

SERVICE MANUAL

YANMAR Marine Gear

XY series

MODEL **YX-Series**

1. General

1-1. Specifications	1 - 1
1-2. Power Transmission Circuit	1 - 7
1-3. Assembly Drawings	1 - 9
1-4. Reduction Clutch Case	1 - 18

2. Disassembly and Reassembly

2-1. Disassembly	2 - 1
2-2. Disassembly and Reassembly by Model	2 - 2
2-3. Assembly Procedures	2 - 35
2-4. Tightening Torque	2 - 39

3. Hydraulic Oil System 3 - 1

4. Service Standard

4-1. Periodic Inspection	4 - 1
4-2. Wear Limit of Major Parts	4 - 1
4-3. Parts to be Replaced Periodically	4 - 1

5. Troubleshooting 5 - 1

6. Trolling Device

6-1. Outline	6 - 1
6-2. Applicable Model	6 - 1
6-3. Major Specifications	6 - 2
6-4. A2 Type Trolling Device	6 - 3

7. Hydraulic Disassembly and Reassembly

7-1. Hydraulic Press-Fitting Tool and Applicable Model	7 - 1
7-2. Principle of Hydraulic Press-Fitting	7 - 2
7-3. Hydraulic Press-Fitting Tools	7 - 3
7-4. Disassembly and Reassembly	7 - 7
7-5. Disassembly Procedures	7 - 4
7-6. Example of Disassembly	7 - 13
7-7. Thrust and Internal Pressure	7 - 16



1. General

1-1. Specifications

Type		Input shaft eccentric hydraulic type multi disc clutch. Forward 1 reverse 1 reduction reversing gear													
Model		YX-6				YX-10				YX-15				YX-20-1	
Clutch capacity	Torque (kgf-m)	4.4				13.6				14.9				27.5	
	PS/rpm	21/3400				60/3200				75/3600				115/3000	
Allowance speed for input shaft (rpm)		400-4400				400-4200				400-4200				400-4000	
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise													
	Output shaft	Clockwise at forward (std.) or counter-clockwise													
Reduction ratio	Forward	3.48	2.96	2.55	2.03	3.50	3.13	2.54	3.53	3.10	2.58	3.48	2.96	2.55	2.03
	Reverse	3.48	2.96	2.55	2.03	3.50	3.13	2.54	3.53	3.10	2.58	3.48	2.96	2.55	2.03
Safety valve opening pressure		—				—				—				—	
Hydraulic oil pressure (kgf/cm ²)		9.5-10.5 (10)				17-19 (18)				17-19 (18)				20-22 (21)	
Lube oil pressure (kgf/cm ²)		1.5-2.5 (2)				1.5-2.5 (2)				1.5-2.5 (2)				1.5-2.5 (2)	
Applicable oil		SAE#30				SAE#30 or the equivalent									
Maximum oil capacity (ℓ) (effective oil capacity)		1.5 (0.3)				2.3 (0.3)				2.4 (0.3)				3.0 (0.3)	
Max. speed for switching (rpm)		≤ 1/2 of engine continuous rating													
Trolling device (Note 1)		—				A-2 type									
Engine rpm tolerance when trolling		—				≤ 1/2 of engine continuous rating (excludes plummet and tugboat operation)									
Propeller shaft output (Note 2)	Lower limit	—				50 rpm at 1/3 of engine rpm continuous rating									
	Upper limit	—				Slip ratio 50% at 1/3 of engine rpm continuous rating									
Lever operating force (kgf)		≤ 5 (cable direction)													
Oil cooler	Cooling water temperature (°C)	≤ 45 (inlet side)				≤ 45 (inlet side)				≤ 45 (inlet side)				≤ 45 (inlet side)	
	Cooling water capacity (ℓ/h) (non-by-pass)	≤ 1500				≤ 4500				≤ 4500				≤ 6500	
Number of mounting flange		SAE#5				SAE#4				SAE#4				SAE#3	
Number of coupling		—				—				—				—	
Dry weight (kg)	Main body	28				27.5				29.5				52.5	
	Input coupling (rubber block)	—				4.1				4.1				7	
	Damper disc	0.9				3				3				6	
	Mounting foot	—				—				—				—	
	Output coupling (stern side)	1.3				2.5				2.5				4	
	Trolling device	—				2.6 (A2)				2.6 (A2)				2.6 (A2)	
Applicable engine, standard model		2GMFYE 3GMFYE				4JHYE 4JH-TYE				4JH-HTYE 4JH-DTYE				4CHE	

(Note 1) From the applicable engine, trolling device is not attached for non-trolling type, otherwise attached for other Type.

(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

Type		Input shaft eccentric hydraulic type multi disc clutch. Forward 1 reverse 1 reduction reversing gear															
Model		YX-30				YX-51				YX-70S				YX-71			
Capacity	Torque (kgf-m)	35.8				71.6				107				110			
	PS/rpm	130/2600				280/2800				405/2700				430/2800			
Allowance speed for input shaft (rpm)		400-3300				400-3600				400-3600				400-3600			
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise															
	Output shaft	Clockwise at forward (std.) or counter-clockwise															
Reduction ratio	Forward	3.48	2.96	2.55	2.03	3.45	2.96	2.50	2.06	2.95	2.50	1.96	1.52	3.53	2.91	2.58	2.07
	Reverse	3.48	2.96	2.55	2.03	3.45	2.96	2.50	2.06	2.95	2.50	1.96	1.52	3.53	2.91	2.58	2.07
Safety valve opening pressure (kgf/cm ²)		—				≥40				≥40				≥40			
Hydraulic oil pressure (kgf/cm ²) (static pressure)		20-22 (21)				22-24.5 (24)				24-26.5 (26)				24-26.5 (26)			
Lube oil pressure (kgf/cm ²) (static pressure)		1.5-2.5 (2)				2.0-3.0 (2.5)				2.0-3.0 (2.5)				2.0-3.0 (2.5)			
Applicable oil		SAE#30 or the equivalent															
Maximum oil capacity (ℓ) (effective oil capacity)		3.2 (0.4)				4.7 (0.7)				4.0 (0.5)				5.5 (0.5)			
Max. speed for switching (rpm)		Max. speed for switching (rpm)															
Trolling device (Note 1)		A-2 type															
Engine rpm tolerance when trolling		≤ 1/2 of engine continuous rating (excludes plummet and tugboat operation)															
Propeller shaft output (Note 2)	Lower limit	50 rpm at 1/3 of engine rpm continuous rating															
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating															
Lever operating force (kgf)		≤5 (cable direction)															
Oil cooler	Cooling water temperature (°C)	≤45 (inlet side)				≤45 (inlet side)				45 (inlet side)				45 (inlet side)			
	Cooling water capacity (ℓ/h) (non-by-pass)	≤7700				≤10200				16000				16000			
Number of mounting flange		SAE#3				SAE#3		SAE#1		SAE#3				SAE#3		SAE#1	
Number of coupling		—				SAE#11½		SAE#14		SAE#11½				SAE#11½		SAE#14	
Dry weight (kg)	Main body	54.5				147		159		146				192		204	
	Input coupling (rubber block)	7				10		16		10				10		16	
	Damper disc	6				—				—				—			
	Mounting foot	—				5.3		10.6		10.4				5.3		9.6	
	Output coupling (stern side)	4				6				10				10			
	Trolling device	2.6 (A2)				2.6 (A2)				2.6 (A2)				2.6 (A2)			
Applicable engine, standard model		6CHE				6HAE 6CH-HTE				6CX-ETE				6CH-UTE 6CH-DTE 6CH-ETYE			

(Note 1) From the applicable engine, trolling device is not attached for non-trolling type, otherwise attached for other Type.

(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

Type	Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear										
Model	YX-90			YX-120			YX-120L				
Capacity	Torque (kgf-m)	110			125			125			
	PS/rpm	430/2800			400/2300			400/2300			
Allowance speed for input shaft (rpm)	400-3600			400-2300			400-2300				
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise									
	Output shaft	Clockwise at forward (std.) or counter-clockwise									
Reduction ratio	Forward	2.06	2.52	2.96	3.52	2.03	2.57	3.04	3.55	4.00	4.59
	Reverse	2.06	2.52	2.96	3.52	2.03	2.57	3.04	3.55	4.00	4.59
Safety valve opening pressure (kgf/cm ²)	23-27			26.5-39.5			26.5-39.5				
Hydraulic oil pressure (kgf/cm ²)	21.5-22.5			21.5-22.5			21.5-22.5				
Lube oil pressure (kgf/cm ²)	2-3			2-3			2-3				
Applicable oil	API service grade CD class (common with engine system oil)										
Maximum oil capacity (ℓ) (effective oil capacity)	9 (0.7)			11 (1.5)			11 (0.5)				
Max. speed for switching (rpm)	≤ 1/2 of engine continuous rating										
Trolling device (Note 1)	A-2 type										
Engine rpm tolerance when trolling	≤ 1/2 of engine continuous rating (excludes plummet and tugboat operation)										
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating									
	Upper limit	Slip ratio of 50% at 1/3 of engine rpm continuous rating									
Lever operating force (kgf)	5 (cable direction)										
Oil cooler	Cooling water temperature (°C)	≤ 45 (inlet side)			≤ 35			≤ 35			
	Cooling water capacity (ℓ/h) (non-by-pass)	≤ 16000			8000-9000			8000-9000			
Number of mounting flange	#3	#1	#2	#1	#2	#1	#2	#1	#2	#1	
Number of coupling	#11½	#14	#11½	#14	#11½	#14	#11½	#14	#11½	#14	
Dry weight (kg)	Main body	230	242	305			390				
	Input coupling (rubber block)	10	16	—			—				
	Damper disc	—	—	—			—				
	Mounting foot	5.3	8.4	—			—				
	Output coupling (stern side)	11.5			—			—			
	Trolling device	2.6 (A2)			—			—			
Applicable engine, standard model	6HA-HTE			6GH-UTE			6HA-HTE 6HA-DTE 6GHA-STE				

(Note 1) From the applicable engine, trolling device is not attached for non-trolling type, otherwise attached for other Type.

(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear												
Model		YX-150			YX-150L			YX-151			YX-151L			
Capacity	Torque (kgf-m)	158			158			175			175			
	PS/rpm	450/2050			450/2050			500/2050			500/2050			
Allowance speed for input shaft (rpm)		2100			2100			2100			2100			
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise												
	Output shaft	Clockwise at forward (std.) or counter-clockwise												
Reduction ratio	Forward	2.08	2.55	3.03	3.50	4.03	4.59	17.2	2.08	2.55	3.03	3.55	4.03	4.59
	Reverse	2.08	2.55	3.03	3.50	4.03	4.59	17.2	2.08	2.55	3.03	3.55	4.03	4.59
Safety valve opening pressure(kgf/cm ²)		21.5–32.5			21.5–32.5			≥24			≥24			
Hydraulic oil pressure (kgf/cm ²) (static pressure)		17.5–18.5			17.5–18.5			19.5–20.5			19.5–20.5			
Lube oil pressure (kgf/cm ²) (static pressure)		2–3			2–3			2–3			2–3			
Applicable oil		SAE#30 or equivalent (lube oil use for engine)												
Maximum oil capacity (ℓ) (effective oil capacity)		8.5 (1.5)			20.0 (1.5)			8.5 (1.5)			20.0 (1.5)			
Max. speed for switching (rpm)		≤1/2 of engine continuous rating												
Trolling device (Note 1)		A-2 type												
Engine rpm tolerance when trolling		≤1/2 of engine continuous rating (excludes plummet and tugboat operation)												
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating												
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating												
Lever operating force (kgf)		5 (cable direction)												
Oil cooler	Cooling water temperature (°C)	≤35			≤35			≤35			≤35			
	Cooling water capacity(ℓ/h) (non-by-pass)	8000–9000			8000–9000			8000–9000			8000–9000			
Number of mounting flange		#1			#1			#1			#1			
Number of coupling		#14			#14			#14			#14			
Dry weight (kg)		370			460			390			480			
Applicable engine, standard model		6KH-UTE			6KH-UTE			6KH-STE			6KH-STE			

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Type	Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear														
Model	YX-180				YX-181				YX-180L		YX-180N				
Capacity	Torque (kgf-m)	189				234				234		206			
	PS/rpm	500/1900				620/1900				620/1900		530/1850			
Allowance speed for input shaft (rpm)	1800				1800				1900		1900				
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise													
	Output shaft	Clockwise at forward (std.) or counter-clockwise													
Reduction ratio	Forward	2.08	2.55	3.03	3.50	※4.09	2.08	2.55	3.03	4.00	4.54	5.10	5.65	※6.02	
	Reverse	2.08	2.55	3.03	3.50	※4.09	2.08	2.55	3.03	4.00	4.54	5.10	5.65	※6.02	
Safety valve opening pressure(kgf/cm ²)	24				28.8				≥28.8		≥28.8				
Hydraulic oil pressure (kgf/cm ²) (static pressure)	19.5-20.5				23.5-24.5				23.5-24.5		23.5-24.5				
Lube oil pressure (kgf/cm ²) (static pressure)	2-3				2-3				2-3		2-3				
Applicable oil	SAE#30 or equivalent (lube oil use for engine)														
Maximum oil capacity (ℓ) (effective oil capacity)	20 (2.0)				21 (2.0)				24.0 (4)		20 (2.0)				
Max. speed for switching (rpm)	≤1/2 of engine continuous rating														
Trolling device (Note 1)	A-2 type														
Engine rpm tolerance when trolling	≤1/2 of engine continuous rating (excludes plummet and tugboat operation)														
Propeller shaft output (Note 2)	Lower limit	50rpm at 1/3 of engine rpm continuous rating													
	Upper limit	Slip ratio 50% at 1/3 of engine rpm continuous rating													
Lever operating force (kgf)	5 (cable direction)														
Oil cooler	Cooling water temperature (°C)	≤45				≤45				≤45		≤45			
	Cooling water capacity(ℓ/h) (non-by-pass)	8000-9000				8000-9000				8000-9000		8000-9000			
Number of mounting flange	#0				#0				—		—				
Number of coupling	#18				#18				—		—				
Dry weight (kg)	500				515				—		—				
Applicable engine, standard model	6LA-DTE				6LAH-STE				6LA-DTE		6LA-DTE				
	6LA-UTE								6LAA-UTE		6LAA-UTE				
									6LAH-STE		6LAH-STE				

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(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

※ Apply for 6LA-DTE

Type		Input shaft eccentric hydraulic multi disc clutch. Forward 1 reverse 1 reduction reversing gear													
Model		YX-350E				YX-350L				YX-351				YX-351L	
Capacity	Torque (kgf-m)	377				377				426				426	
	PS/rpm	1000/1850				1000/1850				1100/1850				1100/1850	
Allowance speed for input shaft (rpm)		1900				1900				1900				1900	
Direction of rotation (viewed from stern)	Input shaft	Counter-clockwise													
	Output shaft	Clockwise at forward (std.) or counter-clockwise													
Reduction ratio	Forward	2.25	2.67	3.11	3.51	4.08	4.52	4.82	2.25	2.67	3.11	3.51	3.53	4.08	4.52
	Reverse	2.25	2.67	3.11	3.51	4.08	4.52	4.82	2.25	2.67	3.11	3.51	3.53	4.08	4.52
Safety valve opening pressure(kgf/cm ²)		≥24				≥24				≥31.5				≥31.5	
Hydraulic oil pressure (kgf/cm ²) (static pressure)		17.5-18.5				17.5-18.5				20.5-21.5				20.5-21.5	
Lube oil pressure (kgf/cm ²) (static pressure)		2-3				2-3				2-3				2-3	
Applicable oil		SAE#30 or equivalent (lube oil use for engine)													
Maximum oil capacity (ℓ) (effective oil capacity)		35 (3.0)				38.5 (2.5)				35 (3.0)				38.5 (2.5)	
Max. speed for switching (rpm)		≤1/2 of engine continuous rating													
Trolling device (Note 1)		—													
Engine rpm tolerance when trolling		—													
Propeller shaft output (Note 2)	Lower limit	—													
	Upper limit	—													
Lever operating force (kgf)		5 (cable direction)													
Oil cooler	Cooling water temperature (°C)	≤45				≤45				≤45				≤45	
	Cooling water capacity(ℓ/h) (non-by-pass)	8000-9000				8000-9000				8000-9000				8000-9000	
Dry weight (kg)		900				1200				1050				1400	
Applicable engine, standard model		8LAA-UTE 12LAA-UTE				12LAA-UTE				12LAA-UTE				12LAK-STE2	

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(Note 2) This value is the standard value for the ship itself, otherwise it will be more/less depending on loading and weather condition (wave, wind).

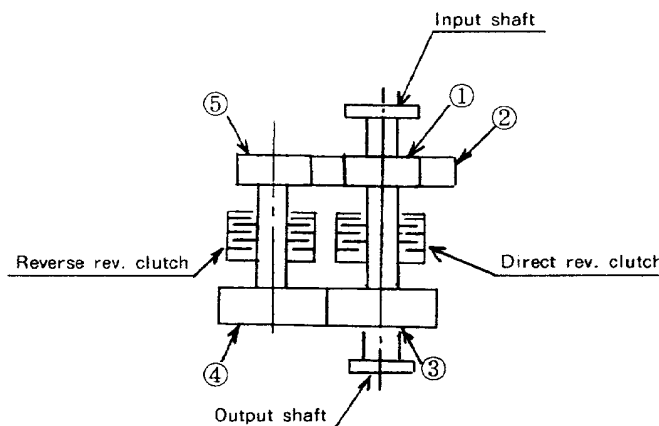
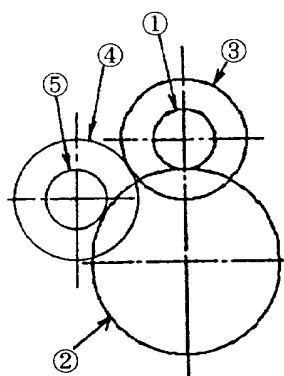


1-2. Power Transmission Circuit

<1>. YX-6, YX-10, YX-15, YX-20-1, YX-30, YX-51,
YX-70S, YX-71, YX-90, YX-120, YX-120L

Direct revolution : Engine→①→②

Reverse revolution : Engine→③→④→⑤→②



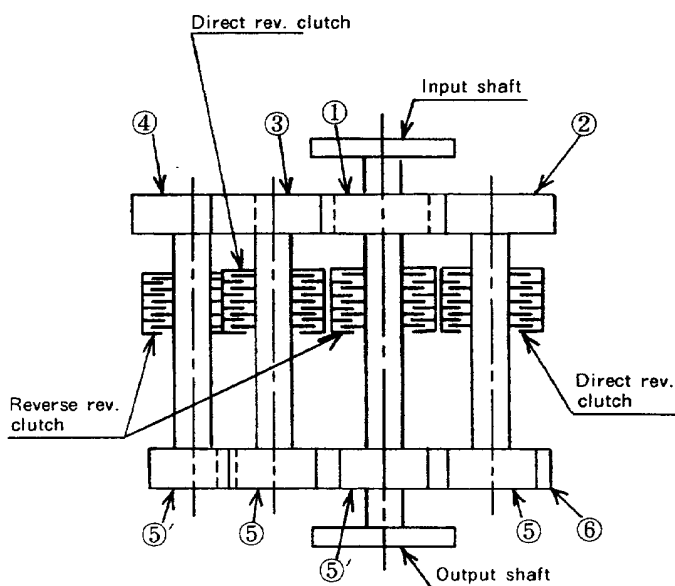
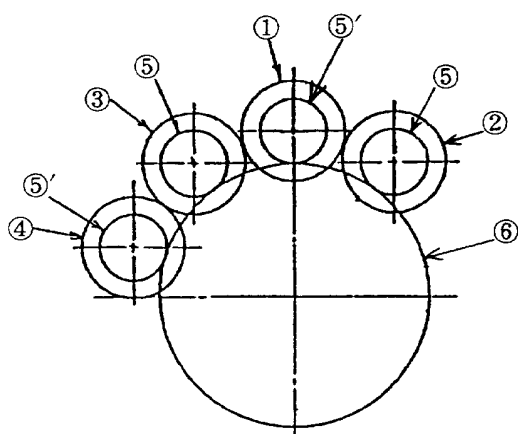
<2>. YX-150, YX-151, YX-150L, YX-151L, YX-180, YX-181, YX-180L

Direct revolution : Engine→①→②→⑤→⑥

①→③→⑤→⑥

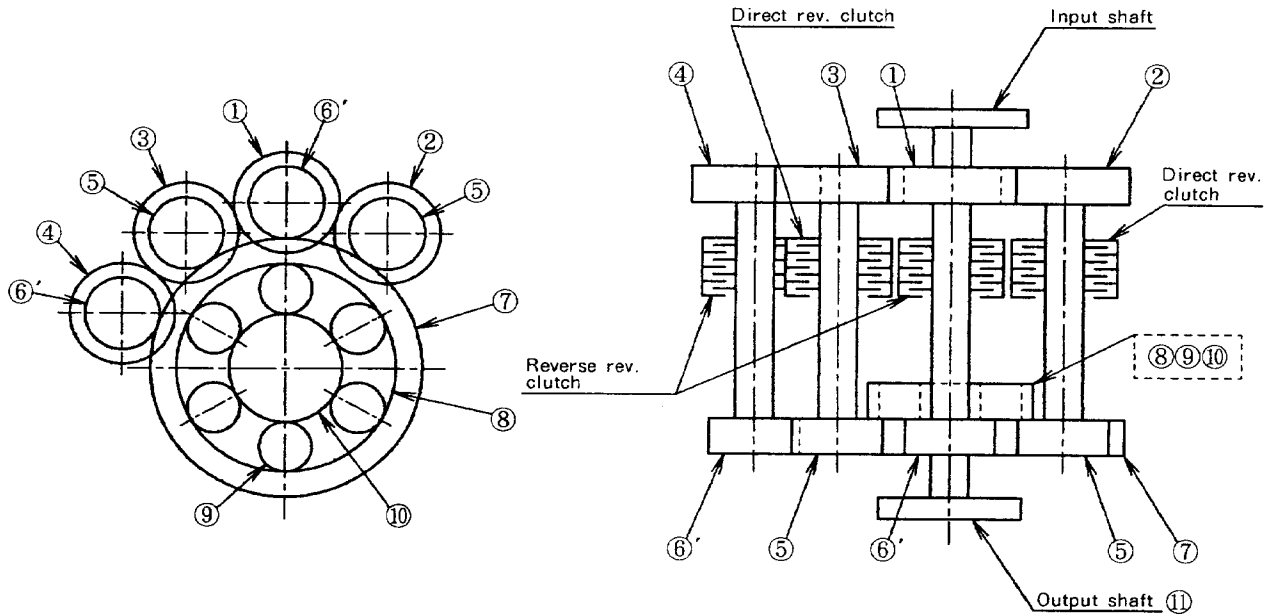
Reverse revolution : Engine→①→③→④→⑤'→⑥

→①→⑤'→⑥



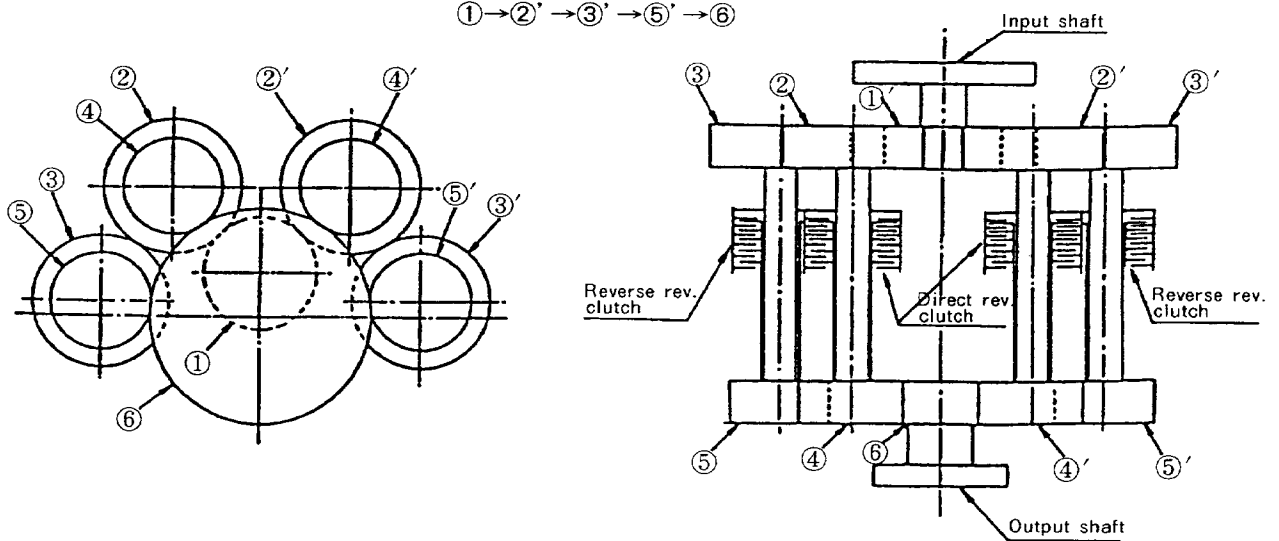
<3>. YX-180N

Direct revolution : Engine → ① → ② → ⑤ → ⑦ → ⑧⑨⑩ → ⑪
 ① → ③ → ⑤ → ⑦ → ⑧⑨⑩ → ⑪
 Reverse revolution : Engine → ① → ③ → ④ → ⑥' → ⑦ → ⑧⑨⑩ → ⑪
 ① → ⑥' → ⑦ → ⑧⑨⑩ → ⑪



<4>. YX-350E, YX-350L, YX-351, YX-351L

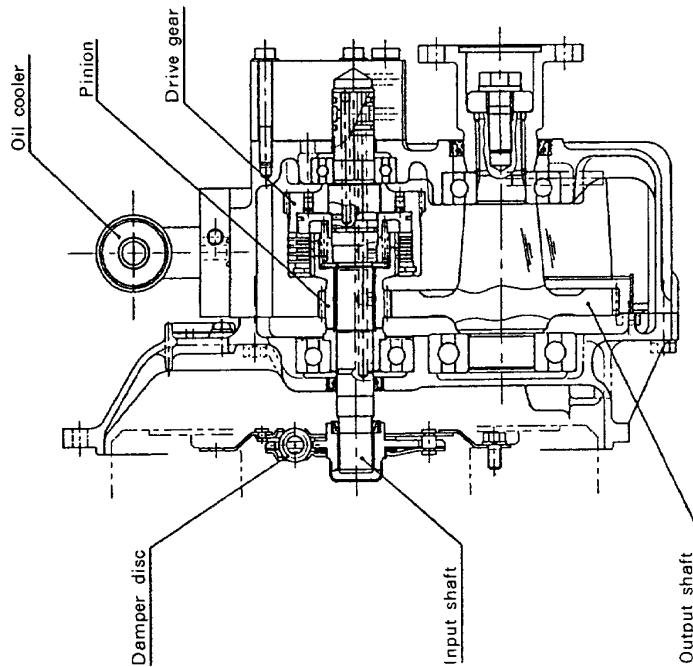
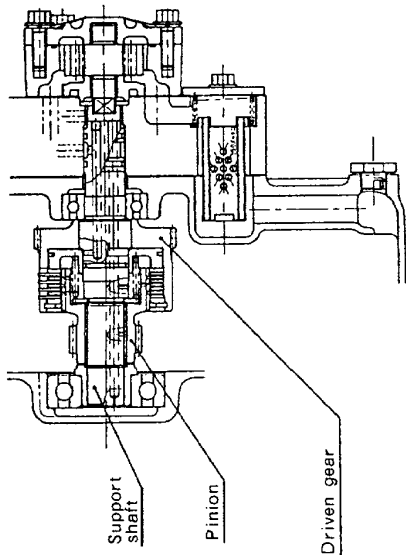
Direct revolution : Engine → ① → ② → ④ → ⑥
 ① → ②' → ④' → ⑥
 Reverse revolution : Engine → ① → ② → ③ → ⑤ → ⑥
 ① → ②' → ③' → ⑤' → ⑥





1-3. Assembly Drawings

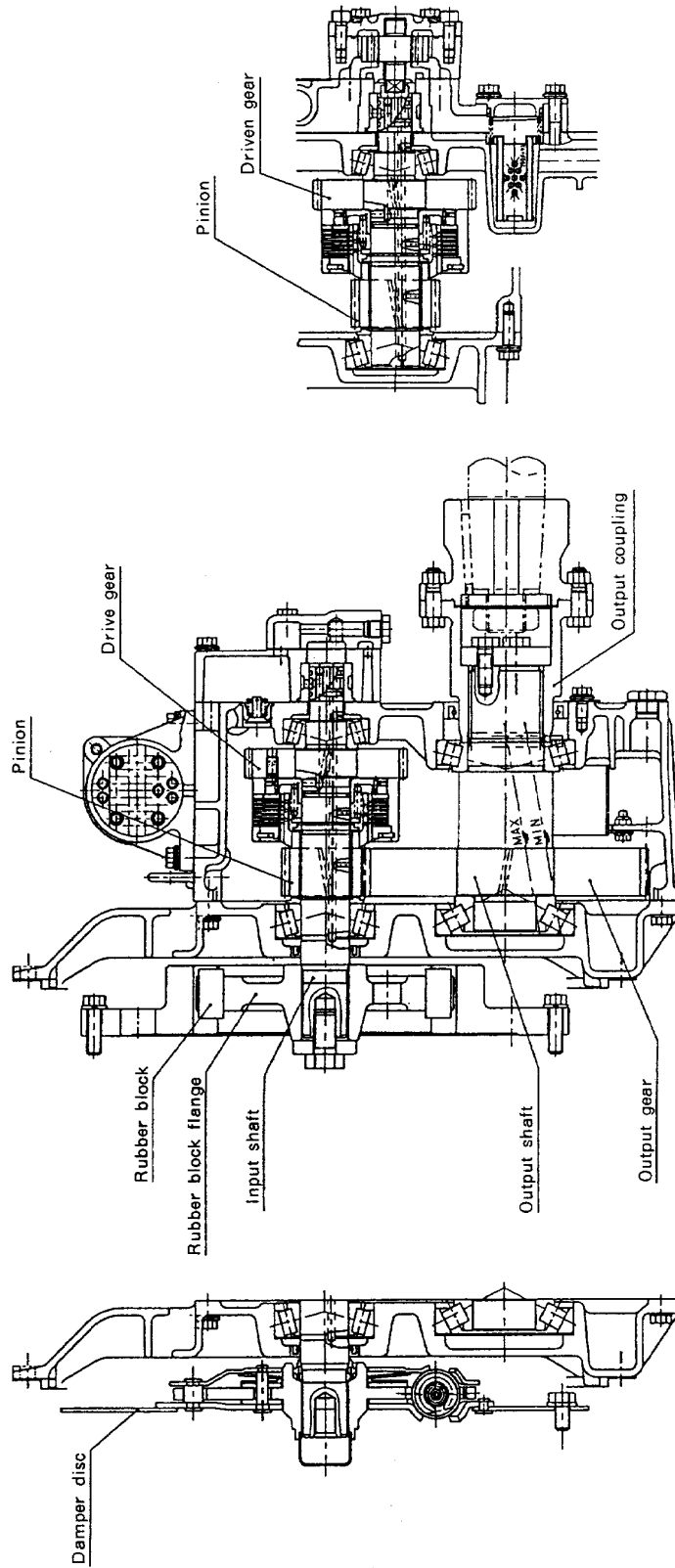
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YX-6

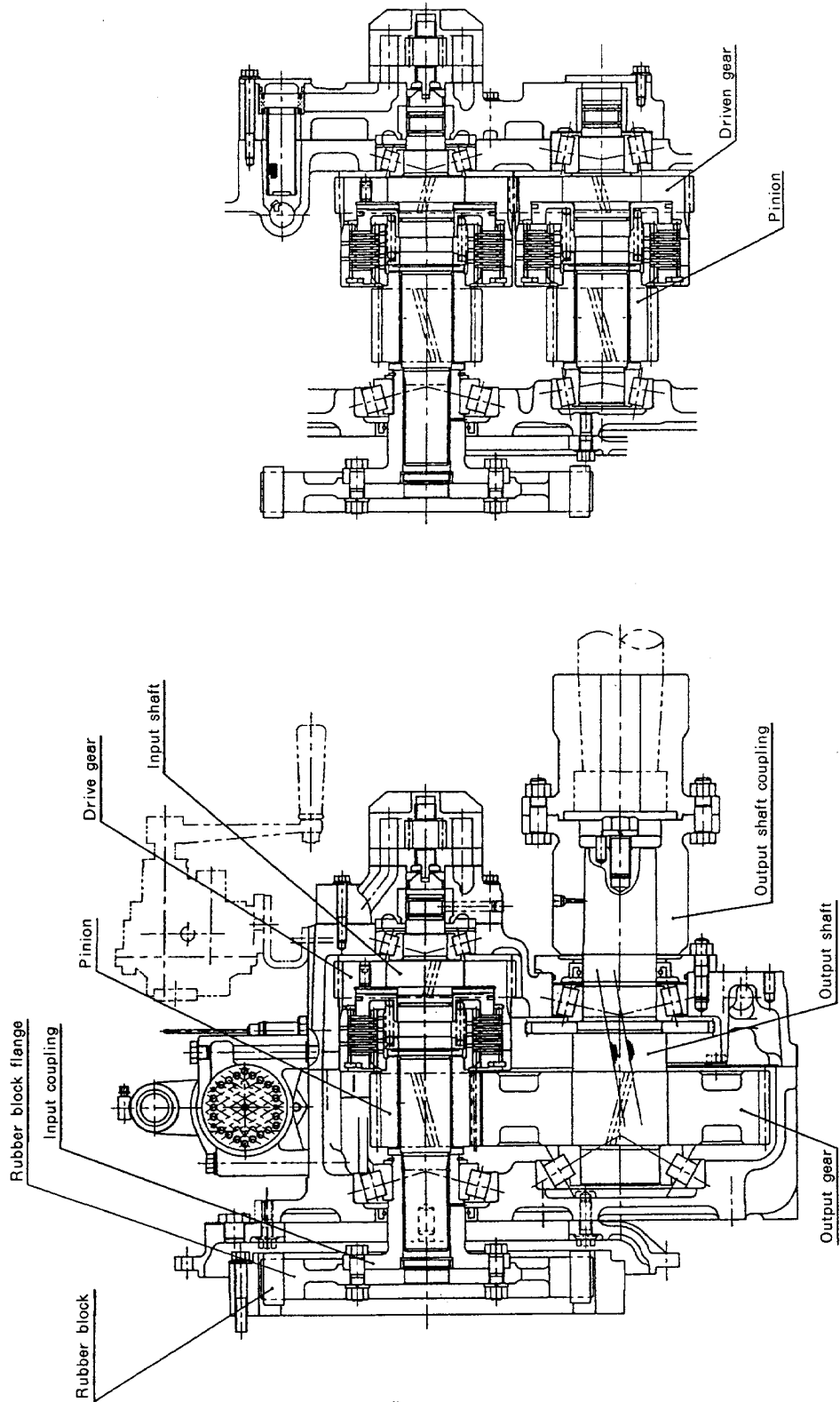
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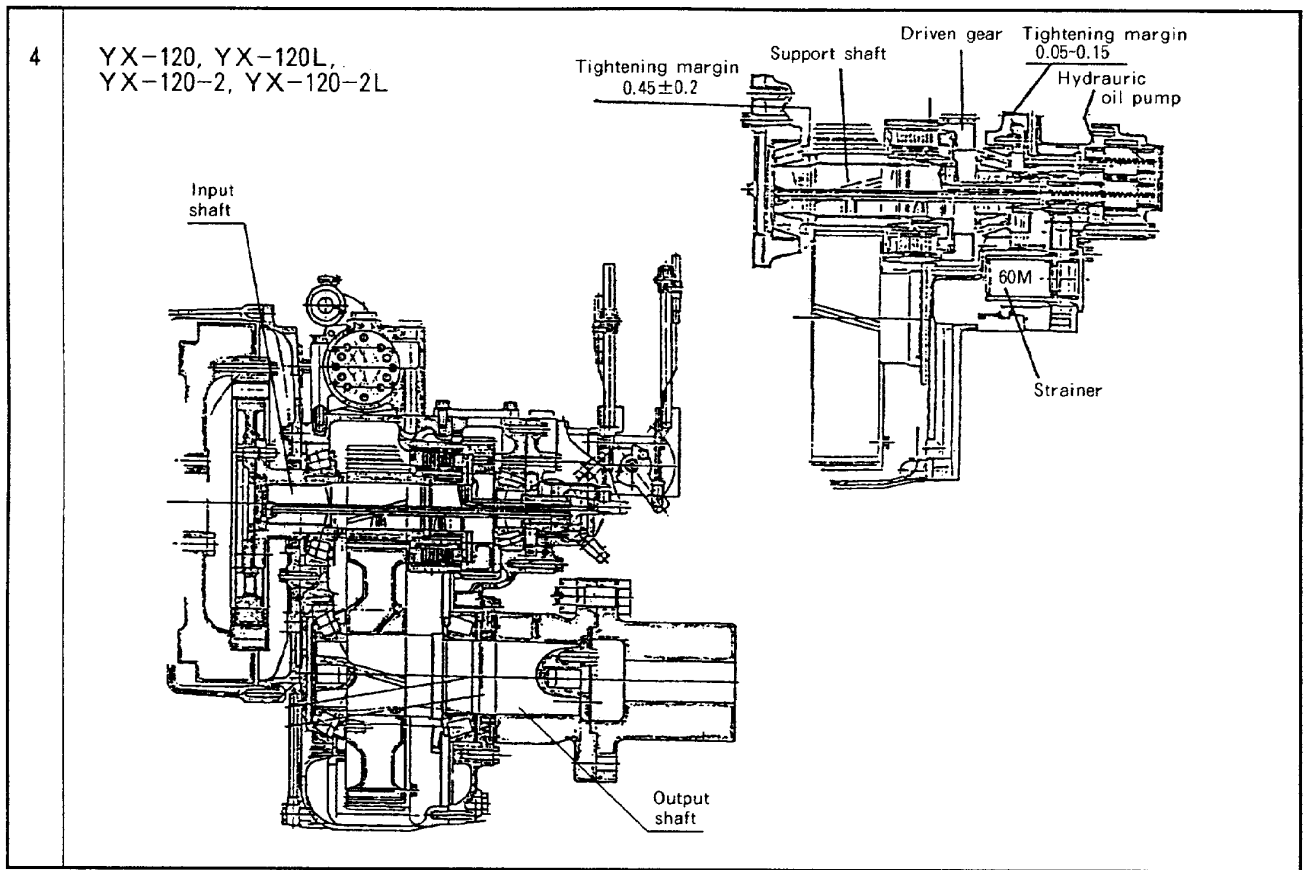
YX-10, YX-15, YX-20, YX-30

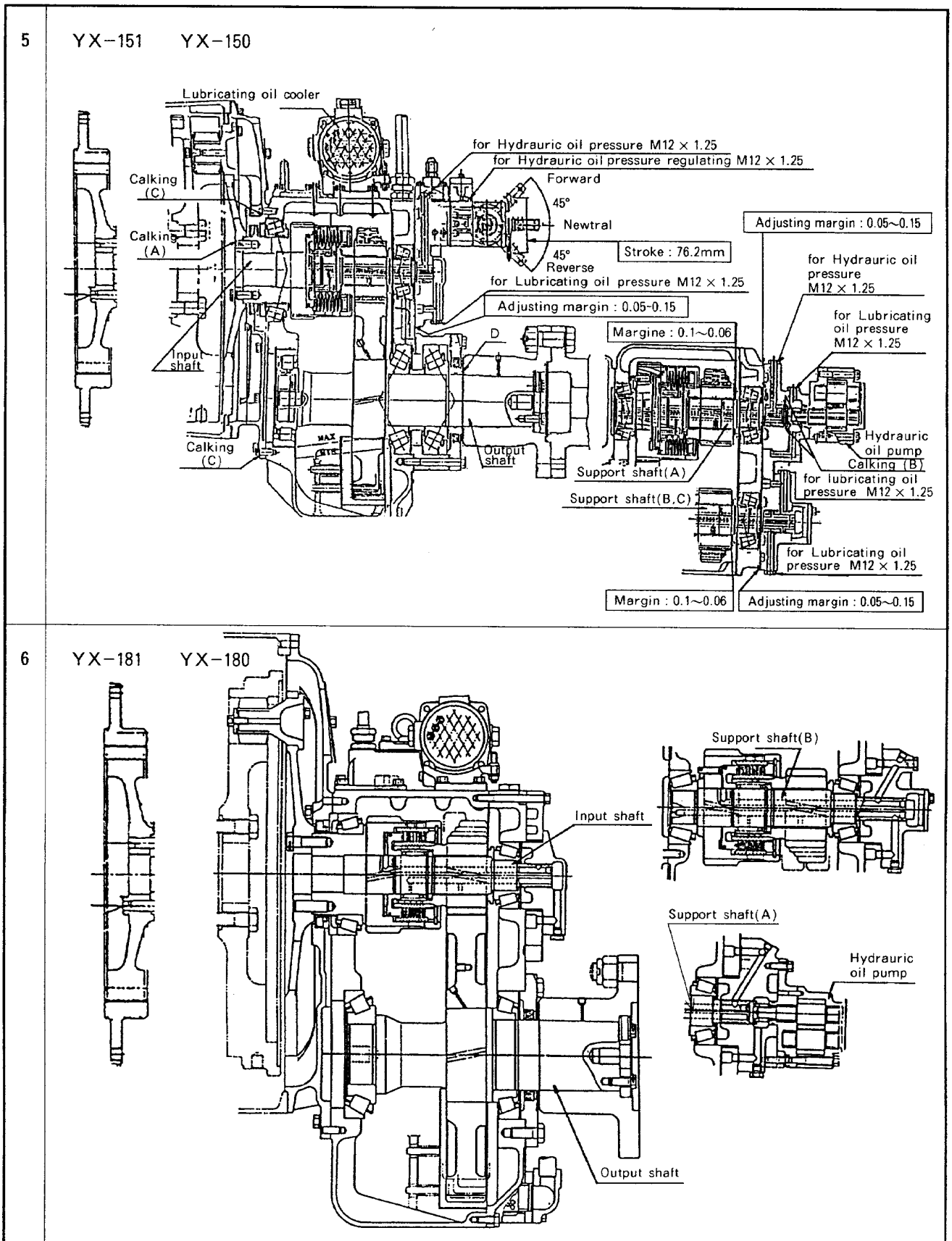


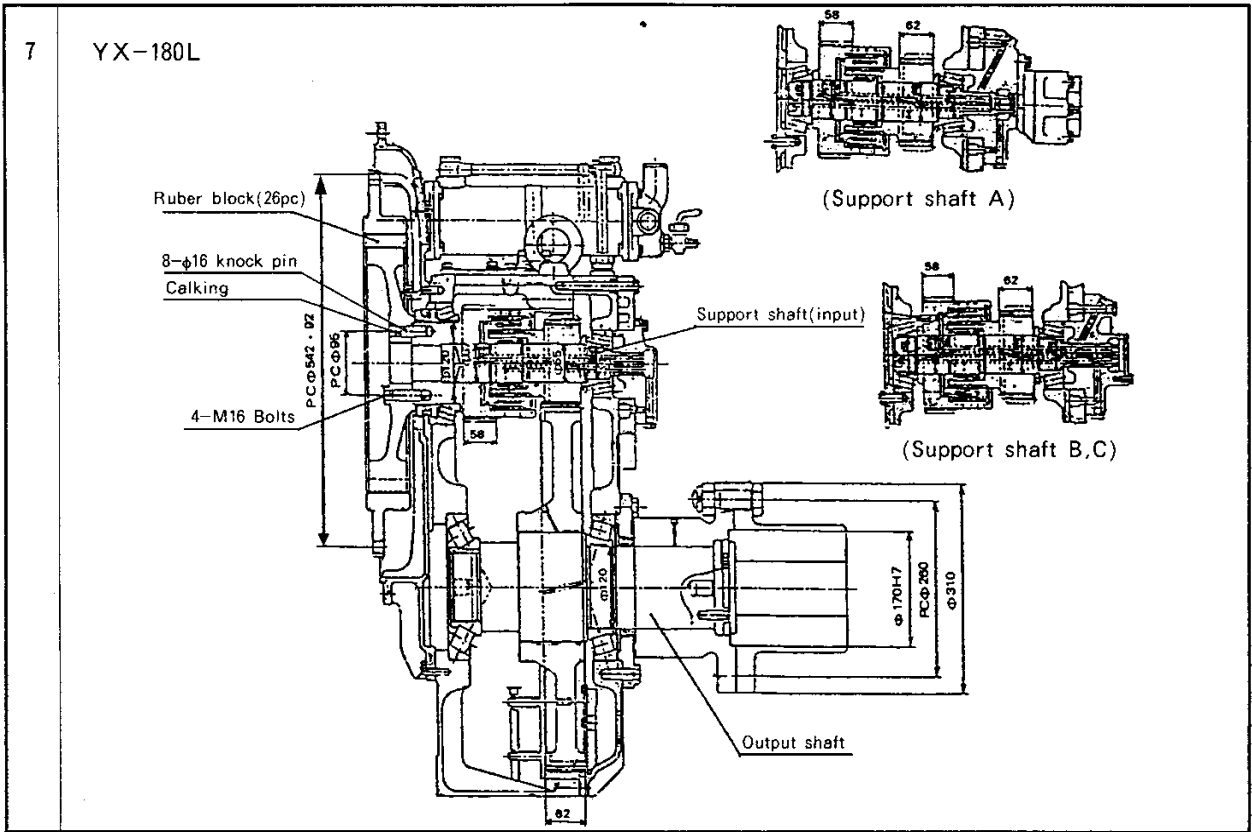
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YX-50, YX-51, YX-50L, YX-70, YX-71, YX-70S, YX-90

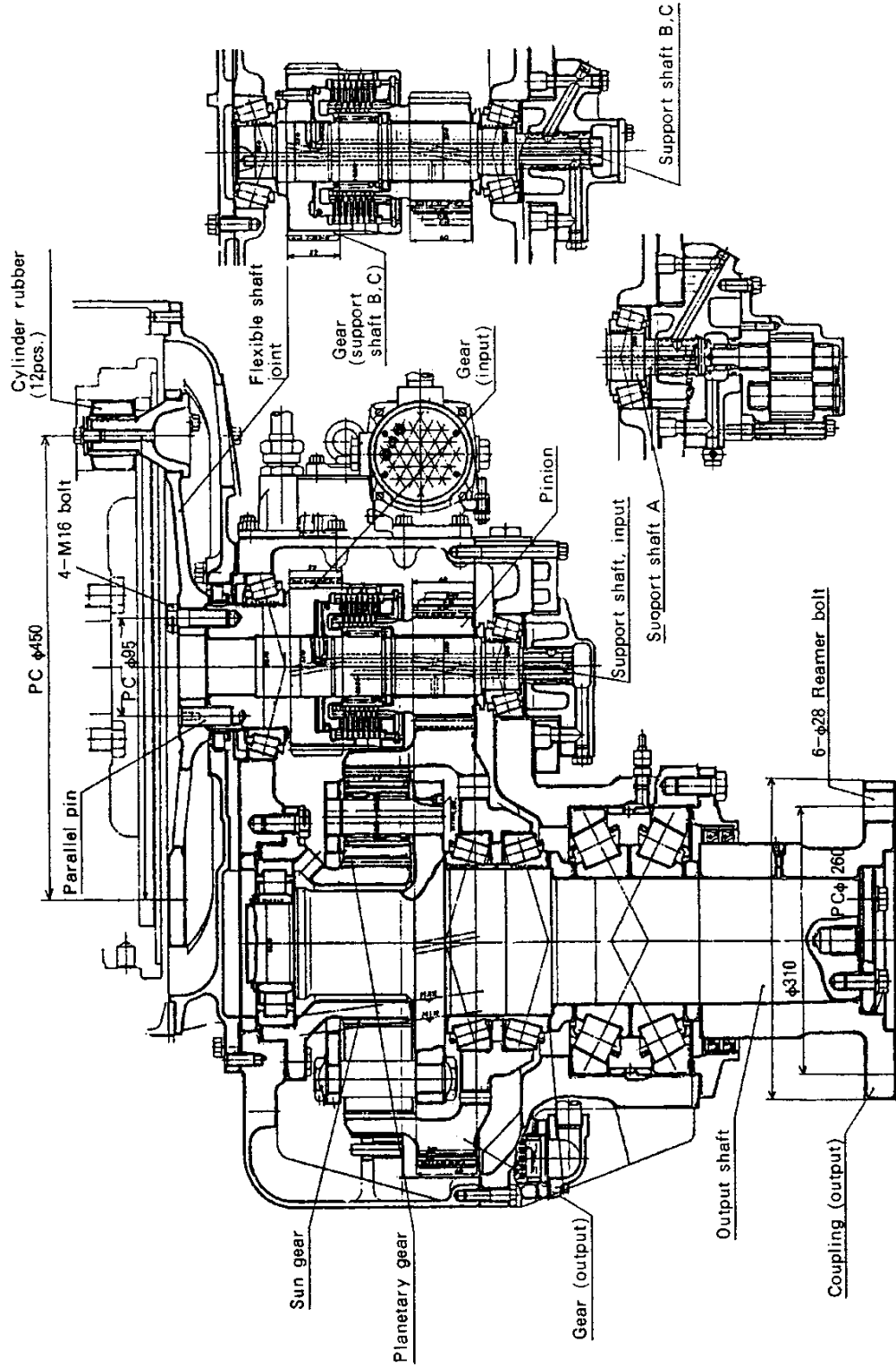




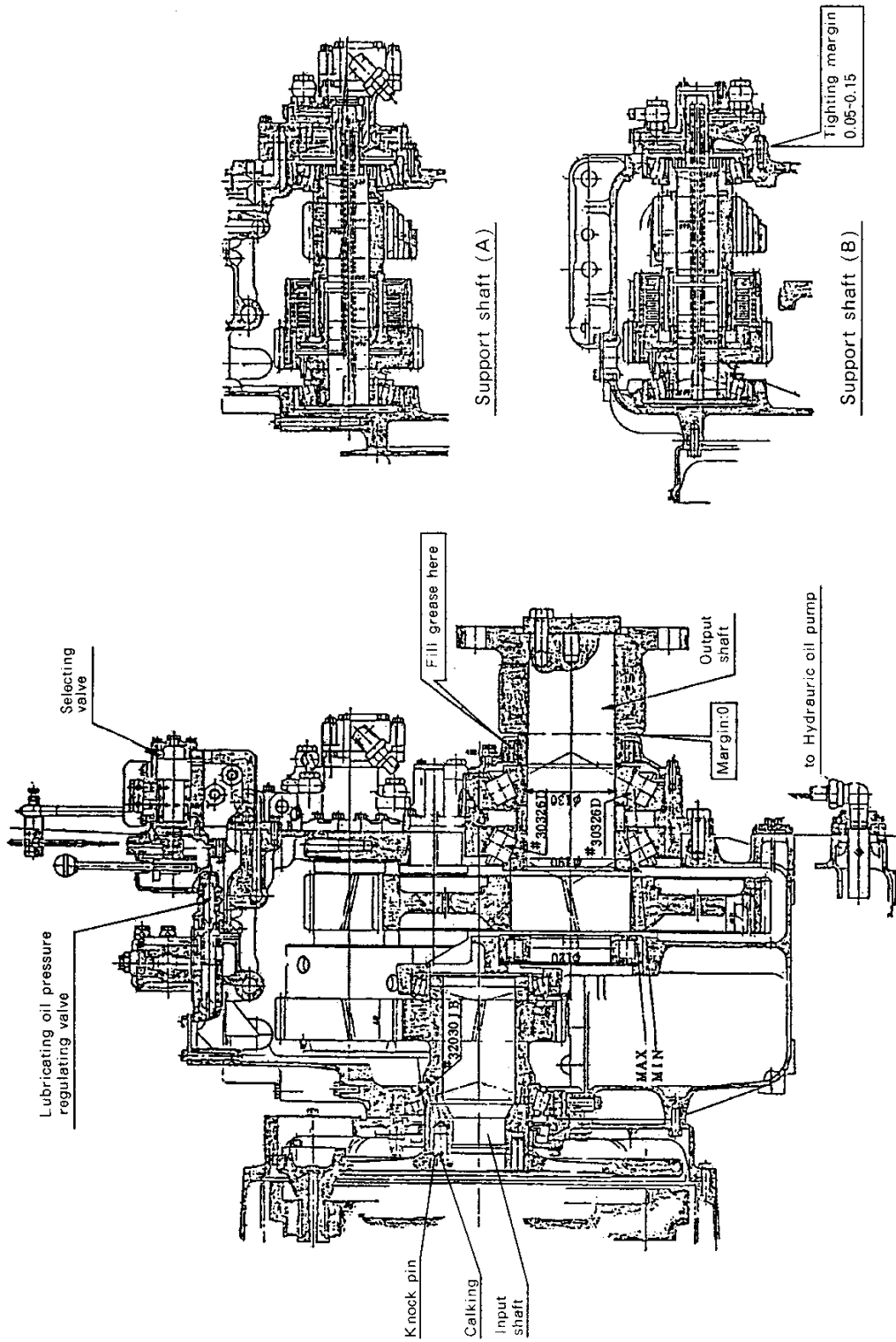




YX-180N

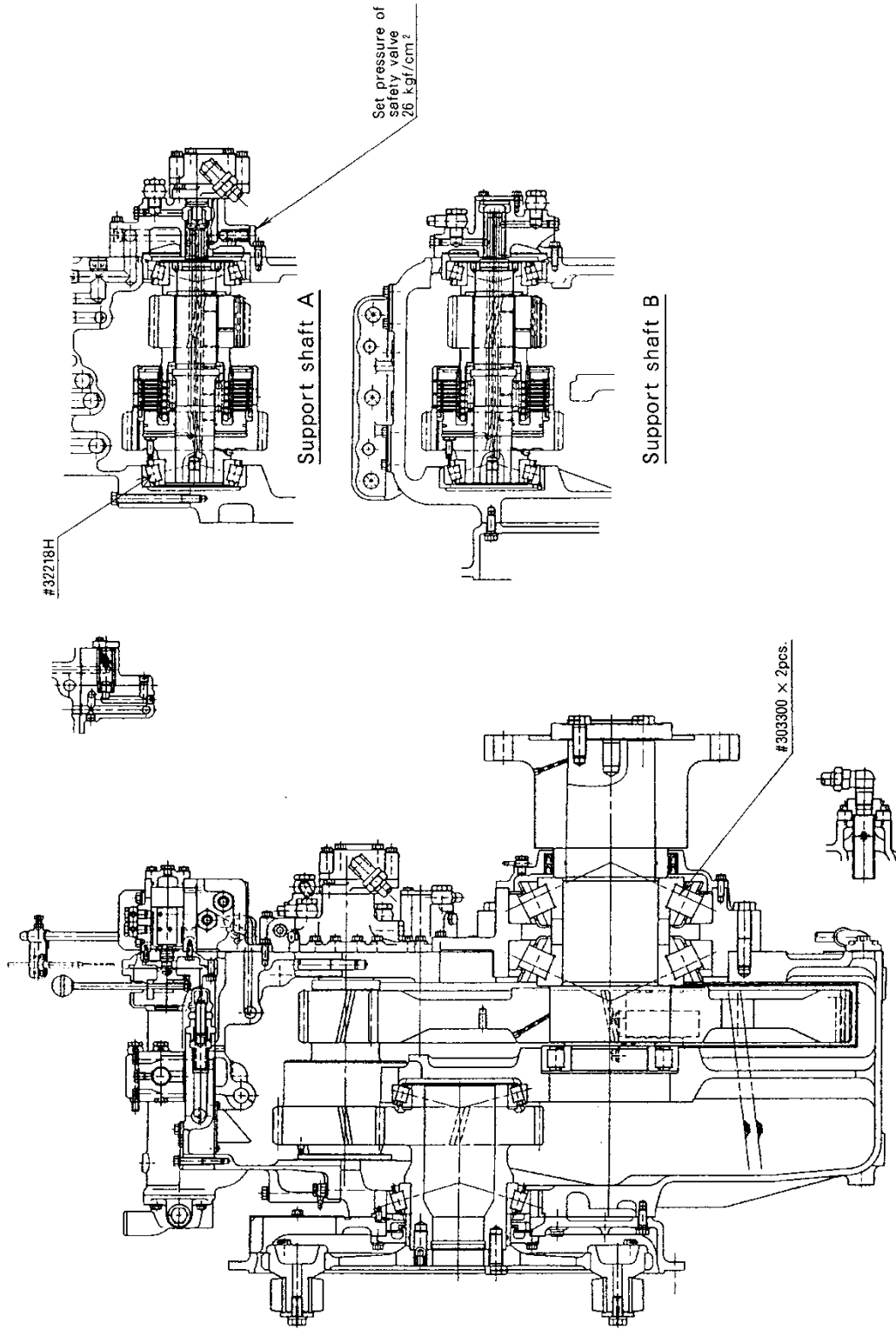


YX-350E, YX-351



10

YX-350L, YX-351L





1-4. Reduction Clutch Case

