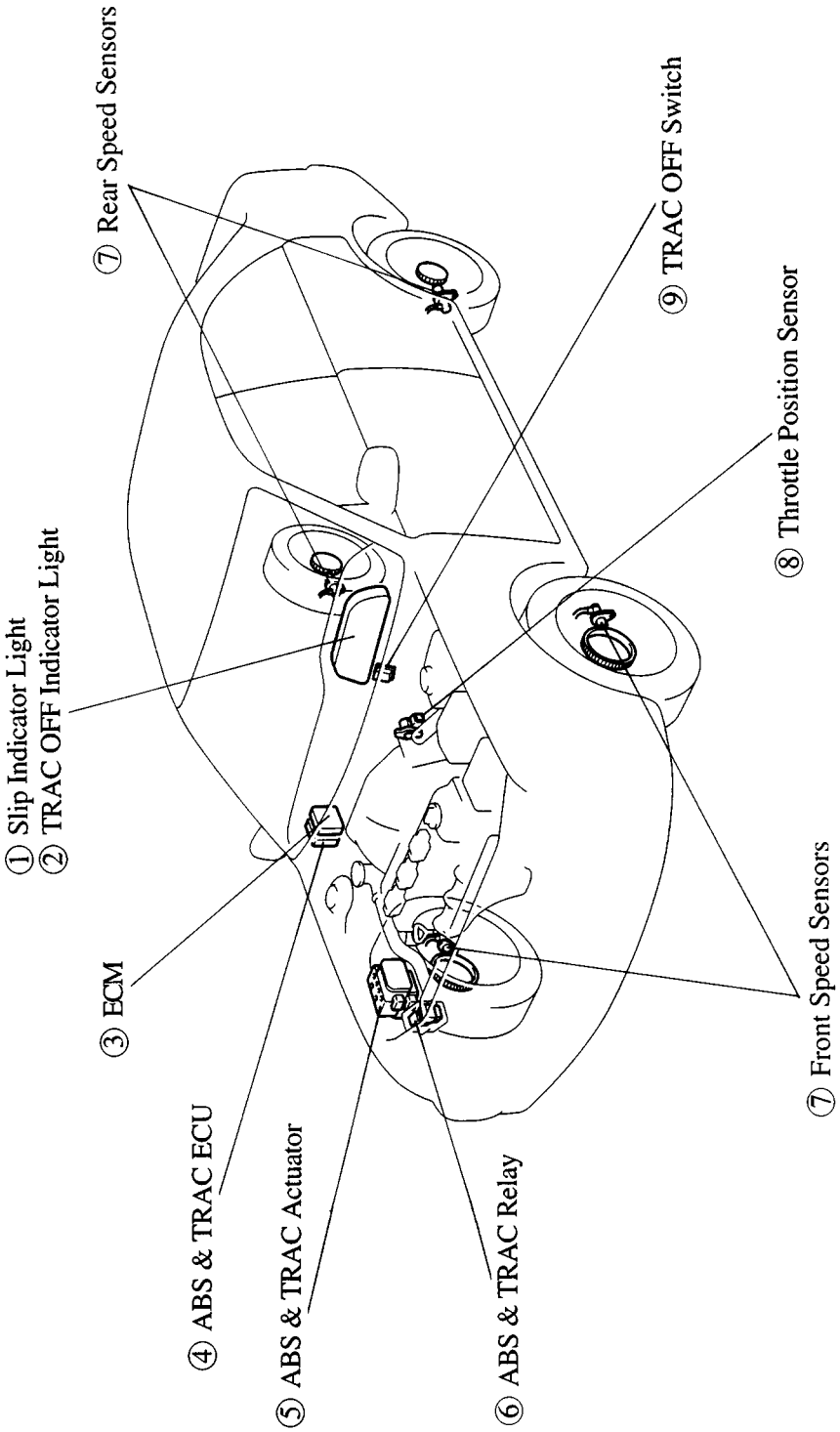


## 3. Wiring Diagram




① ABS Warning Light
② Slip Indicator Light
③ TRAC OFF Indicator Light
④ Front Right Speed Sensor
⑤ Front Left Speed Sensor
⑥ Rear Right Speed Sensor
⑦ Rear Left Speed Sensor
⑧ Front Right Pressure Holding Valve
⑨ Front Right Pressure Reduction Valve
⑩ Front Left Pressure Holding Valve
⑪ Front Left Pressure Reduction Valve
⑫ Rear Right Pressure Holding Valve
⑬ Rear Right Pressure Reduction Valve
⑭ Rear Left Pressure Holding Valve
⑮ Rear Left Pressure Reduction Valve
⑯ Reservoir Cut Solenoid Valve
⑰ Reservoir Cut Solenoid Valve
⑱ Master Cut Solenoid Valve
⑲ Master Cut Solenoid Valve

## 4. Layout of Components



## 5. Function of Components

| No. | Component | | Function |
|---|---|---|---|
| ① | Slip Indicator Light | | Blinks to inform the driver when the TRAC system is operated. |
| ② | TRAC OFF Indicator Light | | Lights to inform the driver when the TRAC system is turned OFF by the TRAC OFF switch. And, blinks to alert the driver when the ECU detects the malfunction in the TRAC system. |
| ③ | ECM | | ● Sends signals to the ABS & TRAC ECU, such as the throttle valve opening angle, specific volume of intake air signal, etc.<br>● Controls the engine output and shift timing in accordance with the fuel cutoff request and shift timing request that are output by the ABS & TRAC ECU. |
| ④ | ABS & TRAC ECU | | Judges the vehicle driving condition based on signals from 4 speed sensors and signals from ECM, and sends fuel cut and shift timing demand signals to the ECM and brake control signal to the ABS & TRAC actuator. |
| ⑤ | ABS & TRAC Actuator | | Controls the brake fluid pressure to each brake wheel cylinder of the driving wheel (front wheel) by signals from the ABS & TRAC ECU. |
| ⑥ | ABS & TRAC Relay | Solenoid Relay | Directs electricity to the solenoid valves in the actuator. |
| | | Pump Motor Relay | Controls the pump motor operation in the actuator. |
| ⑦ | Speed Sensors (Front and Rear) | | Detect the wheel speed of each of four wheels. |
| ⑧ | Throttle Position Sensor | | Detects the throttle valve opening angle. |
| ⑨ | TRAC OFF Switch | | Turns the TRAC system inoperative. |

## 6. Construction and Operation of Components

### TRAC OFF Switch and Indicator Light

**1) TRAC OFF Switch**

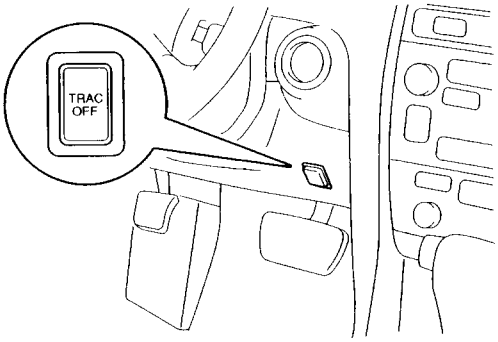
When pressed, this switch turns the TRAC system inoperative. Pressing it again changes it to operative. It is always operative right after the engine is restarted.

**2) TRAC OFF Indicator Light**

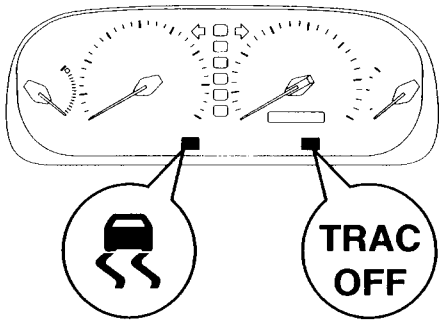
This light goes on when the TRAC system is set inoperative by the TRAC OFF switch, and informs the driver accordingly. And, blinks to alert the driver when a malfunction has occurred in the engine and TRAC system.

**3) Slip Indicator Light**

When the TRAC system is operative, this light blinks and informs the driver accordingly.




**TRAC OFF Switch**




### ABS & TRAC Actuator

**1) Construction**

The ABS & TRAC actuator consists of 12 two-position solenoid valves, I motor 2 pumps, 2 reservoir and 2 pressure regulator valves.

The 12 two-position solenoid valves consist of 2 master cut solenoid valves, 2 reservoir cut solenoid valves, 4 pressure holding valves, and 4 pressure reduction valves.

Pressure regulator valve is assembled into the master cut solenoid valve.

The basic construction and operation of the pump, reservoir pressure holding valve, and pressure reduction valve are shared with the ABS.

**a. Master Cut Solenoid Valve**

When the TRAC system is active, a signal from the ABS & TRAC ECU causes the master cut solenoid valve to turn ON in order to shut off the circuit between the master cylinder and the front brake wheel cylinder.

The basic construction and operation are the same as those of the pressure holding valve.

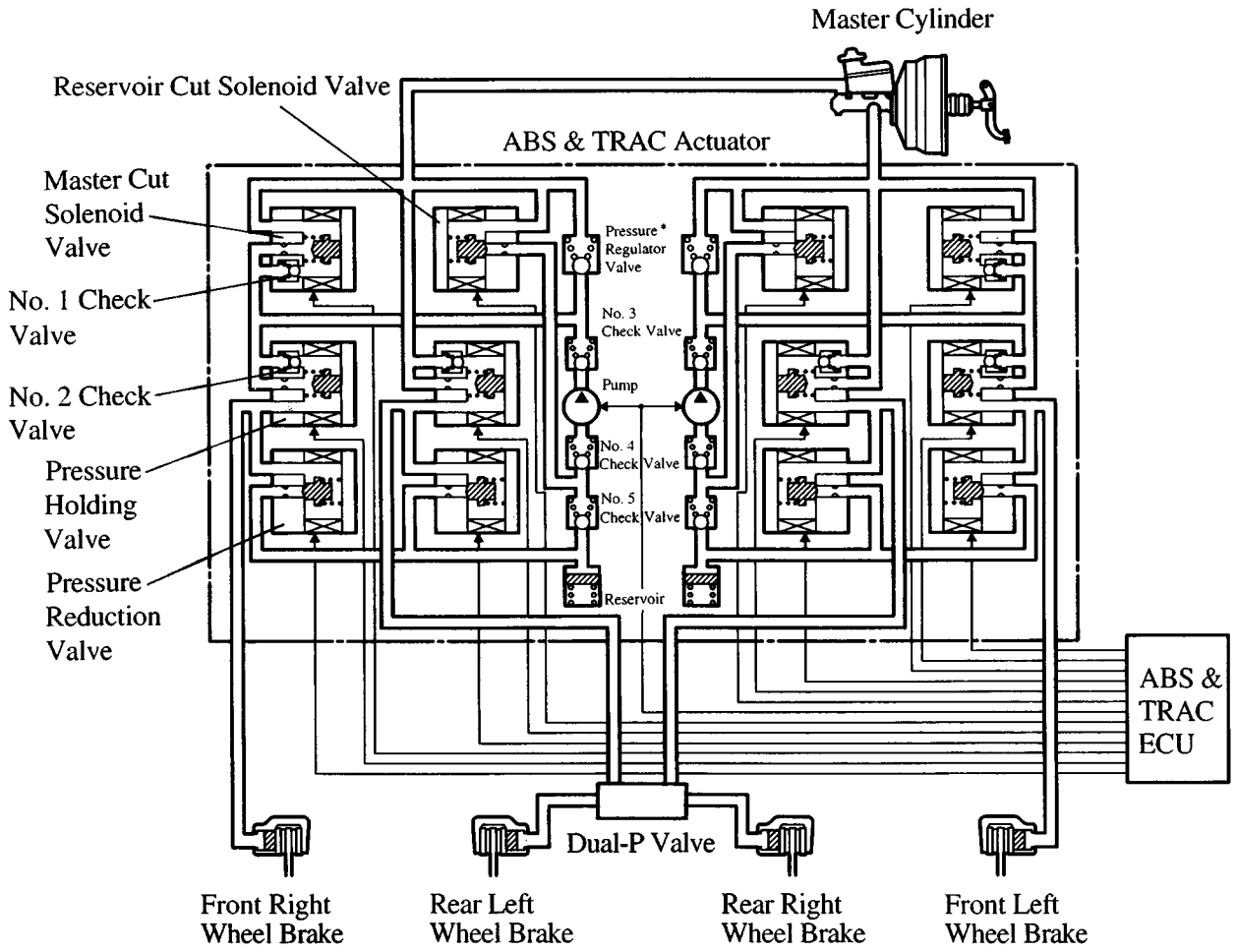
**b. Reservoir Cut Solenoid Valve**

When the TRAC system is active, a signal from the ABS & TRAC ECU causes the reservoir cut solenoid valve to turn ON in order to open the circuit from the master cylinder to the pump.
The basic construction and operation are the same as those of the pressure reduction valve.

**c. Pressure Regulator Valve**

Regulates the brake fluid pressure generated by the pump to a pressure level needed for TRAC control.

**2) Hydraulic Circuit**




*: Pressure regulator valve is assembled into the master cut solenoid valve, however, it is illustrated separately to explain its operation.

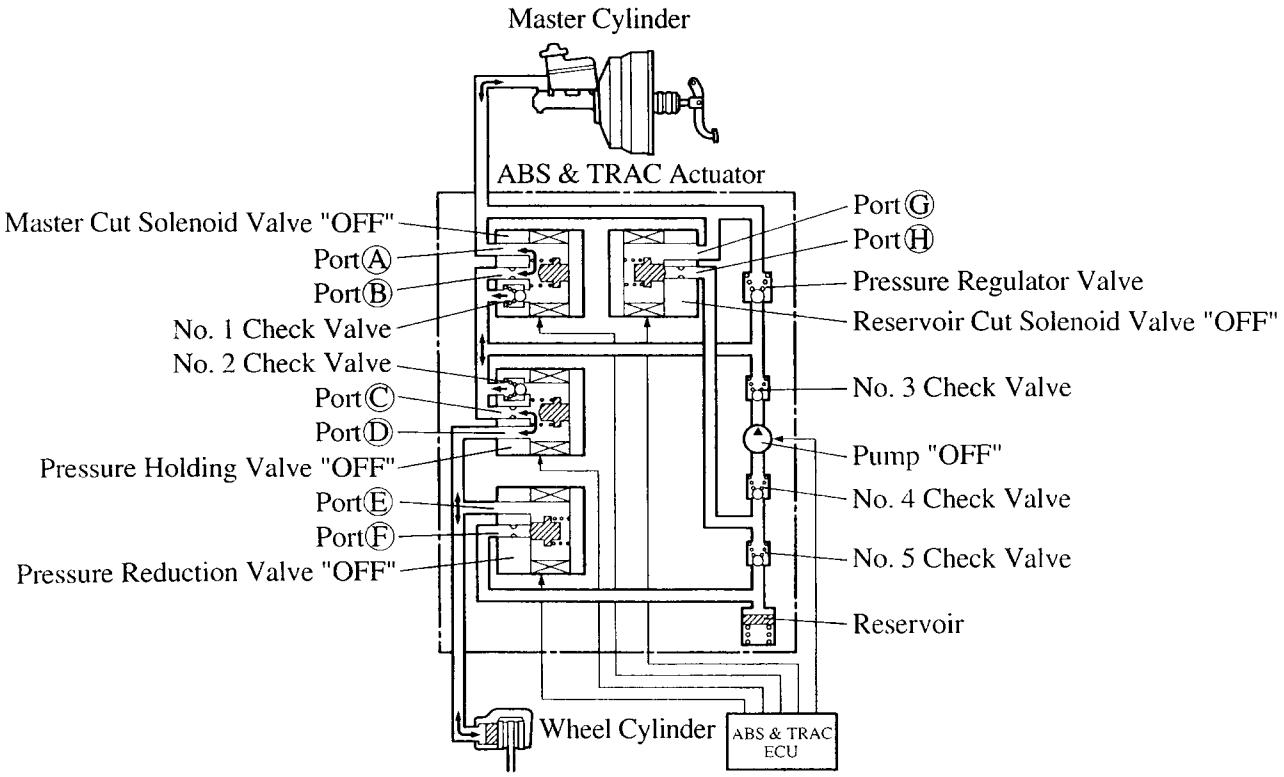
### 3) Operation

The hydraulic system of the TRAC system consists of the following 2 circuits: the front right and front left. Although the hydraulic circuit described below is one circuit, it is applicable to other circuits as well.

#### a. During Normal Operation (TRAC System not Activated)

When the TRAC system is inactive, the ABS & TRAC ECU does not output any control signals. Thus, all valves are OFF.
Accordingly, pressing on the brake pedal causes the brake fluid to flow from the master cylinder to port (A), port (B), No. I check valve, port (C), and port (D), thus applying fluid pressure to the wheel cylinder.
Also, releasing the brake pedal causes the brake fluid to flow from the wheel cylinder to port (D), port (C), No. 2 check valve, port (B), and port (A), thus returning to the master cylinder.
Thus, the brakes operate in the normal brake mode.

**▶ Hydraulic Circuit ◀**




**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS & TRAC ECU | Operation | |
|---|---|---|---|
| Master Cut Solenoid Valve | OFF | Port (B) | Open |
| Reservoir Cut Solenoid Valve | OFF | Port (H) | Closed |
| Pressure Holding Valve | OFF | Port (C) | Open |
| Pressure Reduction Valve | OFF | Port (F) | Closed |
| Pump | OFF | Stop | |

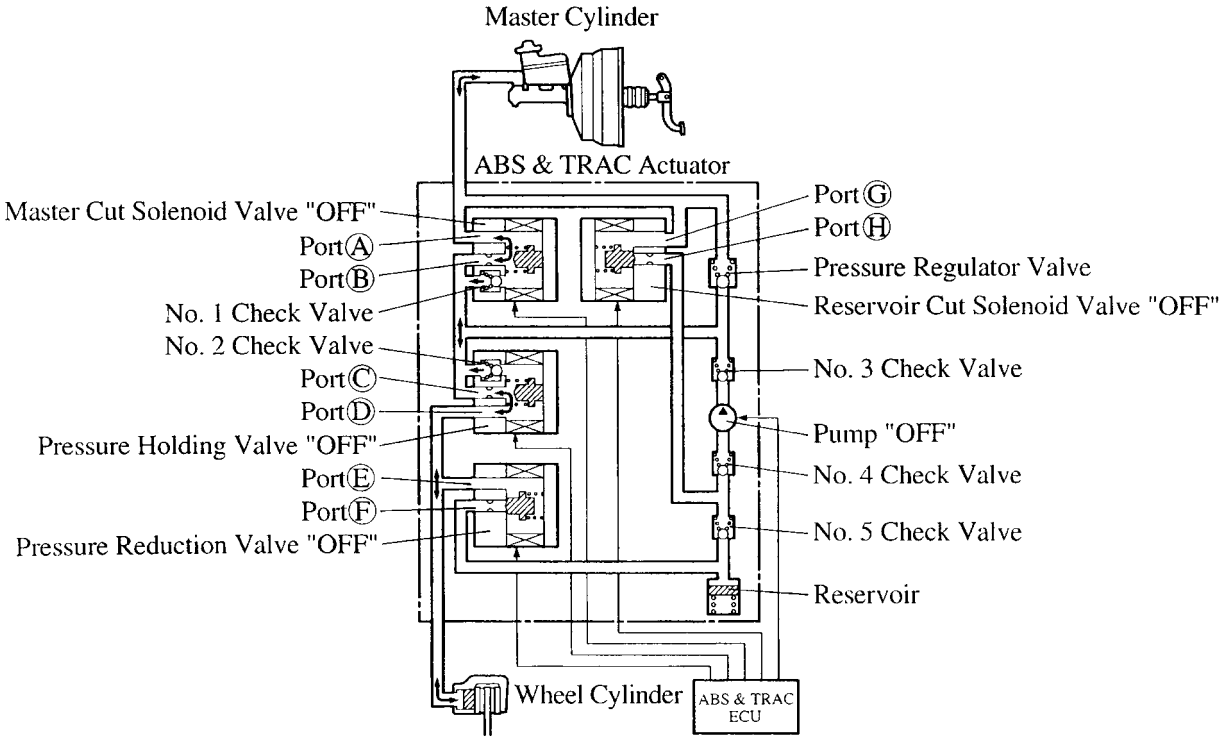
**b. During Vehicle Acceleration (TRAC System Activated)**

When a front wheel slips during acceleration, the TRAC system controls the engine output and braking of the front wheels to help prevent wheel slippage.
The brake fluid pressure applied to the right and left front wheels is controlled separately according to 3 control modes (pressure increase, holding, and pressure reduction) as explained below.

**i) Pressure Increase Mode**

During sudden acceleration or driving on a slippery surface, if the front wheels starts to slip, a control signal from the ABS & TRAC ECU causes the ABS & TRAC actuator to control the valves and pumps as described below, to effect the pressure increase mode.
When the master cut and reservoir cut solenoid valves turn ON, port (B) close, port (H) opens, and the pump operates at the same time.
Accordingly, the brake fluid will be suctioned up from the master cylinder through port (G) and (H). Then the brake fluid pressurized by the pump will be applied to the wheel cylinder through port (C) and (D).
Also, the brake fluid that is pressurized by the pump is regulated to a constant pressure by the pressure regulator valve.

**▶ Hydraulic Circuit ◀**



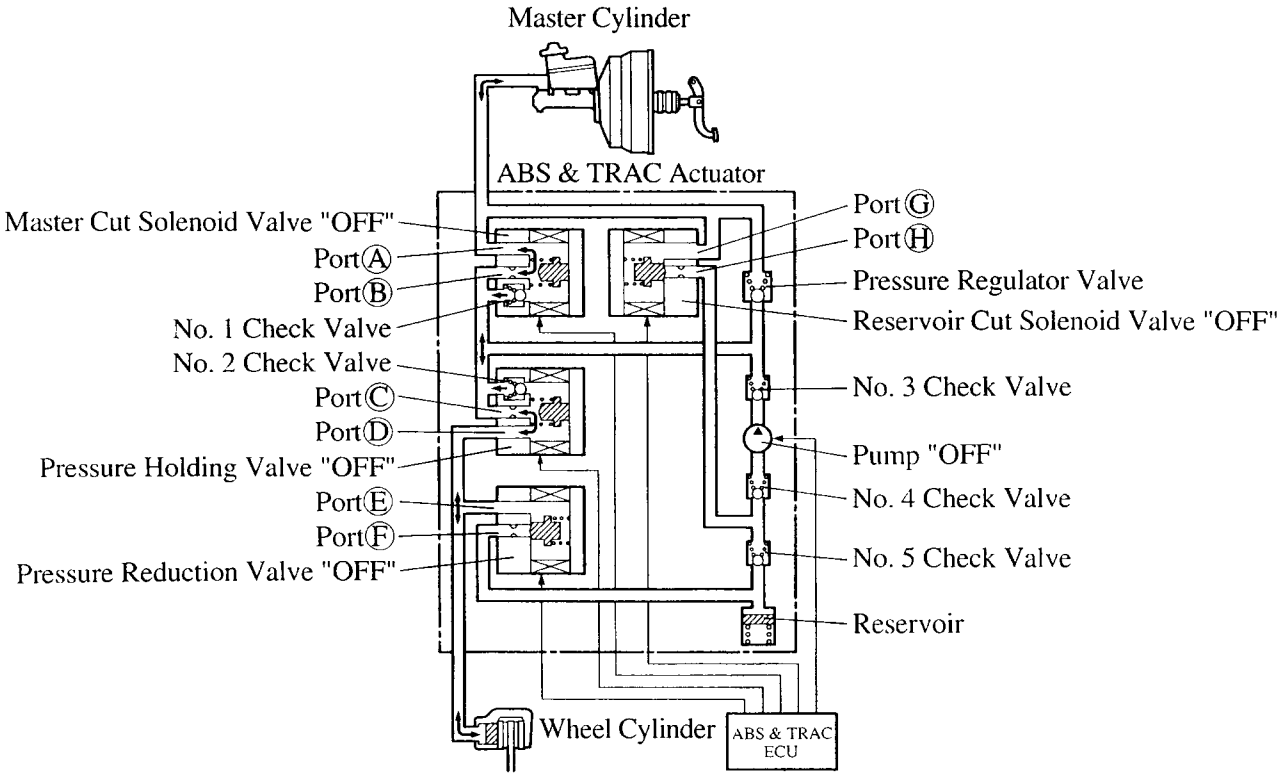

**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS & TRAC ECU | Operation | |
|---|---|---|---|
| Master Cut Solenoid Valve | ON | Port (A) | Closed |
| Reservoir Cut Solenoid Valve | ON | Port (H) | Open |
| Pressure Holding Valve | OFF | Port (C) | Open |
| Pressure Reduction Valve | OFF | Port (F) | Closed |
| Pump | ON | Rotating | |

**ii) Pressure Holding Mode**

When the fluid pressure in the wheel cylinder is increased or decreased to attain the required pressure, the ABS & TRAC ECU sends a control signal to tuna ON the pressure holding valve.
Then, the fluid pressure that is applied to the wheel cylinder is cut off to hold the fluid pressure in the wheel cylinder.

**▶ Hydraulic Circuit ◀**



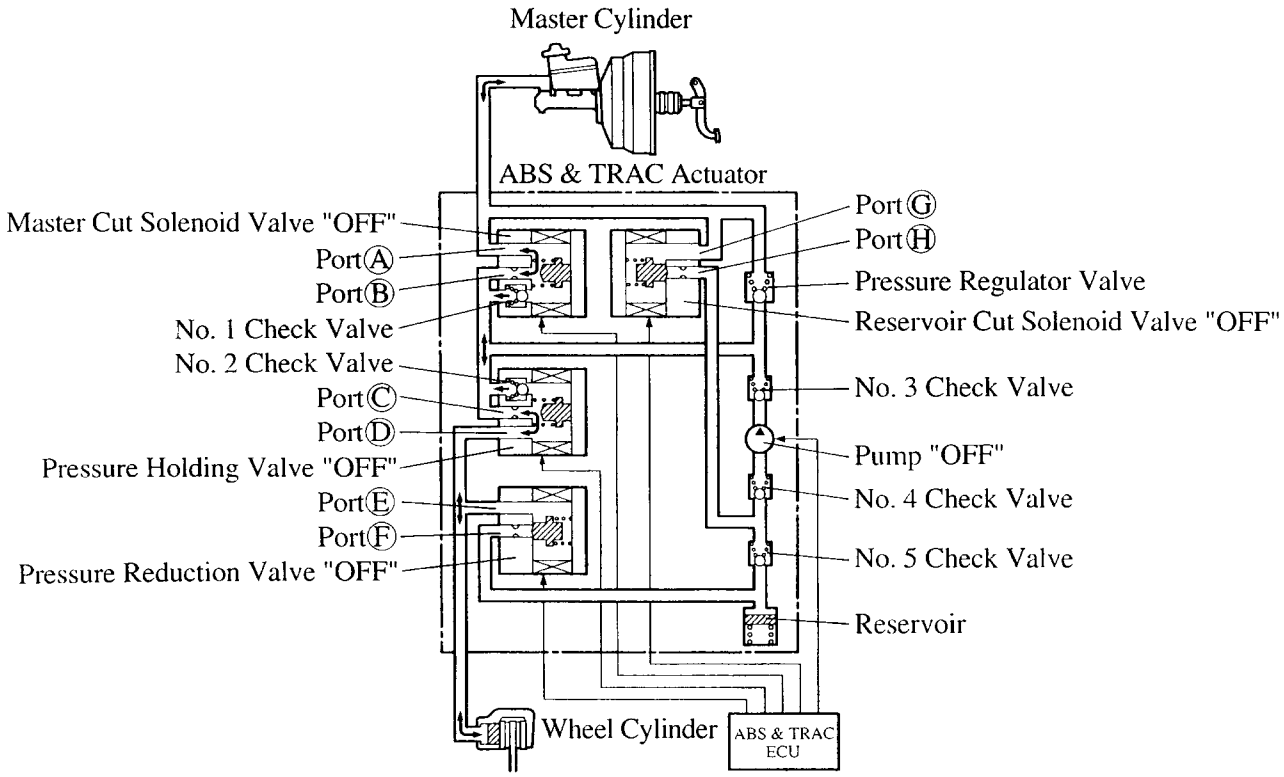

**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS & TRAC ECU | Operation | |
|---|---|---|---|
| Master Cut Solenoid Valve | ON | Port (B) | Closed |
| Reservoir Cut Solenoid Valve | OFF | Port (H) | Closed |
| Pressure Holding Valve | ON | Port (C) | Closed |
| Pressure Reduction Valve | OFF | Port (F) | Closed |
| Pump | ON | Rotating | |

**iii) Pressure Reduction Mode**

When the fluid pressure in the wheel cylinder needs to be decreased, the ABS & TRAC ECU sends a control signal to turn the pressure reduction valve ON, causing port (F) to open.
Accordingly, the brake fluid in the wheel cylinder flows to ports (E) and (F), reservoir, and pump, to reduce the fluid pressure in the wheel cylinder.
The fluid pressure reduction rate is controlled by repetition of the pressure reduction and holding mode.

**▶ Hydraulic Circuit ◀**




**▶ Condition of Each Valve and Pump Motor ◀**

| Part Name | Signal from ABS & TRAC ECU | Operation | |
|---|---|---|---|
| Master Cut Solenoid Valve | ON | Port (B) | Closed |
| Reservoir Cut Solenoid Valve | OFF | Port (H) | Closed |
| Pressure Holding Valve | ON | Port (C) | Closed |
| Pressure Reduction Valve | ON | Port (F) | Open |
| Pump | ON | Rotating | |

## ABS & TRAC ECU

### 1) Wheel Speed Control

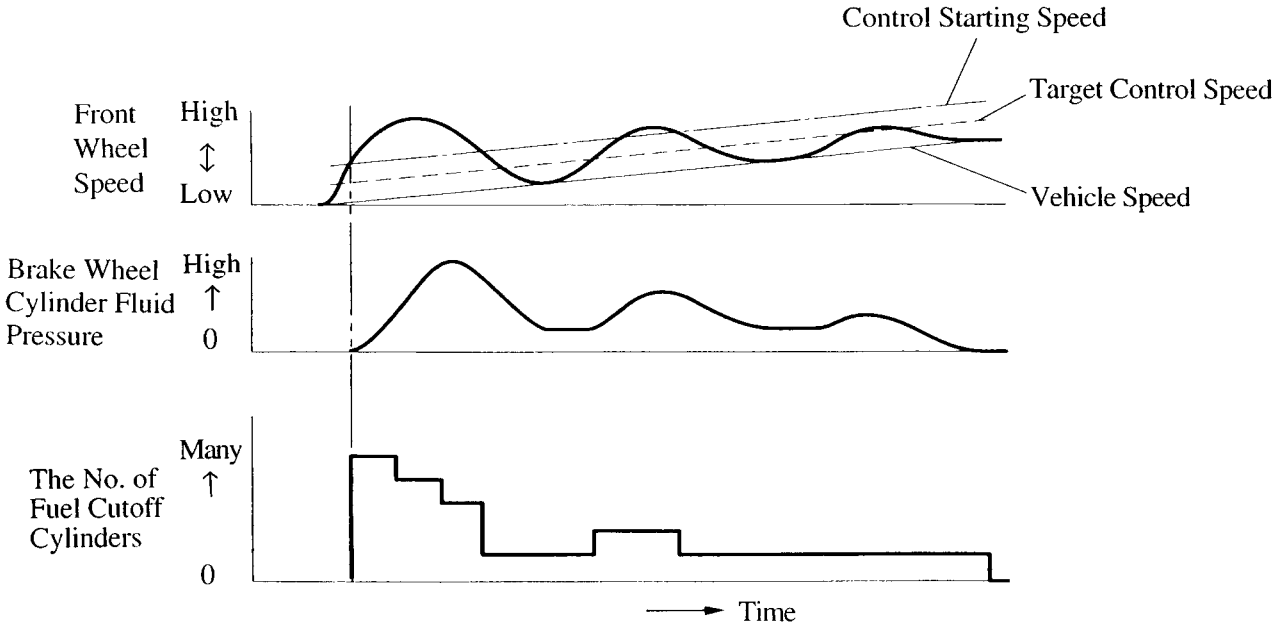
The ABS & TRAC ECU constantly receives signals from the 4 speed sensors and calculates the speed of each wheel and vehicle speed.
During sudden acceleration or driving on a slippery surface, if the drive wheels (front wheels) start to slip, the difference in speed between the drive wheels and the non-drive wheels (rear wheels) becomes greater, causing the ECU to determine that the drive wheels are slipping.
Then, the ABS & TRAC ECU executes the right and left independent control of the front wheel brakes, the engine torque control through fuel cutoff, and shift timing control, according to the extent of the slip.
TRAC operation processes are described below.

① The vehicle speed is determined by way of the rear wheel speed. This speed is then compared to the speed of the front wheels, which are the drive wheels, to determine the slip condition of the drive wheels (front wheels).

② The target control speed for the drive wheels is set based on the estimated vehicle speed.

③ If the speed of the front wheels, which are the drive wheels, exceeds the control starting speed, the ABS & TRAC ECU determines that a slip has occurred and cuts off fuel according to the number of cylinders. By executing engine torque control and brake control in this manner, the system regulates the speed so that the front wheels attain the target control speed. In addition, the system executes control to prohibit the shifting of the automatic transaxle at this time.

④ TRAC control ends when the drive wheels move to a non-slippery surface or when the driver releases the accelerator pedal.



**2) Initial Check**

An initial check is carried out once every a few seconds after the ignition was turned on. The function of each solenoid valve and pump motor in the actuator are checked in order.

**3) Self-Diagnosis**

If the ABS & TRAC ECU detects a malfunction in the engine, ABS or TRAC system, it blinks the TRAC OFF indicator light to alert the driver of the malfunction. At the same time, the ABS & TRAC ECU turns the ABS warning light on. The ECU will also store the codes of the malfunctions. See the 1997 ES300 Repair Manual (Pub. No. RM511 U) for the diagnostic code check method, diagnostic code and diagnostic code clearance.

**4) Fail-Safe**

In the event of a malfunction in the engine, ABS or TRAC system, the ABS & TRAC ECU prohibits the TRAC system.

Thus, the brake and engine controls will operate in the same conditions as those without the TRAC system.

# SUSPENSION

## ◦ DESCRIPTION

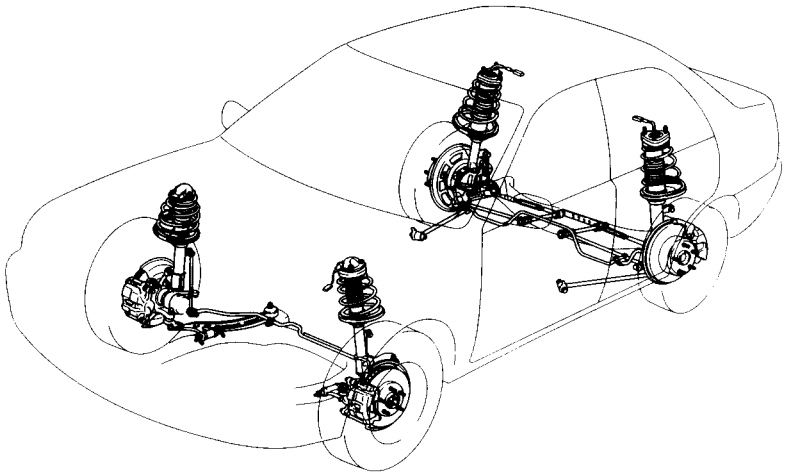
As in the previous model, the new model uses MacPherson strut type independent suspension for both front and rear.
An electric modulated suspension has been made newly available on all models as an option. The items given below have been changed from the previous model.

The caster angle has been changed on the front suspension.

The mounting method of the front suspension stabilizer has been changed.

The mounting position of the rear suspension's lower arm has been changed and its roll center height has been changed.

The rear suspension upper support has been changed.



**Models with Electric Modulated Suspension**

**▶ Specifications ◀**

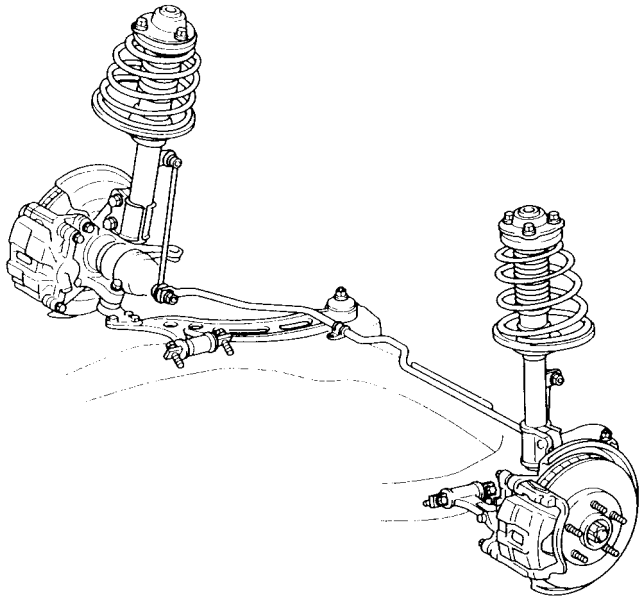
| Model / Item | | | New | Previous |
|---|---|---|---|---|
| Front Suspension | Tread | mm (in) | 1550 (61.0) | ← |
| | Caster*1 | degrees | 2°15′ | 1°15′ |
| | Camber*1 | degrees | –0°40′ | ← |
| | Toe–In*1 | degrees | 0 | ← |
| | King Pin Inclination*1 | degrees | 13°05′ | ← |
| Rear Suspension | Tread | mm (in) | 1520 (59.8) | 1500 (59.1) |
| | Camber*1 | degrees | –0°45′ | –0°30′ |
| | Toe–In*1 | mm (in) | 4 (0.16) | ← |

*1:Unloaded Vehicle Condition

## ° FRONT SUSPENSION

### 1. General

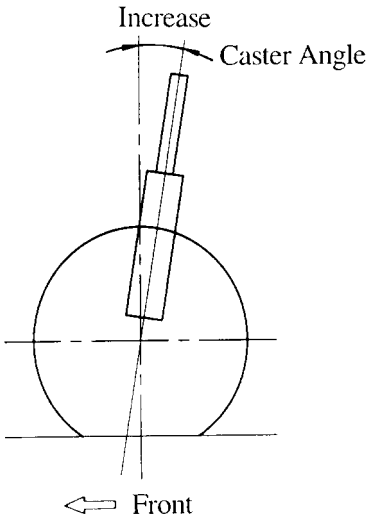
As in the previous model, the new model uses MacPherson strut type independent suspension.
However, each part of suspension has been revised to realize excellent riding comfort, in addition, this provides excellent stability and controllability.



**Conventional Suspension Model**

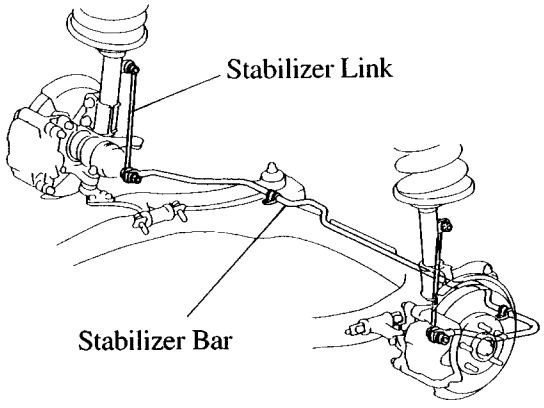
### 2. Geometry

The caster angle has been increased to realize excellent directional stability and steering response.

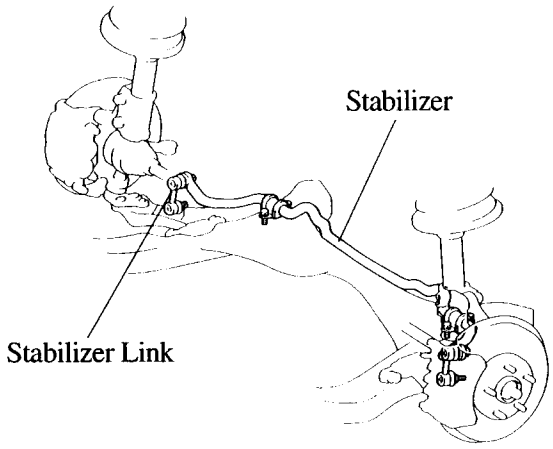


### 3. Stabilizer Bar

The mounting position of the stabilizer link has been changed from the lower arm to the strut.
As a result of realizing rolling control and excellent steering feeling, the spring rate of the coil spring could be lowered to improve riding comfort.




**New**




**Previous**

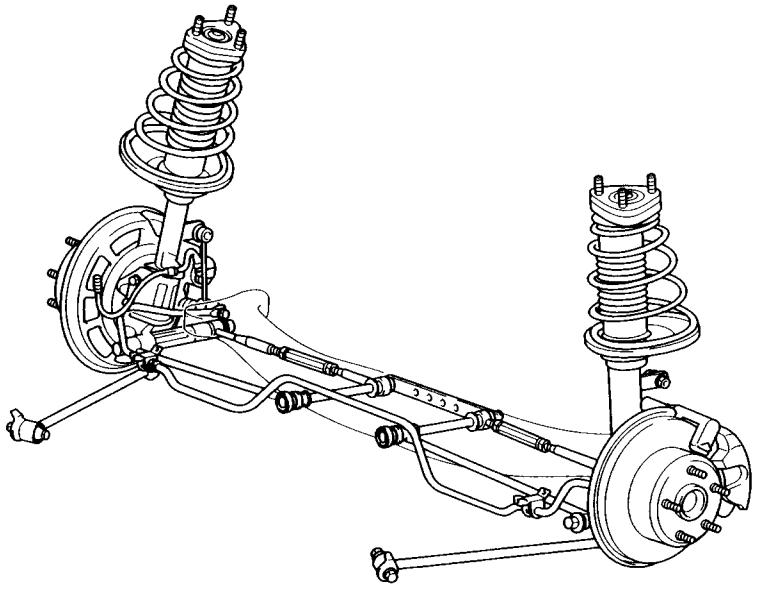
### 4. Suspension Upper Support, Coil Spring and Shock Absorber

The spring rate and damping force have been revised to realize excellent riding comfort, in addition, this provides excellent stability and controllability.

## ◦ REAR SUSPENSION

### 1. General

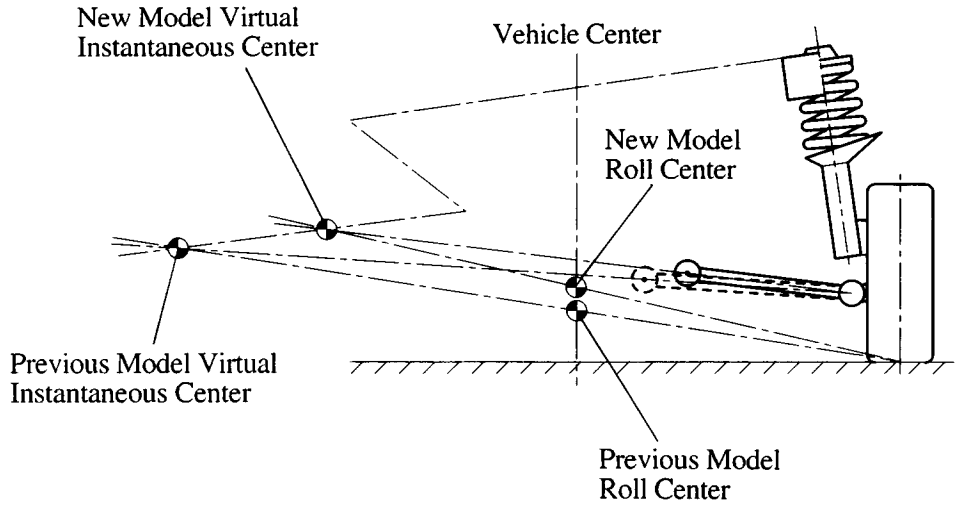
As in the previous model, the new model uses MacPherson strut type independent suspension.
However, each part of suspension has been revised to realize excellent riding comfort, in addition, this provides excellent stability and controllability.



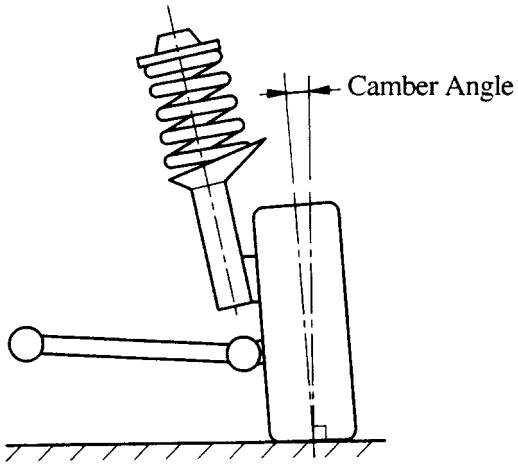
**Conventional Suspension Model**

## 2. Geometry

The position of the lower arm where it mounts to the subframe has been raised to relocate the rear roll center higher than that of previous model. As a result of this change, the body roll is restrained when a lateral force is applied, such as during cornering and lane changes, thus realizing excellent stability and steering response.

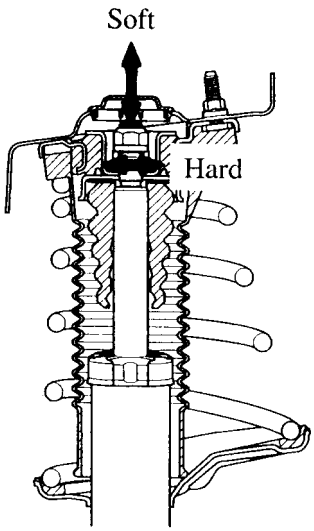



The negative camber angle realizes excellent stability during cornering and lane changes.



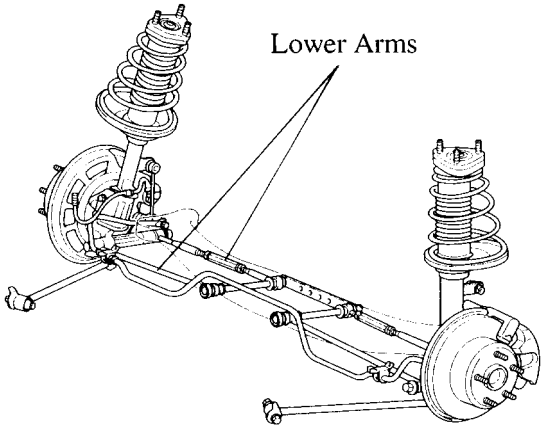
## 3. Suspension Upper Support

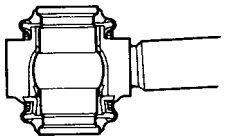
The spring rate of the suspension upper support has been made soft in the axial direction and hard in the perpendicular direction of axis to improve riding comfort.




## 4. Lower Arm

A pillow ball bushing is used for the lower arm to realize excellent riding comfort, stability and controllability.



Pillow Ball Bushing

## 5. Coil Spring and Shock Absorber

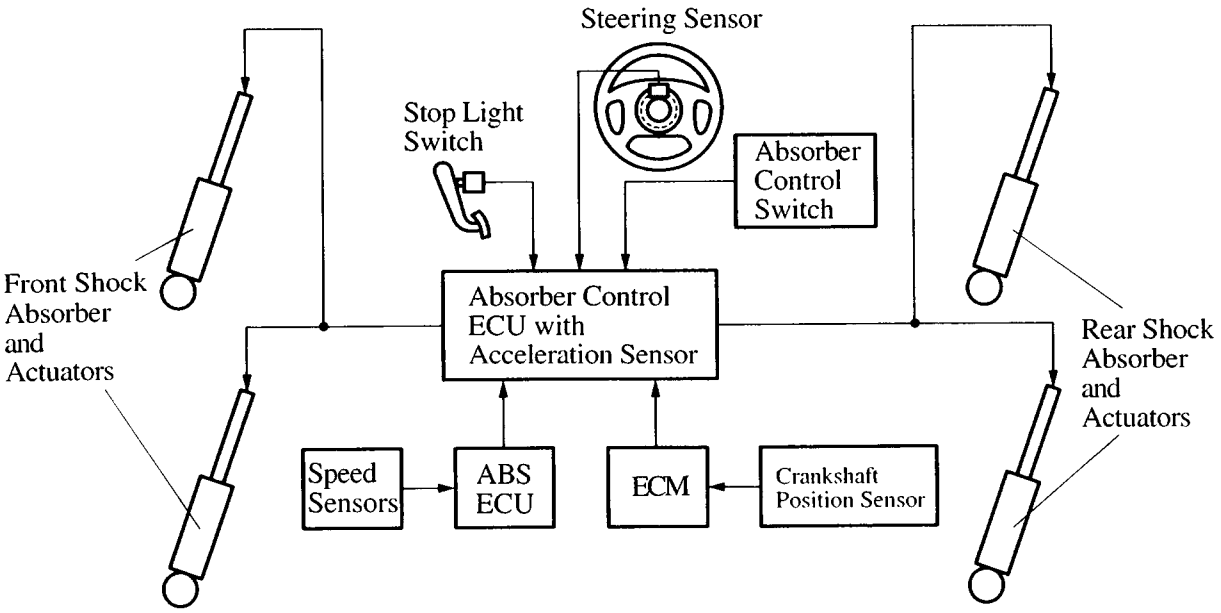
The spring rate and damping force have been revised to realize excellent riding comfort, in addition, this provides excellent stability, and controllability.

## ◦ ELECTRIC MODULATED SUSPENSION

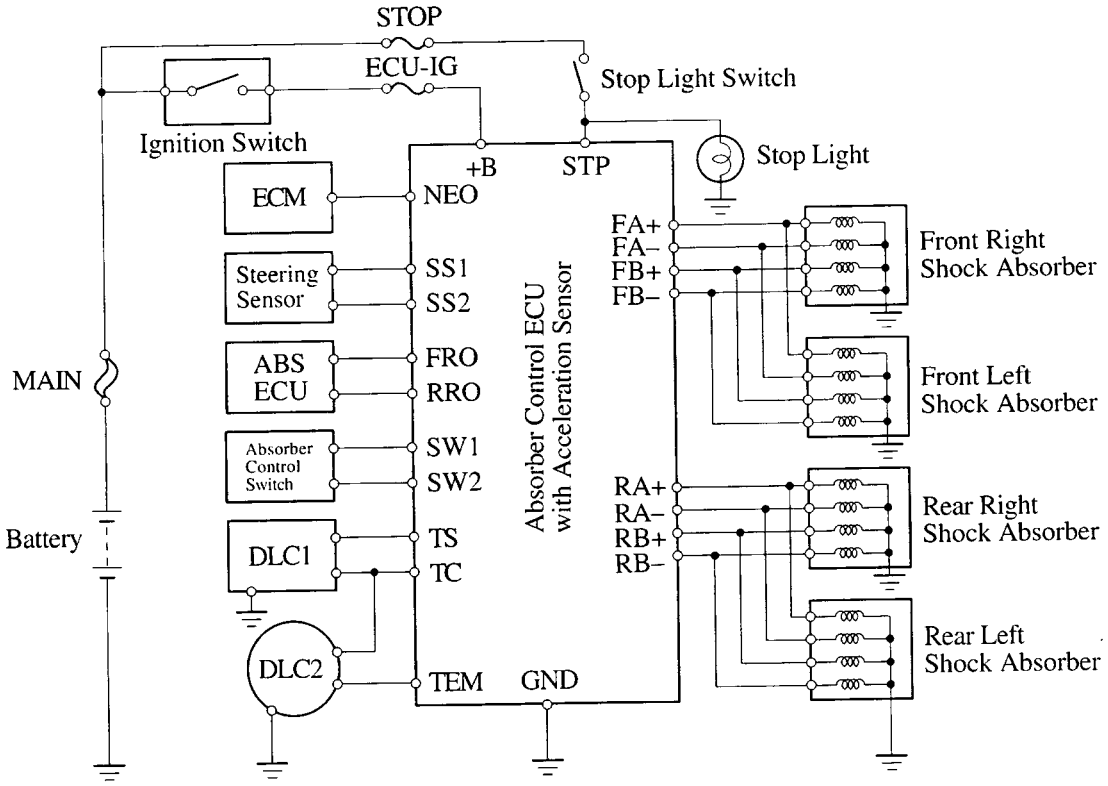
### 1. General

An electric modulated suspension is available as an option on all models.
Through electronic control, this system automatically controls the damping force of the shock absorbers, thus realizing excellent riding comfort, stability, and controllability.

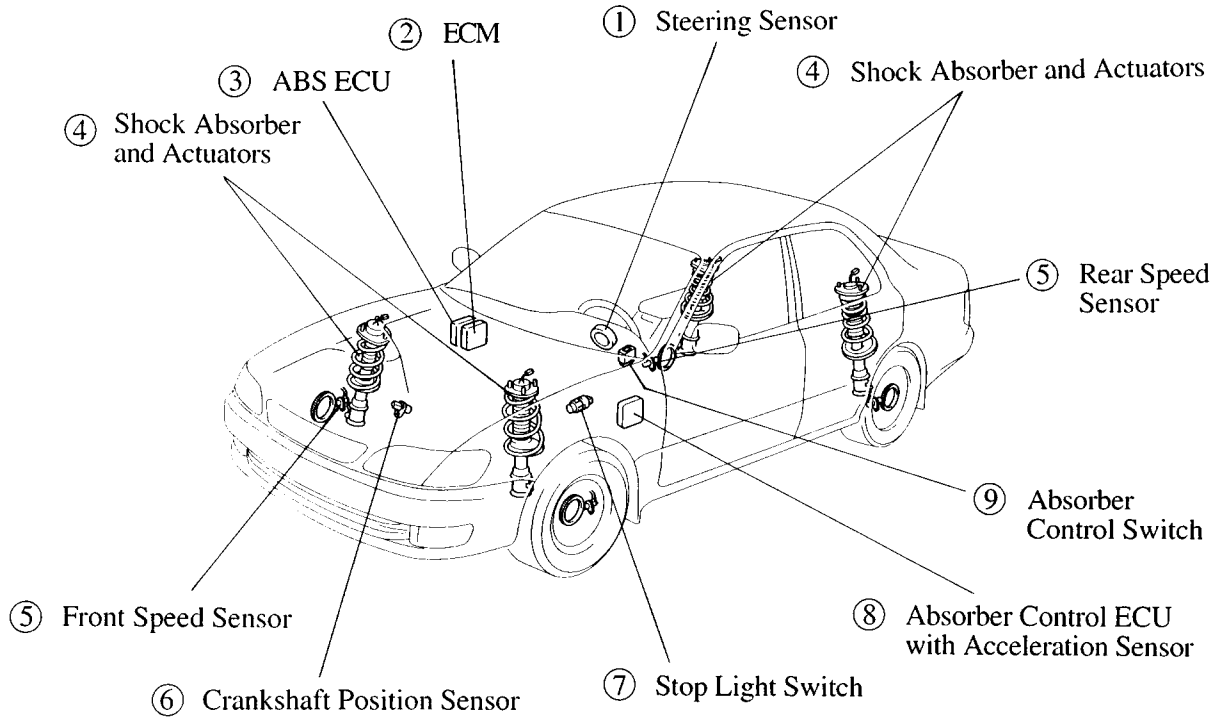
### 2. System Diagram




### 3. Wiring Diagram



## 4. Layout of Components




## 5. Function of Components

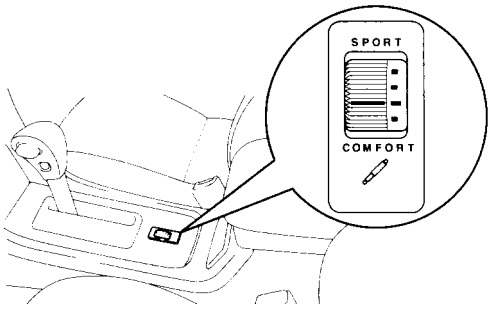
| No. | Component | Function |
|---|---|---|
| ① | Steering Sensor | Detects the steering direction and angle of the steering wheel. |
| ② | ECM | Sends the engine signal from the crankshaft position sensor to the absorber control ECU. |
| ③ | ABS ECU | Converts the wheel speed signal from the speed sensors and sends it to the absorber control ECU. |
| ④ | Shock Absorber and Actuator | Switches the damping force of the shock absorber based on the control signal received from the absorber control ECU. |
| ⑤ | Speed Sensors (Front and Rear) | Detects the wheel speed of each wheels. |
| ⑥ | Crankshaft Position Sensor | Detects the engine revolution speed. |
| ⑦ | Stop Light Switch | Detects the brake condition. |
| ⑧ | Absorber Control ECU with Acceleration Sensor | • Determines the condition of the vehicle based on the signals received from the sensors and switches and sends a control signal to the actuator located in the shock absorber.<br>• Uses an internal acceleration sensor to detect the vehicle's vertical acceleration rate. |
| ⑨ | Absorber Control Switch | Selects the damping force of the shock absorber. |

## 6. Construction and Operation of Components

### Absorber Control Switch

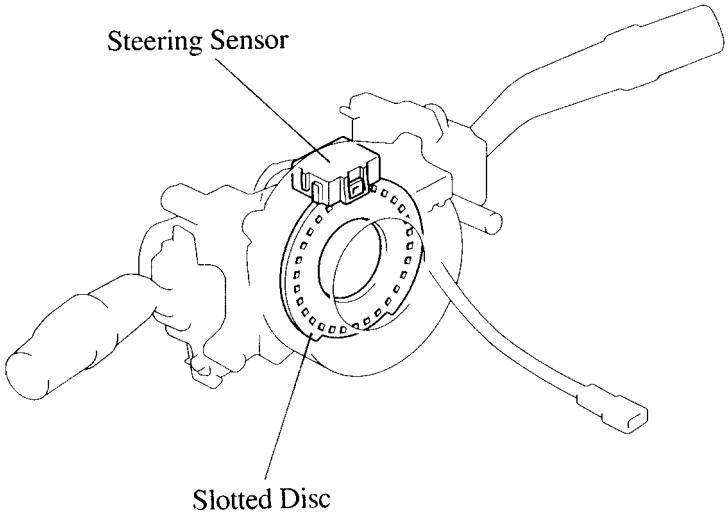
The absorber control switch uses a rotary type switch and is located in front of the rear console box.

By operating this switch, the driver can select four types of damping forces of the shock absorbers.




### Steering Sensor

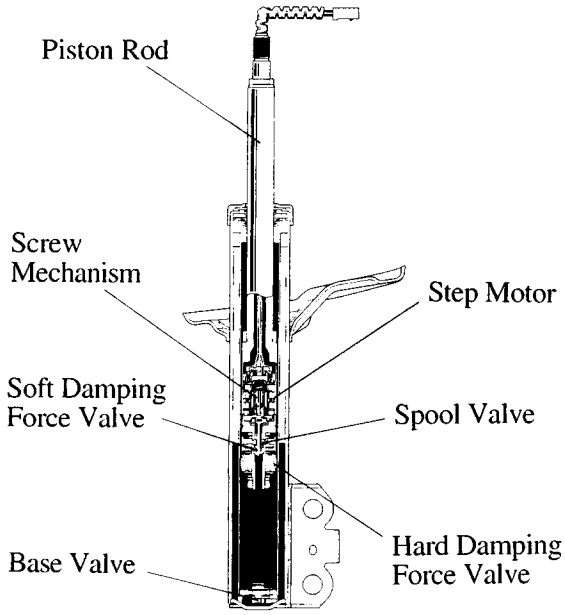
The steering sensor is fitted to the turn signal switch assembly and detects the steering direction and angle. The sensor includes a slotted disc that rotates with the steering wheel and a pair of photo interrupters. Each photo interrupter consists of an LED (Light Emitting Diode) and a photo transistor, located facing each other. It converts the change in the light radiation between the two elements to on/off signals. The slotted disc rotates between the LED and photo transistor. As the steering wheel is turned, the slotted disc rotates with the wheel and controls the light transmission between the two elements. The pair of photo interrupters are phased and the absorber control ECU detects the steering direction and angle based on the changes of each output.

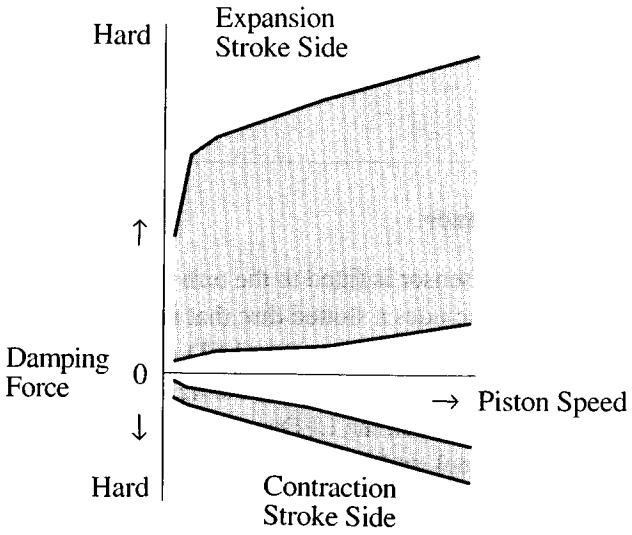


## Front and Rear Shock Absorber and Actuators

The piston rod of the shock absorber is equipped with an internal actuator. The actuator consists of a step motor, a screw mechanism (which converts the rotational movement to a linear movement) and a spool valve. Also, the piston rod is equipped with a soft damping force valve and a hard damping force valve. Signals from the absorber control ECU activate the actuator causing the spool valve to switch the oil passage. Thus, the volume of oil that passes through each valve is varied in order to control the damping force in 16 steps.

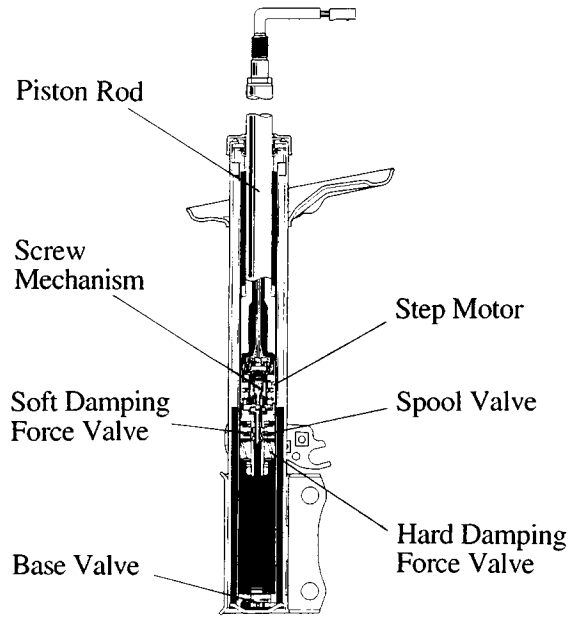
**▶ Front Shock Absorber ◀**

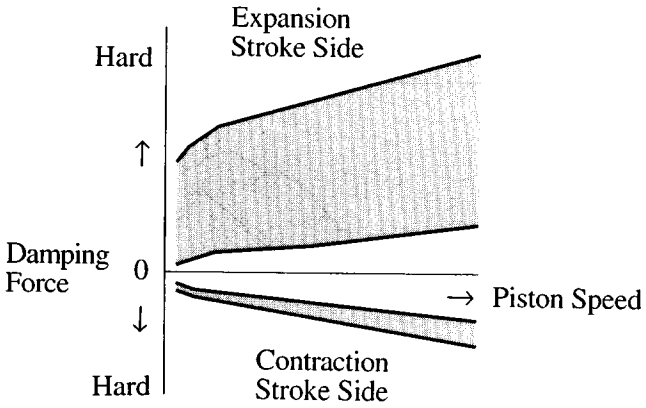



**Damping Force Characteristic**

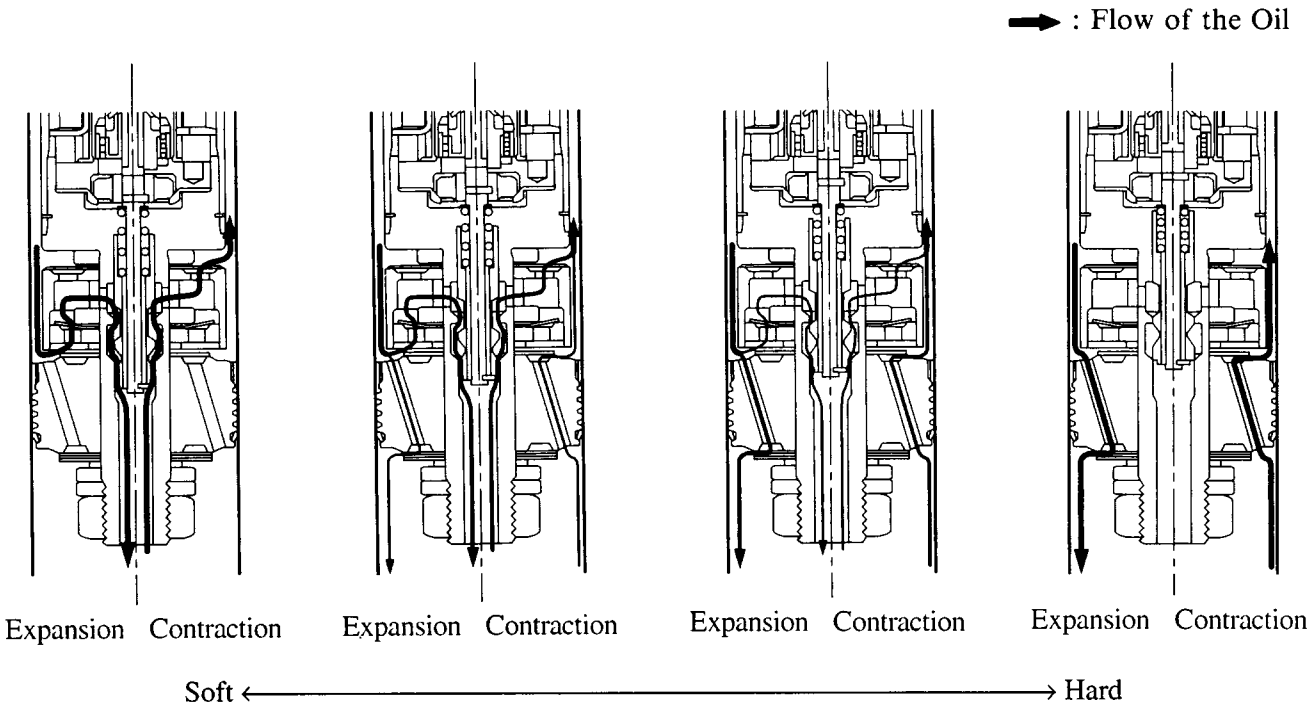
**▶ Rear Shock Absorber ◀**




**Damping Force Characteristic**

▶ **Flow of the Oil** ◀




## Absorber Control ECU

### 1) General

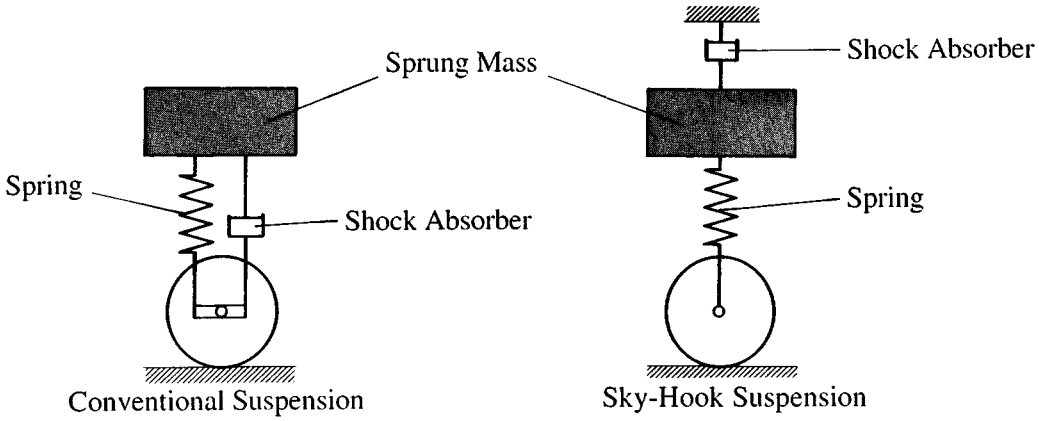
The absorber control ECU, which is located in the instrument panel, is equipped with an internal acceleration sensor to detect the vehicle's vertical movement.

Based on the signals received from the acceleration sensor enclosed in the absorber control ECU and other sensors, the absorber control ECU detects the driving conditions and the vertical movement of the vehicle body (as caused by bumpy roads).

According to the sky-hook theory, the absorber control ECU performs a front/rear wheel control of the damping force of the shock absorbers independently to realize excellent riding comfort, stability, and controllability.

***— REFERENCE —***

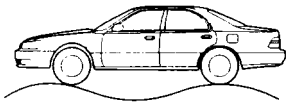
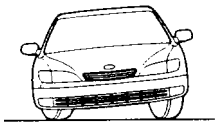
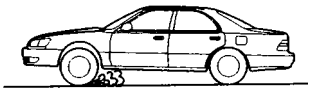
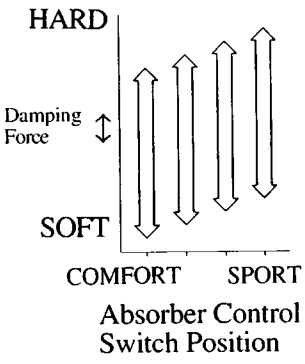
*In order to maintain the vehicle posture fiat and stable, the sky-hook theory is a theory that renders as ideal condition of a vehicle in which only the wheels move up and down when the bumpy road conditions are transmitted to the vehicle body, while the body remains suspended in space via the shock absorbers. In order to attain the movements that are as close as possible to those of the sky-hook theory, the new model minutely controls the shock absorbers' clamping force in response to bumpy roads.*




**Model Based on Vibration Engineering**

### 2) Function of Electric Modulated Suspension

This suspension system performs the controls described below in order to constantly maintain an optimal vehicle posture, thus realizing excellent riding comfort, stability, and controllability.

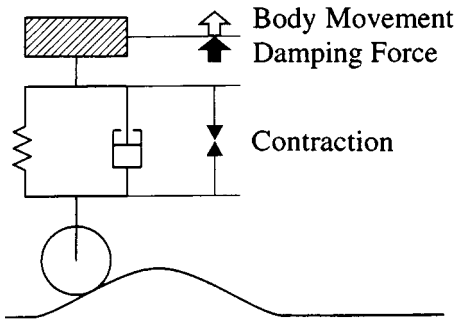
| Control | | | Function |
|---|---|---|---|
| Road-Sensitive Control | Float and Pitch Control |  | Estimates the relative speed between the vehicle body and wheels based on the vehicle body vertical acceleration rate detected by the acceleration sensor and performs a (front/rear wheel independent) semi-active control* of the shock absorbers' damping force. As a result, a damping force that is constantly optimal to the road surface deviation is attained.<br>*: For details, see the next page. |
| | Thumping Sensitive Control |  | When the road surface condition does not require a damping force, this function controls the shock absorbers so that their damping force will not increase. |
| | Unsprung Vibration Control |  | If unsprung resonance is detected, this function controls so that the damping force will not decrease below a certain level, in order to reduce the unsprung resonance. |
| Anti-Roll Control | |  | During cornering, this function makes the damping force firmer, thus restraining the body roll speed in order to realize excellent stability and controllability. |
| Anti-Dive Control | |  | During braking, this function makes the damping force firmer to restrain the body dive, thus ensuring excellent stability and controllability. |
| Anti-Squat Control | |  | During acceleration, this function makes the damping force firmer to minimize the changes in the vehicle body posture. |
| High Speed Control | |  | This function varies the variable range of the damping force according to vehicle speed in order to realize a soft .and comfortable ride and a stable driving condition. The damping force is controlled at a softer variable range at low speeds, and at a firmer variable range at high speeds. |
| Control by Absorber Control Switch | |  | As shown on the left, the absorber control switch enables the driver to select a desired damping force from the 4 modes. |

### 3) Semi-Active Control

Based on the sprung mass and the direction of the shock absorber's movement, the semi-active control determines the conditions which assist and suppress the vibration in terms of the shock absorber's sprung mass. Thus, the semi-active control controls the damping force so that the shock absorber will only apply an effective suppressing force against sprung mass.
Let us take an example of vehicle overcoming a gentle bump and separate it into 4 basic stages (stages ① to ④).

① Starting uphill (1st stage)

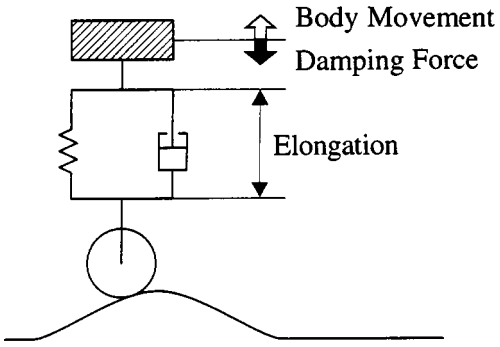
According to the variation in the road surface, the shock absorber contracts and the body moves upward. At this time, the damping force of the shock absorber is applied in the direction which assists the body movement.




**Assisting the Vibrations**

② Ascending (2nd stage)

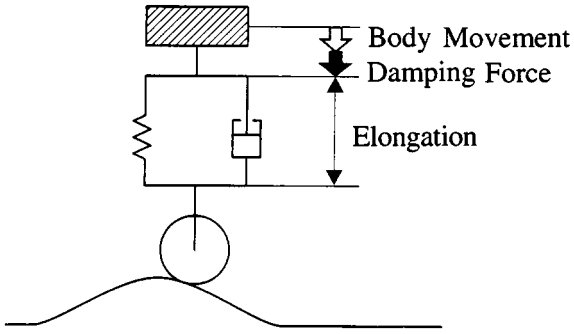
By inertia, the body keeps moving upward causing the shock absorber to elongate gradually. At this time, the damping force of the shock absorber is applied in the direction which restrains the movement of the body.




**Suppressing the Vibrations**

③ Starting Downhill (3rd stage)

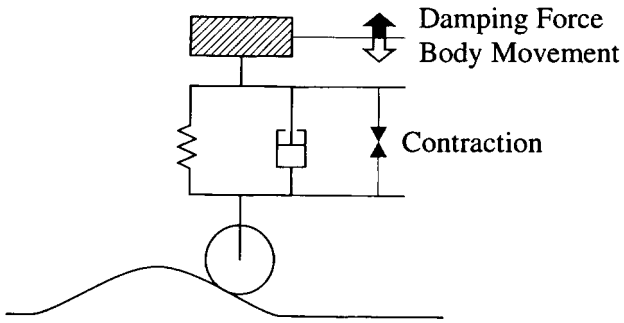
The shock absorber deeps elongating along with the variation of the road surface, but the body starts moving downward. At this time, the damping force of the shock absorber is applied in the direction which assists the body movement.




**Assisting the Vibrations**

④ Descending (4th stage)

By inertia, the body keeps moving downward causing the shock absorber to contract gradually. At this time, the damping force of the shock absorber is applied in the direction which restrains the movement of the body.




**Suppressing the Vibrations**

Thus, during stages ① and ③ the shock absorbers assist the vibration to create a softer damping force, and during stages ② and ④ the shock absorber suppress the vibration to create a hard damping force, the shock absorbers are minutely controlled to suppress the vibration to restrain the movement of the body and of the shock absorbers.
The above processes are performed independently between the front and rear wheels in order to stabilize the vehicle to a flat posture.

**4) Self-Diagnosis**

If a malfunction occurs in any of the sensors or actuators, the diagnostic code of that malfunction is stored in memory. However, once the ignition switch is turned OFF, the diagnostic code is erased.
For diagnostic code check method, diagnostic code and diagnostic code clearance, see the 1997 ES300 Repair Manual (Pub. No. RM511U).

**5) Fail-Safe**

If a malfunction occurs in any of the sensors or actuators, the control of the damping force will be limited.

# STEERING

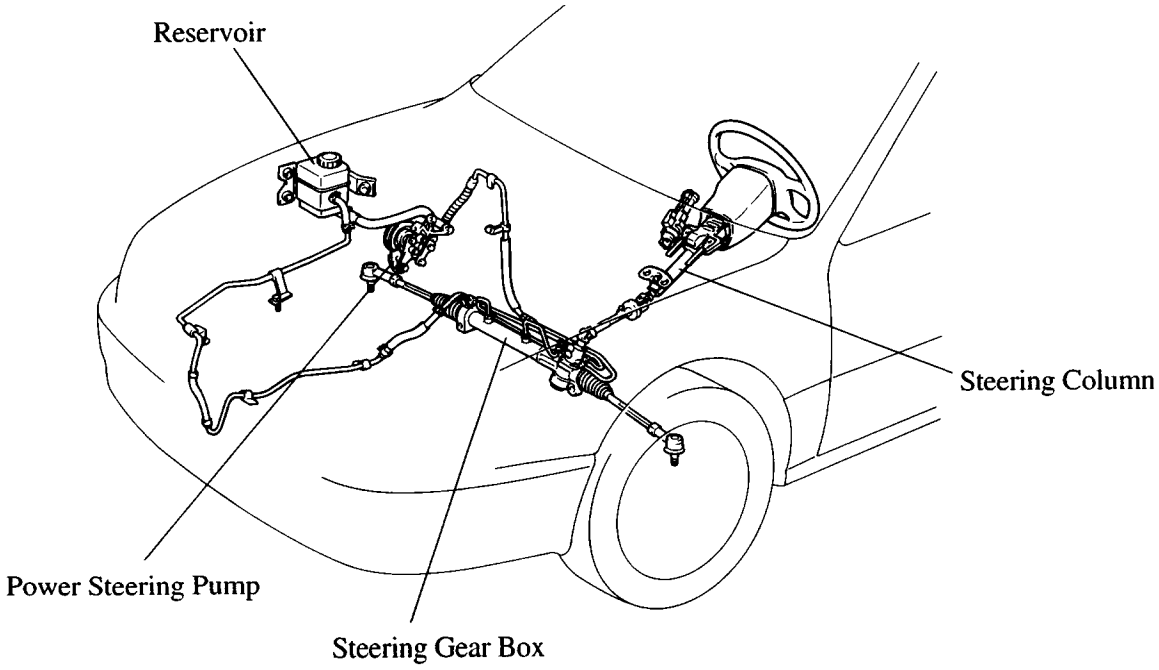
## ● DESCRIPTION

° An engine revolution sensing type rack and pinon power steering is used on all models.

° A compact and lightweight tilt steering is used on all models.

° An energy absorbing mechanism has been changed.

° Along with the discontinuance of the electronically controlled hydraulic cooling fan system, a single type power steering pump has been adopted.



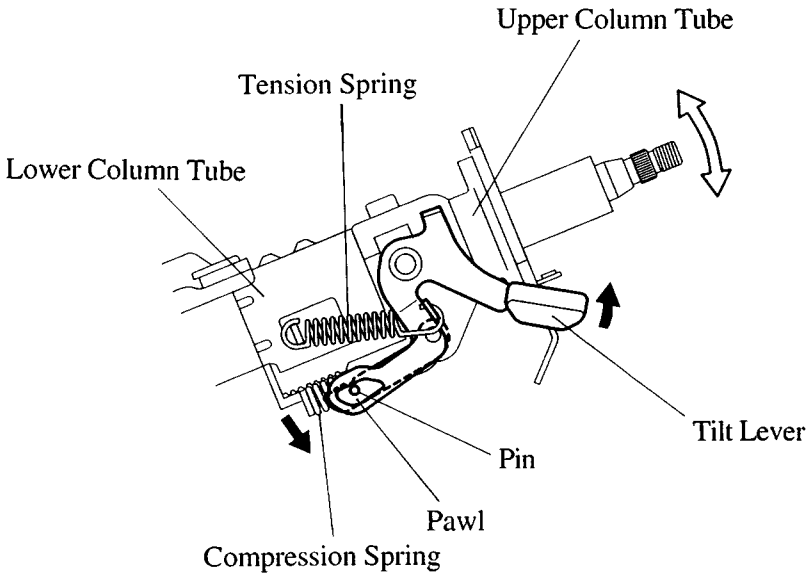

**▶ Specifications ◀**

| Model / Item | New | Previous |
|---|---|---|
| Gear Ratio (Overall) | 17.4 :1 | 15.9: 1 |
| No. of Turn Lock to Lock | 3.0 | 2.7 |
| Rack Stroke mm (in) | 145 (5.71) | ← |
| Fluid Type | ATF Type DEXRON®II or III | ← |

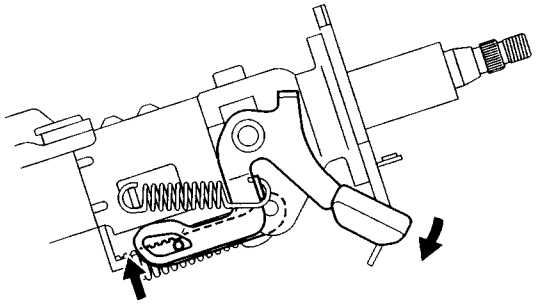
## • STEERING COLUMN

### 1. Tilt Mechanism

The tilt mechanism consists of a tilt lever, pawl, upper column tube, lower column tube, tension spring and compression spring.
A hole is provided at the tip of the tilt lever, into which the pawl pin is inserted.
Because the pawl pin is inserted into the hole at the tip of the lever, moving the tilt lever causes the pawl to move downward. As a result, the ratchet of the lower column tube and the ratchet of the pawl disengage from each other to release the tilt lock.
Releasing the tilt lever causes the lever (which is under spring tension) to return. Accordingly, the pawl is pushed upward, causing the ratchet of the column tube and the ratchet of the pawl to engage with each other, thus locking the tilt lock.




**Free**

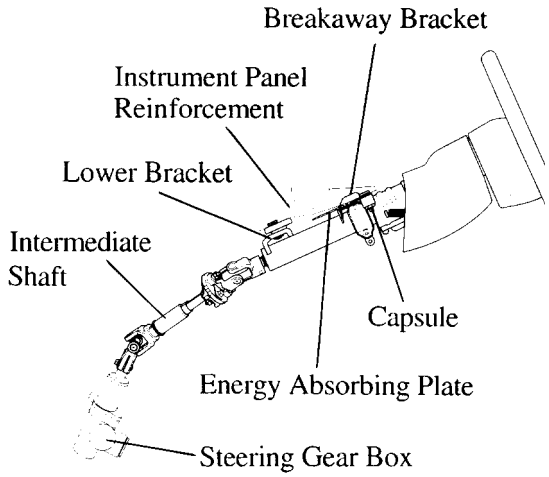


**Lock**

## 2. Energy Absorbing Mechanism

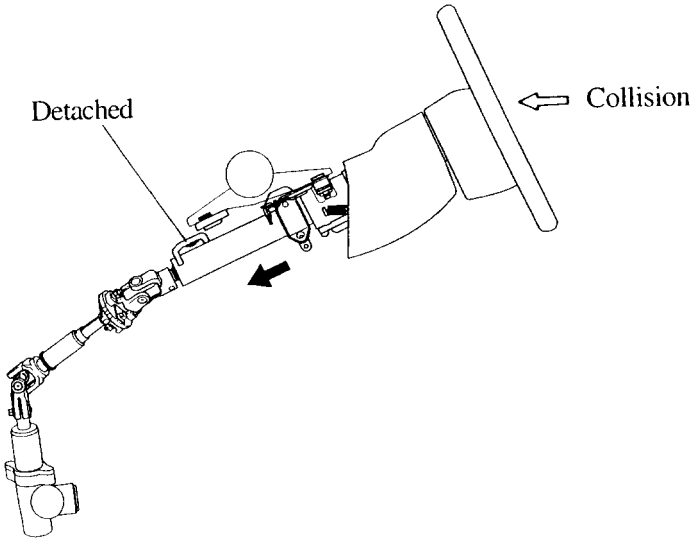
### Construction

The energy absorbing mechanism of the steering column consists of a lower bracket, breakaway bracket and energy absorbing plate.
The breakaway bracket is attached to the instrument panel reinforcement via the capsule and the energy absorbing plate.
The steering column and steering gear box are connected with an elastic intermediate shaft.

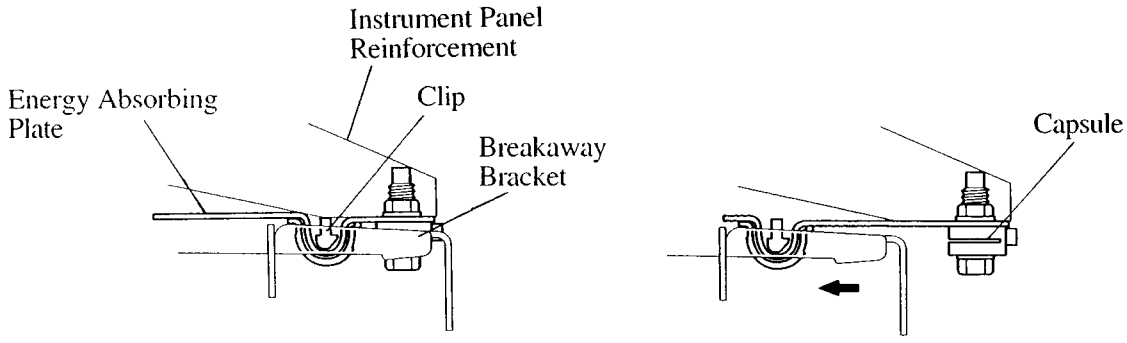



### Operation

The collision is transmitted to the steering wheel, the lower bracket and the breakaway bracket will become detached from each other, thus moving the entire unit forward. At the same time, the energy absorbing plate becomes deformed to absorb the energy of the impact.




**▶ Energy Absorbing Plate ◀**




**Before Collision** **During Collision**

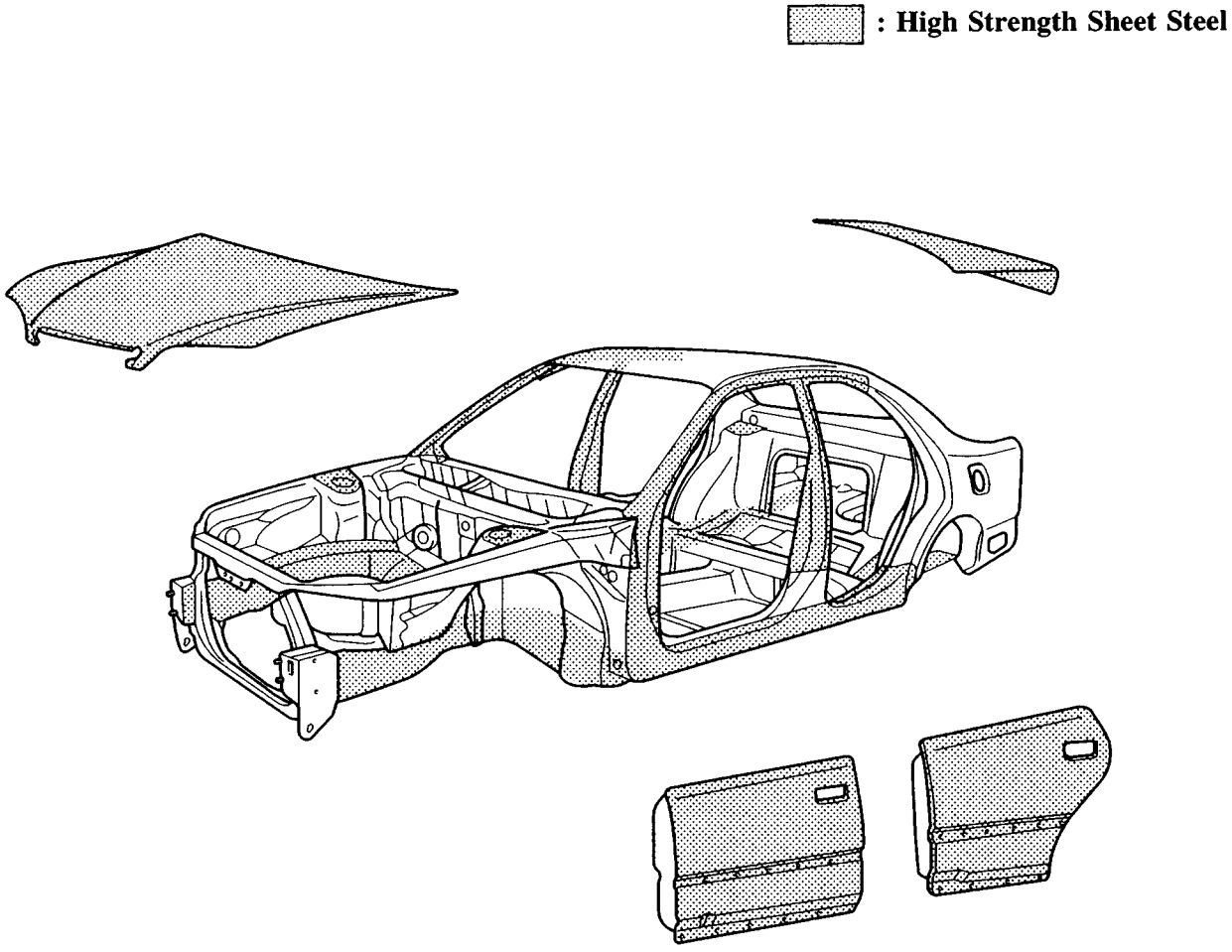
# BODY

## LIGHTWEIGHT AND HIGHLY RIGID BODY

The body of the new ES300 is made highly rigid and lightweight through refinement of the shape and construction of each part, improved joint rigidity, and increased use of high strength sheet steel.

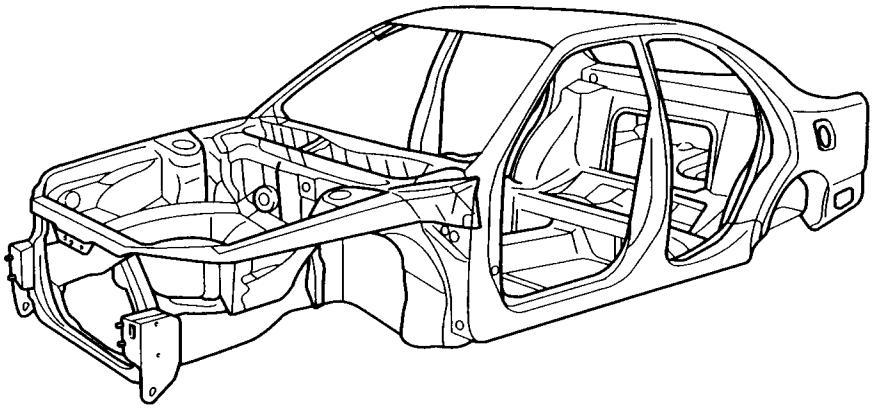
### • HIGH STRENGTH SHEET STEEL

Light and highly rigid high strength sheet steel is used for the hood, door panels and members.

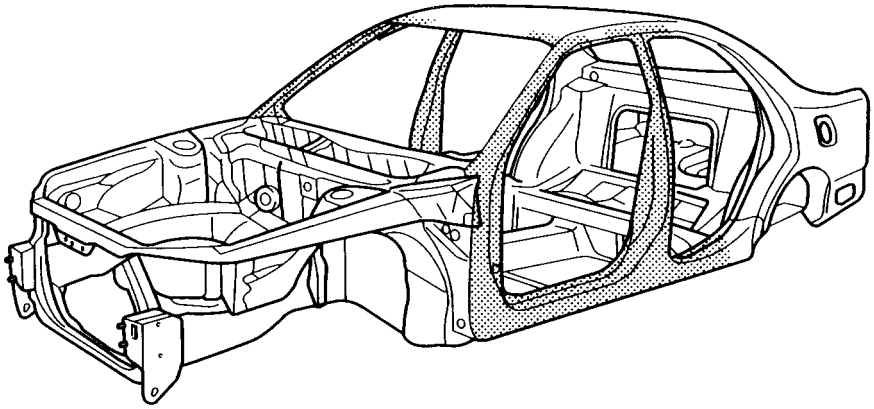


## ● BODY SHELL

° The body of the new ES300 is made highly rigid through the optimization of the location of reinforcements, the continuity in underbody members, and via excellent joint rigidity.

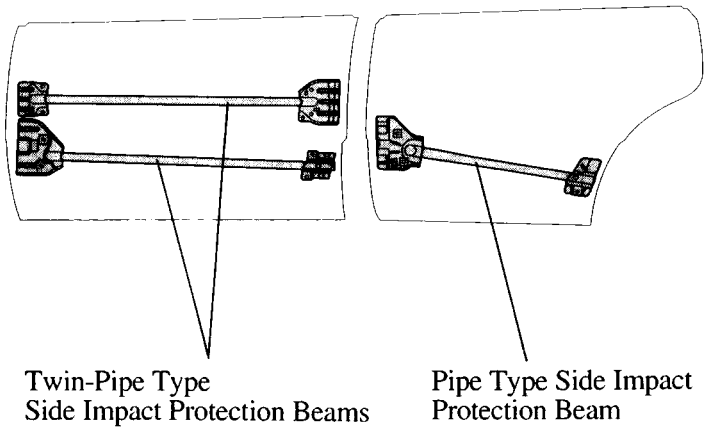


° At each pillar, a continuous reinforcement is provided from where the pillar meets the roof, all the way to the rocker, thus resulting in a strong pillar construction. In addition, the areas where the pillar joins the roof side rail and the rocker have been strengthened to realize excellent body rigidity.



## • DOORS

A twin-pipe type side impact protection beams are mounted in the center space between the front door panels. Similarly, a side impact protection beam is provided in the rear door.



## ● IMPACT ABSORBING STRUCTURE

### 1. General

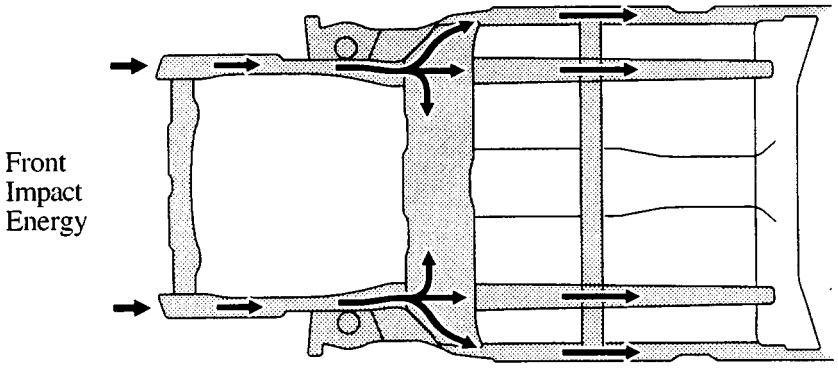
The impact absorbing structure of the new ES300 provides a body construction that can effectively absorb the energy of impact in the event of a front, rear, or side collision. Also, it realizes an excellent occupant protection performance through the use of reinforcements and members that help minimize cabin deformation.

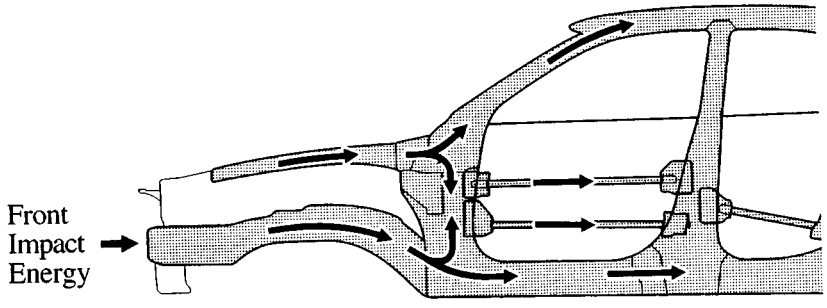
### 2. Construction

#### Impact Absorbing Structure for Front/Rear Collision

In conjunction with the revision made to the impact absorbing structure for a front or rear collision, the cross section of the underbody members, pillars, and reinforcements have been increased in size and thickness of the material used.
Accordingly, the underbody and cabin framework were made to efficiently absorb and dissipate the impact energy in case of a front or rear collision, thus realizing a body structure to minimize cabin deformation.

**▶ Impact Absorbing Structure for Front Collision ◀**

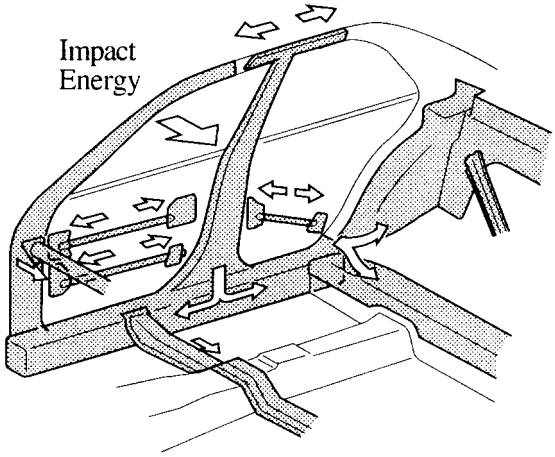


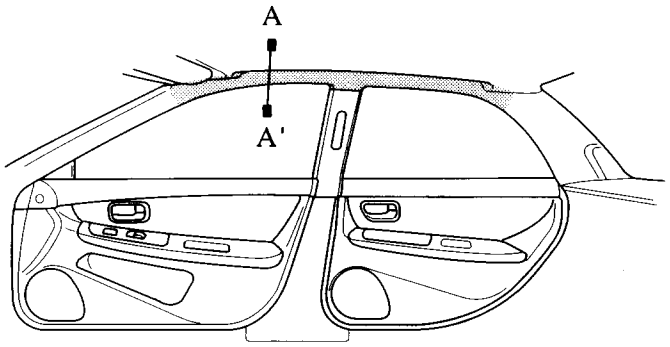
### Impact Absorbing Structure for Side Collision

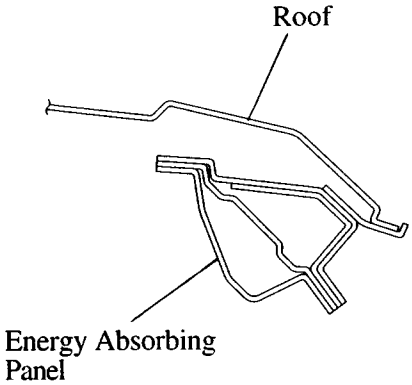
Impact energy of a side collision directed to the cabin area is dispersed throughout the body via pillar reinforcements, side impact protection beams, floor cross members, etc. This dispersion of energy keeps the energy directed to the cabin to a minimum level. In addition, the body is made highly rigid through reinforced joints and the use of high strength sheet steel in order to maintain the maximum preservation of the cabin space. And, in order to make the door more energy absorbent, a closed cross section configuration is provided at the belt line area of the front and rear doors.
Also, a soft upper interior construction has been adopted. With this type of construction, if the occupant's head collides against the roof side rail in reaction to a collision, the inner panel of the roof side rail collapses to reduce the impact.

**▶ Impact Absorbing Structure for Side Collision ◀**




**▶ Soft Upper Interior Structure ◀**



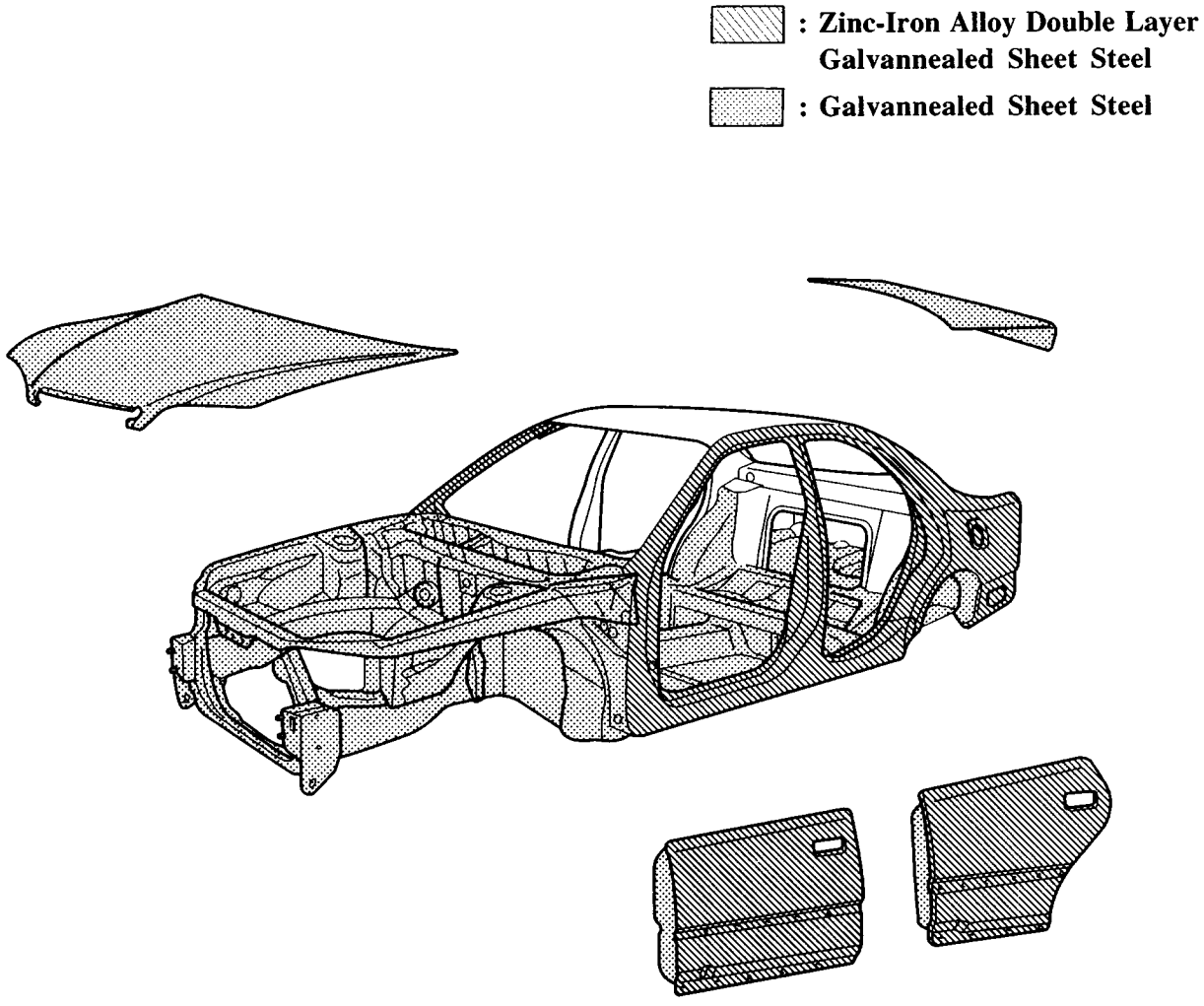

**A – A' Cross Section**

# RUST-RESISTANT BODY

Rust-resistant performance is enhanced by extensive use of anti-corrosion sheet steel and is performing an anti-corrosion treatment by applying wax, sealer and anti-chipping paint to easily corroded pans such as the hood, doors and rocker panels.

## ▶ ANTI-CORROSION SHEET STEEL

Two types of anti-corrosion sheet steel are used: galvannealed sheet steel and zinc-iron alloy double layer galvannealed sheet steel. Galvannealed sheet steel is used for hood, luggage compartment door, many inner panels and engine compartment. Zinc-iron alloy double layer galvannealed sheet steel is used for side outer panels and doors.



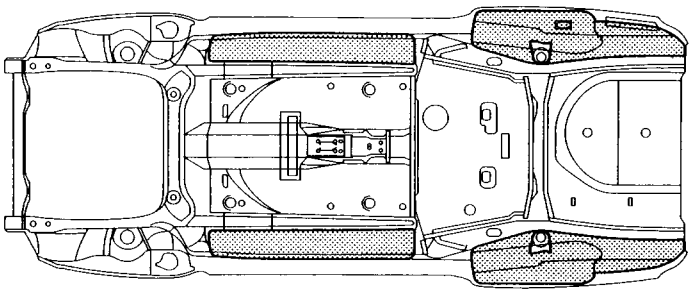
## ▶ WAX AND SEALER

Wax and sealer are applied to the hemmed portions of the hood, door panels and luggage compartment door to improve rest-resistant performance.

## ▶ UNDER COAT

PVC (Polyvinyl Chloride) coating is applied to the under side of the body. A thick coating to improve rust resistant performance is applied to the bottom side of the cowl panel, the fender apron and other pans which are subject to damage by flying stones, etc.

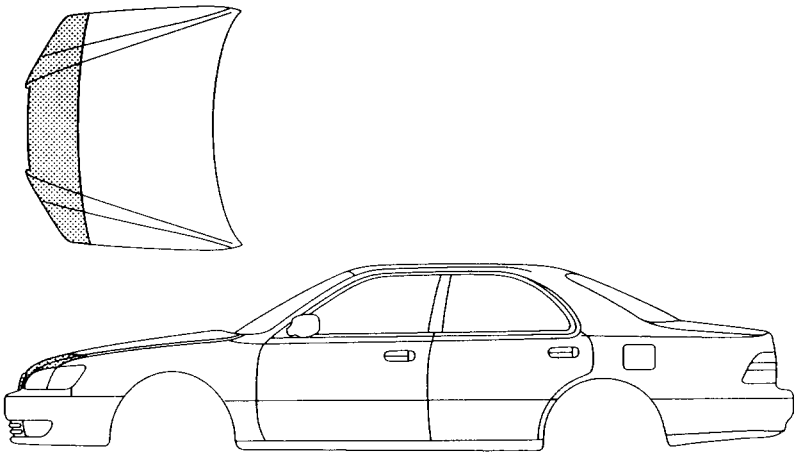
**: PVC Coating Area**



## ▶ ANTI-CHIPPING APPLICATION

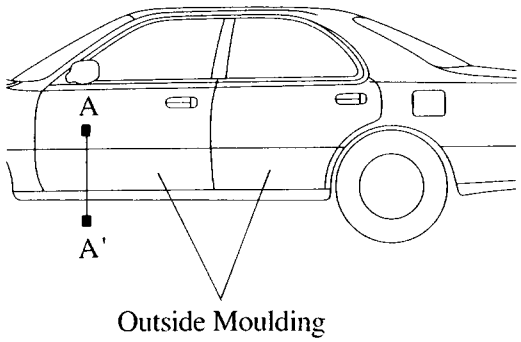
Soft-chip primer is applied to the hood.

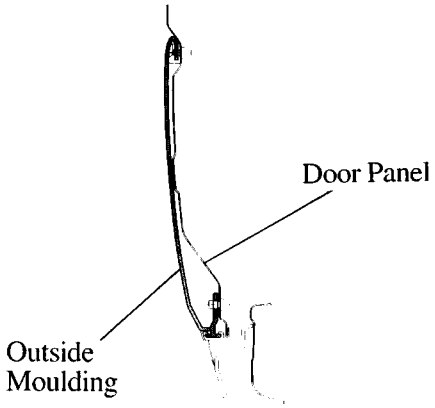
**: Soft-Chip Primer**



## ▶ OUTSIDE MOULDING

Outside mouldings made of TSOP (The Super Olefin Polymer) have been provided to protect the bottom of the doors from chipping by flying stones.

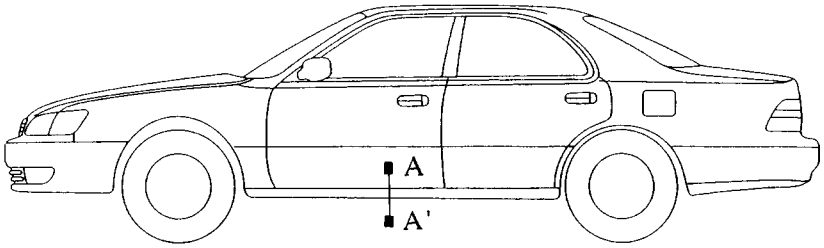


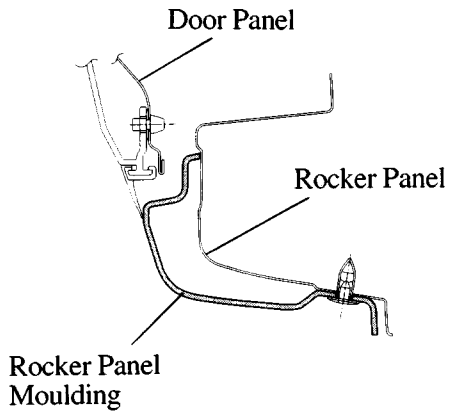



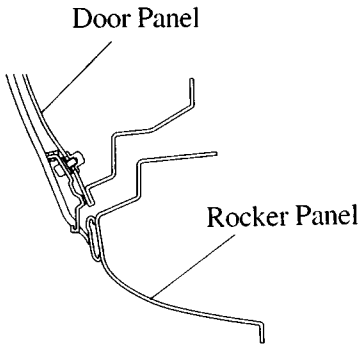

**A – A' Cross Section**

## ▶ ROCKER PANEL MOULDING

A rocker panel moulding has been provided to protect the rocker panels from chipping by flying stones. This moulding is a fore-aft integrated type that offers a seamless, attractive design.




**New** **Previous**

**A – A' Cross Section**

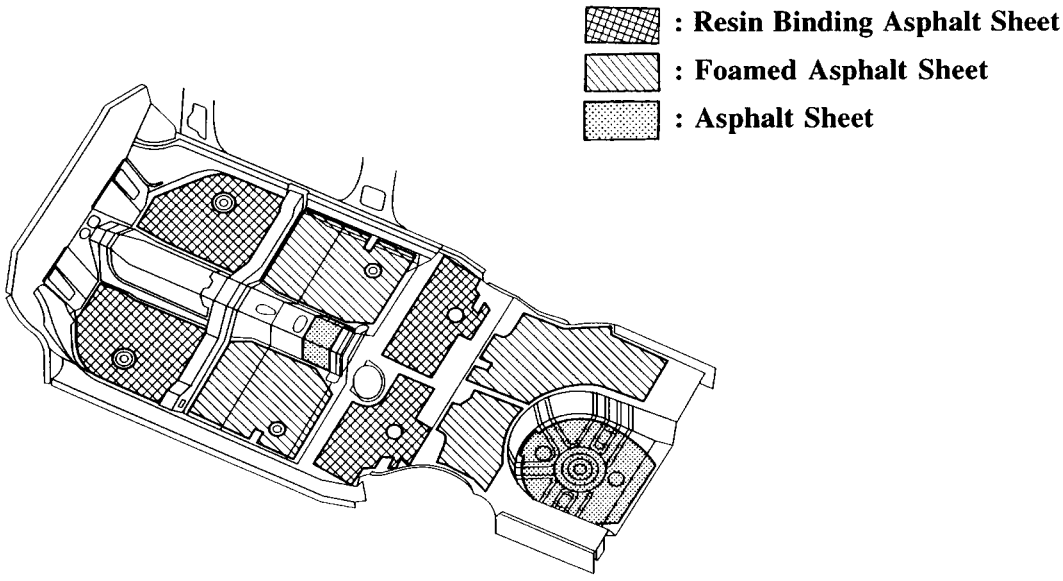
# LOW VIBRATION, LOW NOISE BODY

Effective application of vibration damping and noise suppressant materials reduces engine and road noise.

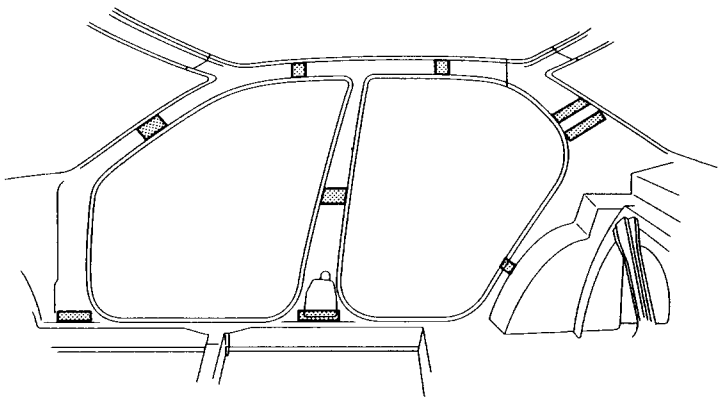
## • SOUND ABSORBING AND VIBRATION DAMPING MATERIALS

- Sandwich panels are used in the dash panel, cowl panel, front floor panel and rear wheel housings.
- Resin binding asphalt sheet and foamed asphalt sheet are optimally allocated to reduce engine and road noise for quieter vehicle operation.
- Foamed material is applied onto the roof panel and pillars to reduce wind noise.

**▶ Resin Binding Asphalt Sheet and Foamed Asphalt Sheet ◀**




**▶ Foamed Sponge Rubber ◀**



## AERODYNAMICS

To improve aerodynamic performance, the following measures have been taken.

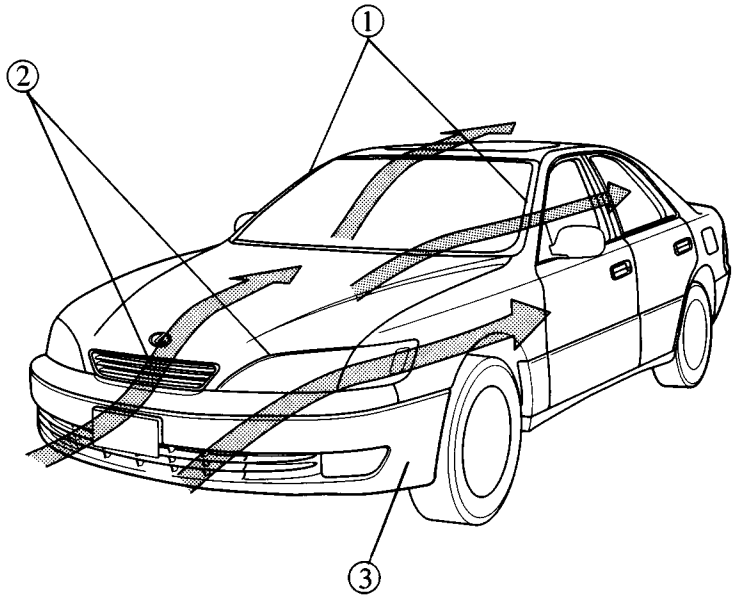
① A large rain gutter has been provided in the front pillar to ensure a smooth airflow from the front to the side.

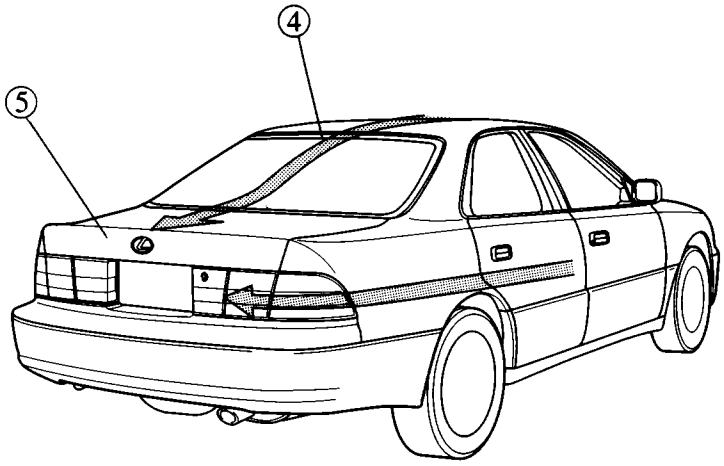
② The front edge of the hood and the area around the headlights offers a smooth shape with minimal level differences for smooth airflow characteristics.

③ The under shape of the front bumper collects the flow of air under the floor.

④ The body line from the roof to the luggage compartment allows the air to flow smoothly from the top of the roof to the rear.

⑤ To ensure a smooth airflow from the roof to the rear, the shape of the luggage compartment door has been optimized.

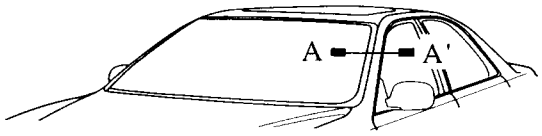


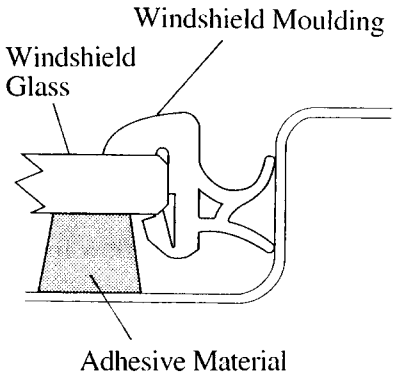



# ENHANCEMENT OF PRODUCT APPEAL

## ▶ WINDSHIELD MOULDING

A rain gutter has been incorporated into the periphery of the windshield moulding in order to reduce the rain flow down from the roof panel to the windshield glass.

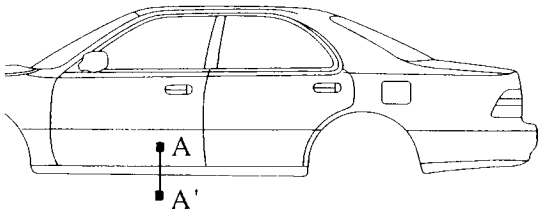


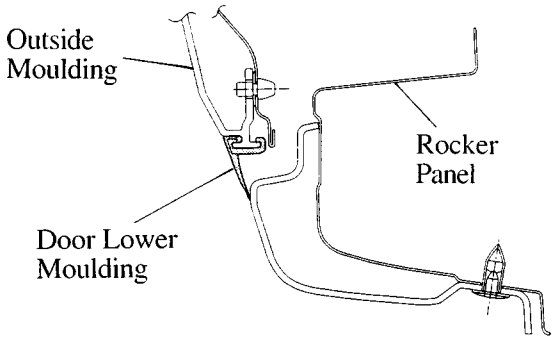




**A – A' Cross Section**

## ▶ DOOR LOWER MOULDING

A door lower moulding has been provided below the outside moulding to prevent the top of the rocker panels from getting soiled. This prevents the passengers' clothes from getting dirty when entering and exiting the vehicle.




**A – A' Cross Section**

# SEAT BELT PRETENSIONER

## • DESCRIPTION

A mechanical sensing type seat belt pretensioner is incorporated with the front outerside seat belt.
In a collision, the pretensioner sensor detects the shock and if the front-to-rear shock is greater than a specified value, the seat belt pretensioner is activated instantaneously to pull in a predetermined length of the seat belt.

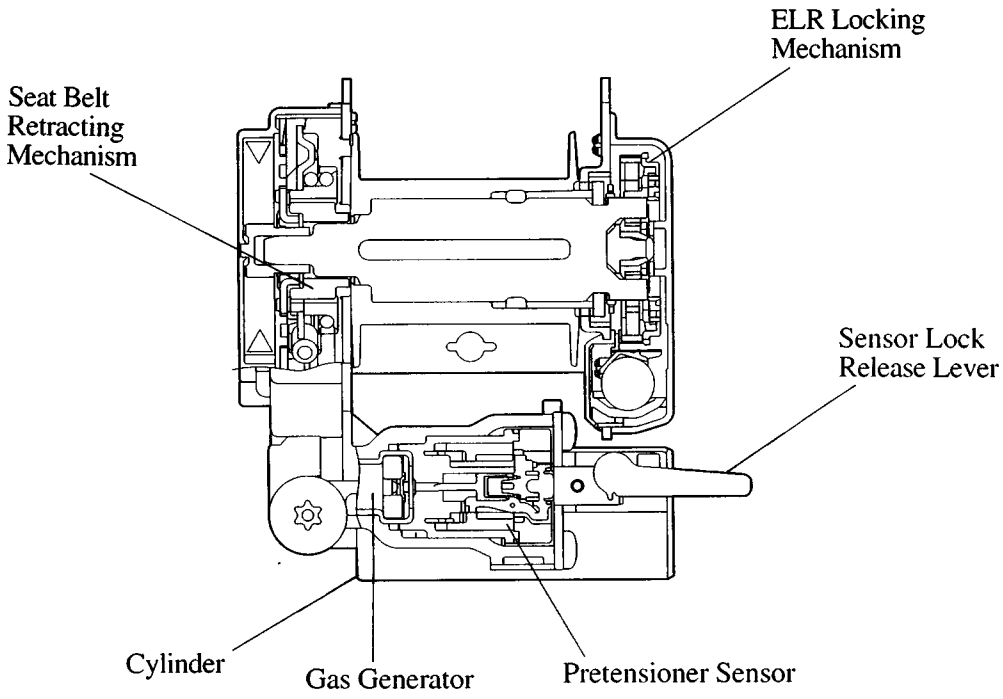
***— REFERENCE —***

*The mechanical sensing type seat belt pretensioner is equipped with an independent pretensioner sensor. For this reason, depending on the circumstances of the collision, the seat belt pretensioner may not operate when the airbag is deployed, and vice versa. The same is applied between the right and left seat belt pretensioners.*

## • CONSTRUCTION AND OPERATION

### 1. General

The seat belt pretensioner consists of the pretensioner mechanism, retractor mechanism, and ELR locking mechanism. The pretensioner mechanism consists of a pretensioner sensor, gas generator, cylinder, etc. The pretensioner sensor detects the vehicle's deceleration speed during a collision.
In addition, a safety device is installed to prevent the seat belt pretensioner from being activated by the seat belt retractor assembly alone.

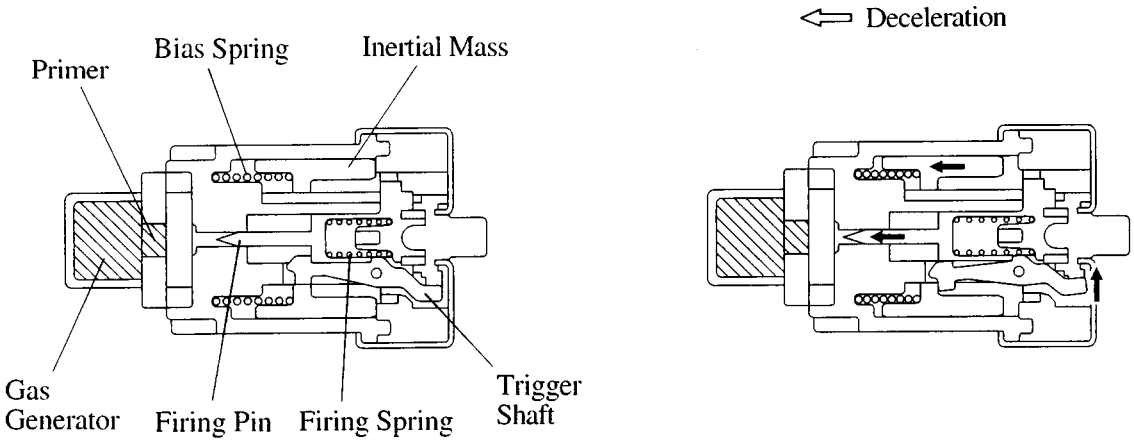



**Right-Hand**

## 2. Gas Generator with Pretensioner Sensor

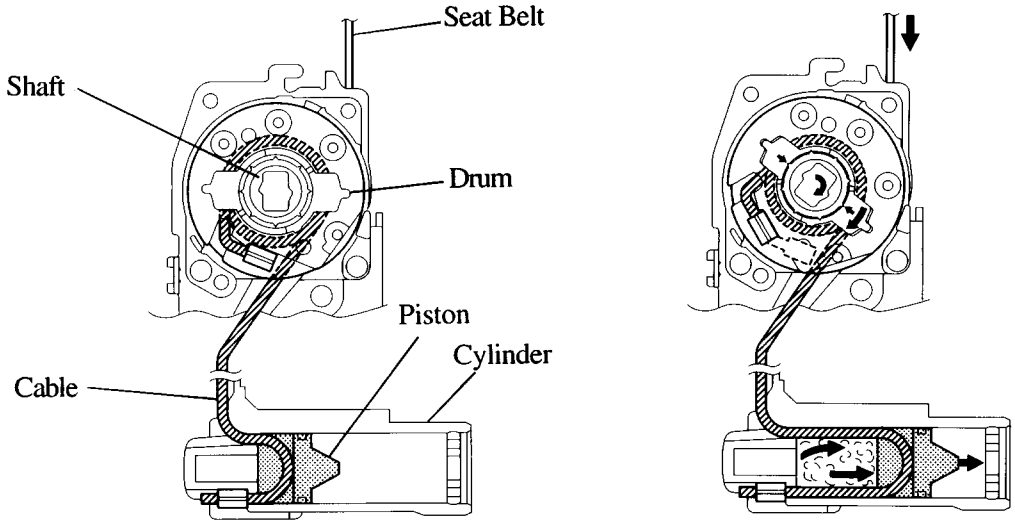
The pretensioner sensor consists of a inertial mass, trigger shaft, firing pin, firing spring, etc.
The trigger shaft and the firing pin are normally engaged with each other so that the firing pin is not ejected. In addition, if any unnecessary inertial mass movement is suppressed by the bias spring force, the seat belt pretensioner is not activated by mistake.
If a severe frontal collision occurs, the vehicle decelerates instantaneously. The inertial mass begins to move despite the bias spring force. If rapid deceleration continues, the spring force of the firing spring disengages the firing pin from the trigger shaft, ejects the firing pin, and ignites the primer. The flame spreads instantaneously to the gas generator and a large amount of gas is generated from the gas generator.

**▶ Non-Deployed State ◀** **▶ Deployed State ◀**




## 3. Pretensioner Mechanism

When the pretensioner sensor comes on, the gas generator emits gas in an extremely short time and pushes the piston. Since the cable is attached to the piston, the piston will pull on the cable causing the drum to grab onto the shaft. The shaft will then move in the retracting direction taking up the belt for a predetermined length.

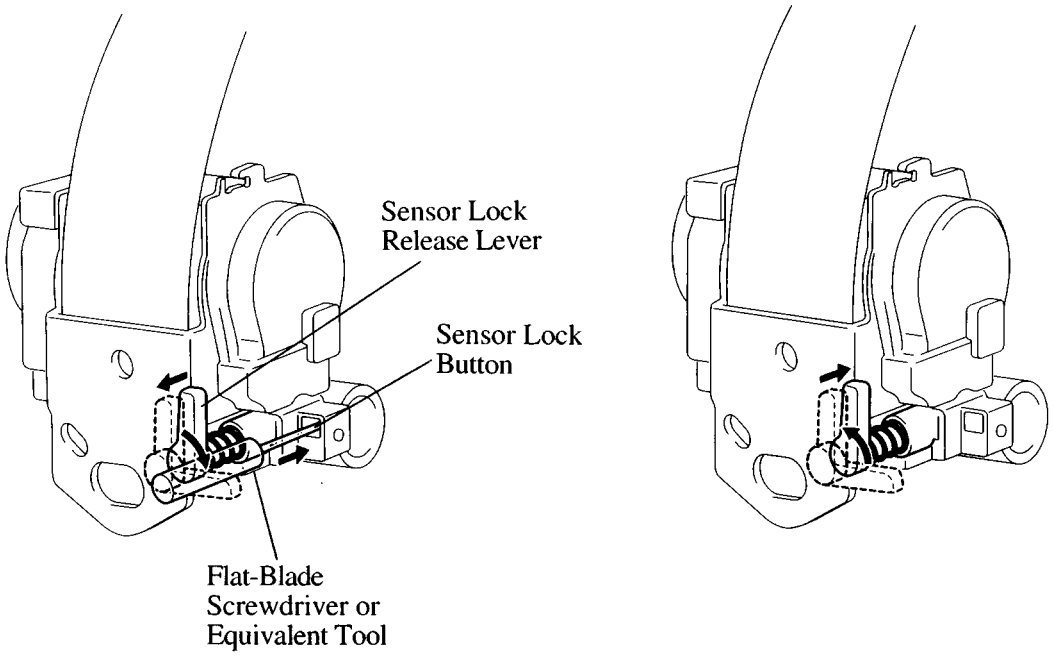



**Inactive** **Activated**

## 4. Safety Device

To activate the safety device, the sensor lock button illustrated below must be pressed with a flat-blade screwdriver or an equivalent tool, which causes the sensor lock release lever to push out and turn 90° clockwise. As a result, the trigger shaft becomes fixed and stops the operation of the seat belt pretensioner. To release the safety device, rum the sensor lock release lever counterclockwise and press it in.

**▶ Safety Device Active ◀** **▶ Safety Device Released ◀**




**Service Tip**

During the installation of a seat belt pretensioner onto the vehicle, if the safety device is active, the sensor lock release lever and center pillar garnish infringe upon each other and will prevent the center pillar garnish from attaching. This prevents the technician from forgetting to release the safety device.

# BODY ELECTRICAL

## LIGHTING

### • DESCRIPTION

The new ES300 has the following systems:

| System | Outline |
|---|---|
| Headlights | The new ES300 has newly adopted the 4-light multi-reflector type headlights. For details, see the next page. |
| Automatic Light Control System | Positioning the light control switch at AUTO turns the headlights and taillights on or off, depending on the light availability surrounding the vehicle, as detected by the automatic light control sensor. In the new model, automatic light control relay is integrated with the automatic light control sensor.<br>The basic construction and operation are the same as in the '95 LS400. |
| Daytime Running Light System | This system is designed to automatically activate the headlights during the daytime to keep the car highly visible to other vehicles. As in the previous model, the headlights are activated at a reduced level from the normal high beam brightness.<br>Also, only the high beam headlight bulb is turned on as daytime running light.<br>The basic construction and operation are the same as in the previous model. |
| Auto Turn-Off Light System | When the ignition key is turned from ON to ACC or LOCK position and the driver's door is opened with the taillights and headlights turned on, this system automatically turns them off.<br>The basic operation of this system is the same as in the previous model. |
| Illuminated Entry System | This system is useful when entering the vehicle, fastening the seat belts and inserting the ignition key into the key cylinder in the dark.<br>As in the previous model, when any of the doors is opened, the illuminated entry system turns on the illumination lights around the ignition key cylinder and dome light (only when the control switch is at DOOR position) simultaneously and fade out in about 15 seconds.<br>The basic operation of this system is the same as in the previous model. |

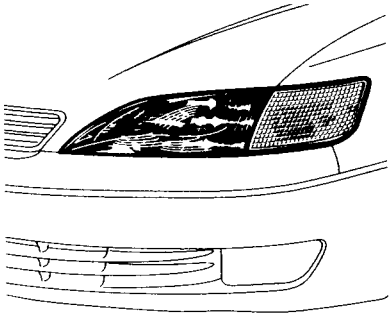
## • HEADLIGHTS

### 1. General

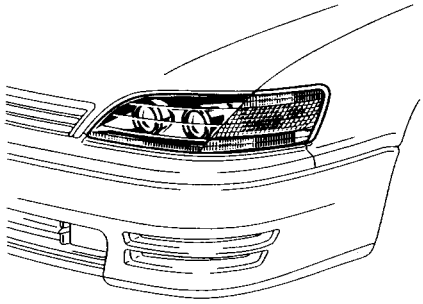
On the new ES300, the headlight construction has been changed from the 4-light projector type headlights of the previous model to the 4-light multi-reflector type headlights.

### 2. Multi-Reflector Type Headlight

Conventional headlights accomplish the dispersion and distribution of the light that is emitted by the bulbs through the lens cut pattern. However, with the multi-reflector type headlights, the light from the bulbs is dispersed and distributed through multiple parabolic shaped reflectors. As a result, the lens cut pattern is no longer provided in the center of the lens, thus realizing a clear look.

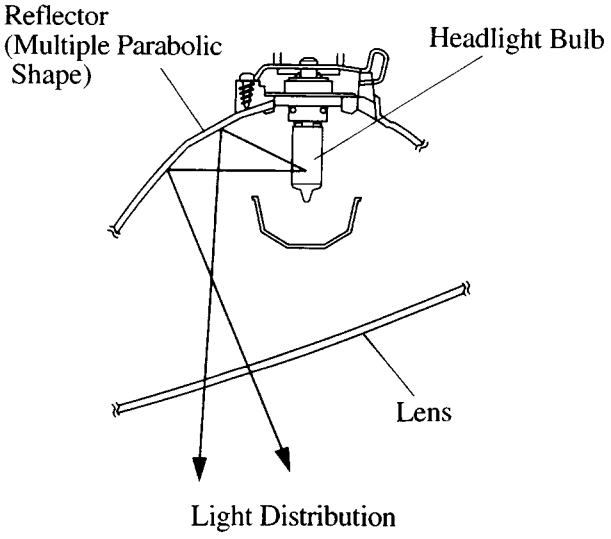


**New**

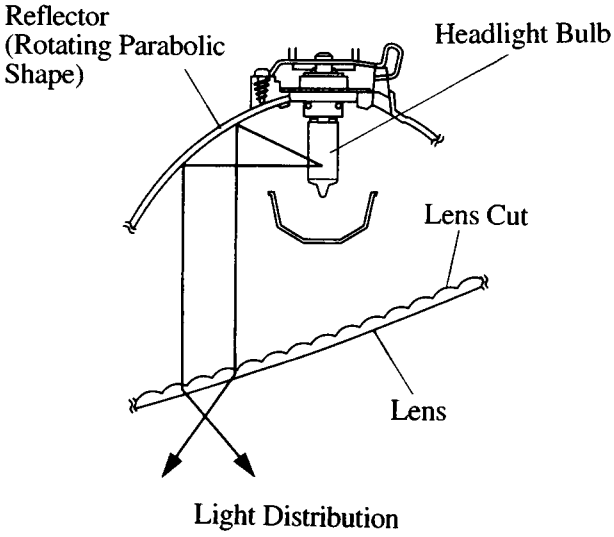


**Previous**

**▶ Light Distribution Diagram ◀**




**Multi-Reflector Type Headlight**




**Conventional Headlight**

# AIR CONDITIONING

## ● DESCRIPTION

### 1. General

The air conditioning system in the new ES300 has the following features:

- ° A fully automatic controlled type air conditioning system is used on all models.
- ° The heater control panel is an easy-to-use dial and push button type panel.
- ° As in the previous model, an air conditioning unit that incorporates a blower, heater and cooler unit, has been adopted.
- ° An aluminum heater core has been adopted on all models.
- ° The defroster nozzle inner wall is modified into a radial configuration for smoother air flow.
- ° A defroster-linked air conditioning startup control, which automatically engages the air conditioning when the defroster mode has been selected, is provided.
- ° As in the previous model, the self-diagnosis function has been adopted.

**▶ Performance ◀**

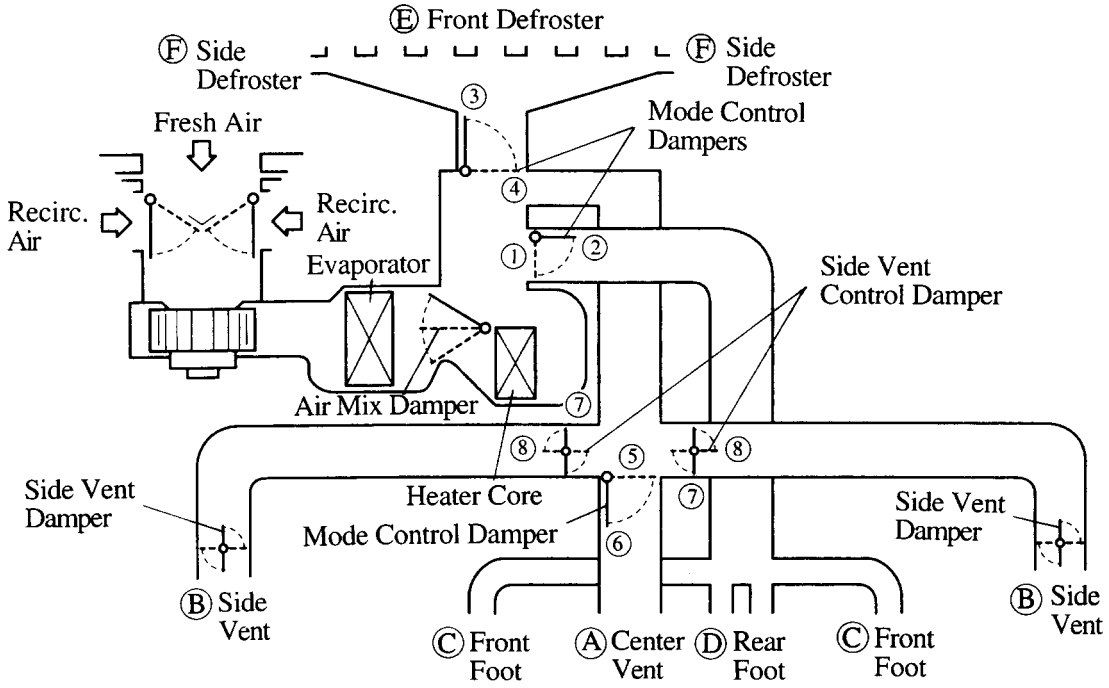
| Model / Item | | | New | Previous |
|---|---|---|---|---|
| Heater | Heat Output | W (Kcal/h) | 5580 (4800) | ← |
| | Air Flow Volume* | $m^3/h$ | 360 | 380 |
| | Power Consumption | W | 220 | ← |
| Air Conditioning | Heat Output | W (Kcal/h) | 5350 (4600) | ← |
| | Air Flow Volume | $m^3/h$ | 530 | ← |
| | Power Consumption | W | 260 | ← |
| Defroster | Air Flow Volume* | $m^3/h$ | 360 | ← |

*:With Side Vent Closed

**▶ Specifications ◀**

| Model / Item | | | New | Previous |
|---|---|---|---|---|
| Ventilation and Heater | Heater Core | Type | Dimpled Tube Type | ← |
| | | Size W x H x L mm (in.) | 155.7 x 220 x 27 (6.1 x 8.7 x 1.1) | 160 x 220 x 32 (6.3 x 8.7 x 1.3) |
| | | Fin Pitch mm (in.) | 2.0 (0.08) | 1.8 (0.07) |
| | Blower | Motor Type | S80Fs12.5T | S80Fs12T |
| | | Size Dia. x H mm (in.) | 150 x 75 (5.9 x 3.0) | ← |
| Air Conditioning | Condenser | Type | 3–Passage Flow Type | ← |
| | | Size W x H x L mm (in.) | 415.6 x 726 x 22 (16.4 x 28.6 x 0.9) | 435.2 x 686 x 22 (17.1 x 27.0 x 0.9) |
| | | Fin Pitch mm (in.) | 4.5 (0.18) | 3.5 (0.14) |
| | Evaporator | Type | Draw Cup Type | ← |
| | | Size W x H x L mm (in.) | 260 x 252 x 90 (10.2 x 9.9 x 3.5) | ← |
| | | Fin Pitch mm (in.) | 4.0 (0.16) | ← |
| | Compressor | Type | 10PA17C | ← |
| | Refrigerant | Type | HFC134a (R134a) | ← |

## 2. Damper Position and Air Flow Relationship




| Air Outlet Mode | | Mode Control Damper Position | Vent | | Foot | | Defroster | |
|---|---|---|---|---|---|---|---|---|
| | | | Ⓐ Center | Ⓑ Side | Ⓒ Front | Ⓓ Rear | Ⓔ Front | Ⓕ Side |
| Face | | ①④⑥⑧ | ○ | ○ | | | | |
| Bi-Level | | ②④⑥⑧ | ○ | ○ | ○ | ○ | | |
| Foot | | ②④⑤⑦ | | ○ | ○ | ○ | ○ | ○ |
| Foot/Defroster | | ②③⑤⑦ | | ○ | ○ | ○ | ○ | ○ |
| Defroster | | ①③⑤⑦ | | ○ | | | ○ | ○ |

Air flow volume differs according to the size of the circle ○ shown in the table.

## ● CONSTRUCTION AND OPERATION

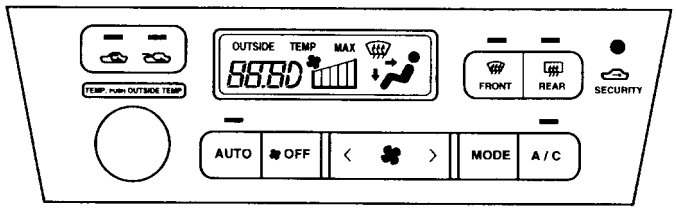
### 1. Heater Control Panel

° An easy-to-use dial and push button type heater control panel is used.

° The size and the position of the buttons are designed with the frequency of use and the order of operation controls is taken into account.

° The heater control panel uses a larger LCD (Liquid Crystal Display) to display the set temperature, air outlet status, etc., and improves its visibility.

° The set temperature display and the outside temperature display on the heater control panel can be switched by the push of a button.




### 2. Air Conditioning Unit

As in the previous model, the air conditioning unit incorporates a blower, heater and cooler units. This provides high rigidity and lower ventilating resistance.

#### Heater Core

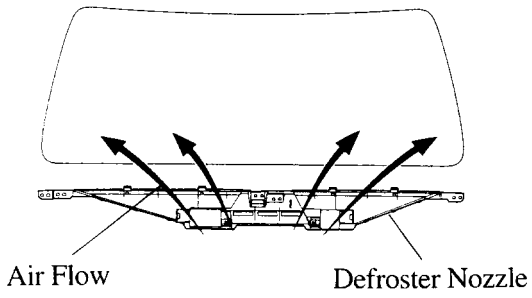
A lightweight aluminum heater core is used on all models.

### 3. Condenser

As in the previous model, the 3-passage flow type condenser which has a greater heat exchanging capability has been adopted on all models.

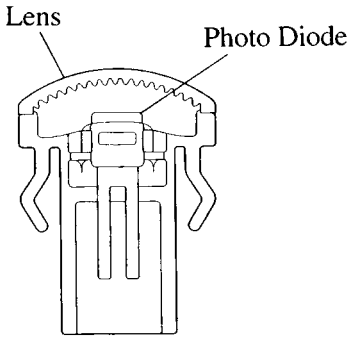
### 4. Defroster Nozzle

The front defroster nozzle inner wall is modified into a radial configuration for a smoother air flow.

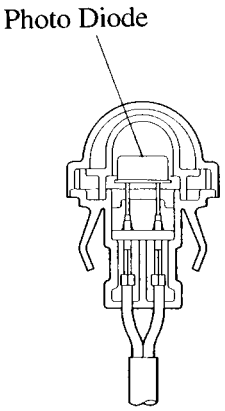


## 5. Solar Sensor

As in the previous model, a dome-type solar sensor is used. However, in the new model, the sensor is made compact for improved appearance, and the orientation of the light is improved through the lens cutting process. As a result, the air-conditioning control capabilities while under diagonal solar radiation are improved.




**New**




**Previous**

## 6. Air Conditioning ECU

The following table is a comparison of the air conditioning ECU functions between the new and previous model.

| System | Function | New | Previous |
|---|---|---|---|
| Calculation of Required Outlet Air Temperature | Calculates the required outlet air temperature based on the set temperature, room air temperature, ambient air temperature and solar radiation. | ○ | ○ |
| Temperature Control | To drive the air mix servomotor in accordance with the required outlet air temperature, the air temperature passed through the evaporator and the engine coolant temperature and to control the outlet air temperature (Air Mix Damper Control). | ○ | ○ |
| Blower Control | Sets the blower speed according to operation of the blower switch (Manual Control). | ○ (5-step) | ○ (5-step) |
| | When the automatic control or front defroster switch is turned on, the blower starts. Then the blower speed that is appropriate for the required outlet air temperature is compared with the blower speed that is appropriate for solar radiation, and the blower is controlled with the faster speed of the above two speeds (Automatic Control). However, when the coolant temperature is below a predetermined level and the air outlet is in the “foot” or “bi-level” mode, the blower will not operate (Warm-Up Control). | ○ | ○ |

| System | Function | New | Previous |
|---|---|---|---|
| Blower Control | When the air outlet mode is at “face” or “bi-level” and the required outlet air temperature is below a predetermined level, the blower is set to operate after a time lag in order to prevent hot air from being blown out suddenly right after the engine is started (Time-Lagged Air Flow Control). | ○ | ○ |
| Air inlet Control | Drives the air inlet servomotor according to the operation of the air inlet control switch and fixes the dampers in the “fresh” or “recirc.” position (Manual Control). | ○ | ○ |
| | Switches the damper position between “fresh”, “fresh and recirc. mix” or “recirc.” according to the required outlet air temperature (Automatic Control). | ○ | ○ |
| | Fixes the damper position on “fresh” if the front defroster switch is turned on during automatic control (Forced Fresh Air Intake Control). | ○ | ○ |
| Air Outlet Control | Drives the air outlet step motor in accordance with the operation of the mode select and front defroster switches and fixes the dampers in the “face”, “bi-level”, “foot”, “foot and def.” or “def.” position (Manual Control). | ○ | ○ |
| | Switches the damper position between “face”, “bi-level” of “foot” according to the required outlet air temperature (Automatic Control) | ○ | ○ |
| | If the blower is under warm-up control when the air outlet mode is in “bi-level” or “foot” mode, the LCD display remains as it is while the air outlet step motor is driven and the dampers are switched to the “def.” position, preventing cool air from leaking from the foot vent (Def.-Foot Control). | ○ | ○ |

| System | Function | New | Previous |
|---|---|---|---|
| Compressor Control | If the A/C switch is switched on while the blower is turned on, this turns on the magnetic clutch relay and operates the compressor (Manual Control). | ○ | ○ |
| | When the AUTO switch is pressed, the magnetic clutch relay is turned on. (Automatic Control). | ○ | ○ |
| | Switches the magnetic clutch relay off when the engine speed is below 450 rpm, when the blower is turned off by the warm-up control, or when the refrigerant pressure is abnormally high or low (Abnormal Condition Detection). | ○ | ○ |
| | Switches the magnetic clutch relay on regardless of the operating condition of the A/C and automatic control switches if the front defroster switch and blower are turned on (Def. Linked Control). | ○ | ○ |
| | Compares the engine speed and compressor speed. If it is judged that the compressor is locked, the magnetic clutch relay goes off and the A]C switch indicator light blinks to warm the driver (Compressor Lock Detection). | ○ | ○ |
| | If the temperature of the air immediately after having passed through the evaporator is detected by the thermistor to be below 3 C (37.4 F), the magnetic clutch relay is turned off (Low Temperature Control). | ○ | ○ |
| | In order to maintain engine condition, the magnetic clutch relay operation is delayed for predetermined time after the A/C switch is turned on (Compressor Delay Control). | ○ | ○ |
| Rear Defogger Control | Switches the rear defogger on for 15 minutes when the rear defogger switch is switched on. Switches the rear defogger off if the switch is pressed while it is operating. | ○ | ○ |
| Self-Diagnosis | Checks the sensors in accordance with operation of the air conditioning switches, then displays a code No. to indicate if there is a malfunction or not (Sensor Check Function). | ○ | — |
| | Checks the sensors in accordance with operation of the air conditioning switches, then displays a code No. and sounds a buzzer to indicate if there is a malfunction or not (Sensor Check Function). | — | ○ |
| | Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioning switches (Actuator Check Function). | ○ | ○ |

# ACCESSORIES

## ▶ DESCRIPTION

The new ES300 includes the accessory systems shown in the below.

| System | Outline |
|---|---|
| Power Window System | The power window system includes one-touch auto down and key-off operation functions. The one-touch auto down function automatically opens the driver's door window fully. The key-off operation function makes it possible to operate the power windows for approximately 45 seconds after the ignition key is turned to the ACC or LOCK position, if the front doors are not opened.<br>The basic construction and operation are the same as in the previous model. |
| Door Lock Control System | This system has a "key-linked lock and unlock function" and a "key-confine prevention function". All doors can be locked and unlocked simultaneously by a key operation at the front fight or left door (the key needs to be operated twice to unlock all the doors at the driver's door). If the door lock operation is performed when one of the front doors is open and the ignition key inserted in the key cylinder, doors are unlocked automatically to prevent the ignition key from being left inside the vehicle.<br>The basic construction and operation are the same as in the previous model. |
| Wireless Door Lock Remote Control System | A remote control system is adopted in which the lock and unlock functions of all doors and panic alarm function can be controlled by the signals emitted from a transmitter. The transmitter is also provided with a 2-step unlock function to unlock all the doors by pressing the switch twice. For details, see page 104. |
| Theft Deterrent System | As in the previous model, when an attempt is made to forcibly enter the vehicle or open the hood or trunk lid without a key, or when the battery terminals are removed and reconnected, this system sounds the horn and flashes the headlights and taillights for about 1 minute to alert the owner. At the same time, it locks all the doors and electronically disconnects the starter.<br>The basic operation is the same as in the previous model. |
| Power Seat | As in the previous model, the front seats am power assisted by electric motors so that the seat positions can be adjusted easily by a simple switch operation.<br>The basic construction and operation are the same as in the previous model. |
| Seat Heater | The heater output temperature switchover (HI or LO position) function that was provided in the previous model's seat heater system has been discontinued. Along with this change, the previous 3-mode, HI-OFF- LO seat heater switch has been changed to the 2-mode, ON-OFF seat heater switch. |

| System | Outline |
|---|---|
| SRS Airbag | The SRS (Supplemental Restraint System) airbag is provided for the driver and front passenger. The SRS airbag has been designed to lessen the shock to the head and chest of the driver and front passenger in the event of a frontal impact collision as a supplement to the seat belt.<br>A 1-sensor type airbag system is used in which the detection of deceleration during a collision as well as control of the airbag system is accomplished by the airbag sensor assembly.<br>The basic construction and operation am the same as in the ’95 LS400. However, the inflator for front passenger has been changed.<br>For details, see page 108. |
| Cruise Control System | Once it has been set at desired vehicle speed, this system automatically adjusts the engine throttle position to maintain the vehicle speed at the desired speed without operating the acceleration pedal.<br>The basic construction and operation are the same as in the previous model.<br>However, in the new model, a new type actuator has been adopted.<br>Also, the function of the cruise control ECU has been changed.<br>For details, see page 112. |
| Moon Roof | A tilt-up and sliding type moon roof has been adopted. Also, a “onetouch slide open” function used in the ’95 LS400 has been newly adopted.<br>The basic operation is the same as in the ’95 LS400. |
| Electrical Remote Control Mirror | The electrical remote control mirrors used in the previous model are also used in the new model. Heaters are also included in the outside rear view mirrors which are linked to the rear window defogger. |
| Key Reminder System | It sounds a buzzer to warn the driver that the ignition key is still in the key cylinder. This helps to prevent the driver from getting locked out.<br>The basic operation is the same as in the previous model. |

## • WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

### 1. General

The wireless door lock remote control system is a convenient system for locking and unlocking all the doors, from a distance. This system in the new ES300 has the following features:

° The new model adopts a multi-function type wireless door lock remote control system which features luggage compartment door opener and panic alarm operation, in addition to all doors lock and unlock function of the previous model.

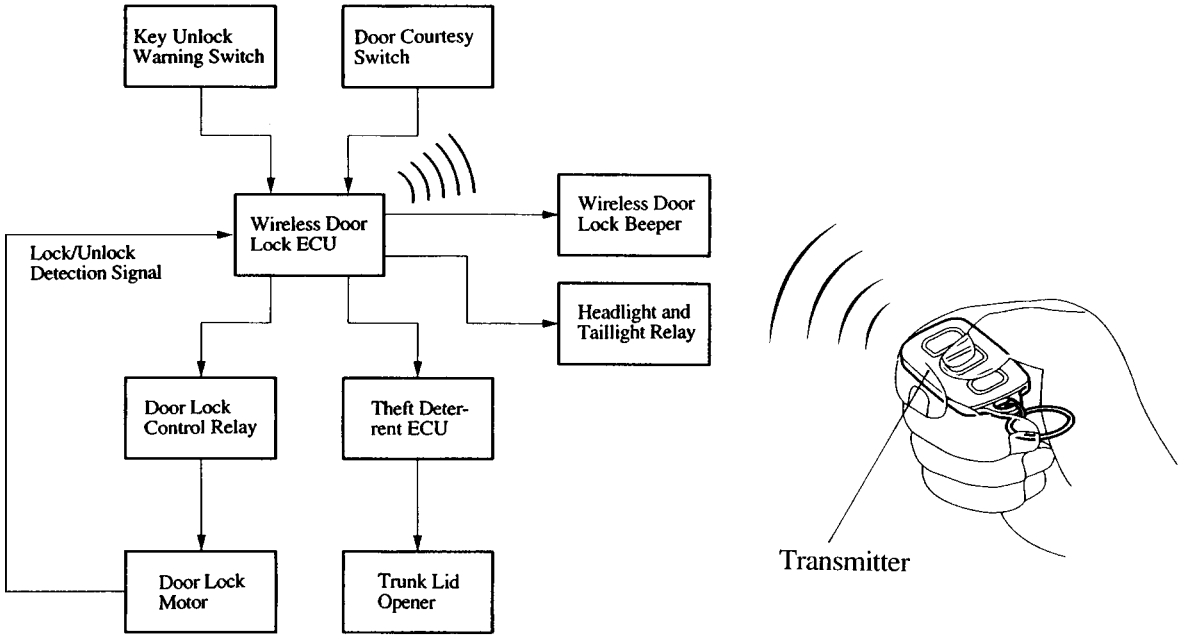
° To accommodate multiple functions, the transmitter has been changed from the previous integrated type with the ignition key to a separate key-holder type.

° The antenna that receives transmitter signals has been changed from the previous printed wiring of the rear window defogger to the one that is enclosed in the wireless door lock ECU.

° To facilitate the verification of its operation, this system sounds the beeper and flashes the parking lights and taillights upon completion of each operation.

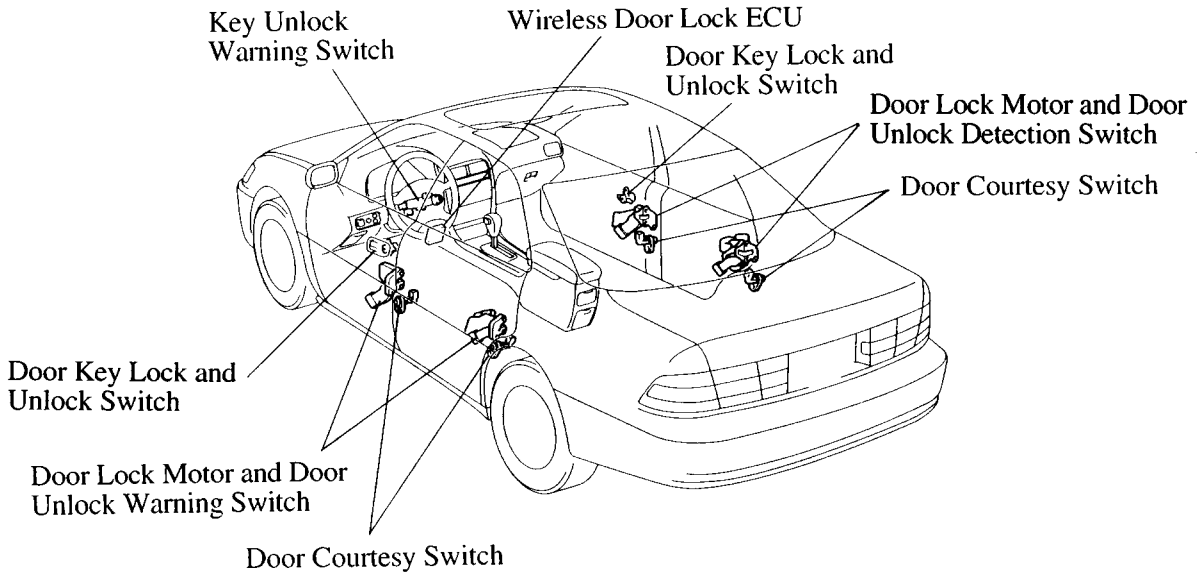
° A prohibit mode, which prohibits the activation of this system, has been newly provided in the registration function of the transmitter recognition code.

**▶ System Diagram ◀**



## 2. Layout of Functional Parts

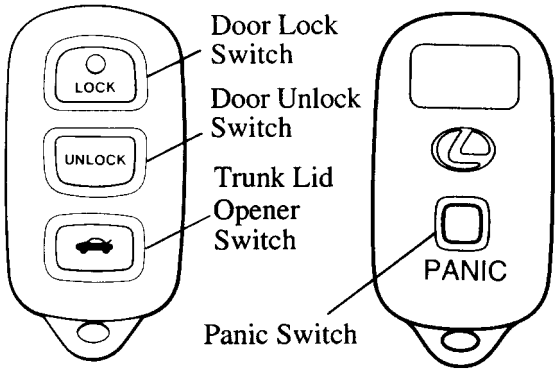
The major functional parts of the wireless door lock remote control system are shown below.




## 3. Construction

### Transmitter

To accommodate the multiple functions provided in the wireless door lock remote control system, and to improve the ease-of-use of the switches, a keyholder type transmitter, which is separate from the ignition key, has been adopted. This transmitter is equipped with a panic switch which activates the security alarm of the theft deterrent system.




**Transmitter**

### Wireless Door Lock ECU

The frequency of the signal transmitted by the transmitter has been raised and the antenna which receives this signal has been changed from the printed wiring of the rear window defogger to the one which is enclosed in the wireless door lock ECU.

Accordingly, the wireless door lock ECU mounting position has been changed from inside the luggage compartment to the inside of the instrument panel.

## 4. Function

The following table is a comparison of the functions of wireless door lock remote control system between the new ES300, previous ES300 and '97 LS400.

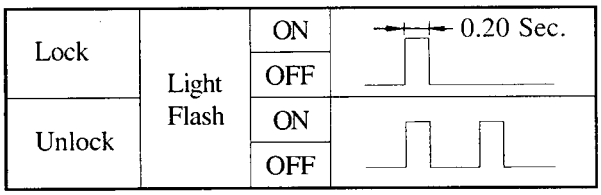
| Function | Outline | New ES300 | Previous ES300 | '97 LS400 |
|---|---|---|---|---|
| All Doors Lock Operation | Pressing the "door lock" switch of the transmitter locks all doors. | ○ | — | ○ |
| All Doors Lock Operation | Pressing the transmitter switch locks all doors. | — | ○ | — |
| Driver's Door Unlock Operation | Pressing the "door unlock" switch of the transmitter once unlocks only the driver's door. | ○ | — | ○ |
| All Doors Unlock Operation | Pressing the "door unlock" switch twice within 3 seconds opens all doors after opening the driver's door. | ○ | — | ○ |
| All Doors Unlock Operation | Pressing the transmitter switch unlocks all doors. | — | ○ | — |
| Trunk Lid Open Operation | Keeping the "trunk lid opener" switch of the transmitter pressed longer than 0.8 seconds opens the trunk lid. | ○ | — | ○ |
| Panic Alarm Operation | Pressing the "panic" switch of the transmitter activates the alarm of the theft deterrent system (to sound the horn and flash the headlights and taillights). | ○ | — | ○ |
| Operation Verification Beeper Function | When the transmitter is used to lock or unlock the doors, this function sounds the beeper to inform that the operation has been completed. | ○ | ○ | ○ |
| Operation Verification Light Function | When the transmitter is used to lock or unlock the doors, this function flashes the parking lights and taillights to inform that the operation has been completed. | ○ | — | — |
| Auto Lock Function | If none of the doors are opened within 30 seconds after they are unlocked by the wireless door lock remote control, all the doors are locked again automatically. | ○ | ○ | ○ |
| Transmitter Switch Misoperation Prevention Function | When an ignition key is in the ignition key cylinder or any of the doors is not closed completely, the wireless door lock remote control is temporarily canceled to prevent misoperation. | ○ | ○ | ○ |
| Repeat Function | If a door is not locked in response to the locking operation of the transmitter, the wireless door lock ECU will output a lock signal once after 2 seconds. | ○ | — | — |
| Repeat Function | If a door is not locked or unlocked in response to the locking or unlocking operation of the transmitter, the wireless door lock ECU will output a lock or unlock signal 10 times at 2-second intervals. | — | ○ | ○ |

| Function | Outline | New ES300 | Previous ES300 | '97 LS400 |
|---|---|---|---|---|
| Door Ajar Warning Function | If any door is open or ajar, pressing the "door lock" switch of the transmitter will cause the beeper to sound. | ○ | — | ○ |
| Beeper Volume Control Function | The beeper volume can be adjusted by adjusting the wireless door lock beeper controller. | ○ | ○ | — |
| Security Function | If the wireless door lock ECU receives more than 10 types of incorrect codes within 10 minutes, it will stop receiving all codes, including the correct code. | — | ○ | ○ |
| | Send an operation signal as a cryptographic code. | ○ | — | — |
| Transmitter Recognition Code Registration Function | 4 types of transmitter recognition codes can be registered (written to and stored) in the EEPROM that is contained in the wireless door lock ECU. | ○ | ○ | ○ |

### Operation Verification Light Function

When the doors are locked by the transmitter switch operation, the parking light and taillight flashes once to confirm that the operation has been completed.
Similarly, the parking light flashes twice when the doors are unlocked.

**▶ Light Flash Patterns ◀**




### Transmitter Recognition Code Registration Function

In addition to the 3 special coded ID registration function modes (rewrite mode, add mode and confirm mode), a prohibit mode has been newly provided in the registration function of the transmitter recognition code.
The table below shows the 4 special coded ID registration function modes through which up to 4 different codes can be registered. The codes are electronically registered (written to and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the 1997 ES300 Repair Manual (Pub. No. RM511 U) to register the codes correctly.

| Mode | Function |
|---|---|
| Rewrite Mode | Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a transmitter or the wireless door lock ECU is replaced. |
| Add Mode | Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of codes exceeds 4, the oldest registered code is erased first. |
| Confirm Mode | Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist. |
| Prohibit Mode | To delete all the registered codes and to prohibit the wireless door lock function. This mode is used when the transmitter is lost. |

## • SRS AIRBAG

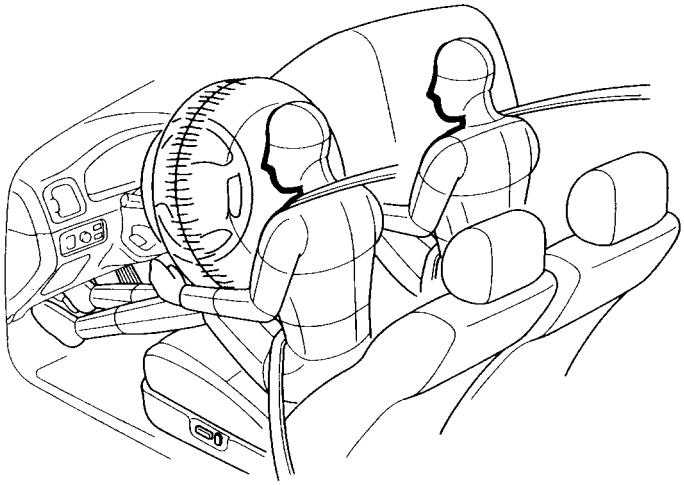
### 1. General

° The SRS (Supplemental Restraint System) airbag is designed to help lessening the shock to the driver and front passenger as a supplement to the seat belt.
In a collision, the airbag sensor detects the shock and if the front-to-rear shock is greater than a specified value, the airbags stored in the steering wheel pad for the driver and above the glove box for the front passenger inflate instantly to help reducing the likelihood of the driver's or front passenger's head and chest directly hitting the steering wheel or instrument panel.

° As in the '95 LS400, a 1 -sensor type airbag system is used, in which the detection of deceleration during a collision is accomplished by the airbag sensor enclosed in the airbag sensor assembly.

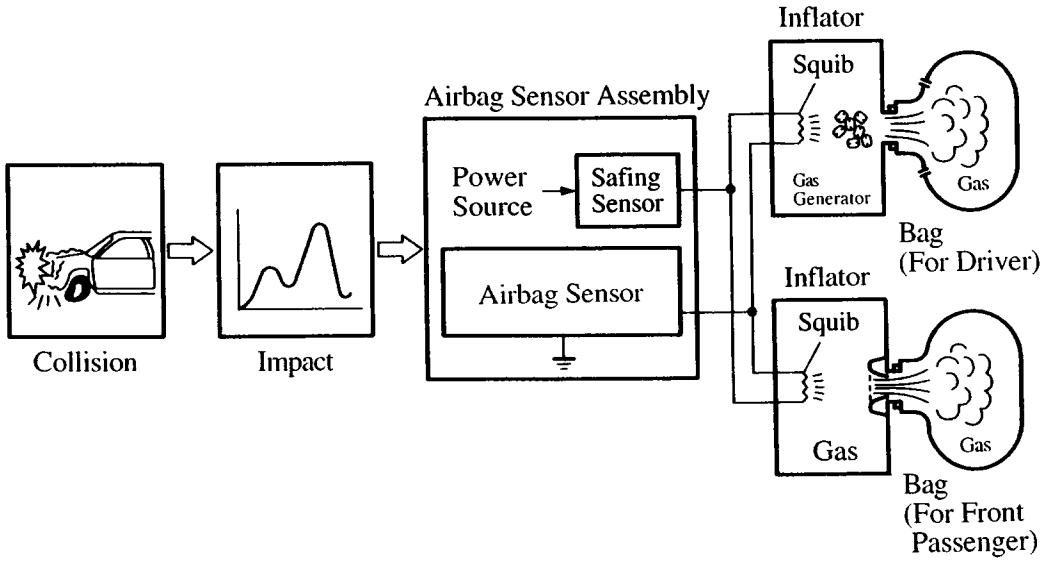
° The airbag system is controlled by the airbag sensor assembly. It has a self-diagnosis function. When it detects a system malfunction, it lights up the SRS Warning light on the combination meter to alert the driver.

The basic construction and operation are the same as in the '95 LS400. However, the construction and operation of inflator for front passenger has been changed.



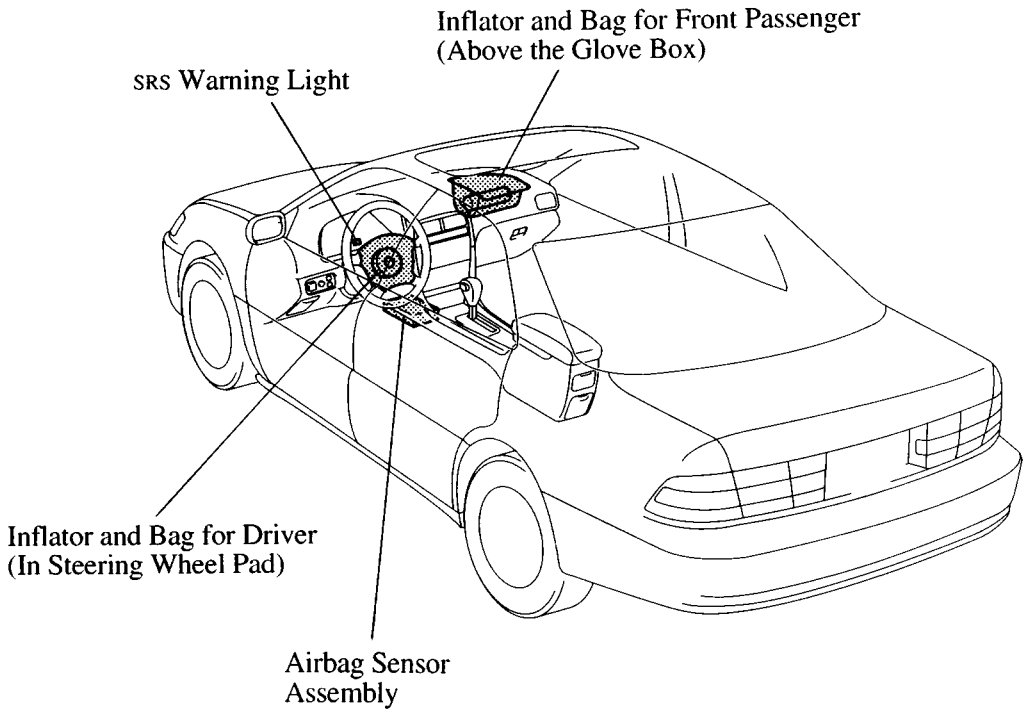
**▶ System Diagram ◀**

The activation processes of the SRS airbag is as illustrated below.

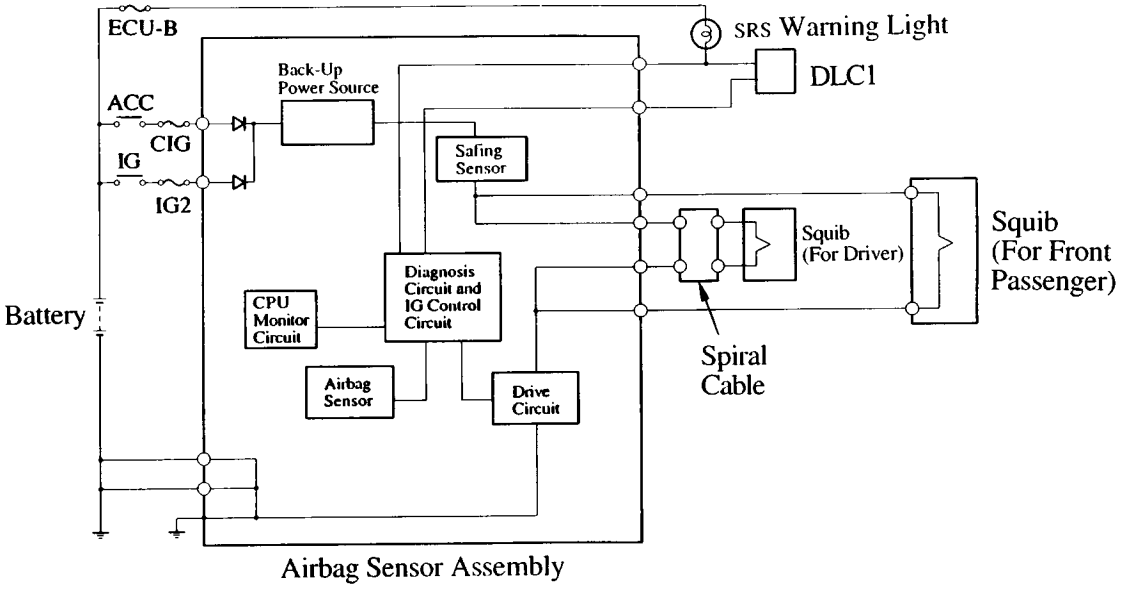


## 2. Layout of Components

The major function parts of the airbag system are shown below.




## 3. Wiring Diagram

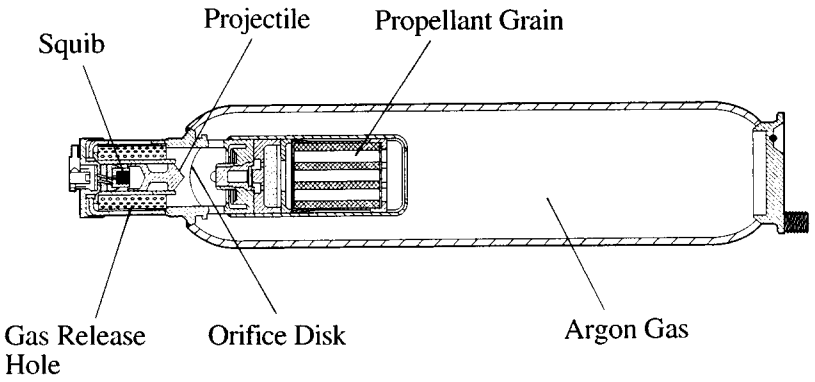


## 4. Construction and Operation

### Inflator and Bag for Front Passenger

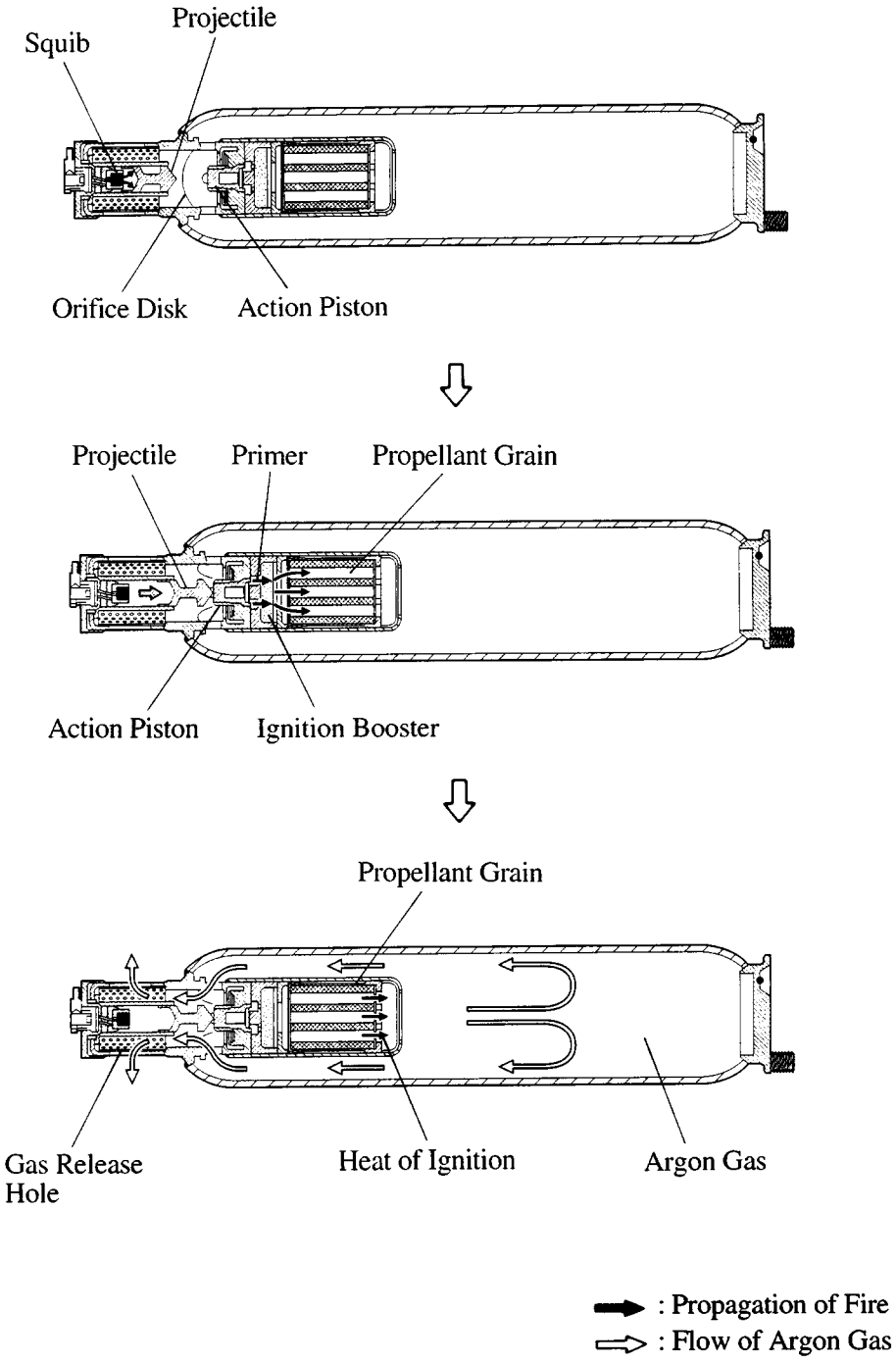
#### 1) Construction

The inflator is comprised of a squib, projectile, orifice disk, propellant grain, high pressure argon gas and etc. The bag is made of strong nylon cloth, and becomes inflated by the argon gas generated by the inflator. The inflator and bag are integrated inside the case, and located in the passenger side instrument panel.



**2) Operation**

If the airbag sensor is activated by deceleration due to frontal collision, the electric current then ignites the squib located in the inflator. The projectile which fired by the ignition of the squib pierces through the orifice disk and collides with the action piston, which causes the primer to ignite. The flame of the primer spreads instantaneously to the ignition booster and to the propellant grain. The gas which expanded by the heat of the ignition of the propellant grain flows into the airbag via the gas release hole, thus inflating the airbag. The airbag pushes the airbag door open to further expand and to help restrain the impact applied to the head and chest of the front passenger.



## ◦ CRUISE CONTROL SYSTEM

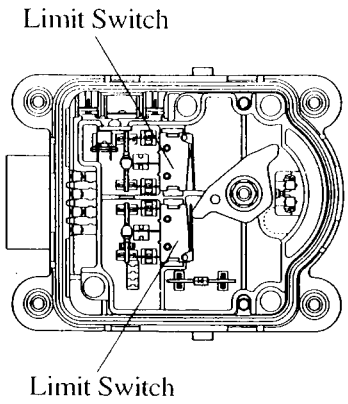
### 1. General

Once the system is set to a desired vehicle speed, the engine throttle position is adjusted automatically to maintain the vehicle speed at that speed without depressing the accelerator pedal.
The basic construction and operation of this system are the same as in the previous model. However, on the new model, the control method for the manual and auto cancel functions have been changed. Also, a new motor type actuator that is both lightweight and simple in construction has been adopted.

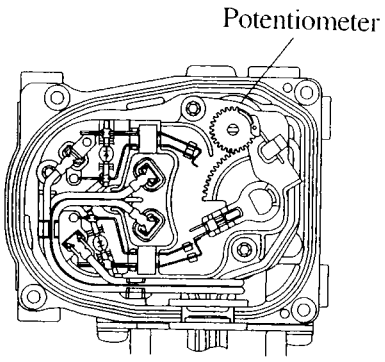
### 2. Construction and Operation

#### Actuator

The new ES300 has adopted a new motor type actuator. The new motor type actuator consists of a motor, control link and limit switch, etc. as shown below.
The potentiometer that measured the opening angle of the control link and transmitted the signals to the cruise control ECU has been discontinued in the new actuator. The new actuator is equipped it with a compact motor. As a result, the new actuator is made both lightweight and simple in construction. Without the potentiometer, the new actuator continuously regulates the opening angle of the control link. This is made possible by the ECU, which compares the current vehicle speed input with the desired vehicle speed that is stored in memory, and the result of that comparison is transmitted to the actuator.




**New**




**Previous**

#### Cruise Control ECU

**1) Manual Cancel Function**

The manual cancel function has been changed as follows:

| New | Previous |
|---|---|
| Transaxle shifted to positions other than “D”. | Transaxle shifted to “N” position. |
| — | Pull up the parking brake lever. |

### 2) Auto Cancel Function

When the vehicle is being driven under cruise control, if any of the conditions listed below is present, the vehicle speed stored in memory is deleted, the control is lifted, the current to the actuator is disrupted, and the power indicator light is made to flash. The methods to reactivate the cruise control at that time, in accordance with that particular condition (malfunction category A or B), are classified in the chart below. Other auto cancel functions are basically the same as those of the previous model.

| Condition | Malfunction Category | How to reactivate |
|---|---|---|
| ● Continuous current applied to the motor's acceleration output.<br>● The motor did not move. | A | Turn off the ignition switch, and turn it back on. Then turn on the main switch. |
| ● Excessive current flowed to the motor or magnetic clutch drive transistor.<br>● Open circuit in magnetic clutch. (Includes a blown stop light fuse.)<br>● The vehicle speed signal is not sent for a predetermined period of time (approx. 140 reset.)<br>● The vehicle speed is equal to the set speed minus approximately 16 km/h (10 mph) or below.<br>● Short circuit in the control switch.<br>● Open circuit in deceleration control. (Including an open circuit in the motor.) | B | Turn the main switch back on. |

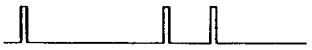
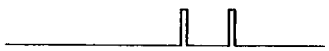
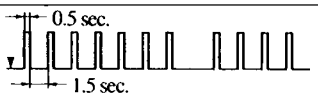
### 3) Diagnosis Function

#### a. Warning Indication

The cruise control ECU immediately blinks the power indicator light in the combination meter on and off repeatedly to alert the driver of a system malfunction.
When the power indicator light is flashing, and the cruise control is released by pressing on the main switch, the power indicator light will be turned off. When the main switch is turned back on, and cruise control driving is resumed, the power indicator light output pattern, as shown on the next page, differs according to the malfunction categories A or B. When a category A malfunction is occurring, the power indicator light will flash again, but if it is a category B malfunction, the indicator light will remain on, indicating that the system is operating.

**▶ Power Indicator Light Blinking Pattern ◀**

▼ : Malfunction Occurred

| Condition / Operation Method | | | Actuator power source is off. | Actuator power source is on. |
|---|---|---|---|---|
| Main Switch | | ON |  |  |
| | | OFF | | |
| Power Indicatro Light | A* | ON |   |  |
| | | OFF | | |
| | B* | ON |  |  |
| | | OFF | | |

*: "A" and "B" Indicate the Malfunction Categories.

### b. Diagnostic Trouble Code Indication

The diagnostic trouble codes have been modified in the new model. For details of inspection, diagnostic trouble codes and repair procedures, see 1997 ES300 Repair Manual (Pub. No. RM 511U).

# MAJOR TECHNICAL SPECIFICATIONS

| Item | | Area | U.S.A. | Canada |
|---|---|---|---|---|
| Body Type | | | 4–Door Sedan | |
| Vehicle Grade | | | — | |
| Model Code | | | MCV20L–BTPGKA | MCV20L–BTPGKK |
| Major Dimensions & Vehicle Weights | Overall | Length mm (in.) | 4830 (190.2) | ← |
| | | Width mm (in.) | 1790 (70.5) | ← |
| | | Height* mm (in.) | 1395 (54.9) | ← |
| | Wheel Base | mm (in.) | 2670 (105.1) | ← |
| | Tread | Front mm (in.) | 1545 (60.8) | ← |
| | | Rear mm (in.) | 1520 (59.8) | ← |
| | Effective Head Room | Front mm (in.) | 966 (38.0), 934 (36.8)*1 | ← |
| | | Rear mm (in.) | 919 (36.2 ), 913 (35.9)*1 | ← |
| | Effective Leg Room | Front mm (in.) | 1105 ( 43.5) | ← |
| | | Rear mm (in.) | 874 (34.4) | ← |
| | Shoulder Room | Front mm (in.) | 1411 (55.6) | ← |
| | | Rear mm (in.) | 1374 (54.1) | ← |
| | Overhang | Front mm (in.) | 1010 (39.8) | ← |
| | | Rear mm (in.) | 1150 (45.3) | ← |
| | Min Running Ground Clearance | mm (in.) | 147 (5.8) | ← |
| | Angle of Approach | degrees | 15º | ← |
| | Angle of Departure | degrees | 16º | ← |
| | Curb Weight | Front kg (lb) | 940 (2072) | ← |
| | | Rear kg (lb) | 555 (1224) | ← |
| | | Total kg (lb) | 1495 (3296) | ← |
| | Gross Vehicle Weight | Front kg (lb) | 1050 (2315) | ← |
| | | Rear kg (lb) | 885 (1951) | ← |
| | | Total kg (lb) | 1935 (4266) | ← |
| | Fuel Tank Capacity | l (U.S. gal., Imp. gal.) | 70 (18.5, 15.4) | ← |
| | Luggage Compartment Capacity | $m^3$ (cu.ft) | 0.365 (12.9) | ← |
| Performance | Max. Speed | km/h (mph) | 221 (137) | ← |
| | Max. Cruising Speed | km/h (mph) | 177 (109) | ← |
| | Acceleration | 0 to 100 km/h sec. | 8.6 | ← |
| | | 0 to 400 m sec. | 16.7 | ← |
| | Max. Permissible Speed | 1st Gear km/h (mph) | 63 (39) | ← |
| | | 2nd Gear km/h (mph) | 116 (72) | ← |
| | | 3rd Gear km/h (mph) | — | ← |
| | | 4th Gear km/h (mph) | — | ← |
| | Turning Diameter (Outside Front) | Wall to Wall m (ft.) | 11.8 (38.7) | ← |
| | | Curb to Curb m (ft.) | 11.2 (36.7) | ← |
| Engine | Engine Type | | 1MZ–FE | ← |
| | Valve Mechanism | | 24–Valve, DOHC | ← |
| | Bore x Stroke | mm (in.) | 87.5 x 83.0 (3.44 x 3.27) | ← |
| | Displacement | $cm^3$ (cu.in.) | 2995 (182.7) | ← |
| | Compression | | 10.5 : 1 | ← |
| | Carburetor Type or Injection Pump Type (Diesel) | | SFI | ← |
| | Research Octane No. | RON | 91 or higher | ← |
| | Max Output (SAE–NET) | kW/rpm (HP @ rpm) | 149/5200 (200 @ 5200) | ← |
| | Max Torque (SAE–NET) | N·m/rpm (lb–ft @ rpm) | 290/4400 (214 @ 4400) | ← |
| Engine Electrical | Battery Capacity (5HR) | Voltage & Amp. hr. | 12–52 | ← |
| | Generator Output | Watts | 960 | ← |
| | Starter Output | kW | 1.4 | ← |
| Chassis | Clutch Type | | — | ← |
| | Transmission Type | | A541E | ← |
| | Transmission Gear Ratio | In First | 2.810 | ← |
| | | In Second | 1.549 | ← |
| | | In Third | 1.000 | ← |
| | | In Fourth | 0.735 | ← |
| | | In Fifth | — | ← |
| | | In Reverse | 2.296 | ← |
| | Counter Gear Ratio | | 0.945 | ← |
| | Differential Gear Ratio (Final) | | 3.933 | ← |
| | Brake Type | Front | Ventilated Disc | ← |
| | | Rear | Solid Disc | ← |
| | Parking Brake Type | | Drum | ← |
| | Brake Booster Type and Style | in. | Tandem 8.5” + 8.5” | ← |
| | Proportioning Valve Type | | Dual–P Valve | ← |
| | Suspension Type | Front | MacPherson Strut | ← |
| | | Rear | MacPherson Strut | ← |
| | Stabilizer Bar | Front | STD | ← |
| | | Rear | STD | ← |
| | Steering Gear Type | | Rack & Pinion | ← |
| | Steering Gear Ratio (Overall) | | 17.4 : 1 | ← |
| | Power Steering Type | | Integral Type | ← |

* : Unladen Vehicle

*1: With Moon Roof