CHAPTER 4

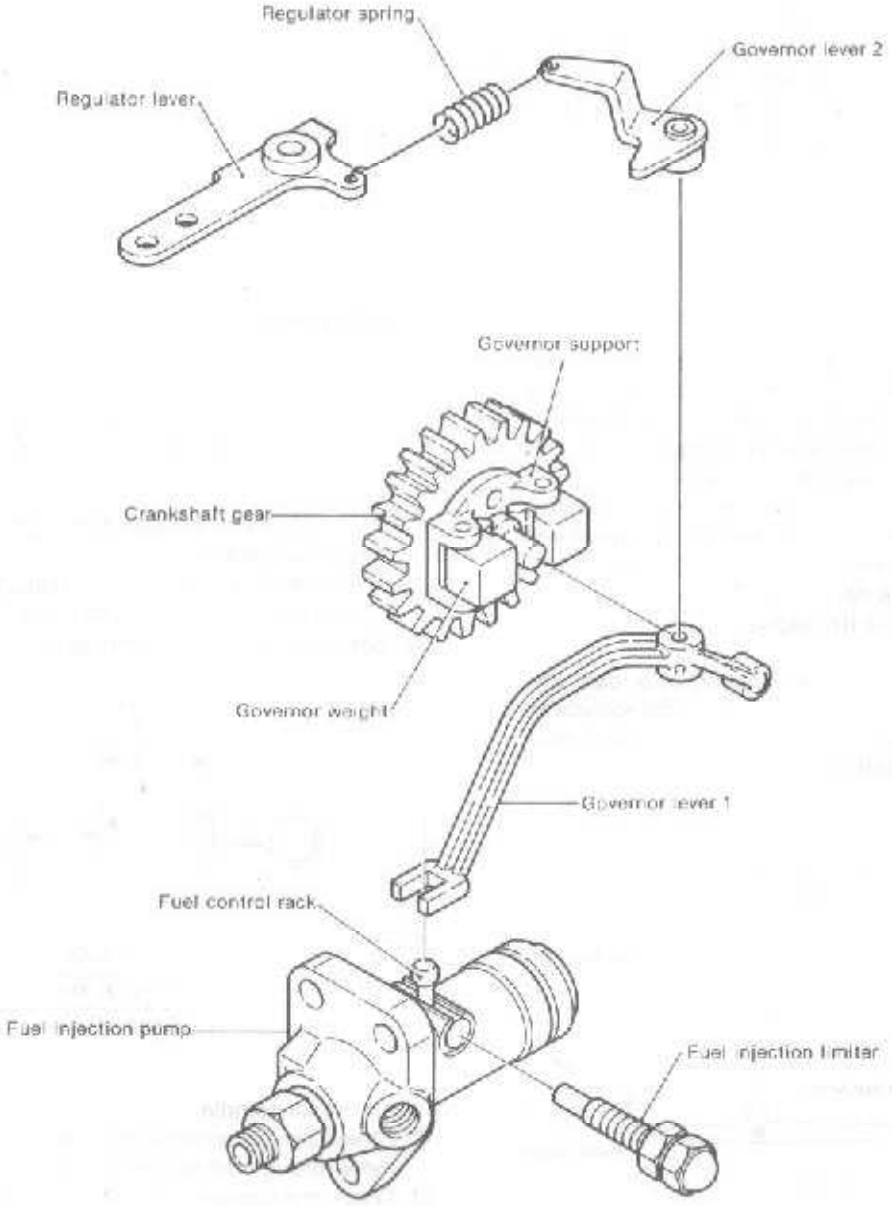
# GOVERNOR

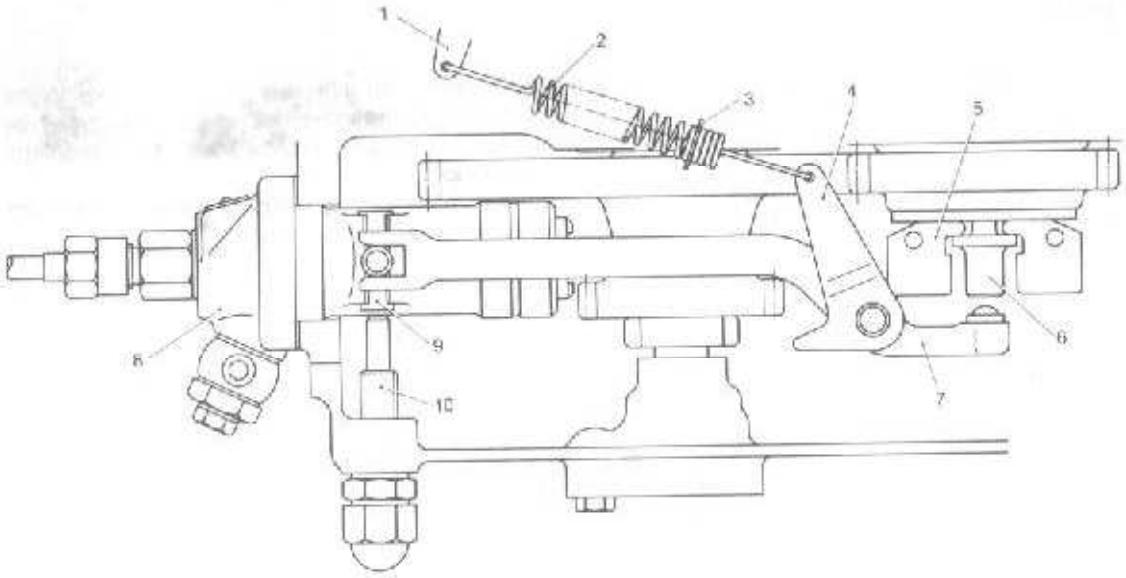
# 1. Governor

The governor serves to keep engine speed constant by automatically adjusting the amount of fuel supplied to the engine according to changes in the load. This protects the engine against sudden changes in the load, such as sudden disengagement of the clutch, the propeller leaving the water in rough weather, or other cases where the engine is suddenly accelerated.

This engine employs an all-speed governor in which the centrifugal force of the governor weight, produced by rotation of the crankshaft, and the load of the regulator spring are balanced.
The governor is remotely controlled by a wire. Refer to the "Control System" chapter for details.

## 1-1 Construction



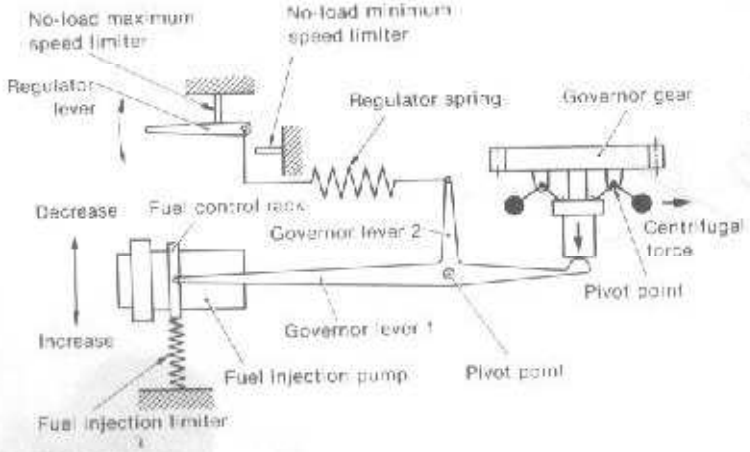



1 Regulator lever
2 Regulator spring
3 Spring hook
4 Governor lever 2
5 Governor weight
6 Governor spindle
7 Governor lever 1
8 Fuel injection pump
9 Fuel control rack
10 Fuel injection limiter

## 1-2 Operation

The position of the two governor weights (open and closed) is regulated by the speed of the engine. The centrifugal force of the governor weights pivots around the governor weight pin and is changed to axial force that acts on the spindle. This force is transmitted to governor lever 2 through governor lever 1, and lever 1 shifts the fuel control rack to increase or decrease the fuel supply. The governor lever is stabilized at the point at which the force produced by the governor weight is balanced with the load of the regulator spring connecting the regulator lever and governor lever 2.

When the speed is reduced by application of a load, the force of the regulator spring pushes the governor spindle in the "fuel increase" direction, stabilizing the engine speed by changing the position of the regulator lever.



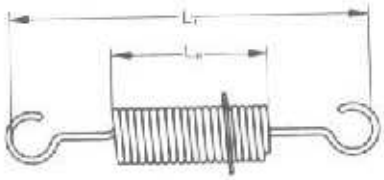

## 1-3 Performance

| | YSM8 | YSM12 |
|---|---|---|
| No-load maximum speed | 3400 rpm | 3150 rpm |
| No-load minimum speed | 650 $^{50}_{0}$ rpm | |

## 1-4 Parts inspection and replacement

### 1-4.1 Regulator spring

(1) Inspect the spring for coil damage, corrosion and hook deformation, and replace if faulty.
(2) Measure the spring's dimensions.

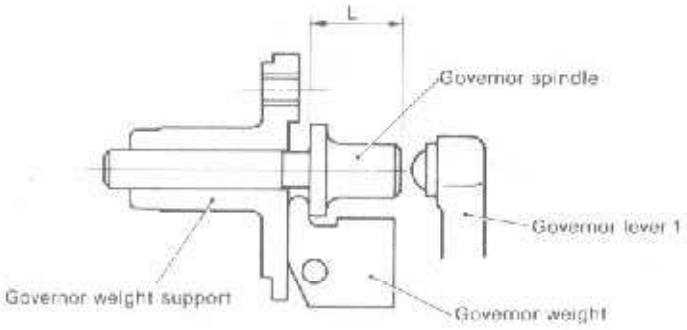



| | | YSM8 | YSM12 |
|---|---|---|---|
| Free length | $L_o$ | 25mm (0.9843in.) | 25mm (0.9843in.) |
| | $L_f$ | 93mm (3.6614in.) | 141mm (5.5512in.) |

### 1-4.2 Governor spindle

(1) Check the governor spindle for smoothness of movement through the hole in the governor weight support.
(2) Check the governor spindle flange where it comes into contact with the governor weight for contact margin and wear.
(3) Check the governor spindle tip where it comes into contact with the governor lever for contact margin and wear.

(4) Measure the clearance between the governor spindle and the governor weight support.

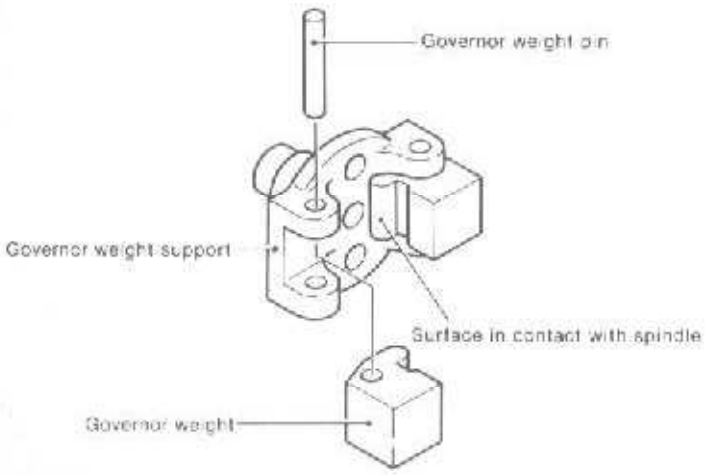



mm (in.)

| | Standard dimension | Clearance when assembled | Wear limit |
|---|---|---|---|
| Outside diameter of governor spindle | 7 (0.2756) | 0.068 ~ 0.113 (0.0027 ~ 0.0044) | 0.025 (0.0098) |
| Diameter of hole in governor weight support | 7 (0.2756) | | |
| Length (L) of governor spindle | 17 (0.6693) | — | 16 (0.6299) |

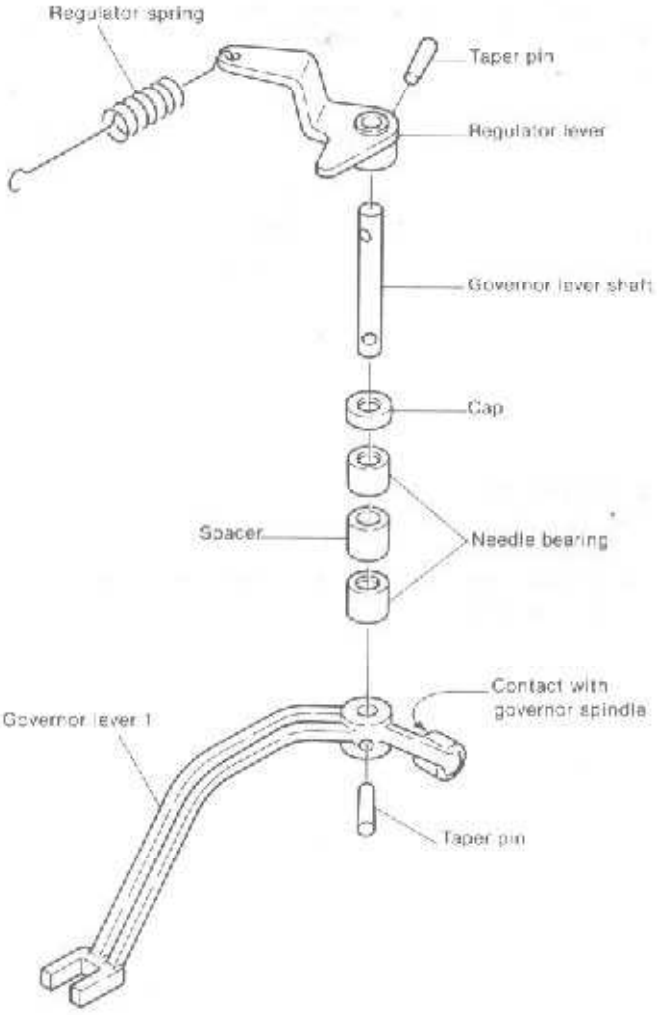
### 1-4.3 Governor weight

(1) Check the governor weight for smoothness of movement.
(2) Check the surface when it comes into contact with the governor spindle for contact margin and wear. If wear is excessive, replace it as a unit.




### 1-4.4 Governor lever shaft

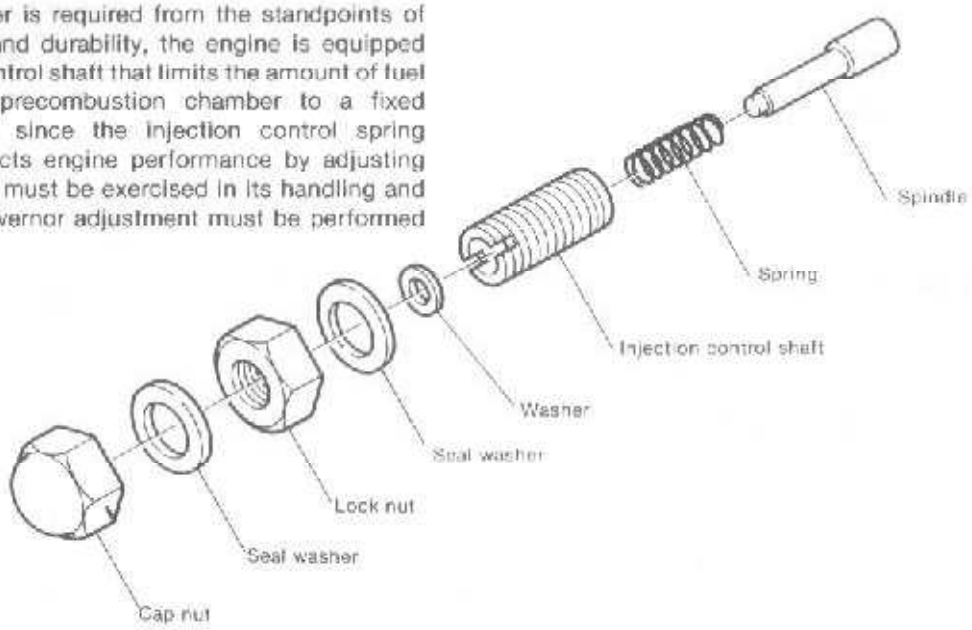
(1) Replace the governor lever shaft if there is play between the shaft and needle bearing, play when the lever is moved, or if the shaft does not move smoothly.
(2) Repair or replace the shaft if there is play between lever 1 or lever 2 and the shaft, or if the taper pin is loose.
(3) Inspect the contact and wear of the end of lever 1.



# 2. Injection Limiter

## 2-1 Construction

Since surplus power is required from the standpoints of sudden overloads and durability, the engine is equipped with an injection control shaft that limits the amount of fuel injected into the precombustion chamber to a fixed amount. Moreover, since the injection control spring (torque spring) affects engine performance by adjusting engine torque, care must be exercised in its handling and adjustment, and governor adjustment must be performed accurately.




## 2-2 Inspection

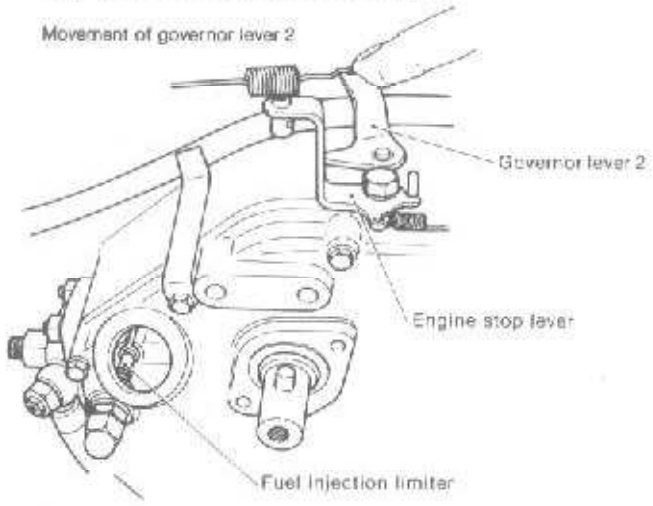
(1) Hold the end of the spindle, and check it for smooth movement.
(2) Replace the spring if it is damaged, corroded or permanently strained.

# 3. Adjusting the Governor Link

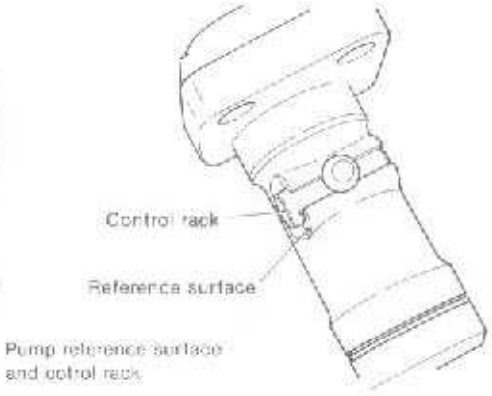
*Note:* Adjust the governor link carefully after disassembling and reassembling the engine.

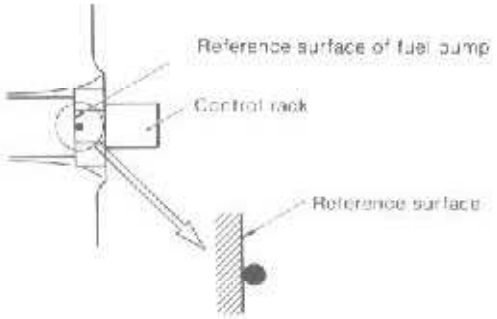
**Adjusting procedures**

(1) Remove the oiler port cap.
(2) Push the governor lever 2 toward the left until it resists slightly to make sure of the rack mark.




*Note:* 1. Do not push the governor lever too far.
2. Make sure the control rack mark from the oiler port is in the correct position. If it does not line up with the reference surface adjust it as follows:

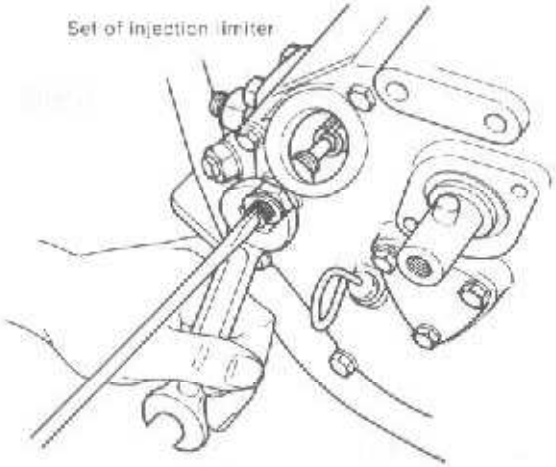



(3) Remove the cap nut of the fuel injection limiter and loosen its lock nut.
(4) While pushing the governor lever toward the left, move the fuel injection limiter so that it lines up the control rack mark with the reference surface.

*Note:* Be sure to correctly align the rack mark with the reference surface.

(5) While holding the fuel injection limiter steady, tighten the lock nut and mount the cap nut.




*Note:* Do not tighten the lock nut excessively.

(6) Attach the lid of the oiler port.

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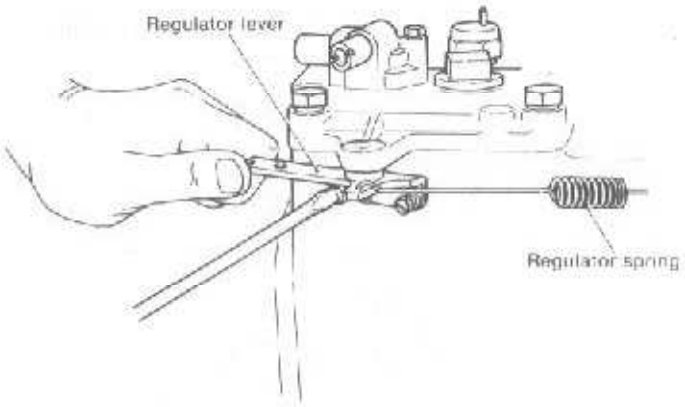
# 4. Adjusting the No-Load Speed

## 4-1 Adjusting the no-load maximum speed

The maximum speed is set with the adjusting bolt on the regulator handle. When re-adjusting, provide the speed values listed below.

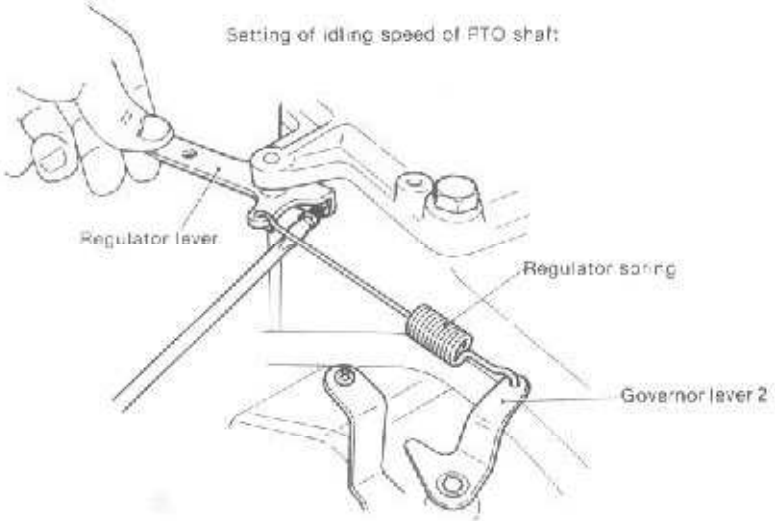



Setting of no-load maximum speed of PTO shaft

| | YSM8 | YSM12 |
|---|---|---|
| No-load maximum speed | 3400 rpm | 3150 rpm |
| Maximum speed of PTO shaft end | 3400 rpm | 3700 rpm |

## 4-2 Adjusting the idling speed (for YSM8R and YSM12R only)

Adjust the idling speed with the adjusting bolt on the regulator handle so that it provides the speed values listed below.




| | YSM8R | YSM12R |
|---|---|---|
| Idling speed | 700 rpm | 700 rpm |
| Idling speed of PTO shaft end | 700 rpm | 820 rpm |

# 5. Engine Stop Lever

With this device, governor lever 2 is moved by the engine stop lever, regardless of the position of the regulator lever, so as to adjust the fuel control rack and reduce the supply of fuel.
This device can be remote-controlled.