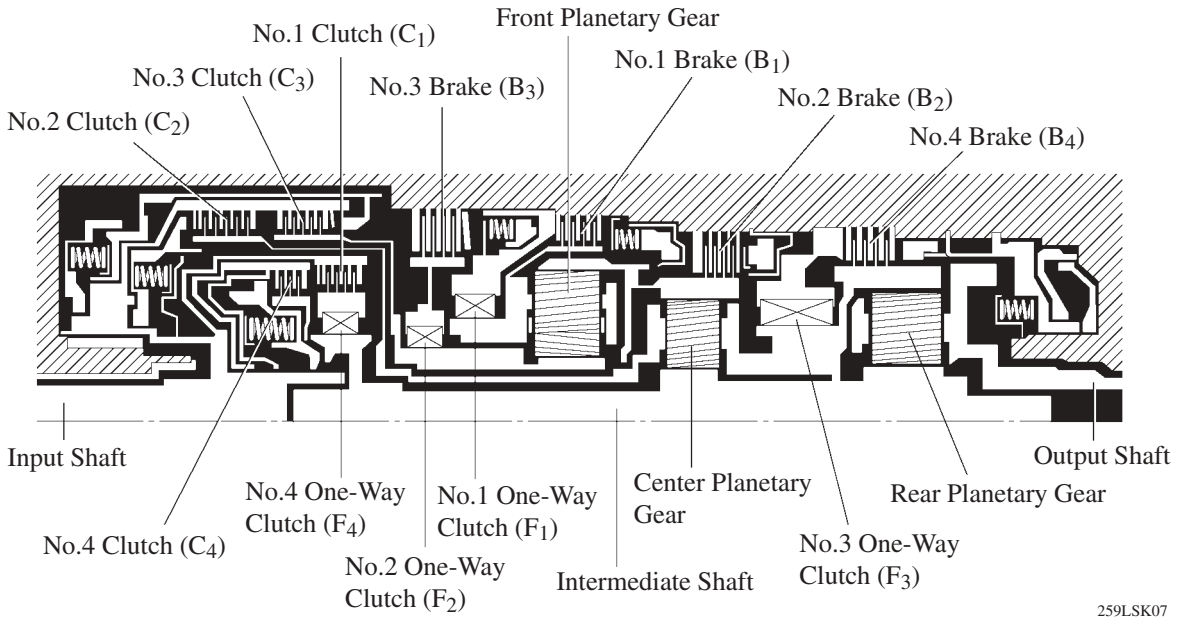
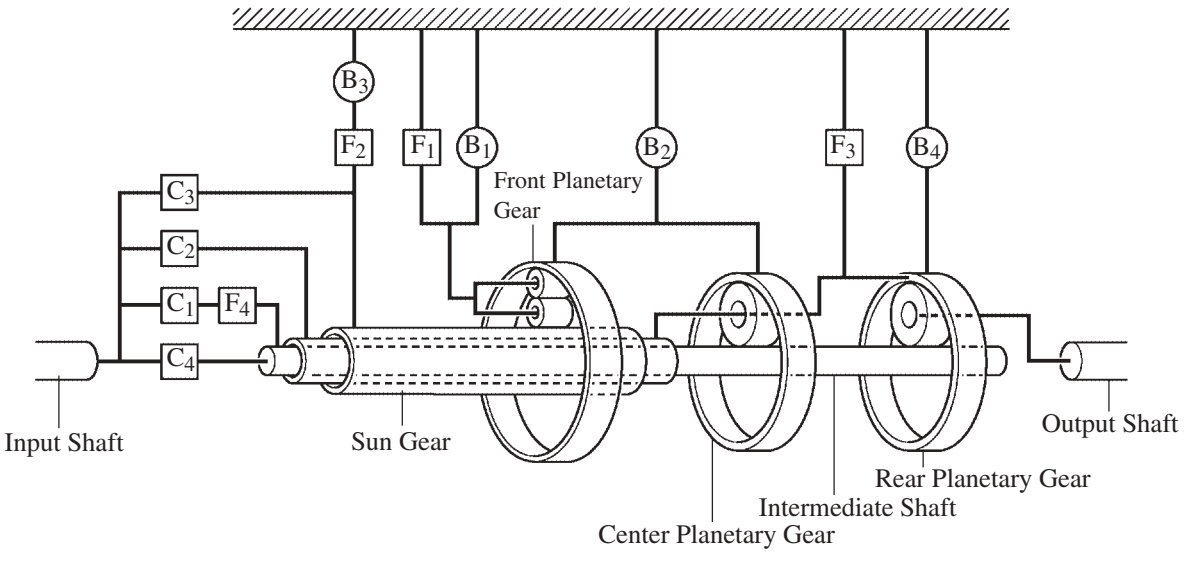
8. Planetary Gear Unit

Construction

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

- A centrifugal fluid pressure canceling mechanism uses 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, refer to page 31.





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.
C_4	No.4 Clutch	Connects input shaft and intermediate shaft
B_1	No.1 Brake	Prevents front planetary carrier from turning both clockwise and counterclockwise.
B_2	No.2 Brake	Prevents front and center ring gear from turning both clockwise and counterclockwise.
B_3	No.3 Brake	Prevents outer race of F_2 from turning both clockwise and counterclockwise.
B_4	No.4 Brake	Prevents center planetary carrier and rear ring gear from turning both clockwise and 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 front sun gear from turning counterclockwise.
F_3	No.3 One-Way Clutch	Prevents center planetary carrier and rear ring gear from turning counterclockwise.
F_4	No.4 One-Way Clutch	Prevents 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 input and output speed.

Transmission Power Flow

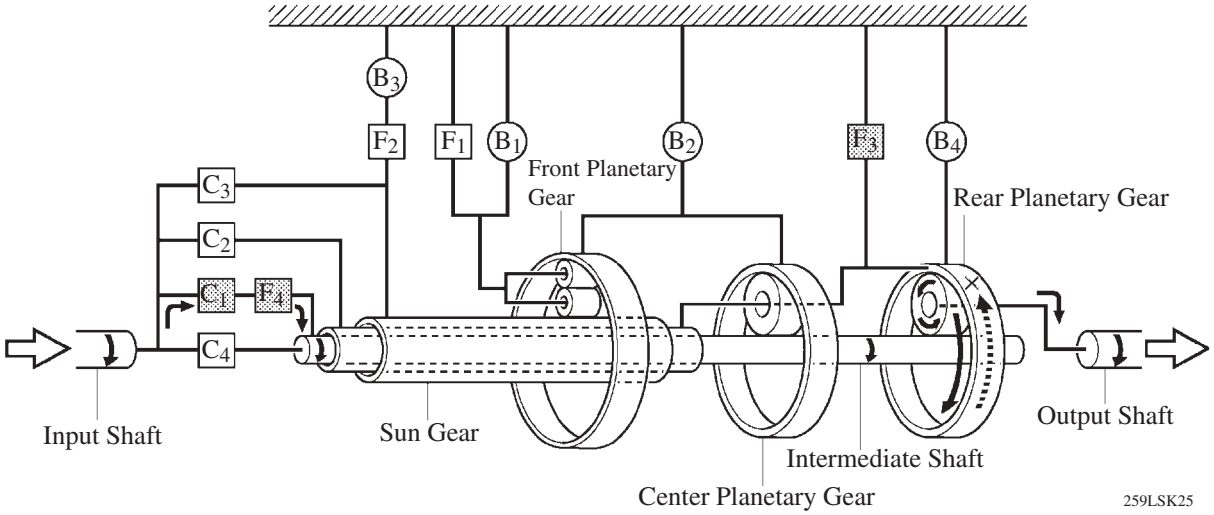
Shift Lever Position		Solenoid Valve								Clutch				Brake				One-way Clutch			
		S1	S2	S3	S4	SR	SL1	SL2	SLU	C_1	C_2	C_3	C_4	B_1	B_2	B_3	B_4	F_1	F_2	F_3	F_4
P			ON	ON		ON		ON													
R*			ON	ON		ON		ON				○		○			○	○			
N			ON	ON		ON		ON													
D, S6	1st		ON	ON		ON		ON		○										○	○
	2nd	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				○			○				○				

○: Operation

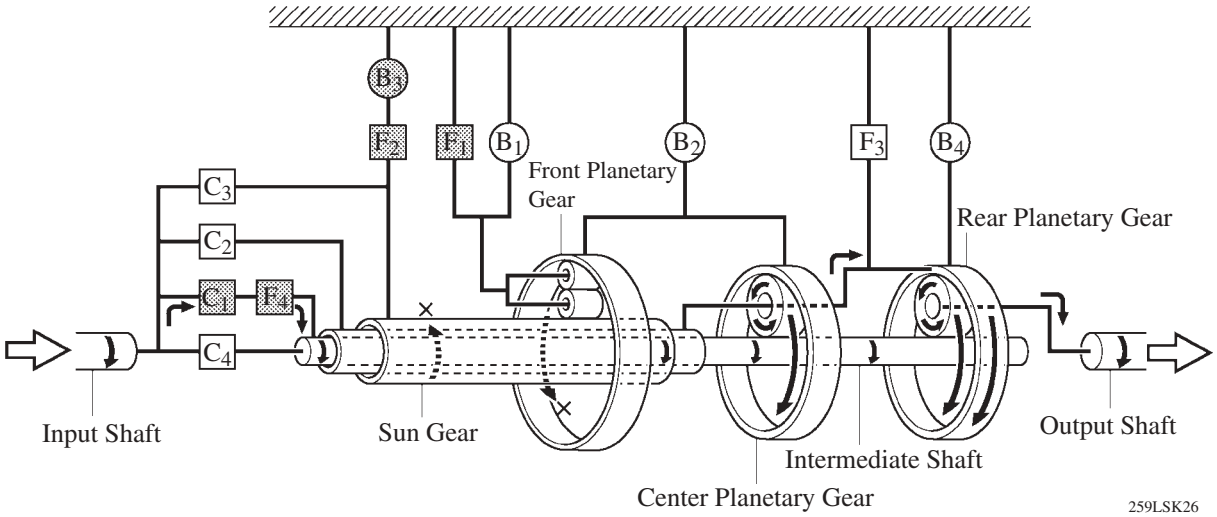
●: Operate but is not related to power transmission

*: with Engine Brake

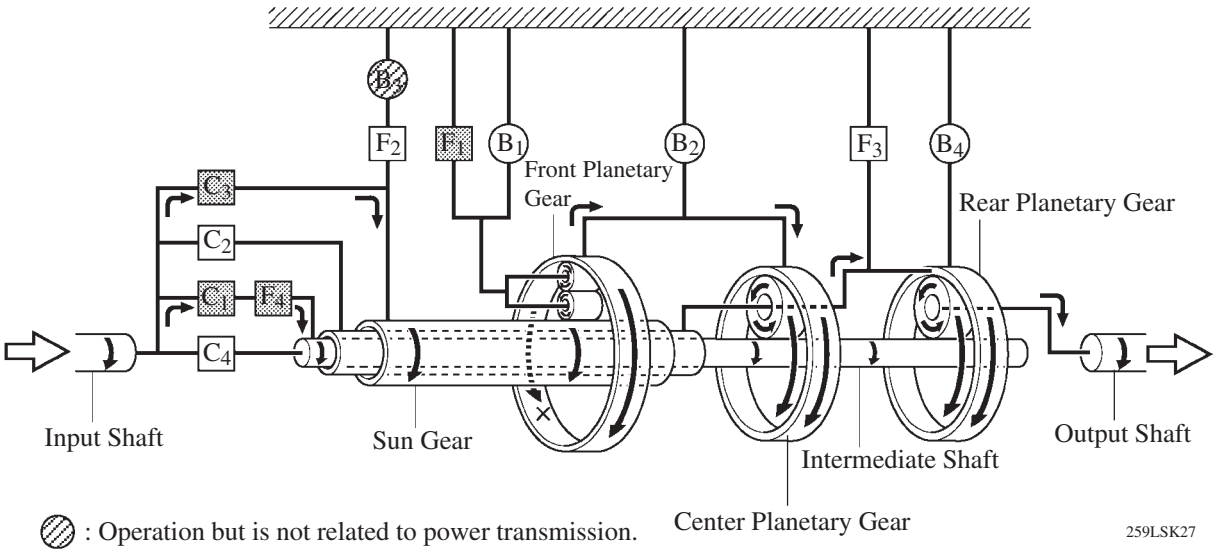
1st Gear (D Position or S Mode)



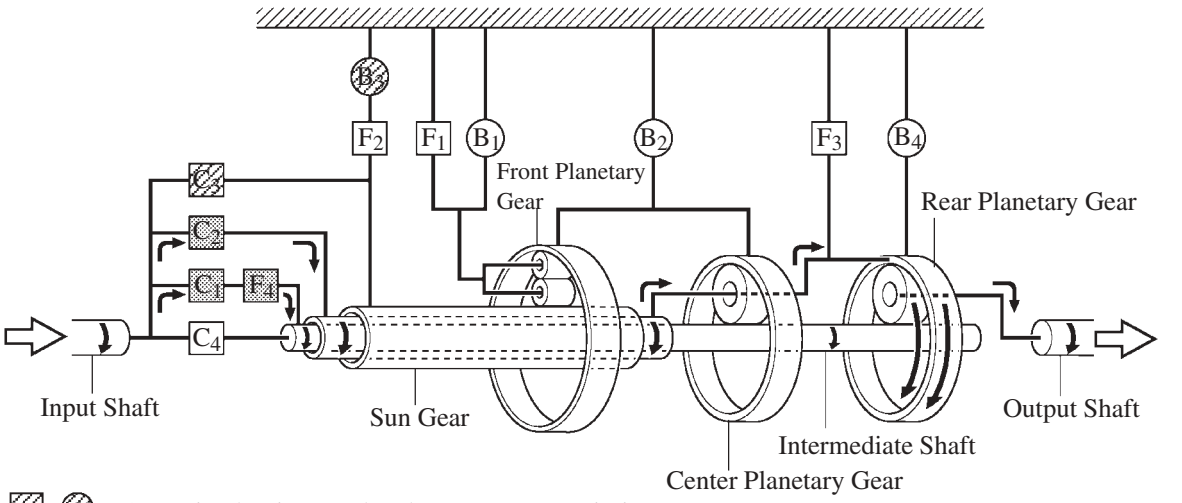
2nd Gear (D Position or S Mode)



3rd Gear (D Position or S Mode)



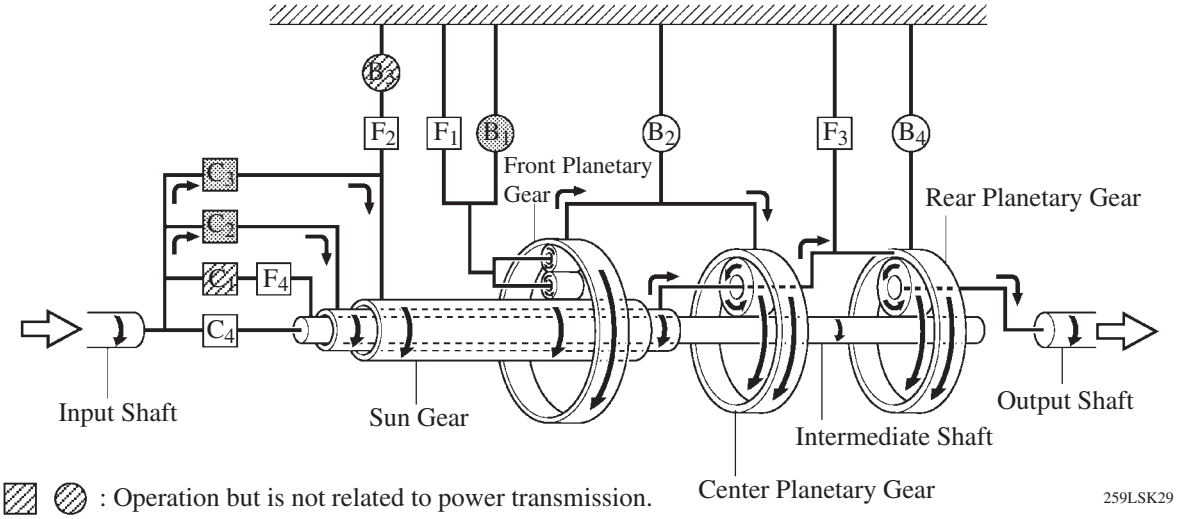
4th Gear (D Position or S Mode)



: Operation but is not related to power transmission.

259LSK28

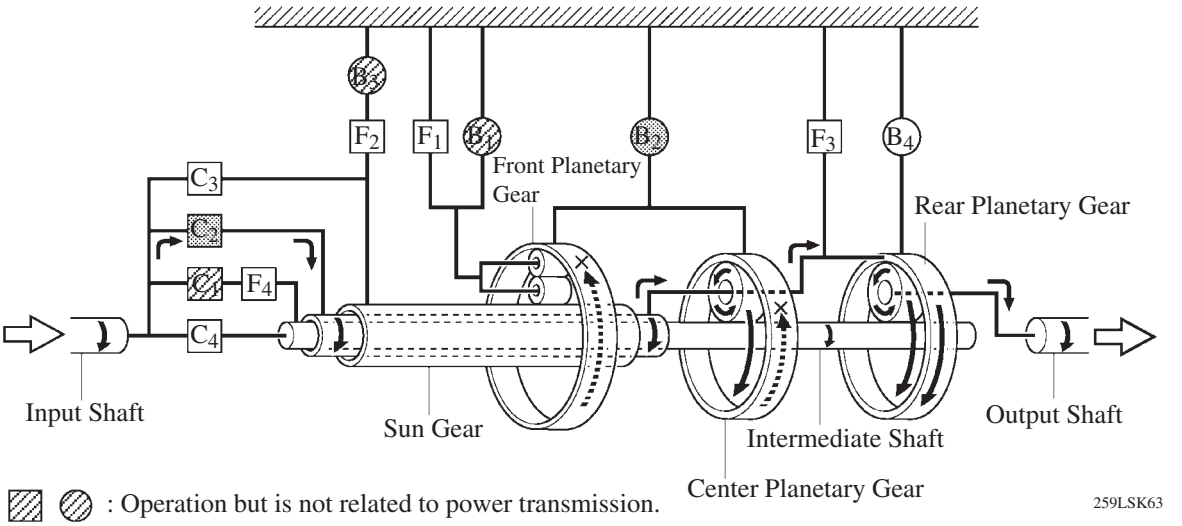
5th Gear (D Position or S Mode)



: Operation but is not related to power transmission.

259LSK29

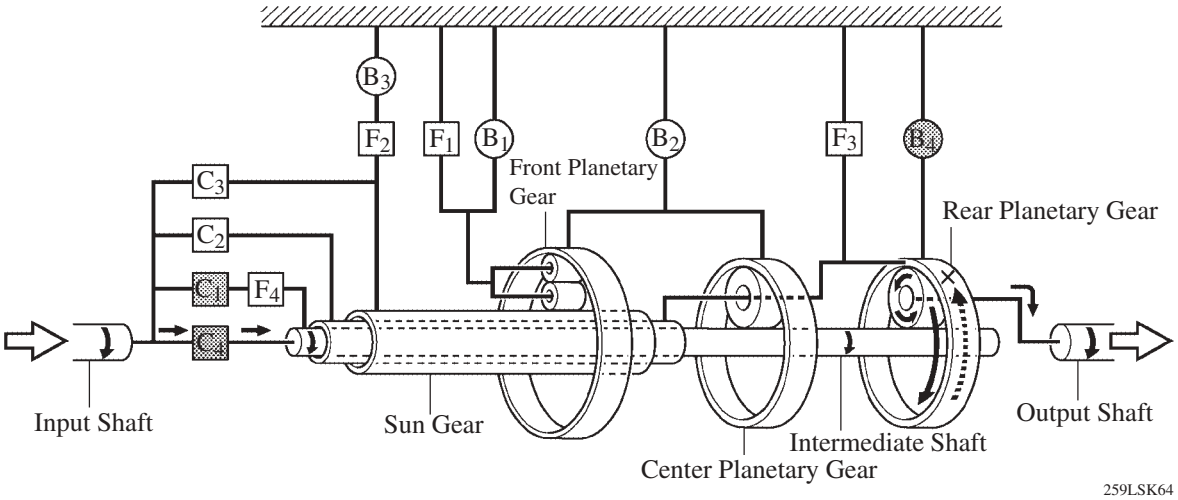
6th Gear (D Position or S Mode)



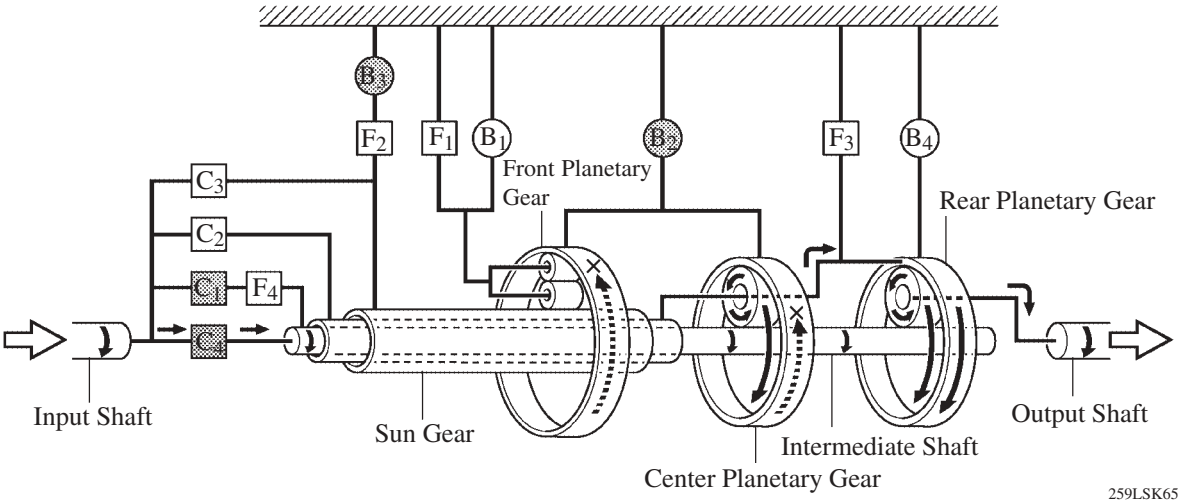
: Operation but is not related to power transmission.

259LSK63

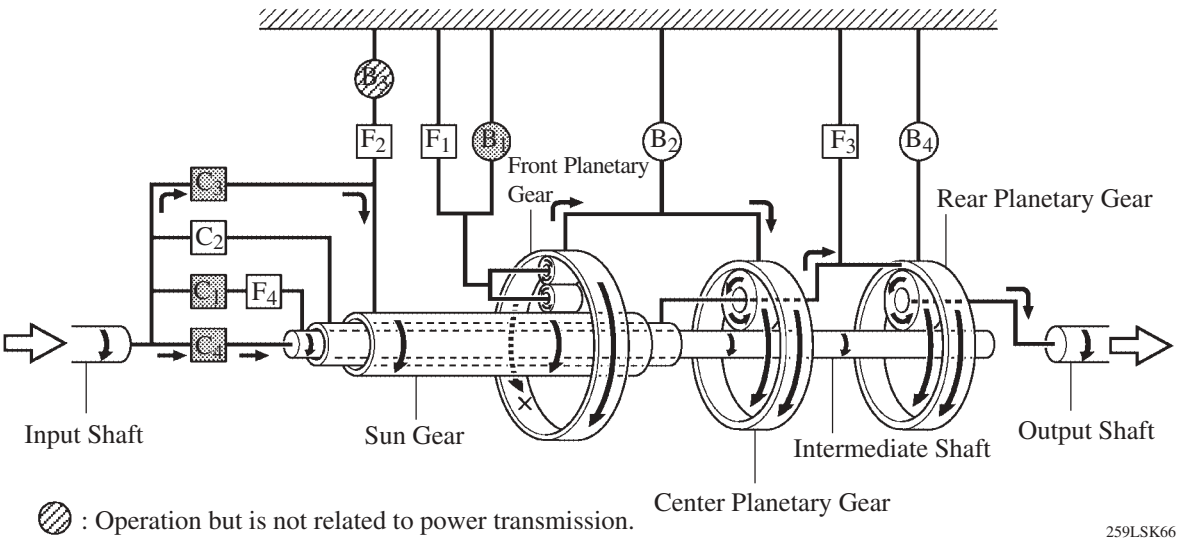
1st Gear with Engine Brake (S Mode/ 1st Range)



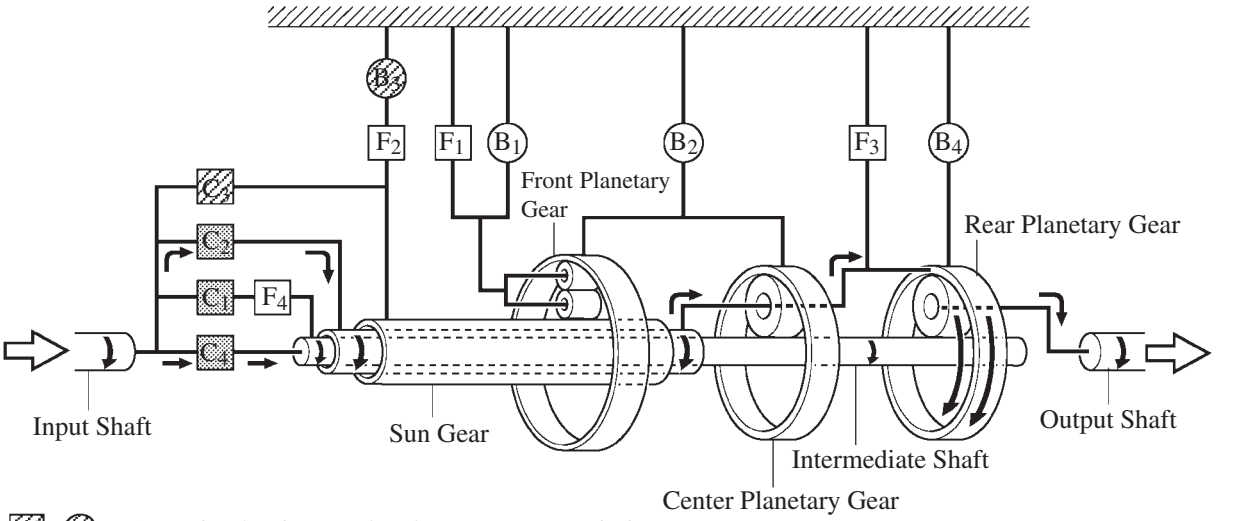
2nd Gear with Engine Brake (S Mode/ 2nd Range)



3rd Gear with Engine Brake (S Mode/ 3rd Range)



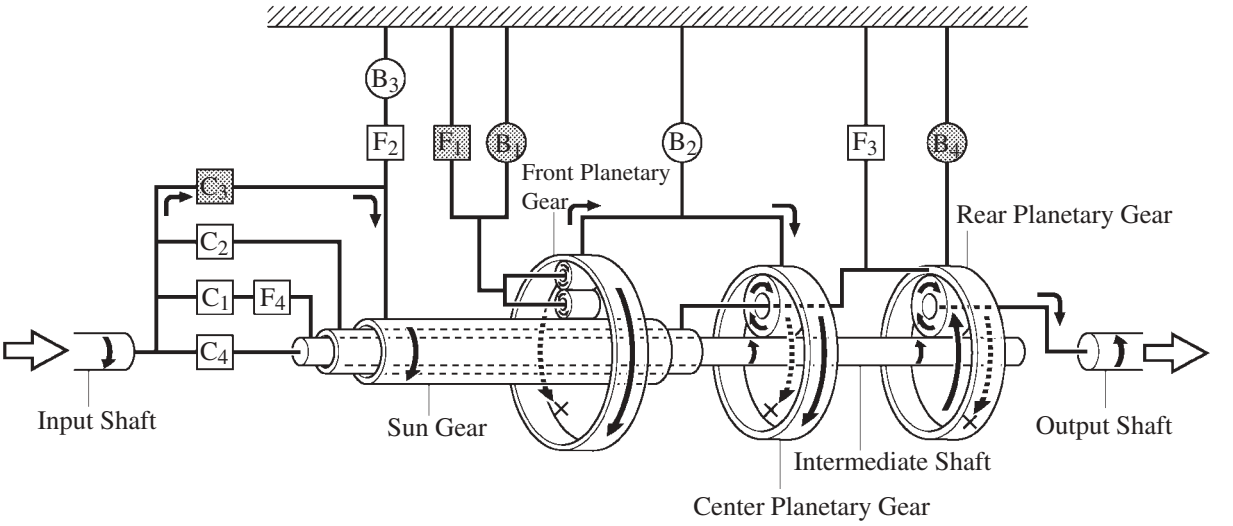
4th Gear with Engine Brake (S Mode/4th Range)



: Operation but is not related to power transmission.

259LSK67

Reverse (R Position)

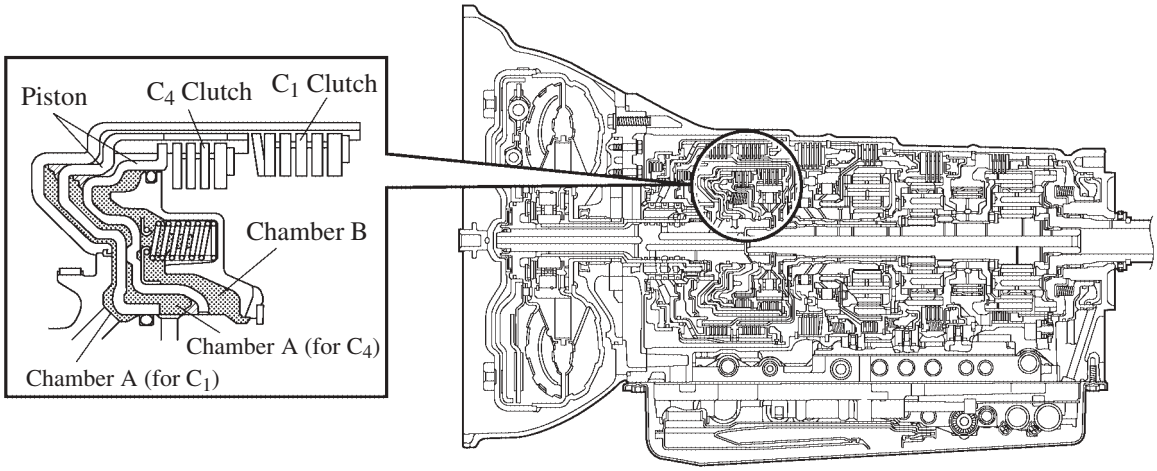


259LSK62

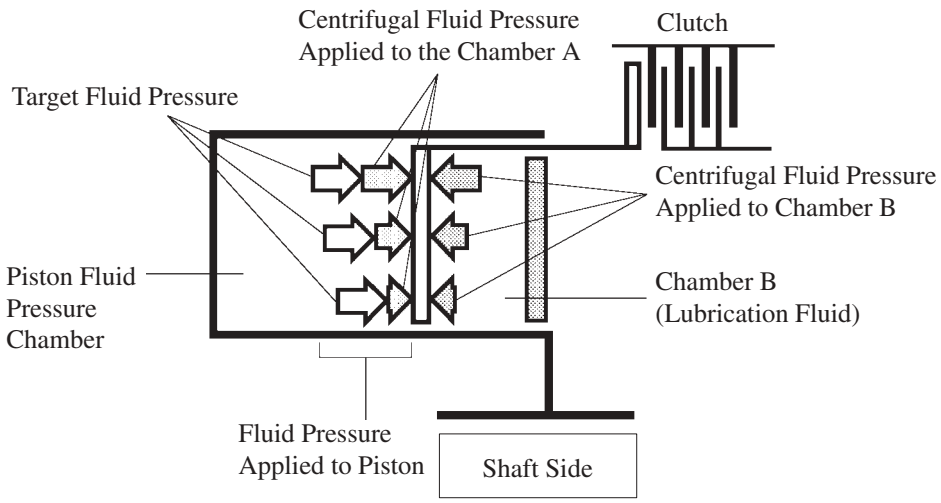
Centrifugal Fluid Pressure Canceling Mechanism

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

- Shifting clutch operation is affected not only by the valve body controlling fluid pressure but also by centrifugal fluid pressure applied to fluid in the clutch piston oil pressure chamber. 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.



259LSK09



157CH17

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