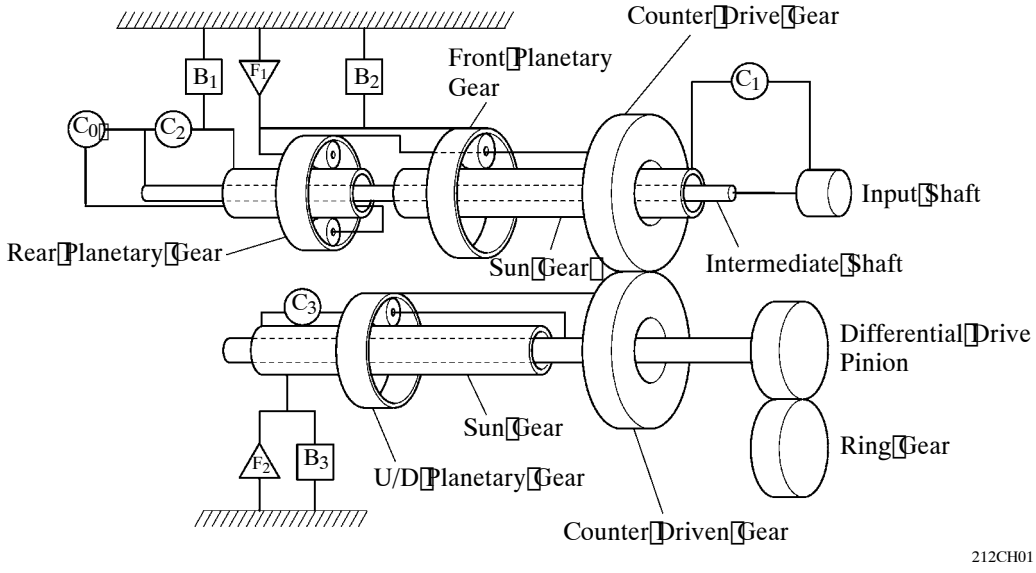
5. Planetary Gear Unit

Construction

- The counter drive and driven gears are placed in front of the front planetary gear and the under drive (U/D) planetary gear unit is placed above the counter shaft. Furthermore, the number of the brake and one-way clutch is minimized to realize the compact and high-capacity structure.
- The centrifugal fluid pressure canceling mechanism is used in the C_0, C_2, C_3, and C_1 clutches that are applied when shifting from 2nd to 3rd, from 3rd to 4th and from 4th to 5th. For details on the centrifugal fluid pressure mechanism, see page 114.



Function of Components

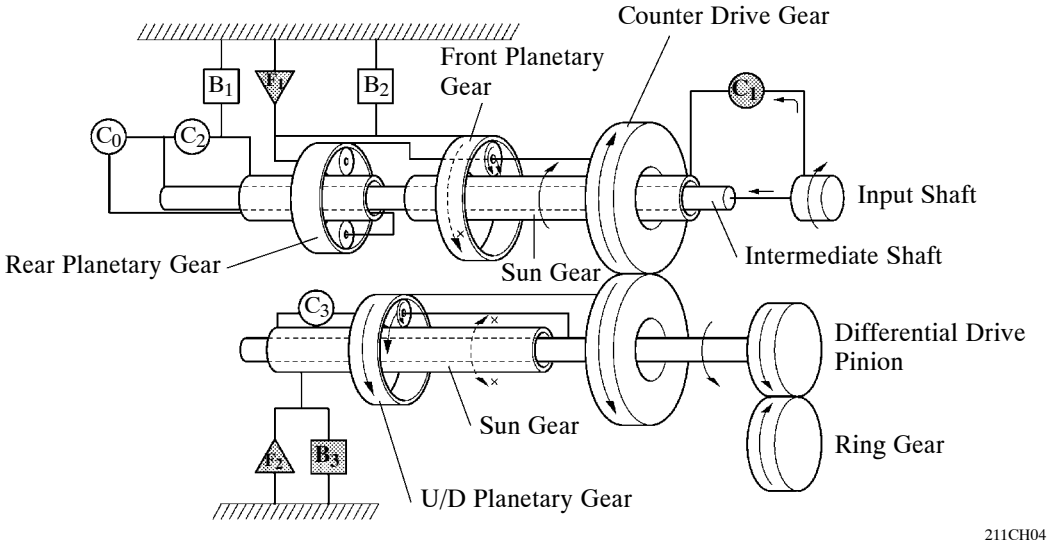
Component		Function
C_1	Forward Clutch	Connects input shaft and front planetary sun gear.
C_2	Reverse Clutch	Connects intermediate shaft and rear planetary sun gear.
C_3	U/D Direct Clutch	Connects U/D sun gear and U/D planetary carrier.
C_0	Direct & O/D Clutch	Connects intermediate shaft and rear planetary carrier.
B_1	2nd & O/D Brake	Prevents rear planetary sun gear from turning either clockwise or counterclockwise.
B_2	1st & Reverse Brake	Prevents rear planetary carrier and front planetary ring gear from turning either clockwise or counterclockwise.
B_3	U/D Brake	Prevents U/D planetary sun gear from turning either clockwise or counterclockwise.
F_1	No. 1 One-way Clutch	Prevents rear planetary carrier and front planetary ring gear from turning counterclockwise.
F_2	U/D One-way Clutch	Prevents U/D planetary sun gear from turning clockwise.
Planetary Gear		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the output speed.

Transaxle Power Flow

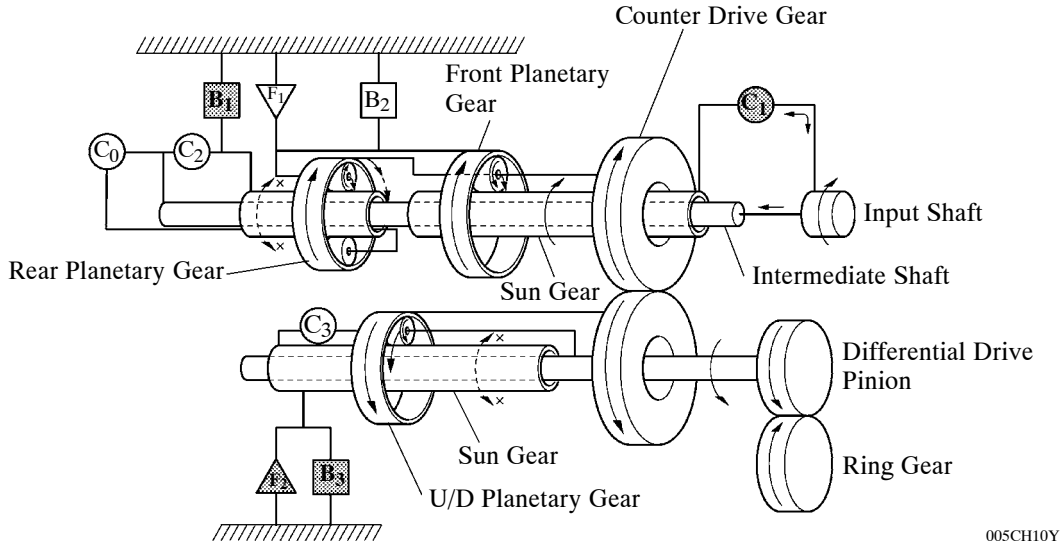
Shift Lever Position	Gear	Solenoid Valve						C_0	C_1	C_2	C_3	B_1	B_2	B_3	F_1	F_2
		S4	SR	DSL	SL1	SL2	SL3									
P	Park	OFF	OFF	OFF	ON	ON	OFF							○		
R	Reverse	OFF	OFF	OFF	ON	ON	OFF			○			○	○		
N	Neutral	OFF	OFF	OFF	ON	ON	OFF							○		
D	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
	4th	OFF	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○				○		○		○
	5th	ON	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○			○	○				
4	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
	4th	OFF	ON	OFF/ ON*	OFF	OFF/ ON*	ON	○				○		○		○
3	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
	3rd	OFF	ON	OFF	ON	OFF	OFF	○	○					○		○
2	1st	OFF	OFF	OFF	ON	ON	OFF		○					○	○	○
	2nd	OFF	OFF	OFF	OFF	ON	OFF		○			○		○		○
L	1st	OFF	OFF	ON	ON	ON	OFF		○				○	○	○	○

○: ON *: Flex Lock-up ON

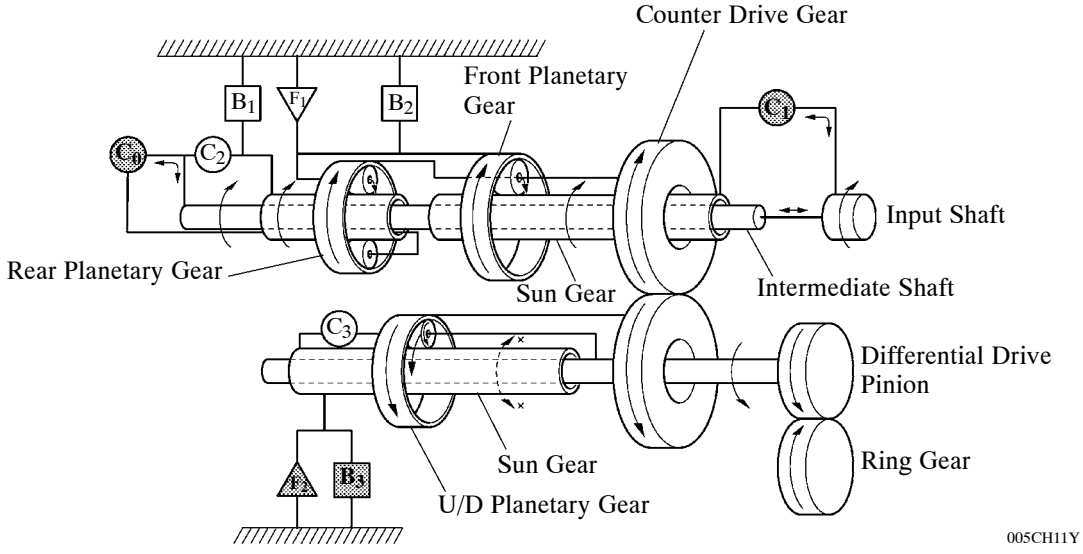
1) 1st Gear (D, 4, 3 or 2 Position)



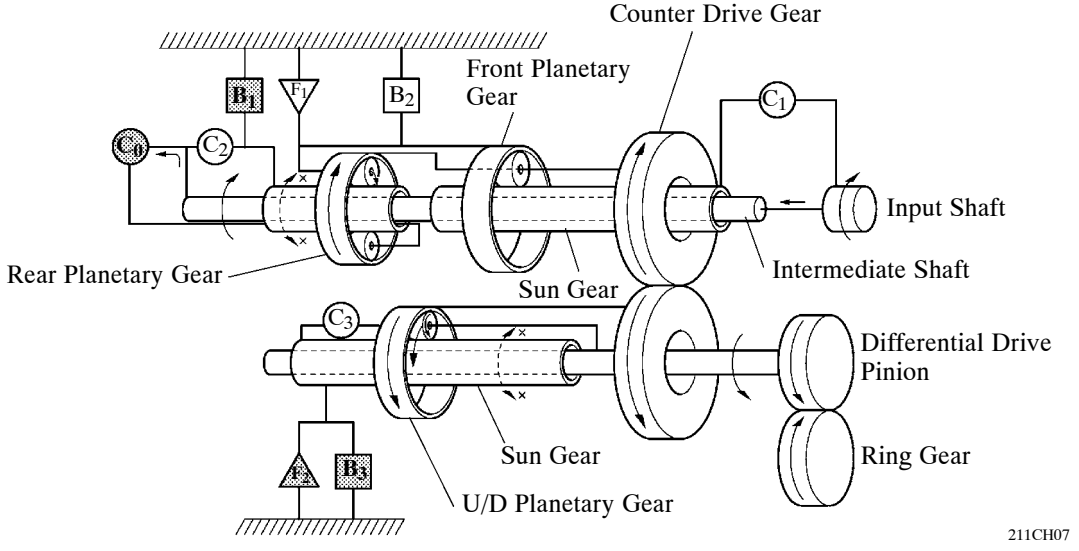
2) 2nd Gear (D, 4, 3 or 2 Position)



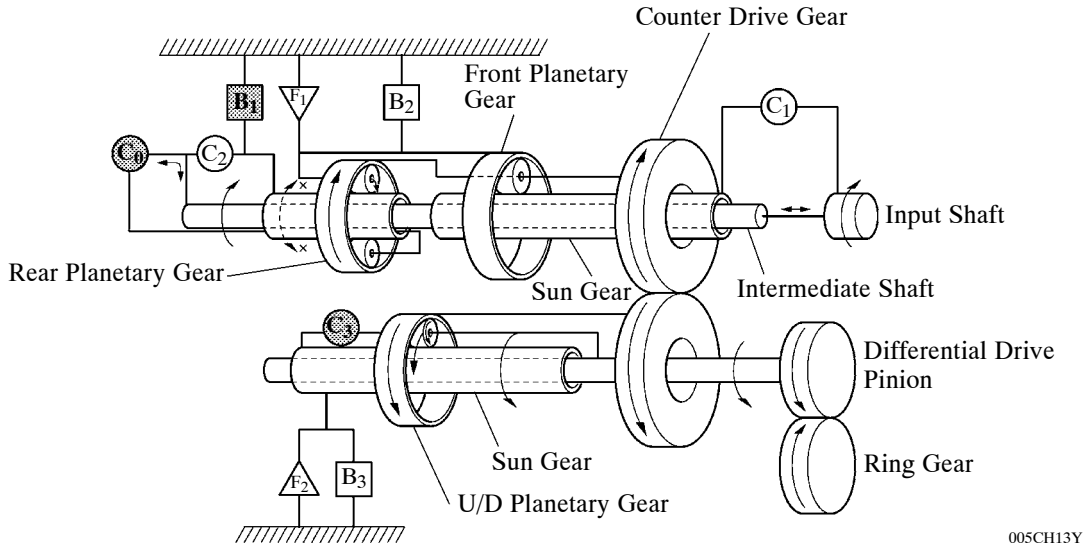
3) 3rd Gear (D, 4 or 3 Position)



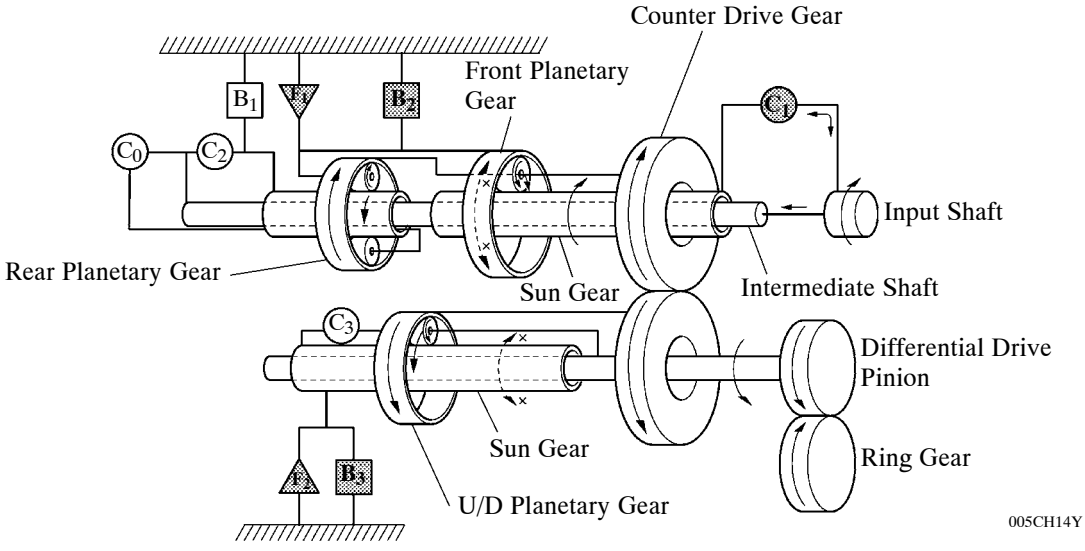
4) 4th Gear (D or 4 Position)



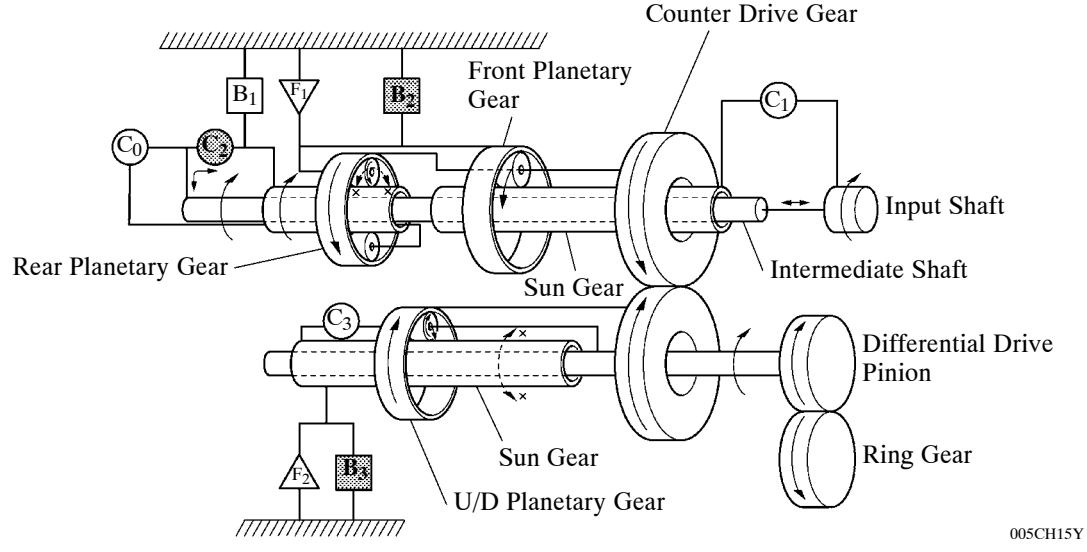
5) 5th Gear (D Position)



6) 1st Gear (L Position)



7) Reverse Gear (R Position)

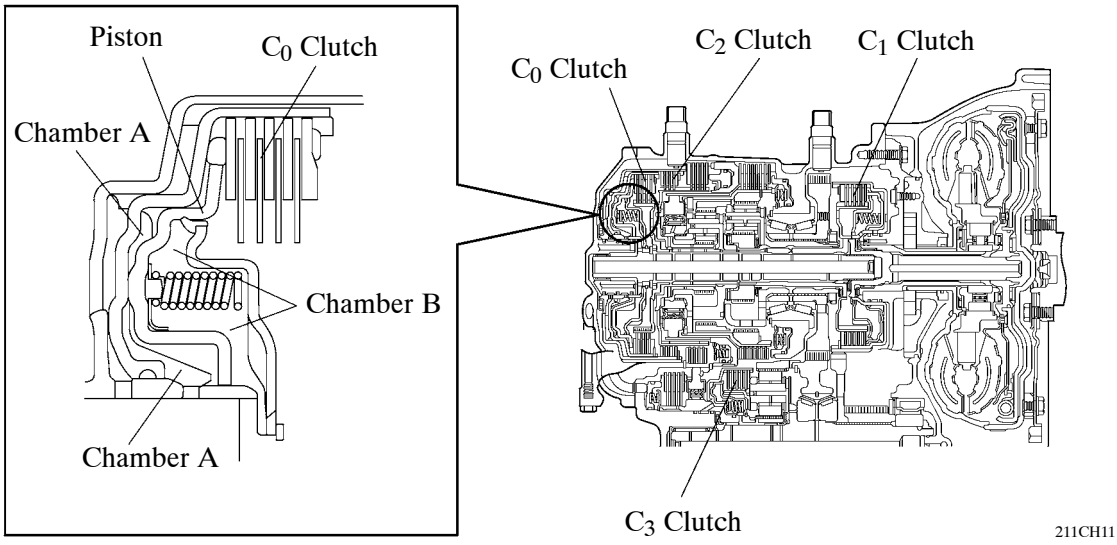


Centrifugal Fluid Pressure Canceling Mechanism

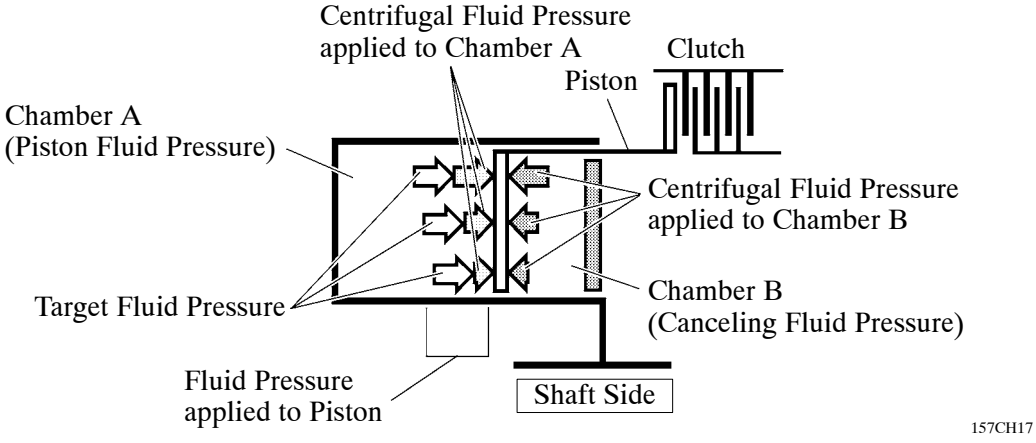
There are two reasons for improving the conventional clutch mechanism:

- To prevent the generation of pressure by the centrifugal force that applied to the fluid in piston fluid pressure chamber (hereafter referred to as “chamber A”) when the clutch is released, a check ball is provided to discharge the fluid. Therefore, before the clutch can be subsequently applied, it took time for the fluid to fill the chamber A.
- During shifting, in addition to the original clutch pressure that is controlled by the valve body, the pressure that acts on the fluid in the chamber A also exerts influence, which is dependent upon revolution fluctuations.

To address these two needs for improvement, a canceling fluid pressure chamber (hereafter referred to as “chamber B”) has been provided opposite chamber A.



By utilizing the lubrication fluid such as that of the shaft, the same amount of centrifugal force is applied, thus canceling the centrifugal force that is applied to the piston itself. Accordingly, it is not necessary to discharge the fluid through the use of a check ball, and a highly responsive and smooth shifting characteristic has been achieved.



Fluid pressure applied to piston	–	Centrifugal fluid pressure applied to chamber B	=	Target fluid pressure (original clutch pressure)