TO INDEX

H1 SRS AIRBAG SYSTEM

1 OUTLINE

1-1 DESCRIPTION

The following *equipment is provided to assure enhanced safety in the event of an accident which may affect the passengers' lives seriously.

*: The side airbag, curtain shield airbag, three-point type ELR seat belt with RH/LH pretensioner + force limiter mechanism are equipped or not equipped depending upon the specifications.

1.Driver's seat airbag, front passenger seat airbag

(1) This occupant protection system is activated in the event of a frontal collision in order to soften the shock on the occupant, which is an added function to the seatbelt protection. The front airbag sensor and the sensor in the airbag ECU detect an impact by the frontal collision, and if the impact exceeds a predetermined value, the airbags accommodated in the steering wheel pad and the instrument panel will deploy immediately to reduce impacts to the heads and faces of the front seat passengers.

2.Side airbag

(1) This is an occupant protection system that is activated in the event of a side collision to reduce impacts to the occupant. The side airbag sensor detects a side impact caused by the side collision, and if the impact exceeds a predetermined value, the airbag mounted inside the seatback on the side of impact will deploy immediately to provide protection for the chest of the occupant.

3.Curtain shield airbag (to be equipped concurrently with the side airbag)

(1) This is an occupant protection system that is activated in the event of a side collision to reduce impacts to the occupant. The side airbag rear sensor detect a side impact, and if the impact exceeds a predetermined value, the airbag extending from the front pillar to the roof side rail on the side of the impact will deploy immediately to reduce impacts to the heads of the front and back seat passengers.

4.Three-point ELR seatbelts with the RH/LH pretensioner and the force limiter mechanism

(1) The pre-tensioner is activated along with the airbag in the event of a collision, which instantly winds the seatbelts to hold the occupants.

(2) After the pretensioner mechanism has operated, the force limiter mechanism extends the belt when a certain load is applied to the seat belt, thus reducing impacts to the chest of a passenger.

1-2 PRECAUTION

1-2-1 ITEMS TO BE OBSERVED FOR SYSTEM

1.The airbag system properly functions when the occupants wear the seatbelts correctly in correct riding posture.

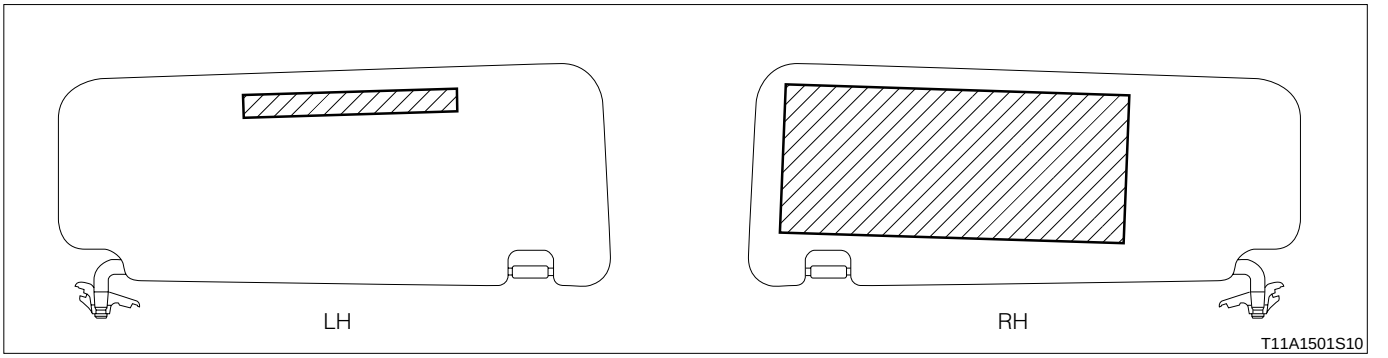
2.To ensure proper operation of the airbag system, do not apply any stickers or place a cover on the airbag deployment zones.

3.Do not place any objects over the airbag deployment zones. Failure to observe this caution pauses risk of injuries to the occupants due to airbag deployment.

4.The airbag system may not be activated in cases where the airbag warning lamp remains lit, or the airbag warning lamp does not light up after the IG SW is turned ON even if the sensor has detected the impact. The system must be checked.

1-2-2 CAUTION PLATE FOR USERS

Caution plates for users are installed to the sun visors for both the driver and front passenger seats.

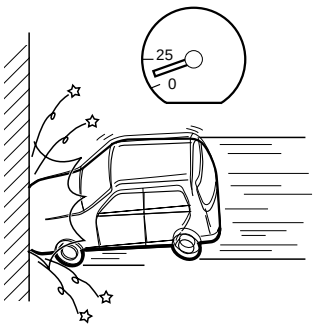


The illustration represents the RHD vehicle.

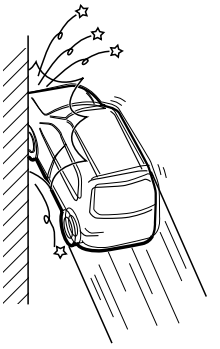
1-2-3 ITEMS TO BE OBSERVED IN CASE OF NON-OPERATION

Under certain conditions given below, the airbag system may not be activated due to the structure of the sensor, and the operation determination requirements of the airbag ECU.

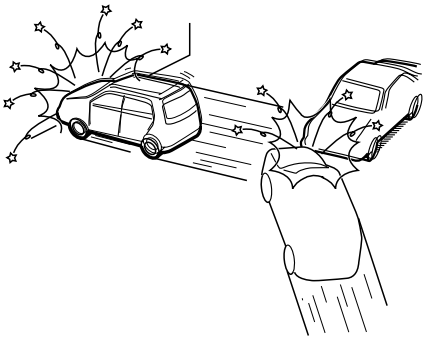
Driver's seat, front passenger seat airbag & seatbelts with the pretensioner + force limiter



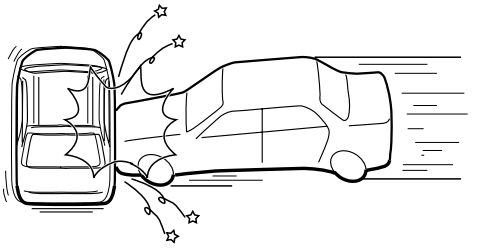
Cases where a vehicle has collided at a vehicle speed of 25 km/h or less



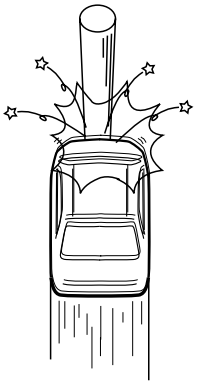
Cases where a vehicle has collided at an angle exceeding approx. 30˚ at the front side



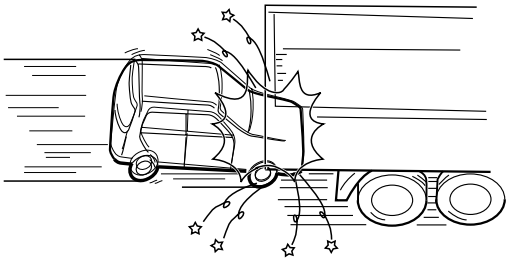
Cases where the vehicle collides after the airbag has deployed once



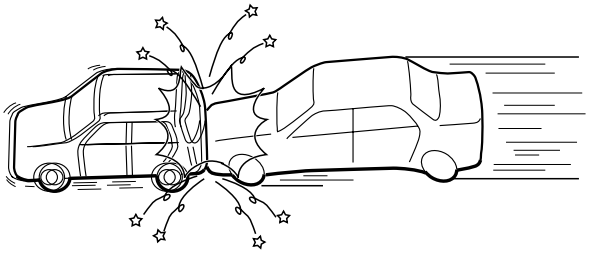
Lateral collision



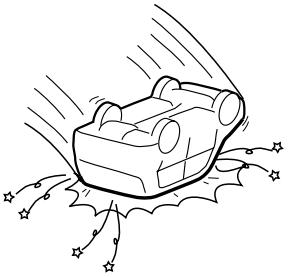
Cases where the vehicle collides against a pole, etc.



Cases where the vehicle dives into under the loading platform of trucks, etc.



Case of rear-end collision

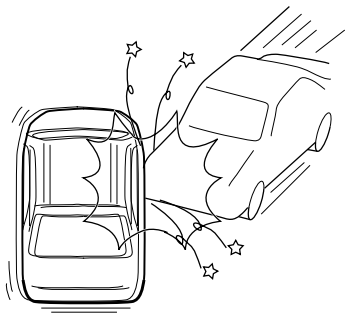


Case of turn-over and roll-over

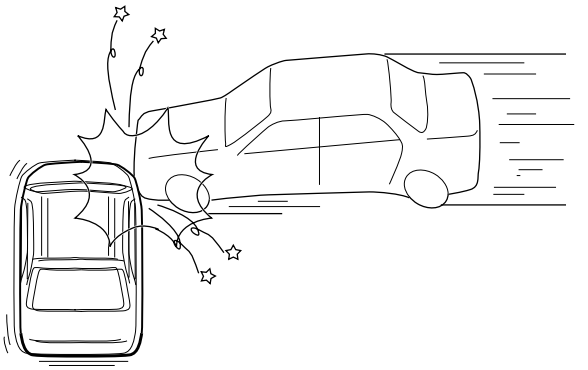
T11A1022ES33

The airbag ECU and the front airbag sensor determine whether the airbag should be deployed based on the impact from the front at time of a collision. Therefore, the airbag may not be deployed in cases where the magnitude of the frontal impact is small despite the massive damage to the vehicle, or the vehicle body has absorbed the impact.

Curtain shield airbag & side airbag



Cases where a vehicle has collided diagonally



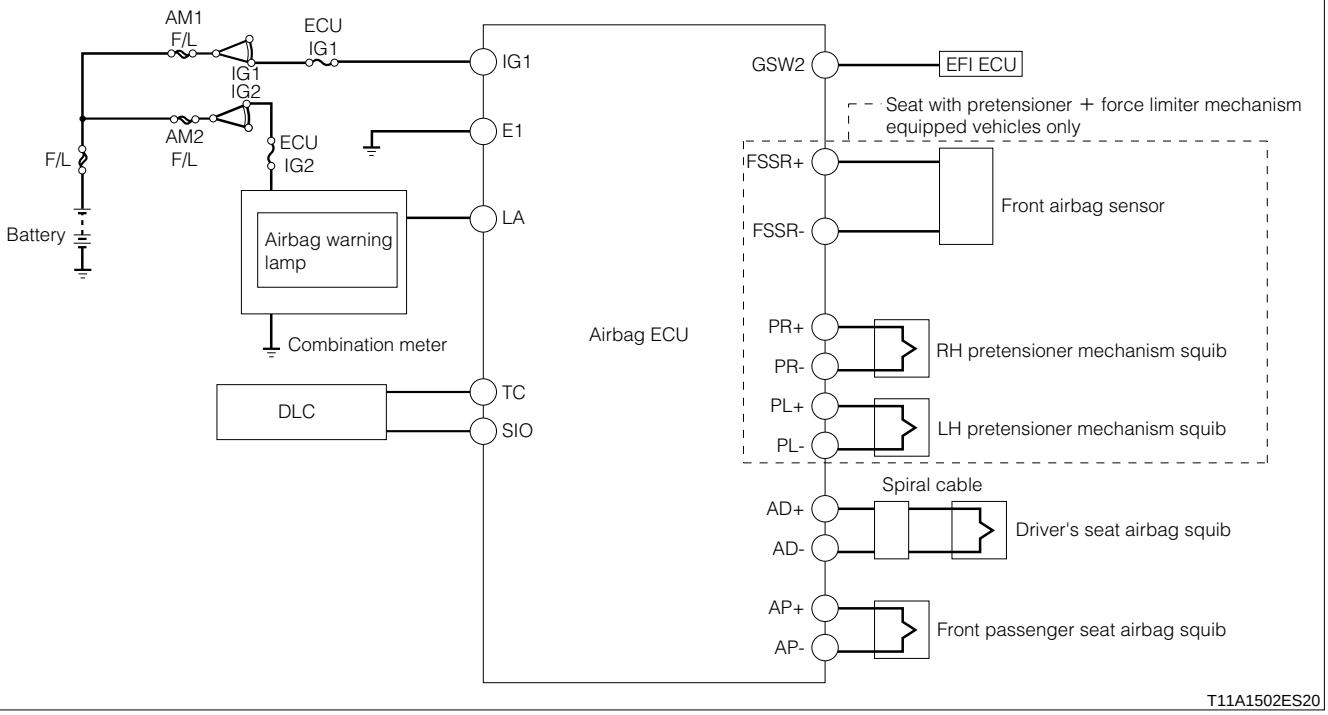
Cases where a vehicle has collided at a section except the passenger compartment

T04A1004ES16

The side airbag sensor and the side airbag rear sensor determine whether the airbag should be deployed based on the impact from the side at time of a collision. Therefore, the airbag may not be deployed in cases where the magnitude of the side impact is small despite the massive damage to the vehicle, or the vehicle body has absorbed the impact.

1-3 SYSTEM WIRING DIAGRAM

Vehicles without the curtain shield airbag & side airbag



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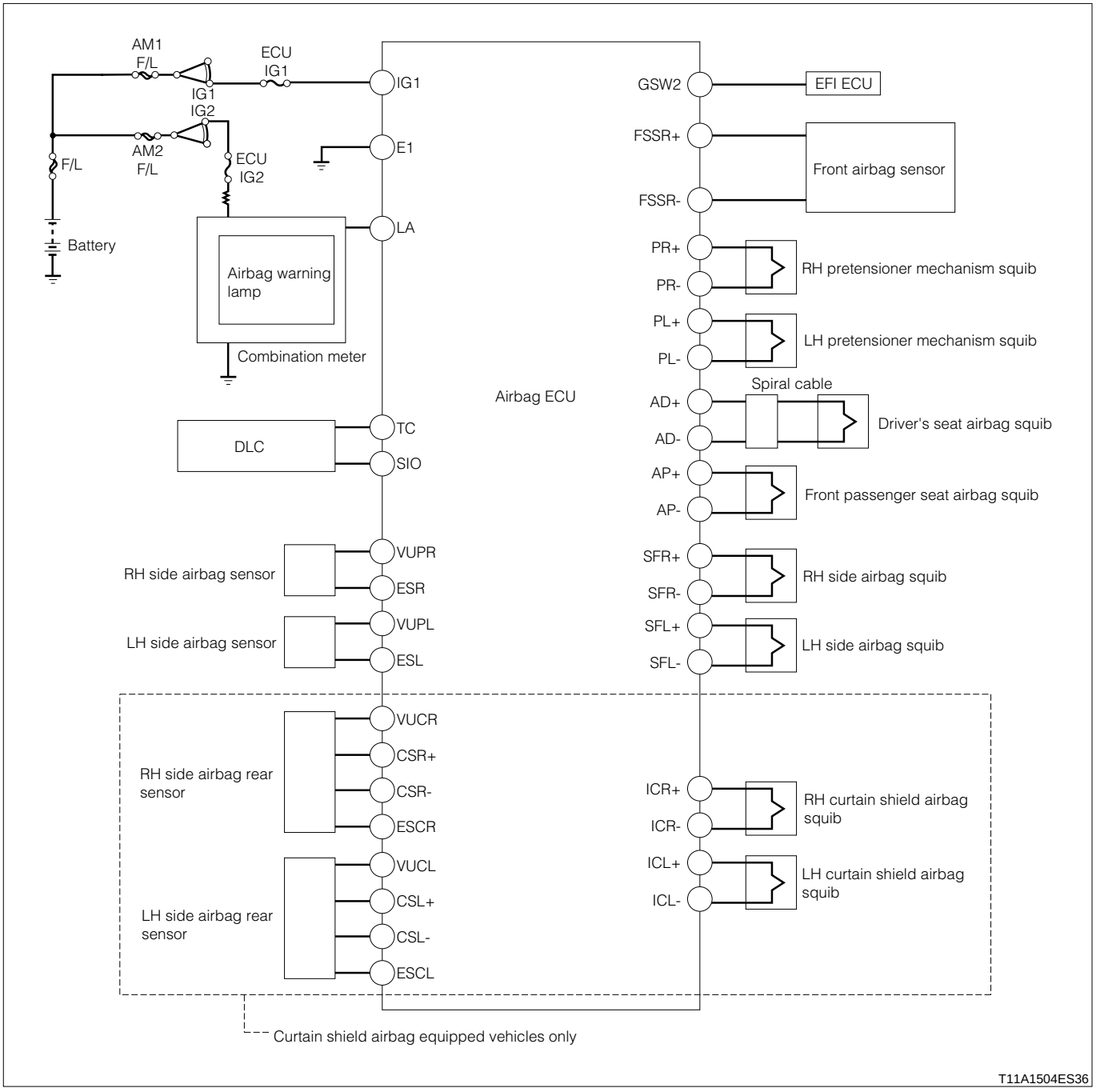
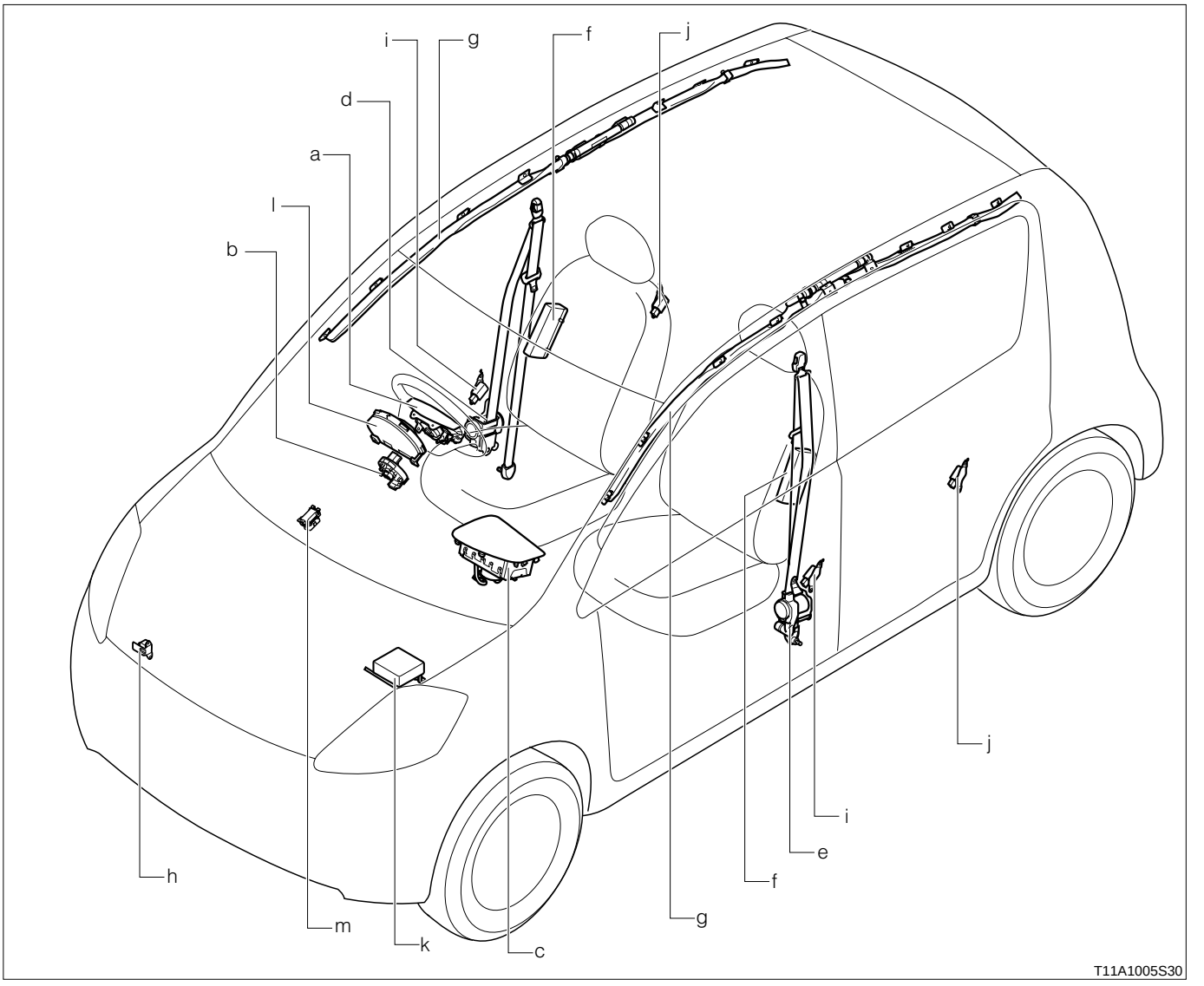
H1–5

Vehicles with the curtain shield airbag & side airbag



1-4 LOCATION OF COMPONENTS



		Vehicles with the airbags at the driver's seat and front passenger seat		Vehicles with the side airbag	Vehicles with the curtain shield airbag & side airbag
		Vehicles with RH, LH pretensioner + force limiter mechanism equipped seat belt	Vehicles without RH, LH pretensioner + force limiter mechanism equipped seat belt		
a	Driver's seat airbag	○	○	○	○
b	Spiral cable	○	○	○	○
c	Front passenger-side airbag	○	○	○	○
d	Seatbelts with the RH pretensioner and the force limiter mechanism	○	–	○	○
e	Seatbelts with the LH pretensioner and the force limiter mechanism	○	–	○	○
f	Side airbag RH/LH	–	–	○	○
g	Curtain Shield Airbag RH/LH	–	–	–	○
h	Front Airbag Sensor	○	–	○	○
i	Side Airbag Sensor RH/LH	–	–	○	○
j	Side airbag rear sensor RH/LH	–	–	–	○
k	Airbag ECU	○	○	○	○
l	Combination Meter (air bag warning lamp)	○	○	○	○
m	DLC	○	○	○	○

○: Provided –: Not provided

2 CONTROL

2-1 OPERATION

2-1-1 DRIVER'S SEAT, FRONT PASSENGER SEAT AIRBAG & SEATBELTS WITH THE PRETENTIONER + FORCE LIMITER

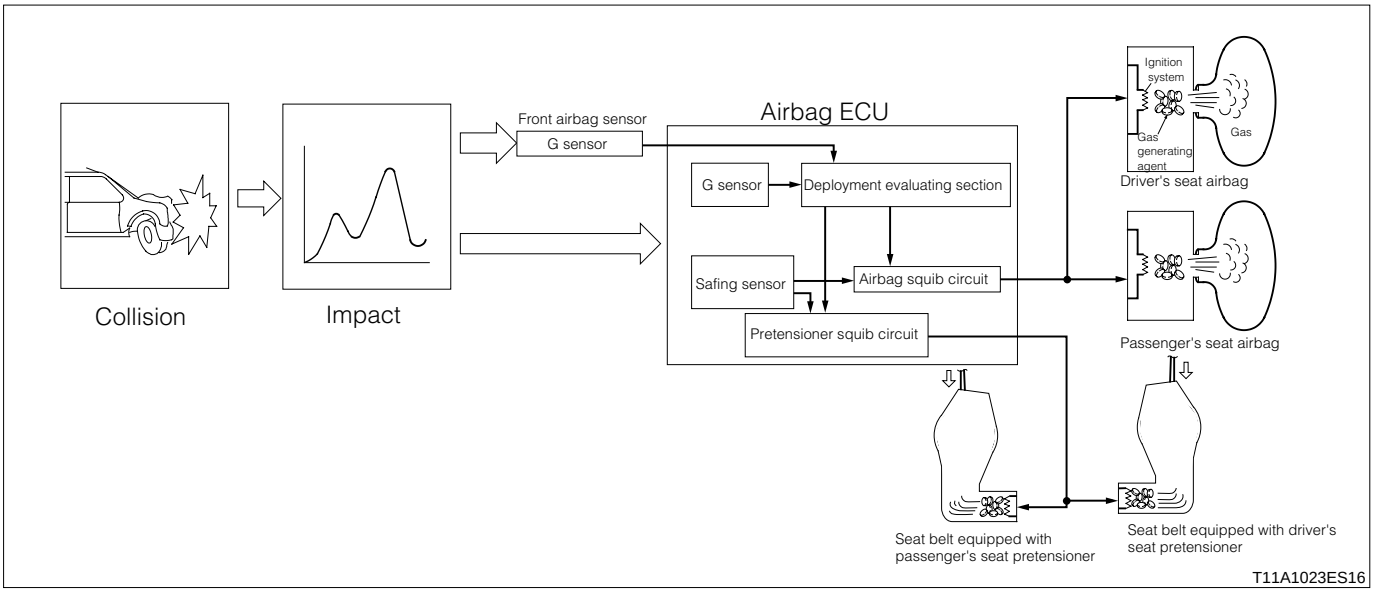
1.When an impact from the front of the vehicle is applied, the G sensor in the front airbag sensor, the safing sensor in the airbag ECU, and the G sensor will detect the impact.
   (1) The G sensor in the front airbag sensor and the safing sensor in the airbag ECU are turned ON when the vehicle experiences a certain level of deceleration due to the collision impact.
   (2) The G sensor mounted in the airbag ECU transmits a G waveform to the airbag ECU.
2.The output of the front airbag sensor and the G waveform of the G sensor in the airbag ECU determine whether or not the airbag should be activated.

NOTE

- The airbag ECU judges that a collision has occurred, when the value calculated according to the predetermined formula exceeds a set value.

3.When the safing sensor is turned ON, and the airbag ECU judges that a collision has occurred, current flows through the pretensioner ignition circuit and the airbag ignition circuit to deploy the airbag.

Operation process



2-1-2 SIDE AIRBAG

1.When an impact from the side of the vehicle is applied, the G sensor in the side airbag sensor and the safing sensor in the airbag ECU will detect the impact.

(1) The side airbag sensor transmits a G waveform generated by the G sensor in the sensor to the operation determination section.

(2) The operation determination section uses a G waveform to determine whether to activate.

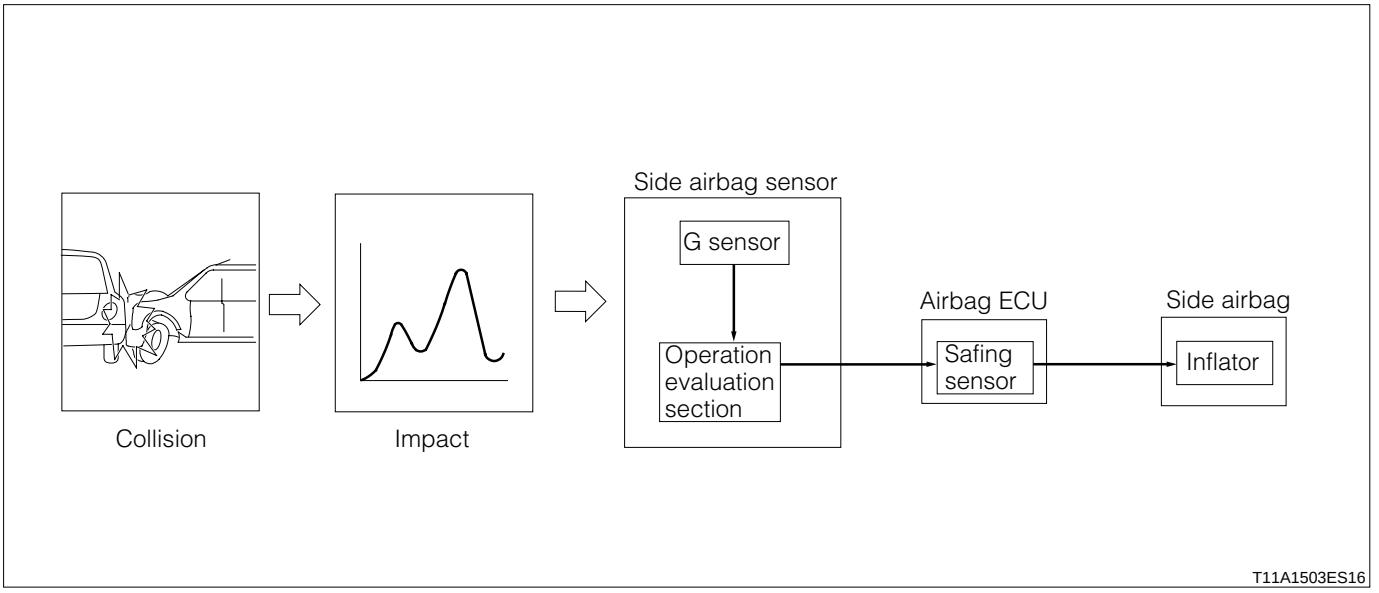
NOTE

- The side airbag sensor judges that a collision has occurred when the value calculated according to the predetermined formula exceeds a set value.

2.The safing sensor mounted in the airbag ECU is turned ON when the vehicle experiences a certain level of deceleration.

3.When the safing sensor in the airbag ECU is turned ON, and the side airbag sensor judges that a collision has occurred, current flows through the side airbag ignition circuit to deploy the airbag.

Operation process



2-1-3 CURTAIN SHIELD AIRBAG & SIDE AIRBAG

(1) Side airbag

Refer to Page H1-8.

(2) Curtain Shield Airbag

1.When an impact from the side of the vehicle is applied, the G sensor and safing sensor mounted in the side airbag rear sensor will detect the impact.
   (1) The G waveform of the G sensor mounted in the sensor is outputted to the operation determination section.
   (2) The operation determination section uses a G waveform to determine whether to activate.
   (3) The safing sensor mounted in the sensor is turned ON when the vehicle experiences a certain level of deceleration.

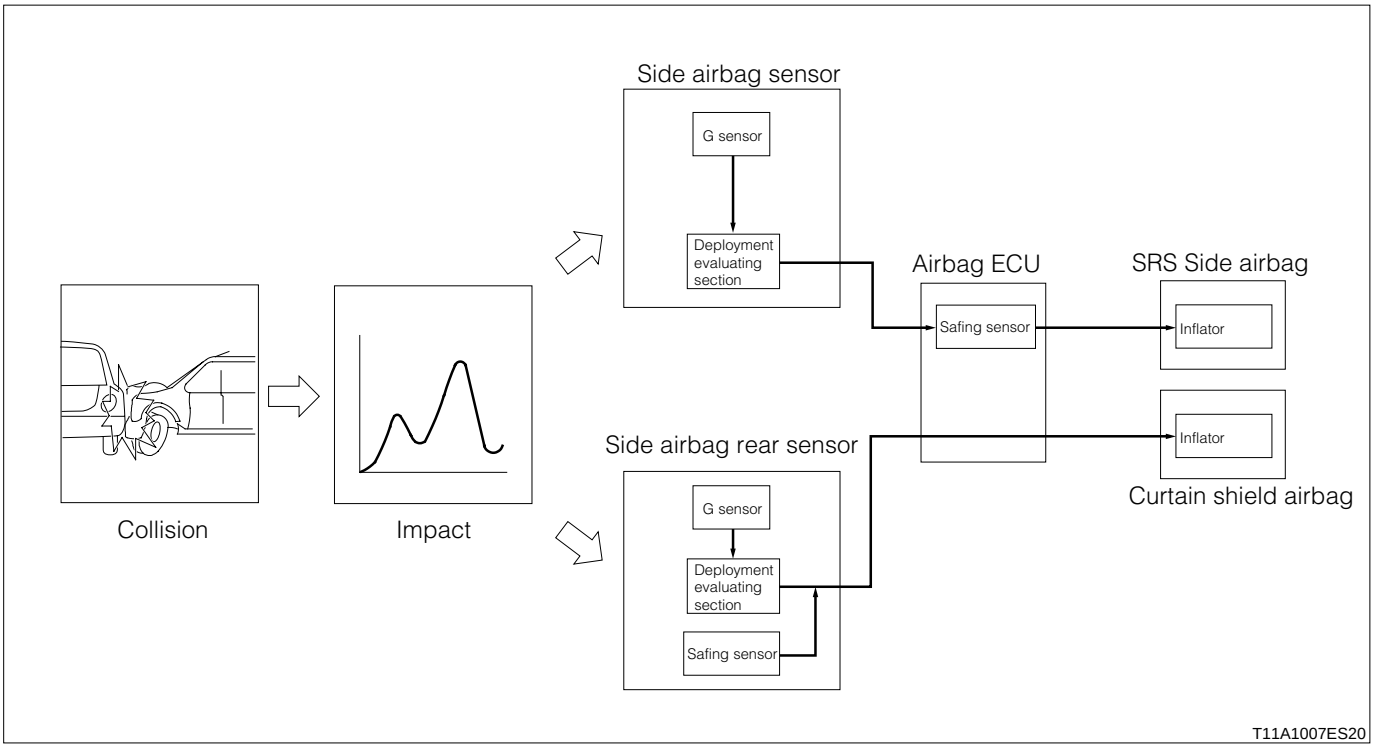
NOTE

- The side airbag rear sensor judges that a collision has occurred when the value calculated according to the predetermined formula exceeds a set value.

2.When the side airbag rear sensor judges that a collision has occurred and the safing sensor mounted in the sensor is turned ON, current flows into the curtain shield airbag ignition circuit to deploy the airbag.

3.When the side airbag is activated, the curtain shield airbag will be activated, in addition to the above components.

Operation process



Even if the side airbag rear sensor detests the impact, the side airbag will not be deployed.

2-2 DIAGNOSIS FUNCTION (SELF-DIAGNOSIS FUNCTION)

2-2-1 DESCRIPTION

1.Diagnosis literally means {{}} failure diagnosis ″, which provides the function that allows the airbag ECU to notify an operator of the fault that has occurred in the input and output system. The airbag ECU stores faulty conditions when a fault occurs. The information is stored in the nonvolatile ROM (EEP-ROM), therefore the diagnosis result will be stored even when a power supply is shut down.
As for the details of the diagnosis, refer to the service manual.

2.In the airbag system, by using the diagnosis mode function that uses the diagnosis tester (DS- 21/DS-Ⅱ), you can choose between the normal mode and test mode. When the test mode is selected, the detection sensitivity of diagnosis will be increased.

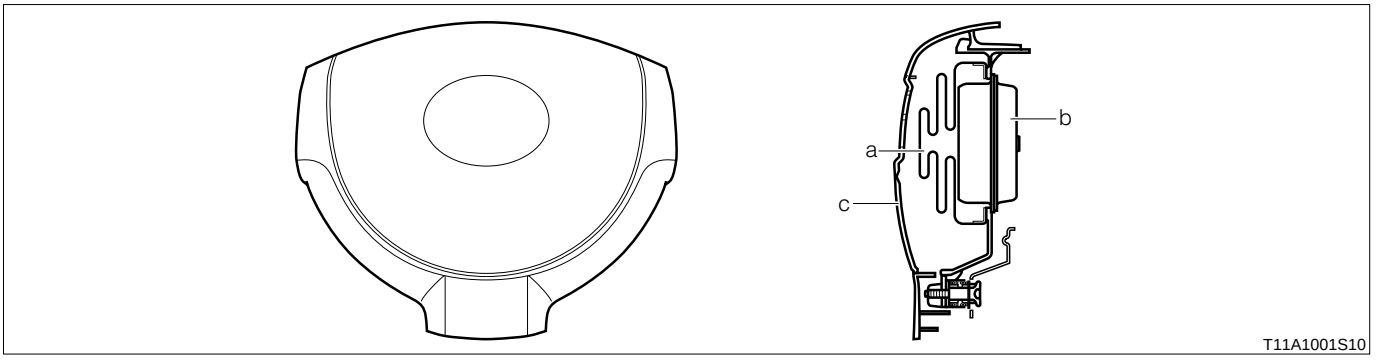
(1) Refer to the diagnosis code list in the service manual for the diagnosis codes which correspond to each test mode.

3 COMPONENTS

3-1 SRS AIRBAG AT DRIVER'S SEAT SIDE

3-1-1 DESCRIPTION

Consists of a bag, an inflator, a steering wheel pad, etc. All of these main components are located in the steering wheel.



a	BAG
b	Inflator
c	Steering Wheel Pad

3-1-2 BAG

The gas filled in the bag instantly breaks a thin portion of the steering center pad to deploy the airbag. The airbag absorbs the impact on the occupant's head and discharges gas from the two air outlets on the back of the airbag to soften the impact to the occupant.

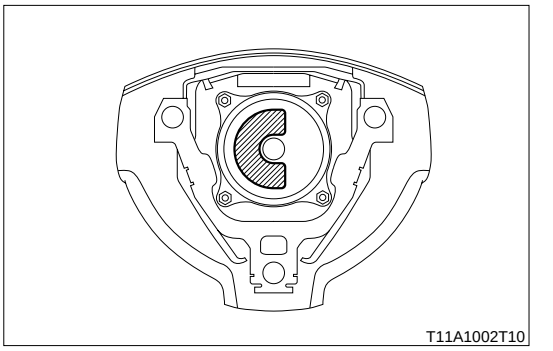
3-1-3 INFLATOR

1.The inflator consists of a squib, propagating agent, gas generating agent, etc. The gas generating agent is the source to generate nitrogen gas to deploy the airbag in the event of a collision. The inflator has a tightly-sealed structure.

2.When the squib is energized due to the deceleration caused by a collision, the filament located inside the squib will be heated.Consequently, the firing agent is ignited.Then, the flame propagates to the propagating agent and gas generating agent in an extremely short length of time. Thus, a great amount of nitrogen gas is generated from the gas generating agent.Nitrogen gas passes through the filter to be cooled down and to remove burnt debris. Thus, the bag is filled with gas.

3-1-4 CAUTION PLATE

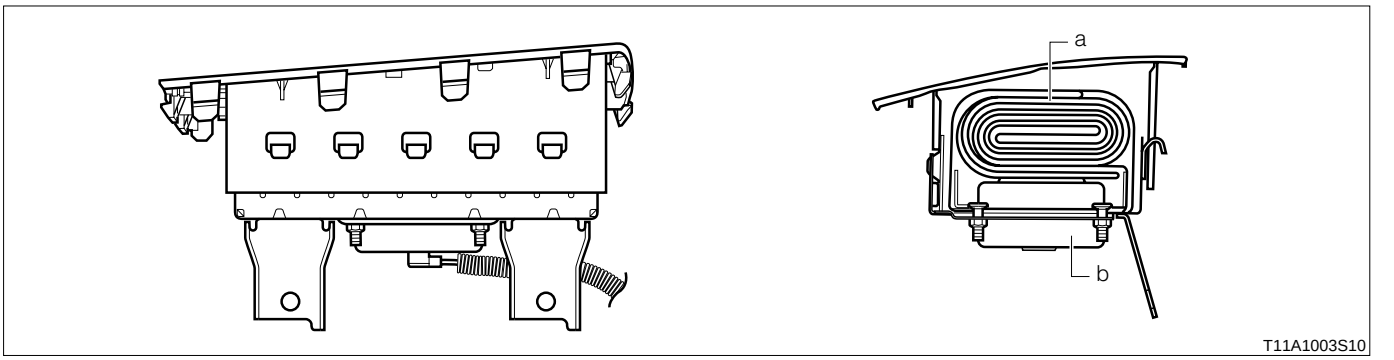
A caution plate is placed at the location shown in the figure.



3-2 SRS AIRBAG AT FRONT PASSENGER SEAT SIDE

3-2-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the airbag.



a	BAG
b	Inflator

3-2-2 BAG

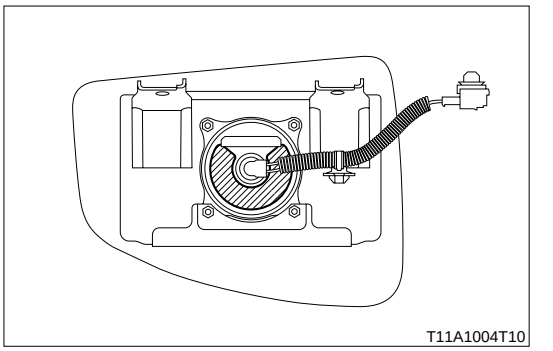
The bag deploys momentarily when the gas filled in the bag ruptures the bag protective cloth provided at the upper surface of the SRS airbag at the front passenger seat side, and the retainer and instrument panel are cracked in an H-shape. After impacts to the head of the front passenger has been sustained, the gas is released through the discharge port provided both at the right and left sides of the back side of the bag. Consequently, the impacts to the front passenger are alleviated.

3-2-3 INFLATOR

1. The inflator consists of a squib, propagating agent, gas generating agent, etc. The gas generating agent is the source to generate nitrogen gas to deploy the airbag in the event of a collision. The inflator has a tightly-sealed structure.
2. When the squib is energized due to the deceleration caused by a collision, the filament located inside the squib will be heated.Consequently, the firing agent is ignited.Then, the flame propagates to the propagating agent and gas generating agent in an extremely short length of time. Thus, a great amount of nitrogen gas is generated from the gas generating agent.Nitrogen gas passes through the filter to be cooled down and to remove burnt debris.
   Thus, the bag is filled with gas.

3-2-4 CAUTION PLATE

A caution plate is placed at the location shown in the figure.



3-3 SEATBELTS WITH THE PRETENSIONER AND THE FORCE LIMITER

3-3-1 DESCRIPTION

1.Seatbelts with the pretensioner＋ force limiter are mounted to the driver and front passenger seats.

3-3-2 CONSTRUCTION

1.The pretensioner mechanism consists of a generator gas, cartridge base, piston, pinion, roller, sleeve, etc.

2.The force limiter mechanism consists of an torsion shaft, etc.

3-3-3 PRETENSIONER MECHANISM

1.This mechanism is activated simultaneously with the airbag by the ignition signal from the airbag ECU in the event of a collision. This mechanism rewinds a certain amount of the seatbelts to hold occupants in position earlier and faster .

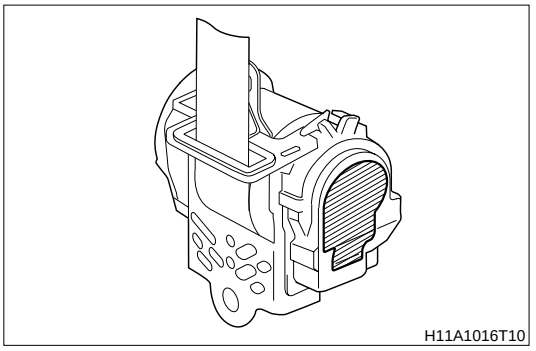
2.The system activates even when the seatbelts are not worn.

3-3-4 FORCE LIMITER MECHANISM

When the tension of the seatbelt exceeds a predetermined value in the event of a collision, the system loosens the seatbelt while maintaining a constant tension on the belt in order to protect the occupants from excessive forces.

3-3-5 CAUTION PLATE

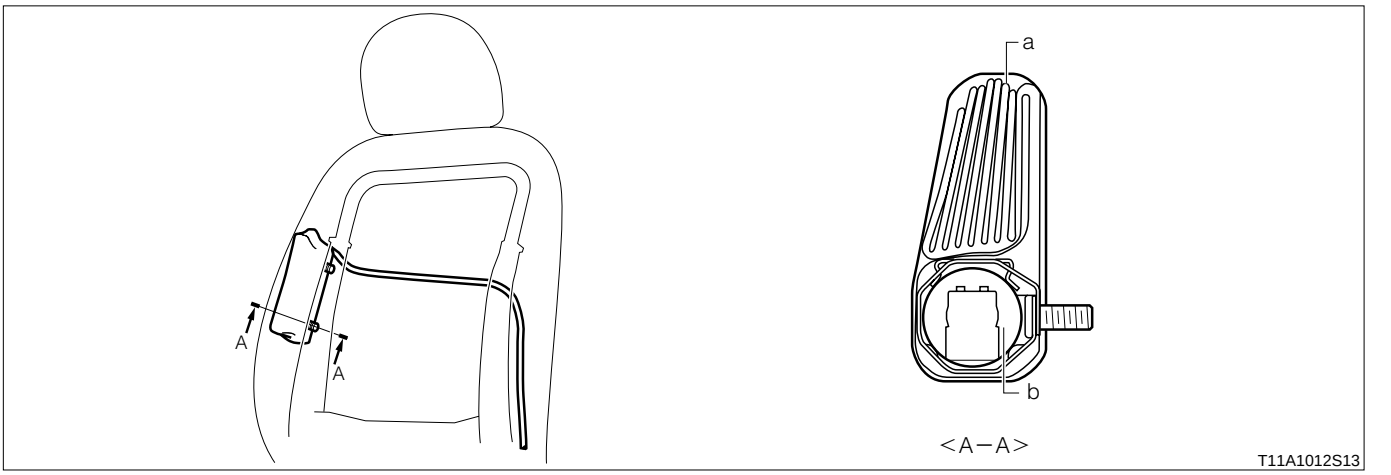
A caution plate is placed at the location shown in the figure.



3-4 SIDE AIRBAG

3-4-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the seat back.



a	BAG
b	Inflator

3-4-2 BAG

The bag deploys momentarily when the gas filled in the bag ruptures the sewed section of the seatback. After impacts to the chest of the passenger has been sustained, the gas is released through the opening section for the wire harness installation at the rear edge of the airbag. Consequently, the impacts to the passenger are alleviated.

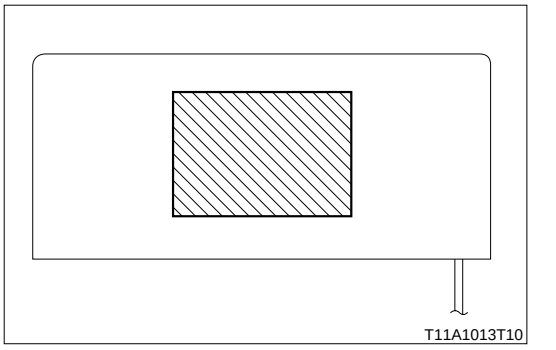
3-4-3 INFLATOR

The inflator consists of an ignition equipment, heating agent, and the pressure container that holds compression gas, etc. The inflator has a tightly-sealed structure.

When the squib device is energized by the deceleration in the event of a collision, the squib device is ignited. As a result, the heating agent is burnt, thus generating gas. Because of this gas, the pressure of the compressed gas inside the pressure container rises. Consequently, the bulkhead is broken by this pressure, thus discharging gas into the bag.

3-4-4 CAUTION PLATE

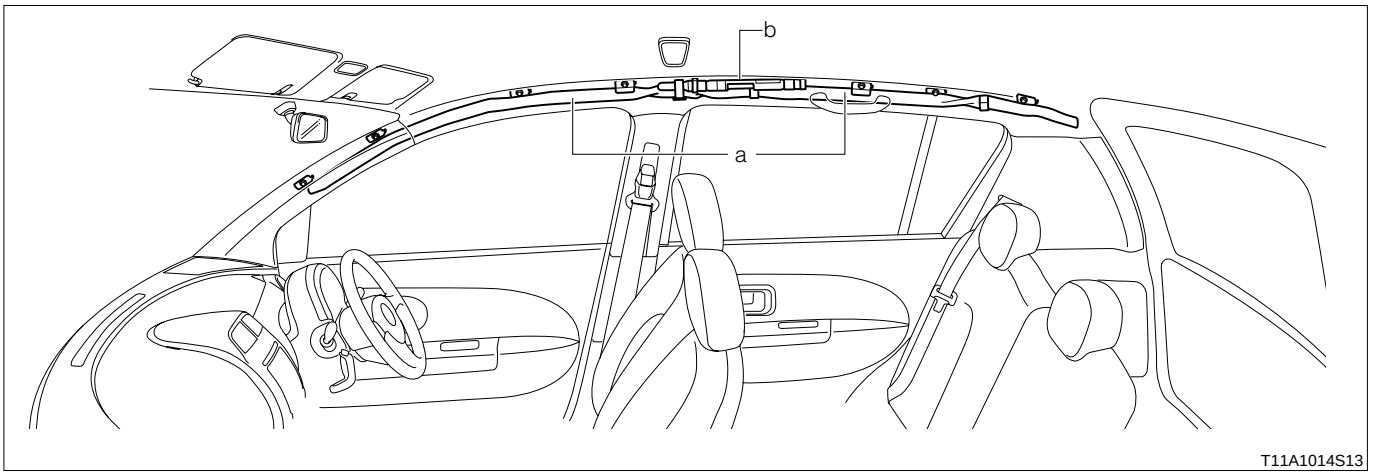
A caution plate is placed at the location shown in the figure.



3-5 CURTAIN SHIELD AIRBAG

3-5-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the area between the front pillar and the central section of the roof side.



a	BAG
b	Inflator

3-5-2 BAG

The gas filled in the bag instantly breaks the front pillar garnish and the roof head lining to deploy the airbag. The airbag absorbs the impact on the occupant's head and reduces the impact to the occupant by discharging gas from the seams of the bag.

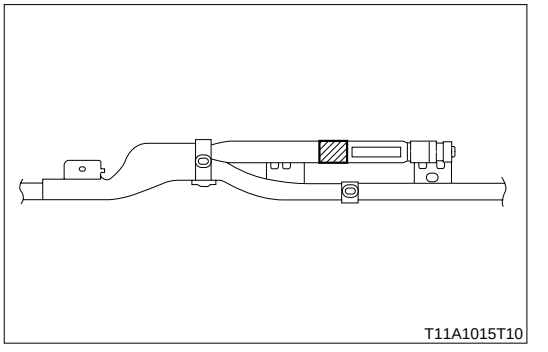
3-5-3 INFLATOR

The inflator consists of an ignition equipment, heating agent, and the pressure container that holds compression gas, etc. The inflator has a tightly-sealed structure.

When the squib device is energized by the deceleration in the event of a collision, the squib device is ignited. As a result, the heating agent is burnt, thus generating gas. Because of this gas, the pressure of the compressed gas inside the pressure container rises. Consequently, the bulkhead is broken by this pressure, thus discharging gas into the bag.

3-5-4 CAUTION PLATE

A caution plate is placed at the location shown in the figure.

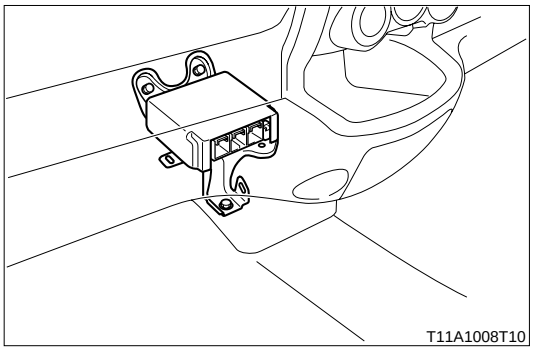


3-6 AIRBAG ECU

3-6-1 DESCRIPTION

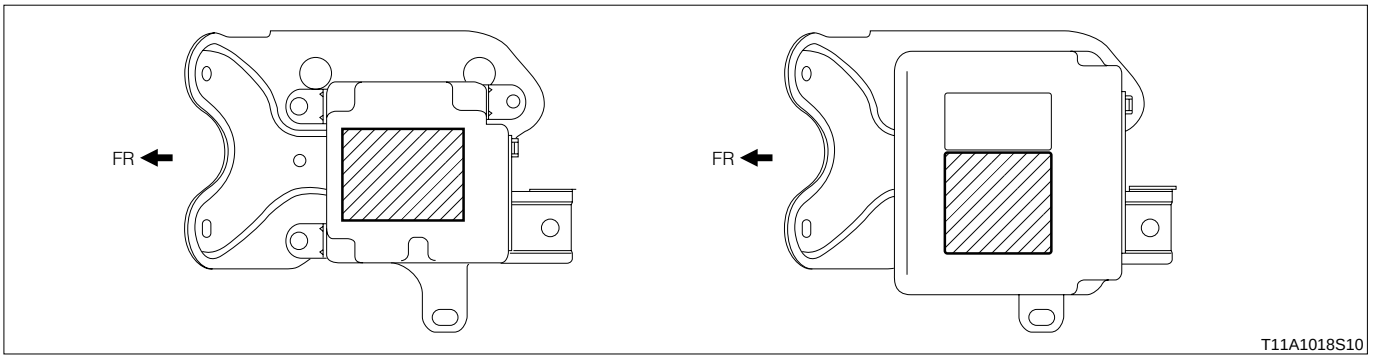
1.Consists of a G sensor, safing sensor, back-up power supply, diagnostic circuit, etc. The system is designed to provide highly reliable construction so that one failure will not lead to catastrophic failure of the entire system.

2.The G sensor in the airbag ECU also functions as a sensor for the fuel cut system. The airbag ECU constantly communicates with EFI ECU.



3-6-2 CAUTION PLATE

A caution plate is placed at the location shown in the figure.

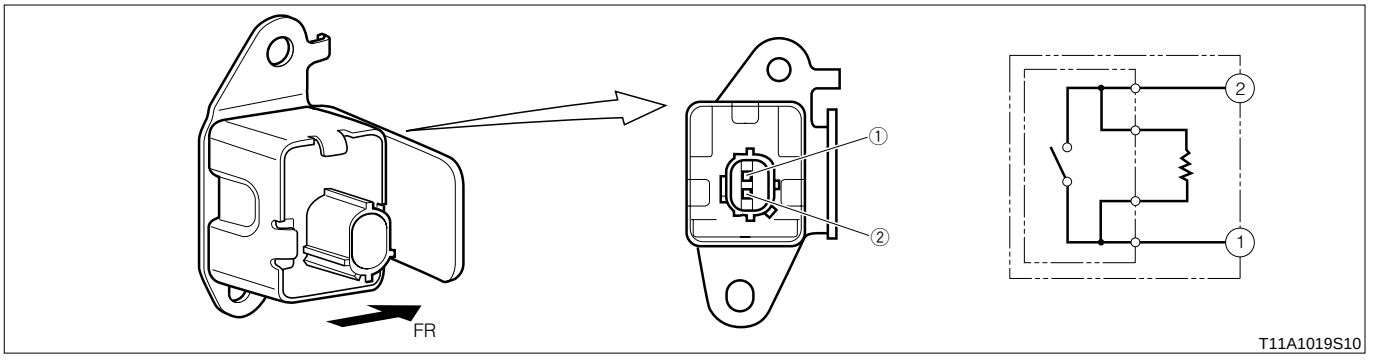


Left: Vehicle without side airbag Right: Vehicle with side airbag

3-7 FRONT AIRBAG SENSOR

3-7-1 OUTLINE

It is installed at the front side of the vehicle at the driver's seat side (on the side of the side member), which consists of the G sensor, etc.



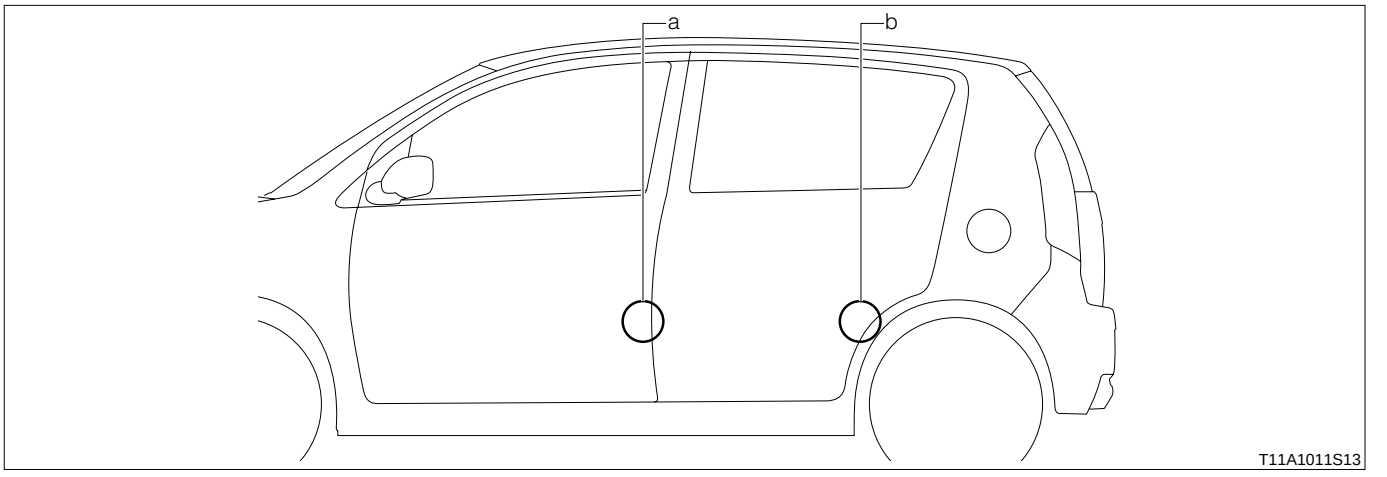
Left: External view Right: Circuit diagram

3-8 SIDE AIRBAG SENSOR & SIDE AIRBAG REAR SENSOR

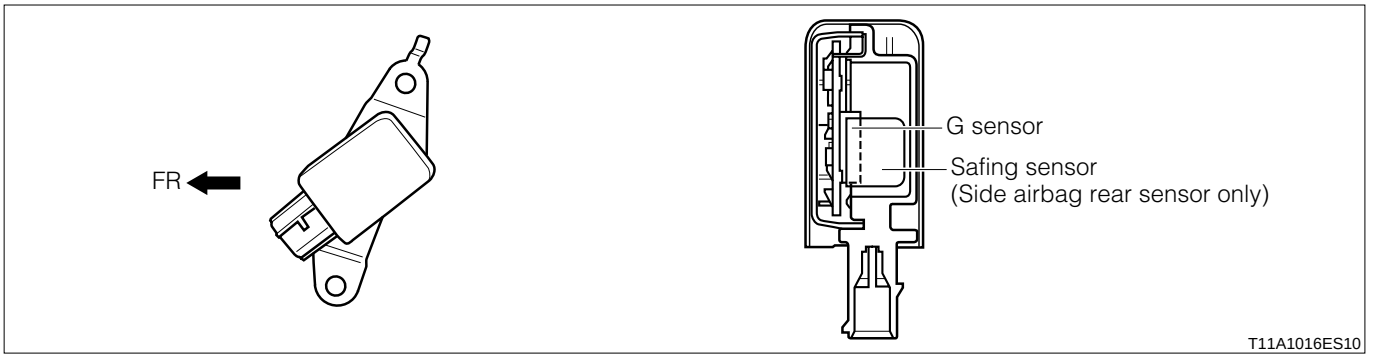
3-8-1 DESCRIPTION

1. The side airbag sensor is installed in the lower part of the center pillar RH/LH. The side airbag sensor consists of a semiconductor G sensor, a collision determination circuit, a communication circuit, etc., and transmits an ignition signal from the side airbag and the curtain shield airbag to the airbag ECU.
2. The side airbag rear sensor is installed in the quarter wheel house. The side airbag rear sensor consists of a semiconductor G sensor, a safing sensor, a collision detection circuit, a communication circuit, etc., and transmits an ignition signal from the curtain shield airbag to the airbag ECU.

Side airbag sensor & side airbag rear sensor mounting locations

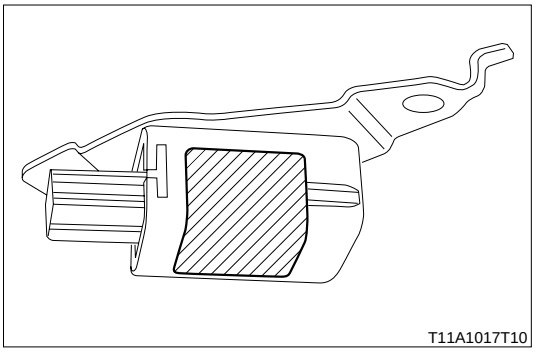


a	Side airbag sensor
b	Side airbag rear sensor



3-8-2 CAUTION PLATE

A caution plate is placed at the location shown in the figure.



3-9 SPIRAL CABLE

3-9-1 DESCRIPTION

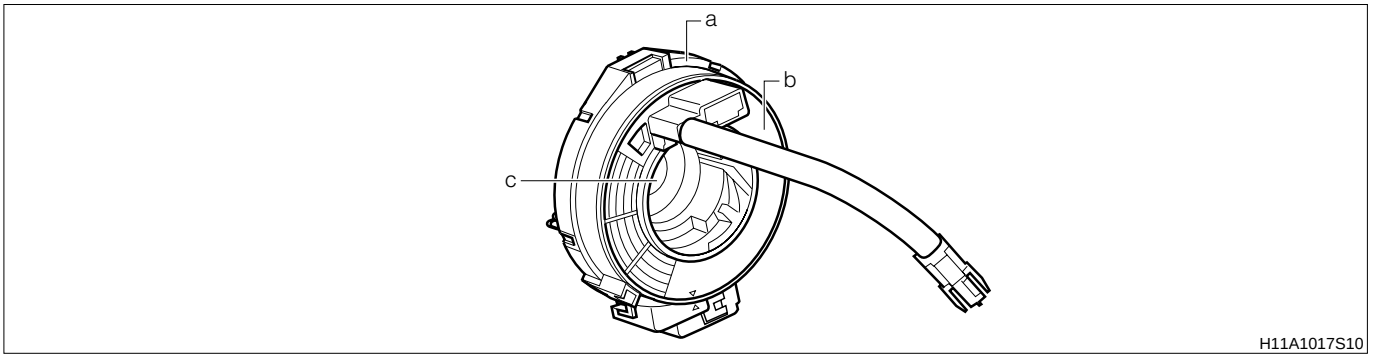
1.The non-contact point type spiral cable is used for wiring connection extending from the cowl wire harness to the driver's seat airbag.

2.The structure provides one-touch snap-on installation.

3-9-2 CONSTRUCTION

1.Consists of a rotator, case, cable, bearing, canceling cam, etc. They are integrated by engagement of the projection in the steering wheel with the groove in the canceling cam. When the steering wheel turns, the rotator turns together with the canceling cam.

2.The cable is folded in half and rolled in the case through the bearing. The rotator is given some allowance for three turns both to the right and the left from the neutral position.



a	Case
b	Rotator
c	Cancel cam

3-10 AIRBAG WARNING LAMP

Airbag warning lamp is installed in the combination meter, with the following functions provided.

(1) When the system is normal, the lamp lights up for approx. 6 seconds after the IG SW is turned on, and then turned off.

(2) When a malfunction occurs in the system, the lamp remains unlit without continuous lighting or lighting for 6 seconds.

(3) After the system started operation, the lamp remains blinking.

(4) Diagnosis code is outputted.

Refer to Page J3-12.