CHAPTER 8

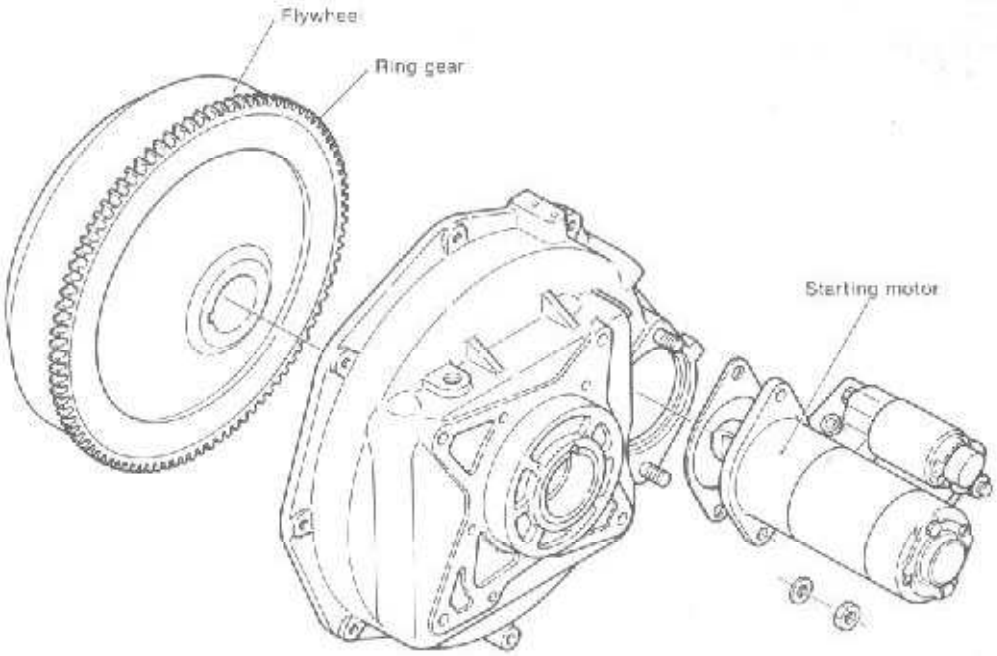
STARTING SYSTEM

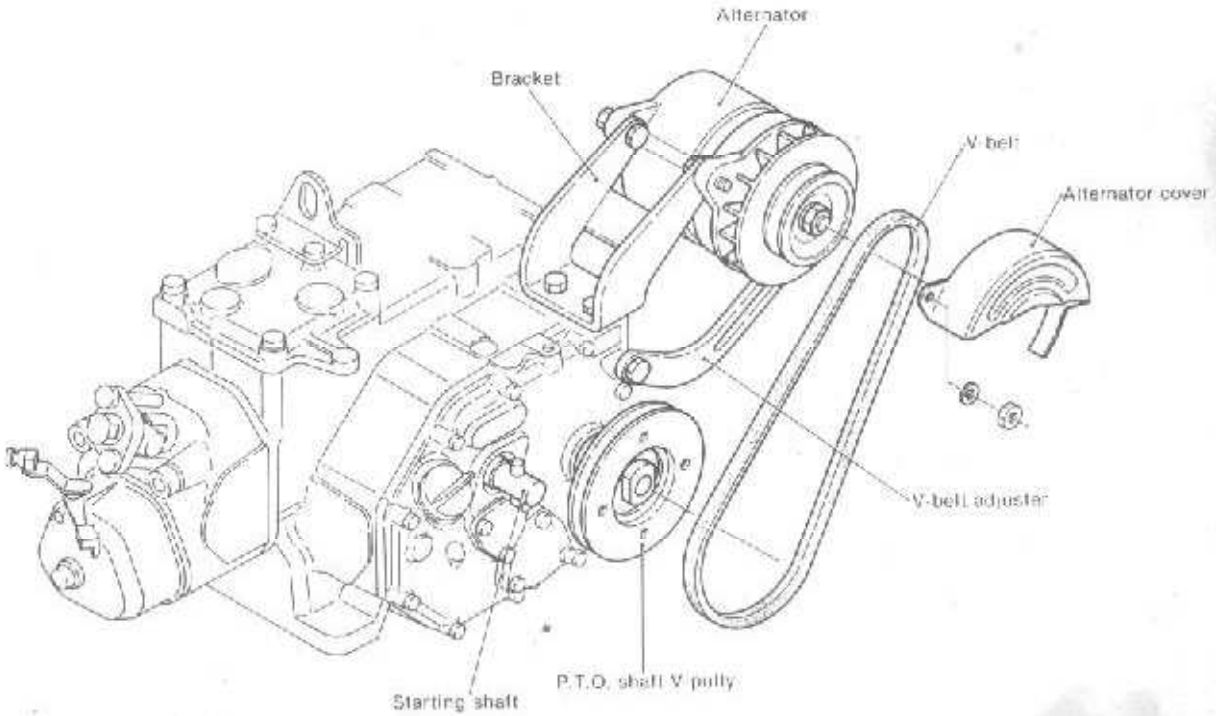
1. Starting System Construction

Model	Standard specifications	special specifications
YSM8-R YSM12-R	Overdrive hand-operated starting system and electric starting system installed side by side	Chain-overdrive hand-operated starting system
YSM8-Y YSM12-Y	Overdrive hand-operated starting system	Chain-overdrive hand-operated starting system

2. Electric Starting System (for details see Chapter 11, "Electrical Equipment")

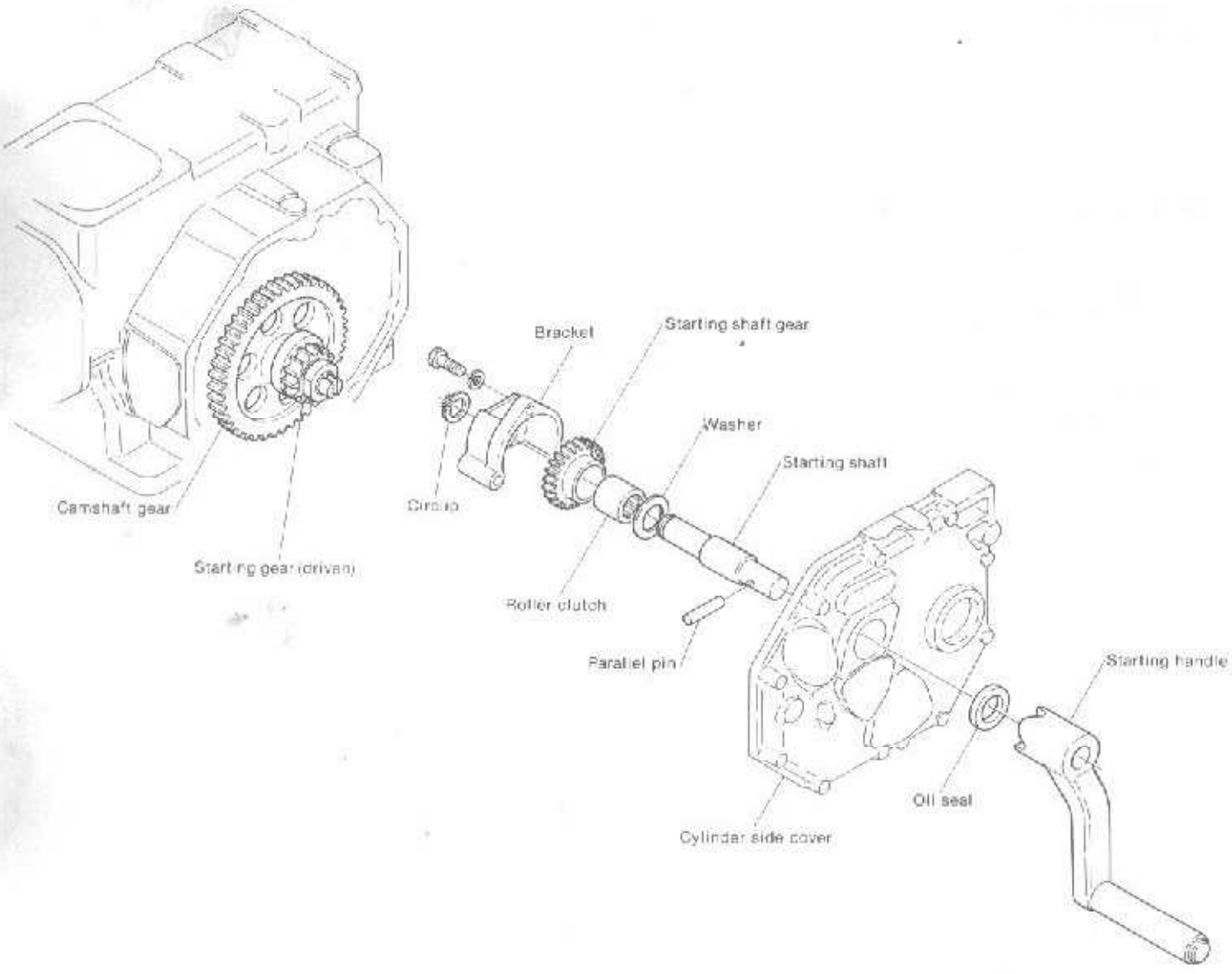
In the electric starting system the pinion of the starting motor installed on the flywheel housing meshes with the ring gear to rotate the crankshaft. The generator for charging battery is driven by the PTO shaft V-pulley.





3. Overdrive Hand-Operated System

3-1 Overdrive hand-operated system construction



In the overdrive hand-operated starting system the hand-operated starting shaft mounted on the cylinder side cover is rotated by the starting handle. The turning force is them transmitted to the driven gear mounted on the camshaft which rotates the crankshaft. Between the starting shaft and the starting shaft gear the roller clutch is installed. As for cranking during start up, the starting shaft rotates the starting shaft gear. But once the engine starts running the starting shaft is freed and will not rotate despite the rotation of the starting shaft gear.

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3-2 Specifications for overdrive hand-operated starting system

	YSM8	YSM12
Overdrive ratio = rotation of crankshaft / rotation of starting shaft	2.67	2.0
Direction of starting handle rotation	Clockwise (bow side)	

3-3 Disassembling the overdrive hand-operated starting unit

1. Remove the cylinder side cover.
2. Extract the parallel pin.
3. Remove the bracket mounting and the starting unit as a unit from the cylinder side cover.
4. Remove the circlip and pull out the starting shaft, gear and roller clutch from the bracket.

3-4 Inspection of each component

1. Inspection of roller clutch
2. Inspection of gears
   Check all teeth surfaces, if any cracks, etc. are detected, replace the gear.
3. Inspection of starting shaft
   Check the roller clutch section and bearing section for burning, wear, etc. If any noticeable defects are detected, replace.
4. If the parallel pin is bent or loose, repair or replace.
5. Check the oil seal. If there are any surface scratches, replace.

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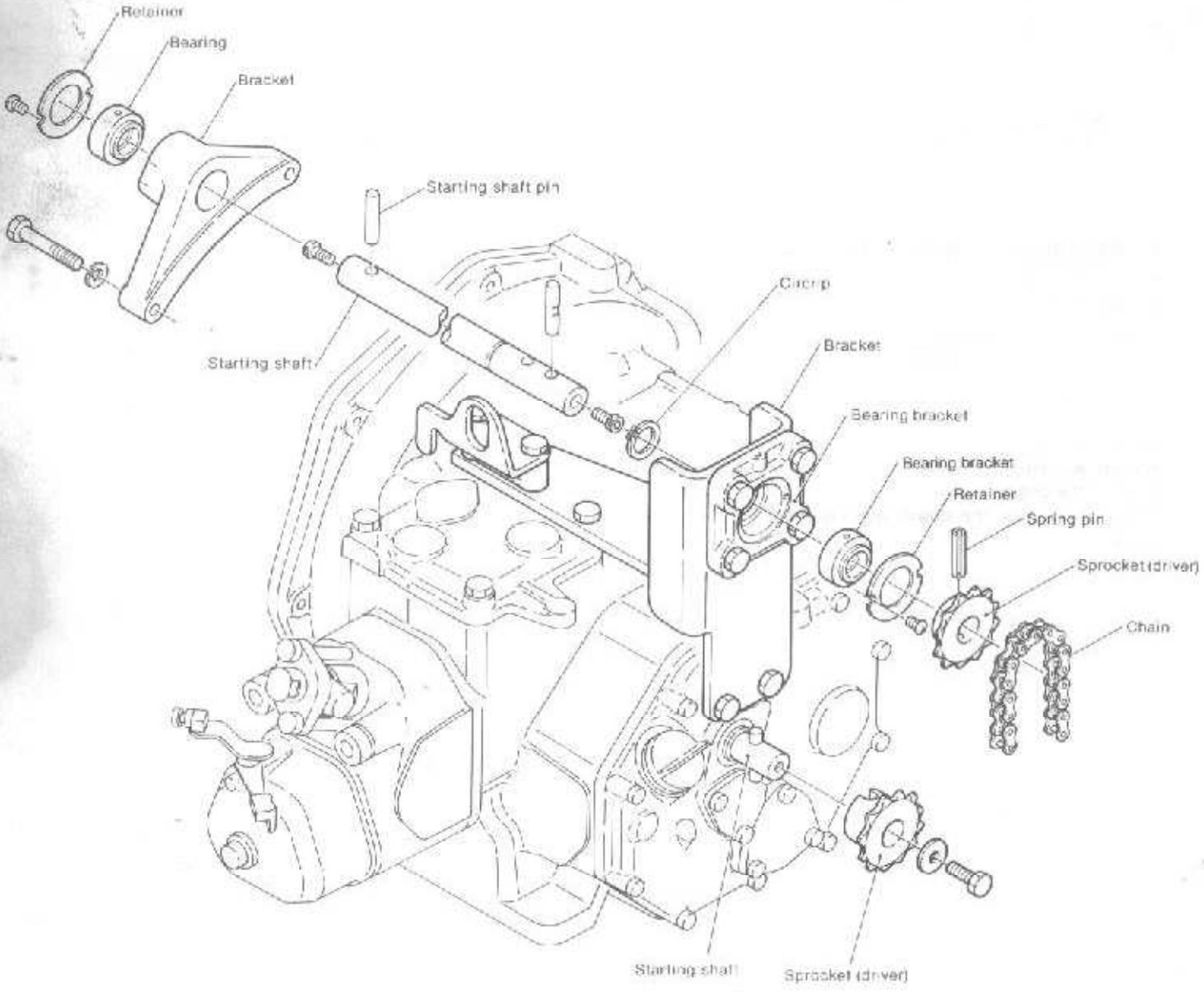
4. Chain-Overdrive Hand-Operated System

4-1 Construction of chain-overdrive hand-operated system

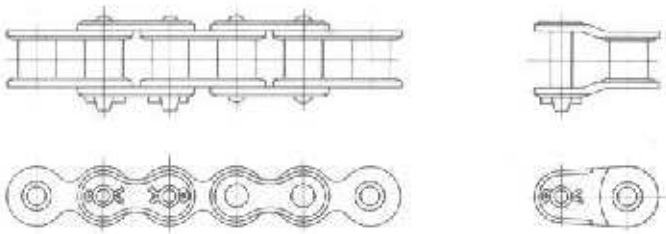
In the chain-overdrive hand-operated system the sprocket wheel, which is mounted on the starting shaft in an overdrive hand-operated system, is connected by a chain to the sprocket wheel of a separate starting shaft, mounted on the upper part of the engine, so it can be started by the starting handle.

Since the speedup ratio between the chain overdrive hand-operated system and the overdrive hand-operated system is 1:1, the force required for the rotation of the former is equal to that required for rotation of the latter. Despite this fact the chain-overdrive hand-operated system has been adopted for increased ease of operation of the starting handle, by elevating the handle rotating position, and for increased range of operation, by making cranking possible from both the bow and the stern.



4-2 Specifications for chain-overdrive hand-operated system

		YSM8	YSM12
Overdrive ratio		2.67	2.00
Direction of rotation	Bow side start	Clockwise	
	Stern side start	Counterclockwise	
Nominal No. of roller chain		43	
Pitch of roller chain		12.7 mm (1/2")	
Length of standard roller chain		42 links	42 links



4-3 Adjusting the tension on the chain

Adjust the tension on the chain by raising or lowering the position of the bearing box.

Adjusting the range using a long hole in the bearing box	±3.5 mm
Tension adjustment values	Install the chain so that the sprocket rotates easily.

If the chain has stretched to the point that its tension can not be adjusted by raising or lowering the bearing box, shorten the chain.
When shortening the chain, use coupling links or offset links.