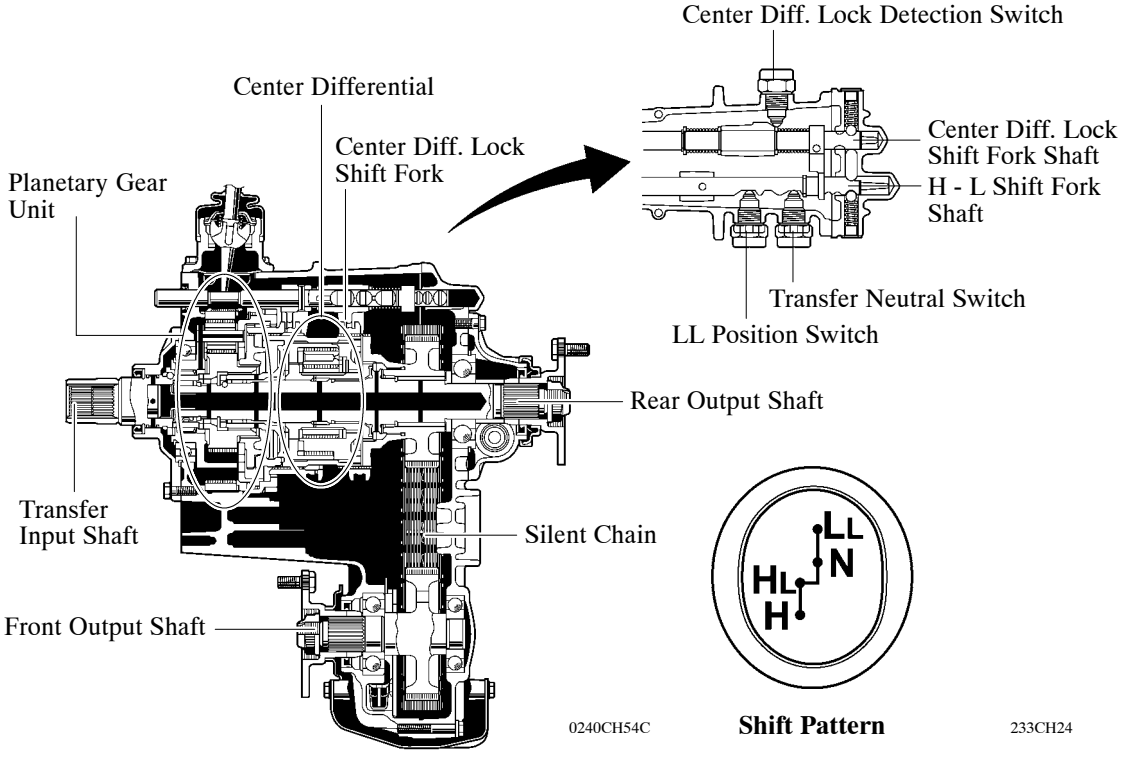
■ VF4B TRANSFER

1. General

The VF4B transfer is a compact and lightweight full-time transfer. In this transfer, a planetary gear unit is used in the reduction mechanism and a silent chain is used to reduce noise for the front drive.

- The VF4B transfer consists of a transfer input shaft, planetary gear unit, center differential, silent chain, rear output shaft, front output shaft, and 2 shift forks.
- The construction of the planetary gear unit is the same as the VF2A transfer. For details, see page CH-42.
- The center differential uses a TORSEN LSD (Limited Slip Differential). As a result, this LSD ensures the proper torque distribution during acceleration and high-speed driving.
- When engaging the center differential lock, the transfer shift lever operates the center differential lock fork. When the transfer shift lever is in the HL (High speed position, center diff. Locked) or LL (Low speed position, center diff. Locked) position, the center differential is locked.



▶ Specification ◀

Type		VF4B
Drive Type		Full-time
Gear Ratio	H, HL	1.000
	LL	2.566
Reduction Gear Type		Single Pinion Planetary
Center Differential Type		TORSEN LSD
Oil Capacity	Liters (US qts, Imp.qts)	1.4 (1.5, 1.3)
Oil Viscosity		SAE 75W-90
Oil Grade		API GL-5
Weight (Reference)*	kg (lb)	40.5 (89.3)

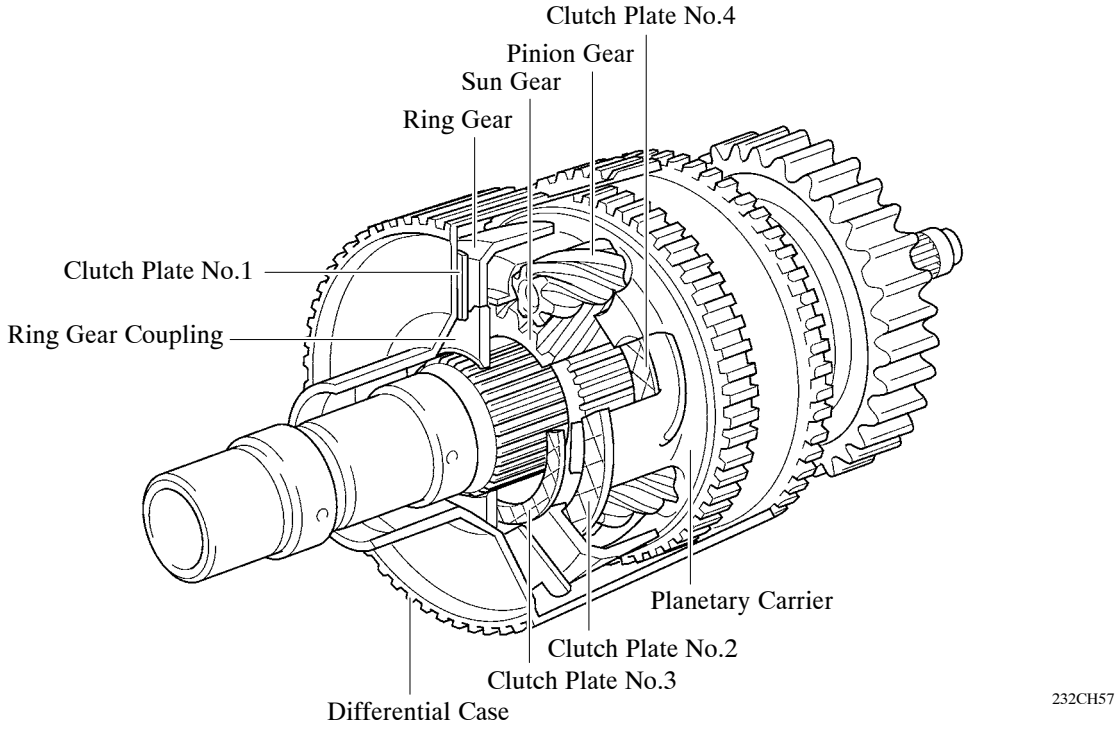
*: The figure shown is the weight of the part including the oil.

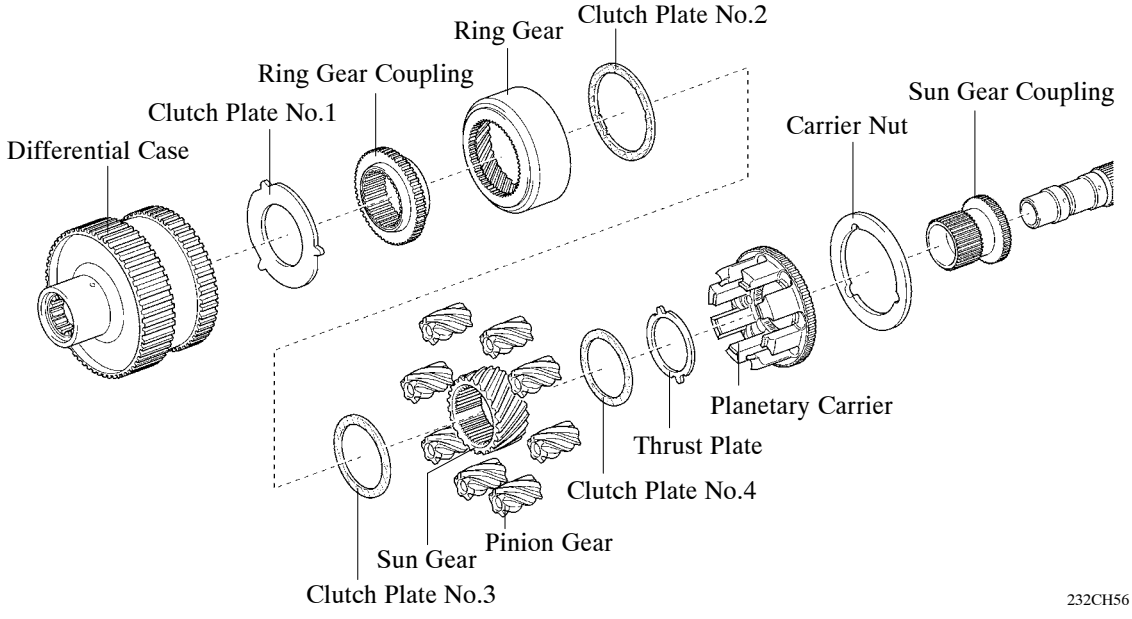
2. Center Differential (TORSEN LSD)

General

The center differential (TORSEN LSD) is a toque-sensing LSD. The center differential consists of a differential case, coupling, ring gear, 8 pinion gears, sun gear, and planetary carrier.

- 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 straight line driving is 40/60 (front/rear), this 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.



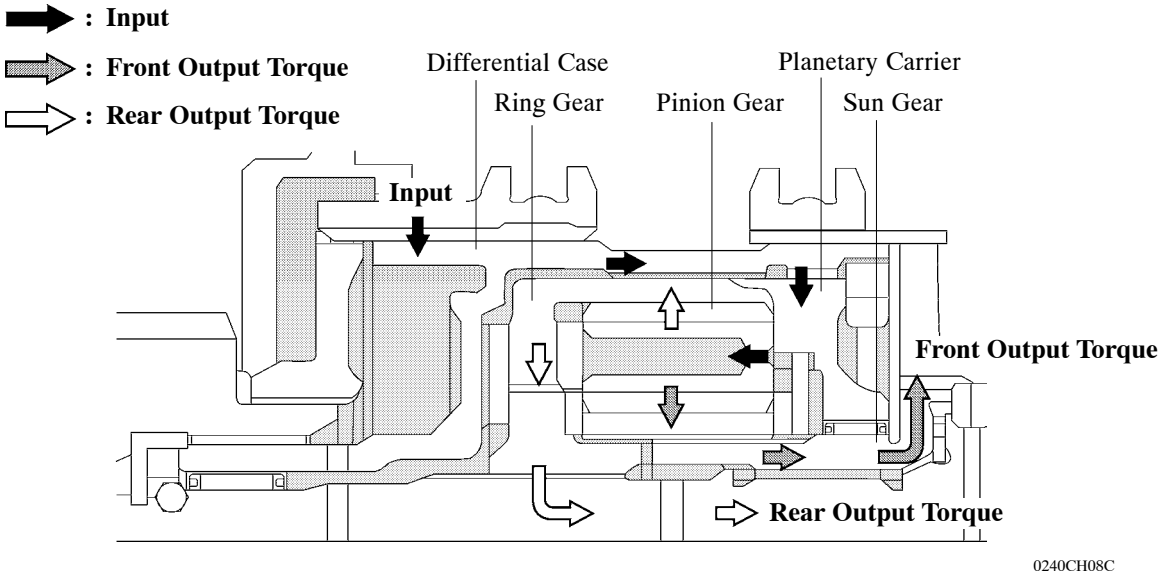


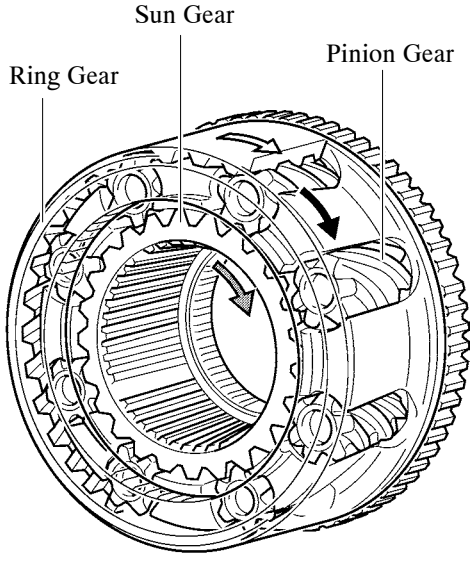
Service Tip

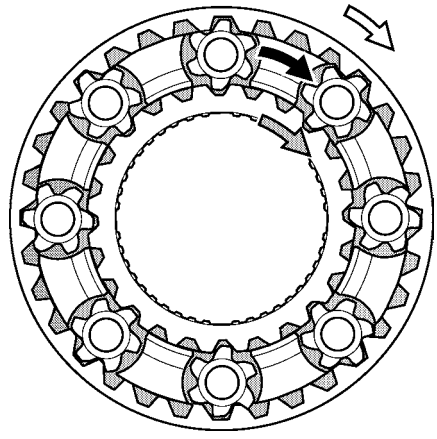
The TORSEN LSD cannot be disassembled, so it must be replaced as an assembly. For details, see the 2007 FJ Cruiser Repair Manual (Pub. No. RM0240U).

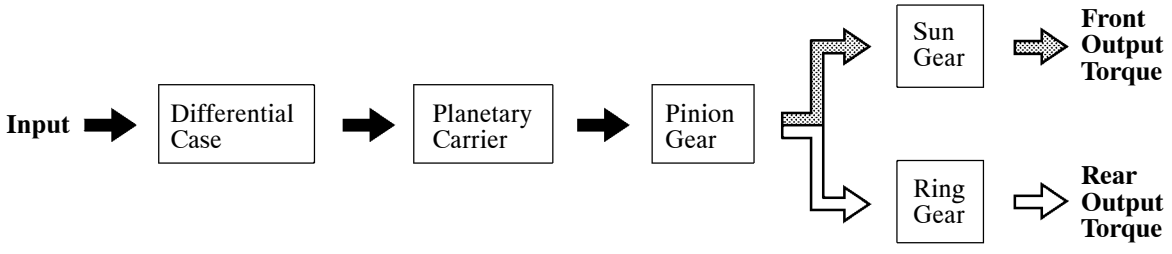
Normal Driving Operation

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







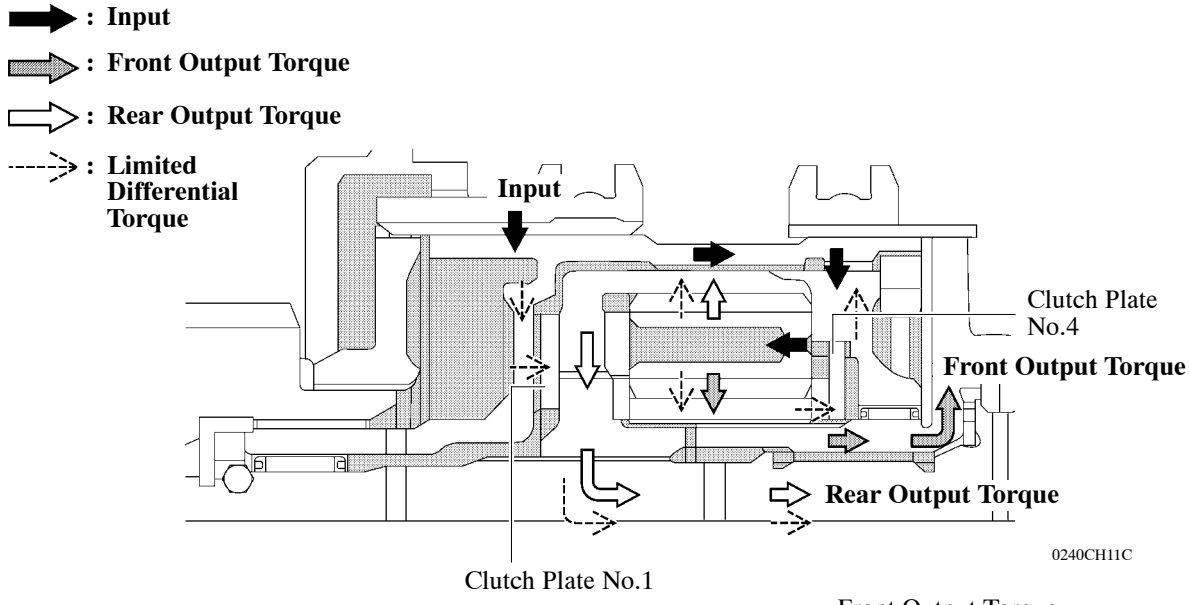


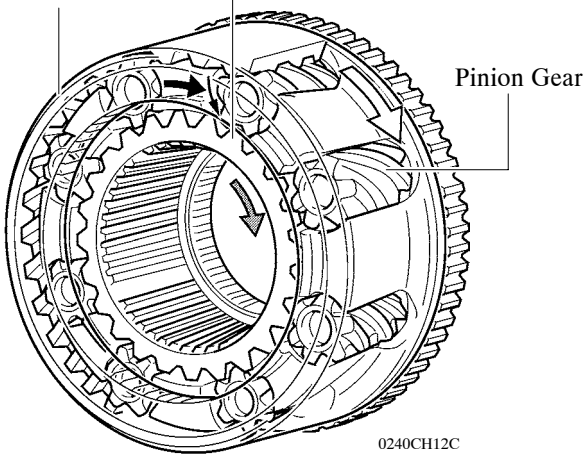
Operation to Counter Front Wheel Spin

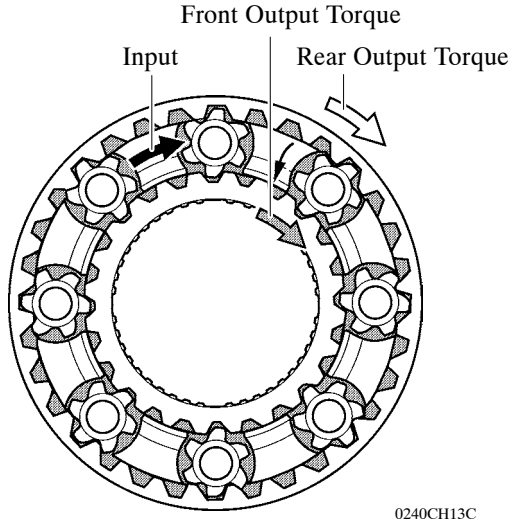
When the front wheels are tending to spin (front wheel speed is greater than rear wheel speed), and a rotational difference begins to exist between the sun gear and the ring gear, the distribution of the torque that is input by the differential case changes instantly before the torque is transmitted. Operation is as follows:

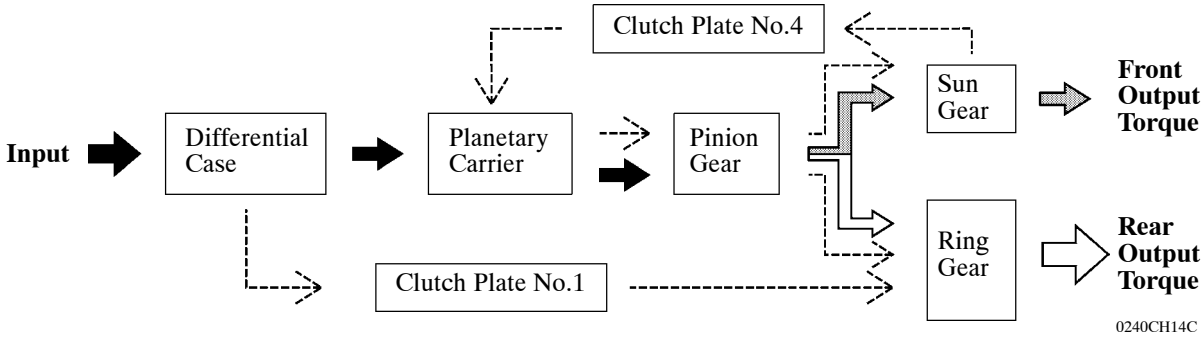
- The sun gear transmits torque to the planetary carrier while pushing on clutch plate No.4. The planetary carrier transmits this torque to the sun gear and ring gear via the pinion gear.
- The differential case transmits torque to the ring gear while pushing on the clutch plate No.1.

The application of these clutch plates changes the torque distribution.









Operation to Counter Rear Wheel Spin

When the rear wheels are tending to spin (front wheel speed is less than rear wheel speed), and a rotational difference begins to exist between the sun gear and the ring gear, the distribution of the torque that is input by the differential case changes instantly before the torque is transmitted. Operation is as follows:

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

The application of these clutch plates changes the torque distribution.

