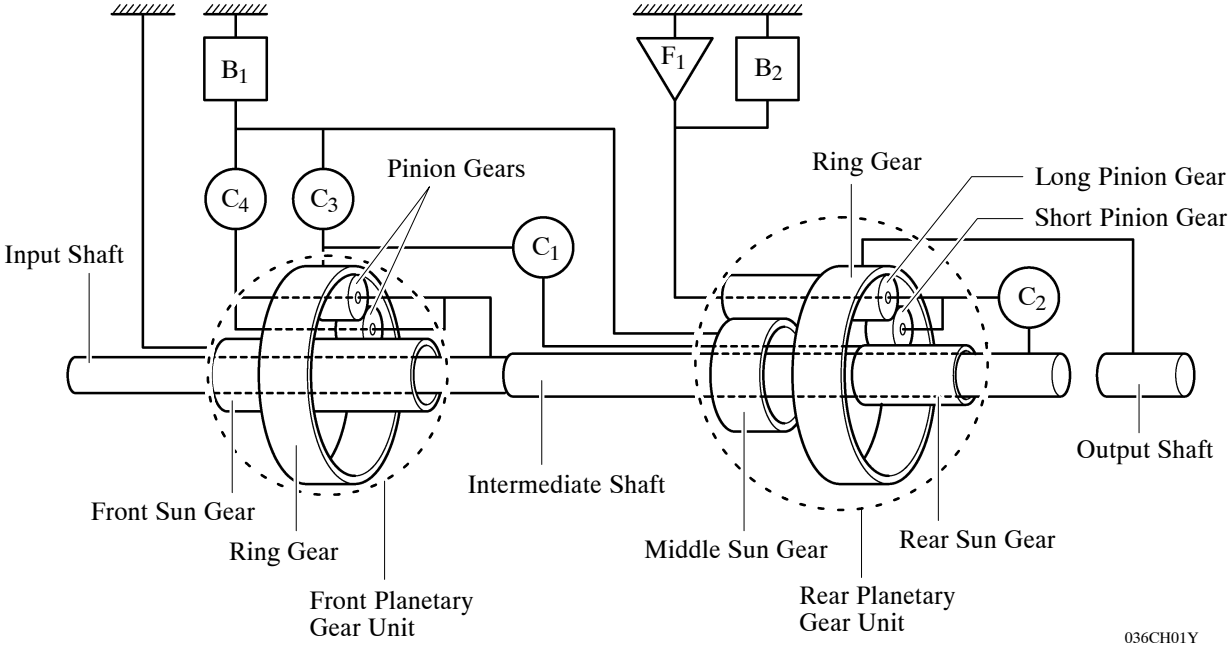
■PLANETARY GEAR UNIT

1. Construction

- The 8-speed configuration has been achieved by using 2 planetary gear units, creating an 8-speed automatic transmission.
- A Ravigneaux type gear unit is used as the rear planetary gear unit. The gear unit consists of pairs of sun gears (middle and rear) and planetary pinion gears (long and short) with different diameters within a single planetary gear.
- 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 from 2nd → 3rd, 3rd → 4th, 4th → 5th, 5th → 6th, 6th → 7th and from 7th → 8th. For details, see page CH-18.



2. Function of Components

Component		Function
C_1	No.1 Clutch	Connects the front planetary ring gear and rear sun gear.
C_2	No.2 Clutch	Connects the intermediate shaft and rear planetary carrier.
C_3	No.3 Clutch	Connects the front planetary ring gear and middle sun gear.
C_4	No.4 Clutch	Connects the front planetary carrier and middle sun gear.
B_1	No.1 Brake	Prevents the middle sun gear from turning either clockwise or counterclockwise.
B_2	No.2 Brake	Prevents the rear planetary carrier from turning either clockwise or counterclockwise.
F_1	No.1 One-way Clutch	Prevents the rear planetary carrier 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 speeds.

3. Transmission Power Flow

General

Shift Lever Position			Shift Solenoid Valve								Clutch				Brake		One-way Clutch
			SL1	SL2	SL3	SL4	SL5	SR	SL	SLU	C_1	C_2	C_3	C_4	B_1	B_2	F_1
P			○					○									
R						○		○	○					○		○	
N			○					○									
D		1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
		5th	○	○				○	○	Δ	○	○					
		6th		○		○		○	○	Δ		○		○			
		7th		○	○			○	○	Δ		○	○				
		8th		○			○	○	○	Δ		○			○		
D*	D8	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
		5th	○	○				○	○	Δ	○	○					
		6th		○		○		○	○	Δ		○		○			
		7th		○	○			○	○	Δ		○	○				
		8th		○			○	○	○	Δ		○			○		
	D7	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
		5th	○	○				○	○	Δ	○	○					
		6th		○		○		○	○	Δ		○		○			
		7th		○	○			○	○	Δ		○	○				
	D6	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
		5th	○	○				○	○	Δ	○	○					
		6th		○		○		○	○	Δ		○		○			
	D5	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
		5th	○	○				○	○	Δ	○	○					

○: ON Δ: In accordance with flex lock-up or lock-up

*: When in D position (fixed range mode)

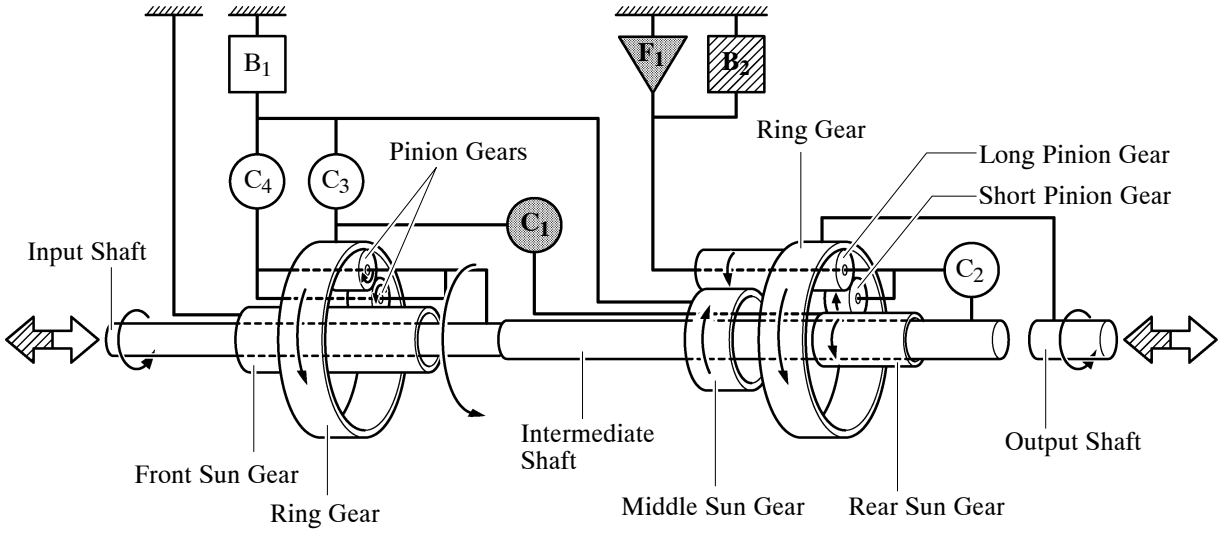
(Continued)

Shift Lever Position			Shift Solenoid Valve								Clutch				Brake		One-way Clutch
			SL1	SL2	SL3	SL4	SL5	SR	SL	SLU	C_1	C_2	C_3	C_4	B_1	B_2	F_1
D*	D4	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
		4th	○			○		○	○	Δ	○			○			
	D3	1st	○					○			○						○
		2nd	○				○	○			○				○		
		3rd	○		○			○			○		○				
	D2	1st	○					○			○						○
		2nd	○				○	○			○				○		
	D1	1st	○							○	○					○	○
M	M1	1st	○							○	○					○	○
	M2	2nd	○				○	○	○	Δ	○				○		
	M3	3rd	○		○			○	○	Δ	○		○				
	M4	4th	○			○		○	○	Δ	○			○			
	M5	5th	○	○				○	○	Δ	○	○					
	M6	6th		○		○		○	○	Δ		○		○			
	M7	7th		○	○			○	○	Δ		○	○				
	M8	8th		○			○	○	○	Δ		○			○		

○: ON Δ: In accordance with flex lock-up or lock-up

*: When in D position (fixed range mode)

1st Gear



: Operates

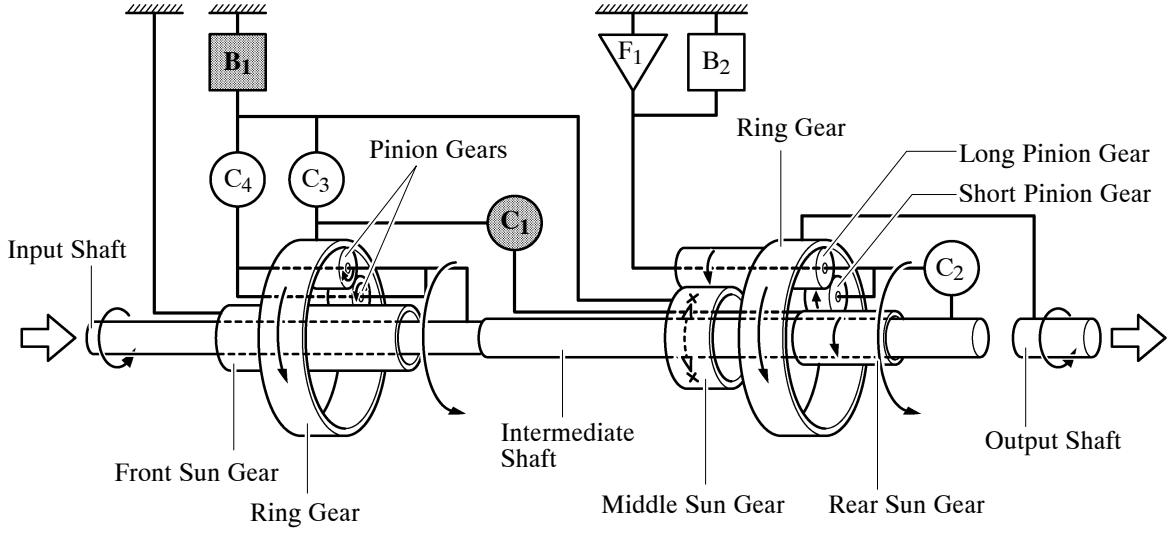
: Operates only in M1 and in D1 range

08D0CH17C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
○					(○)	○

○: Operates (○): Operates only in M1 and in D1 range

2nd Gear



: Operates

08D0CH18C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
○				○		

○: Operates

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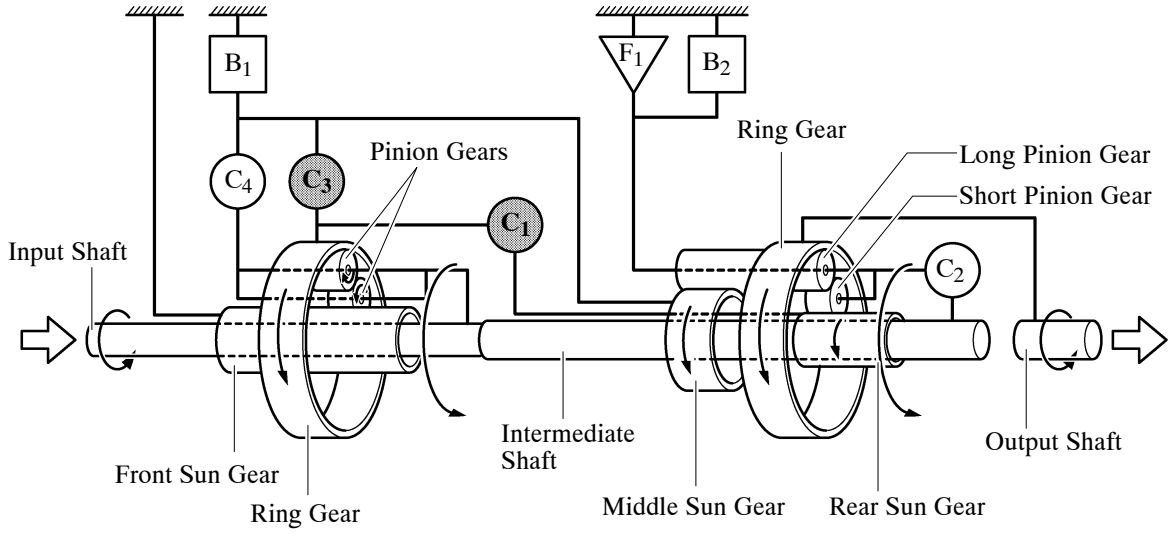
3rd Gear



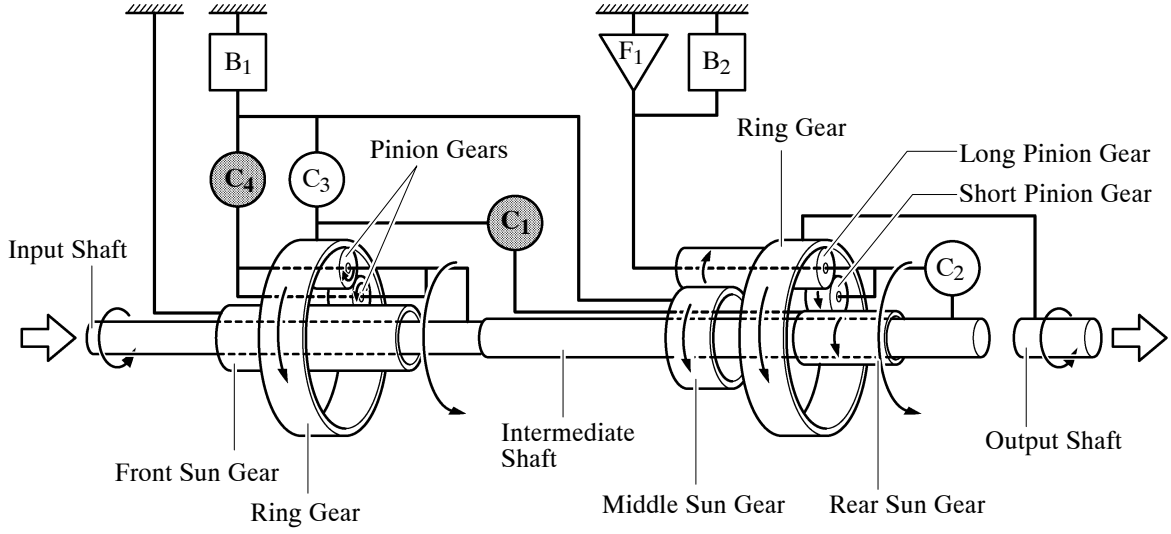
: Operates

08D0CH19C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
○		○				

○: Operates

4th Gear



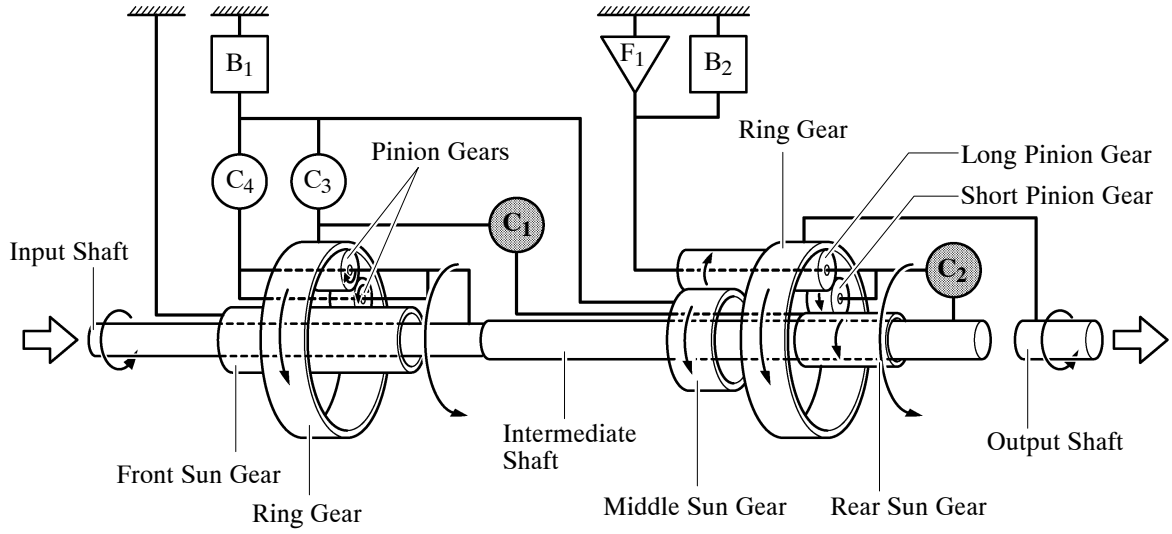
: Operates

08D0CH20C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
○			○			

○: Operates

5th Gear



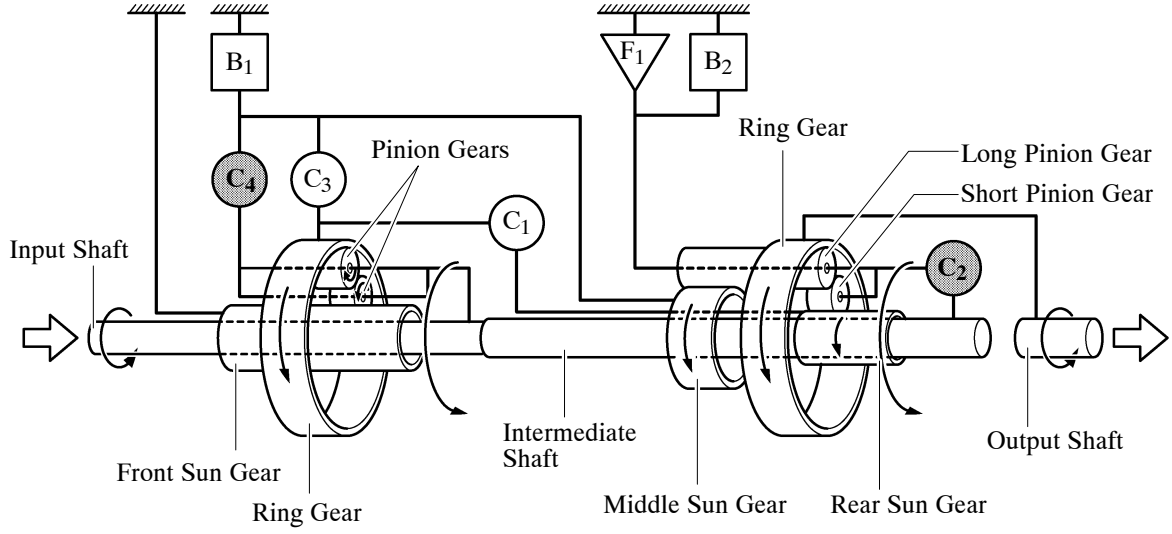
: Operates

08D0CH21C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
○	○					

○: Operates

6th Gear



: Operates

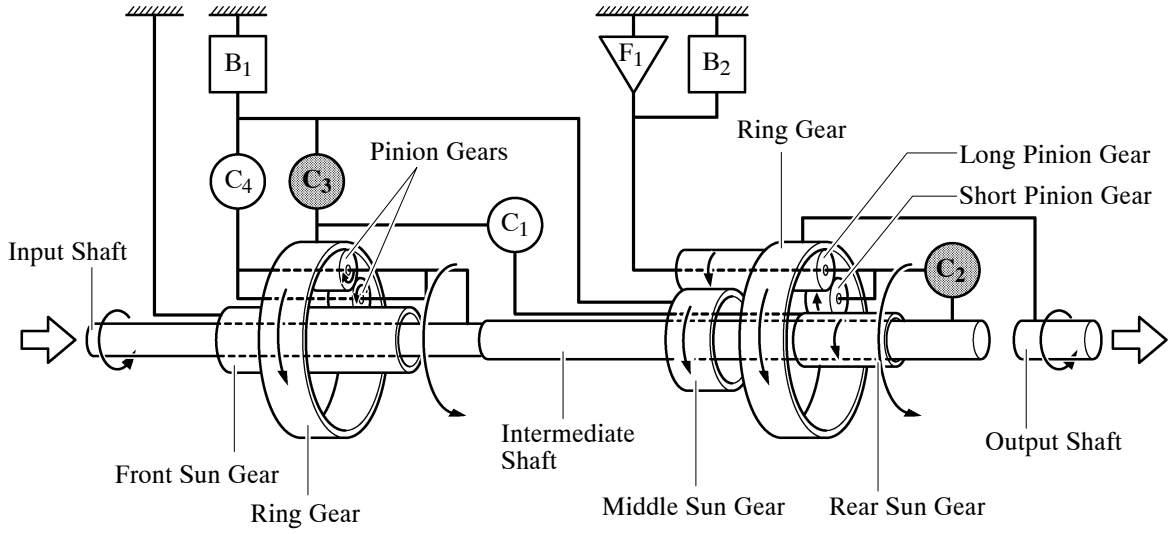
08D0CH22C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
	○		○			

○: Operates

CH

7th Gear



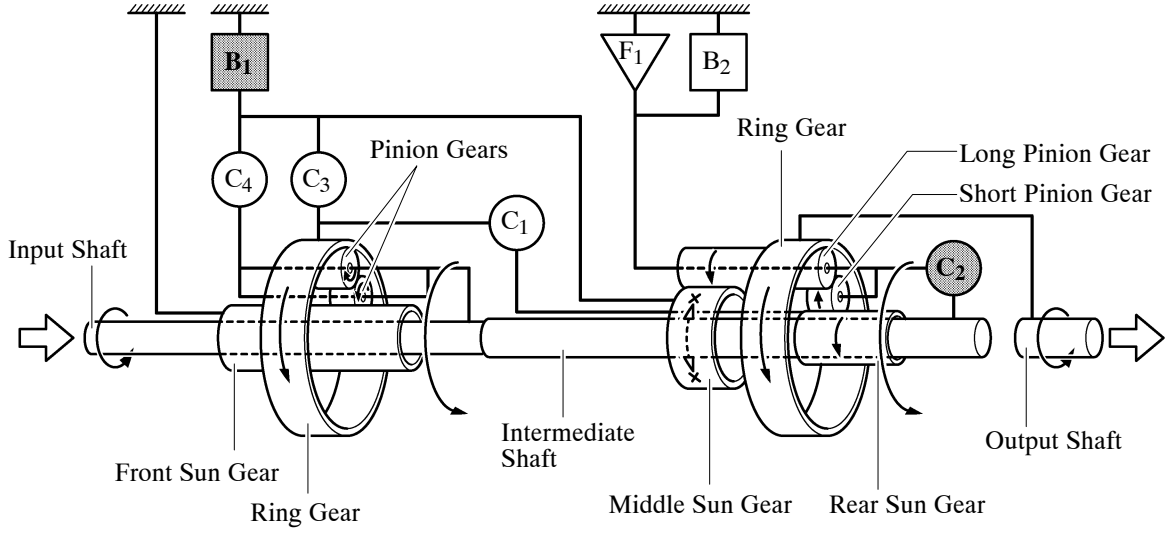
▒ : Operates

08D0CH23C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
	○	○				

○: Operates

8th Gear



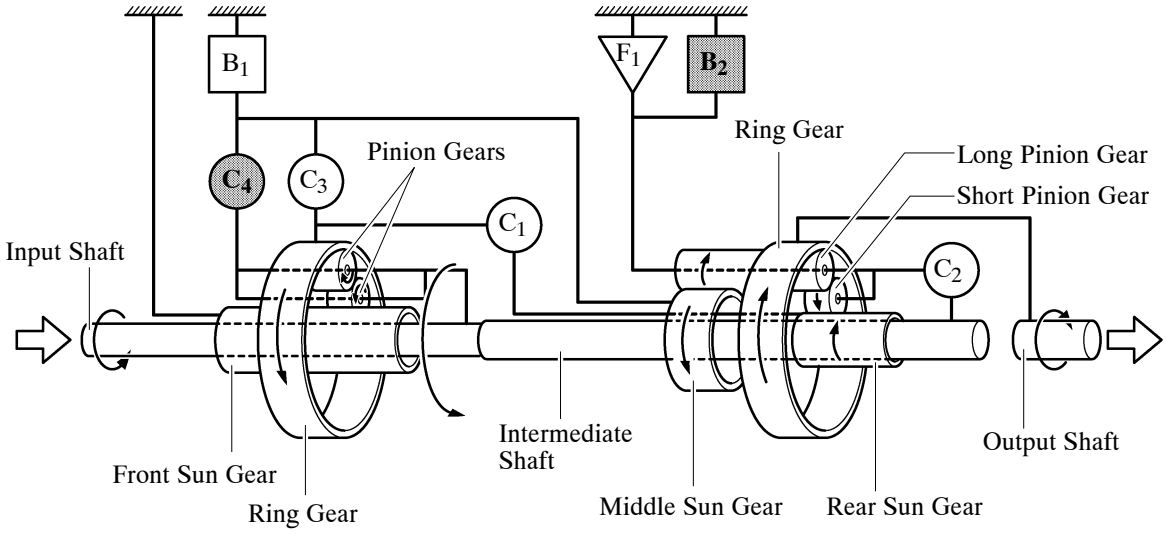
▒ : Operates

08D0CH24C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
	○			○		

○: Operates

Reverse (R Position)



: Operates

08D0CH25C

C_1	C_2	C_3	C_4	B_1	B_2	F_1
			○		○	

○: Operates

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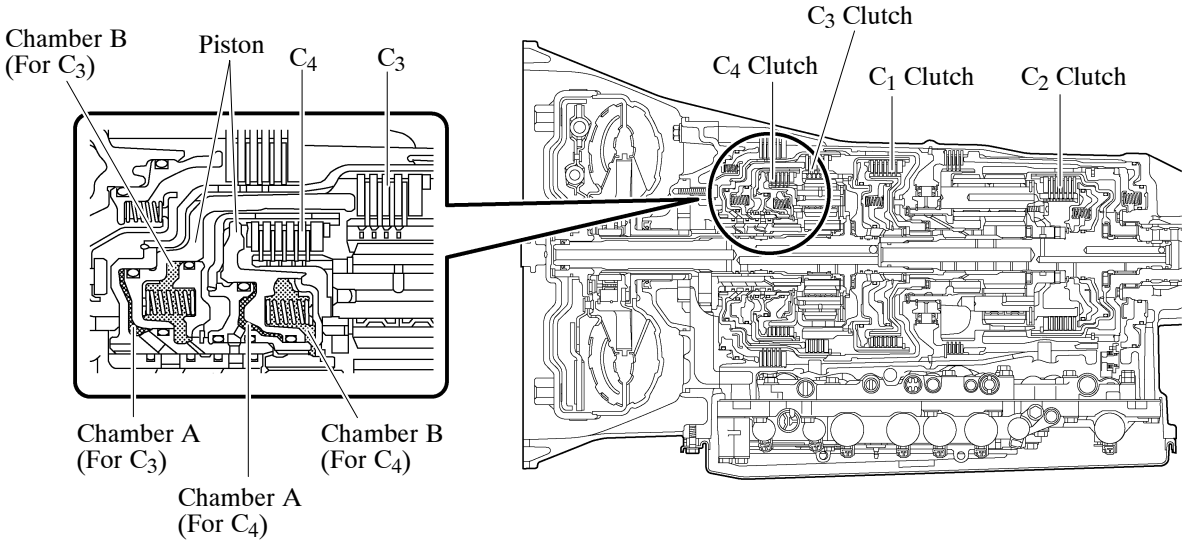
4. Centrifugal Fluid Pressure Canceling Mechanism

For the following reason, a centrifugal fluid pressure canceling mechanism is used on 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 a second chamber (chamber B). Chamber B reduces the effect of the centrifugal pressure applied to the chamber A. As a result, smooth shifting with excellent response has been achieved.



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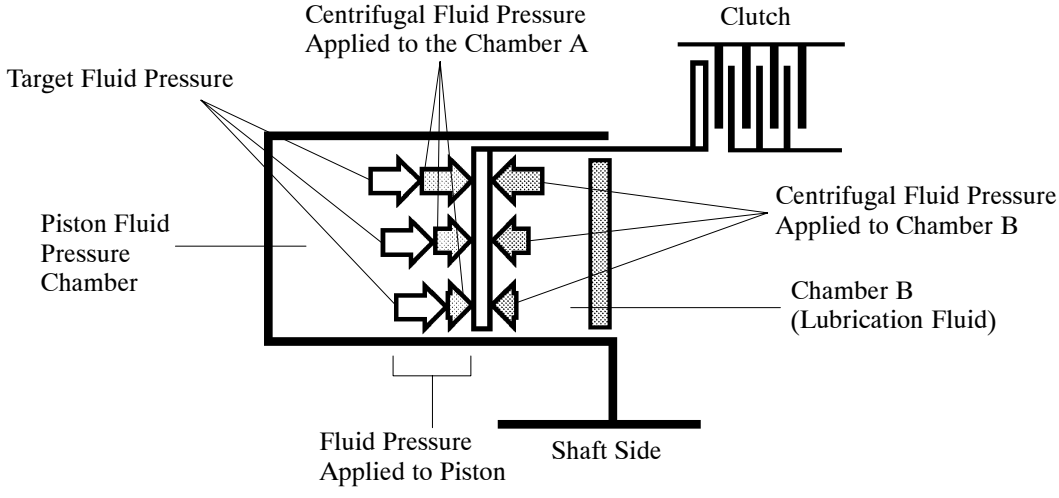

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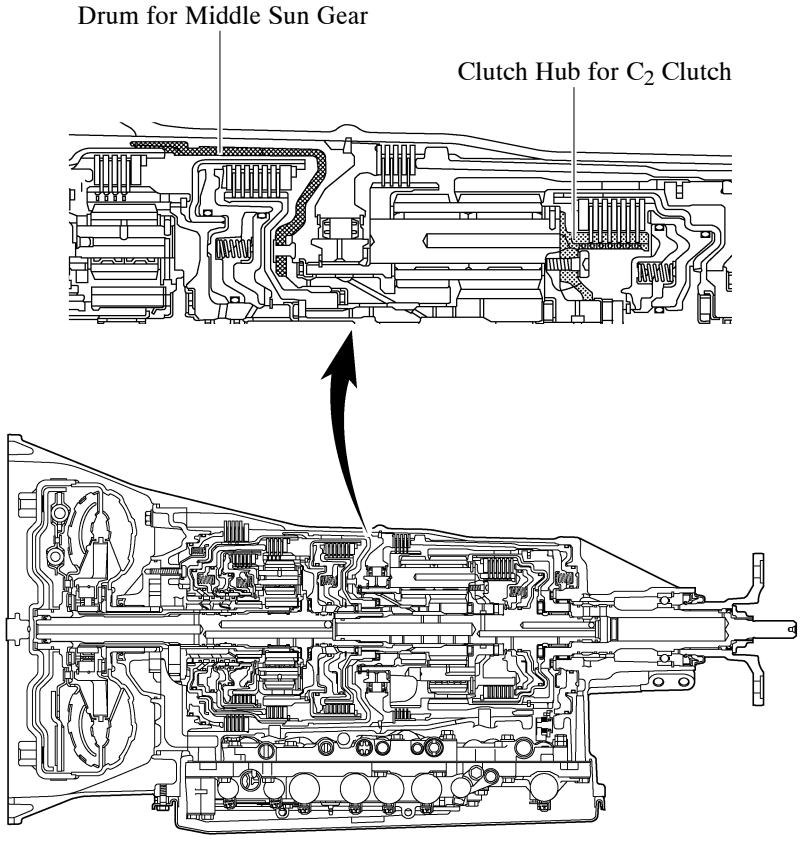
Fluid pressure applied to piston	—	Centrifugal fluid pressure applied to chamber B	=	Target fluid pressure (original clutch pressure)

5. Clutch and Brake

- An aluminum drum for the middle sun gear and an aluminum clutch hub for the C_2 clutch are used to realize a lightweight clutch drum and clutch hub.
- The shapes of the grooves in the clutches and brake linings are optimized in order to reduce drag during clutch and brake operation.



036CH23Y