ENHANCEMENT OF PRODUCT APPEAL

■ SEAT BELT

1. General

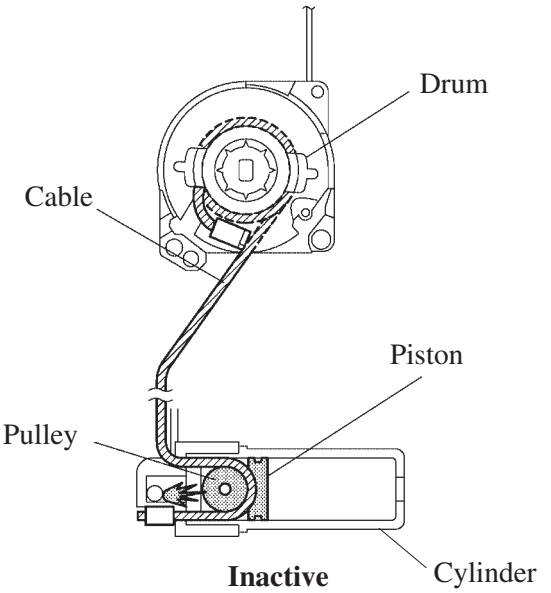
- The front seats are provided with an electrical sensing type seat belt pretensioner and a seat belt force limiter. If the sensor detects a collision of the specified level, the seat belt pretensioner instantly pulls up the seat belt.
  When the impact of a collision causes the tension of the seat belt that is applied to the occupant to reach a predetermined level, the force limiter restrains the tension, thus reducing the force that is applied to the occupant's chest area.
- In accordance with the ignition signal from the airbag sensor assembly, the seat belt pretensioner activates simultaneously with the deployment of the SRS airbags for the driver and front passenger.
- Two types of seat belt pretensioner and force limiter have been adopted: for regular and extra cabs model and for double cab model.

2. Seat Belt for Regular and Extra Cabs Model

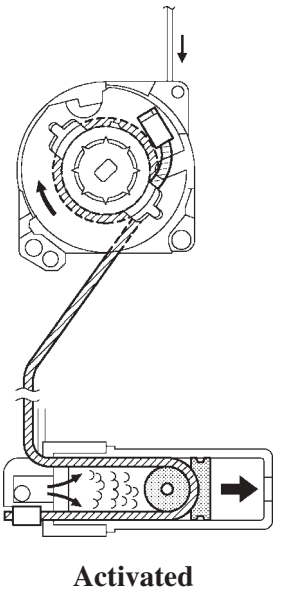
Seat Belt Pretensioner

1) Construction and Operation

The seat belt pretensioner consists of the pretensioner mechanism and retracting mechanism.
The pretensioner mechanism consists of a gas generator, piston, cable, drum and etc.
If the airbag sensor is turned on by deceleration due to frontal collision, electric current then ignites the gas generator located in the pretensioner. As a result, the gas generator emits gas in an extremely short time and pushes the piston. Since the cable is attatched 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 pulling up the belt for a predetermined length.



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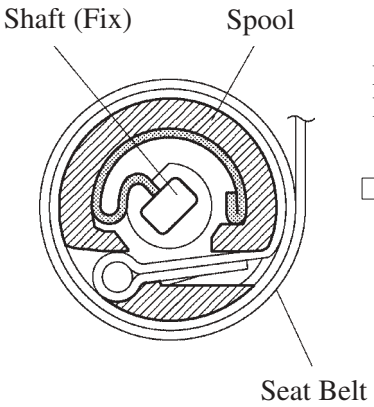


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Seat Belt Force Limiter

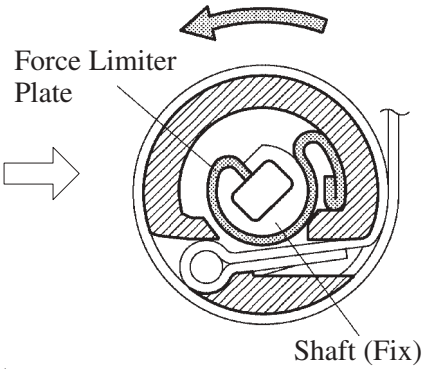
1) Construction and Operation

Seat belt force limiter consists of the force limiter plate, spool, shaft and etc.
When a further movement of the occupant applies a force that exceeds the specified load, the force limiter plate begins to bend, and the spool rotates along with the movement of the belt, allowing the belt to be pulled out. At this time, the force limiter plate bends as if wrapping around the shaft along with the rotation of the spool, and acts as a resistance force against the pulling of the belt.
When the spool makes 1-1/4 turns, the plate makes one complete turn around the shaft. Since the plates themselves come in contact, the spool will not be able to rotate further. As a result, the force limiter completes its activation.



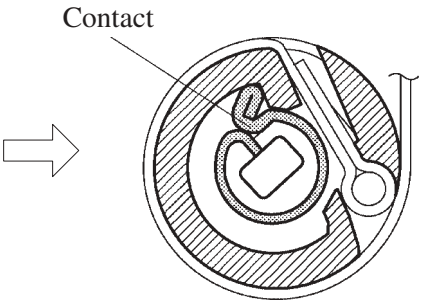
Inactive

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Activated

140BO47



End

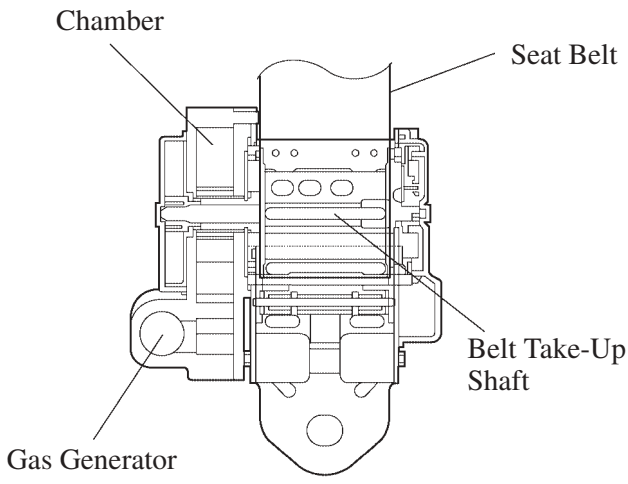
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3. Seat Belt for Double Cab Model

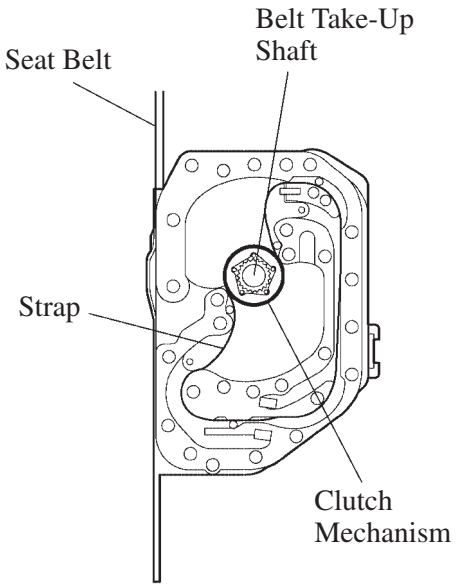
Seat Belt Pretensioner

1) Construction

The seat belt pretensioner consists of the pretensioner mechanism, retracting mechanism, and locking mechanism. The pretensioner mechanism consists of a gas generator, strap, clutch mechanism and etc.



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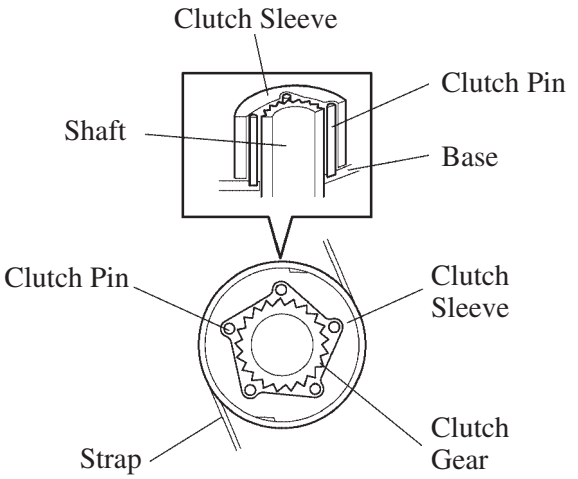


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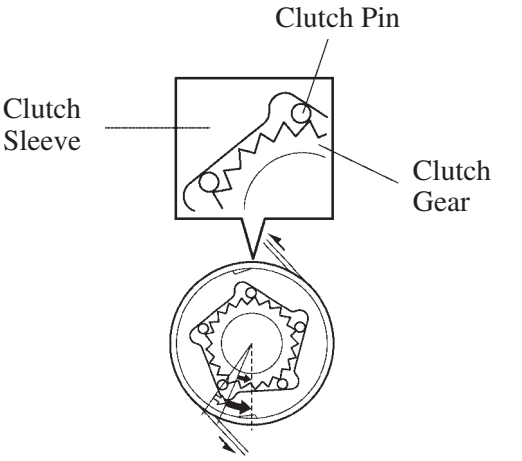
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a. Clutch Mechanism

The clutch mechanism consists of a clutch sleeve, clutch pin, base, and clutch gear. The clutch gear is integrated with the belt take-up shaft. The clutch sleeve has a strap wrapped around it.
Normally, the clutch pin is engaged with the base so that the rotation of the clutch gear is not obstructed. The movement of the strap, which is prompted by the gas that is generated by the gas generator, causes the clutch sleeve to rotate. Then, the clutch sleeve causes the clutch pin to shear off from the base, causing the clutch sleeve and clutch gear to engage. As a result, the clutch gear and shaft rotate together.



Before Activation 140BO51

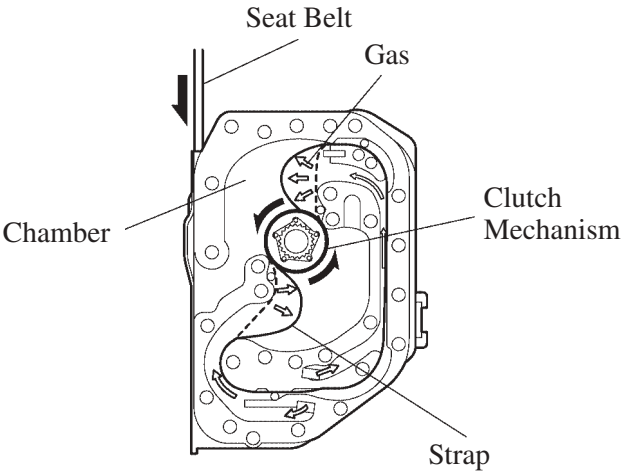


During Activation 140BO52

2) Operation

a. During Activation

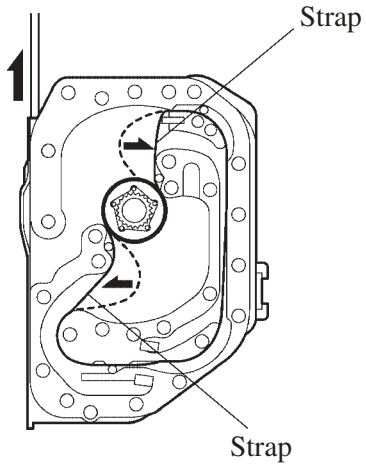
According to the igniter signal received from the airbag sensor, the gas generator generates a large volume of high-pressure gas in the chamber. Then, the strap that is wrapped around the clutch sleeve expands, causing the clutch sleeve to rotate. Then, the movement of the clutch mechanism causes the clutch gear and shaft to rotate, thus taking up the seat belt.



140BO53

b. After Completing Activation

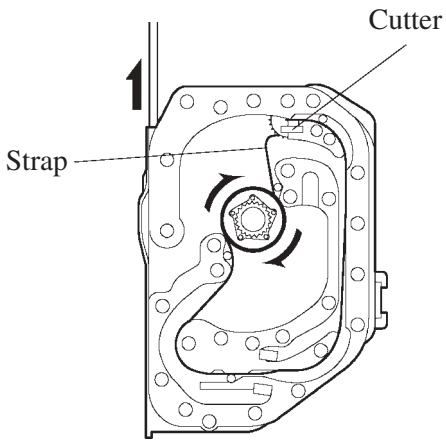
When the activation of the seat belt pretensioner is completed and the seat belt is pulled out by the movement of the occupant, the locking mechanism activates to lock the movement of the belt.
Thereafter, if the force limiter activates, the seat belt is pulled out again, and the rotation of the shaft causes the strap to be taken up by the clutch sleeve.



140BO54

c. If the Activation Amount of the Force Limiter is Large

If the amount of seat belt that is pulled out by the activation of the force limiter is greater than the amount of seat belt that is taken up by the activation of the pretensioner, it would prevent the strap from applying resistance to the rotation of the shaft. Therefore, the cutter cuts the strap.
Accordingly, the force limiter can be activated, so that the seat belt's force to restrain the occupant does not become excessive.

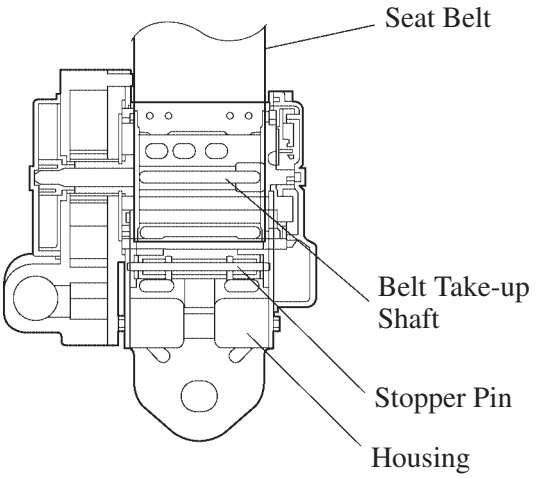


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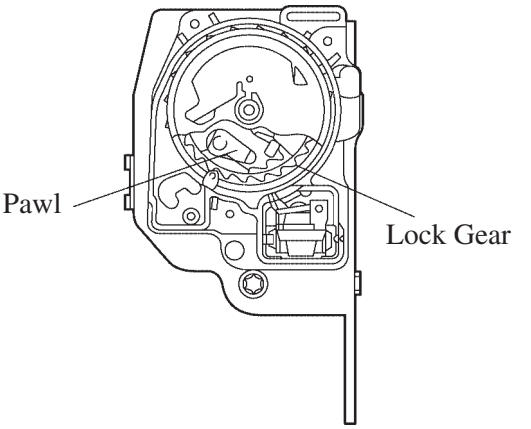
Seat Belt Force Limiter

1) Construction

The seat belt force limiter consists of a lock gear, wire, housing, stopper pin, etc.



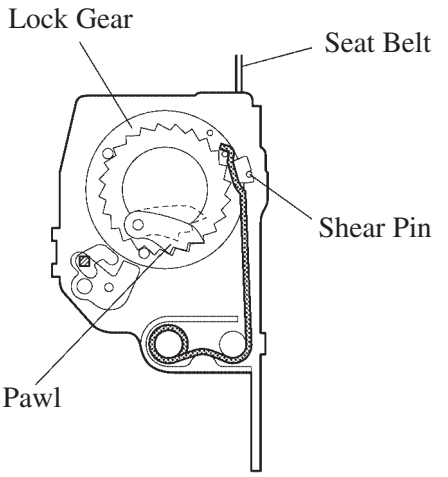
140BO49



140BO56

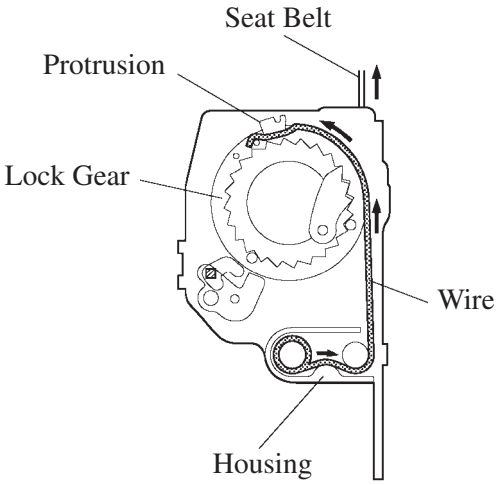
2) Operation

- If the seat belt is pulled out at an acceleration rate that exceeds a predetermined value, the ELR mechanism activates to engage the pawl with the lock gear, preventing the belt from pulling out.
- When the ELR mechanism is activated, if a force that exceeds a predetermined load is applied to the seat belt, the shear pin that secures the lock gear breaks off.



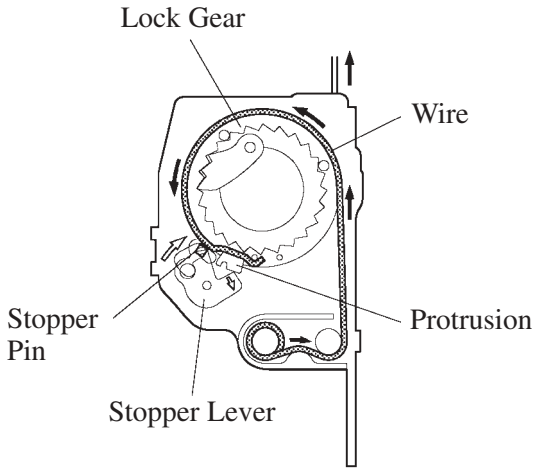
140BO57

- When the movement of the occupant causes the seat belt to pull out, the lock gear rotates together with the movement of the belt. The wire, which is attached to the lock gear, pulls out from the housing along with the rotation of the gear. When the wire passes through the housing, the wire deforms considerably, creating resistance against the pulling of the belt.



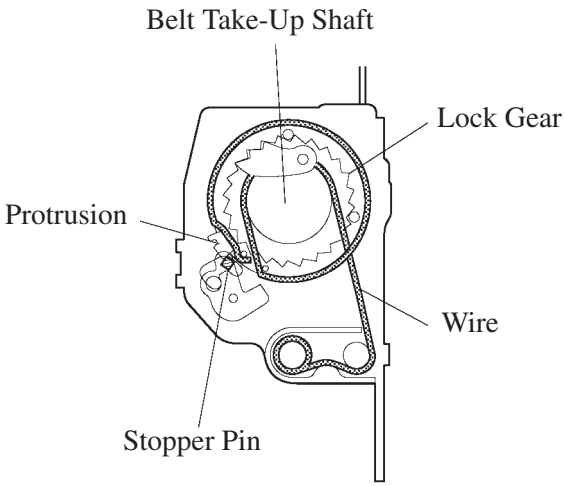
140BO58

- The lock gear rotates together with the pulling of the belt. When the protrusion on the gear contacts the stopper lever, the stopper pin moves to the lock position, causing the lock gear to start its second rotation.



140BO59

- When the lock gear rotates twice, the protrusion contacts the stopper pin, causing the lock gear to stop its rotation and the force limiter to complete its operation.
- When the force limiter completes its operation, the gear cannot rotate further. Therefore, the belt cannot be pulled out.



140BO60