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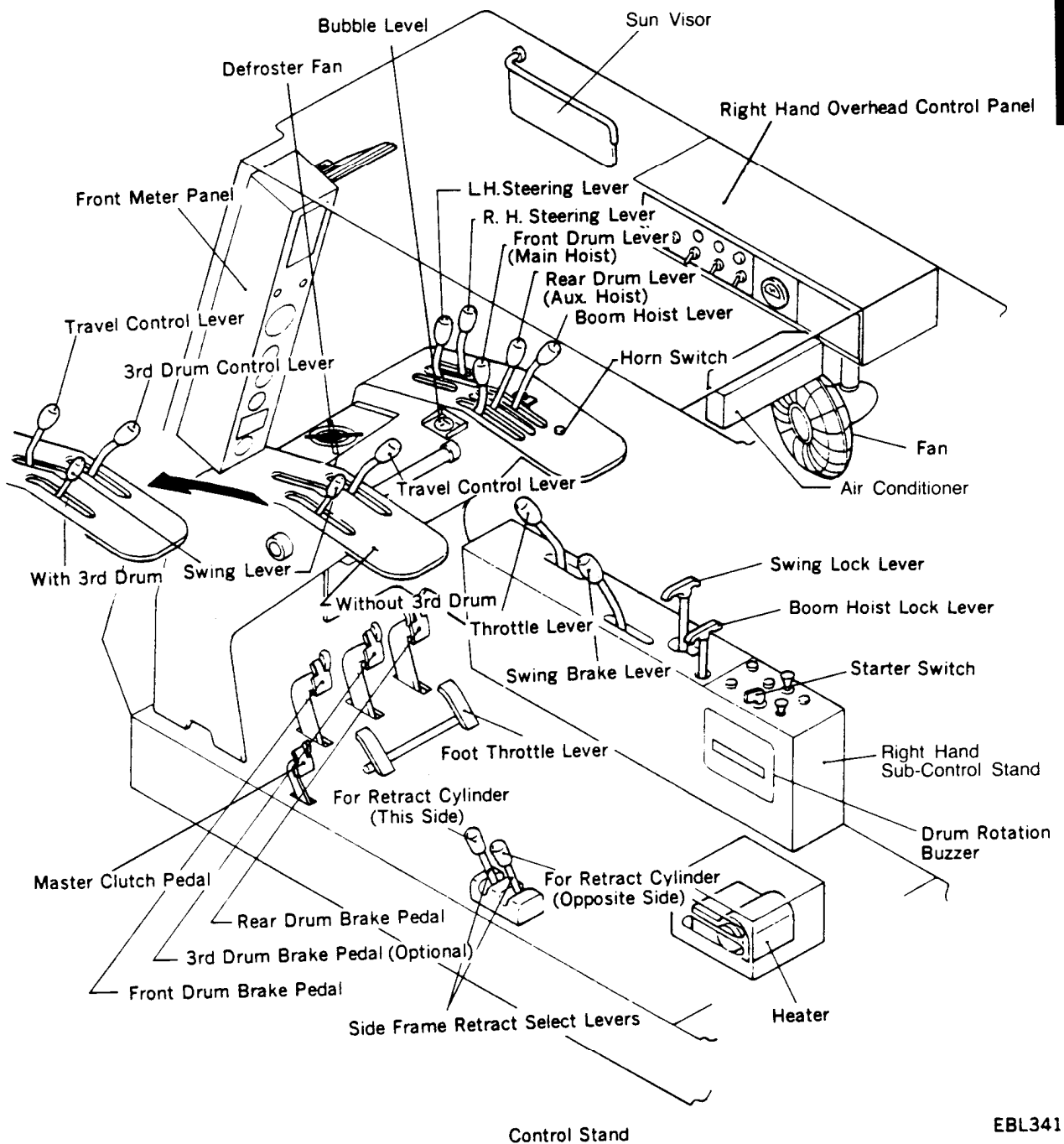
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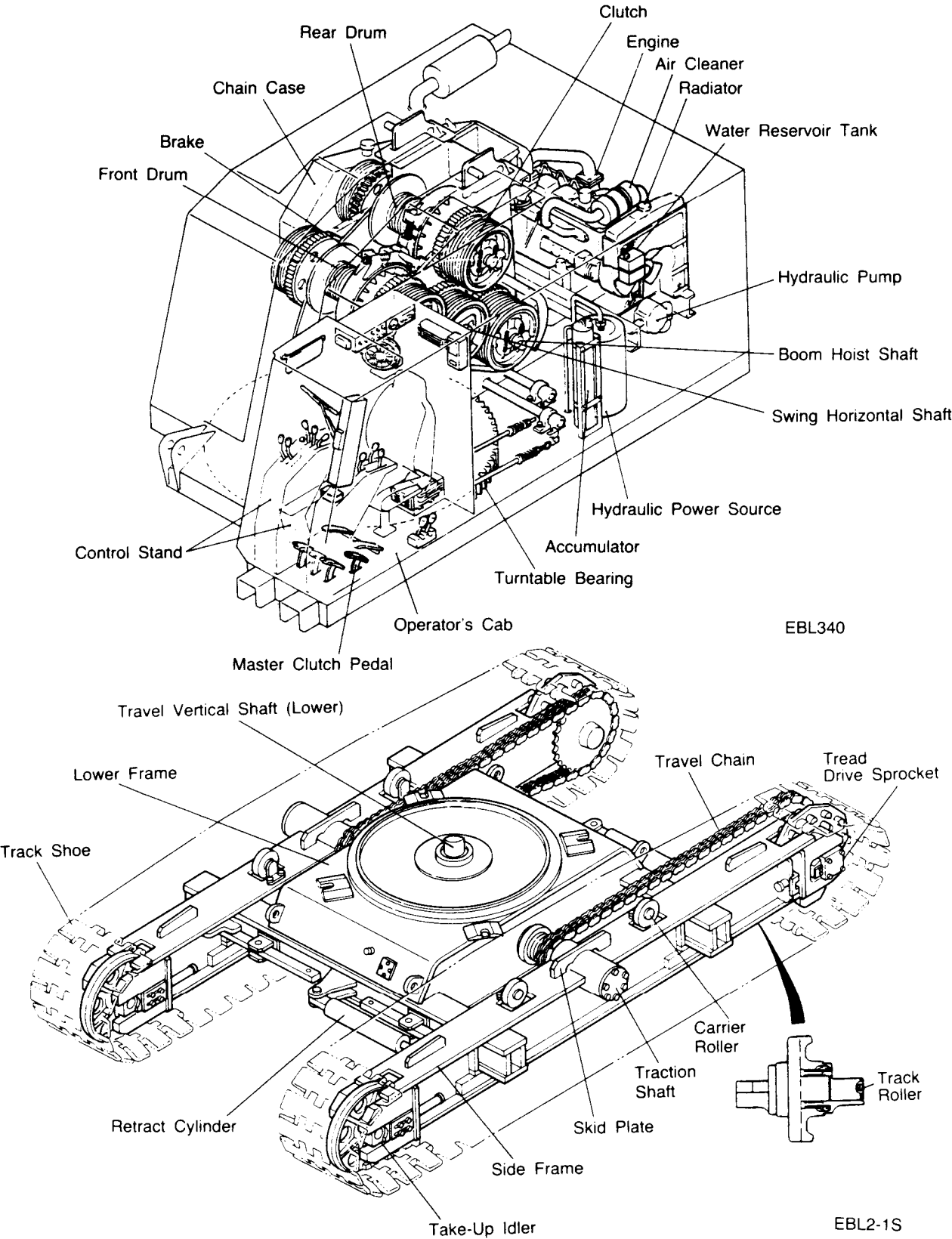
1 Components In Operator's Cab



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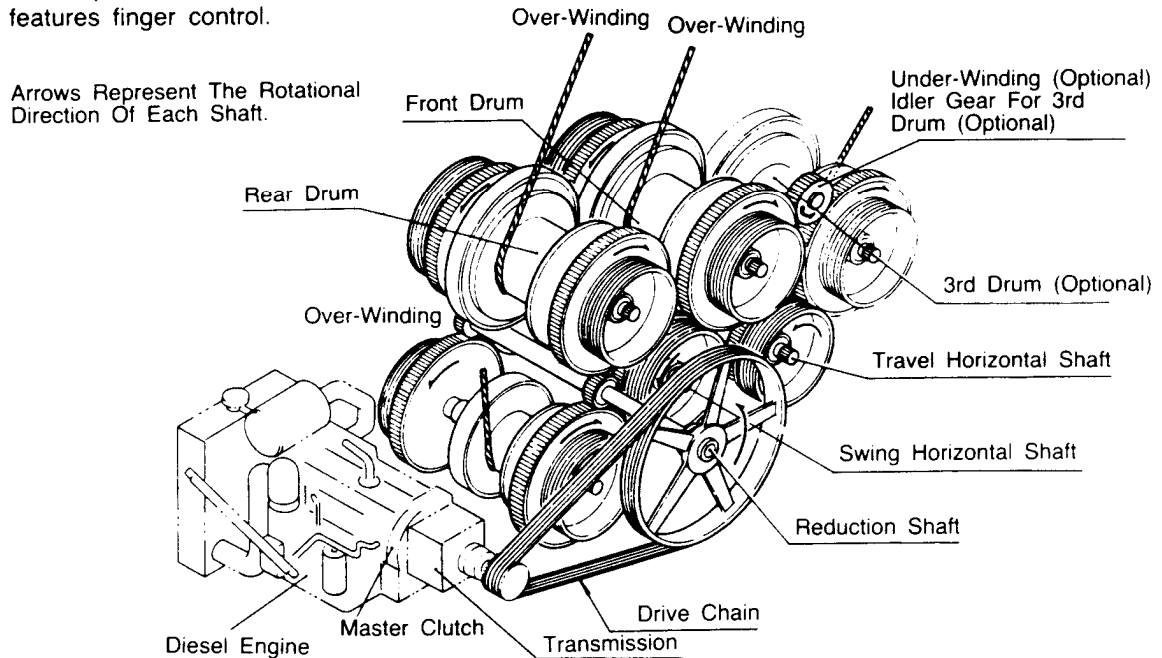
Note: For more details of operating levers, pedals and switches on the panel, refer to the operator's manual.

2 Upper Machinery And Lower Machinery

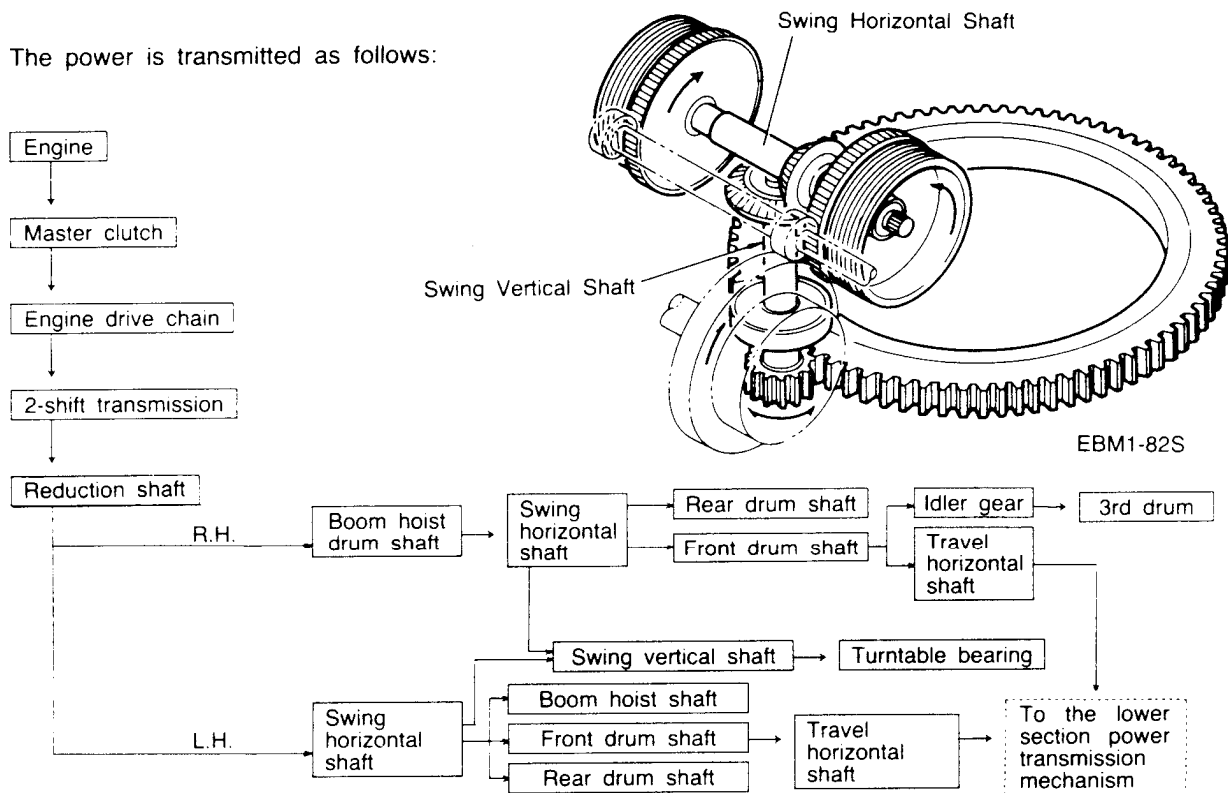


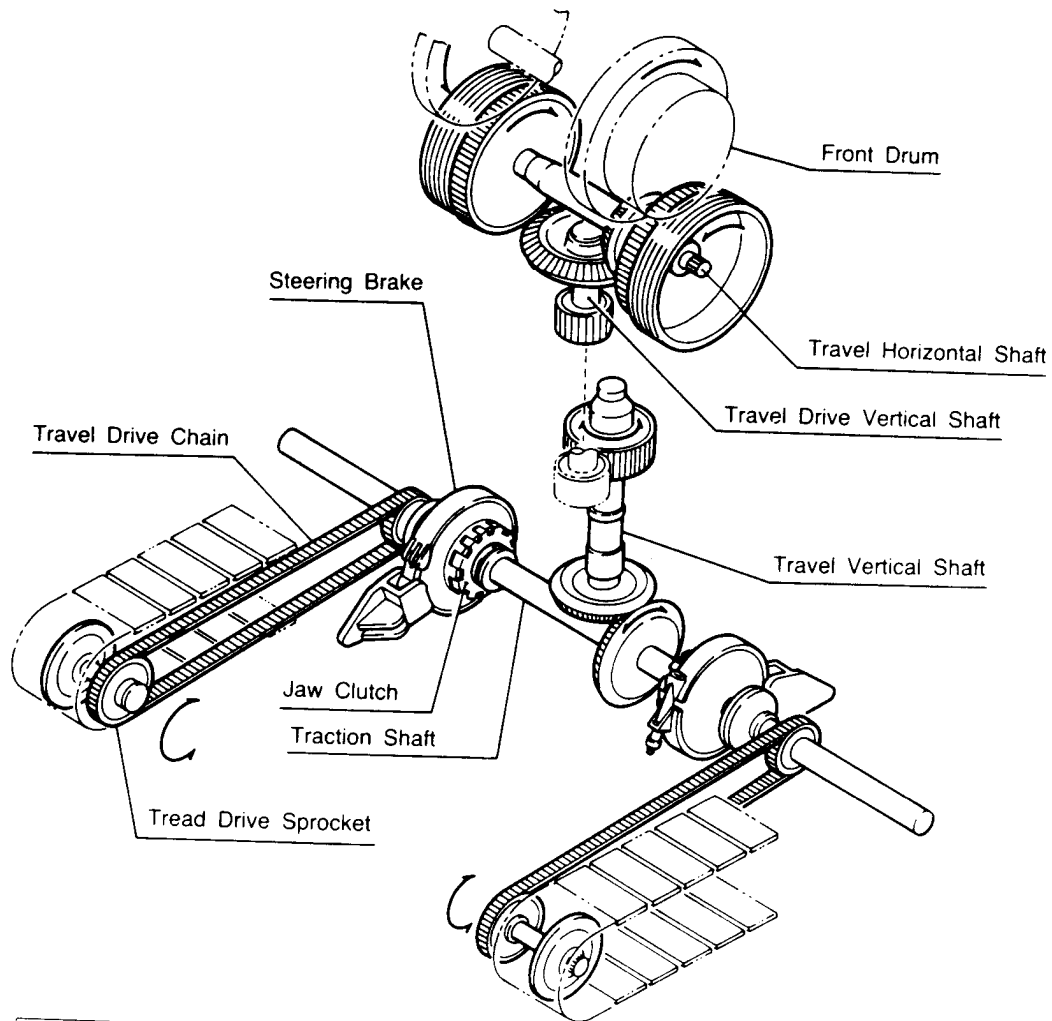
The power torque generated at the diesel engine is transmitted to various mechanisms for hoist, boom hoist, swing, travel, etc. The power torque is transmitted to the various mechanisms through the master clutch in the system as illustrated.

The power to the working devices is turned on and off by a hydraulic "Speed-O-Matic" system which features finger control.

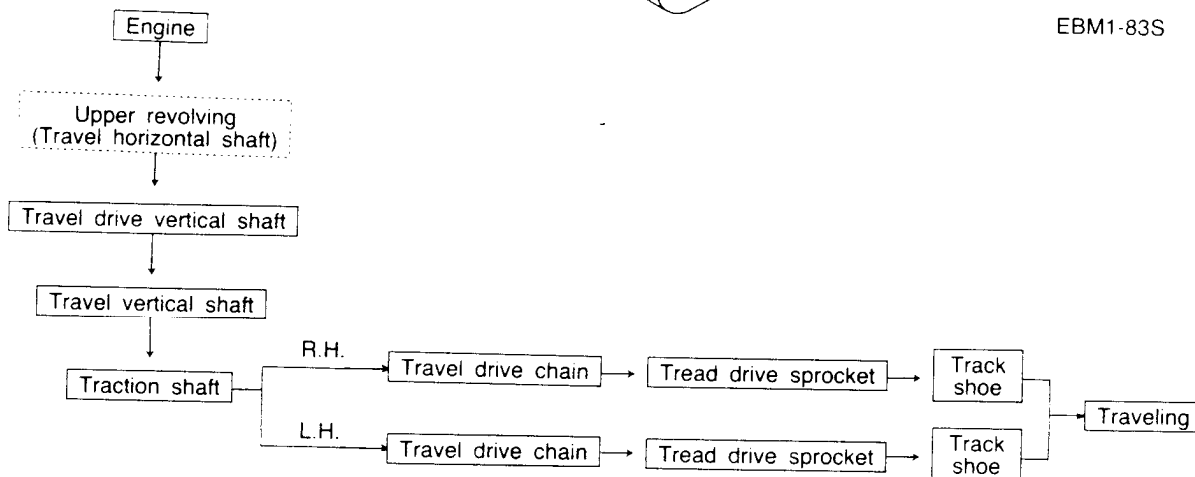


The power is transmitted as follows:





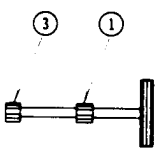
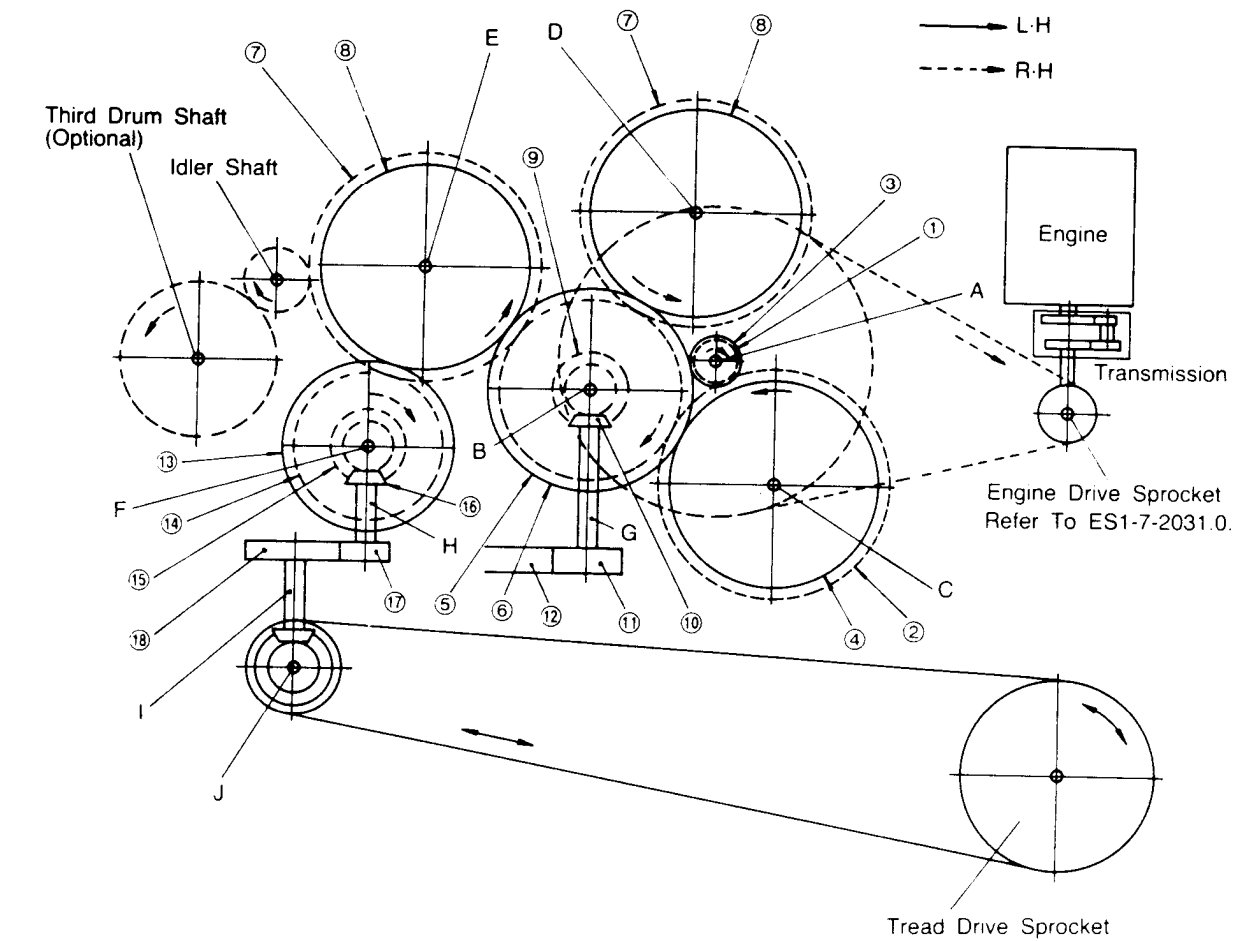
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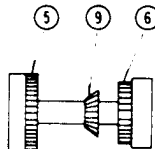
Unit :inch (mm)

Item	Part Name	Number Of Teeth	*1	Allowable Back-Lash	Treatment
1	Pinion	3	2.468" (62.683)	.063" (1.60)	Replacement
2	Spur gear	11	10.085" (256.163)		
3	Pinion	3	2.473" (62.807)	.065" (1.66)	Replacement
5	Spur gear	10	9.112" (231.438)		
5	Spur gear	10	9.112" (231.438)	.085" (2.17)	Replacement
4	Spur gear	10	9.112" (231.438)		
2	Spur gear	11	10.085" (256.163)	.085" (2.17)	Replacement
6	Spur gear	9	8.142" (206.812)		
6	Spur gear	9	8.142" (206.812)	.085" (2.17)	Replacement
7	Spur gear	10	8.819" (224.006)		
5	Spur gear	10	9.112" (231.438)	.085" (2.17)	Replacement
8	Spur gear	9	7.971" (202.460)		
9	Bevel gear	3	4.992" (126.802)	.121" (3.07)	Replacement
10	Bevel gear	4	7.004" (177.912)		
11	Spur gear	3	3.704" (94.093)	.096" (2.45)	Replacement
12	Ball race	16	22.384" (568.552)		
8	Spur gear	10	9.112" (231.438)	.085" (2.17)	Replacement
13	Spur gear	8	7.199" (182.859)		
7	Spur gear	11	10.081" (256.063)	.085" (2.17)	Replacement
14	Spur gear	7	6.230" (158.234)		
15	Bevel gear	3	4.374" (111.087)	.088" (2.23)	Replacement
16	Bevel gear	3	4.280" (108.723)		
17	Spur gear	2	1.784" (45.323)	.075" (1.91)	Replacement
18	Spur gear	4	4.152" (105.456)		

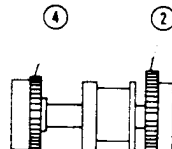
*1 Allowable Displacement Over A Given Number Of Teeth.



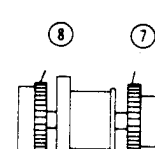
A Reduction Shaft



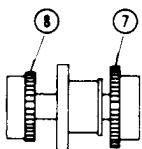
B Swing Horizontal Shaft



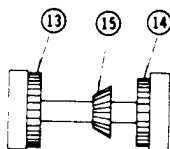
C Boom Hoist Shaft



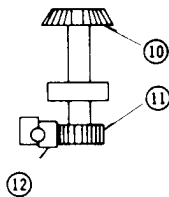
D Rear Drum Shaft



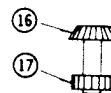
E Front Drum Shaft



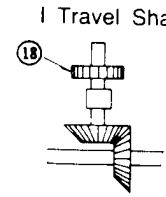
F Travel Horizontal Shaft



G Swing Vertical Shaft

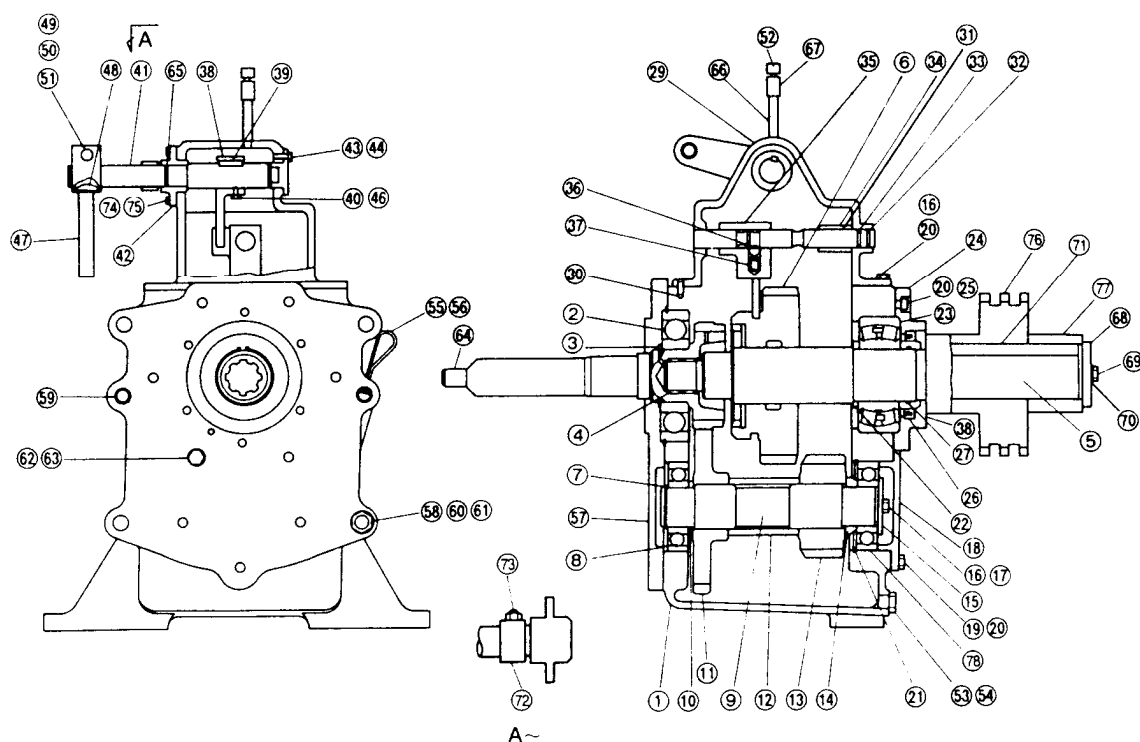


H Travel Drive Shaft



I Travel Shaft

Refer To
 ES2-1-2003.0

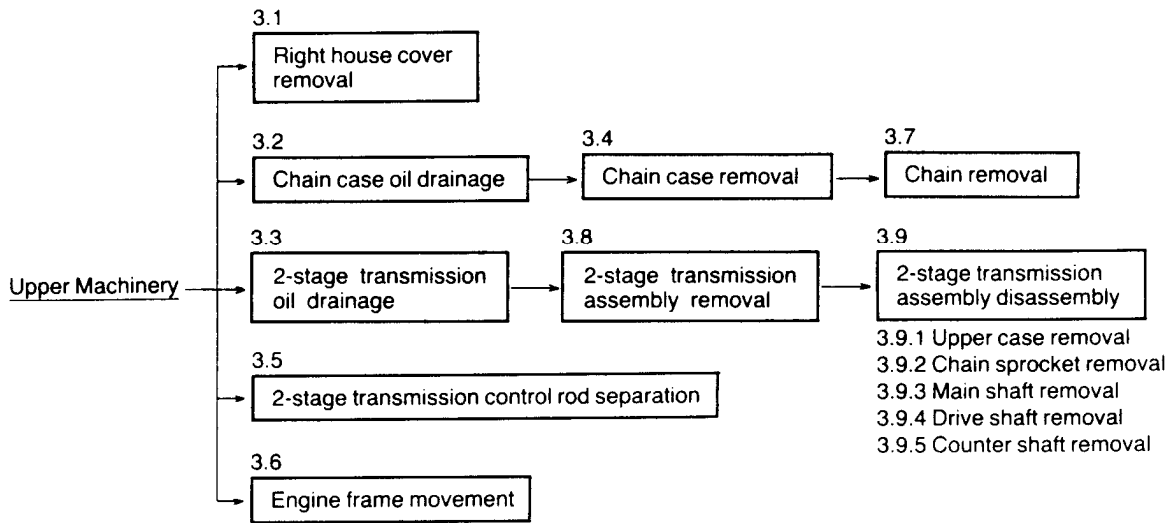


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① Mission Case	②① Snap Ring	④① Shaft	⑥① Spring Washer
② Spacer	②② Spacer	④② Retainer	⑥② Bolt
③ Snap Ring	②③ Bearing	④③ Bolt	⑥③ Spring Washer
④ Bearing	②④ Retainer	④④ Spring Washer	⑥④ Drive Shaft
⑤ Main Shaft	②⑤ Bolt	④⑤ Bearing Holder	⑥⑤ O-Ring
⑥ Spur Gear	②⑥ Oil Seal	④⑥ Wire	⑥⑥ Pipe
⑦ Snap Ring	②⑦ Spacer	④⑦ Lever	⑥⑦ Socket
⑧ Bearing	②⑧ O-Ring	④⑧ Key	⑥⑧ Plate
⑨ Counter Shaft	②⑨ Mission Case	④⑨ Bolt	⑥⑨ Bolt
⑩ Spacer	③① Pin	④⑩ Nut	⑦① Key
⑪ Spur Gear	③② Shift Rod	④⑪ Spring Washer	⑦② Color
⑫ Spacer	③③ Pin	④⑫ Air Breather	⑦③ Nut
⑬ Spur Gear	③④ O-Ring	④⑬ Plug	⑦④ Bolt
⑭ Spacer	③⑤ Spacer	④⑭ Gasket	⑦⑤ Spring Washer
⑮ End Plate	③⑥ Shift Arm	④⑮ Oil Gauge	⑦⑥ Sprocket
⑯ Bolt	③⑦ Ball	④⑯ O-Ring	⑦⑦ Spacer
⑰ Plate	③⑧ Spring	④⑰ Flange	⑦⑧ Bearing
⑱ Retainer	③⑨ Lever	④⑱ Bolt	
⑲ Bolt	③⑩ Key	④⑲ Bolt	
⑳ Spring Washer	④① Bolt	④⑳ Nut	

1 Disassembly Procedure



2 Preparation

- 1) Run the machine to stir the oil.
- 2) Move the machine to level and stable ground, and lower the attachment to the ground.
- 3) Engage the swing lock, and park the machine. Stop the engine.

3 Disassembly

- 3.1 Right house cover removal
Remove the right house cover.

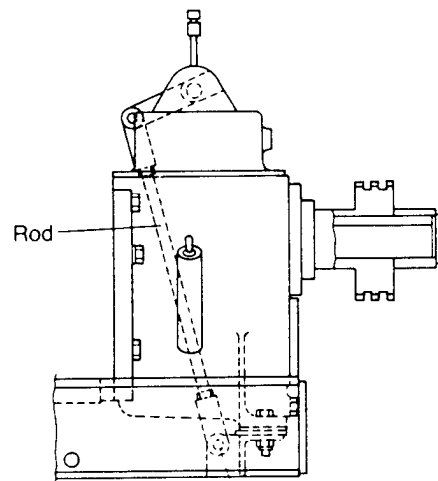
- 3.2 Chain case oil drainage
(Refer to ES1-8-50○○ in this manual.)

- 3.3 2-stage transmission oil drainage
- 1) Remove the plug ⑤③, and drain the oil.
 - 2) After drainage, attach the plug ⑤③.

Oil capacity: 1.7gal. (6.4lit.)

- 3.4 Chain case removal
(Refer to ES1-8-60○○ in this manual.)

- 3.5 2-stage transmission control rod separation
- 1) Remove the cotter pin.
 - 2) Pull out the pin, and separate the rod.



Cotter Pin, Pin

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3.6 Engine frame movement

(Refer to ES1-8-6000 in this manual.)

3.7 Chain removal

(Refer to ES1-8-6000 in this manual.)

3.8 2-stage transmission assembly removal

- 1) Remove the engine frame fastening bolts.
- 2) Suspending the 2-stage transmission assembly with a hoist, remove it rightward.

**CAUTION**

Take Care To Prevent Damaging The Shaft.

Assembly weight: 254.2lbs. (115.3kg)

3.9 2-stage transmission assembly disassembly

3.9.1 Upper case removal

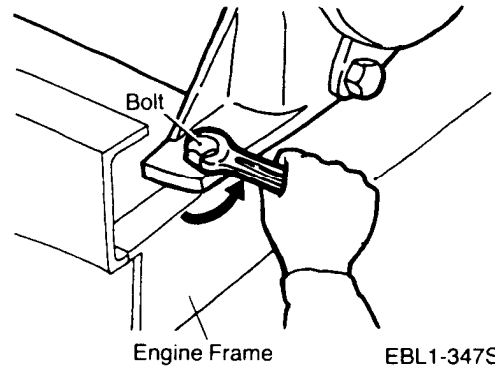
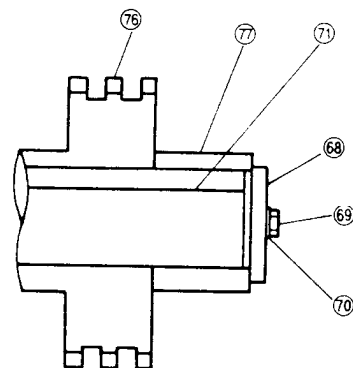
- 1) Remove the bolts (16) and pins (30), and remove the mission case (29).
- 2) Remove the pipe (66).
- 3) Remove the bolt (49), nut (50) and spring washer (51), and remove the lever (47) from the shaft (41).
- 4) Bring the round rod into contact, and knock out the shift rod (31).
- 5) Remove the O-ring (33) from the shift rod (31).
- 6) Remove the bolts (43) and spring washer (44), and remove the bearing holder (45).
- 7) Remove the bolt (40) and wire (46).
- 8) Remove the bolts (74), spring washers (75) and retainer (42). Slide the shaft (41) and remove it from the mission case (29).
- 9) Remove the shaft lever (38) as an assembly with the shift arm (35).
- 10) Remove the ball (36) and spring (37) from the shift arm (35).

3.9.2 Chain sprocket removal

- 1) Remove the bolt (69), washer (70), and plate (68).
- 2) Remove the spacer (77), sprocket (76) and key (71).

3.9.3 Main shaft removal

- 1) Remove the bolts (25), spring washers (20), and retainer (24).
- 2) Remove the oil seal (26), spacer (27) and O-ring (28).
- 3) Pull out the main shaft (5).
- 4) Remove the bearing (23) and spacer (22).
- 5) Remove the spur gear (6).

**1**

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3.9.4 Drive shaft removal

- 1) Remove the bolts ⑤⑨, ⑥②, ⑥⑤, nut ⑥⑦ and flange ⑤⑦.
- 2) Pull out the drive shaft ⑥④.
- 3) Remove the snap ring ③ and bearing ②.
- 4) Remove the bearing ④ from the drive shaft ⑥④.

3.9.5 Counter shaft removal

- 1) Remove the bolts ①⑨, and retainer ①⑧.
- 2) Loosen the bolt ①⑥ and remove the plate ①⑦ and end plate ①⑤.
- 3) Slide the counter shaft ⑨ toward the drive shaft side.
- 4) Remove the snap ring ⑦, bearing ⑧ and spacer ⑩.
- 5) Remove the bearing ⑦⑧, snap ring ②① and spacer ①④.
- 6) Remove the counter shaft ⑨.
- 7) Remove the spur gears ①①, ①③ and spacer ②.

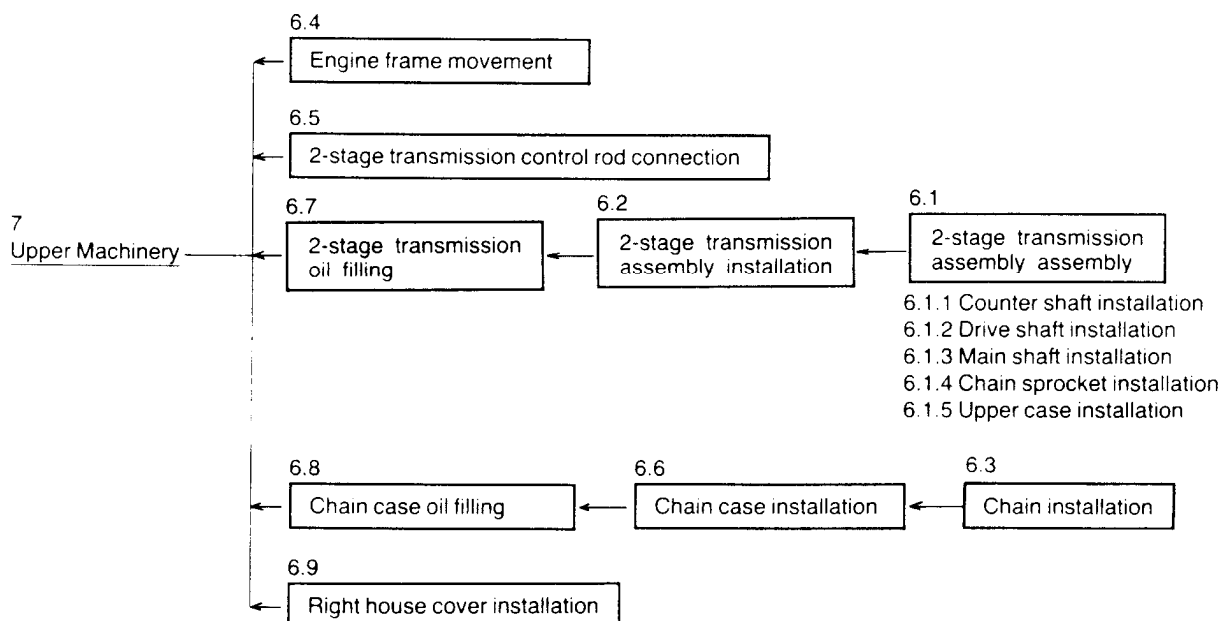
4 Inspection And Parts Replacement

**WARNING**

Use Solvent Only In A Well Ventilated Area
Away From Open Flame.
Wear Safety Glasses And Protective Clothing.
Debris Blown By Compressed Air Can Cause
Injury.

- 1) Wash all disassembled parts and completely dry with compressed air.
- 2) Check all parts for excessive wear. In case of slight scoring, recondition parts with a fine file or oil stone.
Replace parts which cannot be repaired.
- 3) Visually inspect the shaft and spur gear for cracks, deformations, and other abnormalities.
- 4) Replace the bearing if excessively damaged.
- 5) Replace all seals with new ones.

5 Reassembly Procedure



6 Reassembly

6.1 2-stage transmission assembly assembly

6.1.1 Counter shaft installation

- 1) Install the snap ring ②① and bearing ⑦⑩.
- 2) Insert the counter shaft ⑨ from the drive shaft side, and install the spur gear ⑪, spacer ⑫, spur gear ⑬ and spacer ⑭.
- 3) Install the spacer ⑩, bearing ⑧ and snap ring ⑦.
- 4) Install the plate ⑰ and end plate ⑮ with bolt ⑯.
- 5) Install the retainer ⑱ with bolt ⑲.

6.1.2 Drive shaft installation

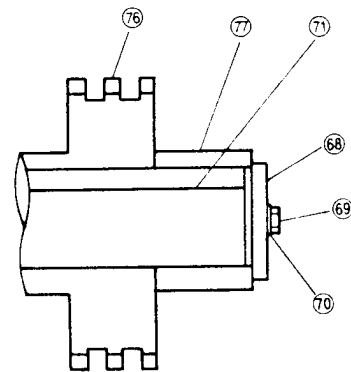
- 1) Install the bearings ④ and ② to the drive shaft ⑥④.
- 2) Install the snap ring ③.
- 3) Insert the drive shaft ⑥④ into the mission case ①.

6.1.3 Main shaft installation

- 1) Install the spacer ②② and bearing ②③ to the main shaft ⑤.
- 2) Position the spur gear ⑥, and insert the main shaft ⑤.
- 3) Install the O-ring ②⑧, spacer ②⑦ and oil seal ②⑥.
- 4) Install the retainer ②④ with the bolts ②⑤ and spring washers ②⑩.

6.1.4 Chain sprocket installation

- 1) Install the key ⑦①, sprocket ⑦⑥ and spacer ⑦⑦.
- 2) Install the plate ⑥⑧ with bolt ⑥⑨ and washer ⑦⑩.



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6.1.5 Upper case installation

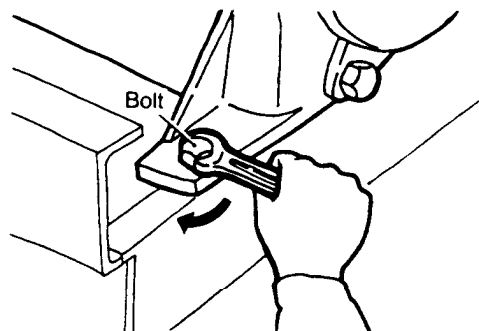
- 1) Set up the ball ③⑥ and spring ③⑦ on the shift arm ③⑤.
- 2) Install the bearing holder ④⑤ with bolts ④③ and spring washers ④④.
- 3) Position the shaft lever ③⑧ as an assembly with the shift arm ③⑤, and pass the retainer ④② on the shaft ④① for insertion. Fasten them with bolt ④⑩ and wire ④⑥.
- 4) Install the O-ring ③③ to the shift rod ③①, and insert the assembly into the mission case ②⑨.
- 5) Install the retainer ④② with the bolts ⑦④ and spring washers ⑦⑤.
- 6) Attach the lever ④⑦ to the shaft ④① with bolt ④⑨, nut ⑤⑩ and spring washer ⑤①.
- 7) Connect the pipe ⑥⑥.
- 8) Install the mission case ②⑨ with bolts ①⑥ and pins ③⑩.

6.2 2-stage transmission assembly installation

- 1) Coat adhesive on the mating surfaces between the 2-stage transmission and the engine frame.

Adhesive: Three bond No. 1102

- 2) Install the 2-stage transmission on the engine frame.



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6.3 Chain installation

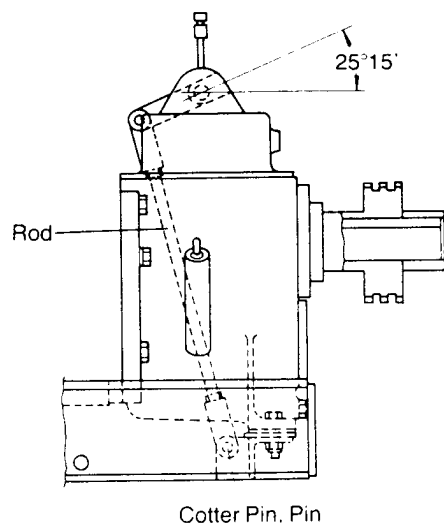
(Refer to ES1-8-6000 in this manual.)

6.4 Engine frame movement

(Refer to ES1-8-6000 in this manual.)

6.5 2-stage transmission control rod connection

- 1) Connect the rod with pin and cotter pin.
- 2) Adjust the control rod.



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6.6 Chain case installation

(Refer to ES1-8-5000 in this manual.)

6.7 2-stage transmission oil filling

Fill oil through the air breather ⑤.

6.8 Chain case oil filling

(Refer to ES1-8-5000 in this manual.)

6.9 Right house cover installation

Install the right house cover.

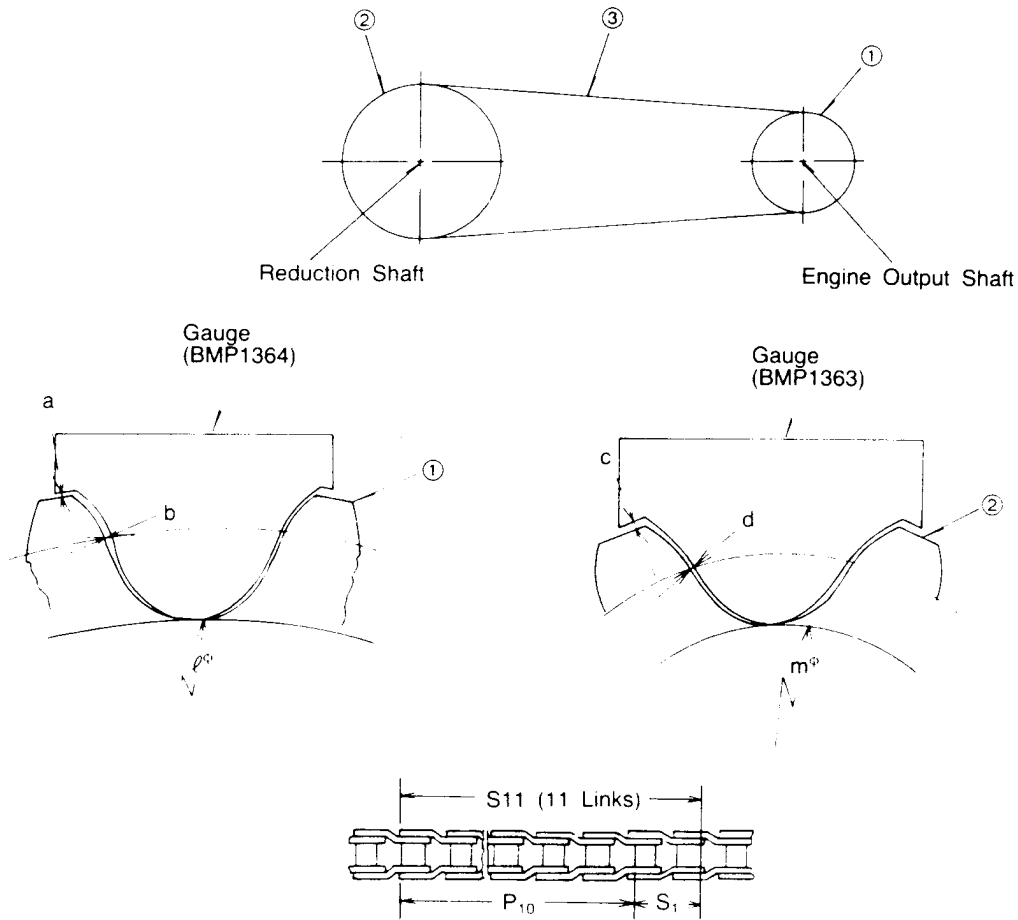
Test operation

- 1) Start the engine to check each connection for oil leakage and the 2-stage transmission for abnormal operation.
Repair if any abnormalities are found.

Unit : mm

Item	Part Name	Mark	Nominal Dimension	Allowable Dimension	Treatment · Note
1	Chain sprocket	a	0	.79'' (2)	Replacement or welding repair Gauge No. BMP1364
		b	0	.79'' (2)	
		ℓ	6.468'' (164.29)	6.390'' (162.3)	
2	Chain sprocket	c	0	.79'' (2)	Replacement or welding repair Gauge No. BMP1363
		d	0	.79'' (2)	
		m	37.657'' (956.5)	37.520'' (953)	
3	Chain	P ₁₀ *	—	7.614'' (193.4)	Replacement

[Att.] $P_{10}^* = S_{11} - S_1$



[Att] Stretch The Chain.