

WSM

WORKSHOP MANUAL KUBOTA EXCAVATOR

KX36-3 KX41-3S, KX41-3V

Service Chapter

Kubota

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d. Piping

(1) General precautions

- Tightening the pipe socket to the specified torque. If too tight, the socket itself or a hydraulic component may get damaged. If too loose, an oil leak may result.
- In connecting a new hose or pipe, tighten its nut first to the specified torque and then turn it back (about 45°). Then tighten it again to the specified torque. (Do not do this to the sealing tape-applied hose or pipe.)
- When disconnecting a vertical hose or pipe, separate its bottom connection first.
- In disconnecting and reconnecting the hose and pipe, be sure to use two wrenches. With one wrench, restrain the mating part to allow no twist.
- Check the mating connector's sleeve and the hose's taper for dust deposits and scratches.
- When the pipe socket has been tightened up, wipe the joint clean. Apply the maximum operating pressure 2 or 3 times to make sure there is no oil leak.

(2) Hydraulic hose

Check the hydraulic hose for too tight a connect or twist.

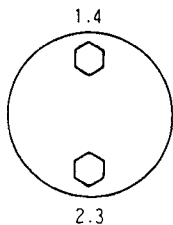
* Excessively tight contact

Let's suppose that a hose is in contact with another hose or other part. If the hose is pulled away by a force of 2 kg but still in contact, it means the contact is too tight.

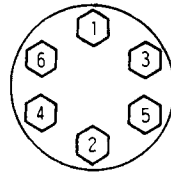
(3) Precautions in tightening the bolts and nuts

- Use bolts of specified length.
- Do not over tighten the bolts: Its threads may get deformed or the fixed part may get damaged. Do not undertighten the bolt either: It may get loose.
- In other words, tighten the bolt to the specified torque.
- Tighten the bolts and nuts diagonally for even tightness.

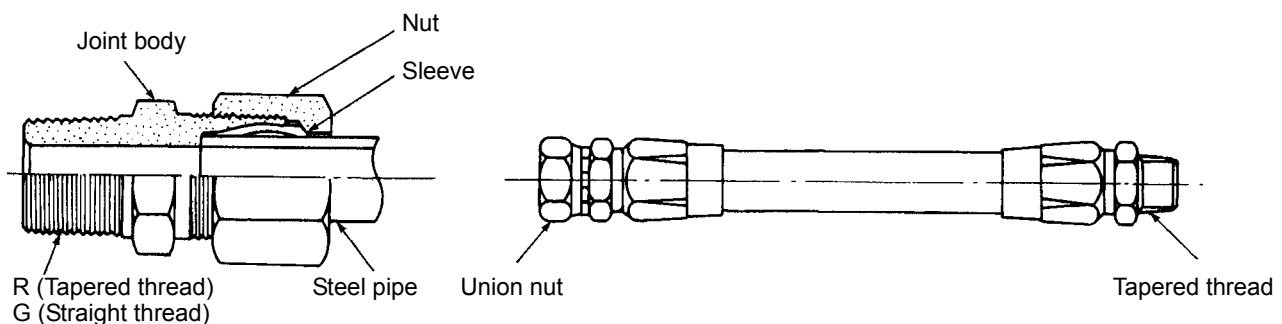
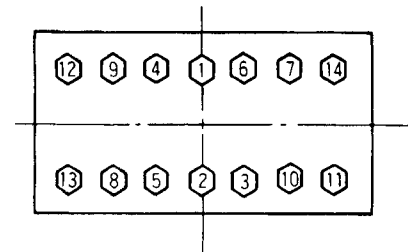
Top and bottom alternately



Diagonally



Diagonally starting from center



b. Machine specifications

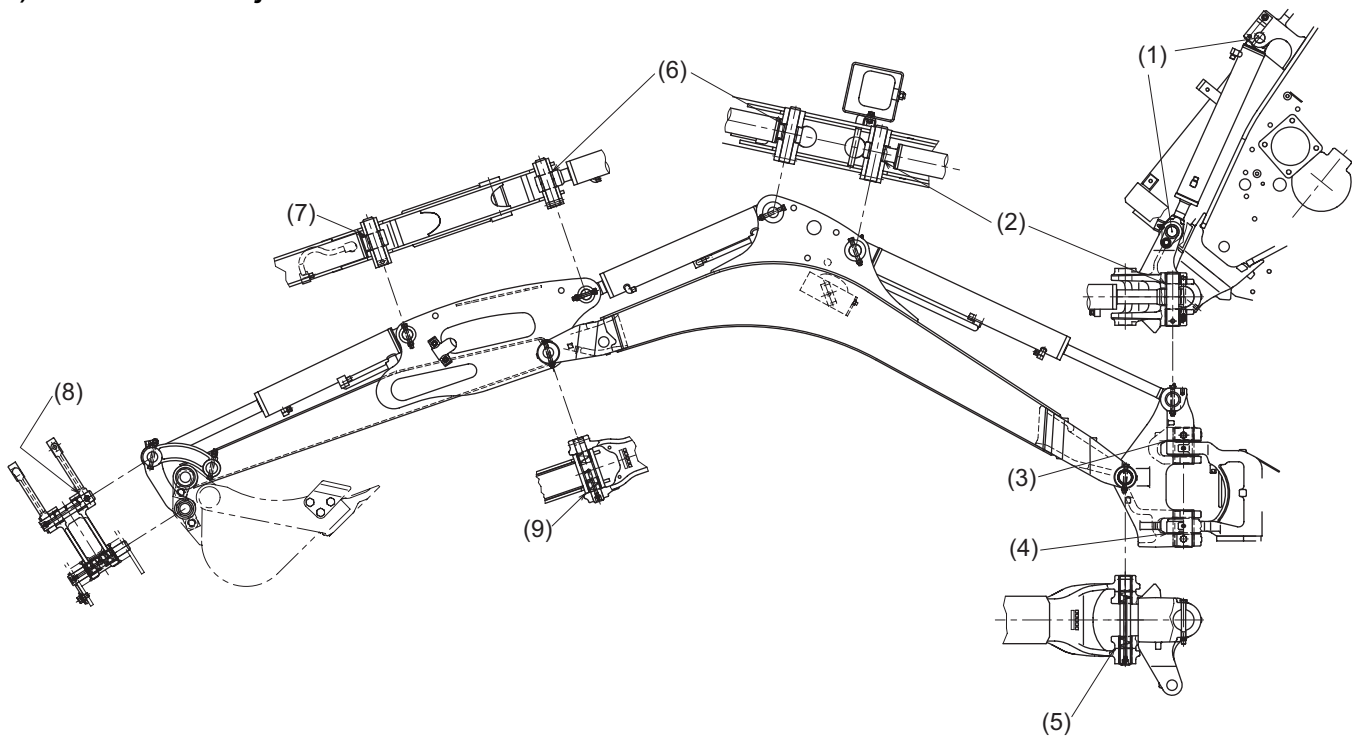
(1)EU version

		Unit	KX36-3	KX41-3S	KX41-3V
Engine					
Type			Vertical, water-cooled 4 cycle, 3 cylinders diesel		
Model			D782-BH-3	D902-BH	D902-EBH
Output power (ISO3046)		kW PS	9.3/2300 12.6/2300	11.6/2300 15.8/2300	←
Displacement		cc	778	898	←
Dimensions					
Overall length		mm	3670	3665	←
Overall width		mm	990	←	1300/994
Overall crawler width		mm	990	←	1300/994
Overall height	Canopy/cab	mm	2283/2283	←	←
Min. ground clearance		mm	167	158	←
Max. digging depth	STD. Arm	mm	-	-	-
	Long Arm	mm	2227	2370	←
Max. digging height	STD. Arm	mm	-	-	-
	Long Arm	mm	3458	3540	←
Max. digging radius	STD. Arm	mm	-	-	-
	Long Arm	mm	3782	3910	←
Max. dumping height	STD. Arm	mm	-	-	-
	Long Arm	mm	2366	2455	←
Swing angle (left/right)		deg	73/50	←	←
Travel speed	Low speed	km/h	2.2	2.4	2.2
	High speed	km/h	-	4.3	4.0
Swivel speed		rpm	9.1	←	←
Max. traction force	Low speed	kN kgf			
	High speed	kN kgf			
Performance					
Tumbler distance		mm	1090	←	1230
Tread		mm	760	←	1000
Crawler width × No. of shoe × pitch (Rubber)		mm	230 × 32 × 96	230 × 35 × 96	←
Bucket					
Capacity CECE heaped		m ³	0.035	0.04	←
Width		mm	402	450	←
Dozer					
Width × height		mm	990 × 230	←	1300 × 230
Lift above GL / below GL		mm	180/193	←	201/205

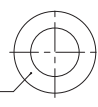
	Unit	KX36-3 (EU)	KX41-3S, V (EU)	KX41-3V (PP)	Remarks
Traveling motor	kg lbs	17 37.5	←	←	
Swivel motor	kg lbs	15 33.1	←	←	
Swivel frame cover, L	kg lbs	8.4 18.5	←	7.95 17.5	
Swivel frame cover, R	kg lbs	6.8 15.0	←	6.55 14.4	
Pump housing	kg lbs	5.9 13.0	←	←	
Rear bonnet	kg lbs	7.7 17.0	←	8.5 18.7	
Rubber mat	kg lbs	2.7 6.0	←	23 5.1	
Unload valve	kg lbs	3.7 8.2	5.2 11.5	1.3 2.9	
Sprocket		4.5 9.9	←	4.6 10.1	
Idler assy		17.8 39.2	←	←	
Control valve without adaptor	kg lbs	14 30.9	←	←	
Boom cylinder	kg lbs	11.6 25.6	←	14.5 32.0	With protector
Arm cylinder	kg lbs	10 22.0	11 24.3	11.5 25.4	
Bucket cylinder	kg lbs	9 19.8	10.2 22.5	10.5 23.1	
Swing cylinder	kg lbs	9.5	←	9.4 20.7	
Dozer cylinder	kg lbs	7.3 20.9	←	7.4 16.3	
Rotary joint	kg lbs	12.6 27.8	←	12.7 28.0	
Track cylinder	kg lbs	-	8.6 19.0	8.2 18.1	

The weights listed above is mostly based on calculations and slightly different from actual ones.

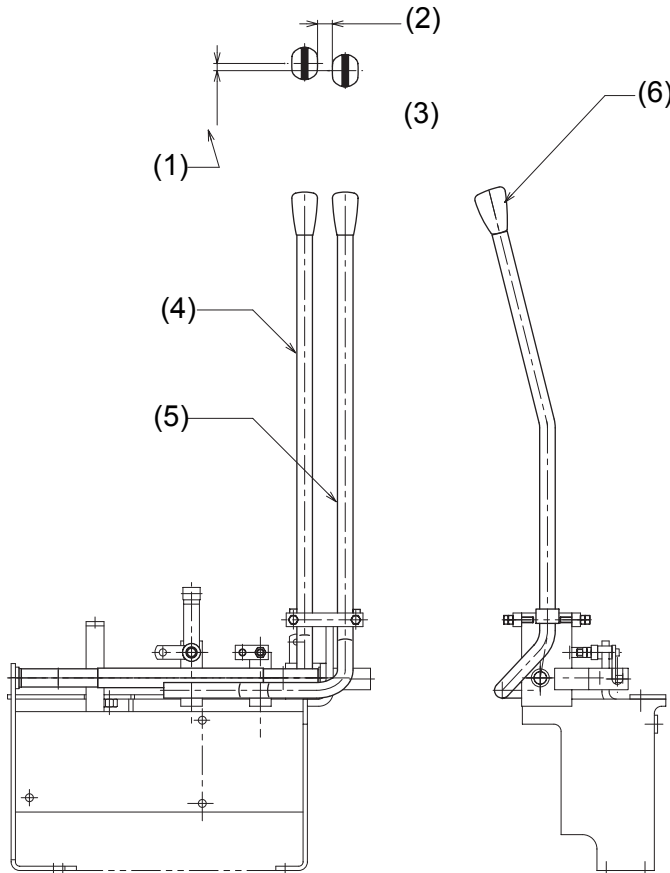
(4) Clearance adjustment



- | | |
|--|-----------------|
| (1) 68721-6697 Shim (0.5, 60-31) SPCC
68051-6633 Shim (1.0, 60-31) SPCC
68051-6634 Shim (1.6, 60-31) SPCC
* Insert a number of shims according to the clearance on the swing cyl bottom side. | } Selective use |
| (2) 68741-6686 Shim (1.0, 60-36) SPCC
68741-6687 Shim (1.6, 60-36) SPCC | } Selective use |
| (3) RG138-6644 Thrust collar (2.3, 92-51) SK5M
* Refer to the mounting method of thrust collar. | |
| (4) RG138-6644 Thrust collar (2.3, 92-51) SK5M
RG138-6648 Thrust collar (2.0, 92-51) SK5M
RG138-6649 Thrust collar (2.5, 92-51) SK5M
* Refer to the mounting method of thrust collar. | } Selective use |
| (5) RG246-6762 Shim (0.5, 70-36) SPCC | |
| (6) 68741-6686 Shim (1.0, 60-36) SPCC
68741-6687 Shim (1.6, 60-36) SPCC | } Selective use |
| (7) 68741-6686 Shim (1.0, 60-36) SPCC
68741-6687 Shim (1.6, 60-36) SPCC | } Selective use |
| (8) 68741-6686 Shim (1.0, 60-36) SPCC
68741-6687 Shim (1.6, 60-36) SPCC | } Selective use |
| (9) 68741-6686 Shim (1.0, 60-36) SPCC
68741-6687 Shim (1.6, 60-36) SPCC | } Selective use |

1. Front Play * Pin on fulcrum Thrust direction Clearance	0.6 mm max. * If the play exceeds 0.6 mm, add some shims and make adjustments. (Use the shims shown in the illustration.)
2. Vertical clearance between swivel frame and swing bracket.	+ 0.3 ~ +1.3 mm
3. Use the shim and thrust collar selectively with each part.	
4. Installation of thrust collar	Apply grease on both surface. 

b. Travel lever



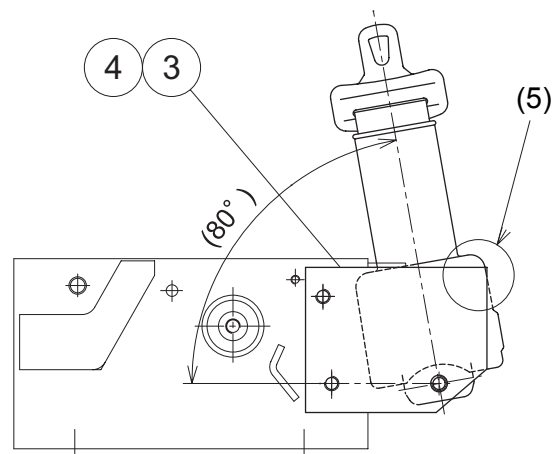
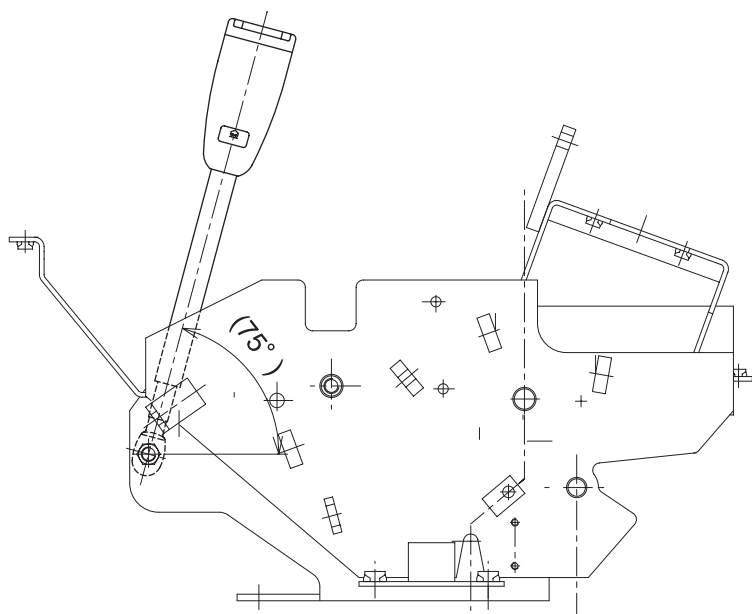
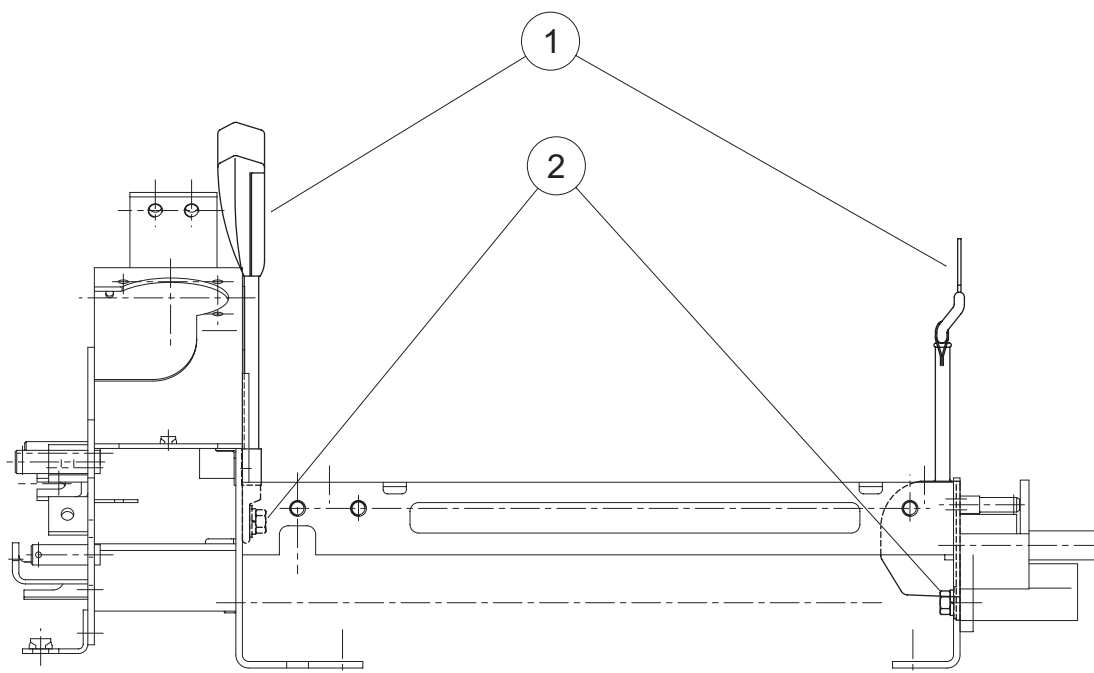
1. Adjustments of lever to neutral position Mounting direction and angle	Mount the levers as shown in the illustration.	Improper position ↓ Improper control
2. Travel lever rotation	The levers must return to the neutral position promptly after operation.	Improper return ↓ Improper action
3. Travel lever adjustments 1) Forward/Backward tolerance of left and right levers 2) Clearance of left and right levers	→ 5 mm (max.) (0.2 in) → 5 ~ 25 mm (EU) 5 ~ 14 mm (KTC) (0.2 ~ 0.55 in)	Levers not aligned ↓ Contact between levers Improper action
4. Grip mounting Mounting direction and angle	Mount the grips securely. The grips must be in backward/forward directions.	Improper assembly ↓ Grips rotate
5. Check items after mounting	The valve spool must operate full stroke. The valve spool must operate smoothly.	Improper action ↓ Increase in required operational power

Adjust the traveling lever as shown below table.

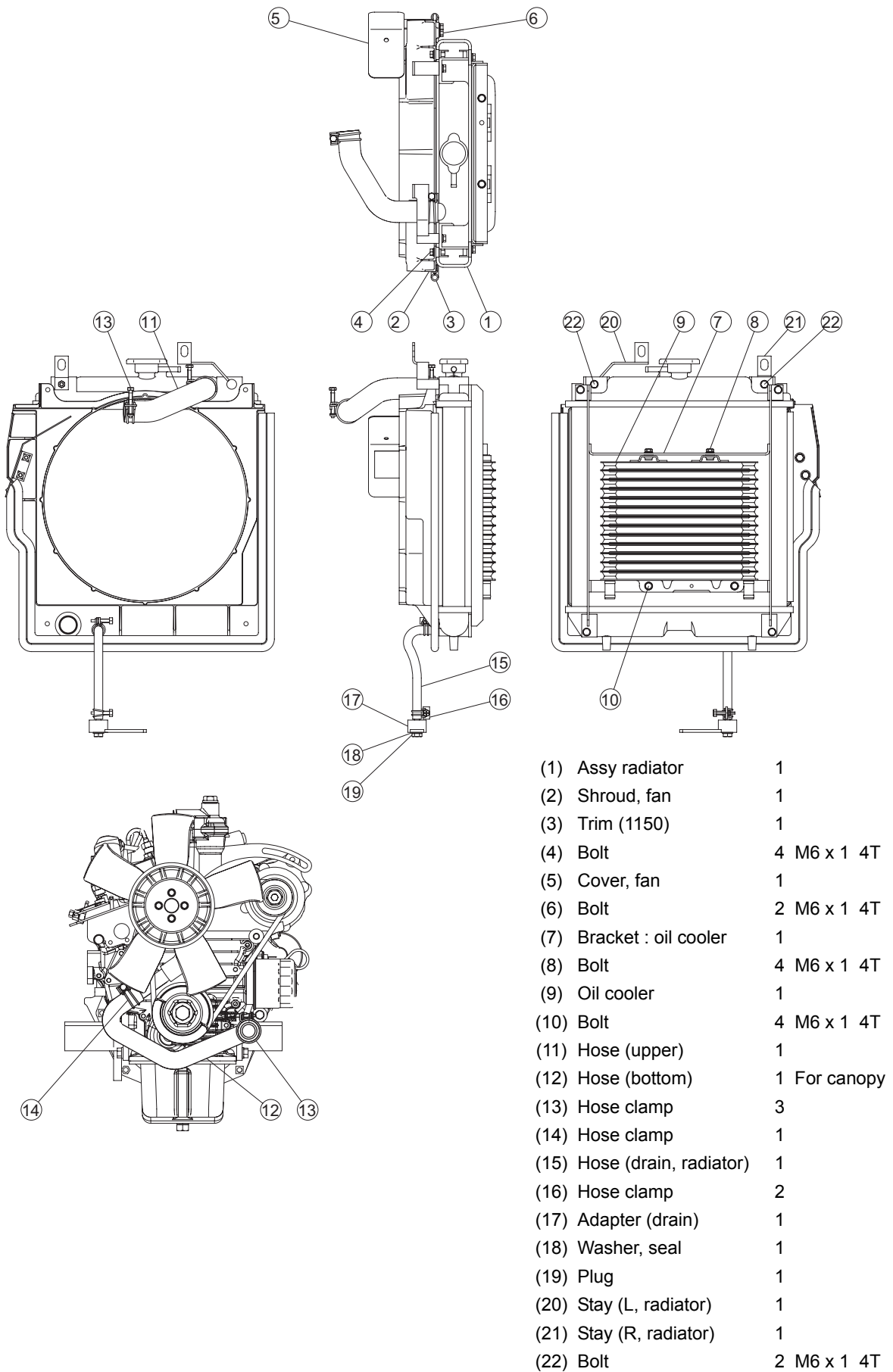
No.	Items	Dimensions	Remarks
(1)	Gap between left and right lever to longitudinal direction.	under 5 mm under 0.2 in	
(2)	Clearance between left and right lever.	15 ~ 25 mm(EU), 5 ~ 14 mm(KTC) 0.43 ~ 0.67 in(EU), 0.2 ~ 0.55 in	
(3)	Distance between bracket front end and neutral position center of Traveling lever grip.	180 mm 7.09 in	Reference valve
(4)	Travel lever, L		
(5)	Travel lever, R		
(6)	Grip		

(7) Check points after assembly : Control valve spool should smoothly shift to full stroke.

h. Seat belt



- | | |
|------------------------|---|
| (1) Seat belt assy | 1 |
| (2) Bolt | 2 |
| (3) Bracket | 1 |
| (4) Bolt | 2 |
| (5) Meet to the corner | |



B.Engine WSM : D902 -E

To the best Service Personnels of Kubota Construction Machinery Dealers.

This engine WSM contains and covers Engine model D902 - E

As for D782 - B, only pages that contain different data and contents were added from page III-S-119.

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of Z602-E and D902-E. It is divided into two parts, "Mechanism" and "Servicing".

■ Mechanism

Information on the construction and function are included. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

Refer to Diesel Engine Mechanism Workshop Manual (Code No. 97897-01872) for the one which has not been described to this workshop manual.

■ Servicing

The heading "General" includes general precautions, check and maintenance and special tools. Other section, there are troubleshooting, servicing specification lists, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

The right is reserved to make changes in all information at any time without notice.

July 2003

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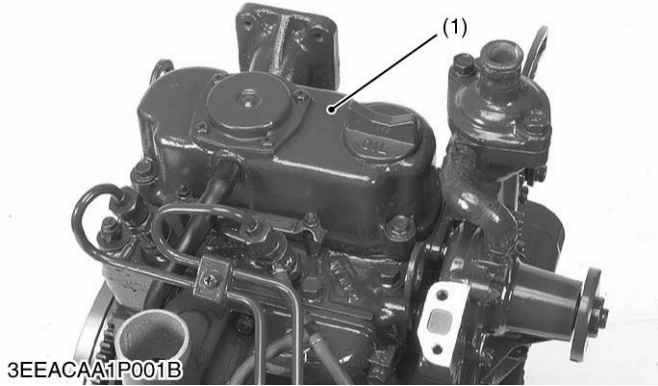
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1. ENGINE BODY

[1] HALF-FLOATING HEAD COVER

The rubber packing is fitting in to maintain the head cover 0.5 mm or so off the cylinder head. This arrangement helps reduce noise coming from the cylinder head.

[a]

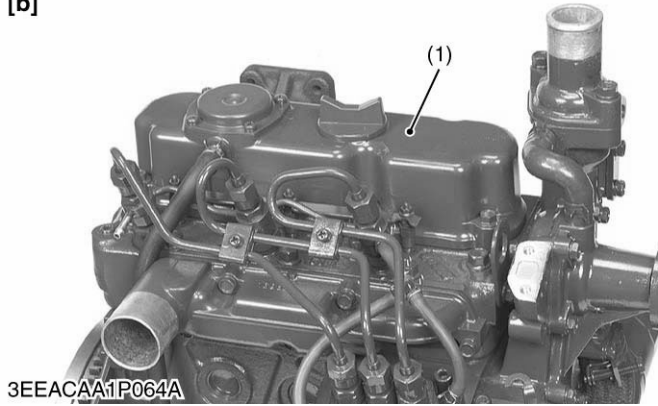


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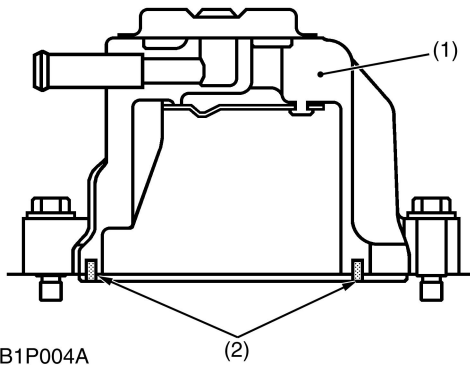
- (1) Cylinder Head Cover [a] Z602-E
- (2) Rubber Packing [b] D902-E

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[b]



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[4] TROUBLE SHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	● No fuel	Replenish fuel	—
	● Air in the fuel system	Bleed	III-S-50
	● Water in the fuel system	Change fuel and repair or replace fuel system	—
	● Fuel hose clogged	Clean	—
	● Fuel filter clogged	Change	III-S-53
	● Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	III-S-51
	● Fuel with low cetane number	Use specified fuel	—
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	III-S-67
	● Incorrect injection timing	Adjust	III-S-104
	● Fuel camshaft worn	Replace	III-S-75
	● Injection nozzle clogged	Repair or replace	III-S-107,108
	● Injection pump malfunctioning	Replace	III-S-73
	● Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	—
	● Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	III-S-64
	● Improper valve timing	Correct or replace timing gear	III-S-74
● Piston ring and cylinder worn	Replace	III-S-77, 91, 97, 98	
● Excessive valve clearance	Adjust	III-S-56	
(Starter Does Not Run)	● Battery discharged	Charge	—
	● Starter malfunctioning	Repair or replace	III-S-110
	● Wiring disconnected	Connect	—
Engine Revolution Is Not Smooth	● Fuel filter clogged or dirty	Replace	III-S-53
	● Air cleaner clogged	Clean or replace	III-S-51
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	III-S-67
	● Injection pump malfunctioning	Replace	III-S-73
	● Incorrect nozzle injection pressure	Adjust	III-S-107,108
	● Injection nozzle stuck or clogged	Repair or replace	III-S-68,108,109
	● Governor malfunctioning	Repair	III-S-75

**CAUTION**

- When changing or inspecting, be sure to level and stop the engine.

NOTE

- **Lubricating Oil**

With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

- **Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.**

Lubricating oil class	Fuel	Low sulfur (0.5 % ≥)	High sulfur	Remarks
	CF		O	O
CF-4		O	X	
CG-4		O	X	

O : Recommendable X : Not recommendable

0000001294E

(9) Check Points of Every 1500 HoursChecking Fuel Injection Nozzle Condition

See page III-S-107, 108.

0000003188E

(10) Check Points of Every 3000 HoursChecking Injection Pump

See page III-S-104, 105, 106.

0000003189E

(11) Check Points of Every 2 YearsReplacing Intake Air Line

See page III-S-52.

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Replacing Radiator Hoses and Clamp Bands

See page III-S-52.

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Replacing Fuel Hoses and Clamp Bands

See page III-S-50.

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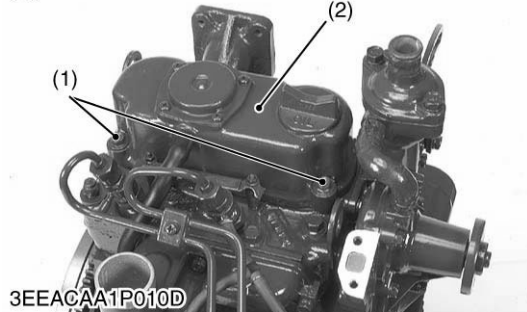
Changing Radiator Coolant (L.L.C.)

See page III-S-49, 54.

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(3) Cylinder Head, Valves and Oil Pan

[a]



Cylinder Head Cover

1. Remove the head cover screws (1).
2. Remove the cylinder head cover (2).

(When reassembling)

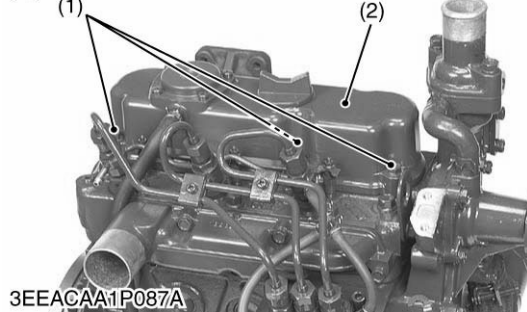
- Check to see if the cylinder head cover gasket is not defective.

Tightening torque	Cylinder head cover screw	6.86 to 11.3 N·m 0.7 to 1.15 kgf·m 5.1 to 8.3 ft-lbs
-------------------	---------------------------	--

- (1) Head Cover Screws [a] Z602-E
 (2) Cylinder Head Cover [b] D902-E

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[b]



Injection Pipes

1. Loosen the screws on the pipe clamp (1).
2. Detach the injection pipes (2).

(When reassembling)

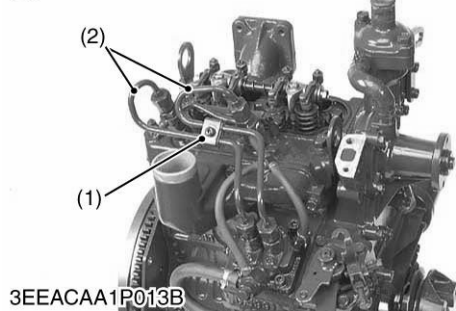
- Sent compressed air into the pipes to blow out dust. Then, reassemble the pipes in the reverse order.

Tightening torque	Injection pipe retaining nut	24.5 to 34.3 N·m 2.5 to 3.5 kgf·m 18.1 to 25.3 ft-lbs
-------------------	------------------------------	---

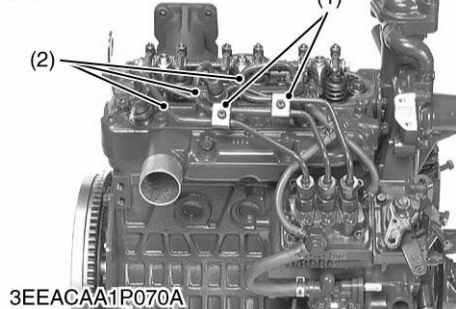
- (1) Pipe Clamp [a] Z602-E
 (2) Injection Pipe [b] D902-E

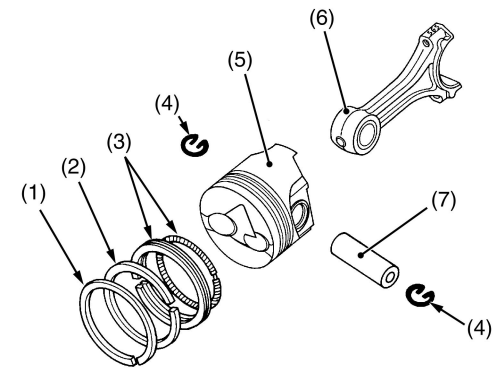
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[a]

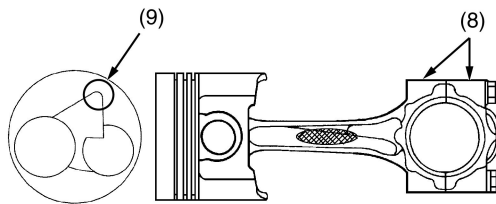


[b]

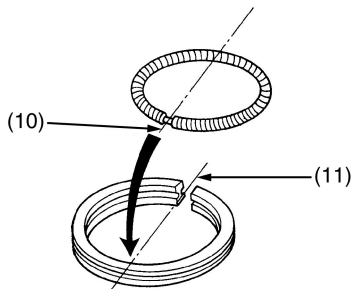




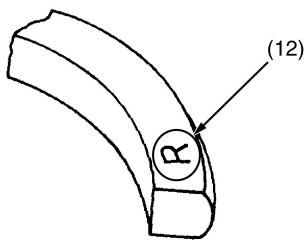
3TMABAB1P047A



3EEACAA1P089A



3EEABAB1P100A



3EEABAB1P101A

Piston Ring and Connecting Rod

1. Remove the piston rings using a piston ring tool (Code No. 07909-32121).
2. Remove the piston pin (7), and separate the connecting rod (6) from the piston (5).

(When reassembling)

- When installing the ring, assemble the rings so that the manufacturer's mark (12) near the gap faces the top of the piston.
- When installing the oil ring onto the piston, place the expander joint (10) on the opposite side of the oil ring gap (11).
- Apply engine oil to the piston pin.
- When installing the connecting rod to the piston, immerse the piston in 80 °C (176 °F) oil for 10 to 15 minutes and insert the piston pin to the piston.
- When installing the connecting rod to the piston, align the mark (8) on the connecting rod to the fan-shaped concave (9).

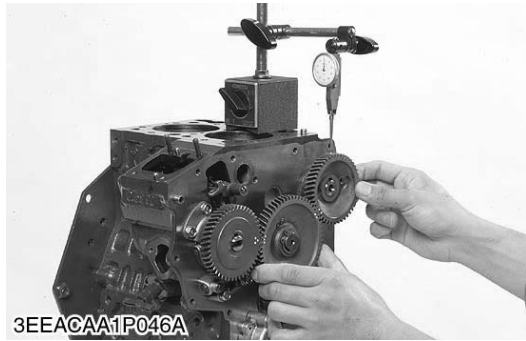
NOTE

- **Mark the same number on the connecting rod and the piston so as not to change the combination.**

- | | |
|--------------------------|--------------------------|
| (1) Top Ring | (9) Fan-Shaped Concave |
| (2) Second Ring | (10) Expander Joint |
| (3) Oil Ring | (11) Oil Ring Gap |
| (4) Piston Pin Snap Ring | (12) Manufacturer's Mark |
| (5) Piston | |
| (6) Connecting Rod | |
| (7) Piston Pin | |
| (8) Mark | |

000003201E

(2) Timing Gear, Camshaft



Timing Gear Backlash

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance isn't proper, replace the gear.

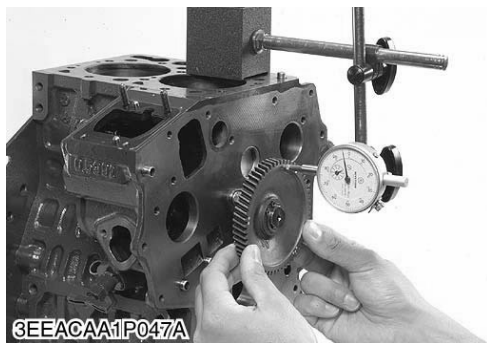
Backlash between idle gear and crank gear	Factory spec.	0.043 to 0.124 mm 0.00169 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.

Backlash between idle gear and cam gear	Factory spec.	0.047 to 0.123 mm 0.00185 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.

Backlash between idle gear and injection pump gear	Factory spec.	0.046 to 0.124 mm 0.00181 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.

Backlash between oil pump drive gear and crank gear	Factory spec.	0.041 to 0.123 mm 0.00161 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.

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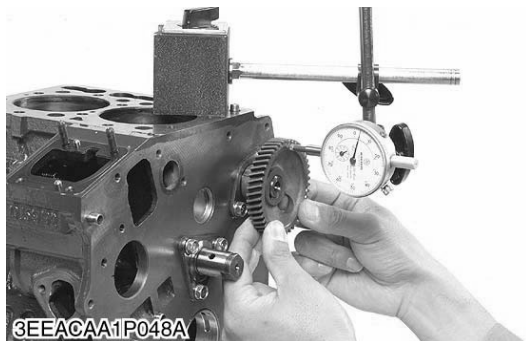


Idle Gear Side Clearance

1. Set a dial indicator with its tip on the idle gear.
2. Measure the side clearance by moving the idle gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the idle gear collar.

Idle gear side clearance	Factory spec.	0.20 to 0.51 mm 0.0079 to 0.0201 in.
	Allowable limit	0.80 mm 0.0315 in.

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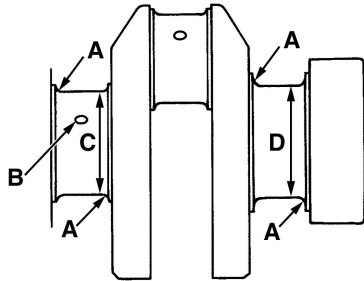


Camshaft Side Clearance

1. Set a dial indicator with its tip on the camshaft.
2. Measure the side clearance by moving the cam gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the camshaft stopper.

Camshaft side clearance	Factory spec.	0.15 to 0.31 mm 0.0059 to 0.0122 in.
	Allowable limit	0.50 mm 0.0197 in.

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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2 (Crankshaft Bearing 3) (Continued)

(Reference)

- Undersize crankshaft bearing 2 and 3

Undersize	Bearing	Code Number	Marking
0.2 mm 0.008 in.	Crankshaft bearing 2 02	15694-23930	020 US
	Crankshaft bearing 2F 02	1G460-07530	
	Crankshaft bearing 3 02	1G460-07580	020 US
	Crankshaft bearing 3F 02	1G460-07630	
0.4 mm 0.016 in.	Crankshaft bearing 2 04	15694-23940	040 US
	Crankshaft bearing 2F 04	1G460-07540	
	Crankshaft bearing 3 04	1G460-07590	040 US
	Crankshaft bearing 3F 04	1G460-07640	

- Undersize dimensions of crankshaft journal

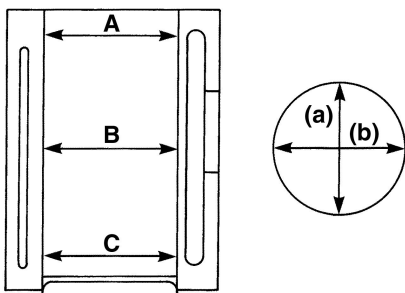
Undersize	0.2 mm 0.008 in.	0.4 mm 0.016 in.
Dimension A	1.8 to 2.2 mm radius 0.071 to 0.087 in. radius	1.8 to 2.2 mm radius 0.071 to 0.087 in. radius
Dimension B	4 mm dia. 0.16 in. dia.	4 mm dia. 0.16 in. dia.
Dimension C	43.734 to 43.750 mm dia. 1.72181 to 1.72244 in. dia.	43.534 to 43.550 mm dia. 1.71394 to 1.7147 in. dia.
Dimension D	43.734 to 43.750 mm dia. 1.72181 to 1.72244 in. dia.	43.534 to 43.550 mm dia. 1.71394 to 1.7147 in. dia.
(0.8-S) The crankpin must be fine-finished to higher than ▽▽▽▽		

0000000910E

(5) Cylinder



3EEACAA1P011A



3EEABAB1P155A

Cylinder Wear

1. Measure the I.D. of the cylinder at the six positions (see figure) with a cylinder gauge to find the maximum and minimum I.D.'s.
2. Get the difference (Maximum wear) between the maximum and the minimum I.D.'s.
3. If the wear exceeds the allowable limit, bore and hone to the oversize dimension. (Refer to "Correcting Cylinder".)
4. Visually check the cylinder wall for scratches. If deep scratches are found, the cylinder should be bored. (Refer to "Correcting Cylinder".)

Cylinder I.D.	Factory spec.	72.000 to 72.019 mm 2.83464 to 2.83539 in.
	Allowable limit	72.169 mm 2.84129 in.

- (A) Top
- (B) Middle
- (C) Bottom (Skirt)
- (a) Right-angled to Piston Pin
- (b) Piston Pin Direction

000001355E

(2) Injection Nozzle

CAUTION

- Check the injection pressure and condition after confirming that there is nobody standing in the direction the fume goes.
- If the fume from the nozzle directly contacts the human body, cells may be destroyed and blood poisoning may be caused.

000000932E

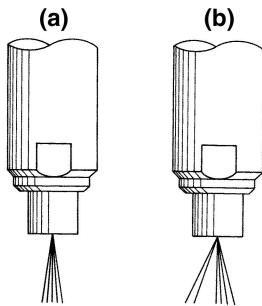
Nozzle Spraying Condition

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361), and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the nozzle piece.

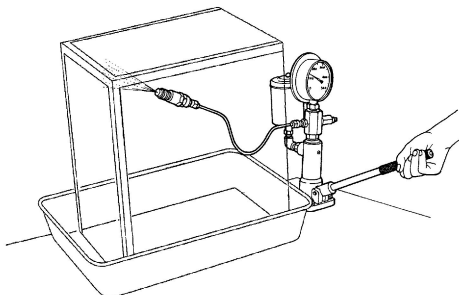
(a) Good

(b) Bad

000000933E



3EEABAB1P037A



3TLABAB1P040A

Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361).
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the adjusting washer (1) in the nozzle holder to adjust it.

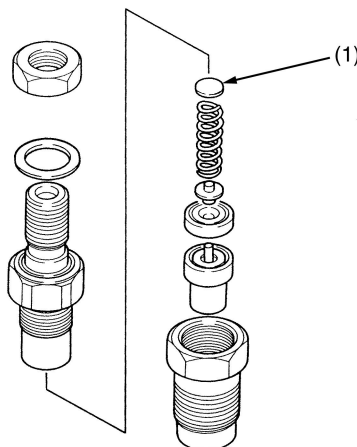
Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2134 psi
-------------------------	---------------	--

(Reference)

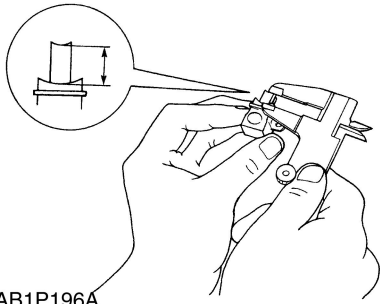
- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness.
Approx. 235 kPa (2.4 kgf/cm², 34 psi)

(1) Adjusting Washer

000000934E



3EEABAB1P171B



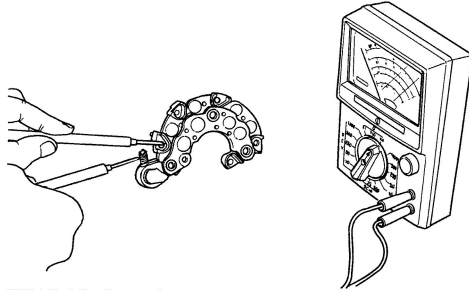
3EEABAB1P196A

Brush Wear

1. Check the length of the brush, if the length is shorter than the allowable limit, replace it.
2. Make sure that the brush moves smoothly.
3. If the brush is defective, replace it

Brush length	Factory spec.	10.0 mm 0.3937 in.
	Allowable limit	1.5 mm 0.0591 in.

0000001378E

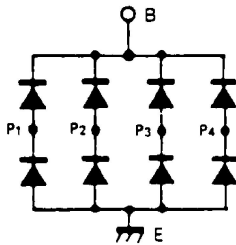


3EEABAB1P197A

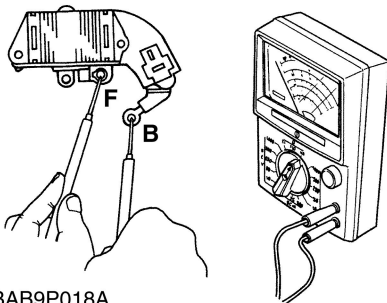
Rectifier

1. Check the continuity across each diode of rectifier with an ohmmeter.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

0000001379E



3EEABAB1P198A



3GFABAB9P018A

IC Regulator

1. Check the continuity across the "B" terminal and the "F" terminal of IC regulator with an ohmmeter.
2. The IC regulator is normal if the conducts in one direction and does not conduct in the reverse direction.

B: "B" Terminal

F: "F" Terminal

0000001380E

(4) Fuel System**Injection Pump**

Item	Factory specification	Allowable Limit
Injection Timing	0.33 to 0.37 rad. (19 to 21°) Before T.D.C.	—
Fuel Tightness of Pump Element	—	14.7 MPa 150 kgf/cm ² 2133 psi
Fuel Tightness of Delivery Valve	—	5 seconds 14.7 → 13.7 MPa 150 → 140 kgf/cm ² 2133 → 1990 psi

Injection Nozzle

Fuel Injection Pressure	13.73 to 14.71 MPa 140 to 150 kgf/cm ² 1991 to 2133 psi	—
Fuel Tightness of Nozzle Valve Seat	When the pressure is 12.75 MPa (130 kgf/cm ² , 1849 psi), the valve seat must be fuel tightness	—

01760G10240

(5) Electrical System**Starter**

Commutator O.D.	30.0 mm 1.1811 in.	29.0 mm 1.1417 in.
Mica Undercut	0.5 to 0.8 mm 0.0197 to 0.0315 in.	0.2 mm 0.079 in.
Brush Length	13.0 mm 0.5118 in.	8.5 mm 0.3346 in.

Dynamo

No-load voltage	AC 20 V or more at 5200 rpm	—
-----------------	--------------------------------	---

Glow Plug

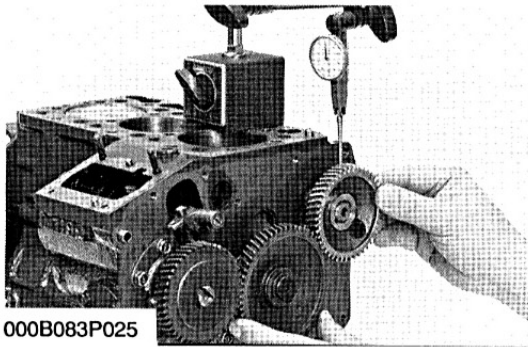
Glow Plug Resistance	Approx. 0.9 Ω	—
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Coolant Temperature Switch

Coolant Temperature Switch Continuity	Infinity less than 112 °C 233 °F Continuity 112 to 118 °C 233 to 280 °F	— —
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01760G10250

[2] TIMING GEAR AND CAMSHAFT



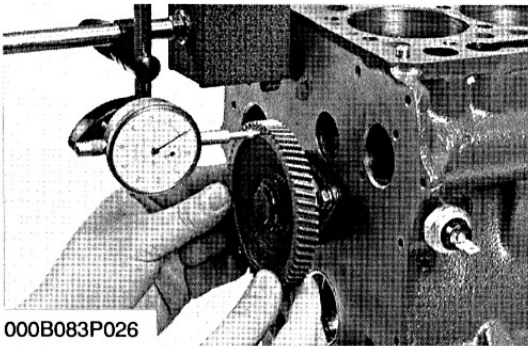
000B083P025

Timing Gear Backlash

1. Set a dial indicator (lever type) with its tip on the gear tooth.
2. Move the gear to measure the backlash, holding its mating gear.
3. If the backlash exceeds the allowable limit, check the oil clearance of the shafts and the gear.
4. If the oil clearance is proper, replace the gear.

Backlash between idle gear and crank gear	Factory spec.	0.043 to 0.124 mm 0.00169 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and cam gear	Factory spec.	0.047 to 0.123 mm 0.00185 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between idle gear and injection pump gear	Factory spec.	0.046 to 0.124 mm 0.00181 to 0.00488 in.
	Allowable limit	0.15 mm 0.0059 in.
Backlash between oil pump gear and crank gear	Factory spec.	0.041 to 0.123 mm 0.00161 to 0.00484 in.
	Allowable limit	0.15 mm 0.0059 in.

01760S10260



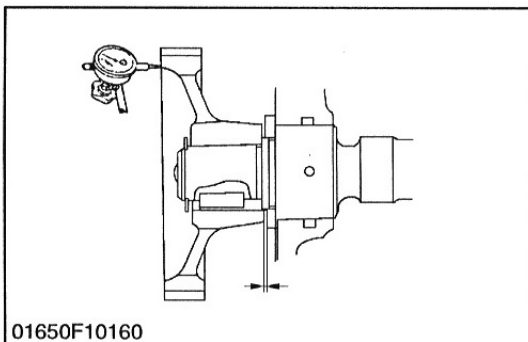
000B083P026

Idle Gear Side Clearance

1. Set a dial indicator with its tip on the idle gear.
2. Measure the side clearance by moving the idle gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the idle gear collar.

Idle gear side clearance	Factory spec.	0.20 to 0.51 mm 0.0079 to 0.0200 in.
	Allowable limit	0.60 mm 0.0236 in.

01760S10270



01650F10160

Camshaft Side Clearance

1. Set a dial indicator with its tip on the camshaft.
2. Measure the side clearance by moving the cam gear to the front and rear.
3. If the measurement exceeds the allowable limit, replace the camshaft stopper.

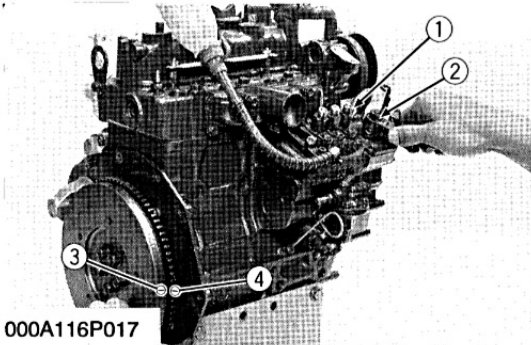
Camshaft side clearance	Factory spec.	0.15 to 0.31 mm 0.0059 to 0.0122 in.
	Allowable limit	0.50 mm 0.020 in.

01760S10280

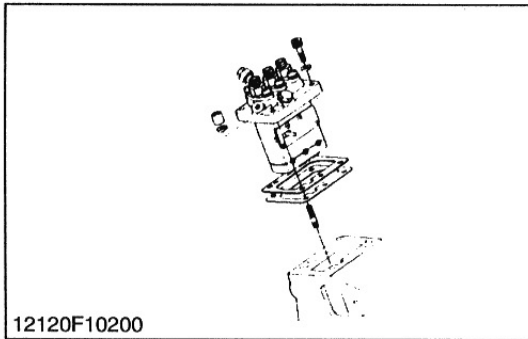
4 FUEL SYSTEM

CHECKING AND ADJUSTING

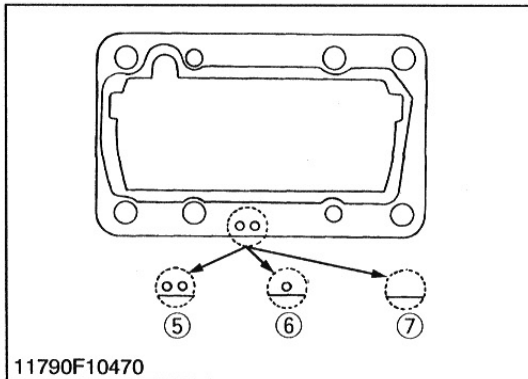
[1] INJECTION PUMP



000A116P017



12120F10200



11790F10470

Injection Timing

■ IMPORTANT

● When inspecting the fuel injection timing, the timing control actuates during starting and the correct fuel injection timing cannot be measured.

1. Remove the injection pipes.
2. Set the speed control lever (2) to the maximum fuel discharge position.
3. Turn the flywheel until the fuel fills up to the hole of the delivery valve holder (1).
4. Turn the flywheel further to check the injection timing, and stop turning when the fuel begins to flow over again.
5. Check to see if the mark or punch mark (3) on the flywheel is aligned with the timing mark (4).
6. If the timing is out of adjustment, readjust the timing with shims.

Injection timing	Factory spec.	0.33 to 0.37 rad. (19 to 21°) before T.D.C.
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■ NOTE

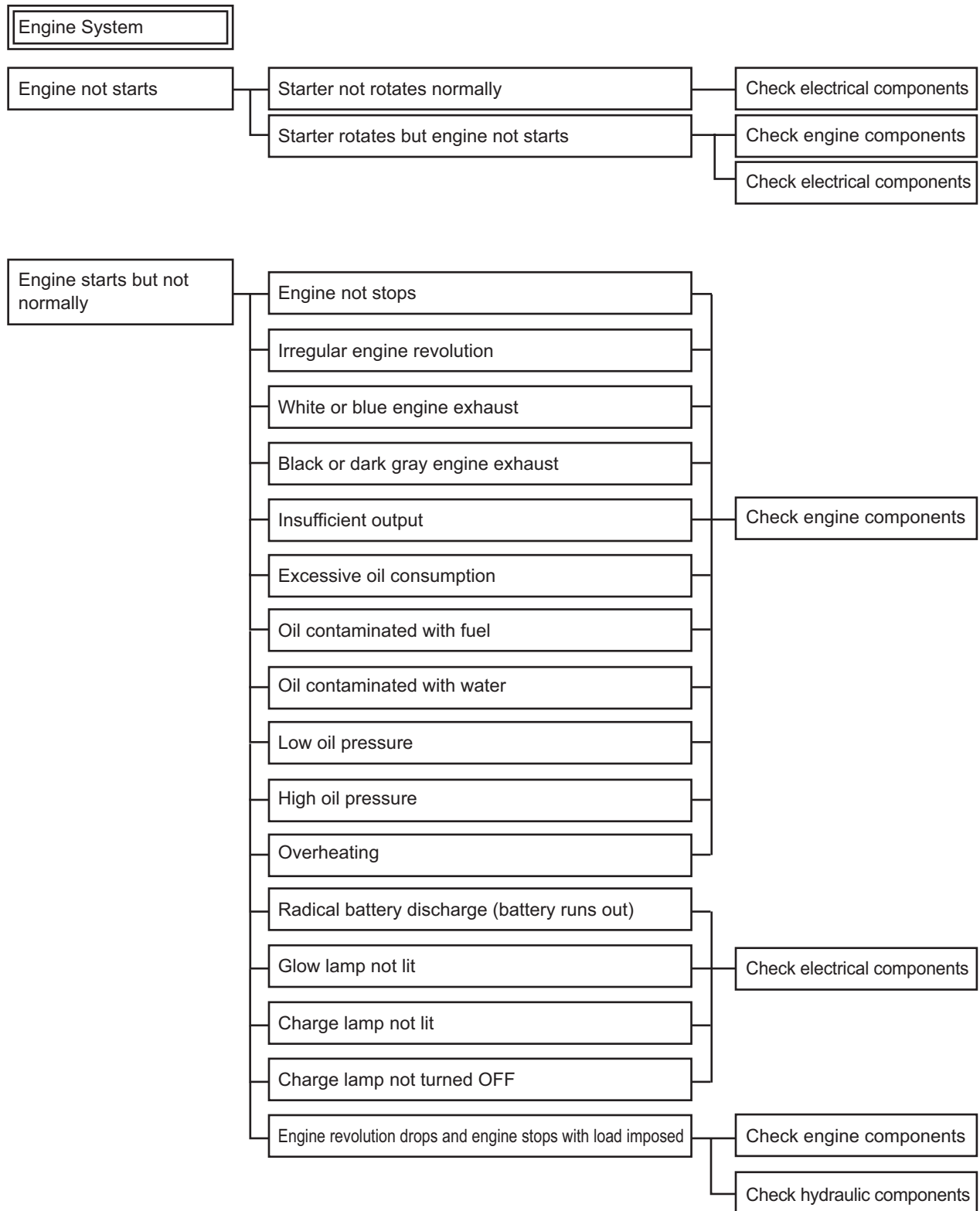
- The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.
- Shims are available in thickness of 0.20 mm (0.0079 in.), 0.25 mm (0.0098 in.) and 0.30 mm (0.0118 in.). Combine these shims for adjustments.
- Addition or reduction of shim (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.0087 rad. (0.5°).
- In disassembling and replacing, be sure to use the same number of new gasket shims with the same thickness.

- | | |
|---------------------------|---|
| (1) Delivery Valve Holder | (5) Two-holes : 0.20 mm (0.0079 in.) |
| (2) Speed Control Lever | (6) One-hole : 0.25 mm (0.0098 in.) |
| (3) Punch Mark | (7) Without hole : 0.30 mm (0.0118 in.) |
| (4) Timing Mark | |

01760S10530

A. Troubleshooting

a. Common circuit



f. Traveling performance

Check in advance that only the traveling components are in improper condition.

Failure	Probable cause	Remedy	Reference page
Machine does not run.	1) Sticking or dropping of the traveling lever of the link system.	Adjust and replace the link system.	
	2) Sticking of the spool of the control valve.	Disassemble, clean, and replace the control valve.	
	3) Internal leakage of the rotary joint.	Disassemble the rotary joint and replace the seal.	
	4) Sticking of the spool of the counter balance valve.	Disassemble, clean, and replace the counter balance valve.	
	5) Excessive motor drain.	Measure the drain quantity, disassemble, and replace the motor.	
	6) Internal damage to the motor.	Disassemble and replace the motor.	
Slow traveling speed. Low traveling power.	1) The link system of the traveling lever is in improper operation.	Adjust the link system.	
	2) The spooling of the control valve is improper.	Disassemble, clean, and replace the control valve.	
	3) Internal leakage of the rotary joint.	Disassemble the rotary joint and replace the seal.	
	4) The spooling of the counter balance valve is improper.	Disassemble, clean, and replace the counter balance valve.	
	5) Excessive motor drain.	Measure the drain quantity, disassemble, and replace the motor.	
	6) Internal damage to the motor.	Disassemble and replace the motor.	
	7) Sticking of the spool of the communicating valve.	Clean or replace the communicating valve and clean the filter.	
Skewing (Only in traveling control)	1) The left and right traveling levers of the link system are not in uniformed operation.	Adjust the link system.	
	2) The left and right control valves are not in uniformed spool operation.	Disassemble, clean, and replace the control valve.	
	3) Internal leakage of the rotary joint on one side.	Disassemble the rotary joint and replace the seal.	
	4) Sticking of the spool of the counter balance valve.	Disassemble, clean, and replace the counter balance valve.	
	5) The difference between the left and right in motor drain quantity is great.	Measure the drain quantity, disassemble, and replace the motor.	
	6) Internal damage to the motor on one side.	Disassemble and replace the motor.	
	If the traveling right and left pumps are different in flow rate or pressure or if the delivery hose on one side malfunctions, the product will skew. In that case, other operational errors will occur as well.		
Machine does not stop running. Machine runs away on slopes.	1) Improper returning or sticking of the link system of the traveling lever.	Adjust the link system.	
	2) Improper returning or sticking of the spool of the control valve.	Disassemble, clean, and replace the control valve.	
	3) Improper returning or sticking of the spool of the counter balance valve.	Disassemble, clean, and replace the counter balance valve.	

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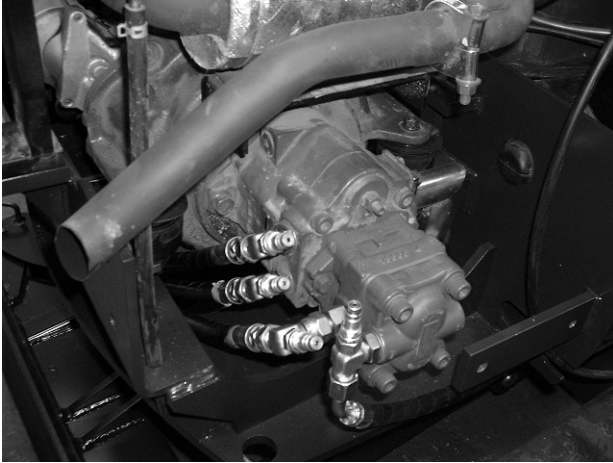
- Thank you very much for reading the preview of the manual.
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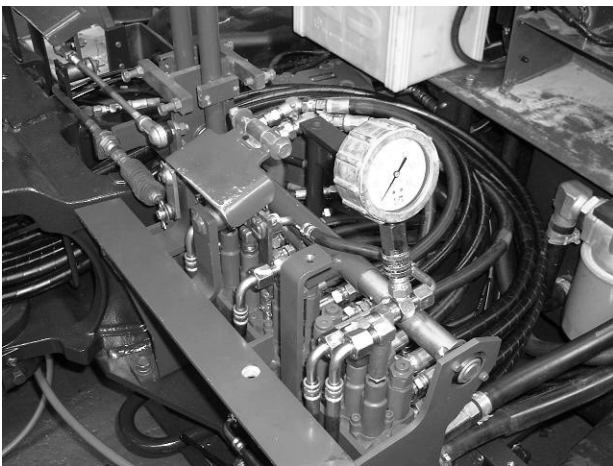
2) Secondary pressure



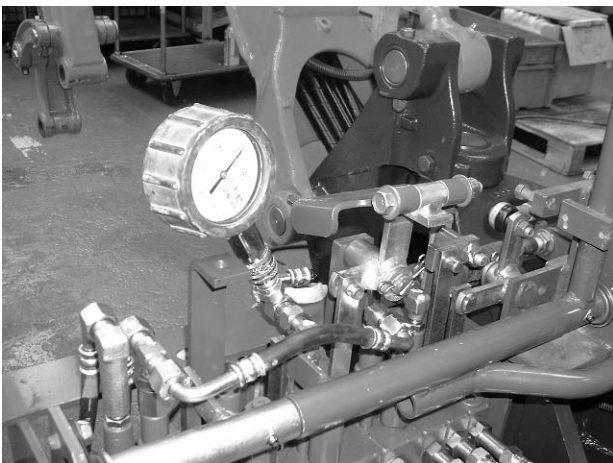
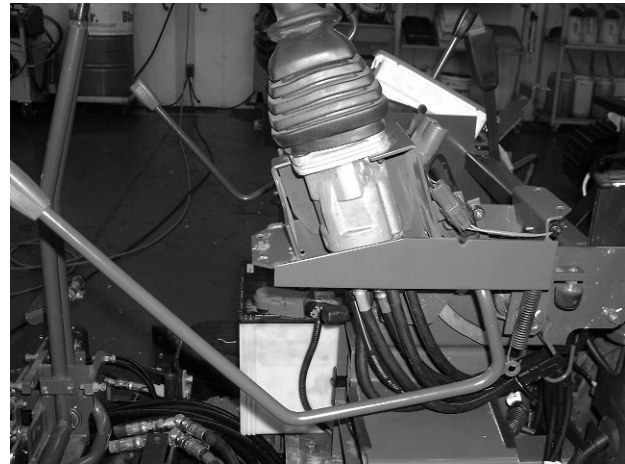
1. Remove step.
2. Connect a joint for measurement to the arrow - marked point and set pressure gauge on it.
3. Start the engine and run it at the maximum speed.
4. Get the safety lever down to activate the unload valve.
5. Shift the control lever to be measured.
6. Take 2 or 3 measurement to have an exact reading.
7. Hydraulic oil temp. : 50 ± 5 °C, 122 ± 41 °F
8. Pilot valve is at its max. stroke and control valve spool is being fully shifted.

KX36-3, KX41-3, KX41-3V

Reference Value at idle speed	1.96 ± 0.2 MPa
	20 ± 2 kgf / cm ²
	284 ± 28 psi
Reference Value at max.speed	2.16 ± 0.3 MPa
	22 ± 3 kgf / cm ²
	313 ± 43 psi



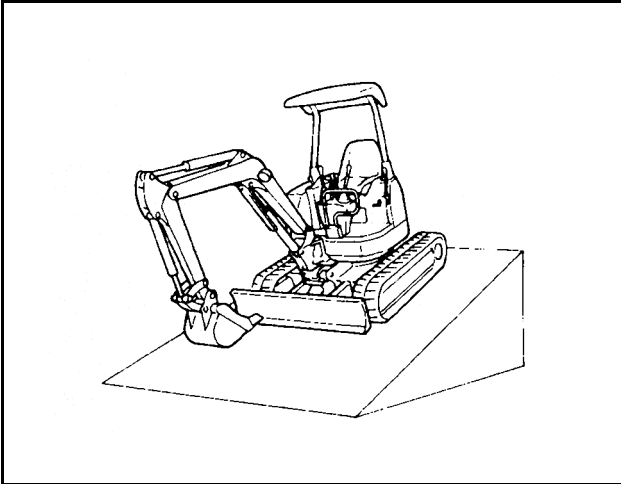
(Boom - up)



(Arm - crowd)



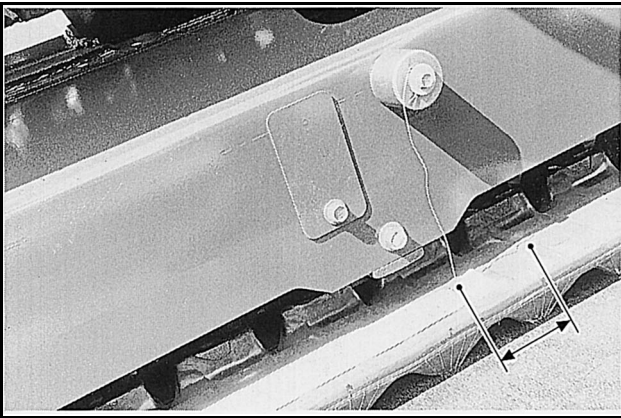
(2) Traveling



1. Park the machine on a 20deg. slope. Keep front at traveling position.
2. Put marks on the truck frame and the crawler.
3. Measure 10 minutes slip-distance without engine running.
4. Hydraulic oil temp. : $50 \pm 5^{\circ}\text{C}$, $122 \pm 41^{\circ}\text{F}$.

KX36-3, KX41-3S, KX41-3V

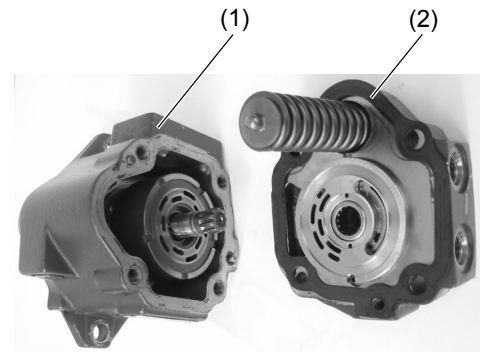
Reference Value	300 mm/10 min 0.98 ft/10 min
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No.	Machine model		KX36-3	KX41-3S EU	KX41-3V EU	KX41-3V PP	
11	Counter balance spool operating pressure		3 bar	6-7 bar			
12	Check valve cracking pressure		less than 0.3 bar	←			
13	Hydraulic motor oil		ISO VG46	←		←	
14	Gearbox oil type		ISO VG150 E.P./ SAE 80W90 API GL5/MIL-L-2105	←		SAE-30-CD	
15	Gearbox oil: quantity		1 l ± 10%	0.3 l ± 10%		330 cm ³	20.13 cu.in
16	Oil temperature		-20 °C/+100°C	←		←	
17	Total weight		17kg ± 10%	←		←	
18	Climbing ability		30°	←	←	←	
19	Max. traction force	1F	11.9 kN	12.2 kN	13.1 kN	12.7 kN	2855 lbw
		2F	-	6.7 kN	7.2 kN	7.1 kN	1596 lbw
20	Traveling block performance		less than 300 mm	←	←	←	
21	Traveling speed	Rubber/Steel crawler					
		1F	2.2 km/h	2.4 km/h	2.2 km/h	2.3 km/h	1.43 mph
22	10m traveling time	1F	16.3 sec	15.0 sec	16.3 sec	15.7 sec	
		2F	-	8.4 sec	9.0 sec	8.8 sec	
23	Straight travel performance	1,2F	less than 600 mm	←	←	←	less than 23.6 in
24	Drain amount at lock	1F					
		2F	-				
25	Drain amount while rotating	1F					
		2F	-				
26	Hi-speed change pressure 1st → 2nd		-				
27	Manufacturer		TRASMITAL- KAYABA	←	←	NACHI	
28	Motor type		MAG10	MAG12V-TRB	←	PHV-120	
29	Sprocket, PCD		277.18 mm	←	←	←	10.91 in
30							

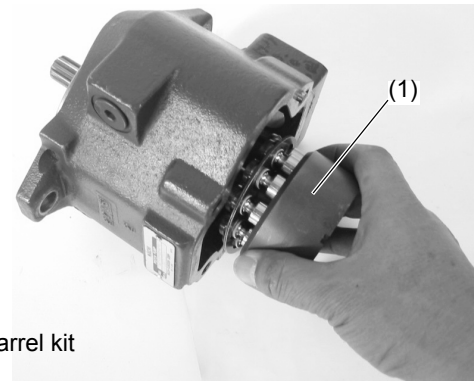
No	Specificatios Items		Unit	KX36-3EU	KX41-3S EU	KX41-3V EU	KX41-3V PP	Remarks		
10	1	Arm cylinder cavitation						Oil temp. 50 ± 5°C		
	2	Arm cylinder shrink								
11	1	Dozer cylinder cavitation								
12	1	Bucket outer width	w/o side cutter	mm						
				inch						
	2		with side cutter	mm						
				inch						
13	1	Max. digging height radius		mm	1895 ± 190	2044 ± 204	←	←		
				inch	74.61 ± 7.48	80.47 ± 8.03	←	←		
	2	Max. dump height radius		mm	1529 ± 92	2083 ± 125	←	←	at bucket pin	
				inch	60.20 ± 3.62	82.01 ± 4.92	←	←		
	3	Distance max. digging depth		mm					From swivel center	
				inch						
	4	Bucket bottom height at arm vertical		mm	1052 ± 32	929 ± 28	←	←	Bucket horizontal	
				inch	41.42 ± 1.26	36.57 ± 1.10	←	←		
	5	Bucket wrist angle		degree	185 ± 3	186 ± 3	←	←		
	6	Bucket bottom angle		degree					Boom up, arm extend bucket crowd	
	Q6	Swivel, swing performance								
	1	1	Swivel torque		L	kgf•m	0.25493 > 0.21414	←	←	Arm extend,show /Quick
kN.m						2.50 > 2.10	←	←		
ft•lbs						2 > 2	←	←		
2		R	kgf•m	0.25493 > 0.21414	←	←				
			kN.m	2.50 > 2.10	←	←				
			ft•lbs	2 > 2	←	←				
2	1	Swivel angle		deg	> 25	←	←	←	Bucket load=JIS heaped x 1.8	
3	1	Swivel block performance	L/R	deg	< 30	←	←	←		
4	1	Swivel slippage (Flat ground, no load)		L / R	deg					90 deg swivel
					deg					
5	1	Swivel start-up speed		sec	2.1± 0.2	←	←	←	0~90 deg swivel	
6	1	Swing torque, max.		Left (Right)	kgf•m					
					kN.m					
					ft•lbs					
7	1	Swing speed		Left	sec	4.7 ± 0.3	4.6 ± 0.3	←	←	
	2			Right	sec	4.0 ± 0.3	3.9 ± 0.3	←	←	
8	1	Swing Lock		Swivel R&L	mm	< 6	←	←	←	90 deg-swivel, 100 times actual digging cylinder dislocation
					inch	< 0.24	←	←	←	
	2	Reciprocating motion	L / R	Swing	mm					90 deg-swivel, 100 times
					inch					

The body S and body H are separated.



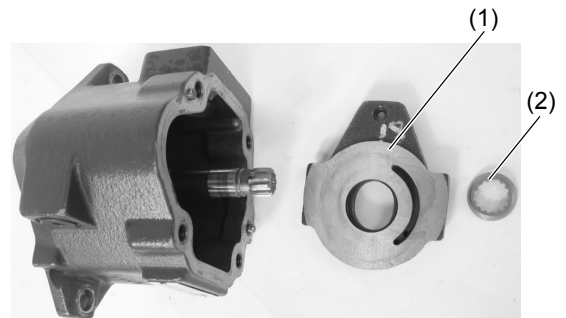
(1) Body S
(2) Body H

4. Remove the cylinder barrel kit.



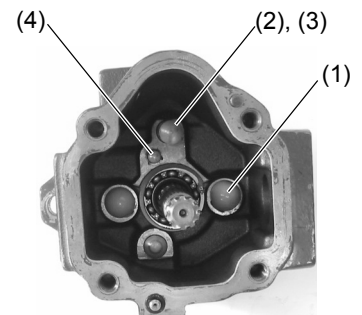
(1) Cylinder barrel kit

5. Remove the swash plate and barrel holder.



(1) Swash plate
(2) Barrel holder

6. Remove the pivot pin, stopper pin, disc spring, and rod.



(1) Pivot pin
(2) Stopper pin
(3) Disc spring
(4) Rod

Upper Side of Body



Lower Side of Body

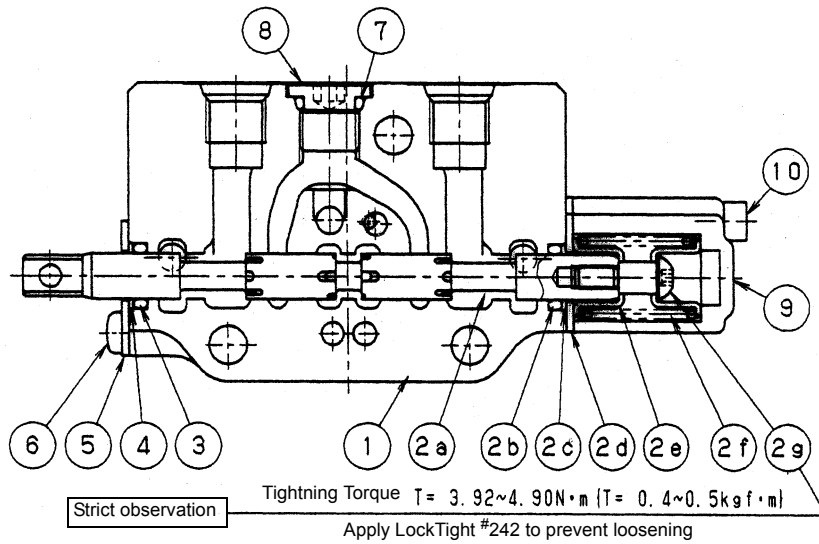
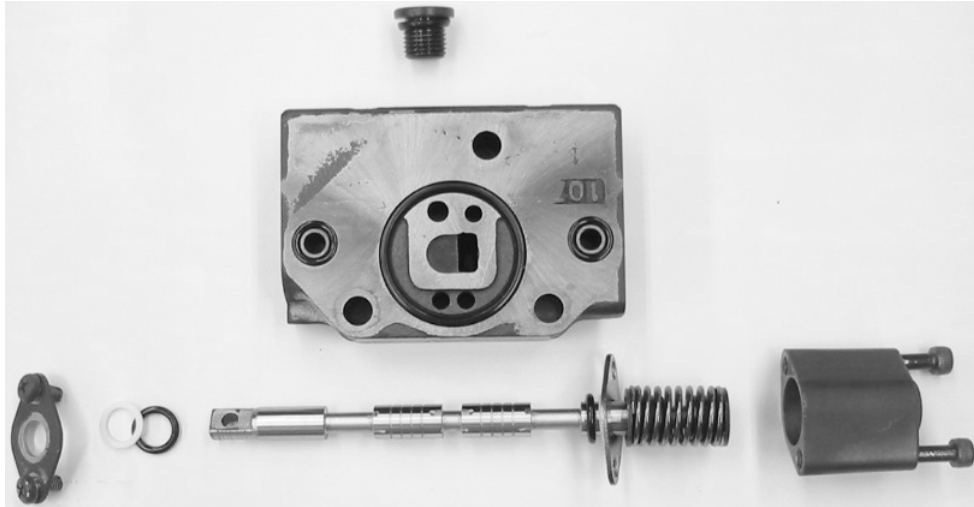
Lower Side of Body



Upper Side of Body

No.	Part Name
1	Outlet
2	Bucket
3	Boom
4	Travel, LH
5	Inlet
6	Travel, RH
7	Arm
8	Service
9	Combination
10	Swivel
11	Dozer
12	Swing

9) Travelling section (LH & RH)



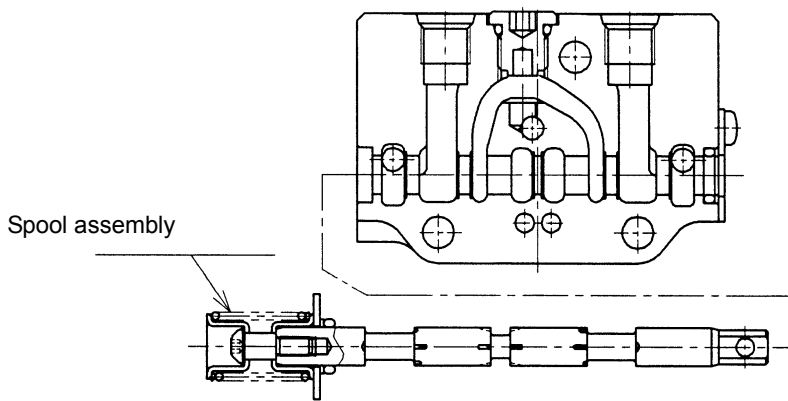
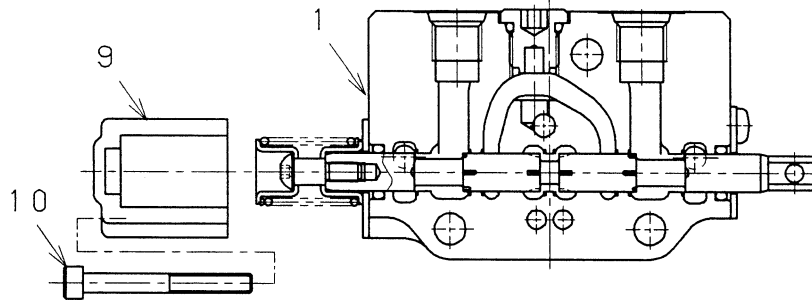
No.	Part Name	Q'ty	Remarks
1	Housing	1	
2a	Spool	1	
2b	Oring	1	Same as No.3
2c	Back up ring	1	Same as No.4
2d	Retainer	1	Same as No.5
2e	Spring retainer	2	
2f	Spring	1	
2g	Bolt	1	
3	Oring	1	
4	Back up ring	1	
5	Retainer	1	

No.	Part Name	Q'ty	Remarks
6	Bolt	2	M5 x 10
7	Oring	1	
8	Plug (PF1/4)	1	
9	Cap	1	
10	Bolt	2	M5 x 45

- Disassembling of travel section (LH, RH)

1. Return Spring Cap

Loosen and remove the two M5 bolts (12) with a 4-mm hexagon spanner.
Remove the return spring cover (11) and extract the spool assembly from the body (1).

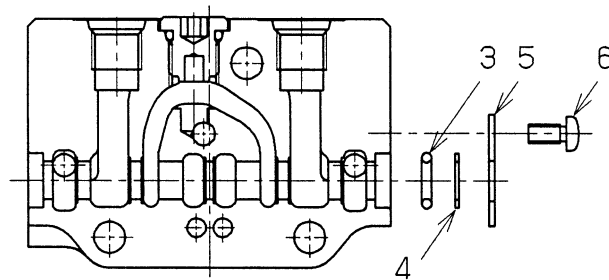


Note:

Remove the spool assembly slowly in the horizontal direction. Carefully remove the spool assembly, or otherwise the spool seal (with the O-ring and backup ring) will be shifted to the edge of the spool and damaged by the edge. Record the direction of the spool and the main component into which the spool is inserted so as not to make mistakes at the time of assembly.

2. Link Mounting Block

- Loosen the two M5 small Phillips-head screws (6) with a Phillips-head screwdriver.
- Remove the O-ring retainer (5), and remove the backup ring (4) and O-ring (3) from the body (1) carefully so that the backup ring and O-ring will not be damaged.



- Arm, Boom, and Bucket Switching Valve

Arm, boom and bucket sections are similar in structure and shape. Therefore, the following section explains the arm section as a typical example.

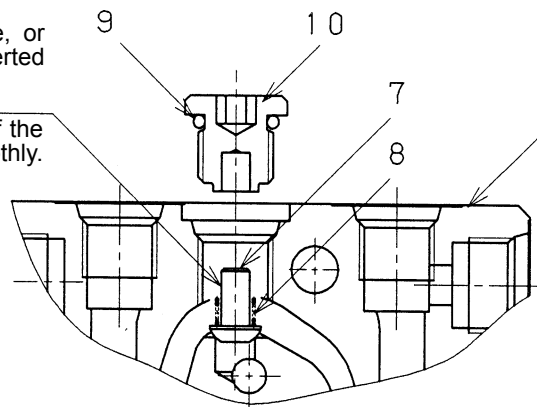
1. Assembling Check Valve

- Insert the check valve (7) straight, with the skirt facing downward, into the main part (1). Insert the check valve spring (8) into the body of the check valve (7) next.
- Restore the slant of the check valve (7) and mount the check valve support (10). Straighten the check valve at that time, or otherwise the check valve (7) cannot be inserted into the hole of the check valve support (10).
- Mount the O-ring (9) to the check valve support (10), lightly screw the check valve support, and tighten the check valve support with a 6-mm hexagon spanner.

• Check valve support (7) tightening torque
24.5 to 29.4 N·m (2.5 to 3.0 kgf·m)

Straighten the check valve at that time, or otherwise the check valve cannot be inserted into the hole of the check valve support.

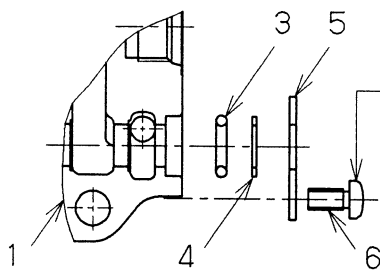
Stop screwing the check valve support if the check valve support is not screwed smoothly.



O-ring used
9: O-ring 1BP11

2. Link Mounting Block

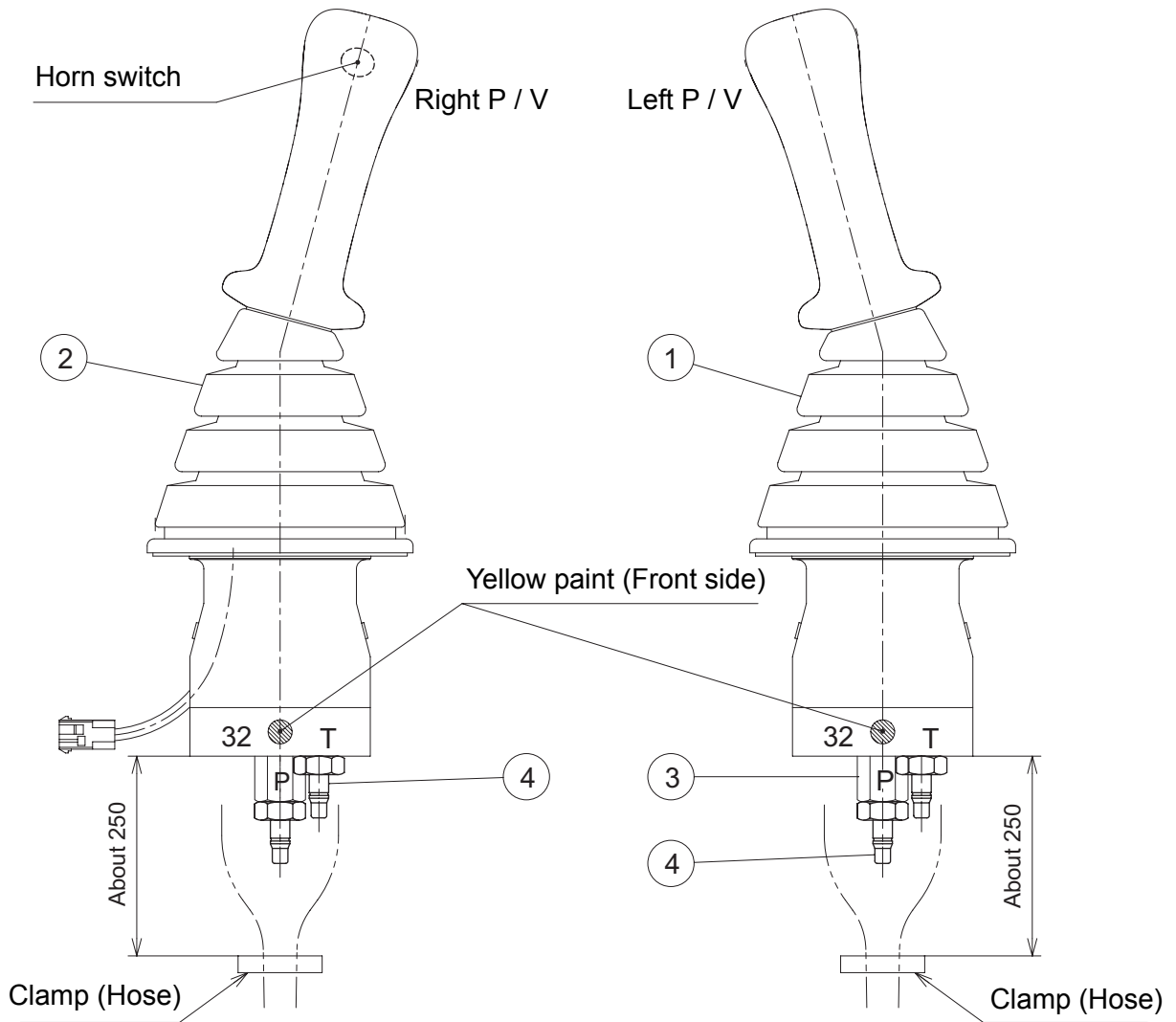
- Mount the O-ring (3) first. Then mount the backup ring (4) to the O-ring mounting hole of the main part (1).
- Temporarily secure the O-ring presser (5) with the M5 cross-slot screws (6). Use a Philips screwdriver.



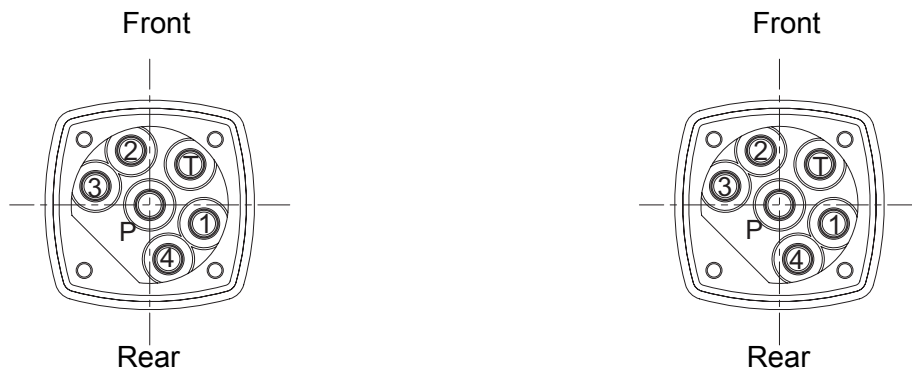
After mounting the return spring cover (11) on the opposite side, temporarily secure the O-ring pressure so as to check that the spool will rotate lightly.

O-ring used, Backup ring
3: O-ring 1AP10A
4: Backup ring T3P10A

(2) Adaptor installation



View from machine front

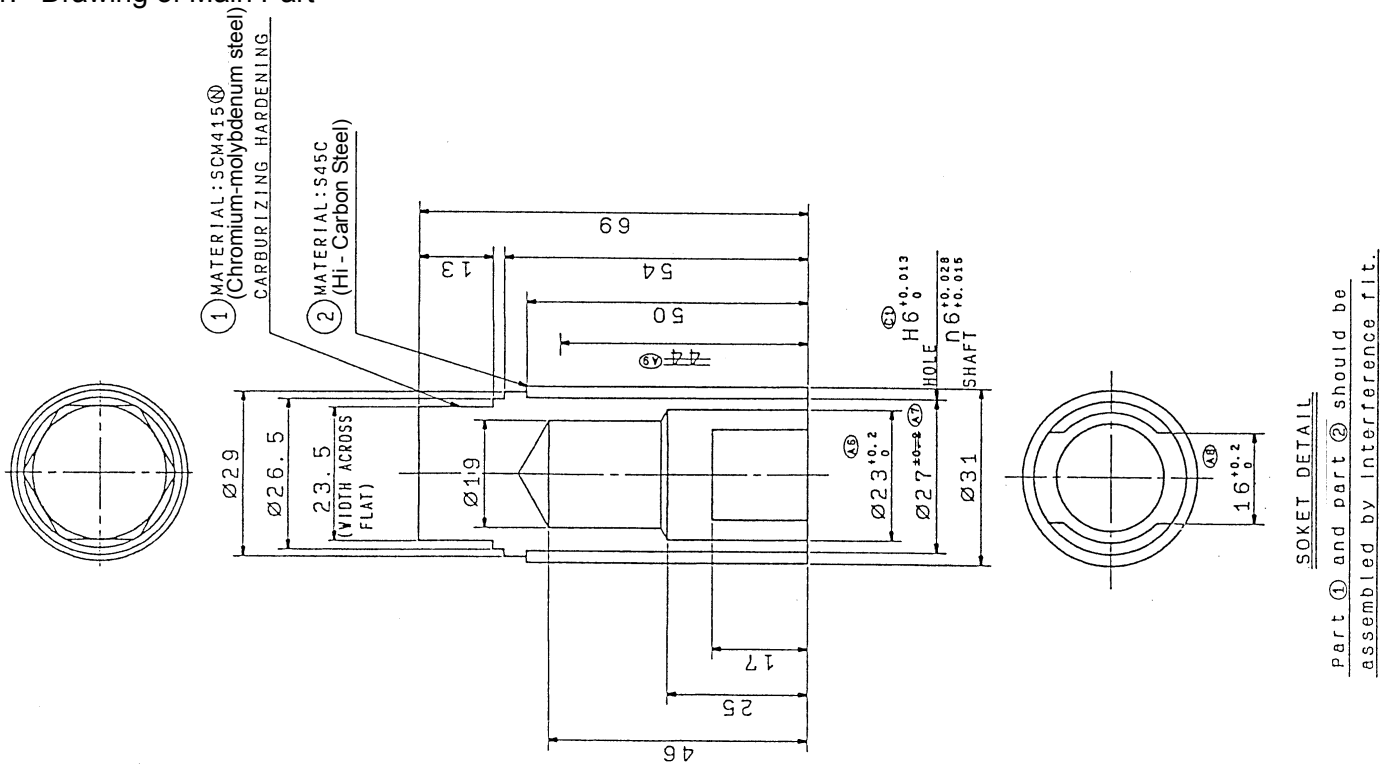


1. Pilot valve LH
 2. Pilot valve RH
 3. Filter
 4. Adaptor
- Filter is installed on P port of each side of pilot valve.
 - Adaptor tightening torque : 24.5 ~ 29.4 N·m
2.5 ~ 3.0 kgf·m
18.1 ~ 21.7 ft·lbf

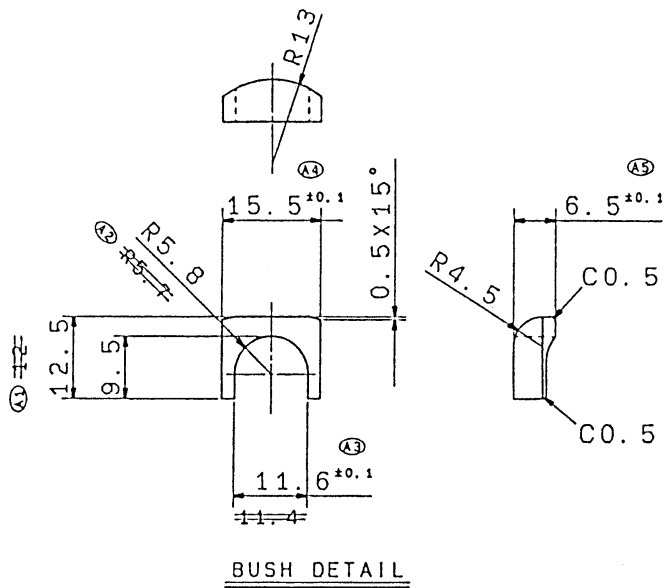
Drawing of Jig

The jig consists of a main part and two bushings.

1. Drawing of Main Part



2. Drawing of Bushing



MATERIAL: SCM415 (Chromium-molybdenum steel)
CARBURIZING HARDENING

q'ty: 2

3. Usage of Jig

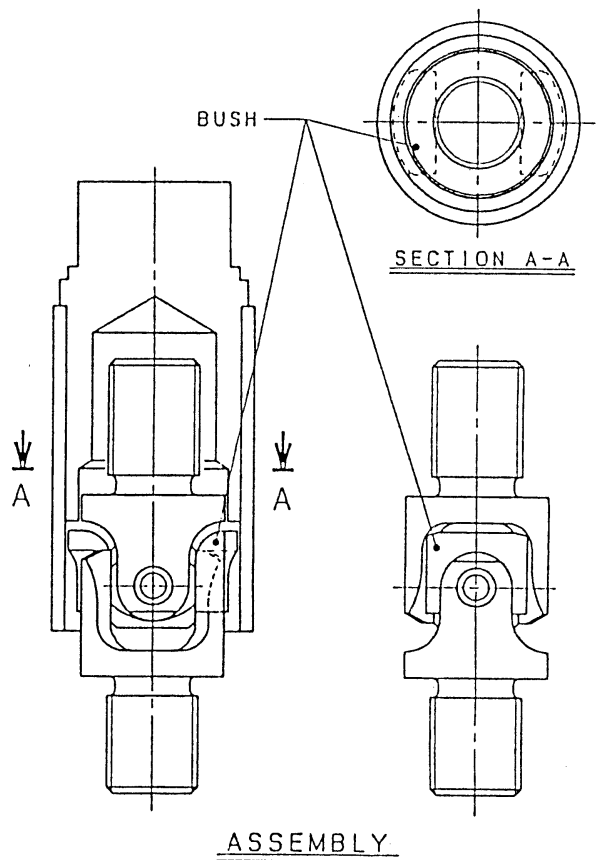


Photo 7-35



Fit the disc (302) to the joint (301). [Photo 7-35]

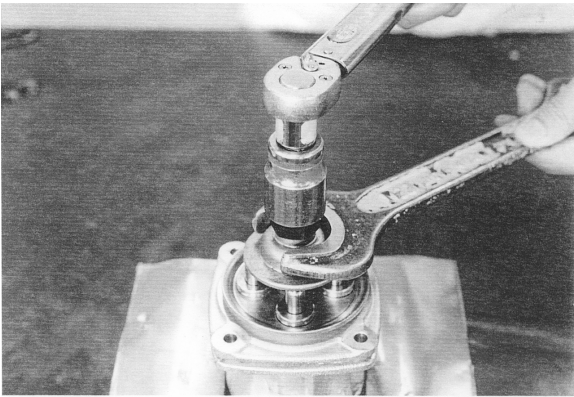
- Screw in the disc until it comes into even contact with the four push rods (212).



WARNING:

Carefully adjust the final position of the disc (302). If it is screwed in too much, the secondary pressure with the lever at neutral may be wrongly applied, causing the machine to malfunction.

Photo 7-36



Apply the adjusting nut (312) and fix it by applying the specified wrench across the disc (302). Tighten the adjusting nut to the specified torque. [Photo 7-36]

- In tightening the nut, keep the disc (302) in position.
[Adjusting nut (312)]
Screw size : M14
Tightning torque : $68.6 \pm 4.9 \text{ N}\cdot\text{m}$
 $700 \pm 50 \text{ kgf}\cdot\text{m}$
 $50.6 \pm 3.6 \text{ ft}\cdot\text{lbf}$

Photo 7-37



Apply grease to the turning portion of the joint (301) and the top of the push rod (212). [Photo 7-37]

Photo 7-38



Fit the bellows back into position. [Photo 7-38]

Pour vapor phase inhibitor from the ports and apply the blind plugs.

- Be careful not to break the bellows (501).

5.4 Guide/plunger and regulation unit replacement

Preliminary operations

Remove the pilot control unit from the machine's arm rest (see § 4).

Remove the handle (see § 5.2).

Remove the cardan (see § 5.3).

NOTE : It is recommended to remove the pilot control unit from the machine (see § 4). Nevertheless, the servicing on machine is possible by securing the unit into a vice-grip wrench (65 opening). This is performed by extracting the body from the arm rest so as to clamp the vice-grip wrench onto the body in order to hold it above the arm rest (for pilot unit 4TH5 particularly).

Removal

Secure the pilot control unit to a vice-grip wrench.

Remove the retaining plate.

Reassembly : line up the notches for the grommet in both the plate and the body.

Insert the end of a thin screwdriver between the guide and the body, carefully lift the guide to remove it from the body.

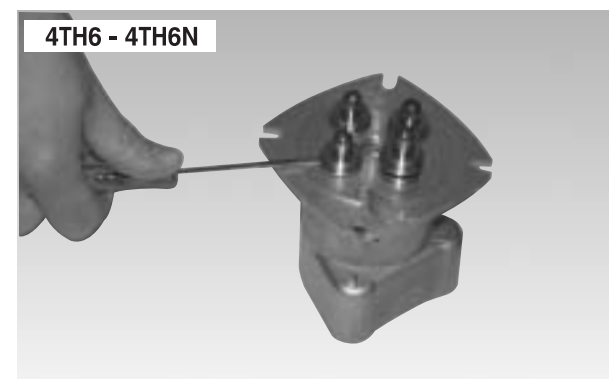
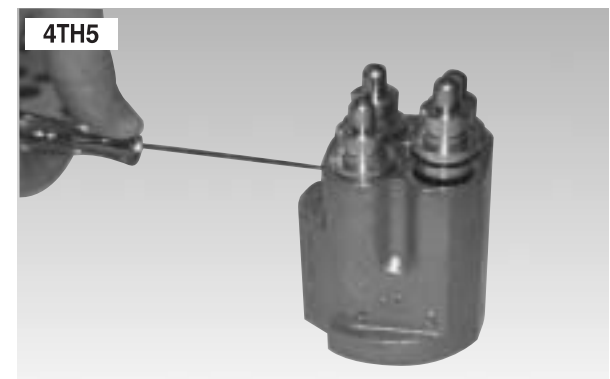
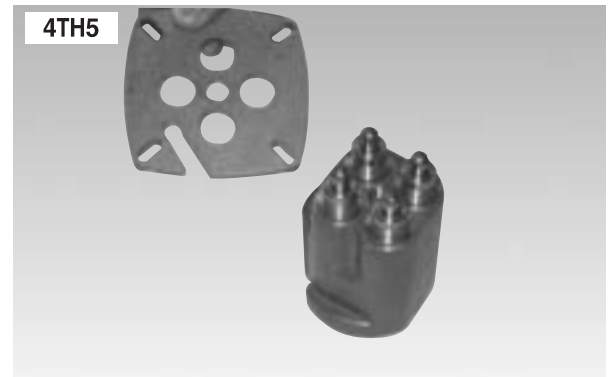
NOTE : Hold the guide with the other hand during the extraction operation to limit the effect of the return spring.

Remove the guide / plunger assembly.

Repeat the operation for the other 3 sub-assemblies.

Reassembly : use the retaining plate to insert the 4 guides into the body simultaneously and perpendicularly .

Reassemble in reverse order.



3) Assembly Procedure

Check the mating side of each part.

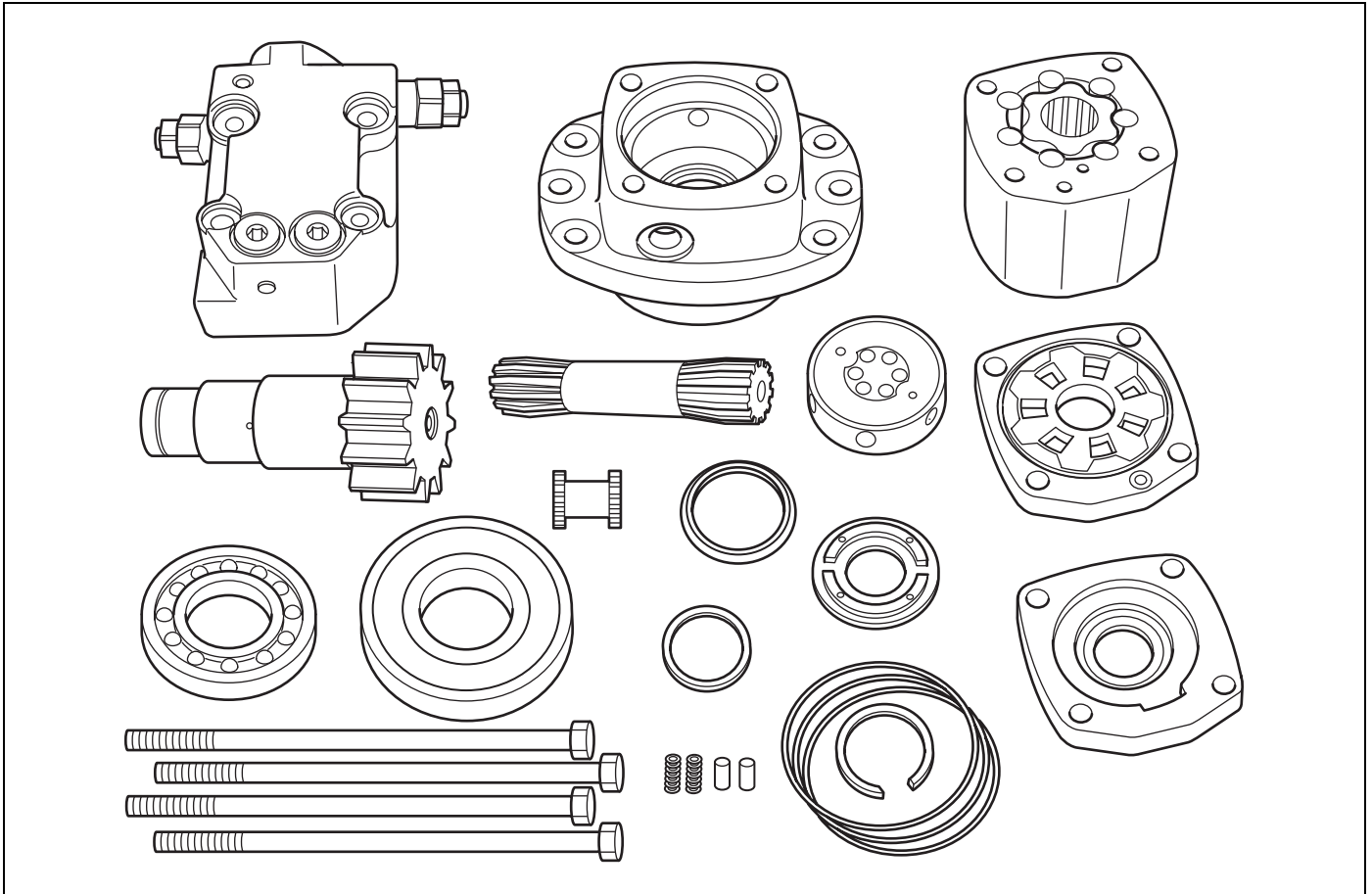
Flaw damage and burrs may result in leakage.

Clean each part with clear wash oil, and dry them with natural ventilation or an air blower.

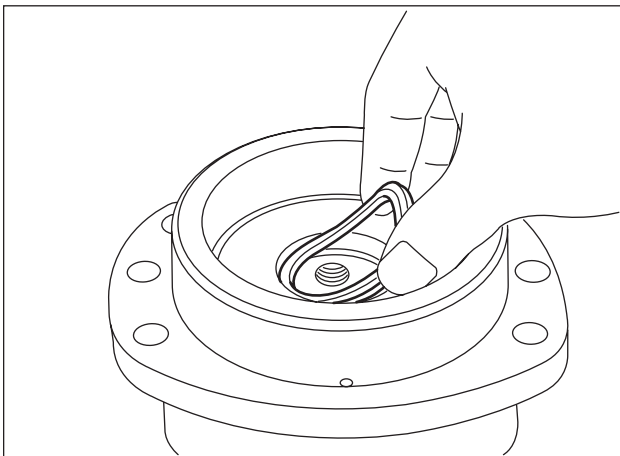
Do not remove the part with cloths or paper towels, or otherwise the nap will stick to the part, which may result in trouble.

Caution :

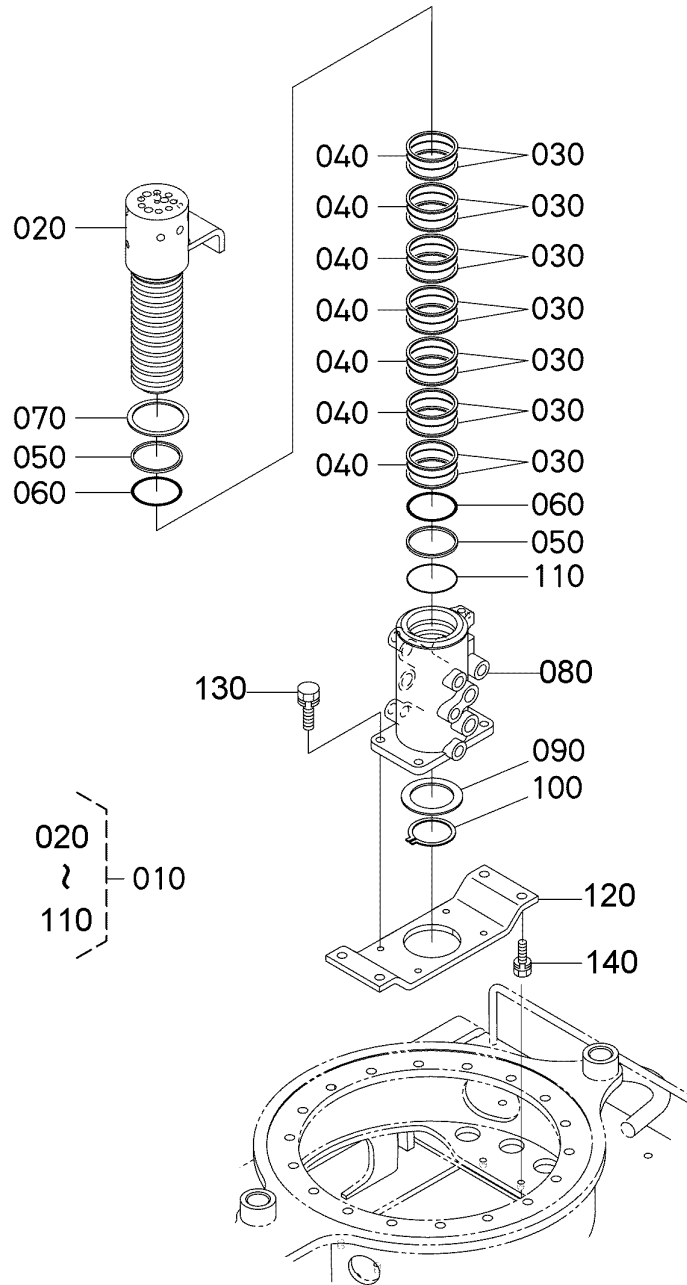
Replace the seals with new ones. Apply grease to the new ones before use.



Mount the X-ring (6) to the bearing housing (1).



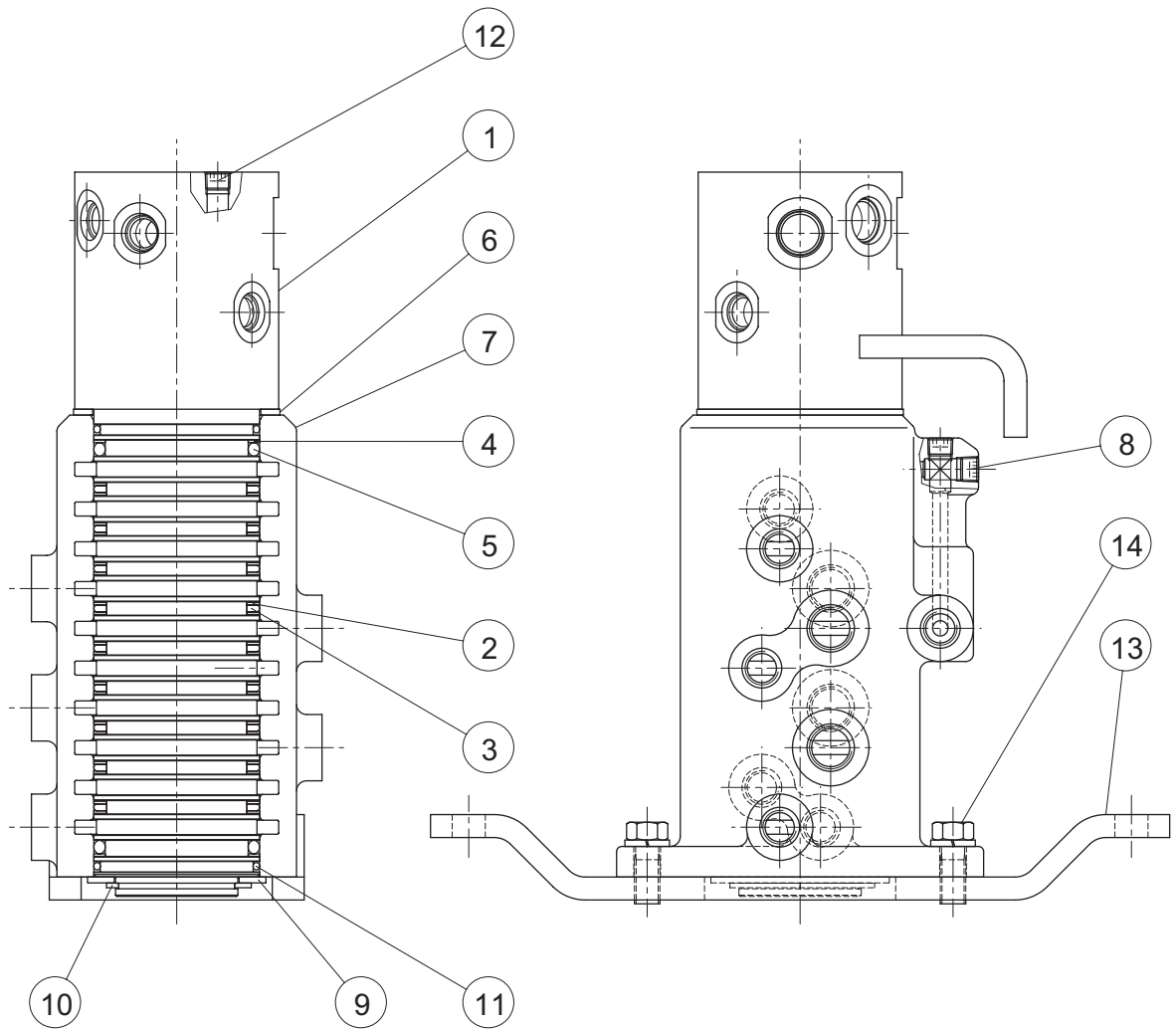
• KX41-3 EU (Fixed Track)



No.	Part Name	Q'ty
010	Assy joint, swivel	1
020	Shaft, swivel joint	1
030	Ring back up	14
040	Ring (D)	7
050	Ring back up	2
060	O - ring	2
070	Coller	1
080	Body, swivel joint	1

No.	Part Name	Q'ty
090	Coller	1
100	Cir clip	1
110	Ring	2
120	Base (Swivel joint)	1
130	Bolt	4
140	Bolt	4

(4) Assembling of the rotary joint



- | | |
|------------------|-----------------------|
| (1) Shaft | (8) Plug |
| (2) Back up ring | (9) Collar |
| (3) D - ring | (10) External circlip |
| (4) Back up ring | (11) O - ring |
| (5) O - ring | (12) Plug |
| (6) Collar | (13) Base |
| (7) Housing | (14) Bolt |

1. Apply grease over the inner and outer surface of the D - ring (3) before hand.
2. Apply grease over the inner and outer surface of the D - ring (5), (11) before hand.
3. Apply screw adhesive (Loctite 271) on the Bolt (14).
 Tightening torque: 48.1 ~ 55.9 N·m
 4.9 ~ 5.7 kgf·m
 35.5 ~ 41.2 ft·lbf

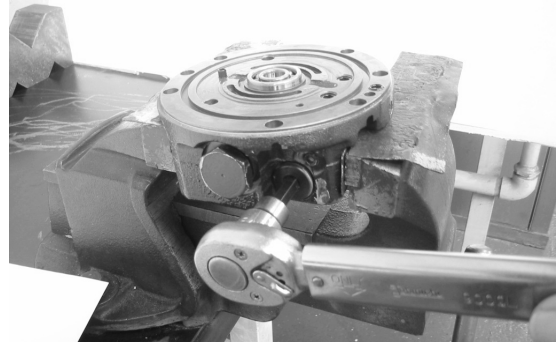
9. Tighten the plugs each with an O-ring (for both sides).

Tightening torque : 46 ~ 51 N·m

4.7 ~ 5.3 kgf·m

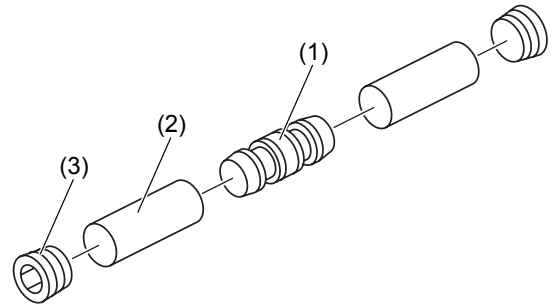
33.9 ~ 37.6 ft·lbf

Hexagon socket double-face width : 8 mm



10. Mount the shuttle spool assembly.
The configuration of the parts is shown in the photograph.

	Q'ty
(1) Shuttle spool	1
(2) Needle	2
(3) Plug	2



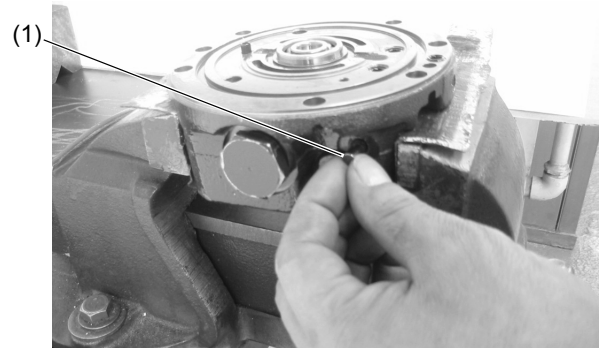
11. Insert the shuttle spool into body 1.

(1) Shuttle spool



12. Insert the needles (for both sides) into body 1.

(1) Needle



15. Mount the snap ring and secure the cover.
Apply a flat-blade screwdriver to the edge of the snap ring and hammer the screwdriver in the direction of the circumference.
(The above can be performed with ease if implemented at the crena.)

[Disassembly]

The snap ring can be removed with ease if the edge of the snap ring is moved to the crena of the main component with a screwdriver and hammer.

(1) Snap ring edge



16. Tighten the hexagon socket plug.
Tighten the plug on the side marked with 'DRAIN' first.
(Use the brim of the plug to stop the cover from turning.)

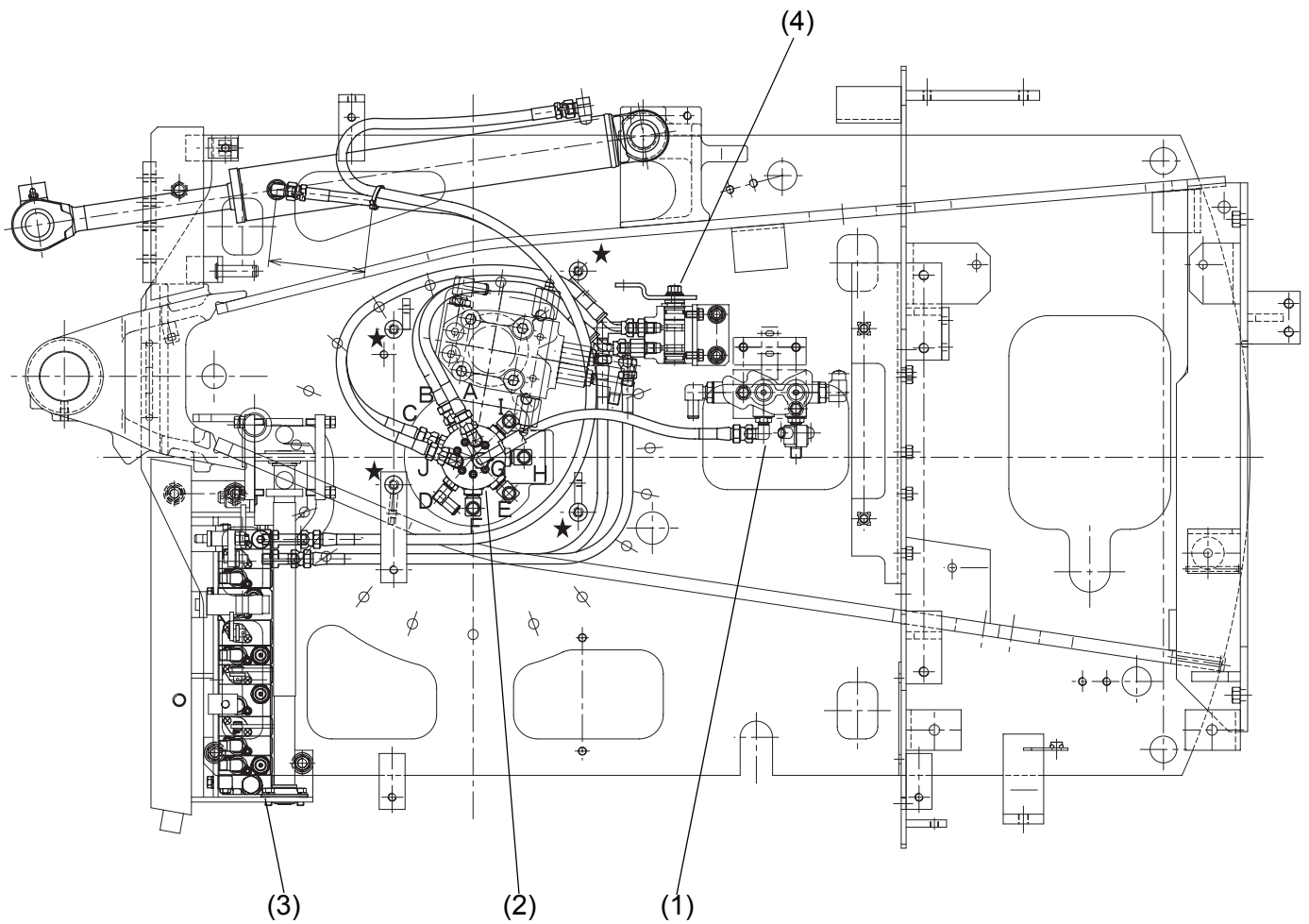
Tightening torque : 46 ~ 51 N·m
4.7 ~ 5.2 kgf·m
33.9 ~ 37.6 ft·lbf

Hexagon socket double-face width : 8 mm



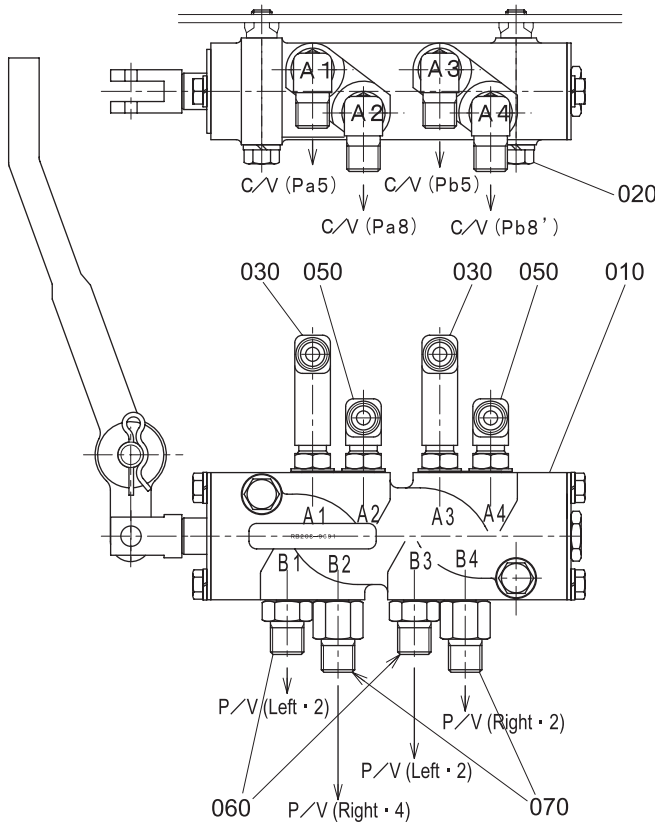
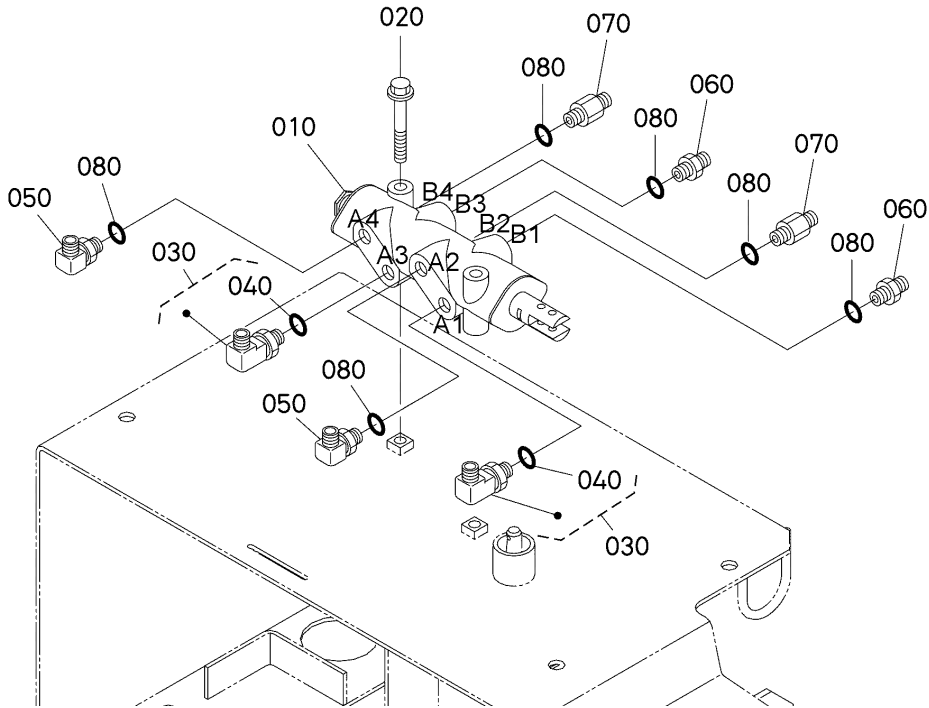
h. Unload valve (KX41-3 PP)

(1) Location of unload valve



- (1) Unload valve
- (2) Rotary Joint
- (3) Control valve
- (4) Change valve (Dozer, track)

(2) Adaptor installation



Tightning torque
 23.5 ~ 27.5 N·m
 2.4 ~ 2.8 kgf·m
 17.3 ~ 20.3 ft·lbf

Ref.No.	Part Name	Q'ty	Remarks
010	TPSS valve assy	1	
020	Bolt	2	
030	Adaptor (L, G1/8 - G1/4)	2	Include 040
040	O - ring	2	
050	Adaptor (L, G1/8 - G1/4)	2	
060	Adaptor (S, G1/8 - G1/4)	2	
070	Adaptor (S, G1/8 - G1/4)	2	
080	O - ring	6	

Tightning torque (Adaptor : 050, 070, 080, 090)
 15.0 ~ 16.5 N·m
 1.5 ~ 1.7 kgf·m
 11.0 ~ 12.2 ft·lbf

V. Electrical System

A. Troubleshooting	V-S-3
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b. Failure display and diagnosis criteria on the meter panel.	V-S-4
c. Engine	V-S-5
d. Others	V-S-6
B. Kubota Intelligent Control System	V-S-7
a. Navigation list of messages	V-S-7
b. Meter display.	V-S-9
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C. Wire harness installation	V-S-15
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b. Engine earth, starter switch.	V-S-16
c. Main harness.	V-S-17
D. Others, for your reference	V-S-23
a. Photo samples taken from Hirakata assembly line	V-S-23
b. Photo samples taken from KBM assembly line : EU - version	V-S-30

◆ Hour-meter

Indicates the total operating hours of the machine.

How the indication goes

- The meter advances one hour after an hour of operation regardless of the engine rpm.



◆ Engine tachometer

Indicates the current rpm of the engine.




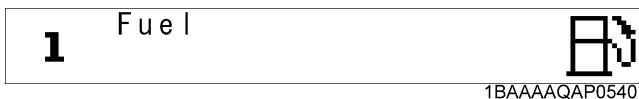
NOTE :

- The LCD display may be illegible when viewed from a certain angle. This is not a display failure.


■ LCD Display for Warning

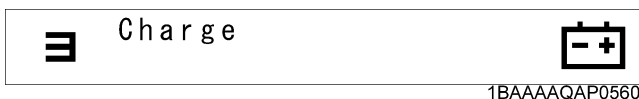
◆ Remaining fuel warning

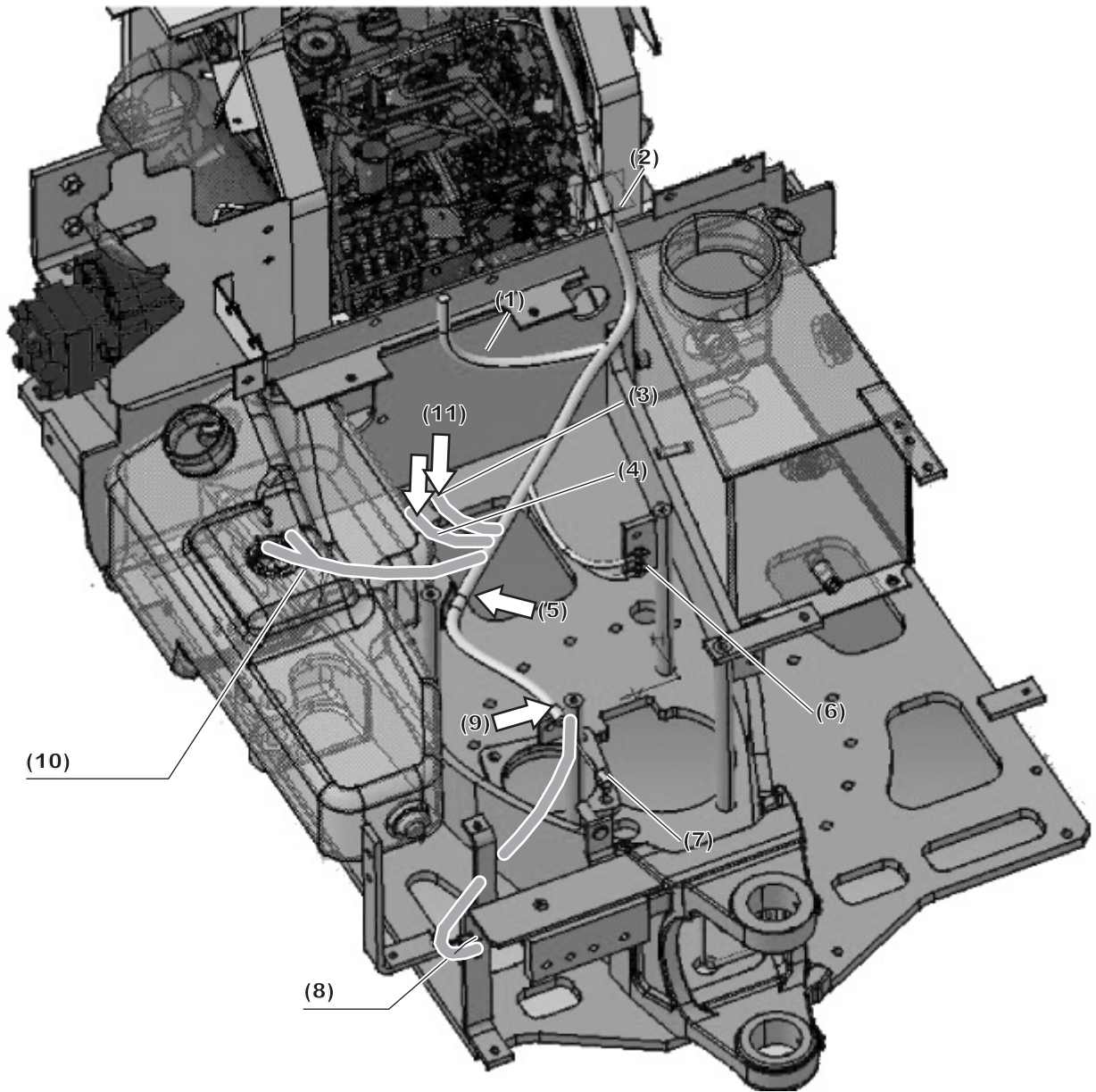
If the fuel level become less, the  lamp (yellow) starts flashing and the following message appears in the display.



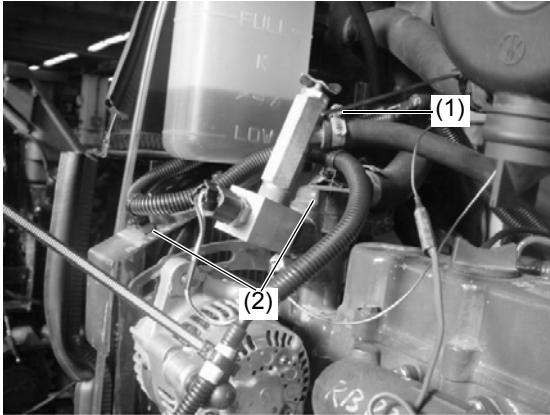
◆ Battery charge warning

If the battery line gets in trouble, the  lamp (red) starts flashing and the following message appears in the display.



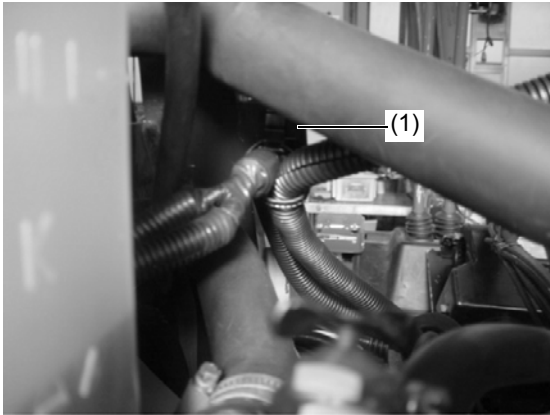


- (1) To control panel
- (2) Grommet
- (3) Trance Hi (Y)
- (4) Lever lock (Gr)
- (5) Clamp
- (6) Earth
- (7) Work lamp harness
- (8) Horn
- (9) Clamp
- (10) Fuel sensor
- (11) Clamp



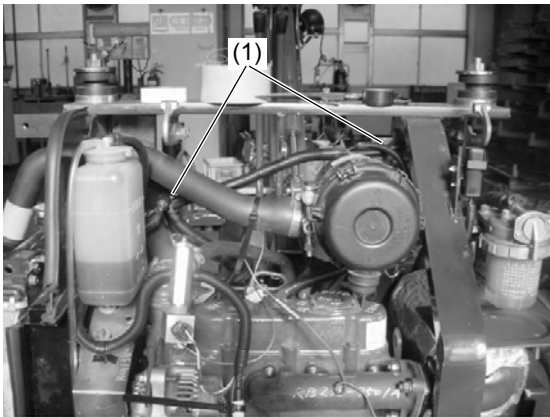
4) Clamp position.

- (1) Heater hose's hoseband fixing is upward.
- (2) Clamp

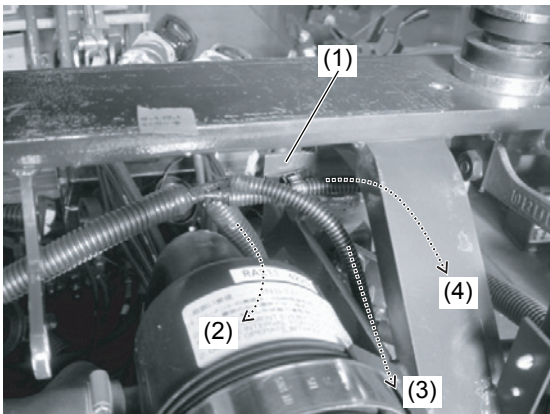


5) Clamp

- (1) Clamp position.



- (1) Clamp position.



6) Wireharness direction

- (1) Clamp position.
- (2) Stop solenoid
- (3) Stop relay
- (4) Fuel pump

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