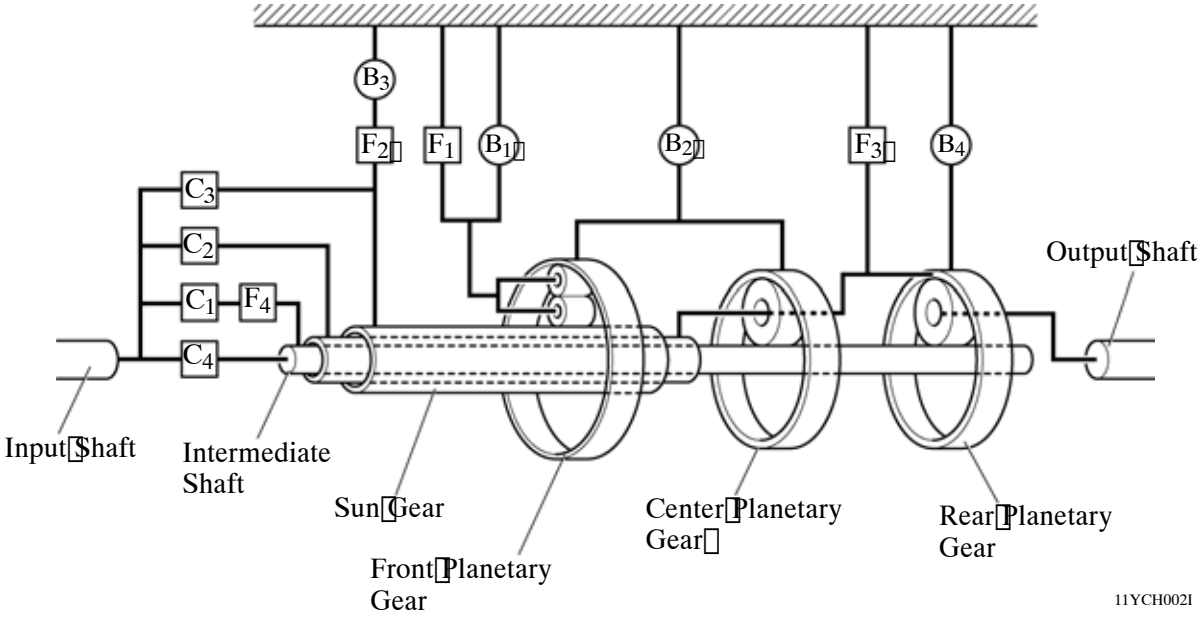
■ PLANETARY GEAR UNIT

1. Construction

The planetary gear unit consists of 3 planetary gear units, 4 clutches, 4 brakes, and 4 one-way clutches.

- A centrifugal fluid pressure canceling mechanism is used in the C_1, C_2, C_3, and C_4 clutches that are applied when shifting 2nd → 3rd, 3rd → 4th, 4th → 5th, and 5th → 6th. For details, see page CH-17.



2. Function of Components

Component		Function
C_1	No. 1 Clutch	Connects the input shaft, F_4 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 sun gear.
C_4	No. 4 Clutch	Connects the input shaft and intermediate shaft.
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 the center ring gears 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 center planetary carrier and the 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, the one-way clutch prevents the front sun gear from turning counterclockwise.
F_3	No. 3 One-way Clutch	Prevents the center planetary carrier and the rear ring gear from turning counterclockwise.
F_4	No. 4 One-way Clutch	Prevents the intermediate shaft 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 output shaft speed.

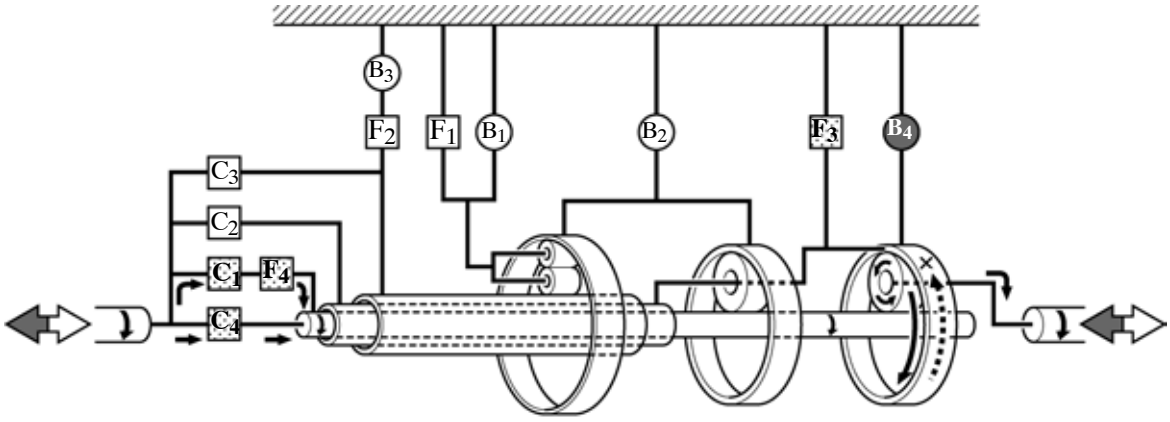
3. Transmission Power Flow

General

Shift Position or Shift Range		Solenoid Valve								Clutch				Brake				One-way Clutch			
		S1	S2	S3	S4	SR	SL1	SL2	SLU	C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
P			On	On		On		On													
R*			On	On		On		On				○		○			○	○			
N			On	On		On	On	On													
D, S6	1st		On	On		On		On		○			○							○	○
	2nd	On	On	On		On		On	On	○			○			○		○	○		○
	3rd	On		On		On		On	On	○		○	○			●		○			○
	4th*	On				On		On	On	○	○	●	○			●					○
	5th*	On			On		On		On	●	○	○		○		●					
	6th*	On	On		On		On		On	●	○			●	○	●					
S5	1st		On	On		On		On		○			○							○	○
	2nd	On	On	On		On		On	On	○			○			○		○	○		○
	3rd	On		On		On		On	On	○		○	○			●		○			○
	4th*	On				On		On	On	○	○	●	○			●					○
	5th*	On			On		On		On	●	○	○		○		●					
S4	1st		On	On		On		On		○			○							○	○
	2nd	On	On	On		On		On	On	○			○			○		○	○		○
	3rd	On		On		On		On	On	○		○	○			●		○			○
	4th*	On				On		On	On	○	○	●	○			●					○
S3	1st		On	On		On		On		○			○							○	○
	2nd	On	On	On		On		On	On	○			○			○		○	○		○
	3rd*	On		On		On			On	○		○	○	△		●		○			○
S2	1st		On	On		On		On		○			○							○	○
	2nd*	On	On	On	On	On			On	○			○		△	○		○	○		○
S1	1st*		On	On		On				○			○				△			○	○

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

1st Gear (Shift Lever is in D or S)



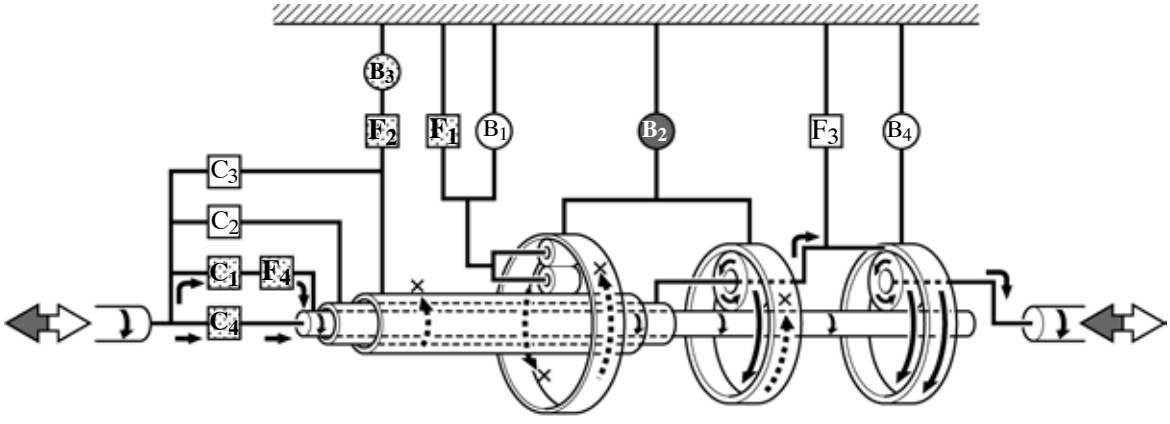
: Operates
: Operates only in the S1 range

11YCH003I

C_1	C_2	C_3	C4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
○			○				Δ			○	○

○: Operates Δ: Operates only in the S1 range

2nd Gear (Shift Lever is in D or S)



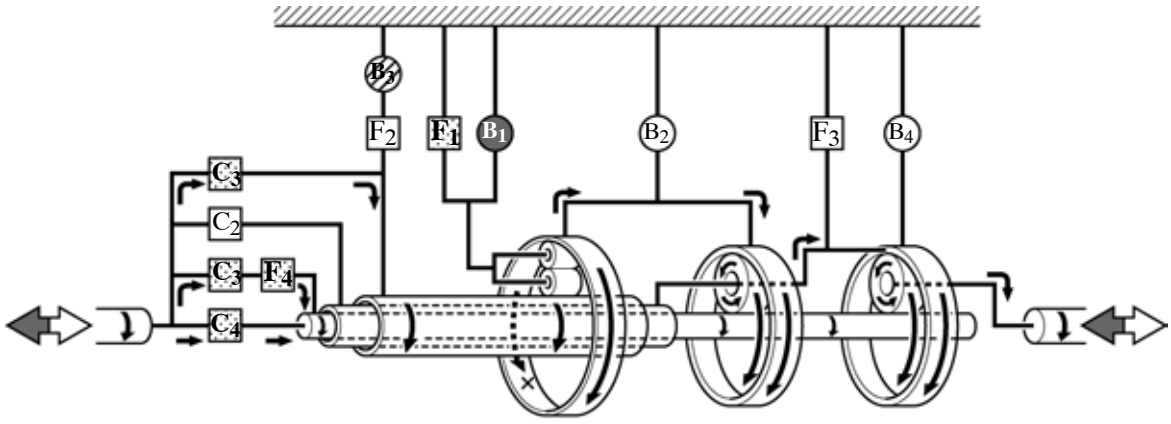
: Operates
: Operates only in the S2 range

11YCH004I

C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
○			○		Δ	○		○	○		○

○: Operates Δ: Operates only in the S2 range

3rd Gear (Shift Lever is in D or S)



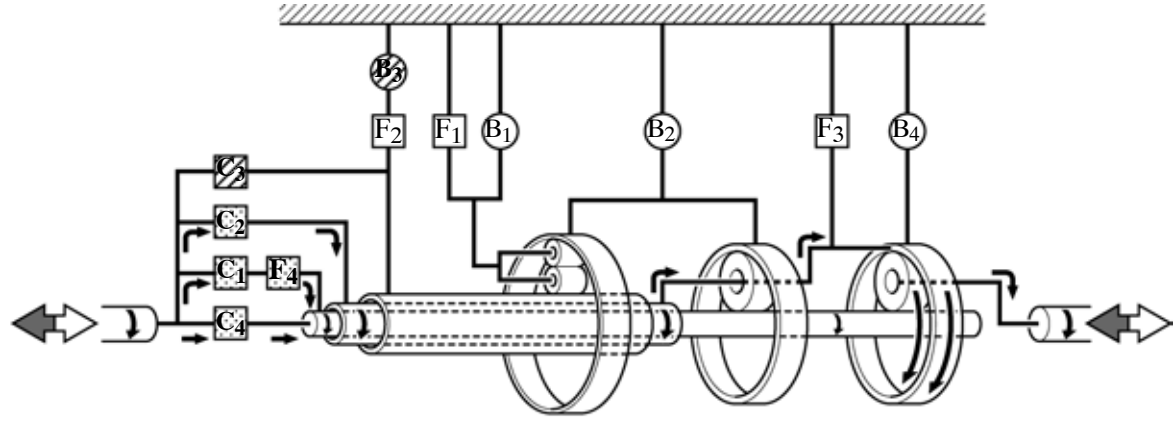
: Operates
: Operates only in the S3 range
: Operates but is not related to power transmission

11YCH005I

C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
○		○	○	△		●		○			○

○: Operates △: Operates only in the S3 range
●: Operates but is not related to power transmission

4th Gear (Shift Lever is in D or S)



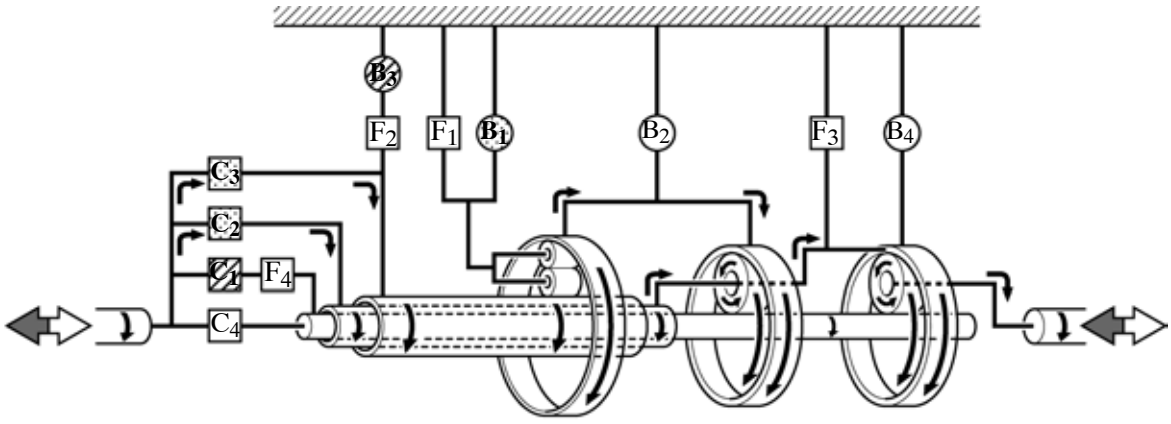
: Operates
: Operates but is not related to power transmission

11YCH006I

C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
○	○	●	○			●					○

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

5th Gear (Shift Lever is in D or S)



: Operates

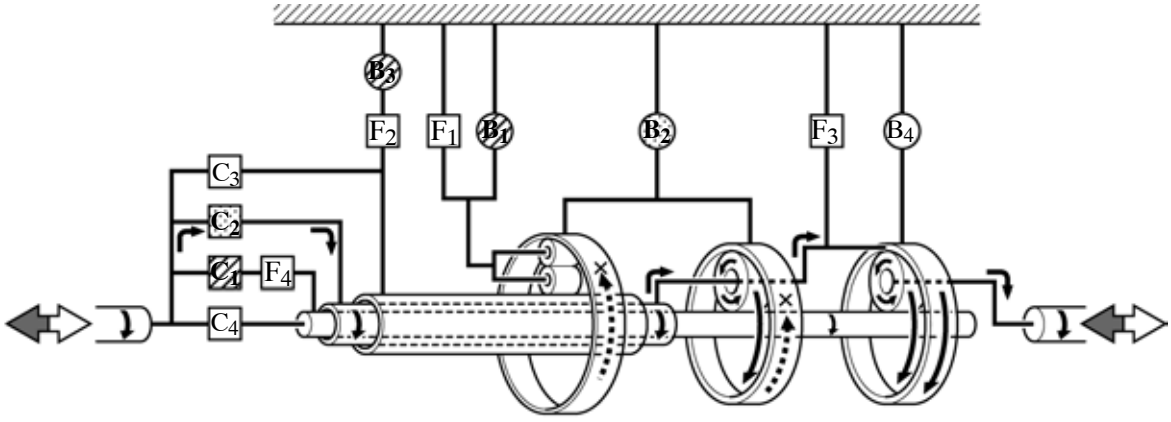
: Operates but is not related to power transmission.

11YCH007I

C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
●	○	○		○		●					

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

6th Gear (Shift Lever is in D or S)



: Operates

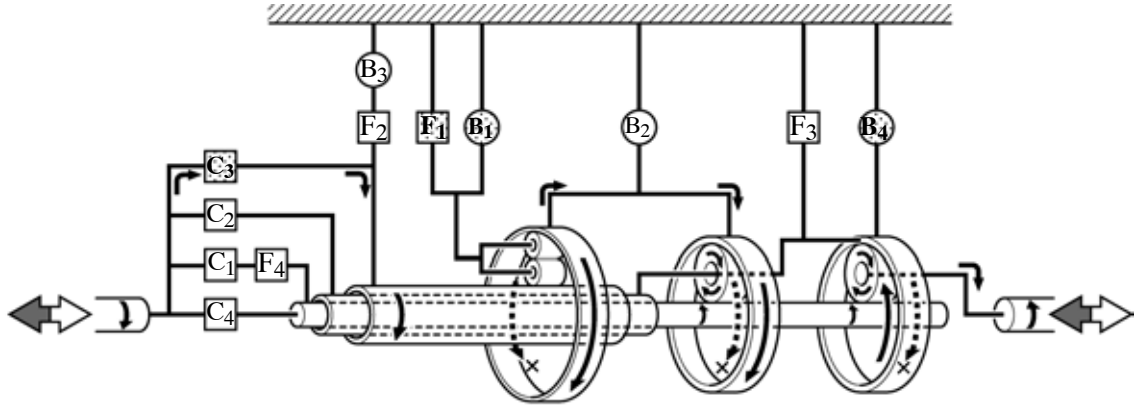
: Operates but is not related to power transmission

11YCH008I

C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
●	○			●	○	●					

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

Reverse Gear (Shift Lever is in R)



: Operates

11YCH009I

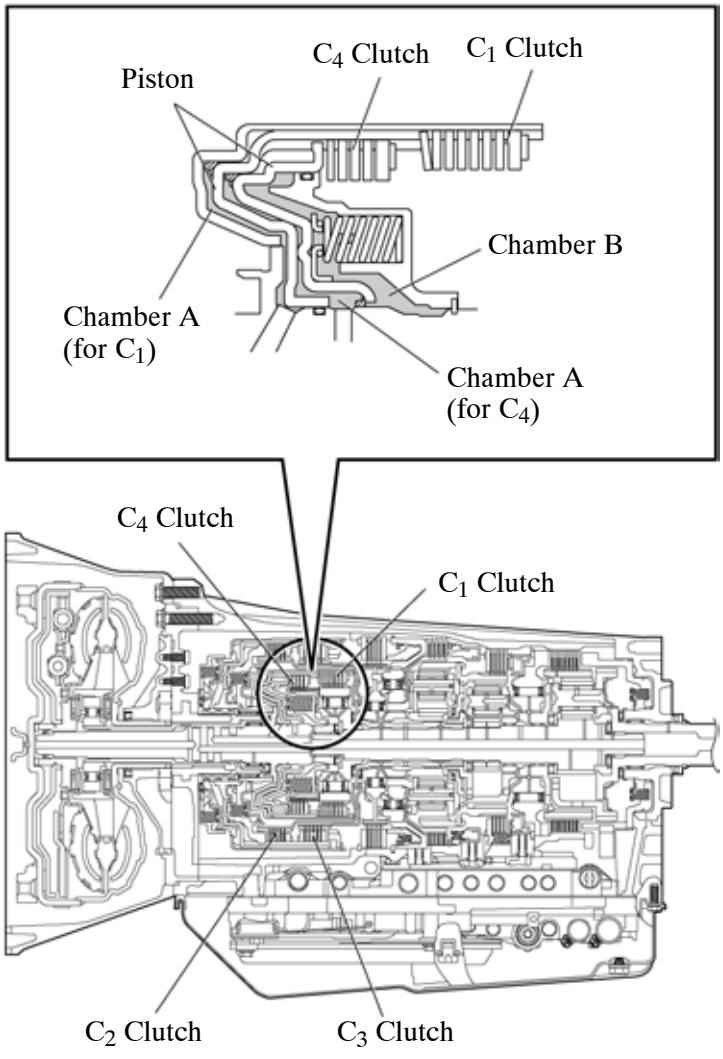
C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
		○		○			○	○			

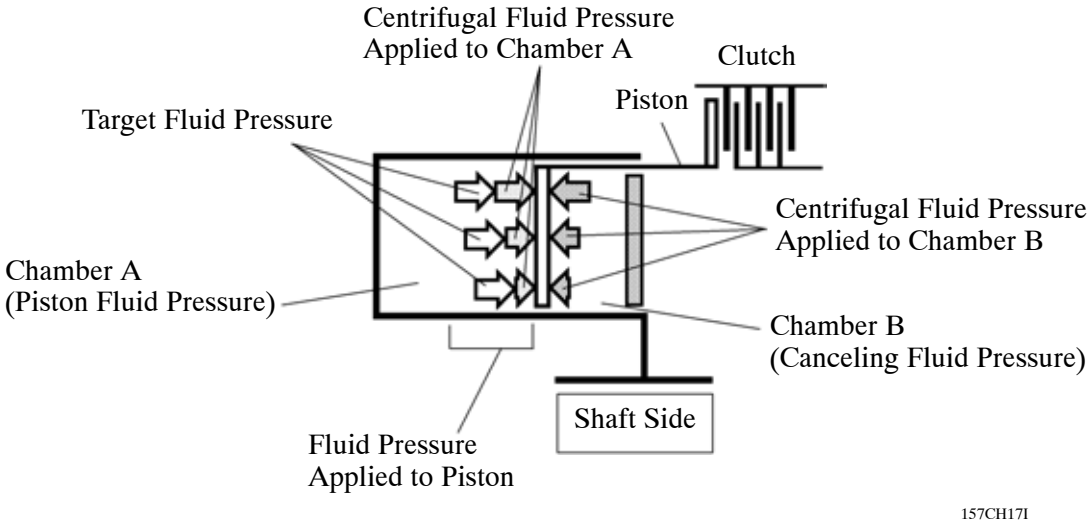
○: Operates

4. Centrifugal Fluid Pressure Canceling Mechanism

For the following reason, the centrifugal fluid pressure canceling mechanism is used on the C_1, C_2, C_3, and C_4 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)