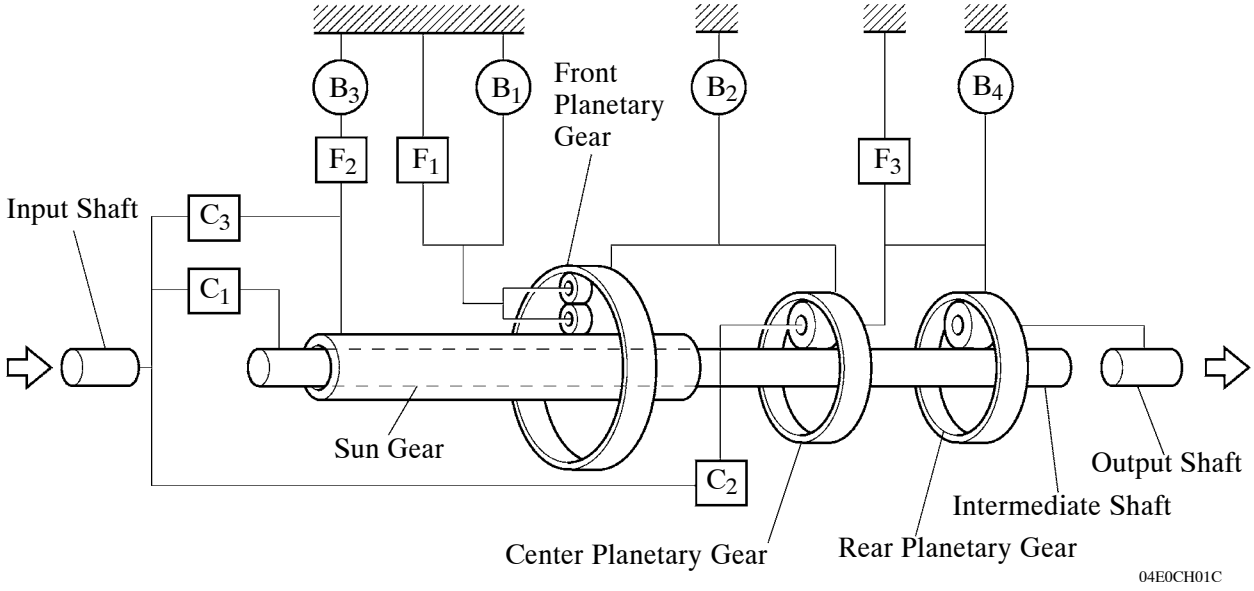
■PLANETARY GEAR UNIT

1. Construction

The planetary gear unit consists of three planetary gear units, three clutches, four brakes, and three one-way clutches.

- A front planetary carrier made of aluminum is used to reduce weight.
- A centrifugal fluid pressure canceling mechanism is used in the C_1, C_2, and C_3 clutches that are applied when shifting 2nd → 3rd, 3rd → 4th, and 4th → 5th. For details, see page CH-16.



2. Function of Components

Component		Function
C_1	No. 1 Clutch	Connects the input shaft and intermediate shaft.
C_2	No. 2 Clutch	Connects the input shaft and center planetary carrier.
C_3	No. 3 Clutch	Connects the input shaft and front sun gear.
B_1	No. 1 Brake	Prevents the front planetary carrier from turning either clockwise or counterclockwise.
B_2	No. 2 Brake	Prevents the front and center ring gears from turning either clockwise or counterclockwise.
B_3	No. 3 Brake	Prevents the outer race of F_2 from turning either clockwise or counterclockwise.
B_4	No. 4 Brake	Prevents the center planetary carrier and rear ring gear from turning either clockwise or counterclockwise.
F_1	No. 1 One-way Clutch	Prevents the front planetary carrier from turning counterclockwise.
F_2	No. 2 One-way Clutch	When B_3 is operating, this one-way clutch prevents the front planetary sun gear from turning counterclockwise.
F_3	No. 3 One-way Clutch	Prevents the 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.

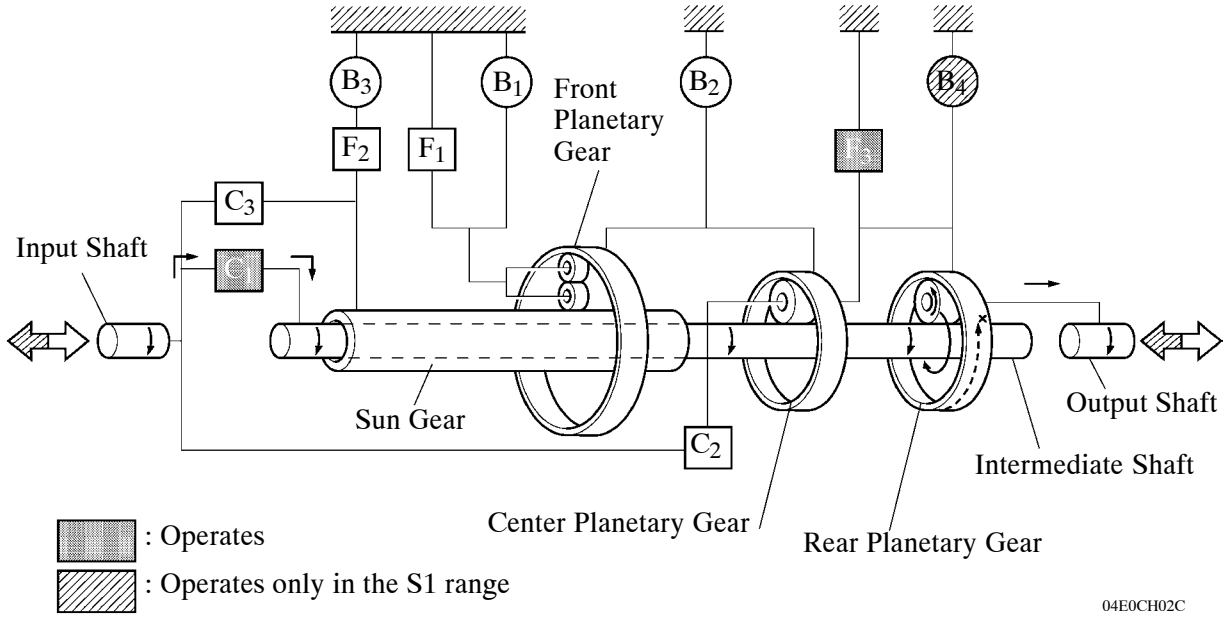
3. Transmission Power Flow

General

Shift Lever or Gear Range Position		Solenoid Valve						Clutch			Brake				One-way Clutch		
		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		ON				ON											
R*		ON				ON				○	(○)			○	○		
N		ON				ON											
D, S5	1st	ON				ON		○									○
	2nd	ON	ON			ON		○					○		○	○	
	3rd		ON			ON		○		○			●		○		
	4th*					ON		○	○	●			●				
	5th*			ON	ON		ON		○	○	○		●				
S4	1st	ON				ON		○									○
	2nd	ON	ON			ON		○					○		○	○	
	3rd		ON			ON		○		○			●		○		
	4th*					ON	ON	○	○	●			●				
S3	1st	ON				ON		○									○
	2nd	ON	ON			ON		○					○		○	○	
	3rd*		ON					○		○	(○)		●		○		
S2	1st	ON				ON		○									○
	2nd*	ON	ON	ON				○				(○)	○		○	○	
S1	1st*	ON						○						(○)			○

○: Operates
●: Operates but is not related to power transmission
(○): Operates during engine braking
*: Engine braking occurs

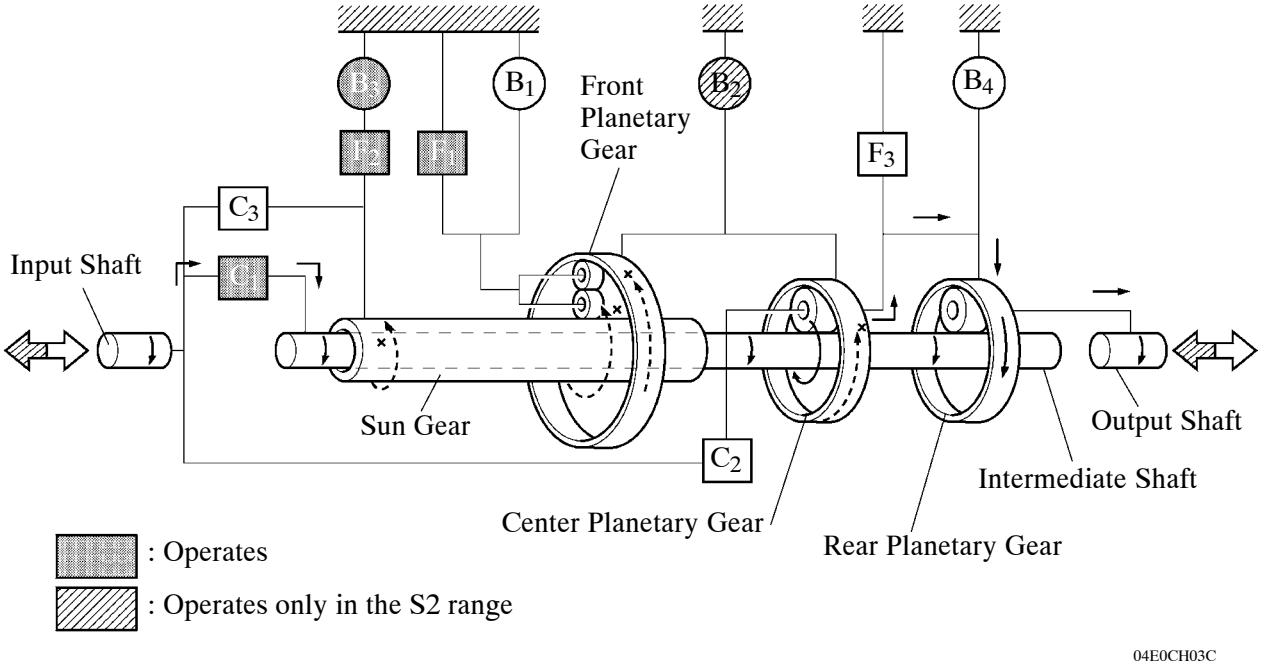
1st Gear (D Position or S Mode)



C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
○						(○)			○

○: Operates (○): Operates only in the S1 range

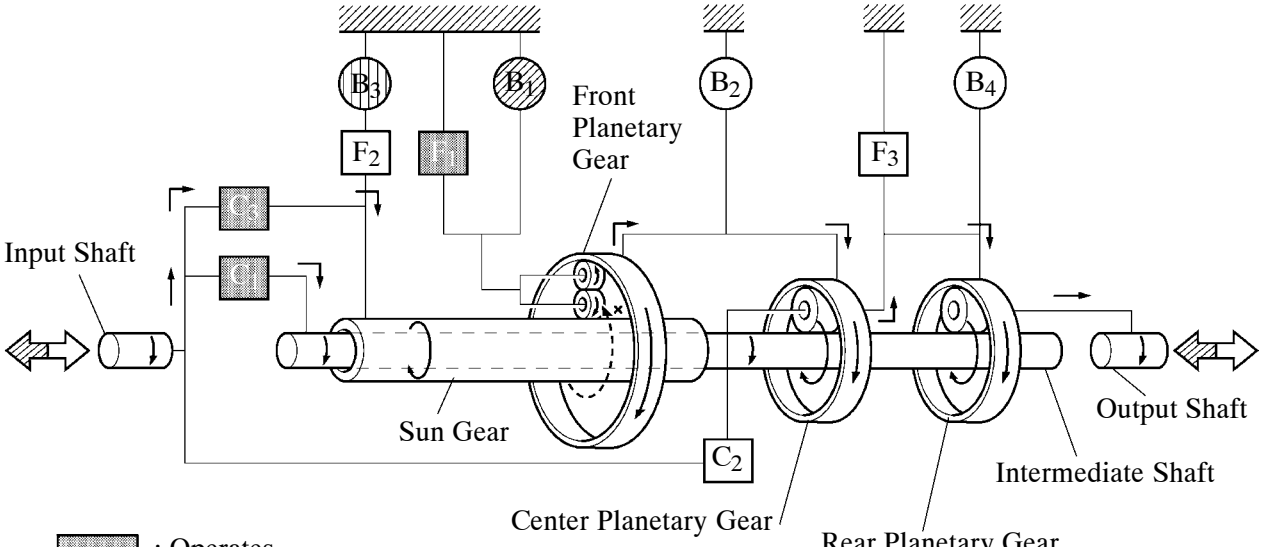
2nd Gear (D Position or S Mode)



C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
○				(○)	○		○	○	

○: Operates (○): Operates only in the S2 range

3rd Gear (D Position or S Mode)



: Operates

: Operates only in the S3 range

: Operates but is not related to power transmission

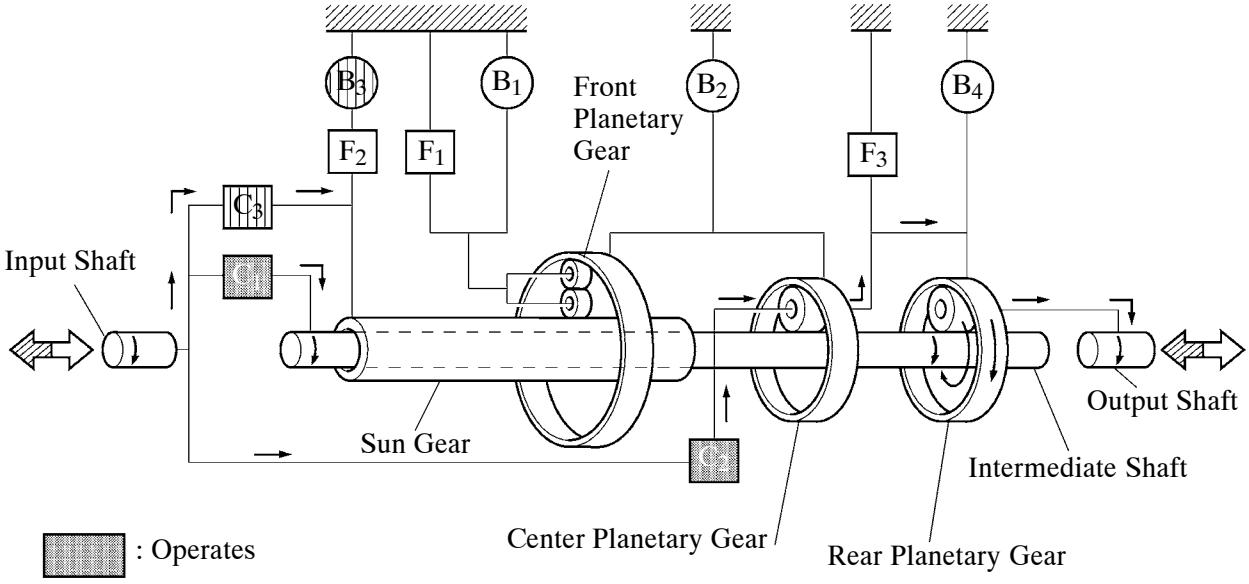
04E0CH04C

C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
○		○	(○)		●		○		

○: Operates (○): Operates only in the S3 range

●: Operates but is not related to power transmission

4th Gear (D Position or S mode)



: Operates

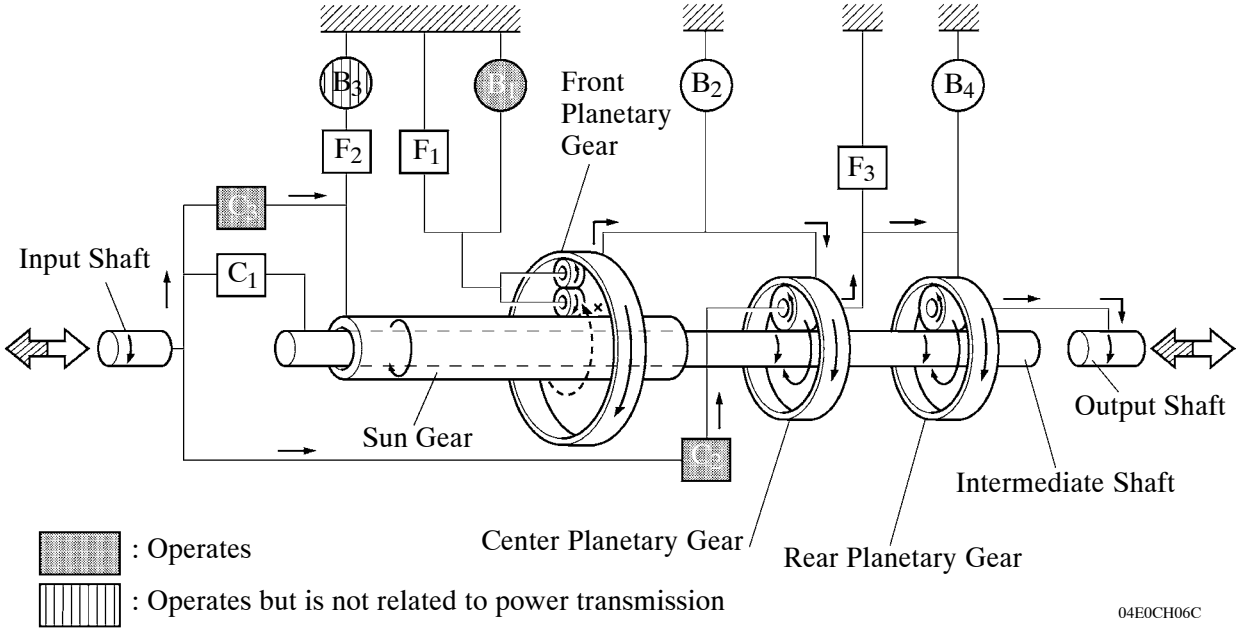
: Operates but is not related to power transmission

04E0CH05C

C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
○	○	●			●				

○: Operates ●: Operates but is not related to power transmission

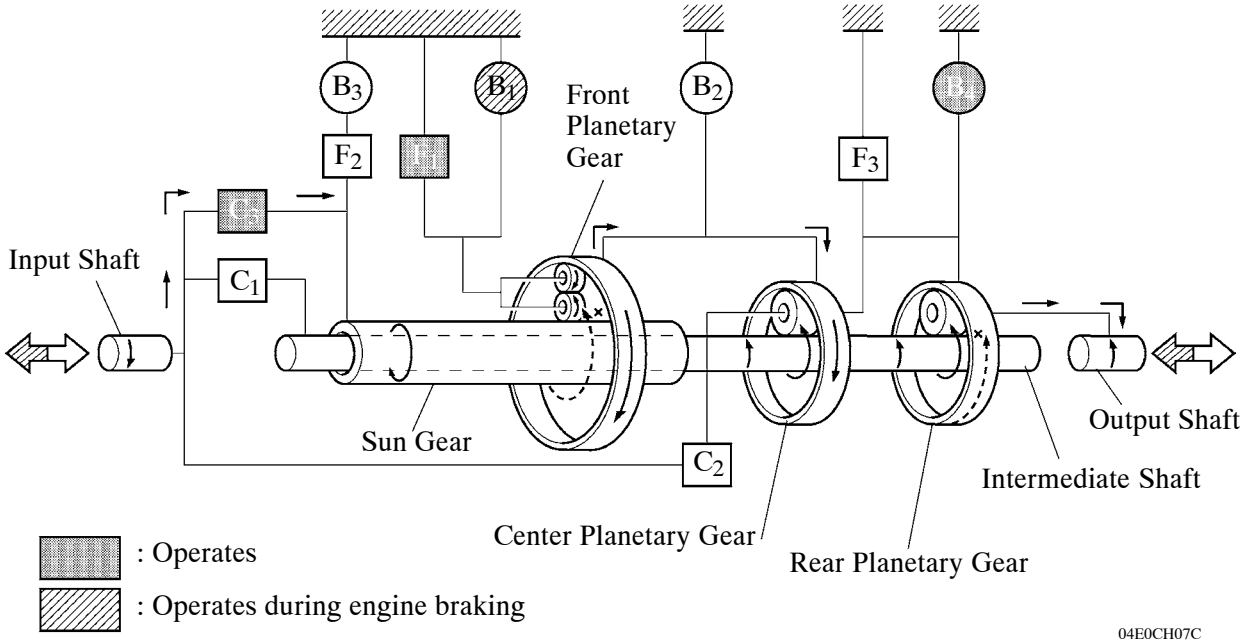
5th Gear (D Position or S Mode)



C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
	○	○	○		●				

○: Operates ●: Operates but is not related to power transmission

Reverse Gear (R Position)



C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
		○	(○)			○	○		

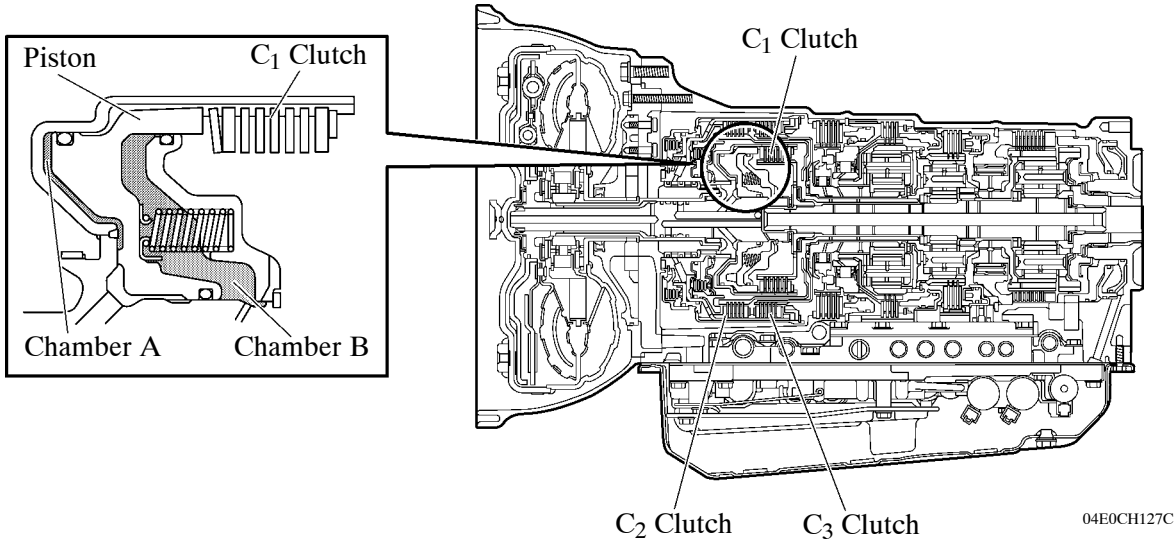
○: Operates (○): Operates during engine braking

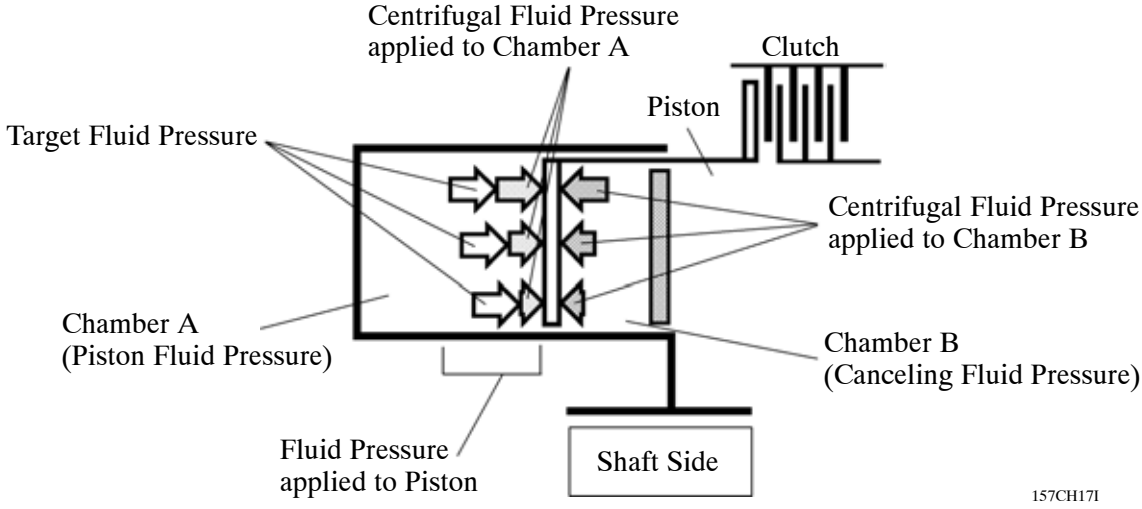
CH

4. Centrifugal Fluid Pressure Canceling Mechanism

For the following reason, the centrifugal fluid pressure canceling mechanism is used on the C_1, C_2, and C_3 clutches.

- Clutch shifting operation is affected not only by the valve body controlling fluid pressure but also by centrifugal fluid pressure that is present due to fluid in the clutch piston oil pressure chamber. The centrifugal fluid pressure canceling mechanism has chamber B to reduce this affect applied to the chamber A. As a result, smooth shifting with excellent response has been achieved.





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