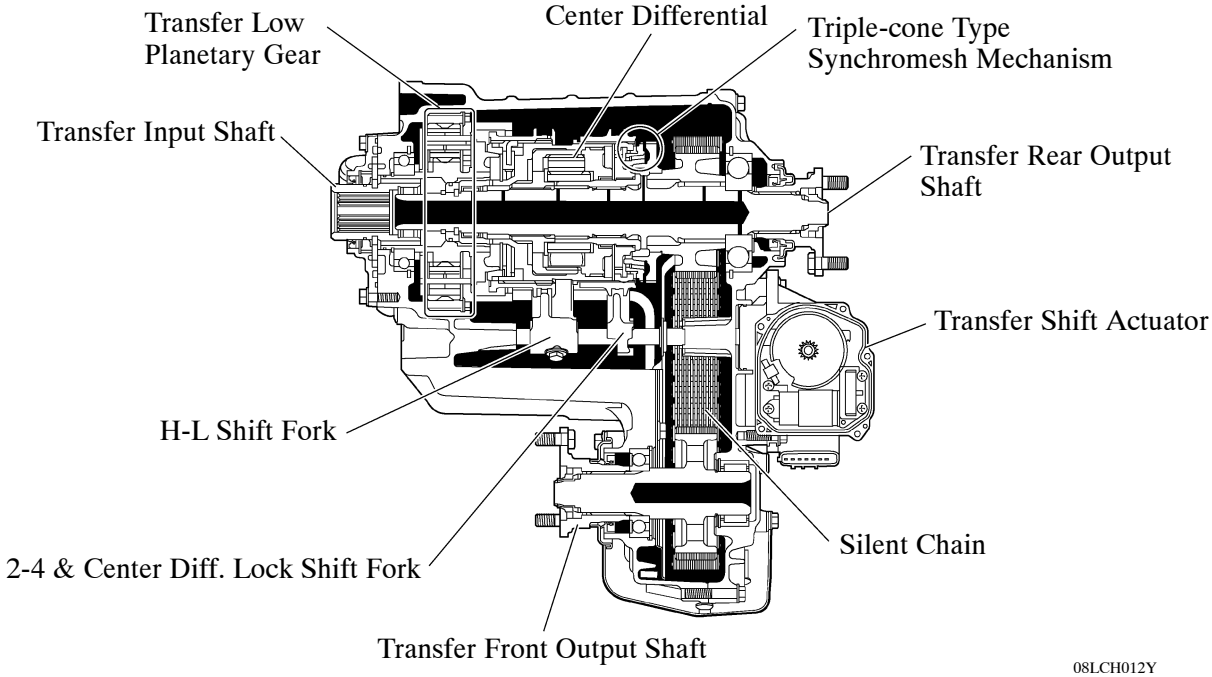
■ CONSTRUCTION

1. General

The construction of the JF3A transfer is shown below:

- A planetary gear unit is used in the reduction mechanism and a silent chain is used to reduce front drive noise.
- The center differential uses a TORSEN® LSD. As a result, this LSD ensures the proper torque distribution during acceleration and high-speed driving.
- A triple-cone type synchromesh mechanism is used for smooth engagement from 2WD to 4WD.
- For the JF3A transfer, a transfer shift actuator that has 2 built-in shift motors is used. As a result, switching between 2WD and 4WD, high and low, and free and lock can be performed independently using the shift motors, achieving a simple shift actuation mechanism. This enhances efficiency of power transfer and durability of the shift mechanism.

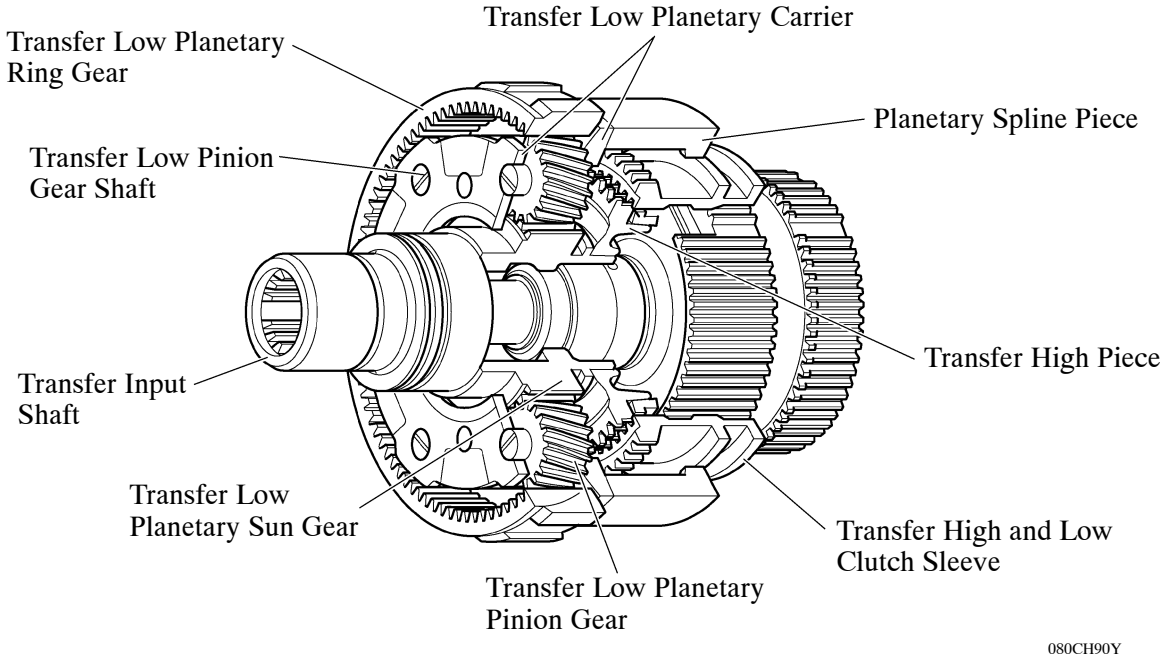


2. Planetary Gear Unit

General

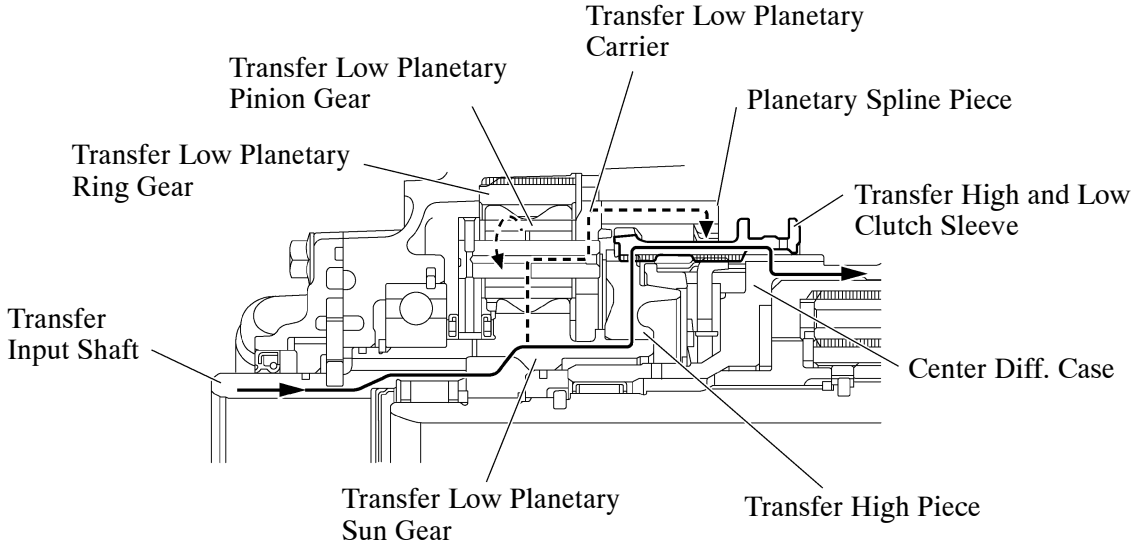
The transfer low planetary gear unit consists of a transfer low planetary sun gear, 6 transfer low planetary pinion gears, a transfer low planetary ring gear, and a transfer low planetary carrier.

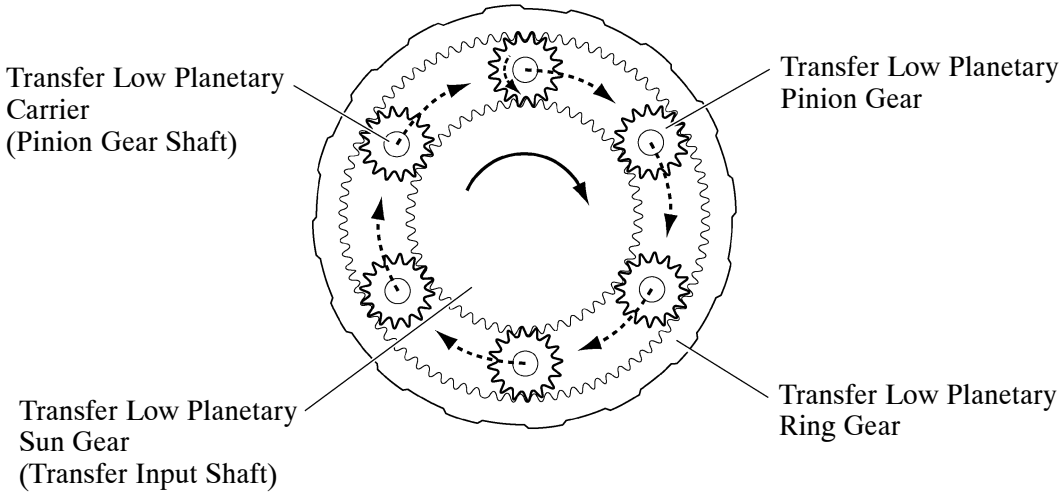
- The transfer low planetary sun gear is integrated with the transfer input shaft. The transfer high piece is fitted to the rear of the transfer low planetary sun gear.
- The 6 transfer low planetary pinion gears are fitted to the transfer low planetary carrier. Each transfer low pinion gear shaft is fixed to the transfer low planetary carrier. The planetary spline piece is fitted to the rear of the transfer low planetary carrier.
- The transfer low planetary ring gear is fixed to the transfer case and its internal teeth mesh with the transfer low planetary pinion gears.
- In this planetary gear unit, the drive torque transmission route is switched in accordance with the movement of the transfer high and low clutch sleeve. The drive torque from the transfer input shaft is transmitted to the center differential case via the transfer high and low clutch sleeve.



High (2WD/H4) Position

In the high (2WD/H4) position, the internal gear teeth of the transfer high and low clutch sleeve are meshed with the transfer high piece.
Also, the transfer high and low clutch sleeve is meshed to the center differential case. Thus, the rotation of the transfer input shaft is transmitted to the transfer low planetary sun gear, transfer high piece, transfer high and low clutch sleeve, and center differential case.

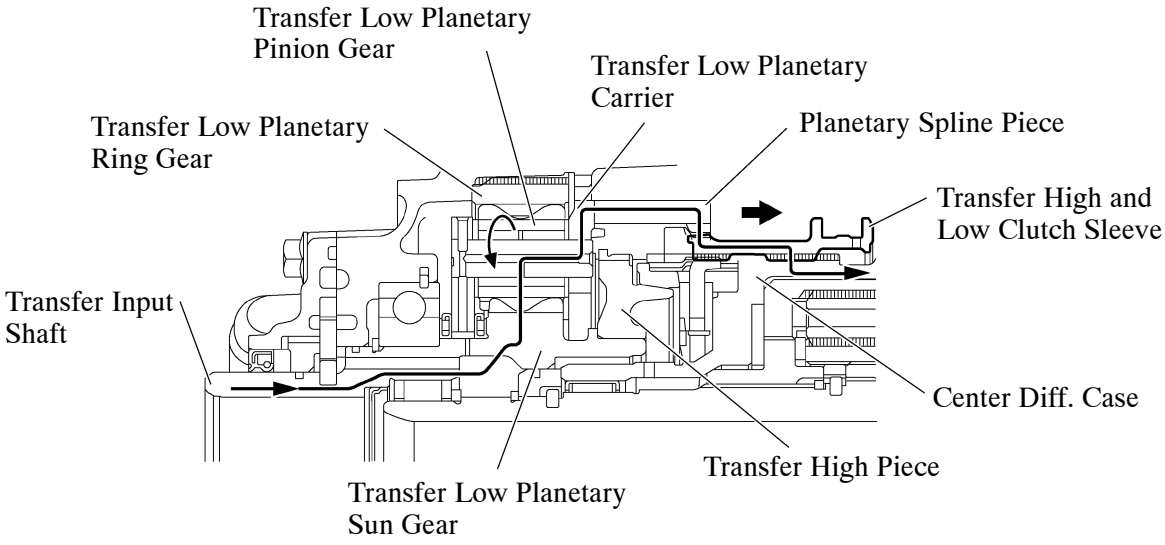


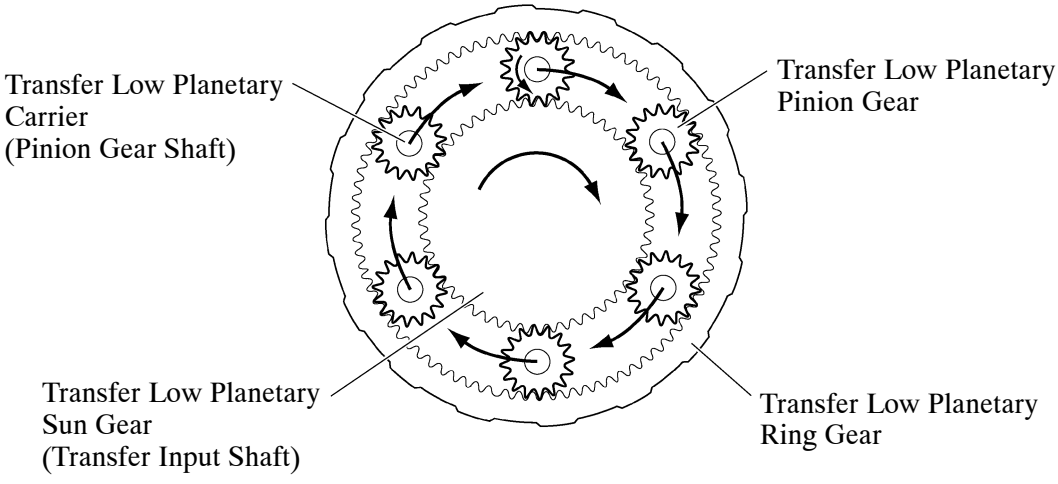


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Low (L4) Position

In the low (L4) position, the external teeth of the transfer high and low clutch sleeve are meshed with the planetary spline piece.
Also, the transfer high and low clutch sleeve is meshed to the center differential case. Thus, the rotation of the transfer input shaft is transmitted in a reduced form to the transfer low planetary sun gear, transfer low planetary pinion gears, transfer low planetary pinion gear shafts, transfer low planetary carrier, planetary spline piece, transfer high and low clutch sleeve, and center differential case.



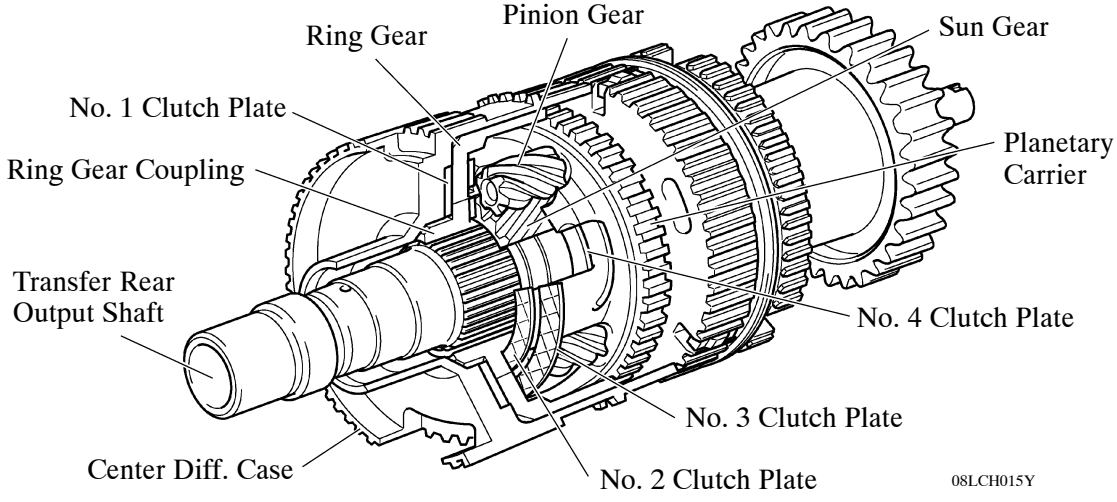


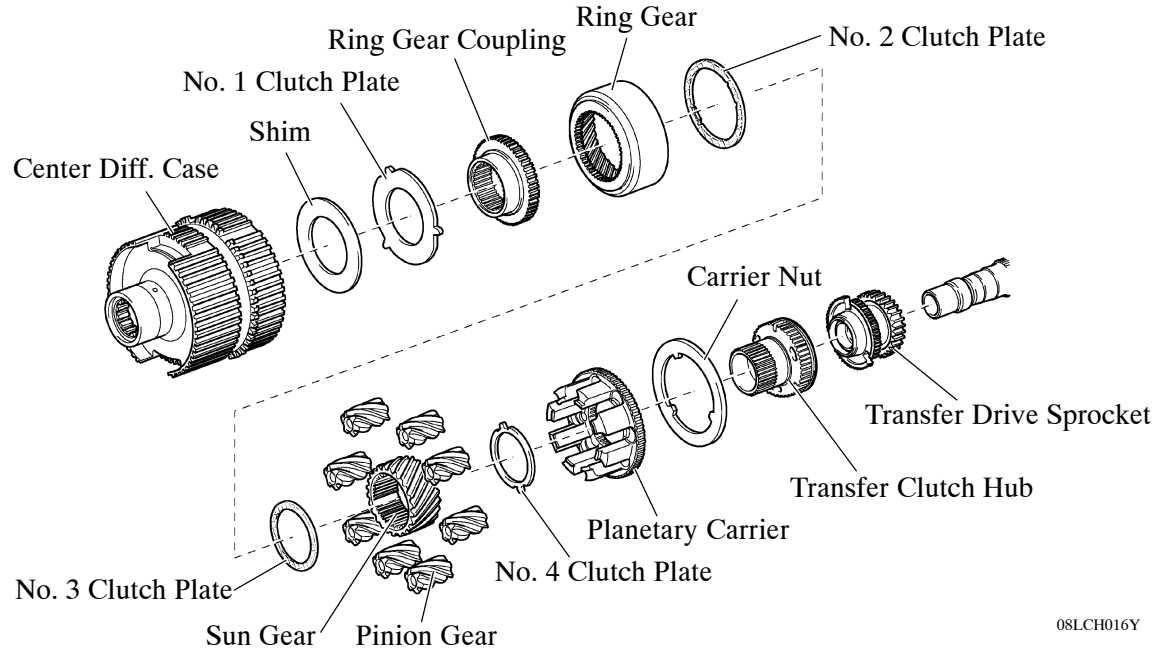
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3. Center Differential (TORSEN® LSD)

General

- The center differential uses a TORSEN® LSD.
- The TORSEN® LSD is torque-sensing LSD. It generates a limited-differential torque in proportion to the drive torque, and instantly changes the front and rear torque distribution.
- The torque distribution during straightline driving is 40/60 (front/rear), which is helpful for an appropriate steering response during the initial stage of a turn. During the acceleration stage of a turn, the torque distribution to the rear wheels increases.
- This center differential consists of a center differential case, a ring gear coupling, a ring gear, 8 pinion gears, a sun gear, a planetary carrier, and each clutch plate.



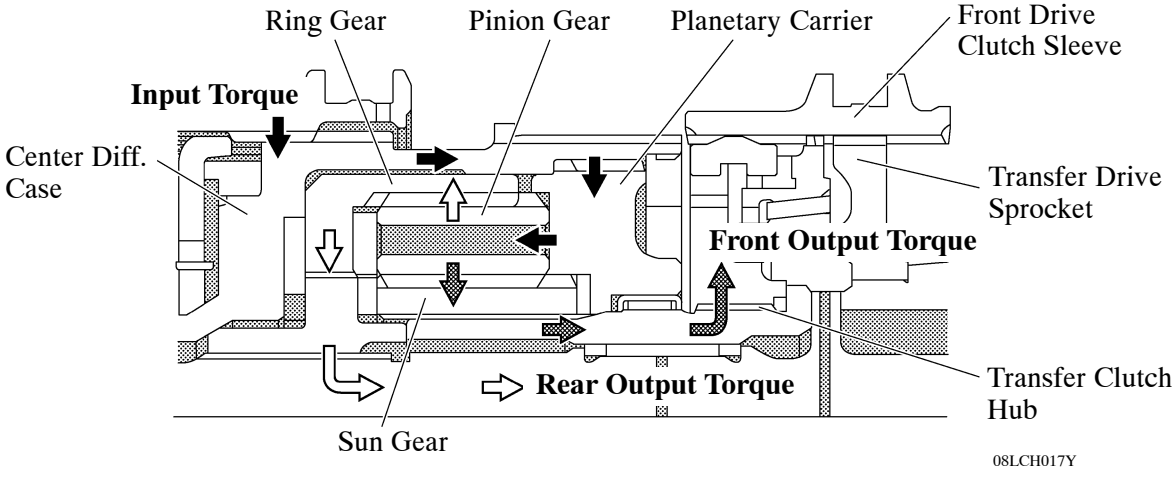


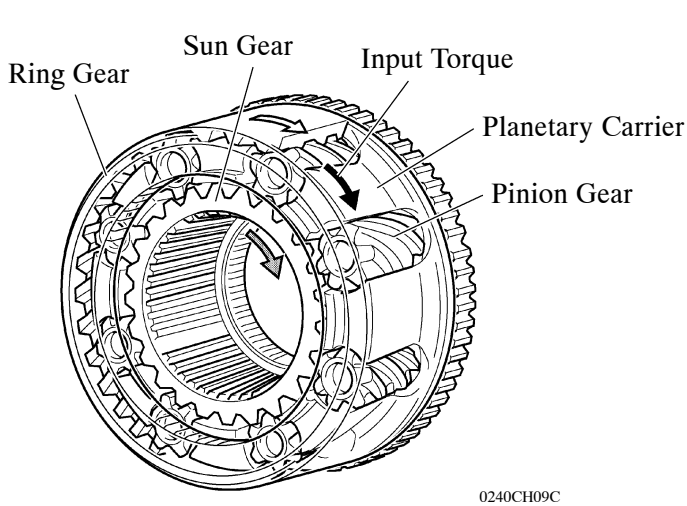
Service Tip

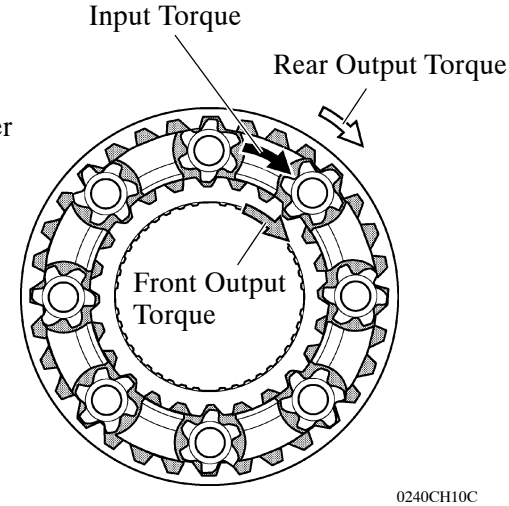
The TORSEN® LSD cannot be disassembled, so it must be replaced as an assembly.
For details, refer to the corresponding Repair Manual for this model.

Normal Driving Operation

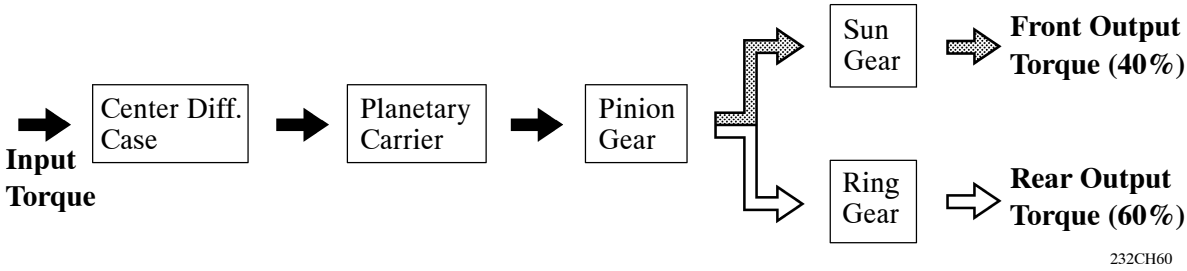
During normal driving (front wheel speed = rear wheel speed), the drive torque that is input by the differential case is transmitted (front: 40/rear: 60) as shown below, without involving the LSD function.







▶ Power Flow ◀

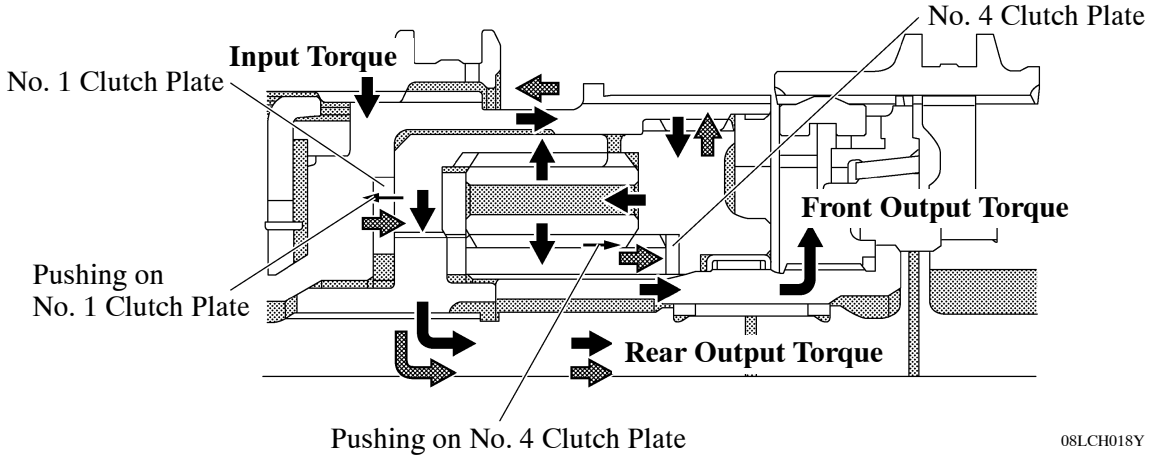


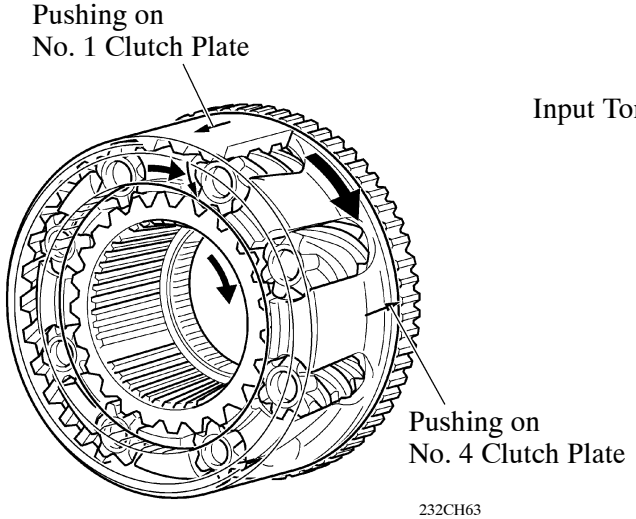
Front Wheel Skid Driving Operation

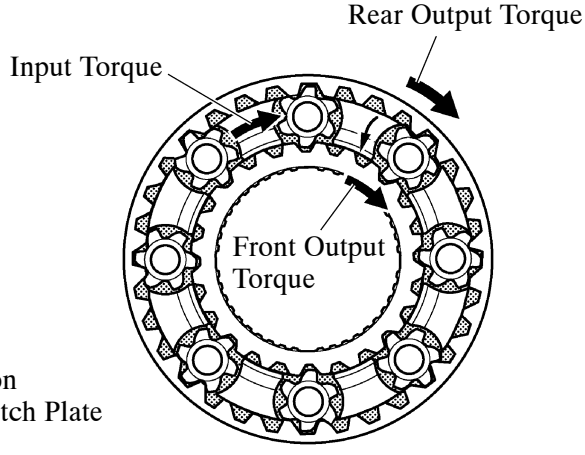
During front wheel skid driving (front wheel speed > rear wheel speed) when a rotational difference exists between the sun gear and the ring gear, the distribution of the drive torque that is input by the center differential case changes instantly before the torque is transmitted, as follows:

- The sun gear transmits torque to the planetary carrier while pushing on the No. 4 clutch plate. The planetary carrier transmits this torque to the ring gear from the center differential case via the No. 1 clutch plate.
- The ring gear outputs torque while pushing on the No. 1 clutch plate.

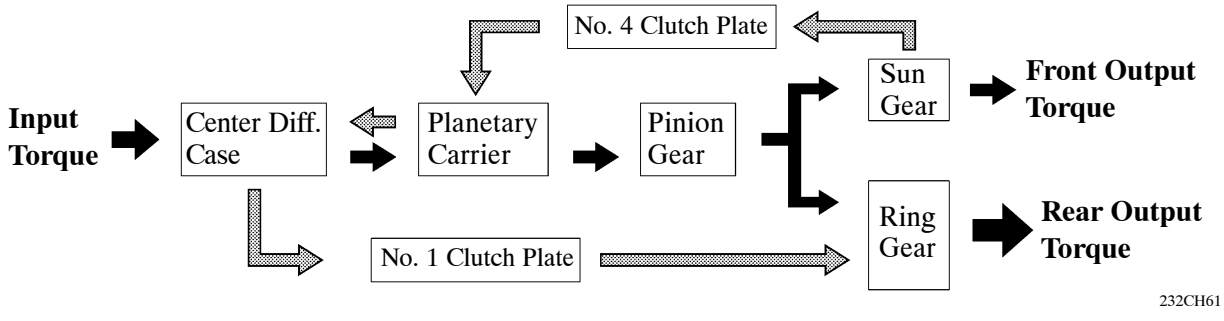
These LSD functions change the torque distribution.







▶ Power Flow ◀

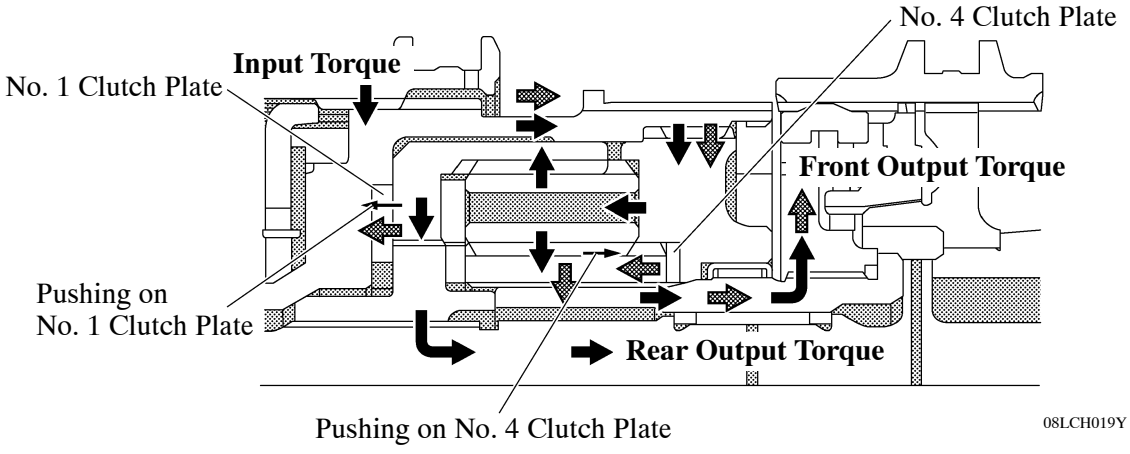


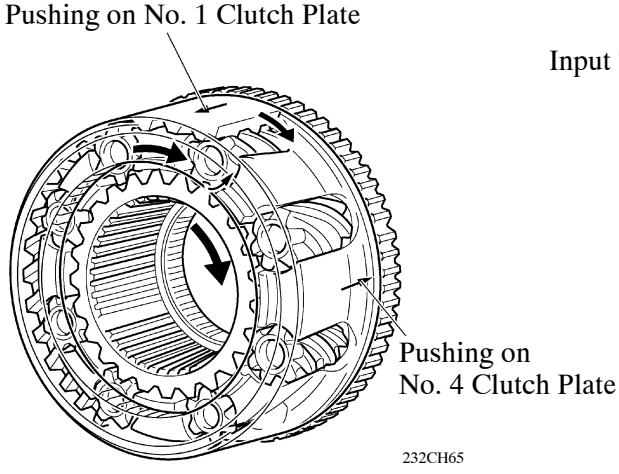
Rear Wheel Skid Driving Operation

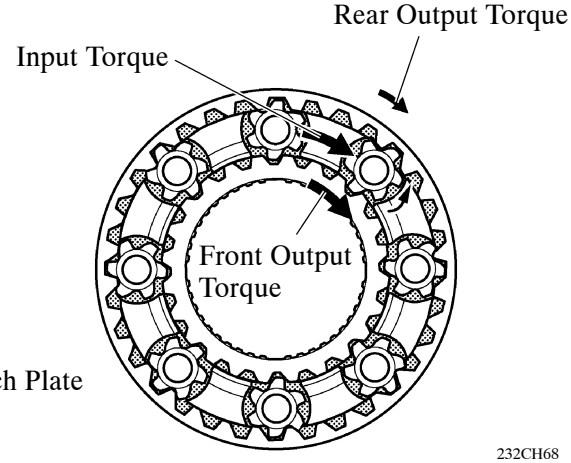
During rear wheel skid driving (front wheel speed < rear wheel speed), when a rotational difference exists between the sun gear and the ring gear, the distribution of the drive torque that is input by the center differential case changes instantly before the torque is transmitted, as follows:

- The ring gear transmits torque to the center differential case while pushing on the No. 1 clutch plate. The center differential case transmits this torque from the planetary carrier to the sun gear via the No. 4 clutch plate.
- The sun gear outputs torque while pushing on the No. 4 clutch plate.

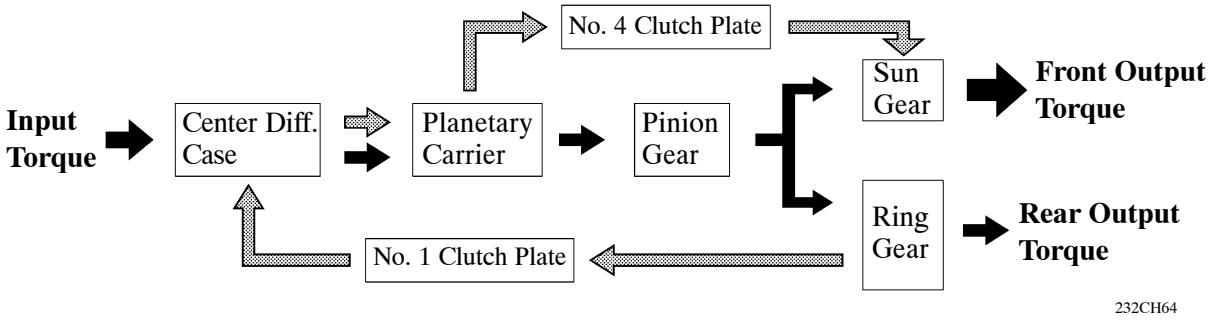
These LSD functions change the torque distribution.







▶ Power Flow ◀

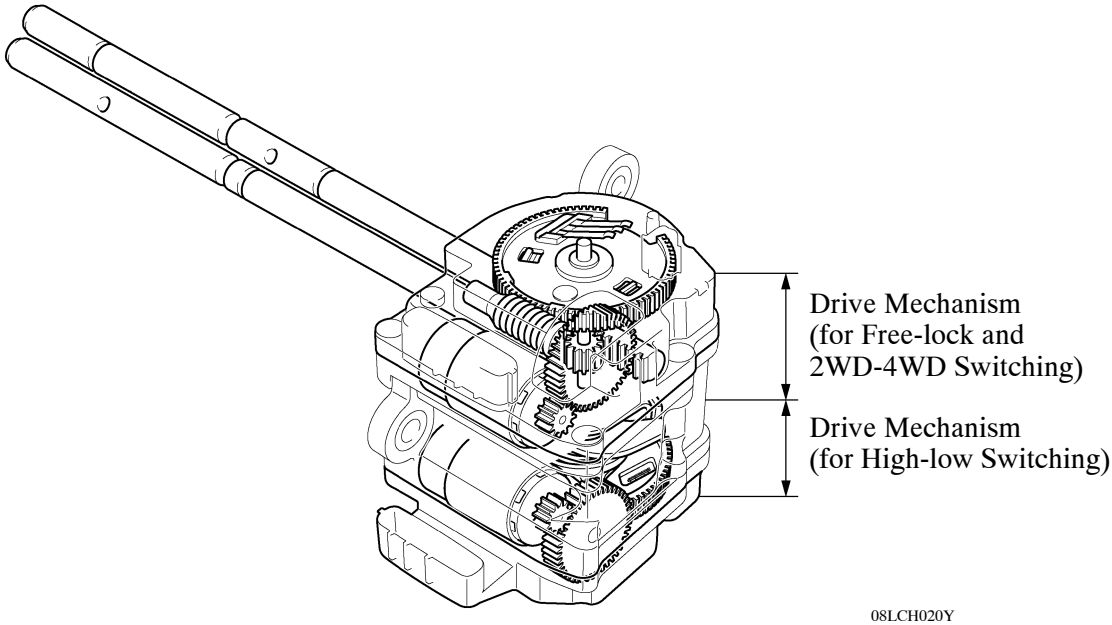


4. Transfer Shift Actuator

General

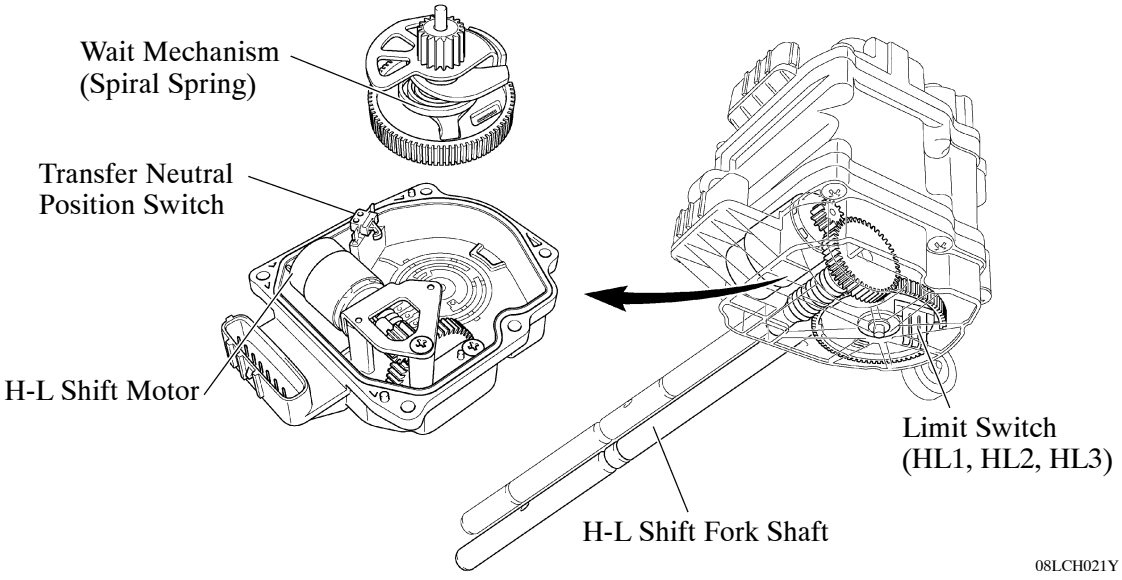
The transfer shift actuator consists of the following 2 mechanisms:

- Free-lock and 2WD-4WD switching (to switch the center differential lock and to transmit drive force to the front)
- High-low switching (to switch the transfer gear ratio)

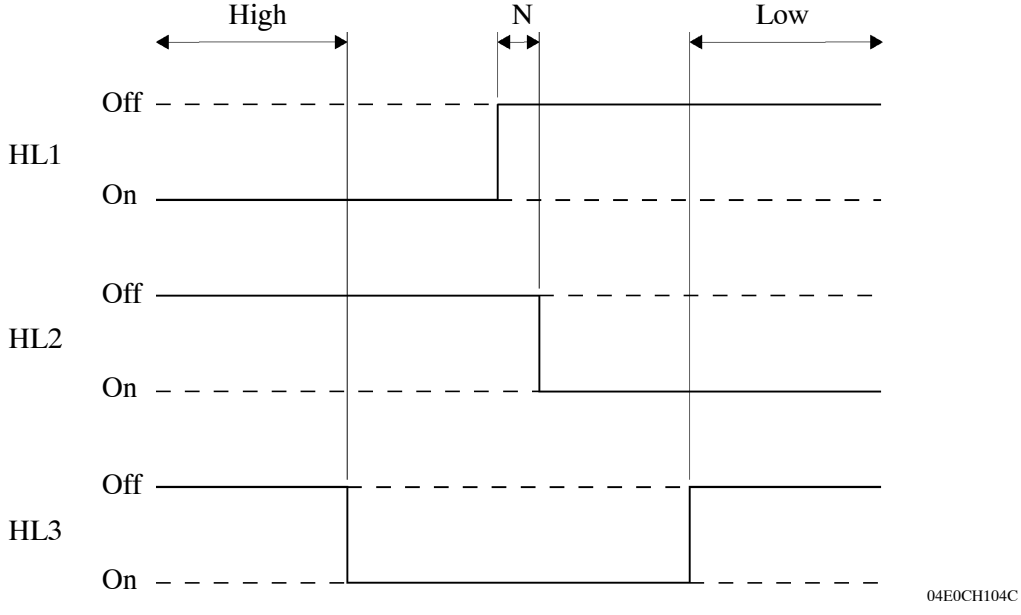


Drive Mechanism for High-low Switching

- The drive mechanism for high-low switching consists of the H-L shift motor, limit switch, transfer neutral position switch, wait mechanism (spiral spring), and H-L shift fork shaft. This drive mechanism cannot be disassembled.
- The limit switch has 3 contact points and detects the shift motor position.
- The wait mechanism (spiral spring) is used for H-L shift fork shaft operations. If the operating resistance of the H-L shift fork shaft is high, the rotation of the H-L shift motor is partially stored in the spiral spring. Afterward, when the operating resistance is reduced, the spring force causes the H-L shift fork shaft to slide.

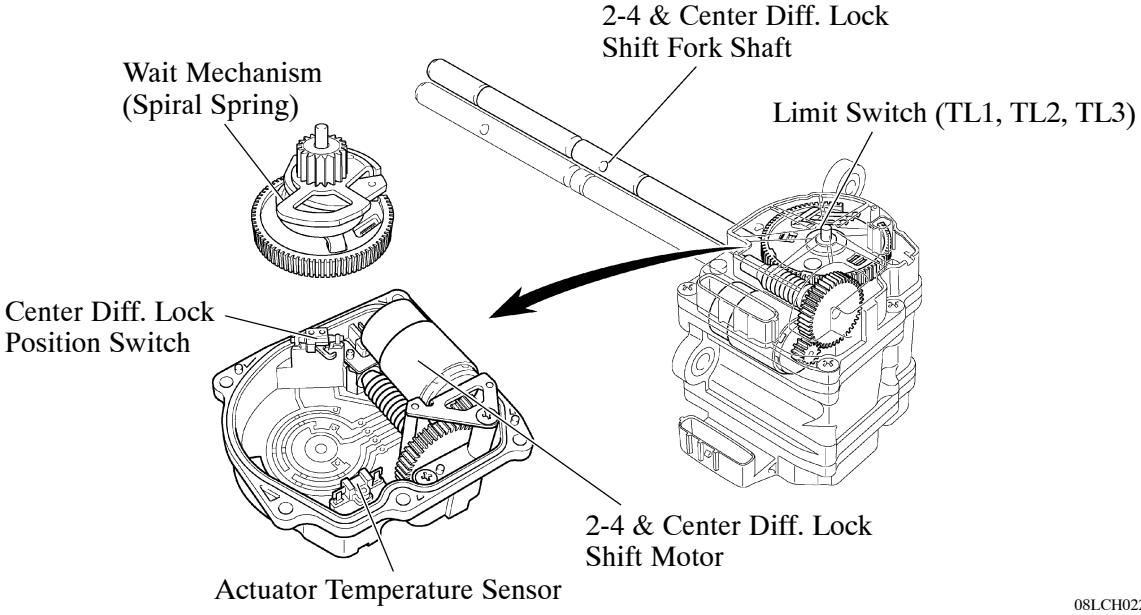


▶ Combination of 3 Contact Point Switches ◀



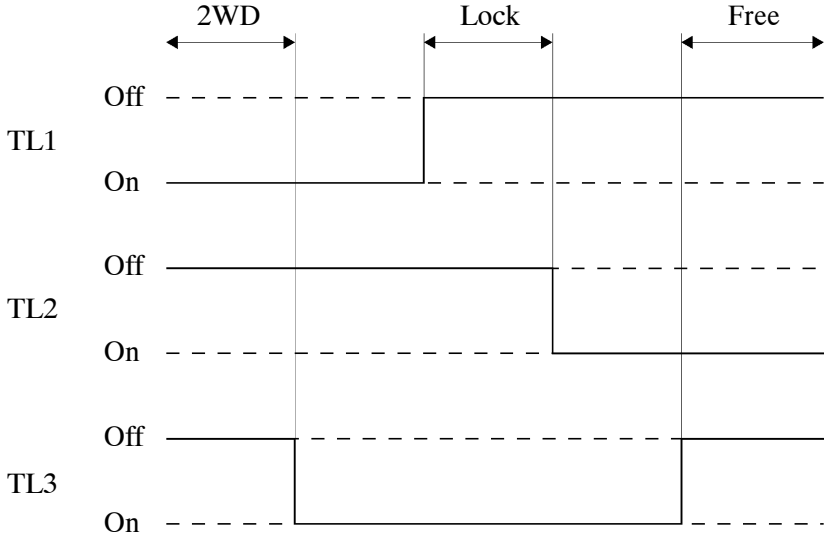
Drive Mechanism for Free-lock and 2WD-4WD Switching

- The drive mechanism for free-lock and 2WD-4WD switching consists of the 2-4 & center differential lock shift motor, limit switch, center differential lock position switch, wait mechanism (spiral spring), 2-4 & center differential lock shift fork shaft, and actuator temperature sensor. This drive mechanism cannot be disassembled.
- The limit switch has 3 contact points and detects the shift motor position.
- The wait mechanism (spiral spring) is used for 2-4 & center differential lock shift fork shaft operations. If the operating resistance of the 2-4 & center differential lock shift fork shaft is high, the rotation of the 2-4 & center differential lock shift motor is partially stored in the spiral spring. Afterward, when the operating resistance is reduced, the spring force causes the 2-4 & center differential lock shift fork shaft to slide.
- An actuator temperature sensor is provided on the shift actuator in order to allow an increase of the amount of current applied to the shift motors, and improves switching performance at low temperatures.



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▶ Combination of 3 Contact Point Switches ◀



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