BODY ELECTRICAL

LIGHTING

■ DESCRIPTION

The new Avensis/Corona has the following systems:

System	Outline
Headlights	Four-sculptured type headlights in which the low-beam and high-beam headlights are mounted separately have been adopted on all models. Also, extensions have been incorporated in the headlights to realize a roundish four-headlight design. For details, see the next page.
Daytime Running Light	This system is designed to activate the headlights and taillight automatically during the daytime to keep the car highly visible to other vehicles. The basic construction and operation are the same as in the previous model.
Headlight Beam Level Control System	This system keeps the beam of the headlights adjusted to the appropriate level in accordance with the number (weight) of passengers and volume of luggage. The headlight beam level can be adjusted steplessly by operating the headlight beam level control switch. For details, see page 130.
Rear Fog Light	The rear fog light makes the car highly visible to other drivers driving behind in the rain or fog. The basic construction is the same as in the previous model. However, the operating condition of the rear fog light has been revised to prevent it from being left on unintentionally. For details, see page 132.
Headlight Cleaner	The headlight cleaner sprays windshield washer fluid onto the headlights to clean the lens. The basic construction and operation are the same as in the previous mode.

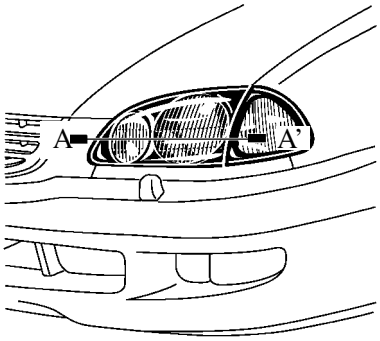
■ HEADLIGHTS

1. General

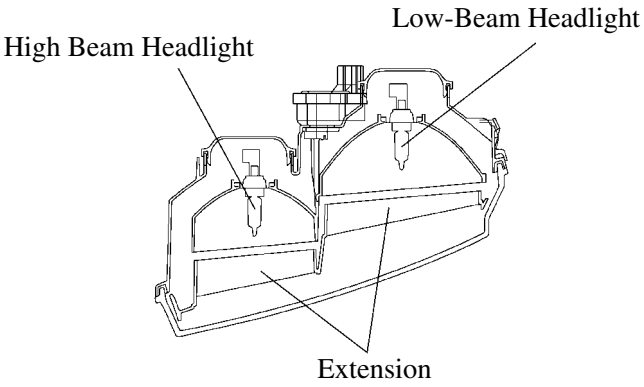
Four-sculptured type headlights in which the low-beam and high-beam headlights are mounted separately in the housing have been adopted on all new Avensis/Corona models.

2. Construction

The new Avensis/Corona has adopted a four-beam type headlight construction in which the low-beam and high-beam headlights are mounted separately in the housing. As a result, a wider light diffusion characteristic has been realized.
Also, extensions have been incorporated in the headlight housing to realize a roundish four-headlight design.



145BE01



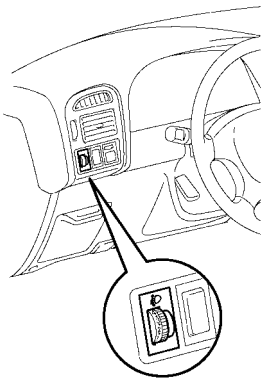
145BE02

A – A' Cross Section

■ HEADLIGHT BEAM LEVEL CONTROL SYSTEM

1. General

This system keeps the beam of the headlights adjusted to the appropriate level in accordance with the number (weight) of passengers and volume of luggage. The headlight beam level can be adjusted by operating the headlight beam level control switch.



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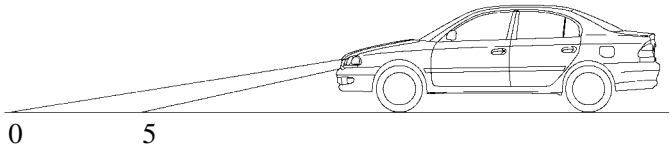
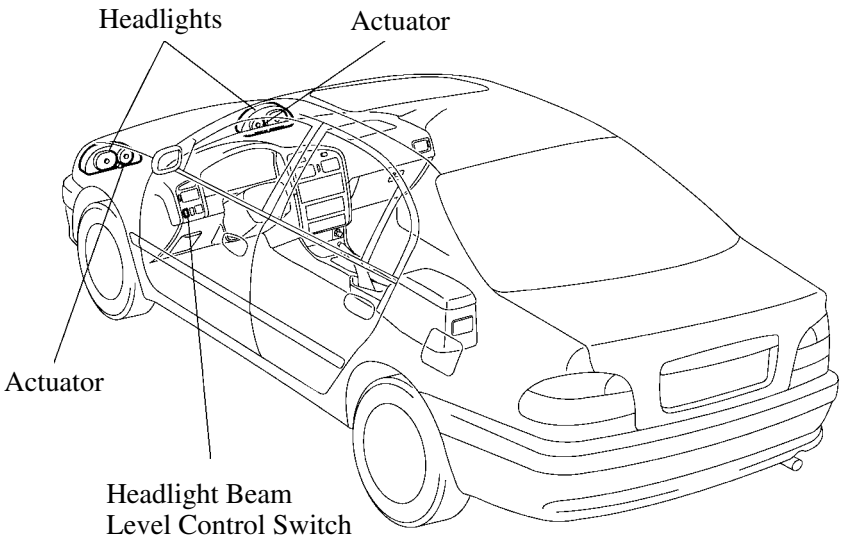


145BE27

Headlight Beam Level Control Switch

2. Layout of Components



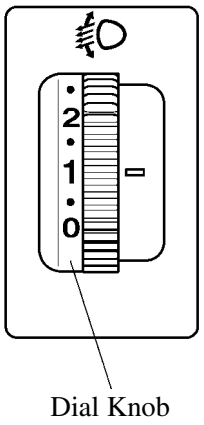
145BE58

Sedan Model

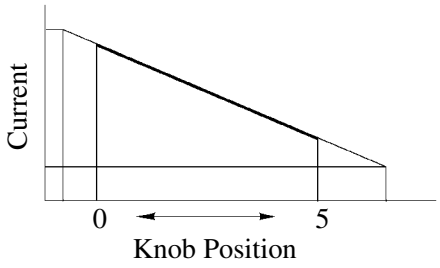
3. Construction

Headlight Beam Level Control Switch

The dial knob of the headlight beam level control switch allows the driver to make adjustment of the headlight beam level.
Equipped with an internal potentiometer, this switch outputs an amount of current in proportion to the position of the dial knob.



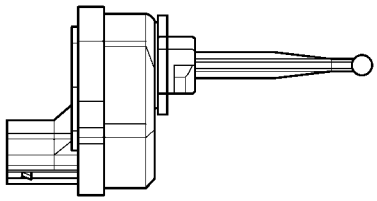
145BE07



145BE29

Actuator

According to the operation of the headlight beam level control switch, the actuator moves the reflector in the headlight to vary its beam.



145BE54

4. Operation

By operating the headlight beam level switch, an amount of current in proportion to the position of the switch is output to the actuators of both headlights.
The actuators operate the reflectors to adjust the headlight beam level according to the amount of current received from the switch.
In this manner, the headlight beam level is adjusted in accordance with the operation of the level control switch.

■REAR FOG LIGHT

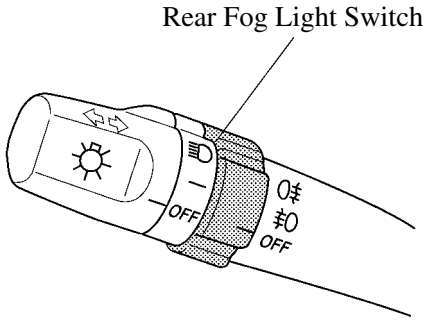
1. General

The rear fog light makes the car highly visible in the rain or fog to other drivers driving behind.
On the new Avensis/Corona, the operating condition of the rear fog light has been revised to prevent it from being left on unintentionally.

2. Construction and Operation

Rear Fog Light Switch

- The rear fog light switch is shaped like a ring and fitted over the light control switch. On the models with front fog lights, the front fog light switch and the rear fog light switch are integrated.
- The rear fog light switch is a momentary type switch. This switch turns on upon twisting and turns off upon twisting it again.



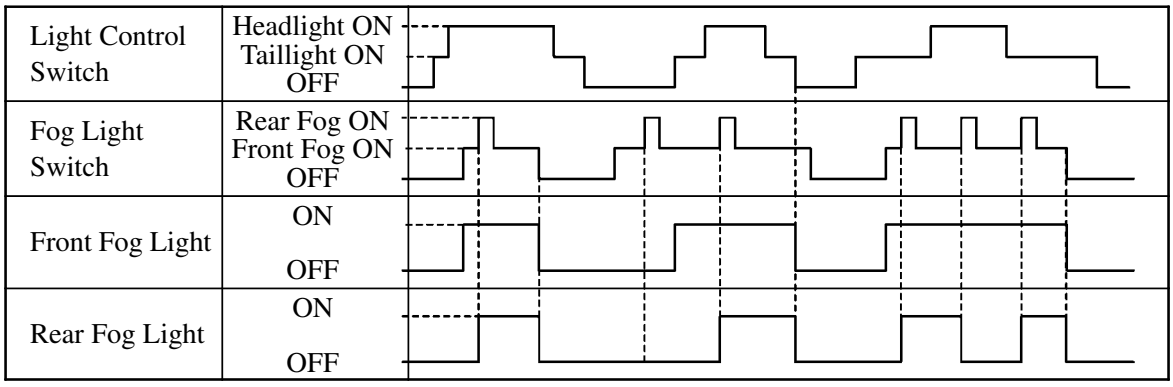
145BE30

Models with Front Fog Light

System Operation

1) Models with Front Fog Light

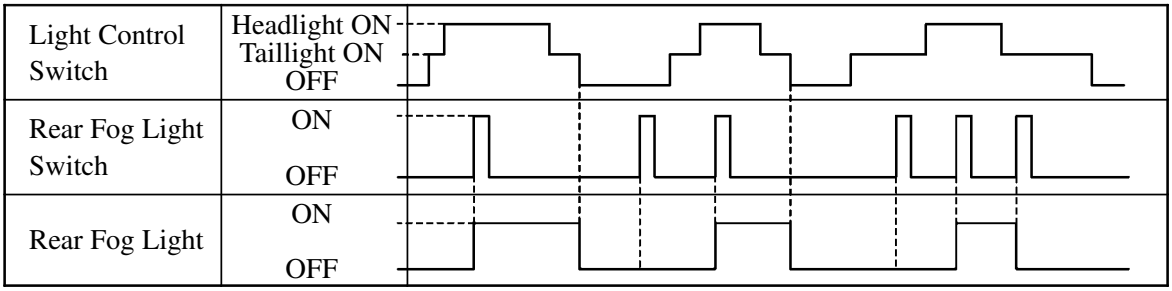
The rear fog light turns on when the rear fog light switch is twisted, providing that the taillights and headlights or front fog light are on. However, once the rear fog light is turned on, it will remain on even after the headlights and front fog light are turned off or the rear fog light switch are turned off. Once the rear fog light is turned off by turning the taillight switch off, the rear fog light will not turn on again unless the rear fog light switch is twisted again.



145BE42

2) Models without Front Fog Light

The rear fog light turns on when the rear fog light switch is twisted, providing that the taillights and headlights are on. However, once the rear fog light is turned on, it will remain on even after the headlights are turned off. Once the rear fog light is turned off by turning the taillight switch off, the rear fog ligtht will not turn on again unless the rear fog light switch is twisted again.



145BE67

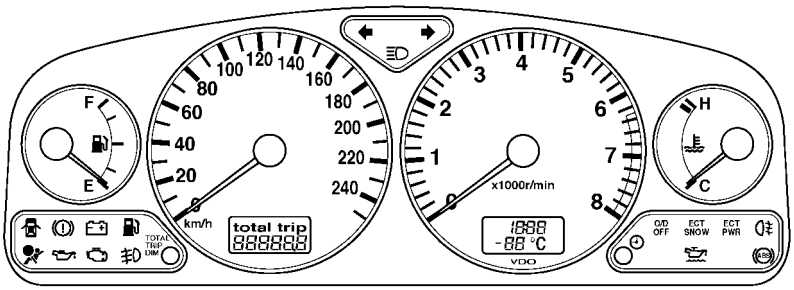
METER

■COMBINATION METER

1. Description

An electronically controlled combination meter that uses a microcomputer has been adopted on the Avensis/ Corona.
The combination meter has the following features:

- The combination meter has a four-eye analog configuration and offers the improved visibility through the use of larger dials.
- A tachometer has been provided as standard equipment on all models.
- An electronic display odometer and trip meter are used for convenience and good visibility.
- A clock and an outside temperature gauge are enclosed in the meter.
- The function to adjust the rheostat is enclosed in the combination meter.
- The setting and the design of the indicator and warning light have been changed.



145BE22

3S-FE Engine Model

2. Construction and Operation

Gauge and Indicator

- In conjunction with the adoption of the electronically controlled combination meter, the detection method of the gauges and indicators have been changed as follows.

Model / Item	New	Previous
Fuel Warning Indicator	Based on the resistance value output by the fuel gauge, the microcomputer calculates the residual amount of fuel to indicate it on the meter.	The residual amount of fuel is detected through the fuel residual amount detection circuit that uses a thermistor to indicate it on the meter.
Water Temperature Gauge	The water temperature signal that is output by the engine ECU is used to determine the water temperature and to display it on the meter (except the models with the 2C-T engine).	A sender gauge for the detection of water temperature is used to detect the water temperature and to display it on the meter.
Engine Oil Level Warning	The sensor is used only to detect the oil level and to display it on the meter. In the combination meter, the indication of the oil temperature has been replaced with the water temperature.	A sender gauge is used to detect the oil temperature and oil level and to display it on the meter.

- The design and the setting of the indicators and warning lights have been changed from the previous model as follows.

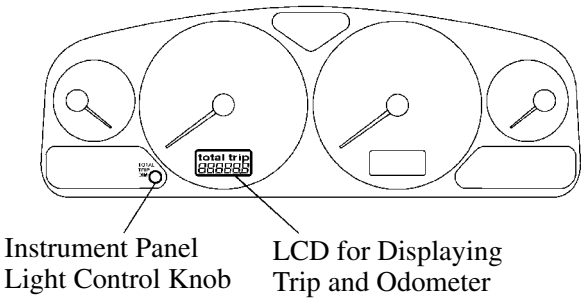
Model / Item	New	Previous
Econodrive Monitor Indicator	ECONO	ECONOMY
Hazard Warning Indicator	— (Shares the turn signal indicator)	
Parking Brake Indicator	— (Shares the brake warning indicator)	
Front Fog Light Indicator		—

145BE55

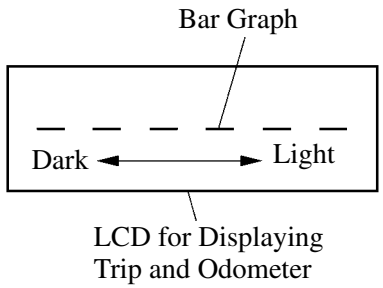
Rheostat

1) General

The rheostat that changes the brightness of the meter has been enclosed in the combination meter. By operating the instrument panel light control knob (trip meter reset knob), the rheostat changes the brightness. In addition, the LCD (Liquid Crystal Display) that displays the trip and odometer provides a bar graph that indicates the present brightness level while the rheostat is being adjusted.



145BE23



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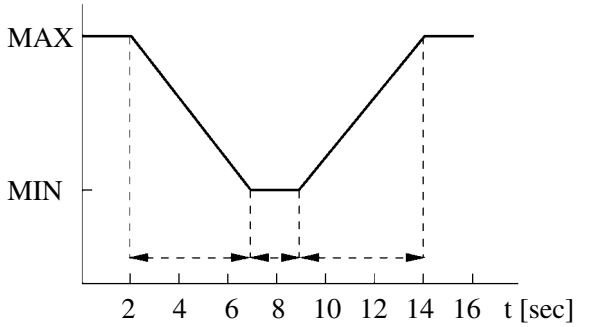
2) Rheostat Brightness Control Method

The brightness can be adjusted on the rheostat as follows.

① When the LCD is in the odometer mode, press the instrument panel light control knob 2 seconds or longer to activate the rheostat brightness control mode. Then, on the LCD for displaying the trip and odometer, a bar graph will appear to indicate the present brightness of the meter.

② By continuing to press the control knob while the bar graph appears on the LCD, the brightness changes as described in the graph shown below. After the desired brightness is reached, release the knob to set the brightness. The rheostat brightness control mode ends at the moment the knob is released.



145BE25

AIR CONDITIONING

■ DESCRIPTION

1. General

The air conditioning system in the new Avensis/Corona has the following features:

- As in the previous model, full air mix type heater and ventilator is used on all models.
- A manual air conditioner is provided as optional equipment on all models.
- An automatic air conditioner is provided as optional equipment on models for Europe.
- A sub-cool condenser that cools the refrigerant twice has been adopted.
- An aluminum heater core has been adopted on all models.
- The foot/def. mode enables the airflow ratio between the foot and defroster vents to be changed.
- A cool-air bypass damper has been provided on all models except those for Scandinavia.
- The rotary switch and lever type heater control panel has been adopted on all models.
- The models with the automatic air conditioner have adopted an automatic ECON control function as the method for controlling the compressor.

▶ Performance ◀

Item \ Model		New	Previous
Heater	Heat Output W (Kcal/h)	4760 (4090)	←
	Air Flow Volume (m^3/h)	320	←
	Power Consumption (Heater) (W)	180	←
Air Conditioner	Heat Output W (Kcal/h)	4660 (4010)	4760 (4090)
	Air Flow Volume (m^3/h)	430	←
	Power Consumption (Compressor) (W)	2700	←

▶ Specifications ◀

Item \ Model			New	Previous
Ventilation and Heater	Heater Core	Size W x H x L mm (in.)	180.9 x 180 x 27 (7.1 x 7.1 x 1.1) 180.9 x 180 x 36 (7.1 x 7.1 x 1.4)*1	178.5 x 180 x 49 (7.0 x 7.1 x 1.9)
		Fin Pitch mm (in.)	2.25 (0.09), 2.8 (0.11)*1	2.8 (0.11)
	Blower	Motor Type	BOSCH Motor	←
		Fan Size Dia. x H mm (in.)	150 x 75 (5.9 x 3.0)	←
Air Conditioner	Condenser	Type	Multi-Flow	3-Passage Flow
		Size W x H x L mm (in.)	570 x 321.3 x 16 (22.4 x 12.6 x 0.6)	686 x 349.2 x 22 (27.0 x 13.7 x 0.9)
		Fin Pitch mm (in.)	3.2 (0.13)	3.5 (0.14), 4.5 (0.18)*2
	Evaporator	Size W x H x L mm (in.)	260 x 212 x 90 (10.2 x 8.3 x 3.5)	←
		Fin Pitch mm (in.)	4.5 (0.18)	4.0 (0.16)
	Compressor	Type	10PA15	←

*1: North Europe Model

*2: 2C-TE and 2C-T Engine Model

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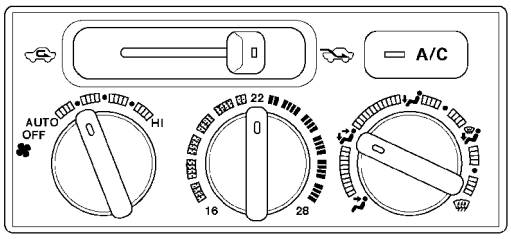
■CONSTRUCTION AND OPERATION

1. Heater Control Panel

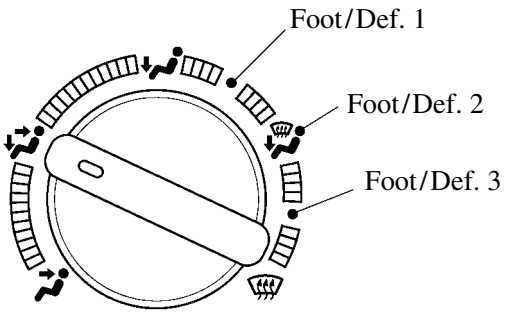
- The rotary switch and lever type heater control panel has been adopted on all models.



Automatic Air Conditioner Model

145BE20

- The mode selector switch provides 3 foot/def. mode settings.
  Thus, in the foot/def. mode, the airflow ratio between the foot and defroster vents can be changed as desired.



Mode Select Switch

145BE21

▶ Airflow Ratio ◀

Airflow Ratio / Switch Position	Foot	Def.
Foot/Def. 1	60 %	40 %
Foot/Def. 2	50 %	50 %
Foot/Def. 3	40 %	60 %

2. Air Conditioning Unit

As in the previous model, a semi-center location air conditioning unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, has been adopted.
However, the following items have been changed.

Heater Core

An aluminum heater core has been adopted on all models.

Air Flow Dampers

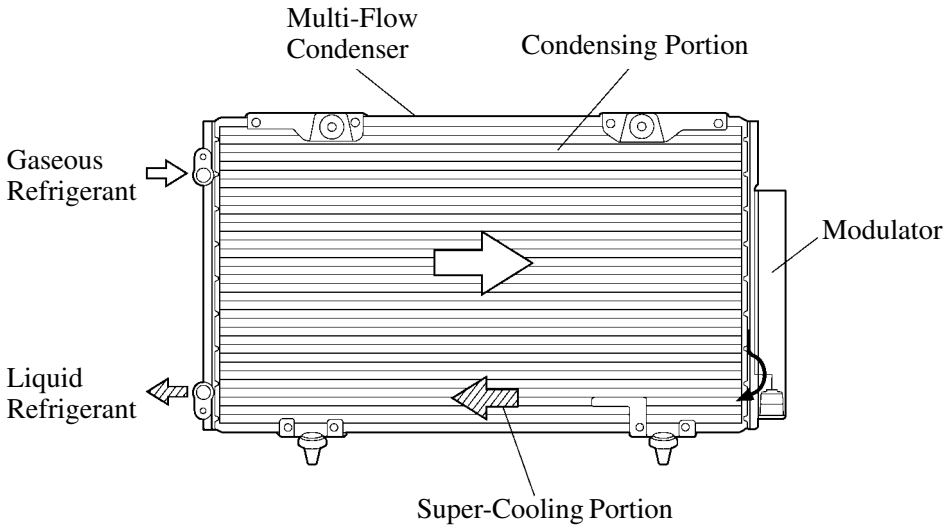
A cool-air bypass damper has been newly adopted in the cool-air bypass duct that is provided on the models except those for Sweden, Denmark, Finland and Norway.

3. Condenser

The new Avensis/Corona has newly adopted a sub-cool condenser in which a multi-flow condenser (consisting of two cooling portions: a condensing portion and a super-cooling portion) and a gas-liquid separator (modulator) have been integrated. This condenser has adopted the sub-cool cycle for its cooling cycle system to improve the heat exchanging efficiency.

Sub-Cool Cycle

The receiver cycle of the previous condenser could not convert the gaseous refrigerant that was sent by the compressor into a completely liquefied state in the condenser. Thus, a portion of the refrigerant remained in the gaseous state as it was sent to the evaporator.
In the sub-cool cycle of the sub-cool condenser that has been adopted on the new model, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquified are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



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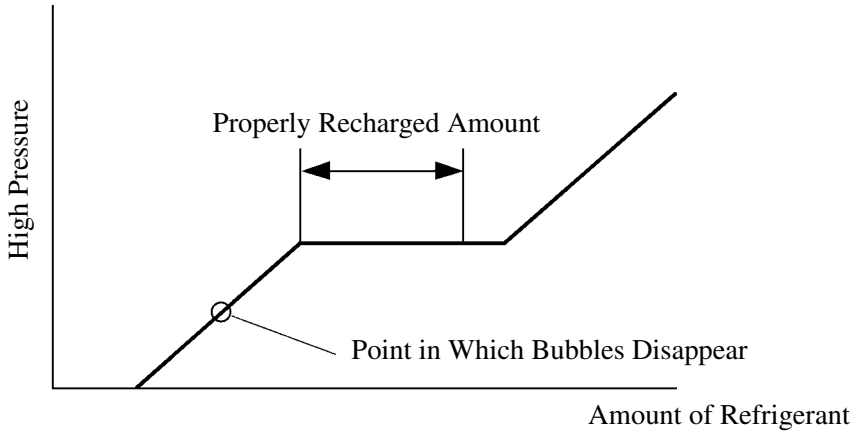
NOTE: The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected.
For the proper method of verifying the amount of the refrigerant and to recharge the system with refrigerant, see the Avensis/Corona Repair Manual (Pub. No. RM599E).



145BE38

4. Automatic Air Conditioning ECU

Compressor Control

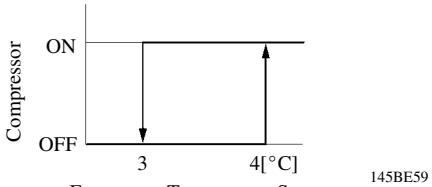
1) Automatic ECON Control

a. General

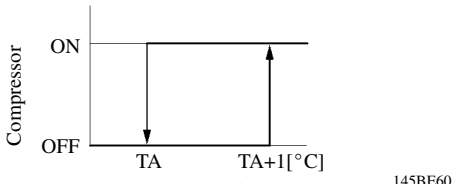
The method for controlling the compressor has been changed to automatic ECON control, thus improving fuel economy, cooling performance and ease of use.

b. Operation

When the air outlet is in a mode other than the defroster mode, the air conditioning system operates in the air conditioning control mode for 5 minutes after the air conditioning is turned ON (compressor ON). Thus, the air conditioning ECU controls the ON/OFF function of the compressor based on the temperature that is detected by the evaporator temperature sensor.
After 5 minutes have elapsed since the air conditioning was turned ON, the air conditioning ECU will make either of the lower temperature as a compressor control temperature when calculating the compressor control temperature from the detected temperature by the ambient temperature sensor and the required outlet air temperature.
For 5 to 8 minutes after the air conditioning was turned ON, the ECU controls the compressor by increasing the compressor control temperature gradually until the compressor control temperature reaches to this calculated temperature.
After 8 minutes have elapsed from the time the air conditioning was turned ON, the air conditioning system engages in the automatic ECON control mode, and the ECU controls the compressor according to the compressor control temperature that was calculated by the aforementioned formula.
Whenever the air outlet mode is in the defroster mode, the air conditioning system is engaged in the air conditioning control mode and the ECU controls the ON/OFF function of the compressor according to the temperature that is detected by the evaporator temperature sensor.
In addition, even if the air outlet mode is changed from the defroster mode to another mode, the system will continue to operate in the air conditioning control mode until the ignition switch is turned OFF.

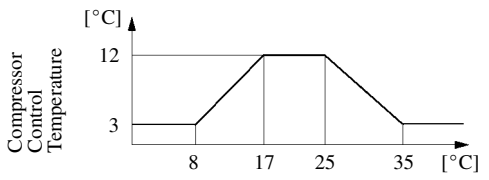


Evaporator Temperature Sensor
Air Conditioning Control Mode

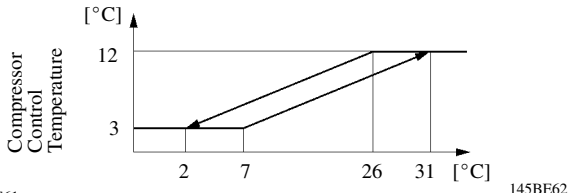


Compressor Control Temperature
Automatic ECON Control Mode

Compressor Control Temperature

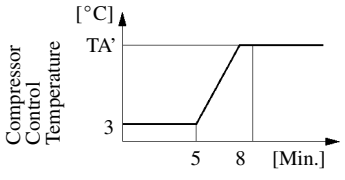


Ambient Temperature
Calculation Based on Ambient Temperature



Required Outlet Air Temperature
Calculation Based on Required Outlet Air Temperature

Method for Calculating Compressor Control Temperature



TA': Initially Calculated Compressor Control Temperature

Determining Compressor Control Temperature

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ACCESSORIES

■ DESCRIPTION

The new Avensis/Corona includes the accessory system shown below.

System	Outline
Power Window System	This system includes one-touch auto up and down and jam protection functions. The one-touch auto up and down function automatically closes and opens the driver's side window fully. A jam protection function automatically stops the power window and moves it downward, if a foreign object becomes jammed in the window during one-touch auto-up operation of the driver's window. For details, see the next page.
Door Lock Control System	This system has "key-linked lock and unlock" and "door lock control switch" functions. All doors can be locked and unlocked simultaneously by operation of the door key or door lock control switch. 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 can be controlled by the signals emitted from a transmitter. For details, see page 146.
Engine Immobiliser System	This is a theft-deterrent system which disables the engine unless the ignition key used to start the engine has an ID code that matches the pre-registered code in the vehicle. For details, see page 149.
Seat Heater	The seat heater system improves the comfort of the driver and the front passenger in a cold weather by heating the surface of the seats. It is a 2-mode control type system that provides a switch to turn the heater ON and OFF.
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 with a frontal impact in the even of a collision. 3 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 front airbag sensor and airbag sensor assembly. For details, see page 153.
SRS Side Airbag	The SRS side airbag is provided for the outer side of the front seat back. SRS side airbag has been designed to help reducing the impact energy that is transmitted to the driver and front passenger in the event of a side collision. For details, see page 160.
Moon Roof	A moon roof provides good ventilation and exhilarating open air driving. This system includes "one-touch slide open and close" and "jam-protection" functions.
Outside Rear View Mirror	An electrical remote control type outside rear view mirror that enables mirror angle to be adjusted by a switch operation of is provided. Also, an internal heater which operates in conjunction with the rear window defogger have been adopted.

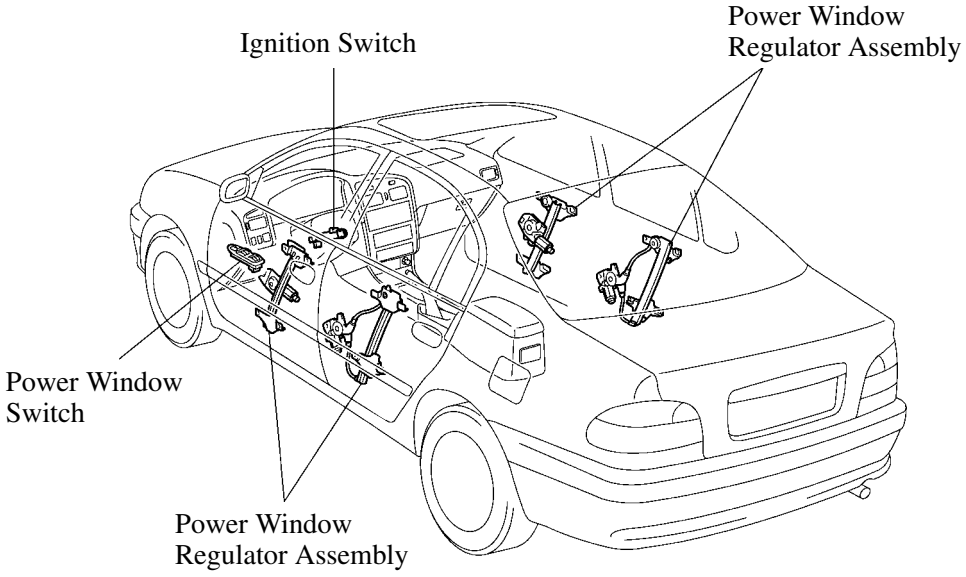
■POWER WINDOW

1. General

The new Avensis/Corona has adopted an “one-touch auto up-and-down” function in which the driver’s door window can be fully opened or closed through one-touch operation.
In conjunction with this function, a jam protection function has been newly added. If a foreign object becomes jammed between the glass and the window frame during one-touch auto-up operation, this function automatically stops the power window’s upward movement and moves it downward.

2. Layout of Components

The major function parts of jam protection function of the power window are shown below.



Sedan Model

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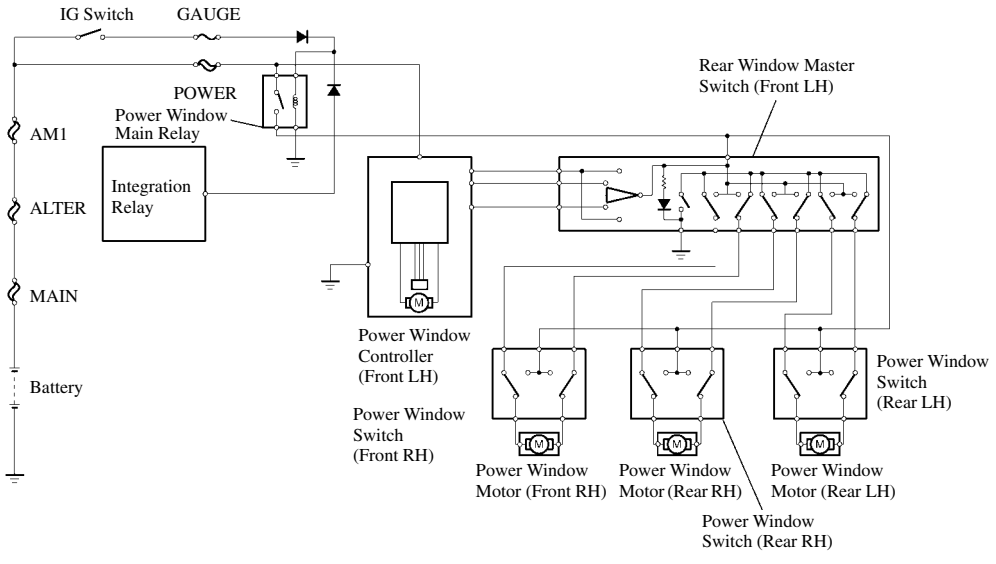
3. Wiring Diagram



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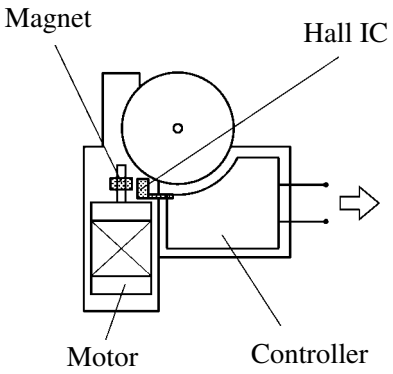
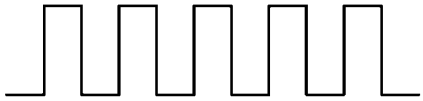
4. Construction

Pulse Sensor

The pulse sensor consists of a magnet and a hall IC. The magnet rotates with the power window motor. The hall IC detects a polarity change which is caused by the rotation of the magnet, and converts it into a pulse signal. The pulse sensor (hall IC) outputs a pulse signal to the controller.
Also, the neutral zone in which the jam protection function does not operate is determined by the number of pulses.



145BE53



Output Pulse Signal

145BE49

Controller

Consisting of a pulse input circuit, jam judgment circuit, and motor drive circuit, the controller is integrated with the power window motor.
The jam judgment circuit detects if a foreign object is jammed in the window by sensing a change in the signal that is output by the pulse sensor.

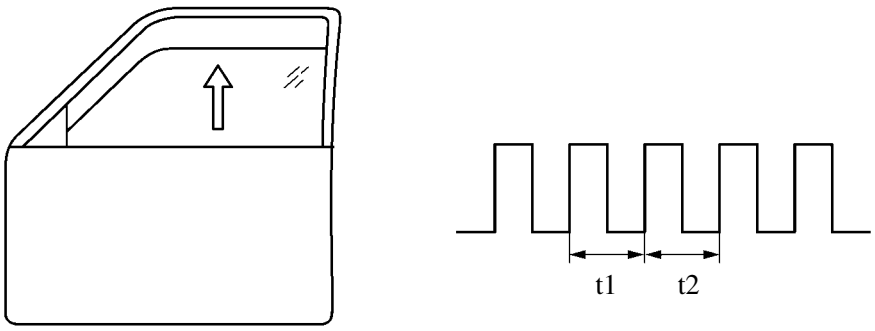
Power Window Master Switch

The power window master switch outputs control signals for the power window's up, down, one-touch auto-up, one-touch auto-down functions to the power window motor.

5. Operation

Normal Operation

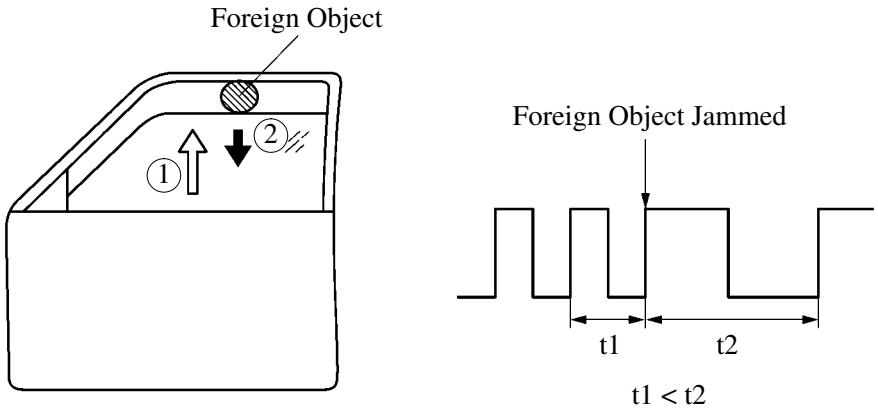
During the normal operation of the power window, the power window motor rotates at a constant speed. Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller is uniform. When the controller receives pulse signals with a uniform width, it determines that no jamming occurred. Thus, the controller determines the power window movement according to the signal that is received by the controller.



Output Pulse Signal 145BE50

Jam Protection Operation

If an object becomes jammed between the glass and the window frame during one-touch auto-up operation, the power window motor's speed decreases (①). Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller increases. After the motor's deceleration rate exceeds a predetermined value, the jam judgment circuit determines that jamming occurred.
Then, the controller stops the upward movement of the window, and automatically moves the window downward so that there will be a window opening of 200 mm (7.9 in.) or more (②).
The jam protection function operates only during a one-touch auto-up operation.



Output Pulse Signal

145BE51

NOTE: Immediately before the window is fully closed, there is an area in which the jam protection function does not operate.

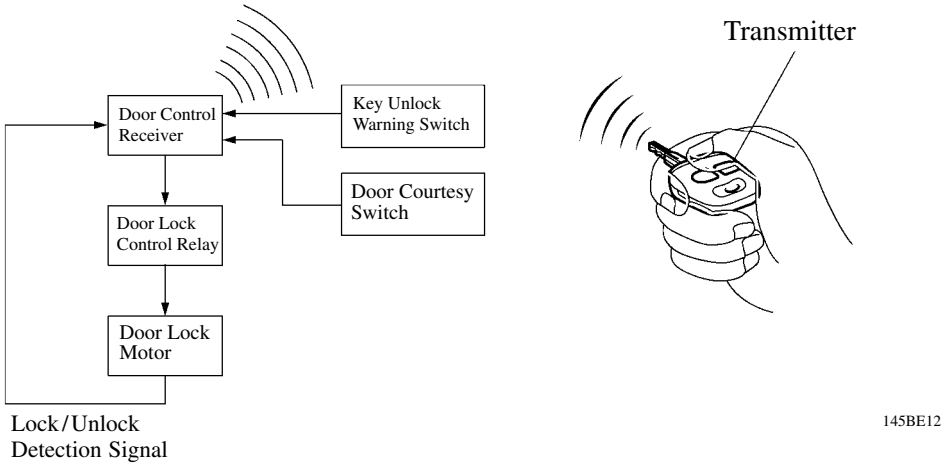
■WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

1. General

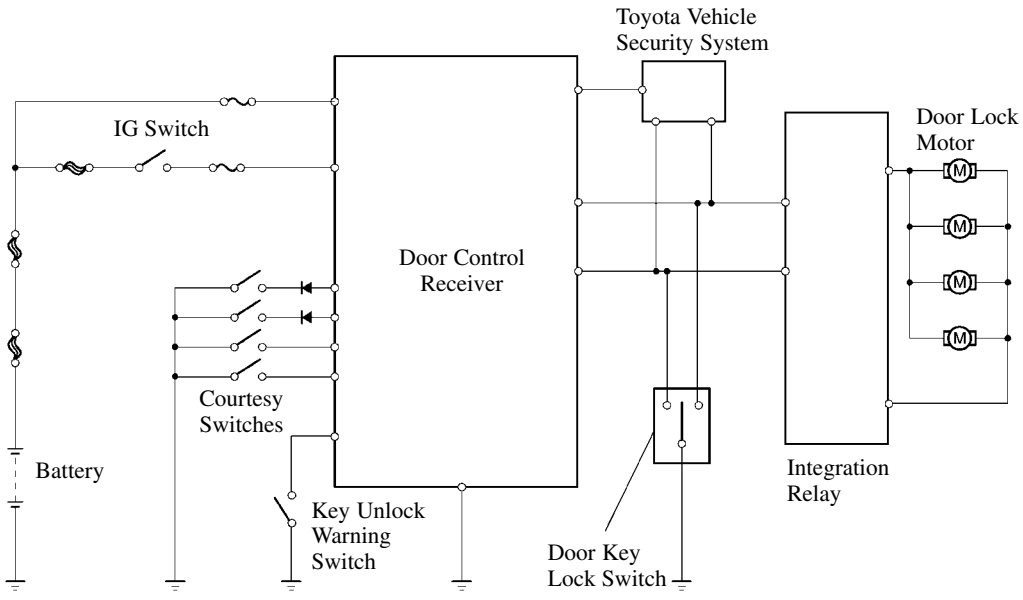
The wireless door lock remote control system is a convenient system for locking and unlocking all the doors from a distance. The (weak radio wave) signal that is transmitted from the transmitter is received by the antenna, which is enclosed in the door control receiver. The door lock motor is then controlled in accordance with the received signal.
This system in the Avensis/Corona has the following features.

- A two-button, key-integrated transmitter has been adopted.
- The maximum of four kinds of transmitter recognition codes can be registered.
- A rolling code system, in which the signal configuration changes each time when a signal is transmitted by the transmitter, has been adopted.
- The key cylinder for the front passenger door has been discontinued on the models with the wireless door lock remote control system.

▶ System Diagram ◀



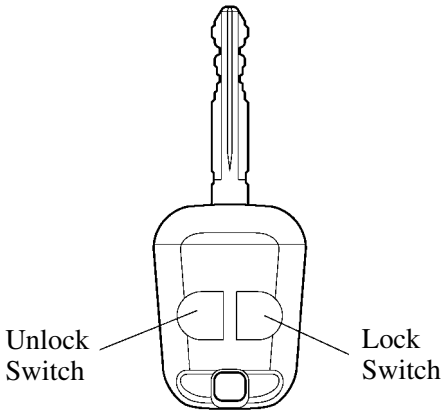
2. Wiring Diagram



3. Construction

Transmitter

A key-integrated type transmitter, which is enclosed in the ignition key, has been adopted.
The lock and unlock functions of all the doors can be controlled by operating the switches on the transmitter.



145BE43

Door Control Receiver

The door control receiver is provided with an internal antenna to receive the signals emitted by the transmitter. When a signal is received from the transmitter, the receiver outputs an appropriate signal (to lock or unlock the door) to the door lock control relay. The receiver also contains an EEPROM which can store the transmitter recognition codes.

Key Unlock Warning Switch

The key unlock warning switch detects whether or not the ignition key is inserted into the ignition key cylinder. It goes on when the key is inserted and off when it is removed from the cylinder.

Door Courtesy Switch

The door courtesy switch detects the operation of a door. It goes on when the door is open and off when it is closed.

4. Function

Normal Operation

The following operations take place by operating the transmitter switches.

1) All Doors Unlock Operation

Unlocks all the doors after the transmitter “Unlock” switch is pressed.
However, if the luggage door or the back door have been locked by the master key, the luggage door or the back door cannot be unlocked with the transmitter.

2) All Doors Lock Operation

Locks all the doors after the transmitter “Lock” switch is pressed.

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, the wireless door lock remote control is temporarily cancelled to prevent misoperation.

Reception Stop Function When Door is Open (Lock Function Only)

Reception is rejected when a door is open because the operator may think that all the doors are locked if the system were to operate when any of the doors is not closed completely. This function is to prevent incorrect operation on such an occasion.

Transmitter Recognition Code Registration Function

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 Avensis/Corona Repair Manual (Pub. No. RM599E) to register the codes correctly.

Mode	Function
Rewire 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.

Transmitter Recognition Code Resynchronizing Function

If the transmitter and the receiver go out of synchronization due to the operations described below, the transmitter in which recognition codes are registered can be resynchronized.

- The transmitter's battery has been changed.
- The transmitter has been operated continuously in an area outside of the receiver's signal reception area.

For details of the recognition code resynchronizing procedure, refer to the Avensis/Corona Repair Manual (Pub. No. RM599E).

Diagnostic Function

A diagnostic function that comprises the following 2 functions has been adopted.

- A function to check the state of the signal being sent and received by the transmitter.
- A function to distinguish a non-registered transmitter or a desynchronized transmitter from a normal transmitter.

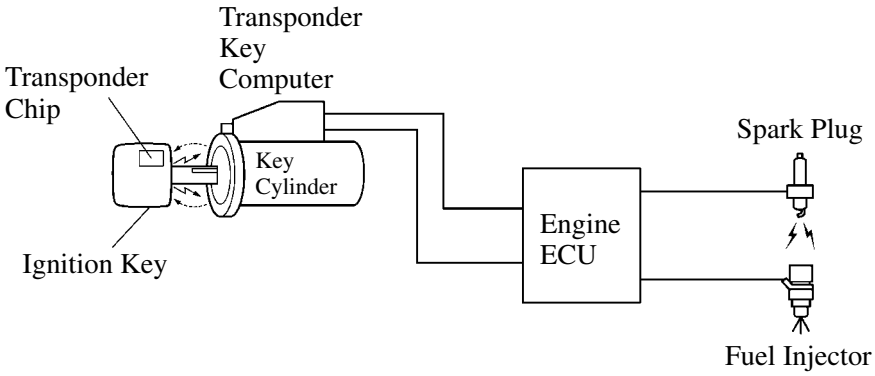
For details of the diagnostic procedure, refer to the Avensis/Corona Repair Manual (Pub. No. RM599E).

■ENGINE IMMOBILISER SYSTEM

1. General

The engine immobiliser system is a theft-deterrent system which disables the engine from starting by using the ignition key with an ID code that matches the pre-registered code in the vehicle.
This system adopts a transponder system which uses a transponder chip embedded in the grip of the ignition key. When the coil that is integrated in the transponder key computer and located around the ignition key cylinder receives the ID code signal transmitted by the transponder chip, the transponder key computer determines whether or not the ID code matches the code that is stored in the transponder key computer.

▶ System Diagram ◀

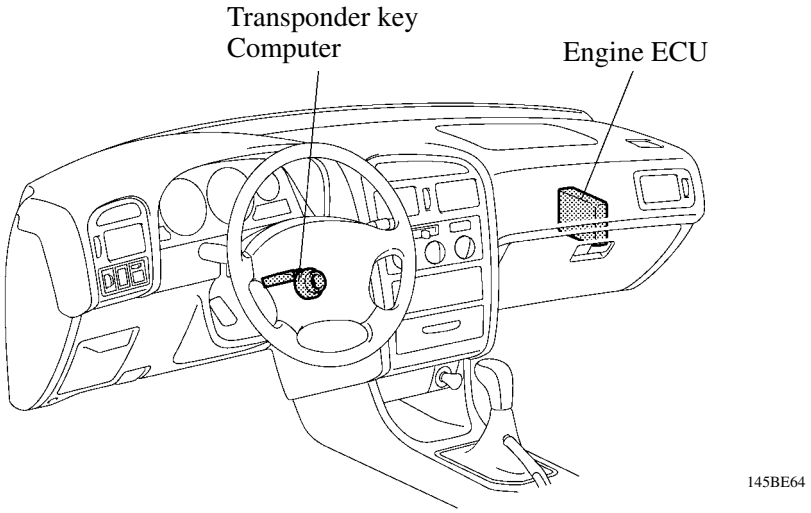


Gasoline Engine Model

145BE46

2. Layout of Components

The major function parts of the engine immobiliser system are shown below.



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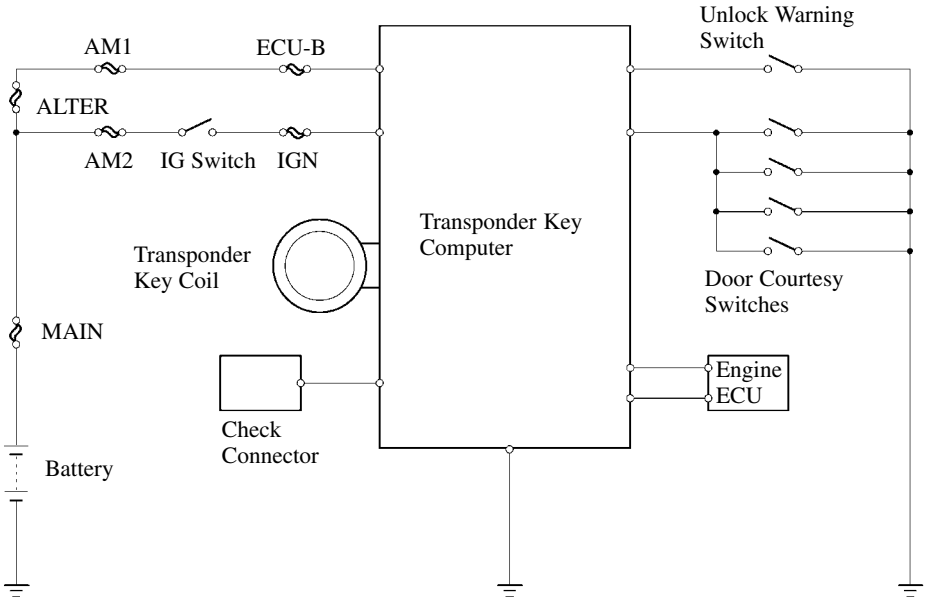
3. Wiring Diagram



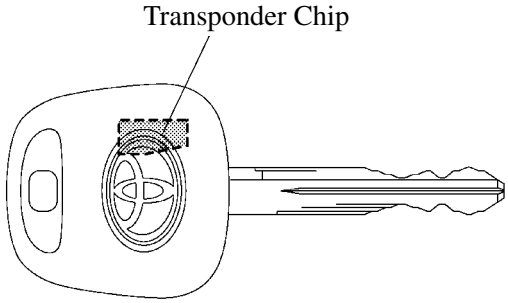
145BE44

4. Construction

The engine immobiliser system consists of the transponder key (ignition key) and transponder key computer.

Transponder Key (Ignition Key)

A transponder chip is embedded in the grip of the ignition key. Each transponder chip contains an individual transponder key code (ID code). The key does not need an internal battery to transmit a key code.



Key without Transmitter

145BE45

Transponder Key Computer

The transponder key computer integrates a coil that receives the transponder key code from the transponder chip, an amplifier that amplifies the code, and an ECU that verifies the legitimacy of the received code. The transponder key computer is installed in the upper of the key cylinder.

5. Operation

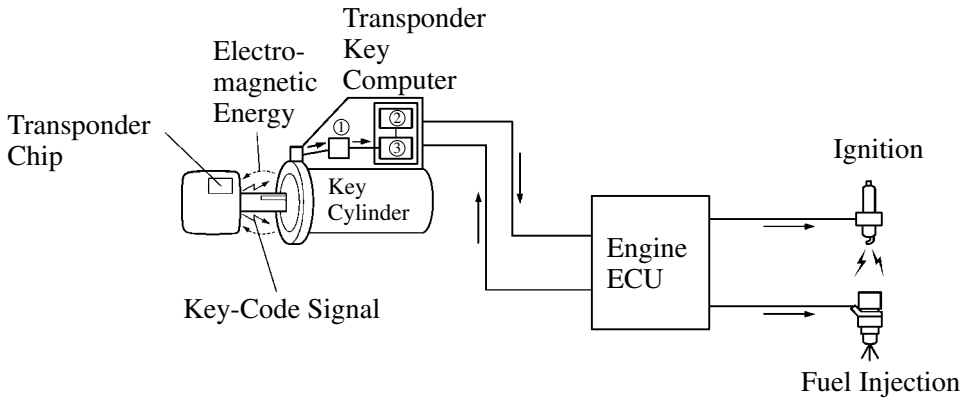
Setting the Engine Immobiliser System

- When the ignition key is removed from the key cylinder, the engine immobiliser system will be set.
- After 20 seconds have elapsed upon turning the ignition key from the ON position to the ACC or LOCK position, the engine immobiliser will be set.

Unsetting the Engine Immobiliser System

(1) When the ignition key is inserted in the key cylinder, the transponder key computer causes the coil that is integrated in the computer to provide electromagnetic energy to the transponder chip, thus enabling the transponder chip to transmit a key-code signal.
The condenser in the transponder chip converts and stores this energy as electrical energy. The transponder chip then uses this electrical energy to transmit a key-code signal.

(2) After being received by the coil that is integrated in the computer, the key-code signal is amplified by the amplifier that is enclosed in the computer and is sent to the ECU portion to verify the legitimacy of the code.
The key code that has been received by the ECU part is then compared to the key code that is stored in the ECU part. The code comparison process takes place, and if the codes match in a row, the ECU part unsets the immobiliser system.
As a result, the engine will be able to start.



Gasoline Engine Model

(1) : Amplifier Part
(2) : Code Memory Circuit
(3) : Code Comparison Circuit

6. Functions

The engine immobiliser system provides the following functions:

Immobiliser Cancel Function

The immobiliser system is cancelled when the following condition is met, thus permitting authorized operation of the engine:

- The ignition key has been inserted in the key cylinder (after the transponder key computer reads the key code of the transponder chip and that code matches the pre-registered key code in a row).

New Transponder Key Code Registration Function

This function allows the registration of the key code of a new master or sub key to the transponder key computer. A maximum of 6 different transponder key codes (4 for master keys and 2 for sub keys) can be registered in the transponder key computer. This function is used if the transponder key computer is replaced with a new one.

Additional Transponder Key Code Registration Function

This function enables the registration of the key code for a new master key or sub key, while retaining the key codes that are already registered. This function is used for the purpose of adding a new master or sub key.

Transponder Key Code Delete Function

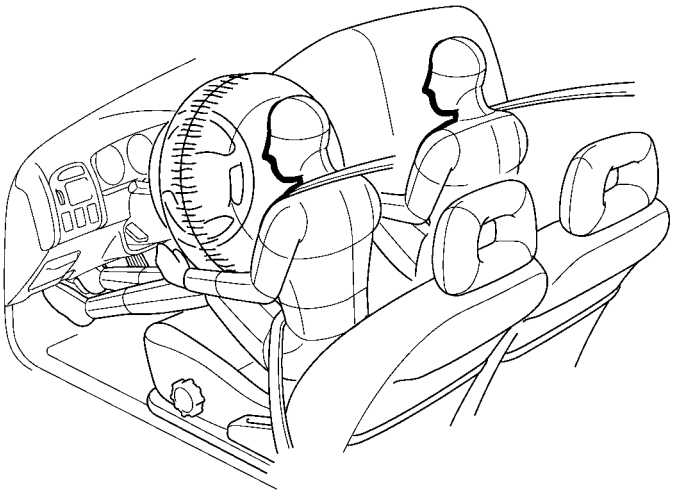
This function deletes all the transponder key codes that are registered in the transponder key computer except for the key code of the master key that was used to execute the delete function.

For further details on transponder key code registration, addition, and deletion, see the Avensis/Corona Chassis and Body Repair Manual (Pub. No. RM599E).

■ SRS AIRBAG

1. General

- The SRS (Supplemental Restraint System) airbag is designed to help lessen 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 reduce the likelihood of the driver's or front passenger's head and chest directly hitting the steering wheel or instrument panel.
- A 3-sensor type airbag system is used, in which the detection of deceleration during a collision is accomplished by the front airbag sensor and 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.

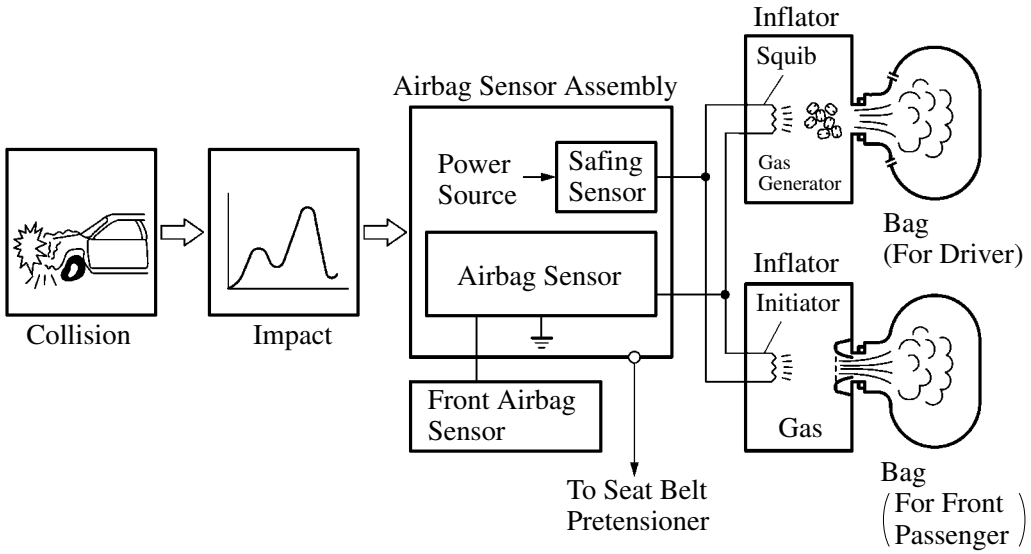


145BE10

LHD Model

▶ System Diagram ◀

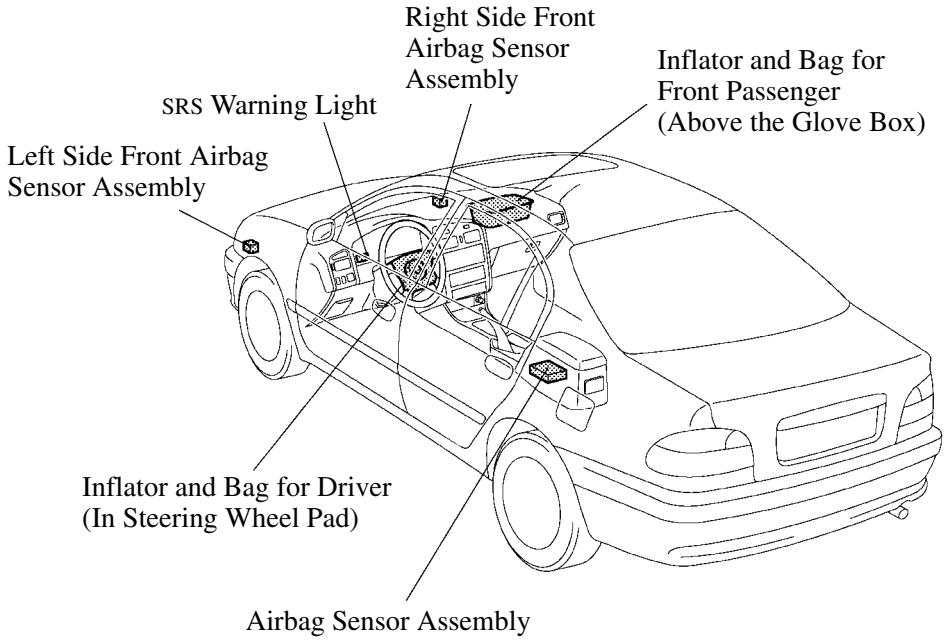
The activation processes of the SRS airbag is as illustrated below.



145BE52

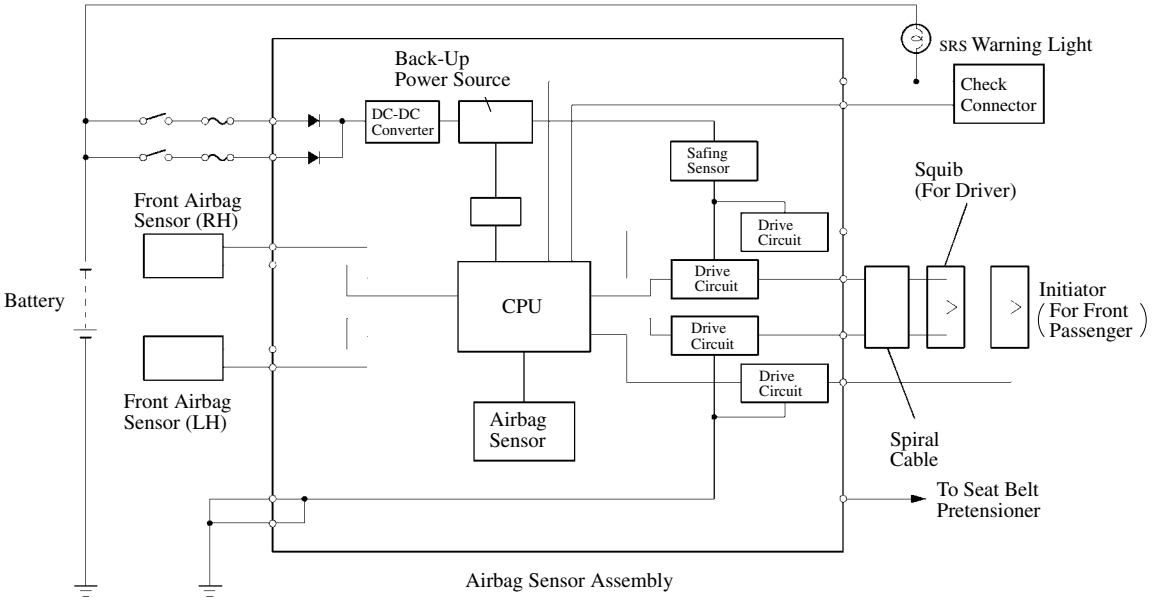
2. Layout of Components

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



LHD Model

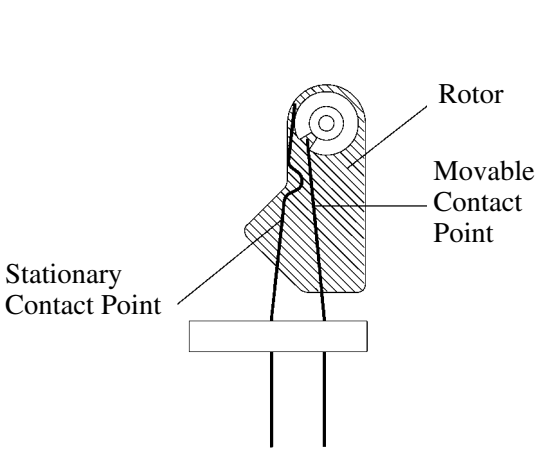
3. Wiring Diagram



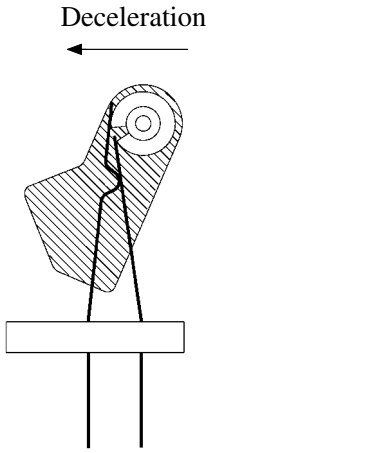
4. Construction and Operation

Front Airbag Sensor

The front airbag sensor consists of rotor, movable contact point and a stationary contact point.
The rotor is fixed by the initial set load of the movable contact point. At the same time, the movable contact point restrains the movement of the rotor which is generated during vehicle deceleration, thus preventing the unintended activation of the system.
If a sudden deceleration that exceeds a predetermined value occurs due to a collision of the vehicle, the rotor will rotate. The rotational movement of the rotor pushes the movable contact point and causes the movable and stationary contact points to come into contact. As a result, an ON signal is generated and transmitted to the airbag sensor assembly.



Normal Condition



Activated Condition

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Airbag Sensor Assembly

1) Description

The airbag sensor assembly is mounted on the center floor under the instrument panel. It receives signals from the airbag sensor enclosed in the airbag sensor assembly and front airbag sensor and judges whether the airbag and seat belt pretensioner must be activated or not, and then diagnoses system malfunctions.

2) Construction and Operation

The airbag sensor assembly consists of airbag sensor, safing sensor, ignition control circuit, diagnosis circuit, etc.

a. Airbag Sensor, Ignition Control Circuit

- The airbag sensor is enclosed in the airbag sensor assembly. Based on the deceleration of the vehicle that occurs during a collision, the distortion that is created in the sensor is converted into an electric signal. This signal is a linear representation of the deceleration rate.
- The ignition control circuit performs a prescribed calculation based on the signal output by the airbag sensor and the front airbag sensor. If these calculated values are larger than a predetermined value, it activates the ignition operation.

b. Safing Sensor

The safing sensor is enclosed in the airbag sensor assembly. The sensor turns ON and outputs an ON signal to the airbag sensor assembly if a deceleration force that is higher than a predetermined value is applied to the safing sensor as a result of a frontal collision.

c. Back-Up Power Source

The back-up power source consists of a power supply capacitor and a DC-DC converter. In case of a power system failure during a collision, the power supply capacitor discharges and supplies electric power to the system. The DC-DC converter is a boosting transformer when the battery voltage drops below a certain level.

d. Diagnosis Circuit

This circuit constantly diagnoses the system for any malfunction. When a malfunction is detected, it lights up the SRS warning light on the combination meter to alert the driver.

e. Memory Circuit

When a malfunction is detected by the diagnosis circuit, it is coded and stored in this memory circuit.

Inflator and Bag

1) Construction and Operation

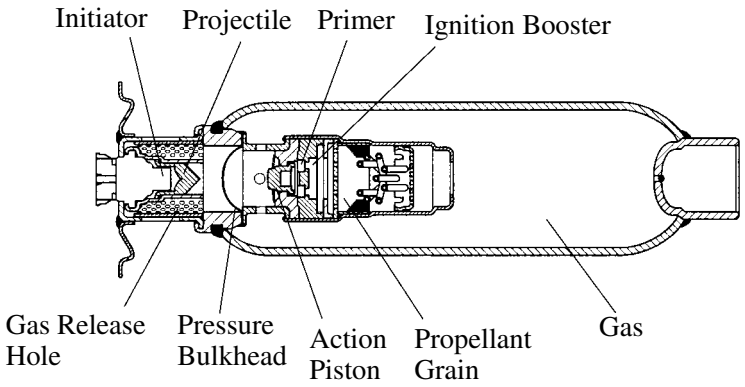
a. For Driver (In Steering Wheel)

- The inflator and bag are stored in the steering wheel pad and cannot be disassembled. The inflator contains a squib, gas generator, etc., and inflates the bag in case of collision. The bag is made of strong nylon cloth.
  Also, there are 2 gas exhaust ports provided at the back of the airbag to release the nitrogen gas quickly after the airbag has been deployed.

- The airbag sensor and front airbag sensors are activated by deceleration due to frontal collision. Electric current then ignites the squib located in the inflator. The flame spreads instantaneously to the gas generator, and a large amount of nitrogen gas is generated from the gas generator. The gas flows through the filter where cinders are removed and the gas is cooled before filling the bag. Then, as it expands, the driver's bag tears open the wheel pad outer layer to further expand and to help to restrain the impact applied to the head and chest of the driver.

b. For Front Passenger (Above the Glove Box)

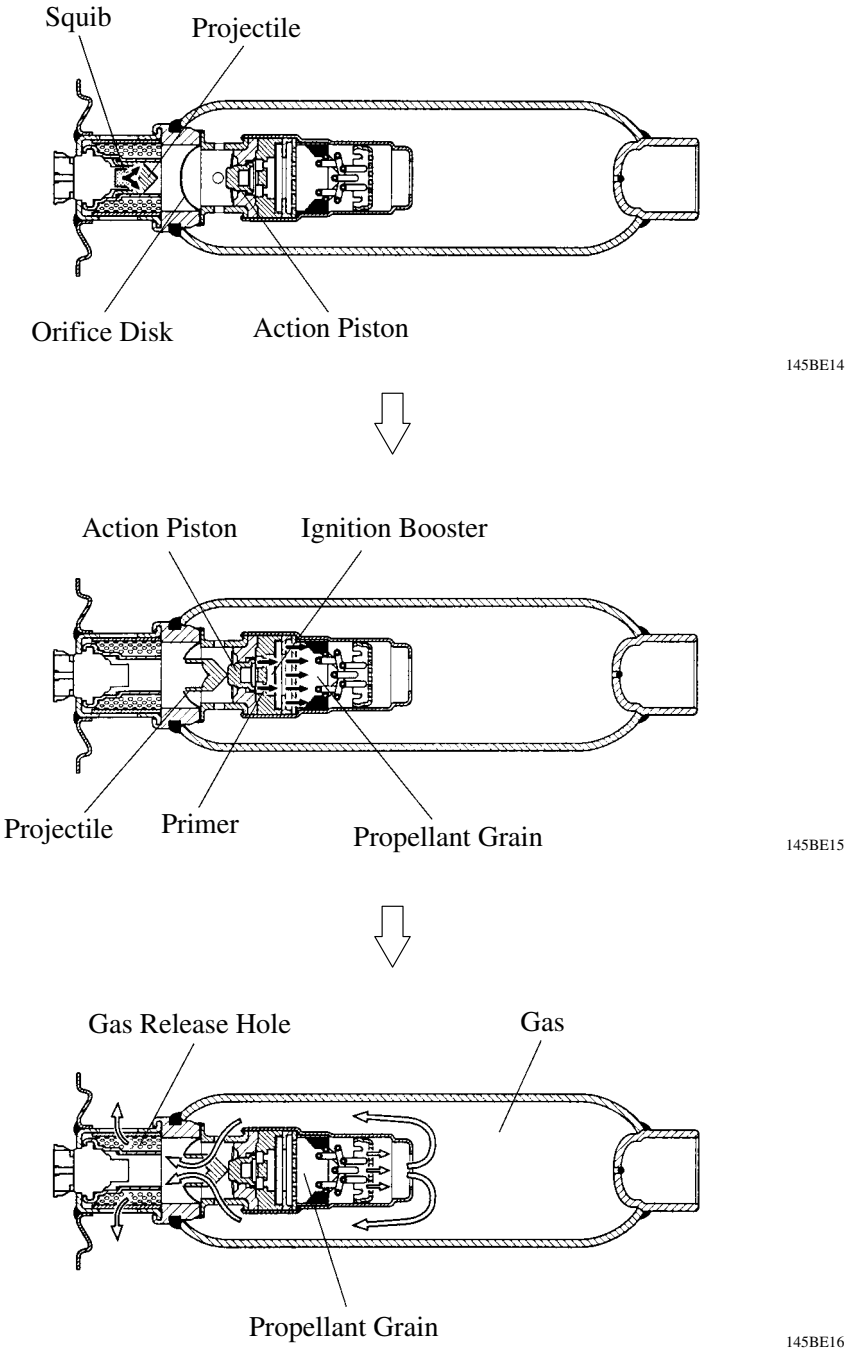
- The inflator is comprised of a initiator, projectile, pressure bulkhead, propellant grain, gas and etc.. The bag is made of strong nylon cloth, and becomes inflated by the argon gas generated by the inflator. The inflator and bag are integrated inside the case, and located in the passenger side instrument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



145BE13

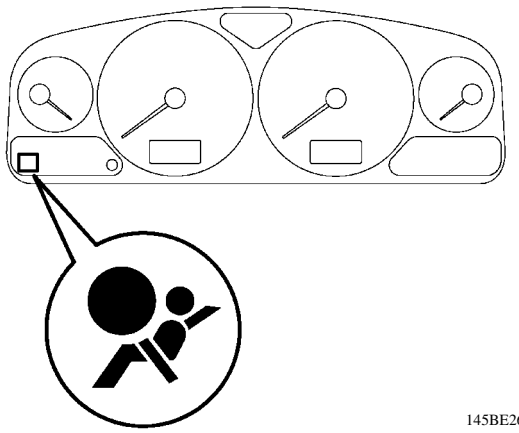
- If the airbag sensor is turned on by deceleration due to frontal collision, electric current then ignites the initiator located in the inflator. The projectile which fired by the ignition of the initiator pierces through the pressure bulkhead and collides with the action piston, which causes the primer 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 reduce the impact applied to the head and chest of the front passenger.

▶ Operation ◀


Squib
Projectile
Orifice Disk
Action Piston
145BE14
Action Piston
Ignition Booster
Projectile
Primer
Propellant Grain
145BE15
Gas Release Hole
Gas
Propellant Grain
145BE16
: Propagation of Fire
: Flow of Argon Gas

SRS Warning Light

The SRS warning light is located on the combination meter.
It comes on to alert the driver about the system trouble when a malfunction is detected in self-diagnosis of the airbag sensor assembly and side airbag sensor assembly. In normal operating conditions when the ignition switch is turned to the ACC or ON position, the light comes on for about 6 seconds and then goes off.

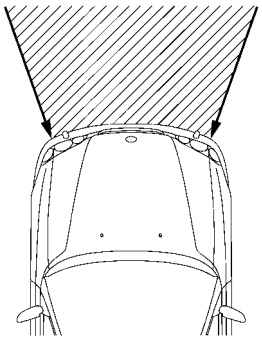


145BE26

5. System Operation

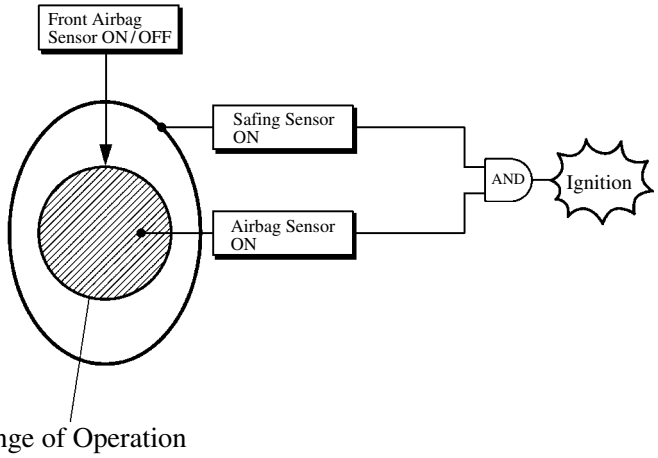
Ignition Judgement and Condition

- When the vehicle collides in the hatched are (Fig. 1) and the shock is larger than a predetermined level, the airbag and the seat belt pretensioner are activated automatically. The airbag sensor is characteristically turned in such a way that can judge the need for ignition in collisions within the hatched area.
- The safing sensor is designed to be activated by a smaller deceleration rate than that of the airbag sensor. As illustrated in Fig. 2 below, ignition is operated when current flows to the squib. This happens when a safing sensor and the airbag sensor go on simultaneously.
- Airbag sensor assembly judges whether or not to inflate the airbag in accordance with ON/OFF of the front airbag sensor and the deceleration detected by the airbag sensor.



145BE17

Fig. 1



145BE18

Fig. 2

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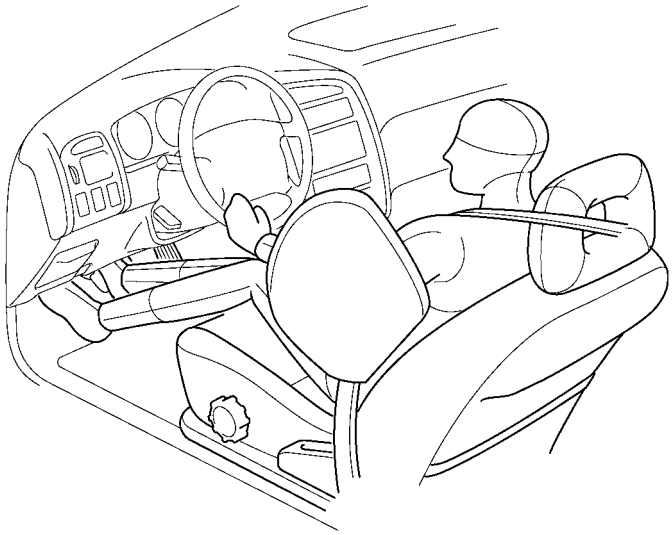
■SRS SIDE AIRBAG

1. General

- In conjunction with the energy absorbing doors, the SRS side airbags have been designed to help reducing the impact energy that is transmitted to the driver and front passenger in the event of a side collision. In a side collision, the side airbag sensor detects the shock and if the side-to-side shock is greater than a specified value, the airbags stored in the seat back for the driver and the front passenger inflate instantly to help reducing the likelihood of the driver's or front passenger's arm and chest directly hitting against the door trim.
- Each SRS side airbag is independent of the other.
- An electrical type SRS side airbag, in which the side airbag is activated by the ignition signal emitted by the airbag sensor assembly, has been adopted.

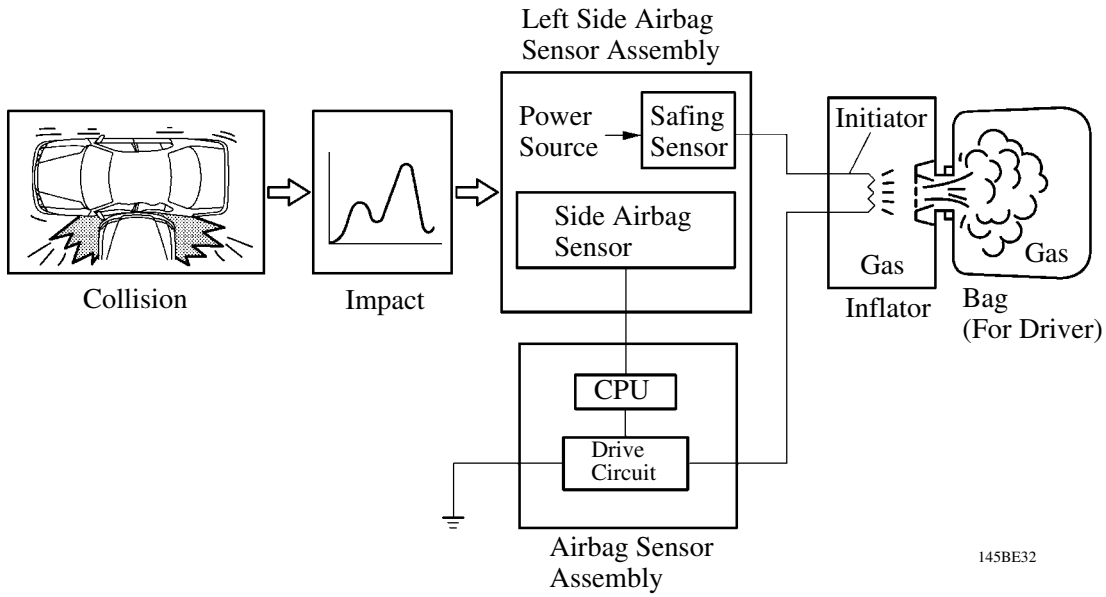


145BE11

LHD Model

▶ System Diagram ◀

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

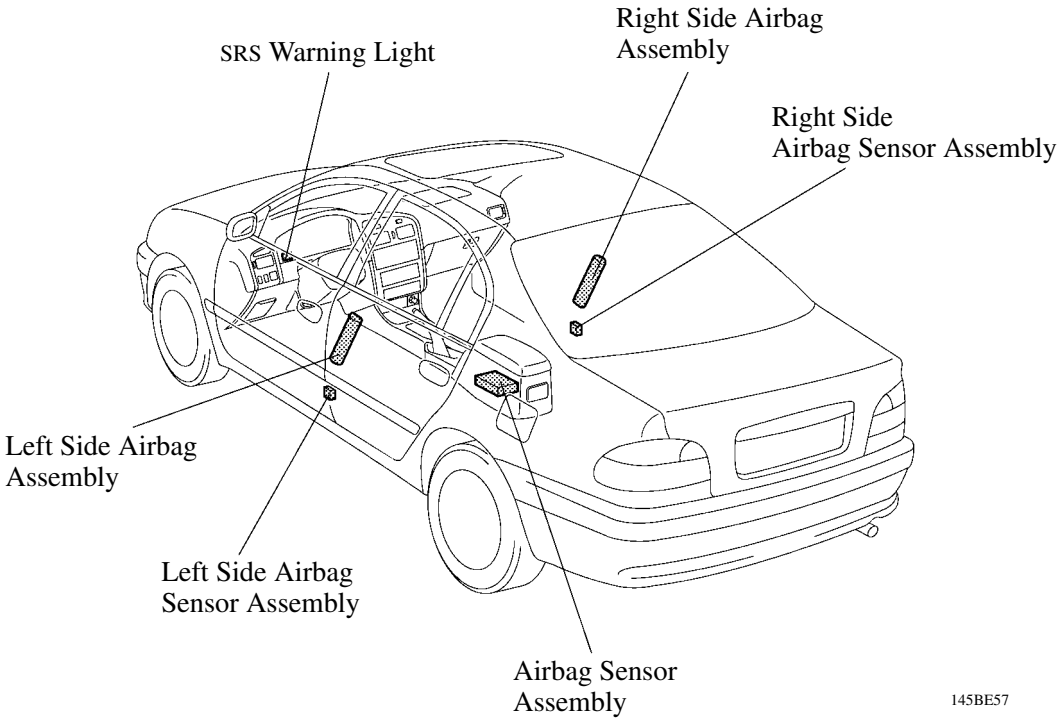


145BE32

For Driver (LHD Model)

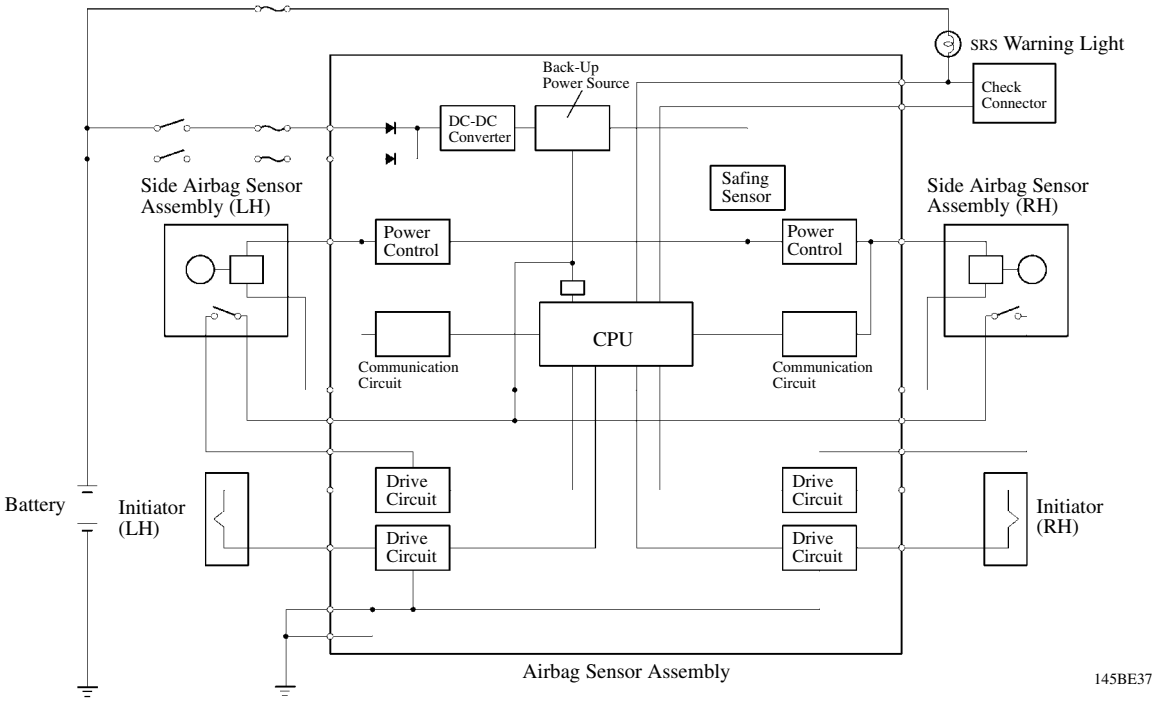
2. Layout of Components

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



LHD Model

3. Wiring Diagram



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4. Construction and Operation

Side Airbag Sensor Assembly

1) Description

The side airbag sensor assembly is mounted on the right and left center pillars. It receives signals from the side airbag sensor enclosed in the side airbag sensor assembly and judges whether the side airbag must be activated or not.

2) Construction and Operation

The side airbag sensor assembly consists of side airbag sensor, safing sensor, etc.

a. Side Airbag Sensor

The side airbag sensor is enclosed in the side airbag sensor assembly based on the acceleration of the vehicle that occurs during a side collision. The distortion that is created in the sensor is converted into an electric signal. This signal is a linear representation of the acceleration rate.

b. Safing Sensor

The safing sensor is enclosed in the side airbag sensor assembly. The sensor turns ON if an acceleration force that is higher than a predetermined value is applied to the safing sensor as a result of a side collision.

Airbag Sensor Assembly

1) Description

The airbag sensor assembly is mounted on the center floor under the instrument panel.
When the airbag sensor assembly receives the airbag activation signal from the side airbag sensor assembly, it applies current to the inflator.
Furthermore, the airbag sensor assembly diagnoses a system malfunction of the side airbag system.
This is the same airbag sensor assembly which is used for the SRS airbag for the driver and front passenger.

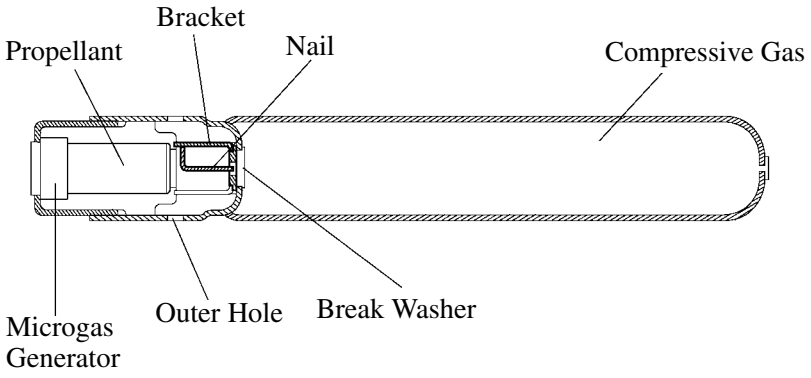
2) Construction and Operation

The airbag sensor assembly consists of ignition control circuit, back up power source, diagnosis circuit, memory circuit, etc.
For details on the construction and the operation of these items, refer to page 155.

Inflator and Bag

1) Construction

The inflator and bag are integrated inside the case and located in the outer side of the seat back. The inflator is compraised of a microgas generator, propellant, bracket, break washer and compressive gas. The bag is made of strong nylon cloth and becomes inflated by the gas heated by the inflator.



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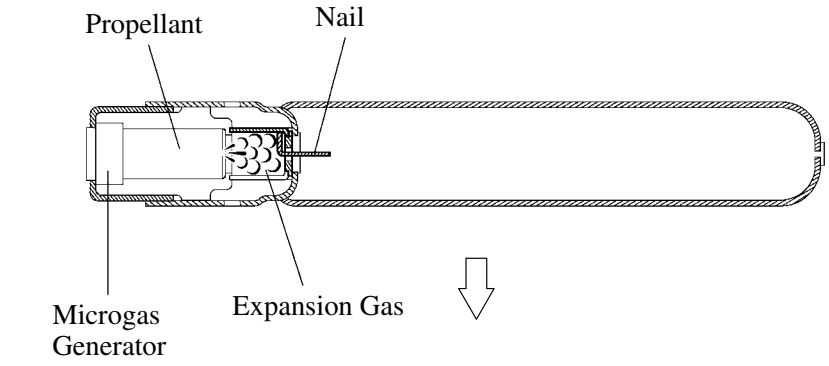
CAUTION

The microgas generator is ignited even by a feeble current. As it is dangerous, never measure the resistance of the microgas generator with a volt/ohmmeter, etc.

2) Operation

If the side airbag sensor is turned on by acceleration due to side collision, electric current then ignites the microgas generator in the inflator. The flame of microgas generator spreads instantaneously to the propellant.
The flame of microgas generator spreads instantaneously to the propellant. The combustion of the propellant causes the gas to expand and the bracket and nail to move. The movement of the bracket and nail causes the compressive gas to tear the break washer and enables the gas to be discharged. The discharged gas mixes with the propellant's combustion gas and flows into the bag through the outlet hole.
Then the side airbag tears open the seat outer cover to further expand and to help to reduce the impact applied to the arm and chest of the driver/front pasenger.



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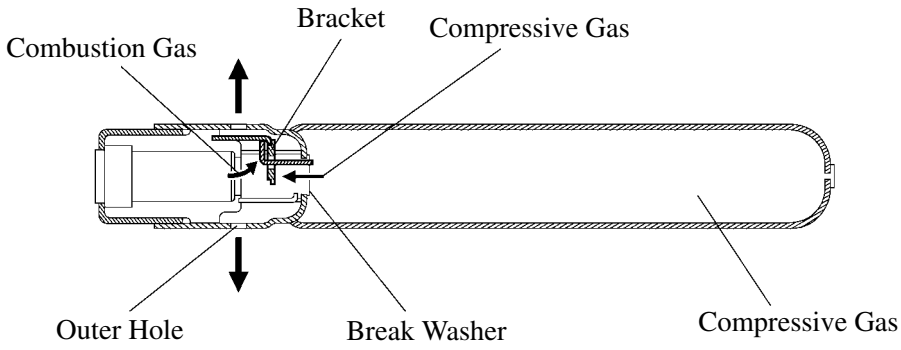

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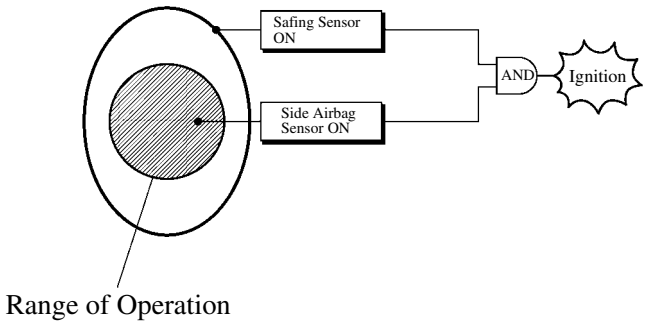
SRS Warning Light

The SRS warning light, which is located inside the combination meter, illuminates to inform the driver if a malfunction occurs in the SRS side airbag system. This light is also used as a warning light for the SRS airbag system.

5. System Operation

Ignition Judgement and Conditions

The safing sensor is designed to be activated by a smaller acceleration rate than that of the side airbag sensor. As illustrated below, ignition is caused when current flows to the initiator, which happens when a safing sensor and the side airbag sensor go on simultaneously,



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