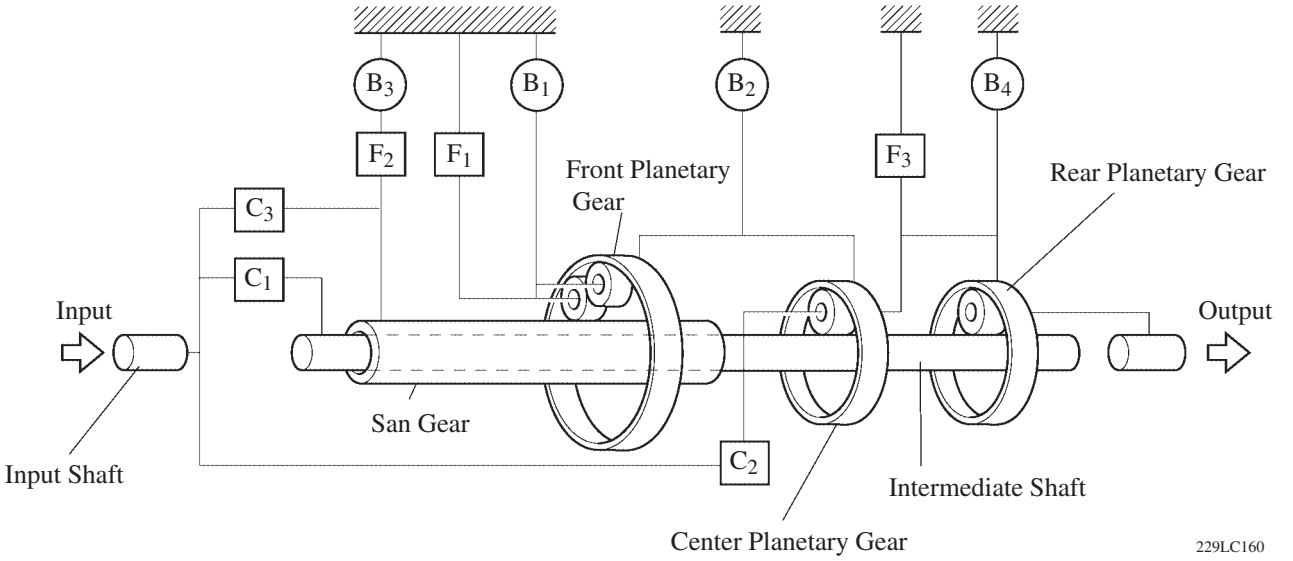
## 4. Planetary Gear Unit

### Construction

- The 5-speed configuration has been achieved without increasing the number of planetary gears, thus creating a 5-speed automatic transmission, practically the same as the previous 4-speed automatic transmission.
- The front planetary carrier is made of aluminum to reduce the weight.
- A centrifugal fluid pressure canceling mechanism has been adopted in the $C_1$, $C_2$, and $C_3$ clutches that are applied when shifting from 2nd to 3rd, from 3rd to 4th and from 4th to 5th. For details, refer to page 195.




### Function of Component

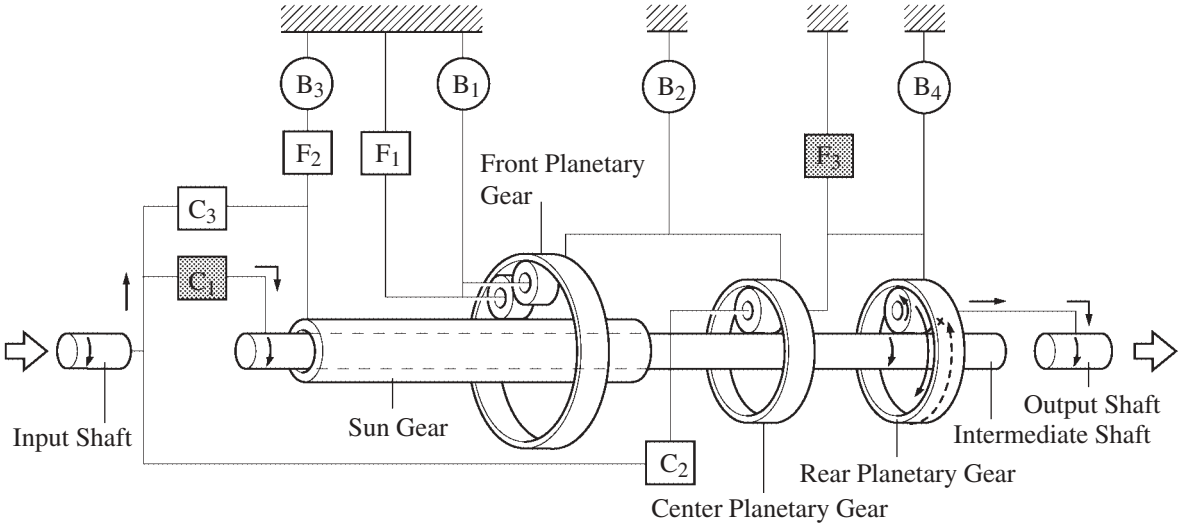
| Component | | Function |
|---|---|---|
| $C_1$ | No.1 Clutch | Connects input shaft and intermediate shaft. |
| $C_2$ | No.2 Clutch | Connects input shaft and center planetary carrier. |
| $C_3$ | No.3 Clutch | Connects input shaft and front sun gear. |
| $B_1$ | No.1 Brake | Prevents front planetary carrier from turning either clockwise or counterclockwise. |
| $B_2$ | No.2 Brake | Prevents front and center ring gear from turning either clockwise or counterclockwise. |
| $B_3$ | No.3 Brake | Prevents outer race of $F_2$ from turning either clockwise or counterclockwise. |
| $B_4$ | No.4 Brake | Prevents rear ring gear from turning either clockwise or counterclockwise. |
| $F_1$ | No.1 One-Way Clutch | Prevents front planetary carrier from turning counterclockwise. |
| $F_2$ | No.2 One-Way Clutch | When $B_3$ is operating, prevents planetary sun gear from turning counterclockwise. |
| $F_3$ | No.3 One-Way Clutch | Prevents center planetary carrier and rear ring gear from turning counterclockwise. |
| Planetary Gears | | 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 input and output speed. |

## Transmission Power Flow

| Shift Lever Position | Gear | Solenoid Valve | | | | | | Clutch | | | Brake | | | | One-way | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S1 | S2 | SR | SL1 | SL2 | SLU | $C_1$ | $C_2$ | $C_3$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $F_1$ | $F_2$ | $F_3$ |
| P | Park | ON | | | | ON | | | | | | | | | | | |
| R | Reverse* | ON | | | | ON | | | | ○ | ○ | | | ○ | ○ | | |
| N | Neutral | ON | | | | ON | | | | | | | | | | | |
| D | 1st | ON | | | | ON | | ○ | | | | | | | | | ○ |
| | 2nd | ON | ON | | | ON | | ○ | | | | | ○ | | ○ | ○ | |
| | 3rd | | ON | | | ON | | ○ | | ○ | | | ● | | ○ | | |
| | 4th | | | | | ON | ON | ○ | ○ | ● | | | ● | | | | |
| | 5th | | | ON | ON | | ON | | ○ | ○ | ○ | | ● | | | | |
| 4 | 1st | ON | | | | ON | | ○ | | | | | | | | | ○ |
| | 2nd | ON | ON | | | ON | | ○ | | | | | ○ | | ○ | ○ | |
| | 3rd | | ON | | | ON | | ○ | | ○ | | | ● | | ○ | | |
| | 4th | | | | | ON | ON | ○ | ○ | ● | | | ● | | | | |
| 3 | 1st | ON | | | | ON | | ○ | | | | | | | | | ○ |
| | 2nd | ON | ON | | | ON | | ○ | | | | | ○ | | ○ | ○ | |
| | 3rd* | | ON | | | | | ○ | | ○ | ○ | | ● | | | | |
| 2 | 1st | ON | | | | ON | | ○ | | | | | | | | | ○ |
| | 2nd* | ON | ON | ON | | | | ○ | | | | ○ | ○ | | | | |
| L | 1st* | ON | | | | | | ○ | | | | | | ○ | | | |

○ : Operation
● : Operate but is not related to power transmission
* : with Engine Brake

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

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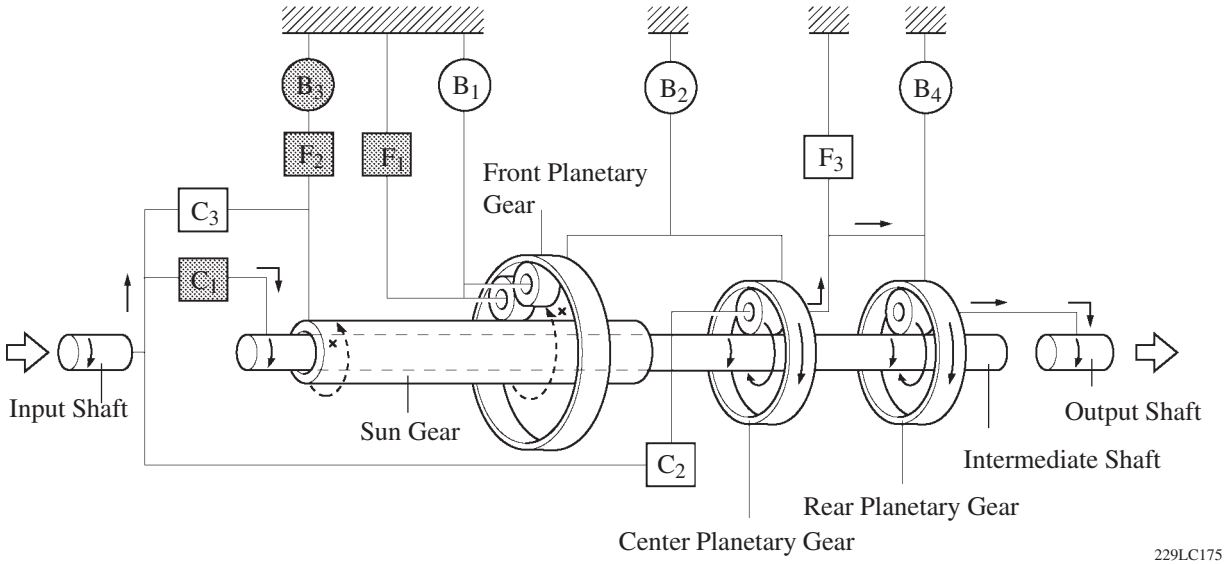
### 2nd Gear (D, 4 or 3 Position)

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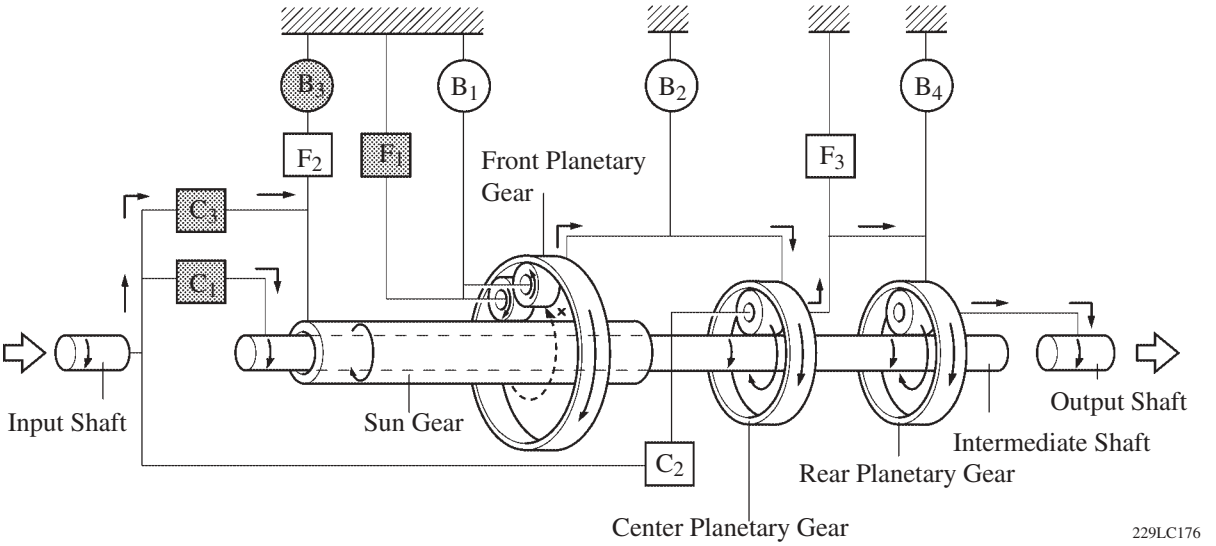
### 3rd Gear (D or 4 Position)

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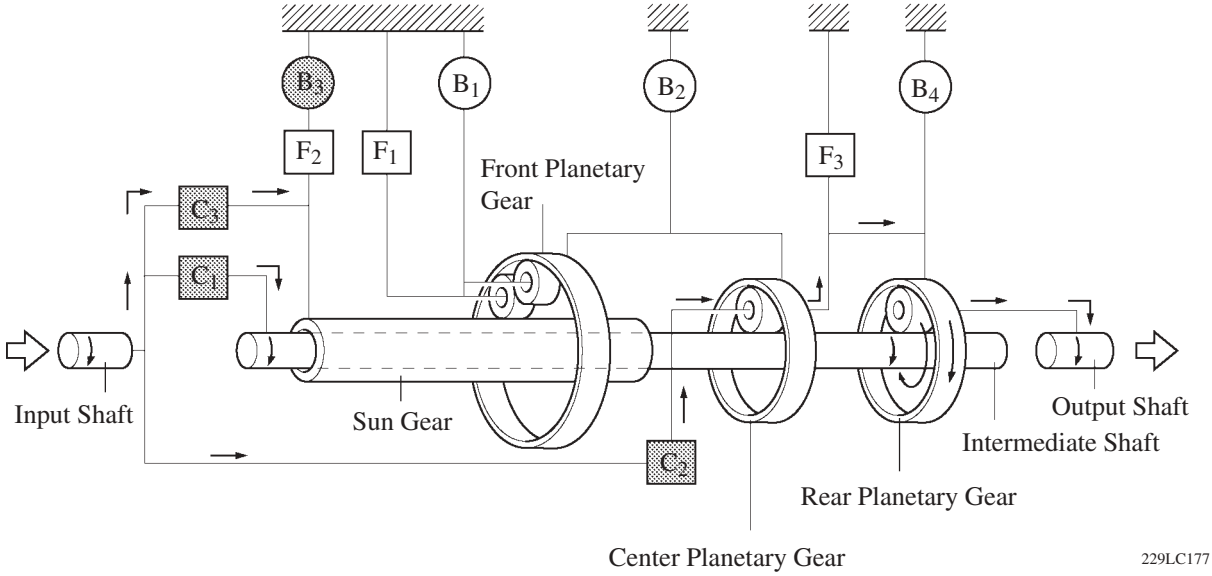
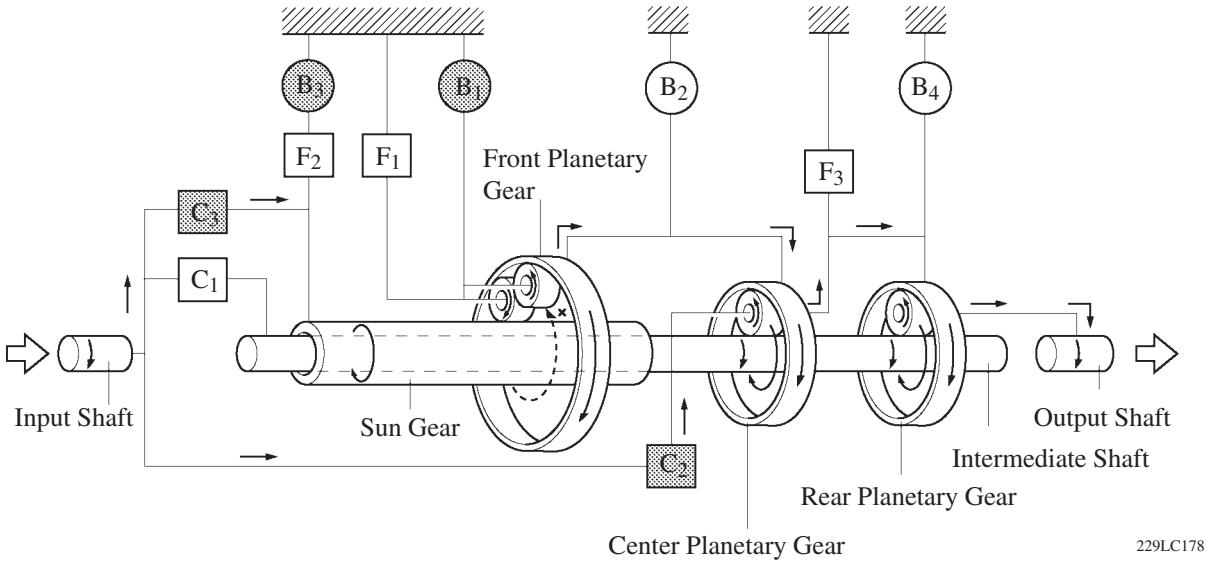
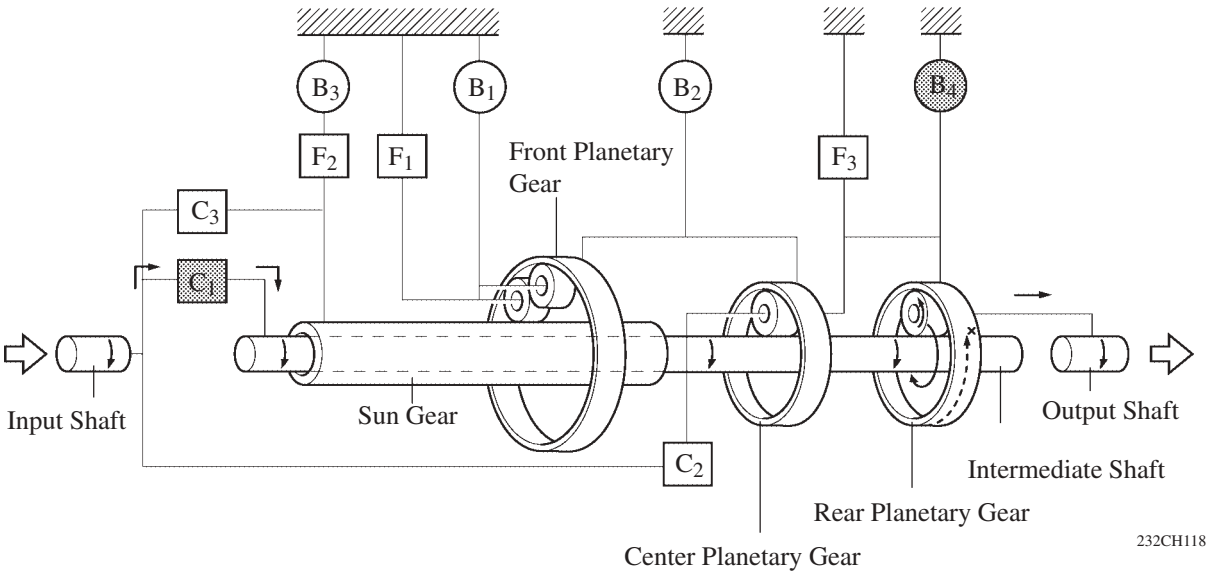
### 4th Gear (D or 4 Position)




### 5th Gear (D Position)




### 1st Gear (L Position)

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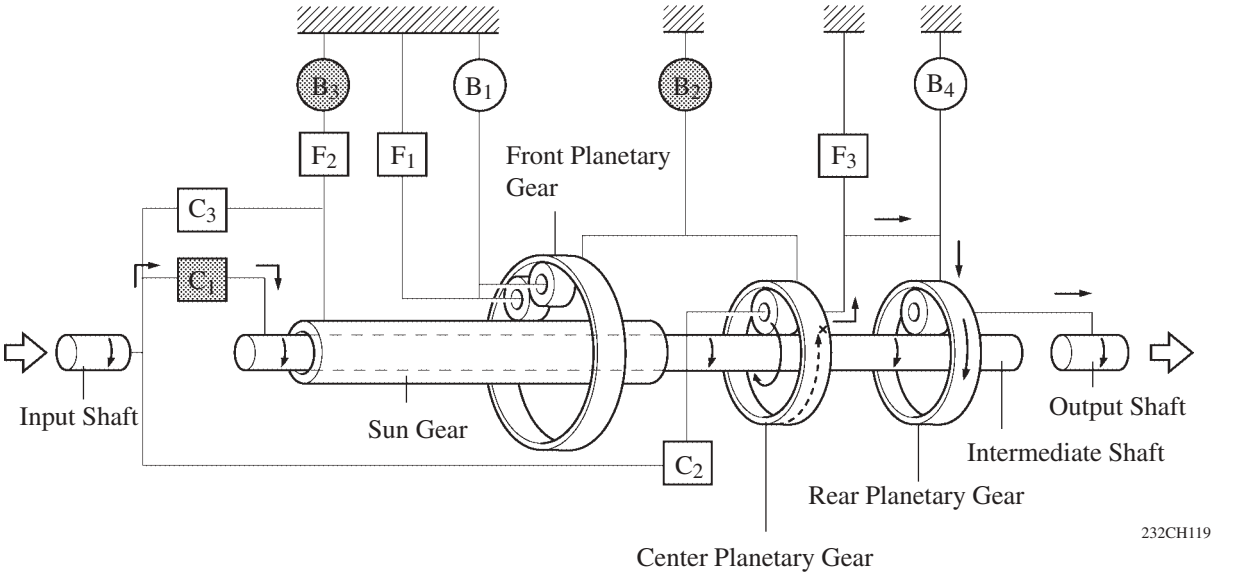
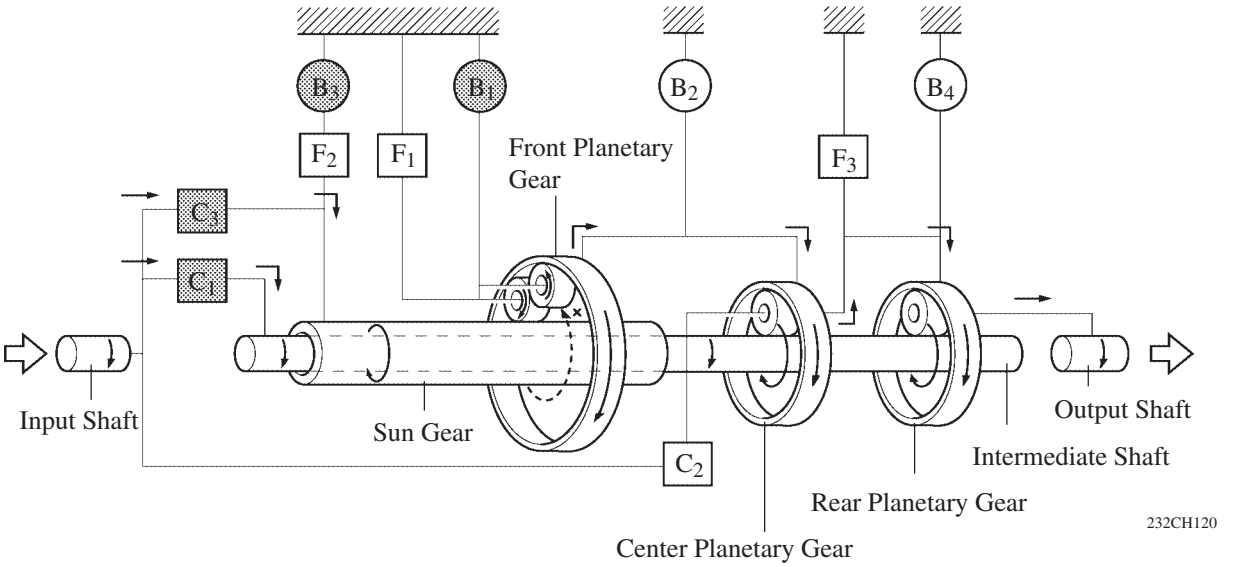
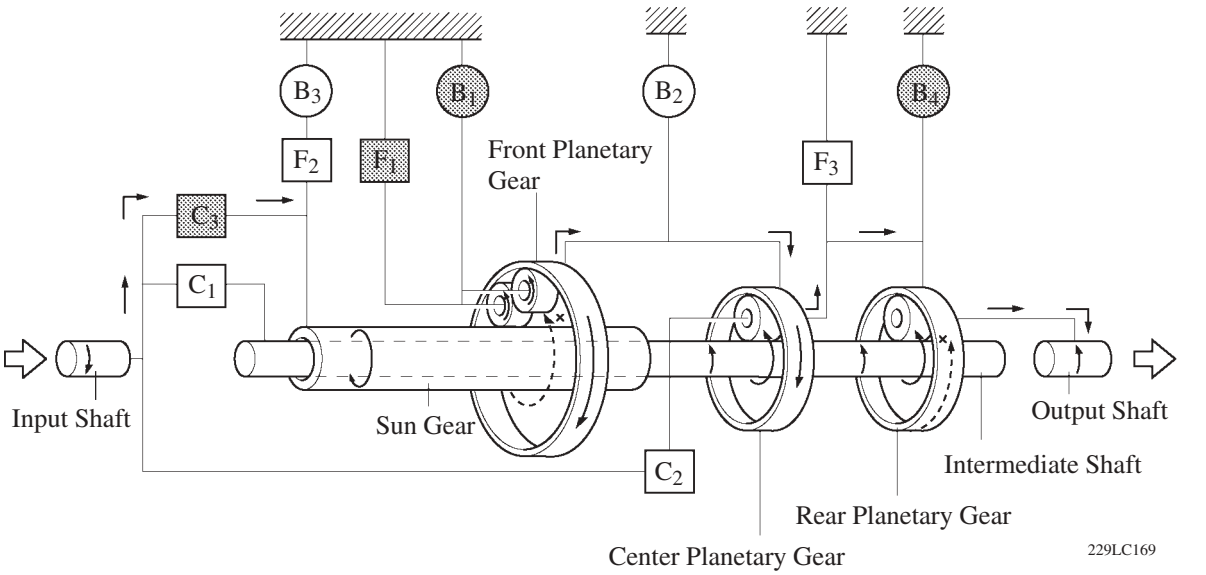
### 2nd Gear (2nd Position)




### 3rd Gear (3rd Position)




### Reverse Gear (R Position)

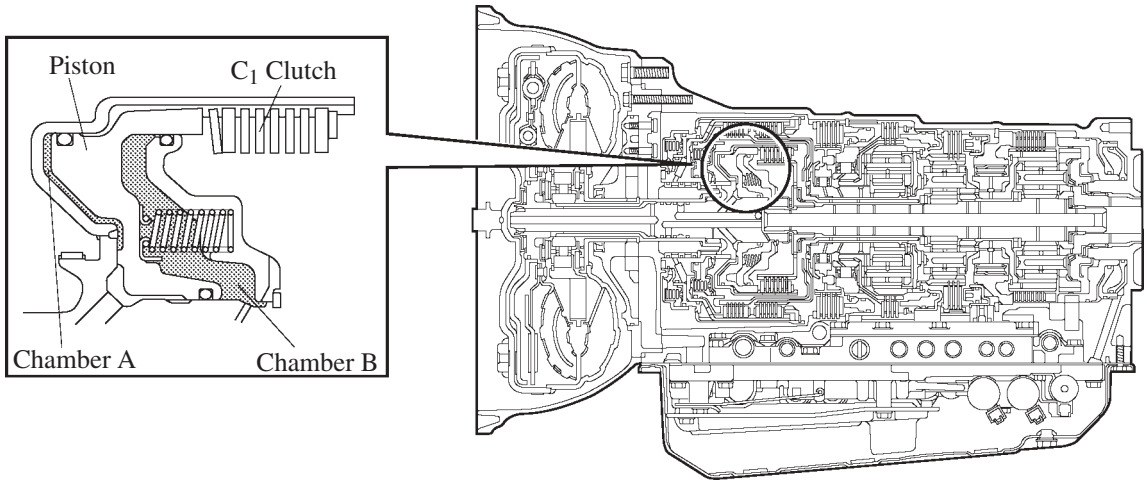


### Centrifugal Fluid Pressure Canceling Mechanism

There are two reasons for improving the conventional clutch mechanism:

- To prevent the generation of pressure by centrifugal force applied to the fluid in the piston fluid pressure chamber (hereafter referred to as "chamber A") when the clutch is released, a check ball is provided. Therefore, before the clutch could be subsequently applied, it took time to fill chamber A.
- During shifting, in addition to the original clutch pressure that is controlled by the valve body, centrifugal pressure acts on the fluid in the chamber A exerting increased pressure depending on RPM.

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

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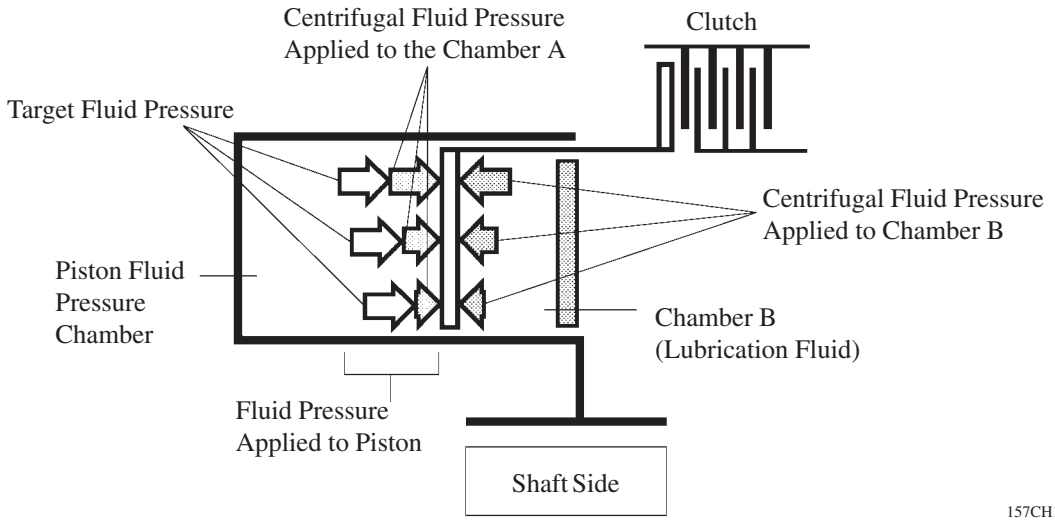
By utilizing the lubrication fluid such as that of the shaft, the same amount of centrifugal force is applied, thus canceling the centrifugal force that is applied to the piston itself. Accordingly, it is not necessary to discharge the fluid through the use of a check ball, and a highly responsive and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

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| | | | | |
|---|---|---|---|---|
| Fluid pressure applied to piston | — | Centrifugal fluid pressure applied to chamber B | = | Target fluid pressure (original clutch pressure) |

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