

**PARTS & SERVICE
NEWS**

REF NO.	AT01237
DATE	Jan. 28, 2002

SUBJECT: REPAIR OF FUEL INJECTION PUMP (ELECTRONIC GOVERNOR) ON SA6D170A ENGINE FOR GENERATOR

PURPOSE: To introduce modification procedure to prevent occurrence of malfunctioning of the fuel injection pump for the SA6D170A engines (electronic engine speed governor spec.) for power generator applications

APPLICATION: SA6D170A-1 Engines, Serial Nos. up to 21567
(Engine for power generator applications)

FAILURE CODE: A720CA

DESCRIPTION:

1. Introduction

With the SA6D170A electronic engine speed governor spec. engines for power generator applications (being equipped with the ZWX fuel injection pump), since the oil level inside the fuel injection pump while the engine is in operation is apt to drop to a lower level, lubrication for the sliding surfaces of the cam - tappet roller and lubrication for the governor linkage may become insufficient causing excessive wear of the cam or excessive wear and stiffness of the governor linkage, that is resulting in malfunctioning such as engine starting troubles and control troubles. To prevent occurrence of those malfunctioning, make the modification following the procedure being outlined in this Service News.

2. List of parts

Part No.	Part Name	Purpose of part	Q'ty	Remarks
6162-74-1312 (6162-74-1310)	Pump ass'y (Pump ass'y)	} Replacement	1 (1)	Necessary parts when modifying 6162-74-1310 into 6162-74-1311 Improved parts for already shipped engines With the identification stamping "B"
DK971514-1346 (DK029731-4630)	Bolt (Bolt)		1 (1)	
07005-01412	Gasket		2	
6162-74-5821 (6162-74-5820)	Tube (Tube)		1 (1)	
07005-01412	Gasket		3	

3. Contents of the modification

(1) Reasons for making this modification

With the SA6D170A electronic engine speed governor spec. engines for power generator applications, the oil inside the fuel injection pump is drained from two places, from the cam chamber side and from the governor side.

When the engine is started, majority of the oil flowing into the fuel injection pump will be drained through the cam chamber side draining port by the rotation of the cam and little quantity will be drained through the governor section.

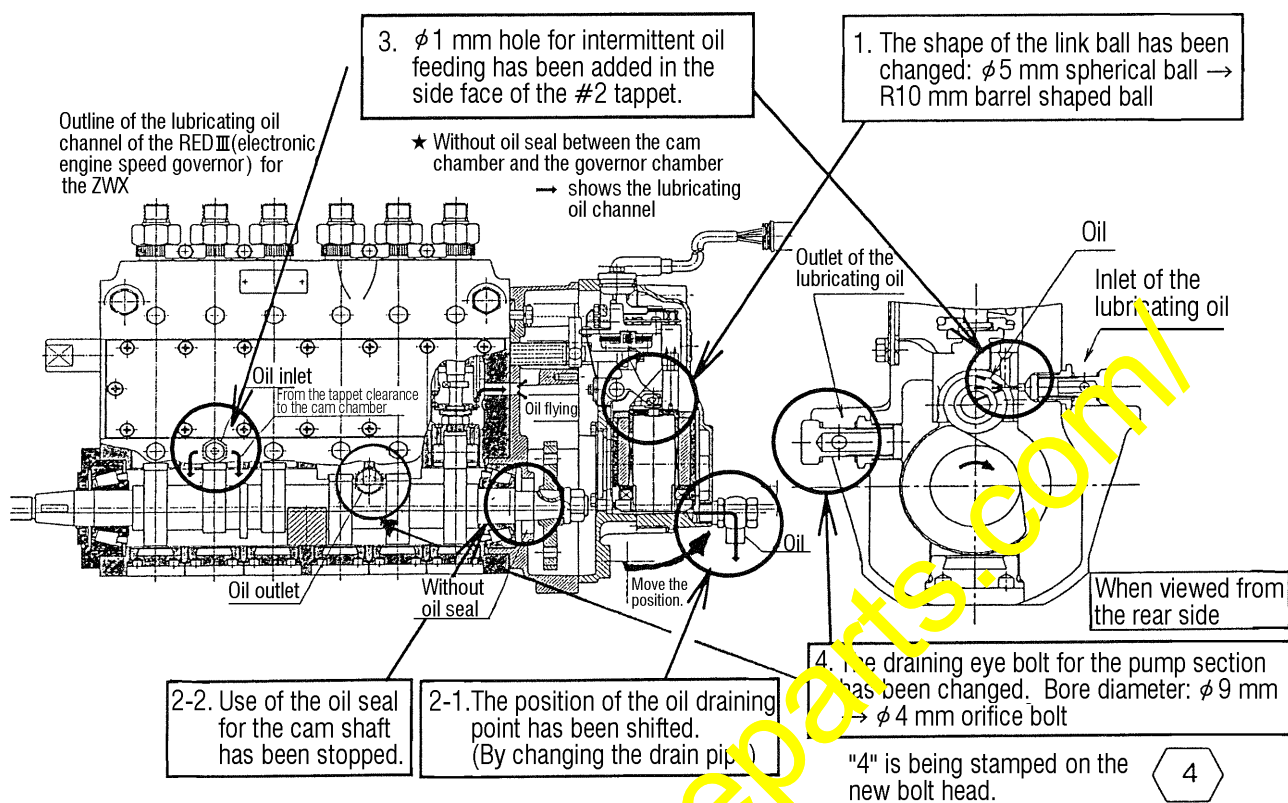
Therefore, the oil flowing into the fuel injection pump is drained promptly, and the oil level inside the fuel injection pump drops to a low level, then, lubrication for the sliding surfaces of the cam · tappet roller becomes insufficient causing excessive wears, or the oil splashing quantity inside the governor section becomes insufficient causing wears and stiffness of the governor linkage section, thus resulting in malfunctioning such as engine starting troubles and control failures. The improved fuel injection pump has been developed to prevent occurrence of the those malfunctioning.

(2) Modification history of the fuel injection pumps and the contents of the modifications

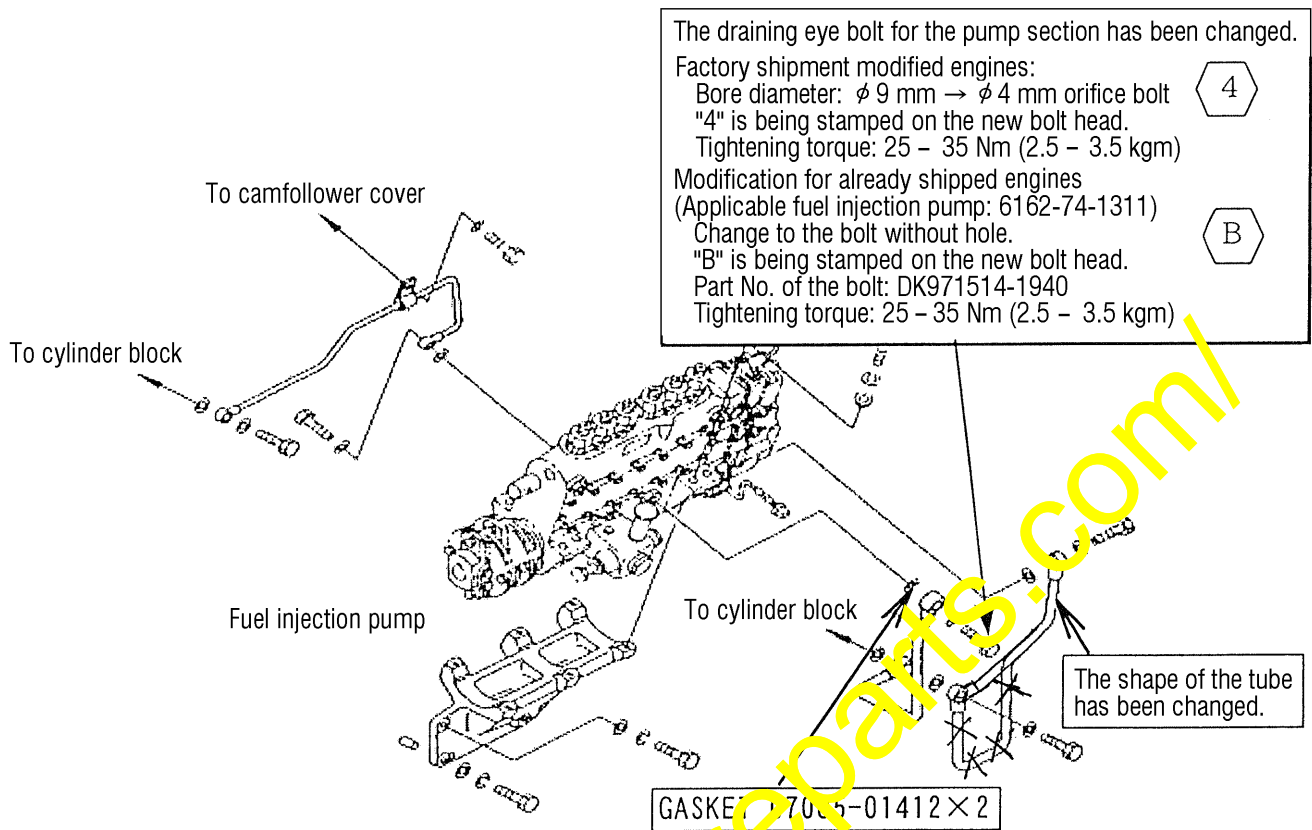
1) Modification history of the fuel injection pumps

Part number of the fuel injection pumps	6162-74-1310	6162-74-1311	6162-74-1312	
Serial numbers of the applicable engines	— #20718	#20719 — #21567	#21568 —	
Contents of the modifications	1. The shape of the link ball being used inside the governor has been changed: 1) $\phi 5$ mm spherical ball → R10 mm barrel shaped ball	—	○	○
	2. The oil level inside the governor chamber has been raised: 1) Use of the oil seal for the cam shaft has been stopped. 2) The position of the oil draining port has been shifted.	—	○	○
	3. The oil feeding quantity has been increased: 1) $\phi 1$ mm hole has been added in the #2 tappet.	—	—	○
	4. The oil flow out quantity from the cam chamber has been decreased: 1) The hole of the draining bolt has been changed. Hole diameter: $\phi 9$ mm → $\phi 4$ mm	—	—	○

2) Contents of the modifications of the fuel injection pumps



3) Contents of the modifications of the oil draining circuit



As the exclusive part for modification of already shipped engines (to modify the fuel injection pump from 6162-74-1310 to 6162-74-1311), the joint bolt "without hole" to use for the oil draining circuit of the cam chamber side of the fuel injection pump has been developed.

By this modification, oil drainage from the cam chamber side will be stopped and, since oil drain will then be made from the governor side only, the oil level inside the fuel injection pump will be raised thus making it possible to improve the lubrication status inside the fuel injection pump.

"B" has been stamped on the bolt head of the above joint bolt without hole for the identification purpose.

4. Modification procedure

4-1. When modifying the fuel injection pump to the final improved pump 6162-74-1312
 (Applicable fuel injection pumps: 6162-74-1310 and 6162-74-1311)

(1) Replace the pump.

When replacing the fuel injection pump, refer to the shop manual.

(2) Replace the oil drain tube. (Applicable fuel injection pumps: 6162-74-1310)

Since the position of the oil draining port of the fuel injection pump is shifted to a point behind the governor, replace the oil drain tube.

(It is not necessary to replace the drain tube when making this modification with the fuel injection pump 6162-74-1311.)

(3) Replace the draining bolt for the pump section. (Applicable fuel injection pumps: 6162-74-1310 and 6162-74-1311)

Since the identification stamping "4" is being stamped on the head of the drain bolt being installed to the final improved pump (6162-74-1312), check and confirm this stamping before replacing the fuel injection pump.

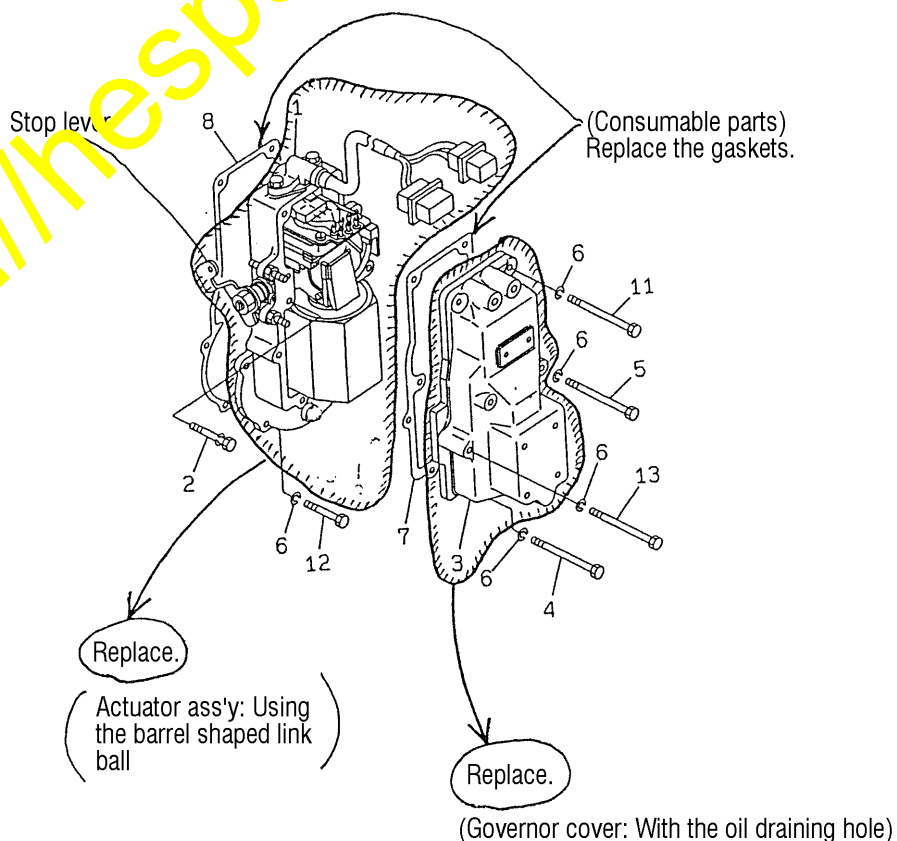
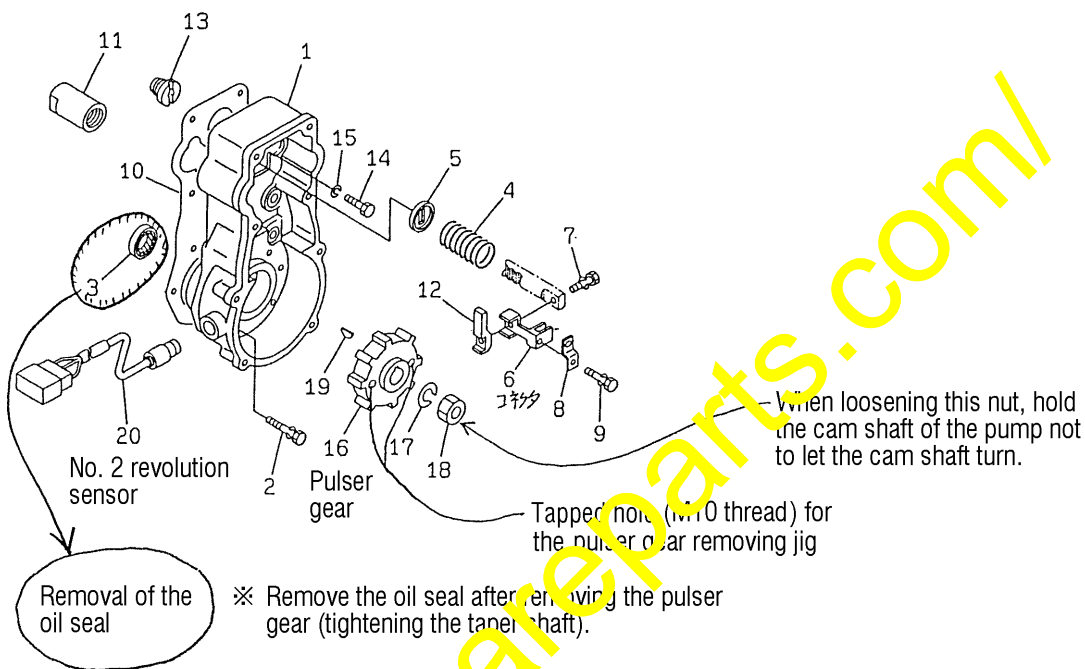
4-2. Modification procedure:

When modifying the fuel injection pump 6162-74-1310 to 6162-74-1311

(1) Modify the governor.

When modifying the governor, request the agent of Bosch Automotive Systems Corporation to make this modification.

The contents of the modification are as follows:

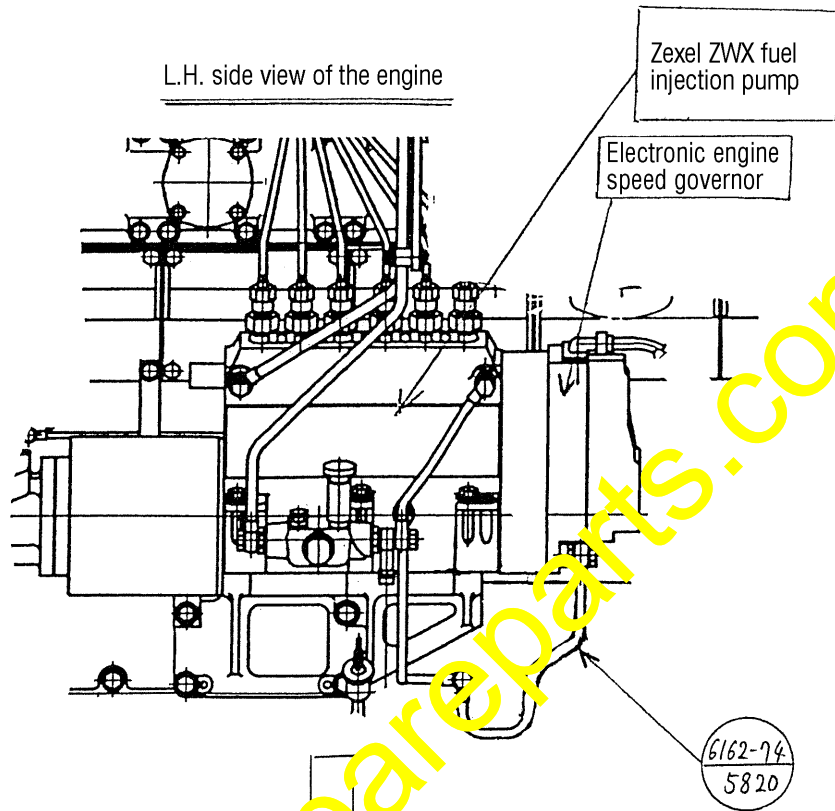


(2) Replace the oil draining tube.

Since the position of the oil draining port of the modified governor is shifted to a different point, replace the oil drain tube as per the instructions given in the drawing below.

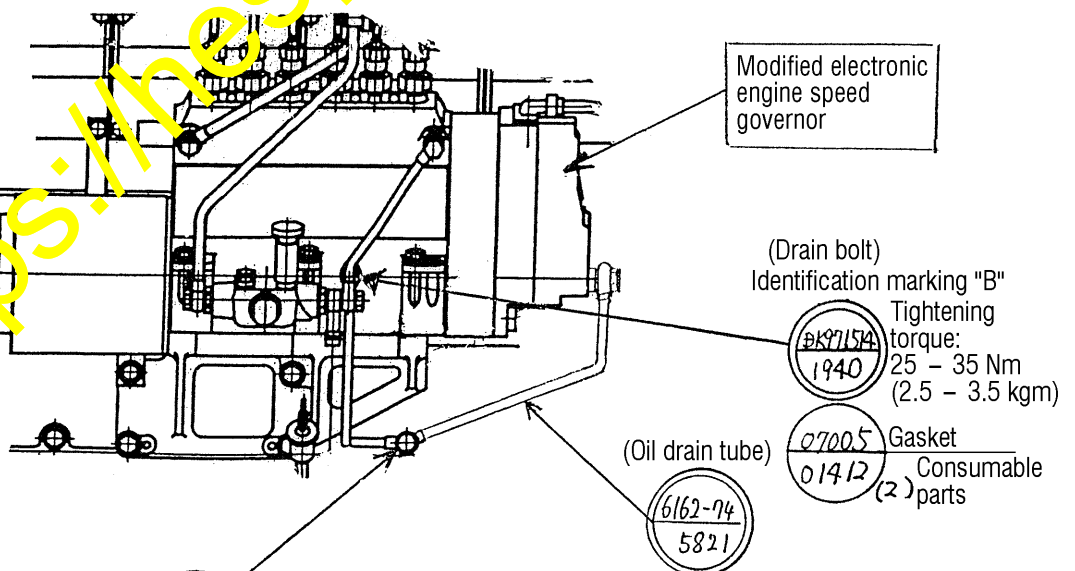
Current state

6162-74-1310



After the modification

6162-74-1311



6127-71 Joint bolt
5710 Reuse this part. Tightening torque:
20 - 30 Nm (2.0 - 3.0 kgm)

07005 Gasket
01412 Consumable parts

(3)

(3) Contents of the modification for the North American markets (DCA600SSK)

The contents of the modification for the North American markets are basically the same as the contents of the modification for the Japanese market.

However, since the engines for the North American markets carry the certification for the EPA regulations, the fuel injection pump also carries the same certification.

Since the modification according to this Service News is to modify the fuel injection pump from 6162-74-1310 into 6162-74-1311, it becomes necessary to change the part number stamping on the nameplate of the fuel injection pump.

(Refer to page 13.)

The address of the North American Area Agent of the Bosch Automotive Systems Corporation is as follows:

Pump Service in USA

- Contact person: Mr. Jeff Wunderl
 Robert Bosch Corporation
 Sales Group
 2800 South 25th Avenue Broadview, IL 60155-4594
 Tel 708-865-5225 Fax 708-681-7179
 E-mail Address jeffery.wunderl@us.bosch.com

- Organization in USA

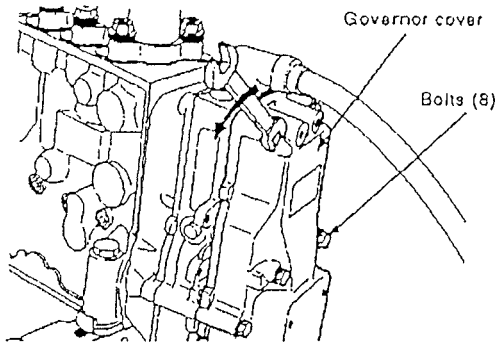
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    graph TD
      RB[Robert Bosch] --- CD1[Central Dist.]
      RB --- CD2[Central Dist.]
      CD1 --- SD[Service Dealer]
      RB -.-> JWD["Mr. Jim Dewberry  
Mr. Jeff Wunderl"]
      ZEXEL[Zexel USA]
    
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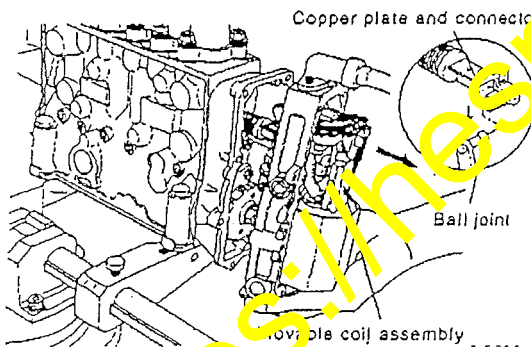
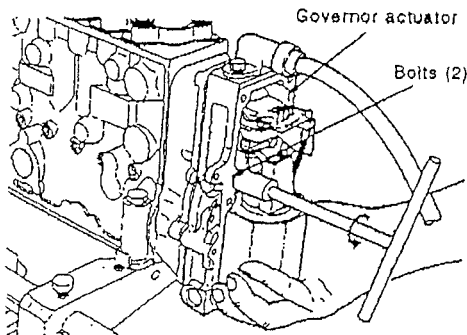


MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE

Governor disassembly:



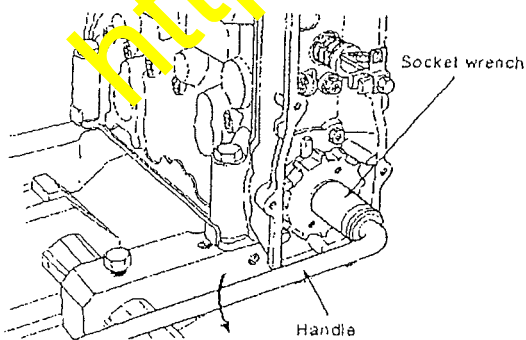
1. Check and see if there are any missing parts of the received parts.
2. Before starting the job, be sure that the power-source key is OFF.
3. Remove the cramp of the governor actuator cable.
4. Disconnect the governor connector.
5. Loosen the eyebolt (SW19) at the lubrication oil outlet on the lower part of the governor cover.
6. Unhook the wire from the stop-lever.
7. Remove the lubrication oil outlet pipe (engraving part).
8. Remove the six bolts (SW10) of the governor cover.
9. While holding the governor actuator with a hand, remove the two fixing bolts (SW10).



10. Lift the linear DC motor's movable coil assembly and tilt the governor actuator a little. Then, move the link's ball joint down from the connector.

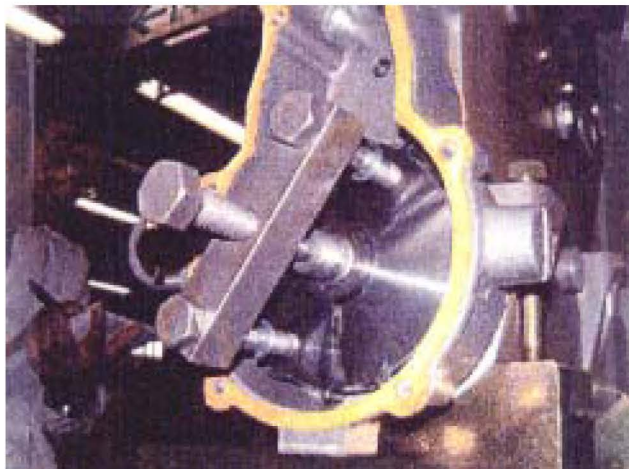
Advice:

Do not use excessive force. Excessive force may deform or damage the copper plate for the control-rack position sensor or the ball joint. Carefully perform this service.

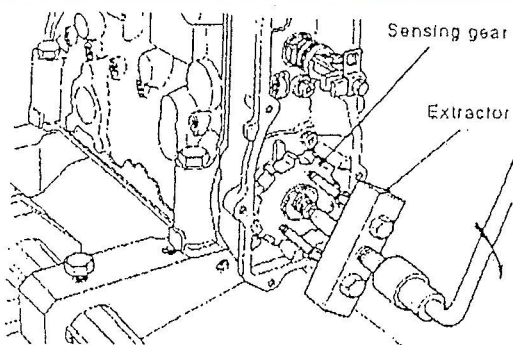


11. Loosen the nut (SW19) fixing the sensing-gear, and take off the spring washer.

MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE



12. Attach the extractor (157927-4320) to the pulsar gear as shown in the photo.



13. Tighten the extractor's center bolt (SW19) to move the pulsar gear from the camshaft.

Advice:

Be careful not to drop the woodruff key at this service step.



14. As shown in the photo, insert a screwdriver under the oil seal rubber as if cutting the rubber so that the oil seal can come out easily.

Advice:

Do not push the screwdriver's tip so strong as to push out the seal into the pump housing side.



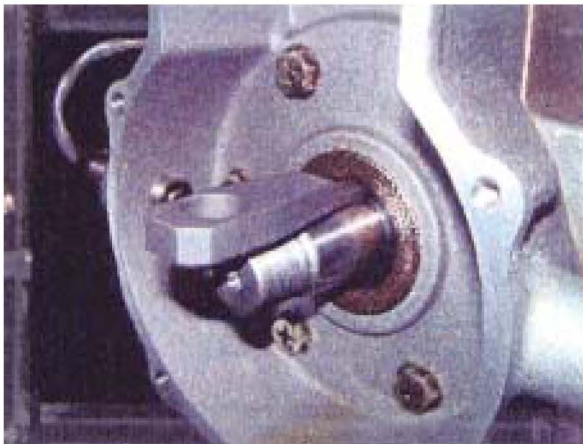
15. Insert the extractor (157992-8500) with its claw facing upward into the driver-hole as shown in the photo.

Tap around the oil seal lightly so that the adhesive may be losing its effect.

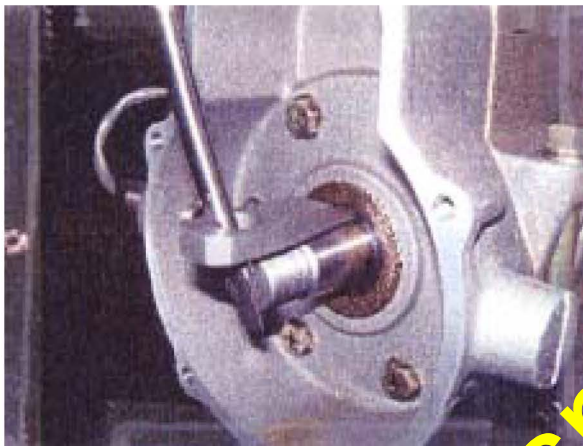
Deforming the seal slightly can decrease the force imposing on the extractor.

(Extracting the seal may be easier)

MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE



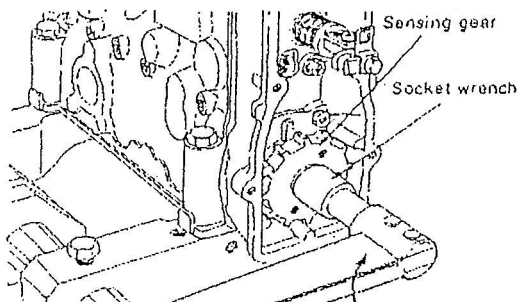
16. Raise the fork parallel to the face of the governor housing as shown in the photo.



17. Insert the driver into the extractor's hole as shown in the photo.



18. Push the driver down to the governor side with the cam's top as fulcrum and pull out the oil seal.

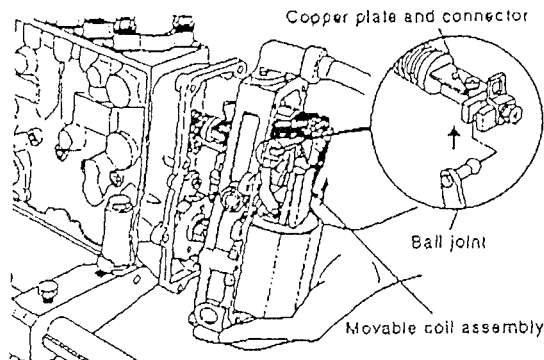


Governor reassembly:

1. Make sure that the woodruff key is installed securely on the camshaft.
2. Install the pulsar gear. Put the spring washer and round nut in order, and tighten the round nut at the specified fixing torque;

Specified tightening torque: 49~59 N.m
(5.0~6.0 kaf-m)

MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE



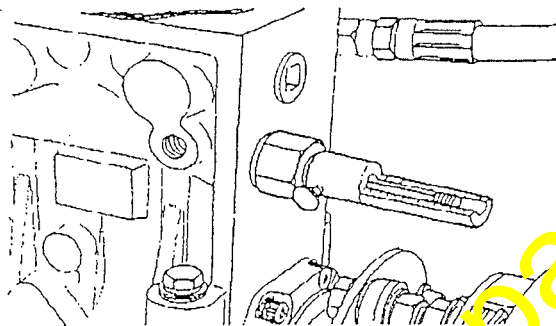
3. Install a new gasket. Be sure not to use a broken gasket or install it slantingly.

4. Install a new governor actuator. Tighten the bolts (SW10) at specified torque.

Specified torque: 6.9~8.8N.m (0.7~0.9 kgf-m).

Advice:

Be careful not to let the rack sensor hit the copper plate.



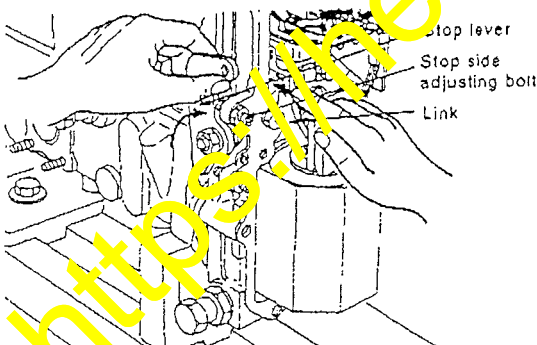
5. Stop lever adjustment

1) Remove the rack cap. Attach the measuring device (1-5702-6350: vernier-type) on the top of the control rack.

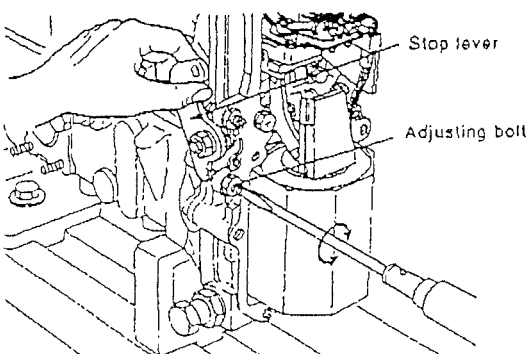
2) Pull the control rack fully toward the governor side, and set up the zero position for the measuring device.

Advice:

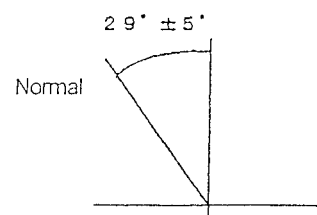
At this step, tighten slightly the stopper bolt of the stop lever shaft so that the bolt does not interfere with the link.



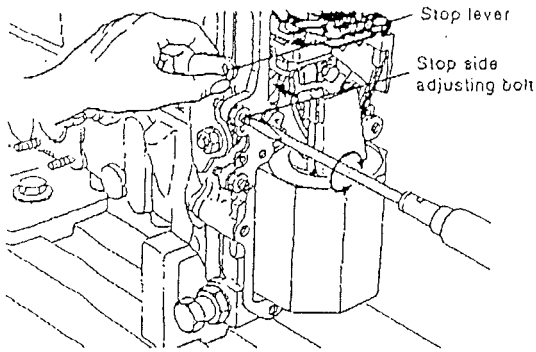
3) Push the control rack toward fuel-increasing direction (as arrow-marked)



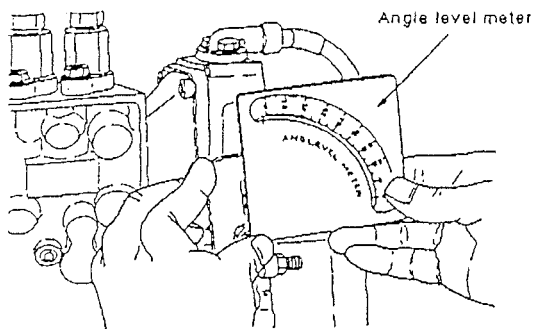
4) Adjust the bolt and set the stop lever at the below angle.



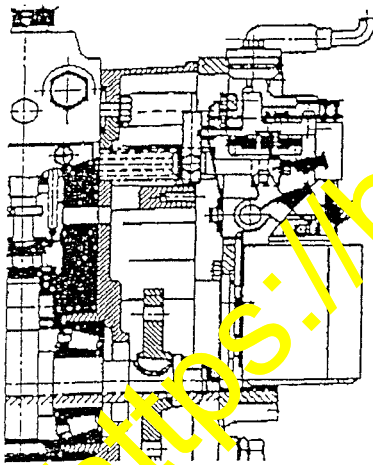
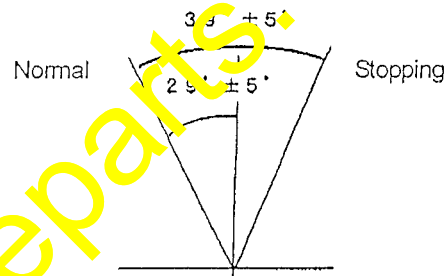
MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE



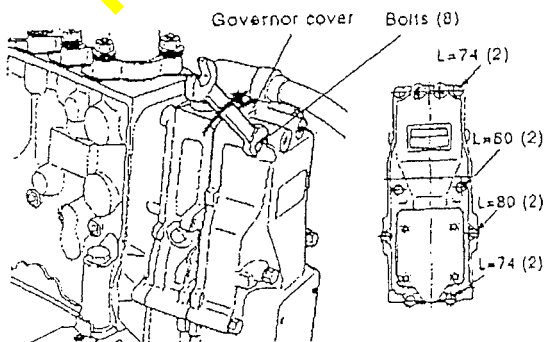
5) Shift the stop lever to stopping – side, and at the same time push the control rack toward fuel-increase direction (as arrow-marked in the picture).



6) Adjust the adjusting bolt and set the stop lever on stopping-side at the below angle.



6. Before installing the governor cover, put engine oil (about 250cc) into the governor by pouring the oil over the link arrow-marked in the picture.



7. Attach a new gasket to the governor-housing, install the governor cover and tighten the bolts (SW10) at the specified torque.

Specified torque: 6.9~8.8 N.m (0.7~0.9 kgf.m)

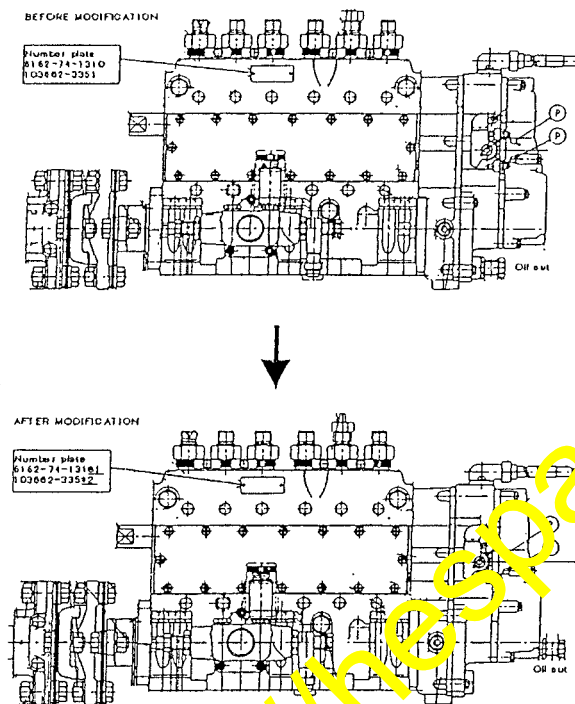
Advice:

The gasket will stay in place if the governor housing is lightly coated with grease.
Put the gasket flat on the housing section face.

MODIFICATION PROCEDURE FOR KOMATSU RED GOVERNOR ON ENGINE

8. Replace the existing pipe at the lubrication oil outlet with a new pipe supplied by Komatsu and also the eye bolt (SW19) with a new one and tighten the bolt at the specified torque.

Specified torque: 20~30 N.m (2.0~3.0 kgf.m)



9. Insert securely the connector of the governor actuator and the connector on engine side.
10. Stamping new Injection pump number.
Erases the last digit of the number, and stamping additional numbers as follows.

6162-74-1310 change to 6162-74-1314#1
103662-3351 change to 103662-33542

10. Start engine.
Check and see if any oil leak from the reassembled portions.
11. Adjust the length of the stopper bolt so that shifting the stop lever will stop engine operation. At this adjustment, request Komatsu engineer to confirm that shifting the engine will surely stop by shifting the stop lever.
12. The stopper bolt should be sealed after the above adjustment.
13. Put the cramp of the governor actuator cable.
See that both cables have some play in lengths when putting the cramp.
14. When all the above service procedures have been completed, request Komatsu engineer to confirm that the governor actuator replacement has been finished with the results expected by Komatsu side.
15. Clean up the working site and then finish this replacement service.