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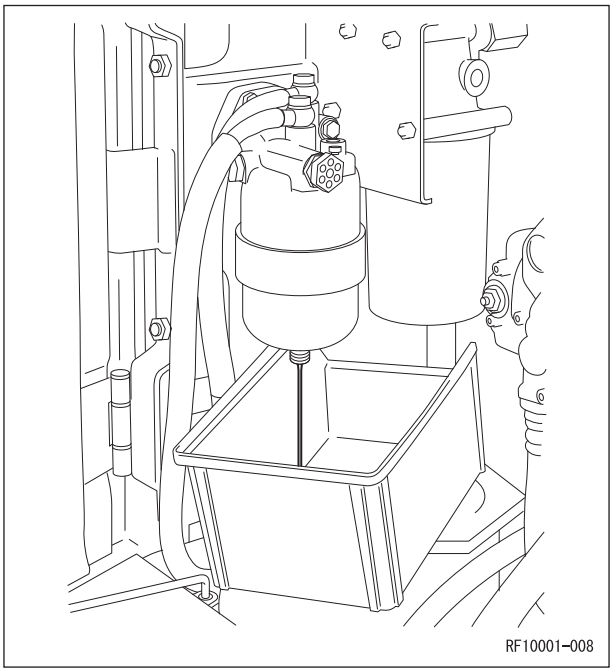
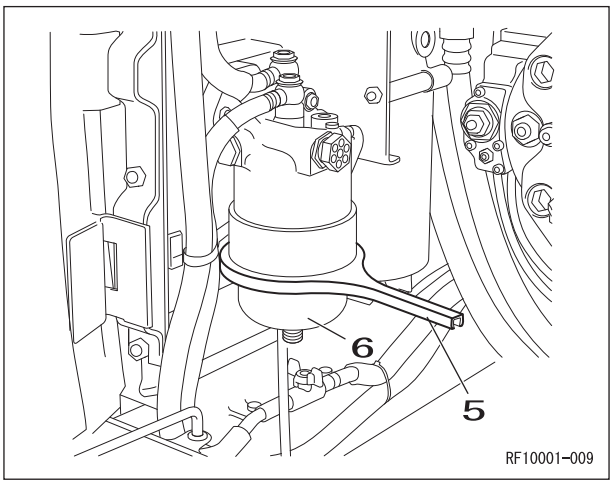
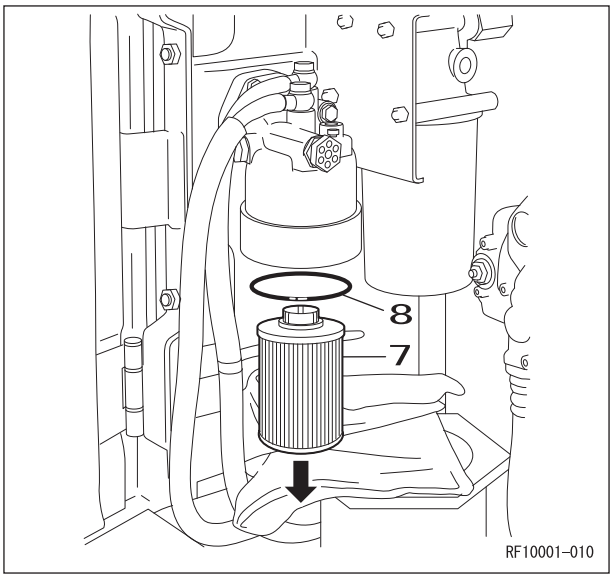
[5] Drain the fuel.



[6] Use the filter wrench (5) to remove the cover (6).



[7] Replace the element (7) and O-ring (8).
The O-ring cannot be reused. Always replace it with a new one.



5	Filter wrench
6	Cover
7	Element
8	O-ring

Removal and Installation of Engine Assembly

⚠ Warning	・Keep away from fire. ・Be sure to release hydraulic pressure before beginning work. ・The air conditioner circuit is filled with high-pressure gas, so beware of the gas released when loosening lines. ・Do not use open flames and do not allow sparks near the battery.

⚠ Caution	・Be sure to stop the engine before beginning work. ・Be sure to inspect the wire rope and other lifting equipment before beginning work. ・Do not stand or pass under the suspended load.

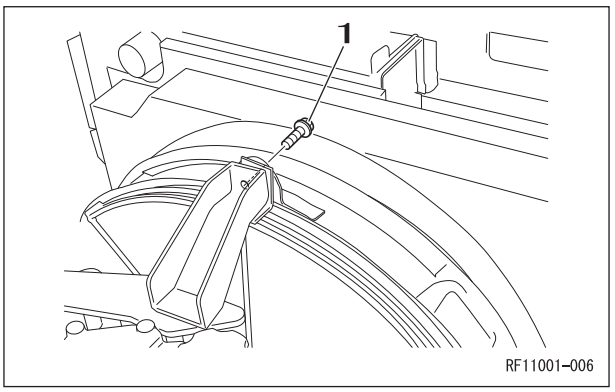
Items to prepare

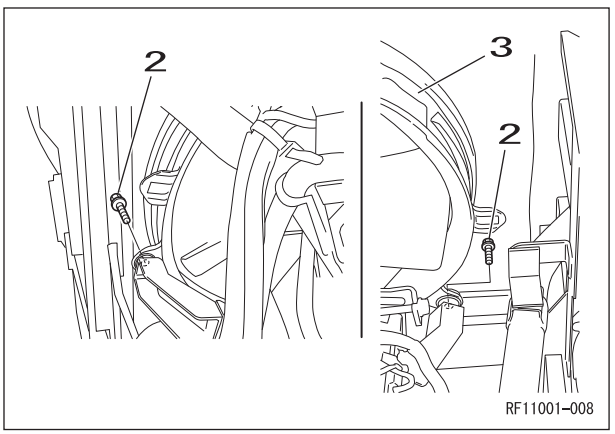
- Wrenches (7 mm, 8 mm, 10 mm, 12 mm, 13 mm, 14 mm, 17 mm, 36 mm)
- Box wrench (24 mm)
- Shackle (with the required lifting capacity) x 2
- Wire rope (with the required breaking load)
- Crane (with the required lifting capacity)
- Marking pen
- Caps
- Plugs
- Waste oil can
- Rag
- Cleaning fluid
- Wood planks, etc.

[1] Remove the counterweight.
(For details, see "Removal and Installation of Counterweight".)

[2] Remove the pump.
(For details, see "Removal and Installation of Hydraulic Pump".)

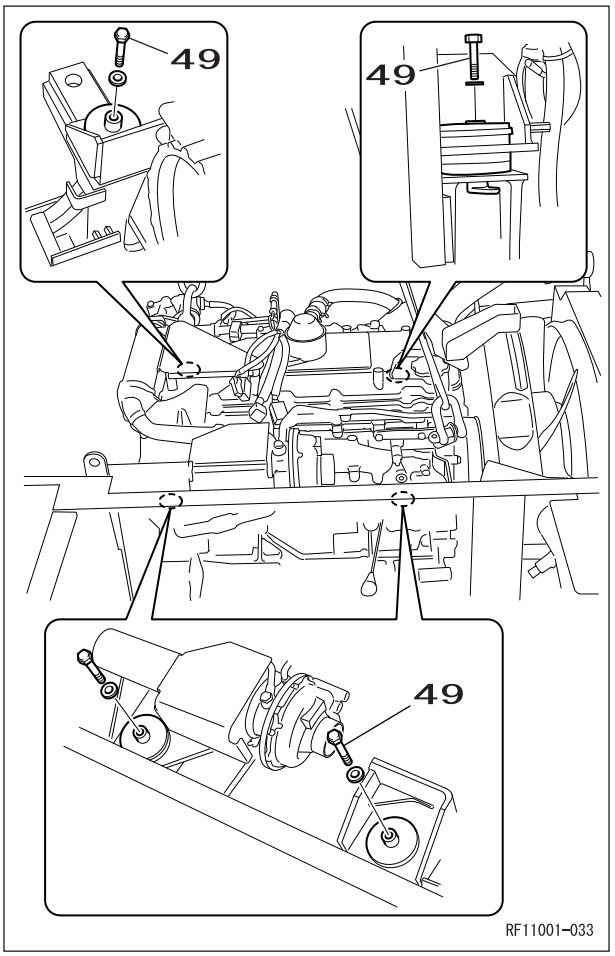
[3] Use a wrench (14 mm) to remove the bolts (1) and (2), and then remove the fan shroud (3).





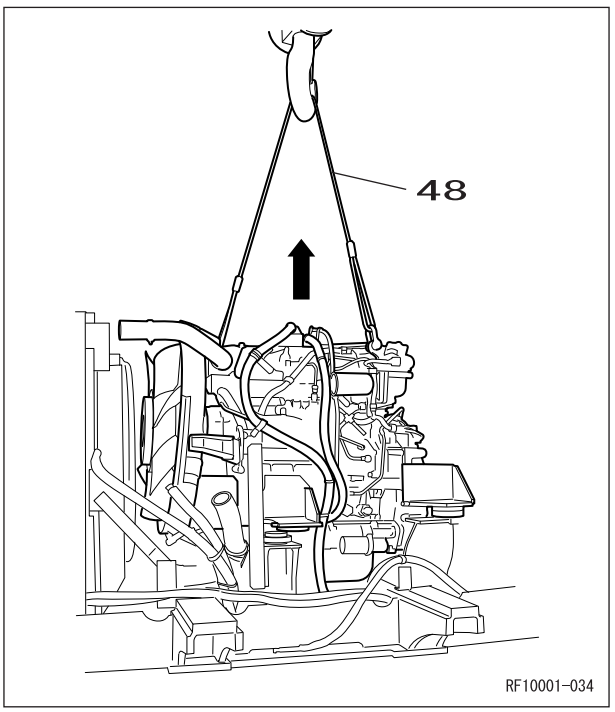
1	Bolt
2	Bolt
3	Fan shroud

[30] Use a box wrench (24 mm) to remove the 4 bolts (49) from the mount.



[31] Use the wire rope (48) and crane to lift the engine.

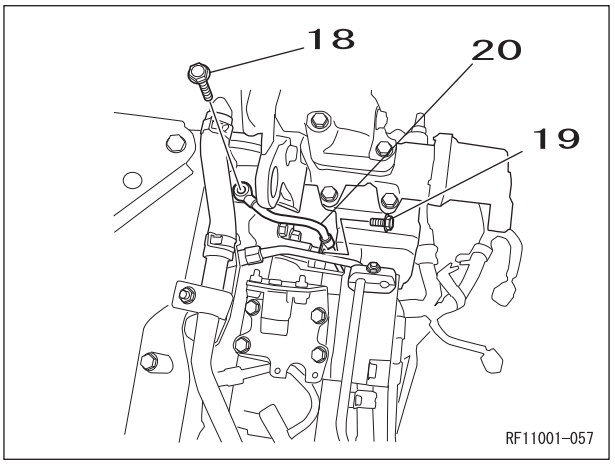
[32] Thoroughly check that the location is safe before lowering the engine on wood planks, etc.



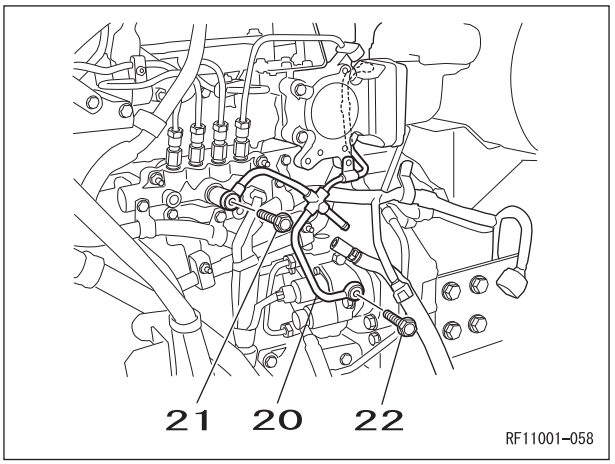
48	Wire rope
49	Bolt

[12] Use a wrench (10 mm) to remove the bolt (19) on the leak-off pipe (20).

[13] Use a wrench (12 mm) to remove the eye bolt (18) on the leak-off pipe (20).

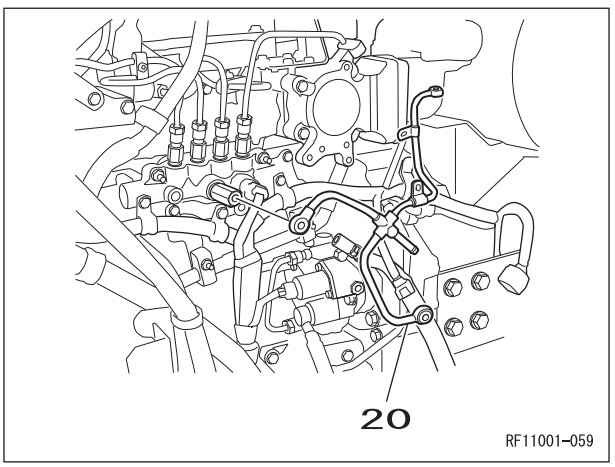


[14] Use a wrench (14 mm) to remove the eyebolts (21) and (22) on the leak-off pipe (20).



[15] Remove the leak-off pipe (20).

- Use caps and plugs to cover the lines to prevent any entry of water, dust or dirt.
- Clean the line by spraying it with a parts cleaner to prevent scratches and prevent dirt from accumulating on the connectors.



18	Eyebolt
19	Bolt
20	Leak-off pipe
21	Eyebolt
22	Eyebolt

Removal and Installation of Common Rail

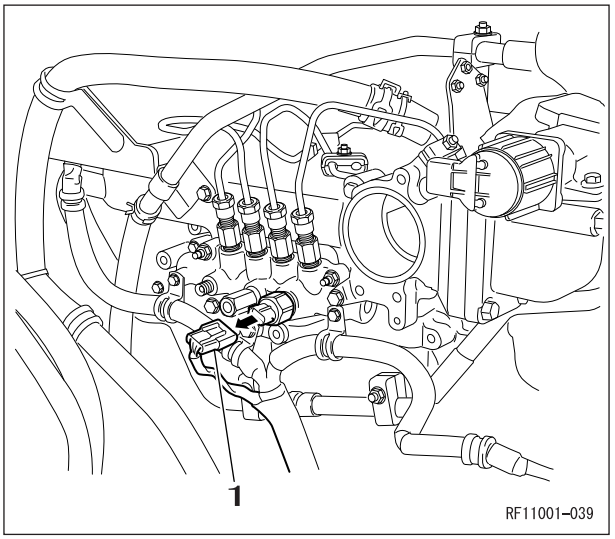
Caution	・ Be sure to stop the engine before beginning work.

Items to prepare

- Wrenches (10 mm, 12 mm, 14 mm, 17 mm)
- Marking pen
- Caps
- Plugs
- Rag
- Cleaning fluid

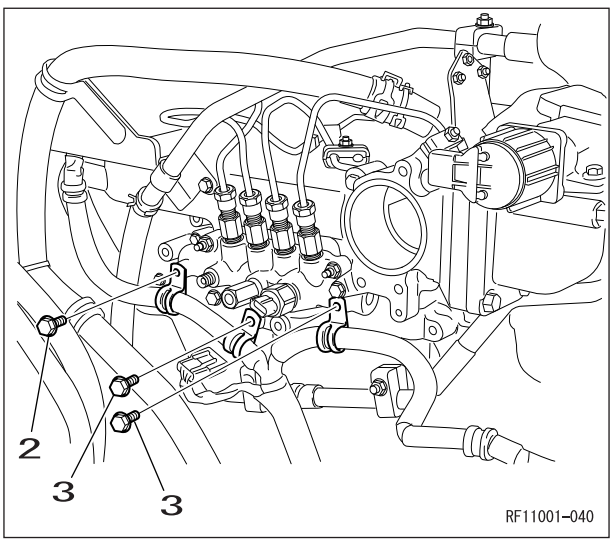
See "Removal and Installation of Supply Pump" for procedures for removal and installation of the oil level gauge pipe, intake hose, manifold, etc.

[1] Remove the connector (1).



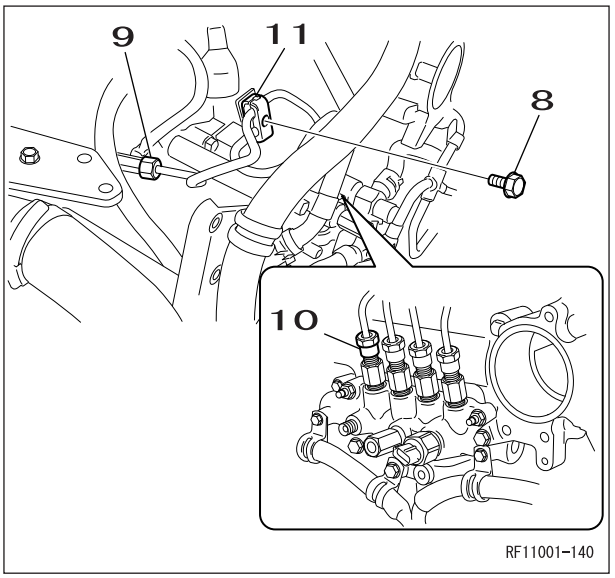
[2] Use a wrench (12 mm) to remove the bolts (2) on the wiring clamp.

[3] Use a wrench (10 mm) to remove the bolts (3) on the wiring clamp.



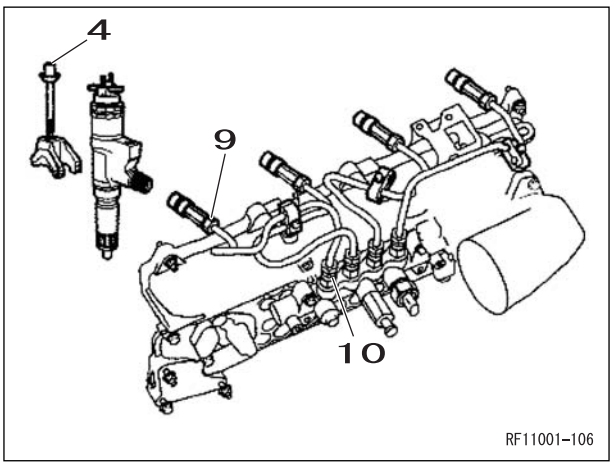
1	Connector
2	Bolt (M8)
3	Bolt (M6)

[3] Apply a small amount of engine oil to the outside surface of the injector-side sleeve nut (10).
Install the line.
Carefully tighten each of the sleeve nuts (9) and (10) until the line is touching the common rail and injector.
Tighten the bolt (8) on the line clamp (11) to the specified torque.
Tightening torque: 6 N•m



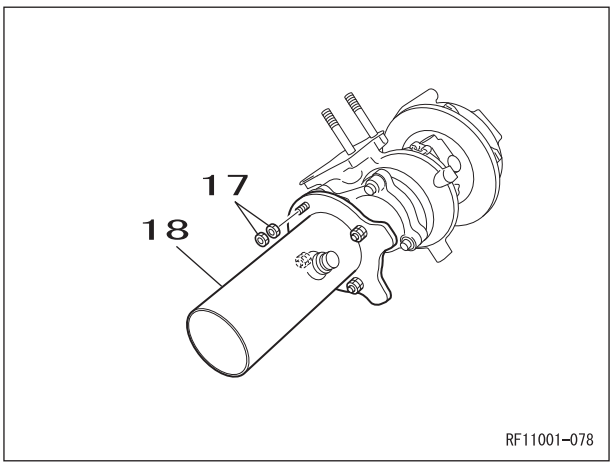
Fully tighten the bolt (4) on the injector clamp to the specified torque.
Tightening torque: 30 N•m

Tighten the line sleeve nuts to the specified torque.
Tightening torque: 44 N•m



4	Bolt
8	Bolt
9	Sleeve nut
10	Sleeve nut
11	Line clamp

[10] Use a wrench (13 mm) to remove the 8 nuts (17), and then remove the line (18) from the turbo charger.



17	Nut
18	Line

Removal and Installation of Compressor

Warning	・ The air conditioner circuit is filled with high-pressure gas, so there is the danger of gas splaying out when loosening lines.

Caution	・ Be sure to stop the engine before beginning work. ・ When removing and installing the compressor, check the compressor oil quantity.

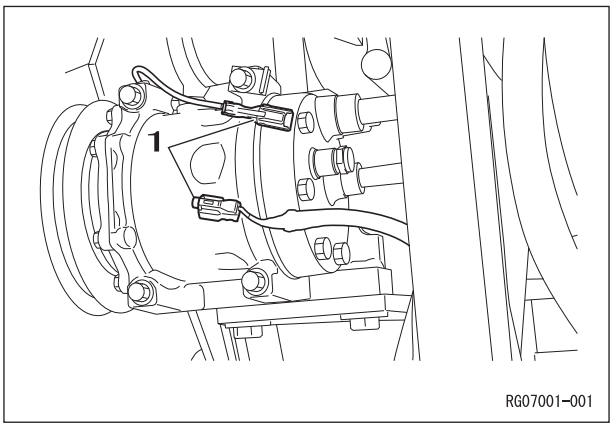
Items to prepare

- Wrench (12 mm)
- Box wrench (12 mm)
- Rag
- Cleaning fluid

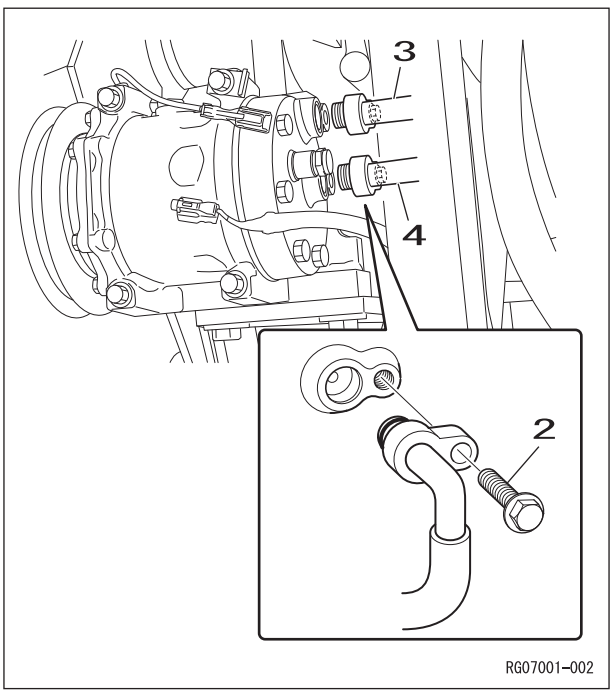
1. Removal of Compressor

[1] Remove the counterweight.
(For details, see "Removal and Installation of Counterweight page 222".

[2] Remove the connector (1).



[3] Use a box wrench (12 mm) to loosen the bolts (2) on the lines in the 2 locations, and then remove the 2 lines (3) and (4).
- Always remove the low-pressure line (3) first.
- Attach caps or plugs to the compressor and line to prevent any entry of water, dust or dirt.



1	Connector
2	Bolt
3	Line (low-pressure side)
4	Line (high-pressure side)

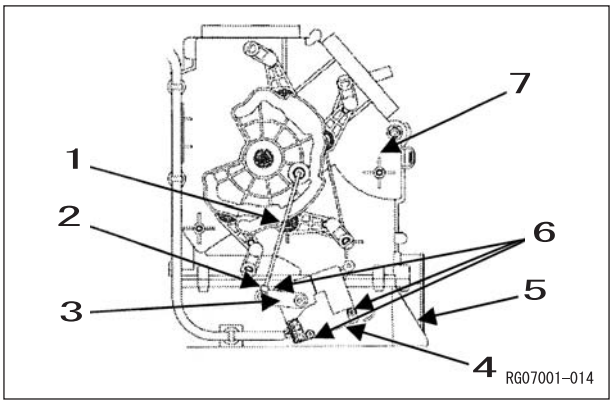
8. Replacement of Motor Actuator

[1] Replacement of mode motor actuator

Remove the connector connected to the motor actuator (4).

Remove the mode rod (1) connecting the motor actuator and mode cam from the rod holder (2).

Remove the 3 N4 x 30 (T1) Phillips screws (13) that are used to install the motor actuator, remove the motor actuator from the unit with the rod holder and lever MAL 1 (12) attached to the actuator, remove the rod holder and lever MAL 1 from the motor actuator, and then install the new motor actuator. To install, perform the reverse of the removal procedure.

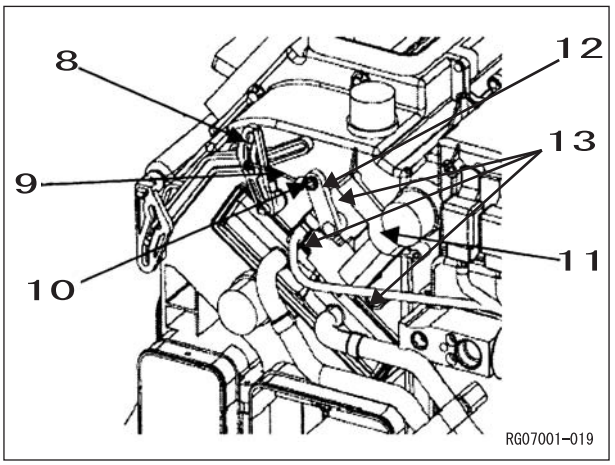


[2] Replacement of air mix motor actuator

Remove the connector connected to the motor actuator (11).

Remove the AM rod (9) connecting the motor actuator and lever AM (8) from the rod holder (10).

Remove the 12 N4 x 30 (T1) Phillips screws (13) that are used to install the motor actuator, remove the motor actuator from the unit with the rod holder and lever MAL 1 (3) attached to the actuator, remove the rod holder and lever MAL 1 from the motor actuator, and then install the new motor actuator. To install, perform the reverse of the removal procedure.



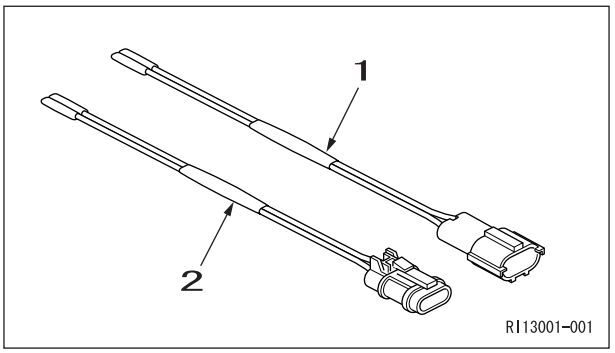
1	Mode rod
2	Rod holder
3	Lever MAL 1
4	Mode motor actuator
5	Unit case bottom
6	Phillips screw
7	Unit case rear
8	Lever AM
9	AM rod
10	Rod holder
11	Air mix motor actuator
12	Lever MAL 1
13	Phillips screw

Procedure for Electricity Measurement

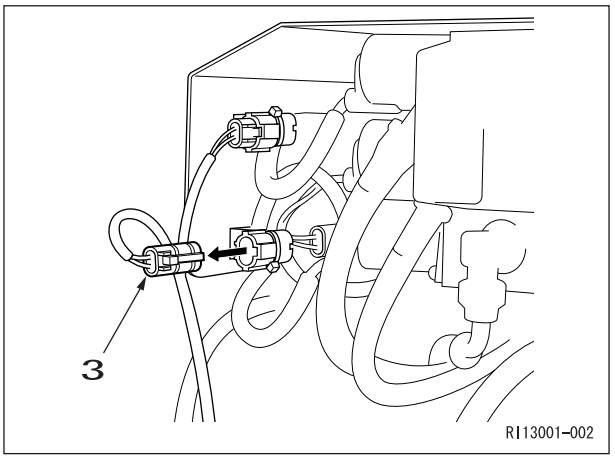
Items to prepare

- Service connectors
- Tester

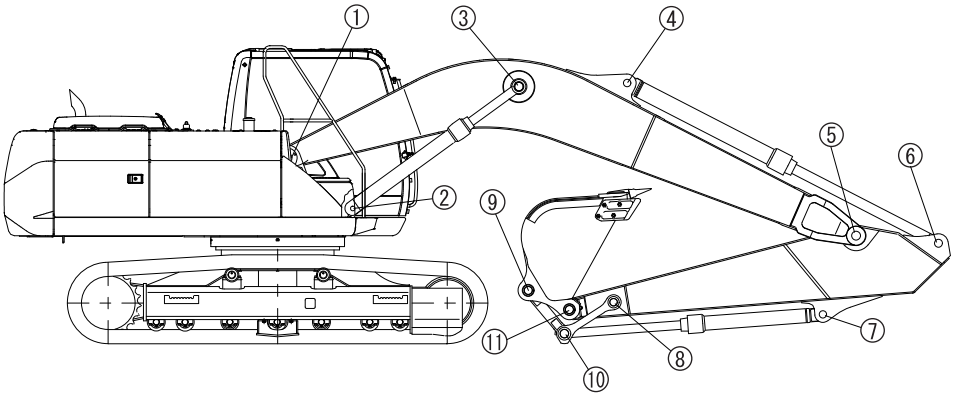
[1] Use service connector (female) (1) and service connector (male) (2) for voltage measurement.



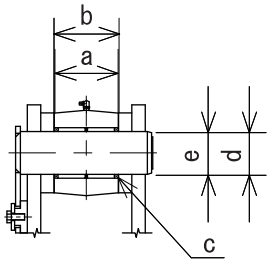
[2] Remove the connector (3) in which voltage is to be measured.



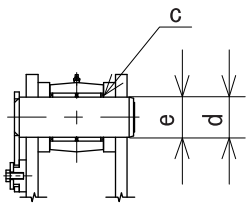
1	Service connector (female)
2	Service connector (male)
3	Connector



(6) Arm and arm cylinder installation section



(7) Arm and bucket cylinder installation section



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* Use the maintenance standard values table for judgment.

(6) Arm and arm cylinder installation section

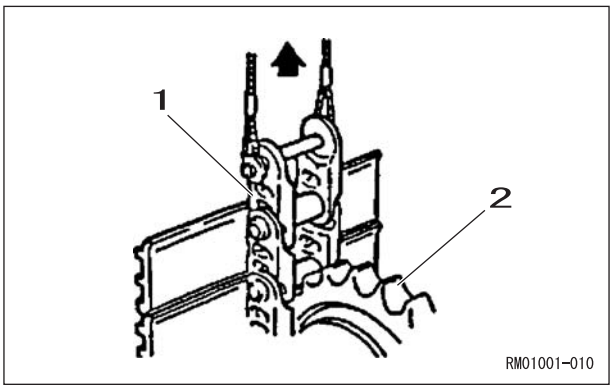
Part name	Code	Measured dimensions (mm)	Standard value (mm)	Usage limit (mm)	Judgment	Action
Arm	a		121	127	Acceptable / Unacceptable	—
Arm cylinder (top section)	b		120	118	Acceptable / Unacceptable	Replacement
Clearance	c		0.5 - 3.0	Adjust with shims	Acceptable / Unacceptable	Adjust with shims
Pin	d	ϕ	ϕ80	ϕ79	Acceptable / Unacceptable	Replacement
Bushing (arm cylinder)	e	ϕ	ϕ80	ϕ81.5	Acceptable / Unacceptable	Replacement

(7) Arm and bucket cylinder installation section

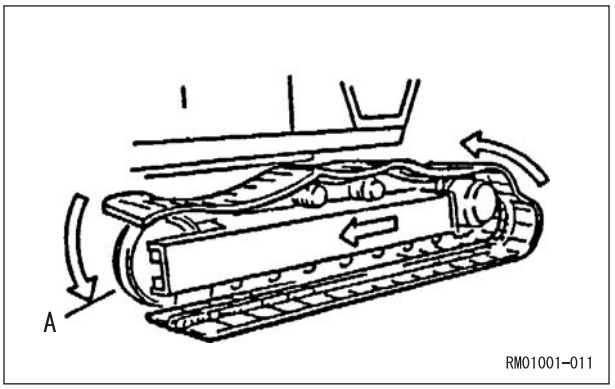
Part name	Code	Measured dimensions (mm)	Standard value (mm)	Usage limit (mm)	Judgment	Action
Arm	a		101	107	Acceptable / Unacceptable	—
Bucket cylinder (foot section)	b		100	98	Acceptable / Unacceptable	Replacement
Clearance	c		0.5 - 3.0	Adjust with shims	Acceptable / Unacceptable	Adjust with shims
Pin	d	ϕ	ϕ75	ϕ74	Acceptable / Unacceptable	Replacement
Bushing (bucket cylinder)	e	ϕ	ϕ75	ϕ76.5	Acceptable / Unacceptable	Replacement

2. Installation of Shoe Assembly

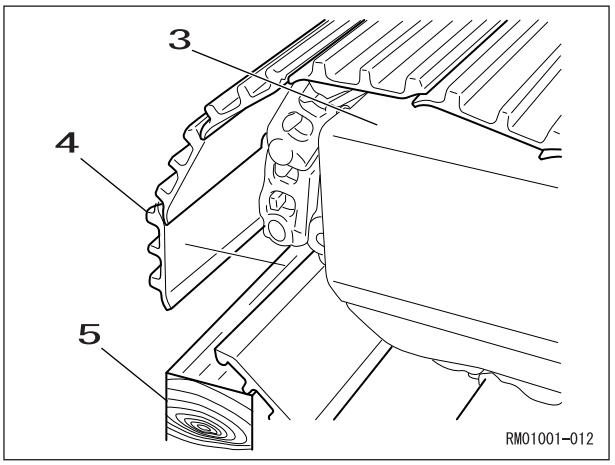
[1] Raise the lower side frame about 20 cm.
Lift the track shoe (1) and align it with the sprocket (2).
Pay attention to the backwards and forward direction of the track shoe.



[2] Slowly set the travel lever to forward and feed the track shoe to the take-up roller side as shown in the diagram.
In the middle of this procedure when the track shoe passes the upper roller, use a crowbar, etc. to lift the track shoe while it is being fed.
Lower the lower side frame after the shoe has reached position A shown in the diagram.

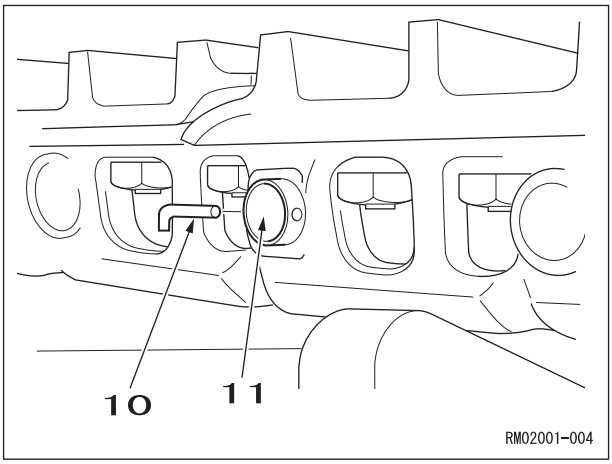


[3] Wrap the edge of the track shoe (4) onto the take-up roller (3).
Place a wood plank (5) on the ground and lift the bottom-side link to align the position where the master pin is inserted.

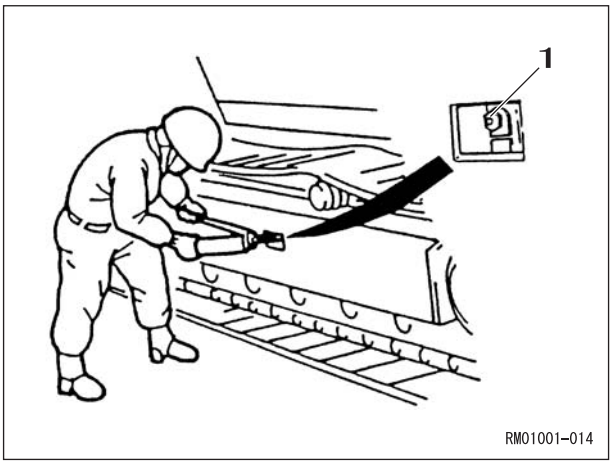


1	Track shoe
2	Sprocket
3	Take-up roller
4	Track shoe
5	Wood plank

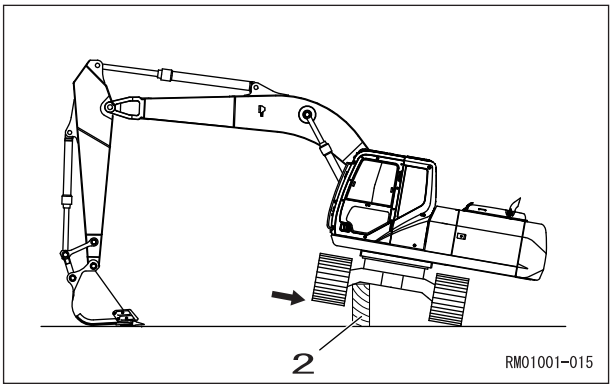
[7] Insert the master pin (11).
Insert the S-pin (10) and bend it so that it cannot slip out.

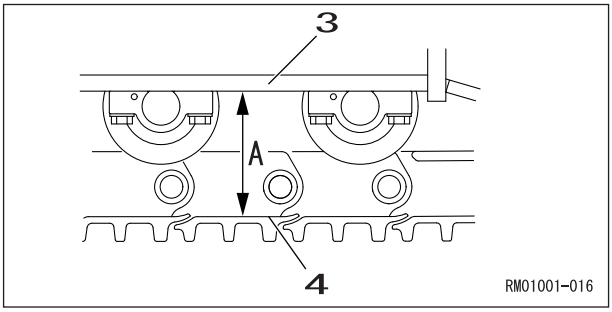


[8] Tighten the check valve (12).
While monitoring the track shoe tension, inject grease into the grease cylinder.



[9] To adjust the track shoe tension, raise the lower side frame as shown in the diagram.
Place a wood plank (13) under the lower frame to prevent falling.
Adjust the tension so that the distance indicated with A between the frame bottom (14) of the center area of the lower side frame and the lowest hanging part of the top of the shoe plate (15) is 280 - 300 mm.





10	S-pin
11	Master pin
12	Check valve
13	Wood plank
14	Frame lower section
15	Topside of shoe plate

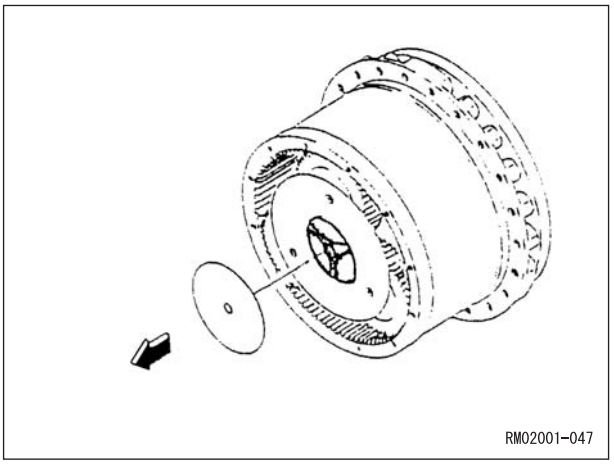
(2) Tightening torque

Table 5 indicates tightening torque for each connection section.

Table 5. Tightening torque for each section

Reference number	Part name	Screw size	Bolt width	Tightening torque
1-2-2-4	Plug	M24 x 1.5	14	137 ± 10 N•m
1-2-6-3	Hexagon socket head bolt	M12 x 1.75 x 40L	10	108 ± 10 N•m
1-2-6-5	Plug	G1/8	14	20.6 ± 1.0 N•m
1-2-6-6	Orifice	M5 x 0.8 x 5L	2.5	2.45 ± 0.49 N•m
1-2-7	Relief valve assembly	1-5/16 12UNF	27	373 ± 20 N•m
1-2-8	Plug	NPTF 1/16	4	9.8 ± 1.0 N•m
1-2-11	Plug	G1/2	10	118 ± 6 N•m
1-2-14	Plug	G1/2	10	118 ± 6 N•m
1-2-17	Orifice	M5 x 0.8 x 5L	2.5	2.45 ± 0.49 N•m
1-2-18	Orifice	M5 x 0.8 x 5L	2.5	2.45 ± 0.49 N•m
1-2-19	Orifice	M5 x 0.8 x 5L	2.5	2.45 ± 0.49 N•m
1-2-20	Plug	G1/4	6	36.8 ± 2.5 N•m
1-11	Hexagon socket head bolt	M14 x 2.0 x 35L	12	205 ± 10 N•m
8	Bolt	M20 x 2.0 x 70L	Torx T90	539 ± 28 N•m
14	Bolt	M20 x 2.0 x 130L	Torx T90	539 ± 28 N•m
24	Screw	M10 x 1.5	Torx T50	58.8 ± 4.9N•m
28	Hexagon socket head bolt	M10 x 1.5 x 16L	8	73.4 ± 3.63 N•m
29	Plug	G3/4	12	157 ± 8 N•m

[19] Removal of drive gear
Remove the driver gear (25).

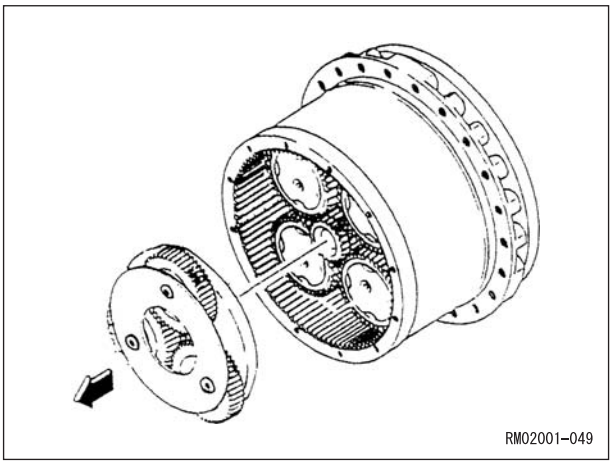


[20] Removal of 1st stage holder assembly
Remove the 1st stage holder assembly comprising the holder B (17), planetary gears B (21), needle bearings (20), inner races (19), thrust plates (18), thrust plates (22), thrust plate (23), and screws (24).

Caution:

When removing the 1st stage holder assembly, observe the following precaution.

When removing the assembly, be careful of fingers getting caught.



[21] Disassembly of 1st stage holder assembly
Secure the 1st stage holder assembly with a vice and warm the screws (24) with a dryer to loosen them.
Remove the screws, thrust plate (23), thrust plates (22), planetary gears B (21), needle bearings (20), inner races (19) and thrust plates (18) from holder B (17), in that order.

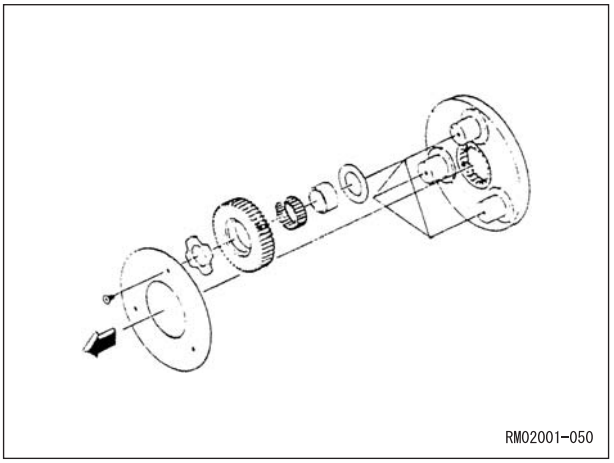
Cautions:

When loosening the screws, observe the following precautions.

Loctite has been applied to the screws. For this reason, they do not loosen easily.

If they are scratched due to being forcibly loosened, they cannot be used again.

Before loosening, warm the screws sufficiently with a dryer.



(2) Assembly procedures

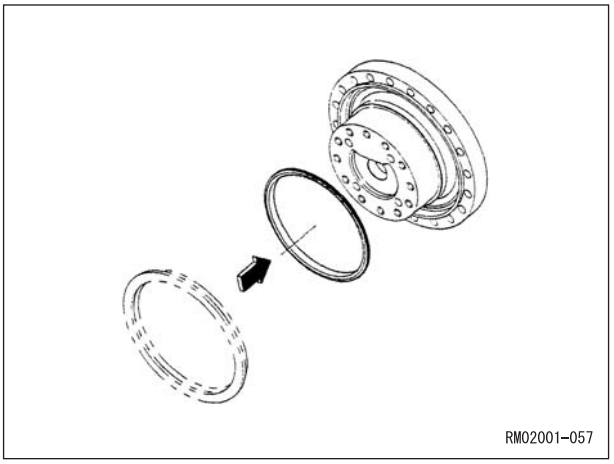
Perform assembly by observing the precautions listed in Section 1 and following the procedure indicated below.

[1] Assembly of reduction gear section

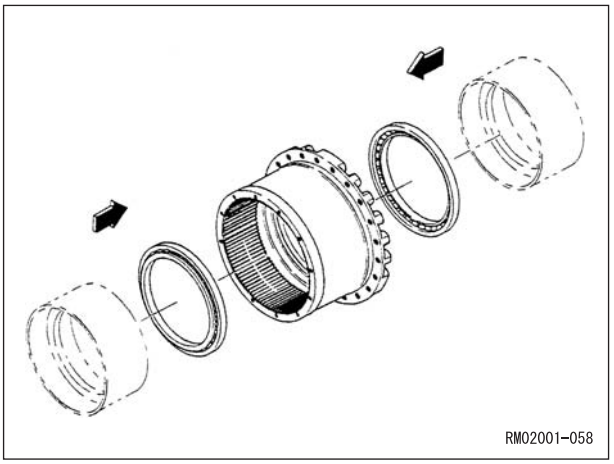
1) Attaching floating seal to flange
After confirming the items below concerning the floating seals (2), use the floating seal installation jig to attach the floating seals to the flange (1-1).

Confirmation items:

a. Check that there is no dirt adhered to the floating seal mounting surfaces on the flange.
b. Thoroughly degrease the floating seal mounting surfaces on the flange.
c. Check that there is no dirt adhered to the O-ring surfaces on the floating seals.
d. Thoroughly degrease the O-ring surfaces on the floating seals.

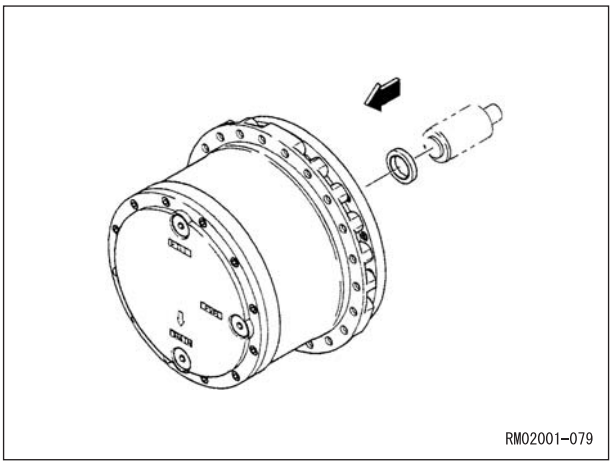


2) Attaching angular bearing to housing
Use the press-fit jig or press to press fit the angular bearings (3) to the housing (4).

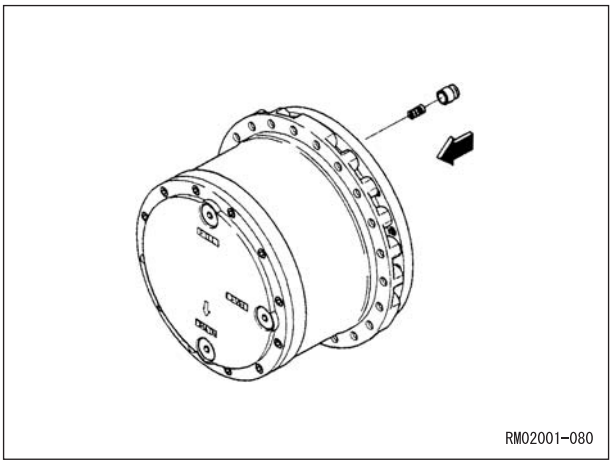


[2] Assembly of motor parts

1) Oil seal attachment
Check whether the oil seal is mounted on the flange (1-1), and use an oil seal press-fit jig to press fit the oil seal (1-12) to the flange if it is not mounted already.
Cautions:
a. Press fit the oil seal after applying grease to the internal diameter surface of flange oil seal press-fit section and the oil seal outside diameter section.
b. Press fit the oil seal after applying grease to the lip section of the oil seal inner diameter.
c. When press fitting the oil seal, push it vertically with the press. Slanting will cause damage to the oil seal outer diameter surface.
d. When press fitting the oil seal, be careful not to scratch the lip section of the oil seal internal diameter. Scratching may cause oil leaking and reduction gear internal damage could occur during motor operation.



2) Piston assembly attachment
Attach the springs (1-20) to the flange (1-1) holes for attaching the piston assemblies (1-7).
Next, attach the piston assemblies to the flange.
Cautions:
a. Attach springs in the center of the hole when attaching.
b. When attaching the piston assemblies, have the cylinder sections facing down.
c. Before attaching the piston assemblies, apply hydraulic oil to the internal diameter surface of the flange mounting holes and the outer diameter of the piston assembly cylinder sections.
d. After attaching the piston assemblies, check that the piston assemblies move smoothly.

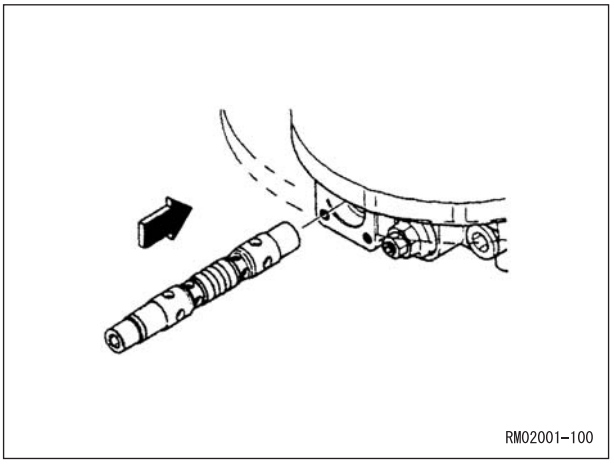


15) Plunger assembly attachment

Attach the base plate (1-2-1) to the plunger assembly (1-2-2).

Cautions:

a. Apply hydraulic oil to the plunger assembly outer circumference before attachment.
b. Attach the plunger assembly slowly and in a straight line while rotating it.
c. If the plunger assembly becomes stuck, do not force it too much and lightly strike it with a hammer.



16) Cap assembly attachment

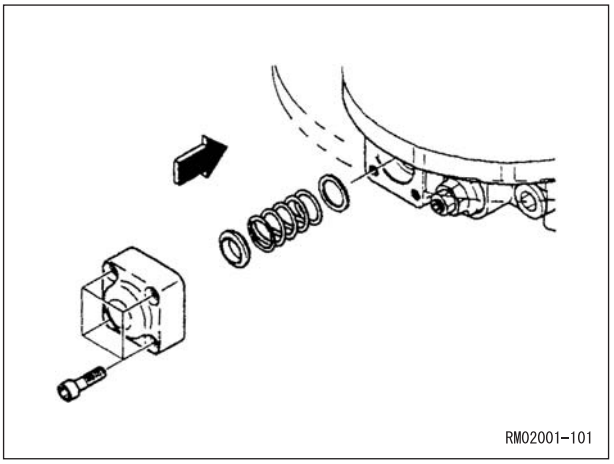
Attach the spring seats (1-2-3) and springs (1-2-4) to the plunger assembly (1-2-2) in that order.

After checking that the O-ring (1-2-6-2) is mounted to the cap assemblies (1-2-6) and that the O-ring (1-2-24) is mounted to the base plate, mount the spring seats (1-2-5) on the cap assemblies and attach the cap assemblies to the base plate.

Finally, tighten the hexagon socket head bolts (1-2-6-4) to the specified torque.

Cautions:

a. Apply grease to the O-rings.
b. The cap assemblies are pushed by the springs. Push the cap assemblies down by hand when tightening the socket head bolts.
c. When tightening the hexagon socket head bolts, evenly tighten the 4 bolts. If the cap assemblies are tightened at a slant, this could cause damage O-rings and cause oil leaking.



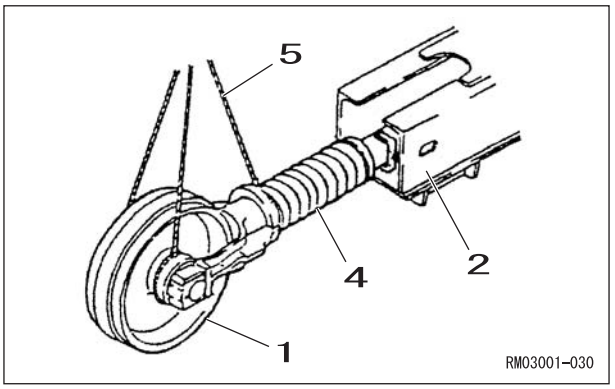
This completes assembly of the motor.

When installing the motor in the machine body, see "7. Installation of Motor", "8. Operation Check", and the Operator's Manual for the machine.

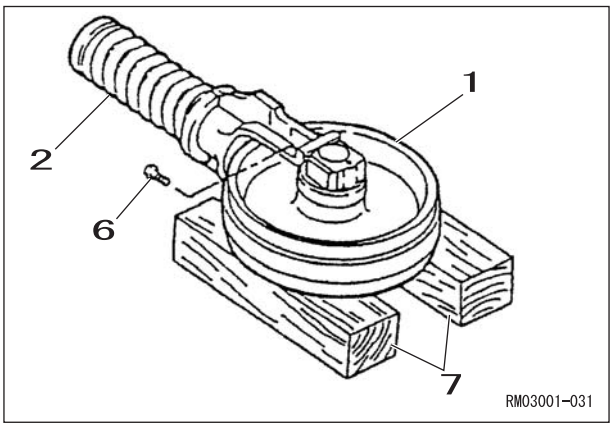
Problem	Possible cause	Countermeasure and solution
When an external load acts on the motor and pumping operation is done, cavitation occurs and abnormal noise is created.	There is foreign matter caught in the plunger, plunger movement is poor, and counter balance functions are not fulfilled.	Perform disassembly and remove foreign matter. Investigate the degree of damage according to Maintenance Procedures and reassemble the plunger if it is useable. If reusing is impossible, perform replacement with the base plate kit.
	There is damage to the plunger spring and counter balance functions are not fulfilled.	Perform disassembly and replace the spring and perform reassembly after removing foreign matter.
	The plunger spring is not fit correctly in place and counter balance functions are not fulfilled.	Fit the spring correctly in place.
	There is damage to the check valve spring and counter balance functions are not fulfilled.	Perform disassembly and replace the spring after removing foreign matter.
	The check valve spring is not fit correctly in place and counter balance functions are not fulfilled.	Fit the spring correctly in place.
	Foreign matter is clogging the orifice in the pilot oil path, and counter balance functions are not fulfilled.	Perform disassembly and reassemble after removing foreign matter.

Take-up Roller

[3] Install the lifting equipment (5) on the take-up roller (1) and recoil spring assembly (4) and hang them from the side frame (2) with the crane.

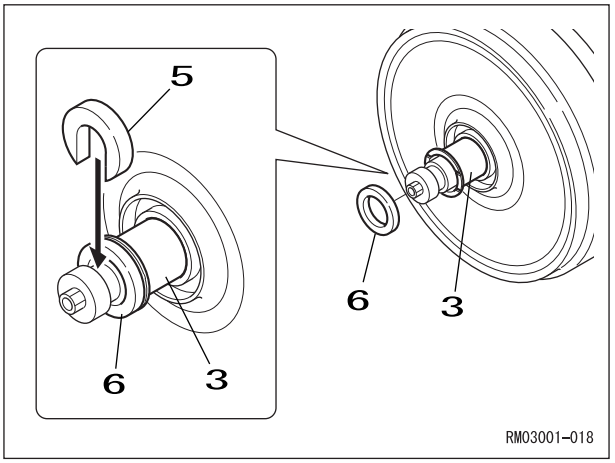


[4] Place the take-up roller (1) and recoil spring assembly (4) onto wood planks (7) as in the diagram. Use a wrench (24 mm) to remove the take-up roller bolt (6) and separate the roller and the recoil spring assembly.

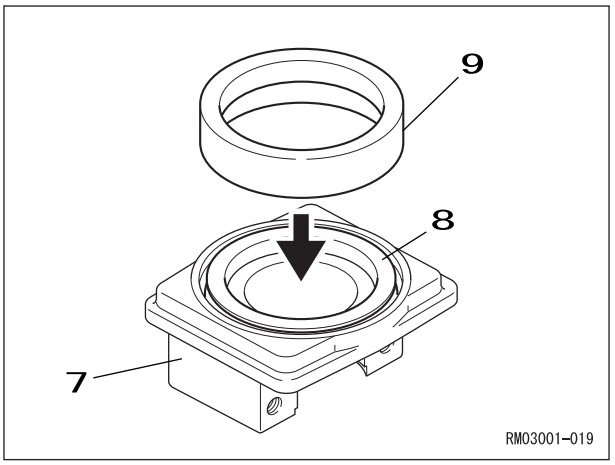


1	Take-up roller
2	Side frame
4	Recoil spring assembly
5	Lifting equipment
6	Bolt
7	Wood plank

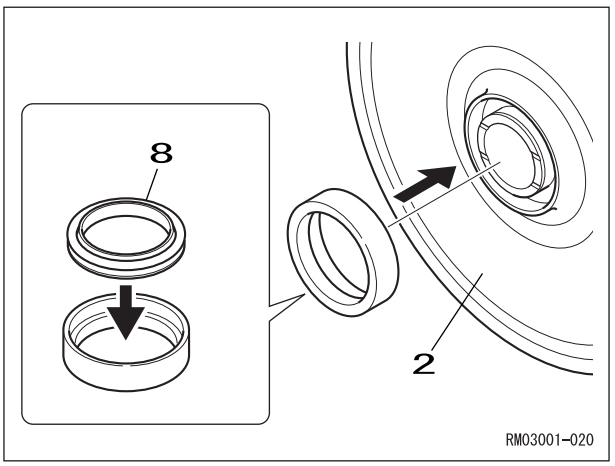
[4] Use the jigs (5) and (6) attached to the pressing machine to attach the bushing (3). Use the pressing machine to press from the opposite side. Next, use a special fiber cloth to remove all dust and debris.



[5] Attach the floating seal (8) to the hub (7). Use jig C (9) to press the floating seal into position.



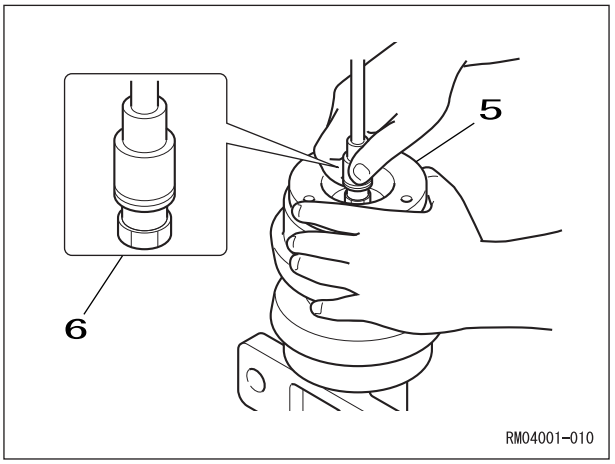
[6] Use jig C (9) to attach the floating seal (8) to the roller (2) side.



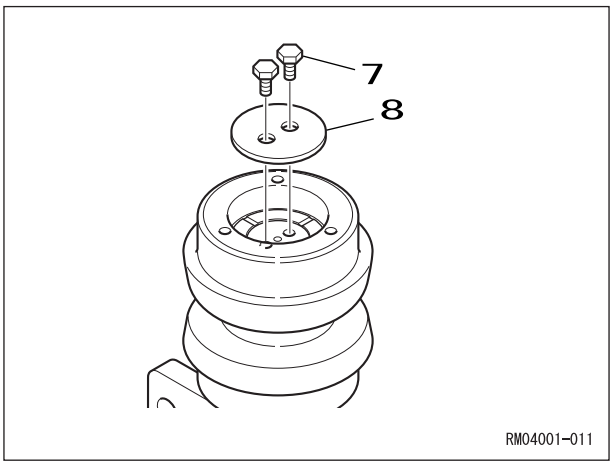
2	Roller
3	Bushing
5	Jig
6	Jig
7	Hub
8	Floating seal
9	Jig C

[4] Remove the cover (5).
If the cover is difficult to remove, it is possible to use an adapter to apply compressed air or to pry it open by inserting a flathead screwdriver into either end of the cover.

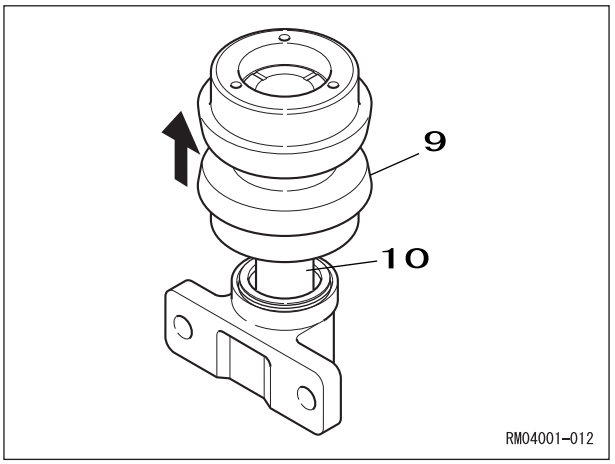
- When using compressed air, be careful of flying parts.



[5] Use a box wrench (17 mm) to remove the 2 bolts (7) inside the roller, and then remove the thrust plate (8).



[6] Lift the roller (9) and the shaft (10) comes off.

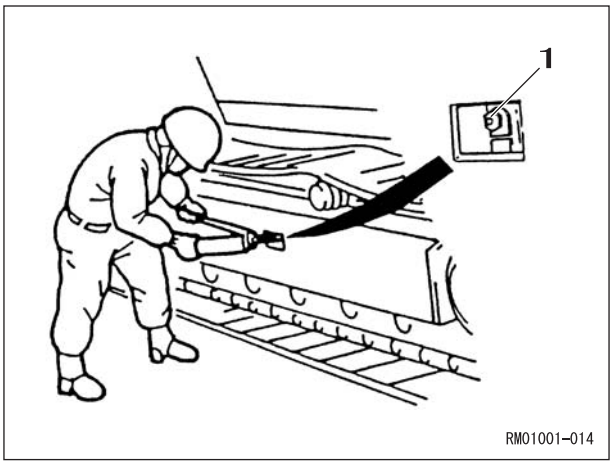


5	Cover
6	Air hose
7	Bolt
8	Thrust plate
9	Roller
10	Shaft

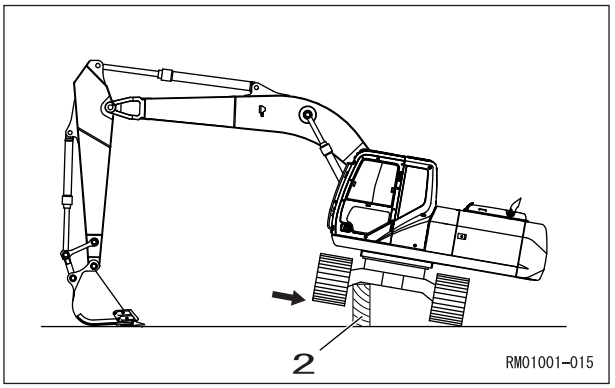
2. Installation of Lower Roller

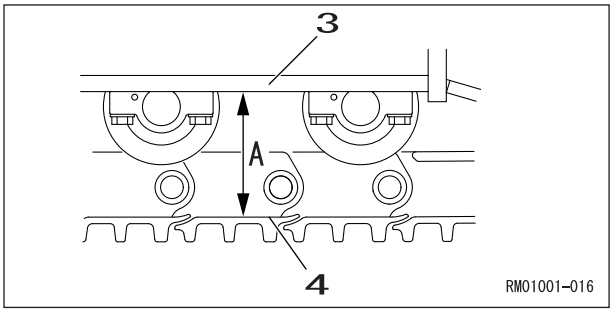
[1] Perform the reverse of the removal procedure.
Apply Loctite to the bolts and tighten them to the specified torque.
Tightening torque: 371 - 432 N•m

[2] Tighten the check valve (1).
While monitoring the track shoe tension, inject grease into the grease cylinder.



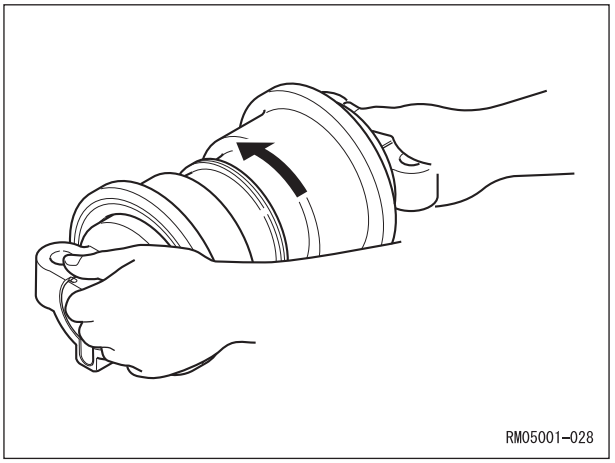
[3] To adjust the track shoe tension, raise the lower side frame as shown in the diagram.
Place a wood plank (2) under the lower frame to prevent falling.
Adjust the tension so that the distance indicated with A between the lower frame (3) of the center area of the lower side frame and the lowest hanging part of the shoe plate (4) is 280 - 300 mm.



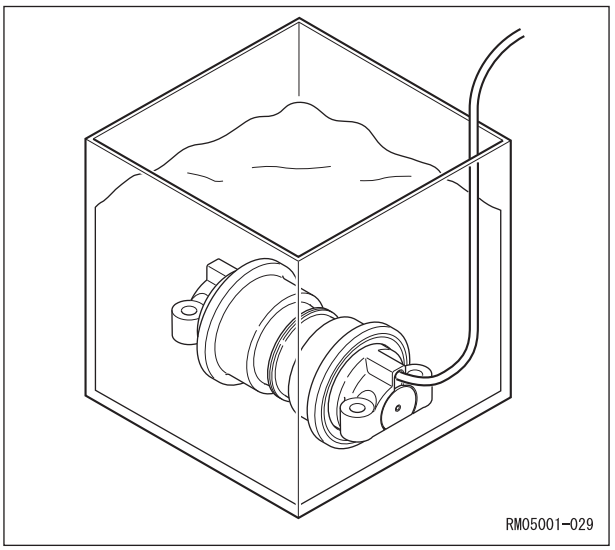


1	Check valve
2	Wood plank
3	Frame
4	Shoe plate

[10] Turn the main unit and check that the roller rotates properly.

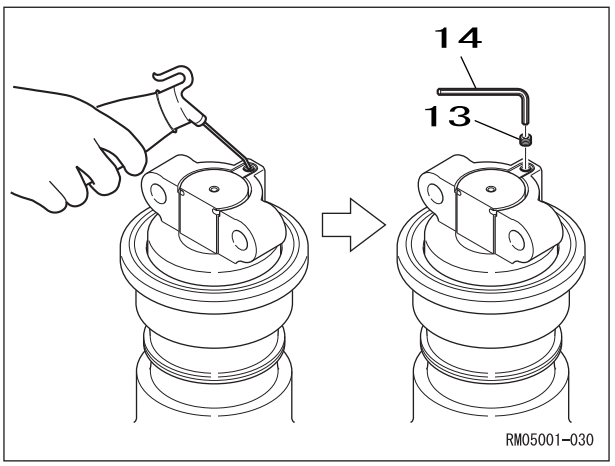


[11] Inject compressed air (0.2 MPa) from the oil fill port and immerse in water to check that there are no leaks.



[12] Fill gear oil (125 cc) into the roller. Use a hexagon wrench (6 mm) (14) to tighten the plug (13) with the nylon seal applied.

- Mobile Gear Oil SHC320 is recommended for use.
- The plug tightening torque is 24.5 N•m.
- To reuse a plug, wrap it with seal tape.

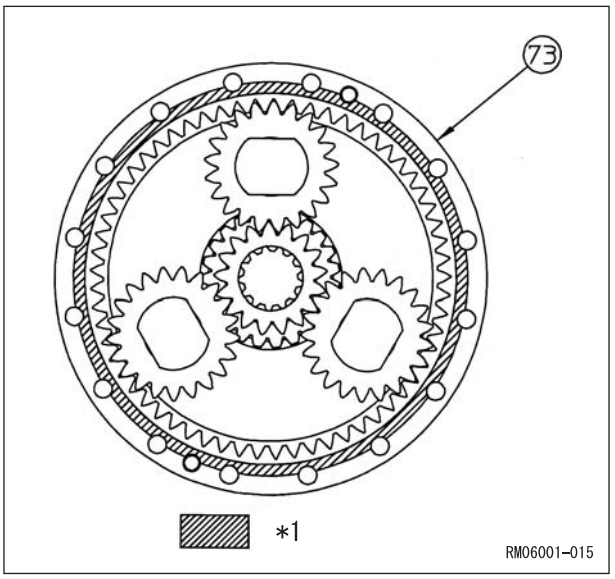


13	Plug
14	Hexagon wrench

This completes the assembly.

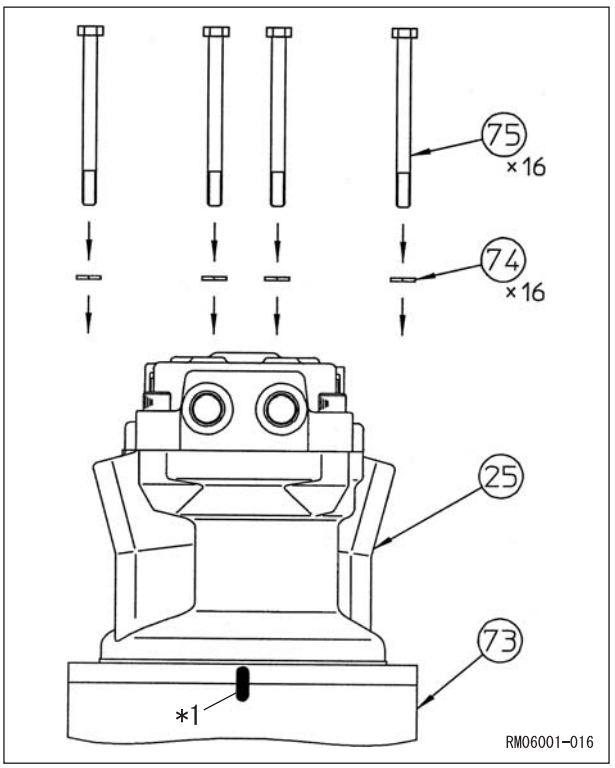
2. Assembly

[1] Liquid packing application
After cleaning and degreasing the reduction gear ring gear (73) and the motor housing (25) matching surfaces, apply (*1) liquid packing (ThreeBond Co.,Ltd. "1215" gray or the equivalent) as shown in the diagram on the right.



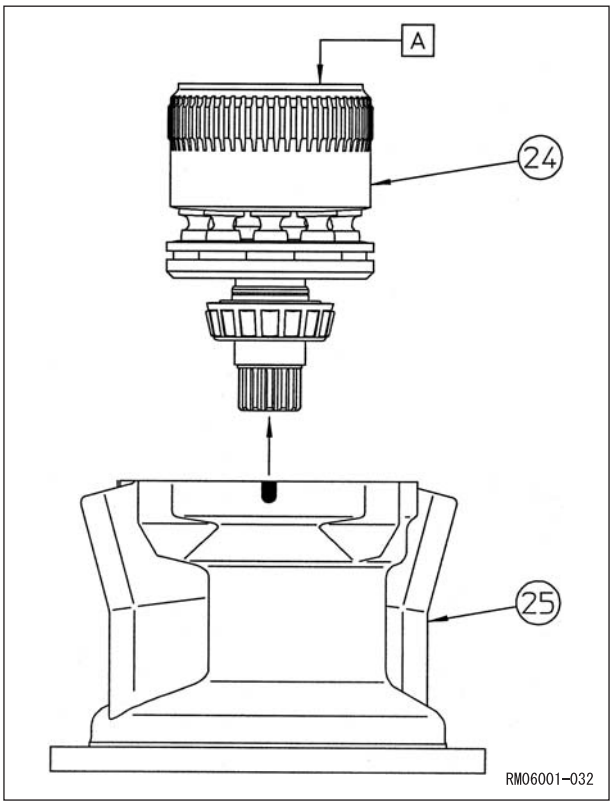
[2] Installation of motor
Lift the motor and softly install it in the reduction gear, tighten the hexagon bolts (75) (19 mm hex diameter) holding the washers (74) in place to the tightening torque of 103 N•m.

- Align the housing (25) and ring gear (73) according to the reference mark (*1) made before disassembly.



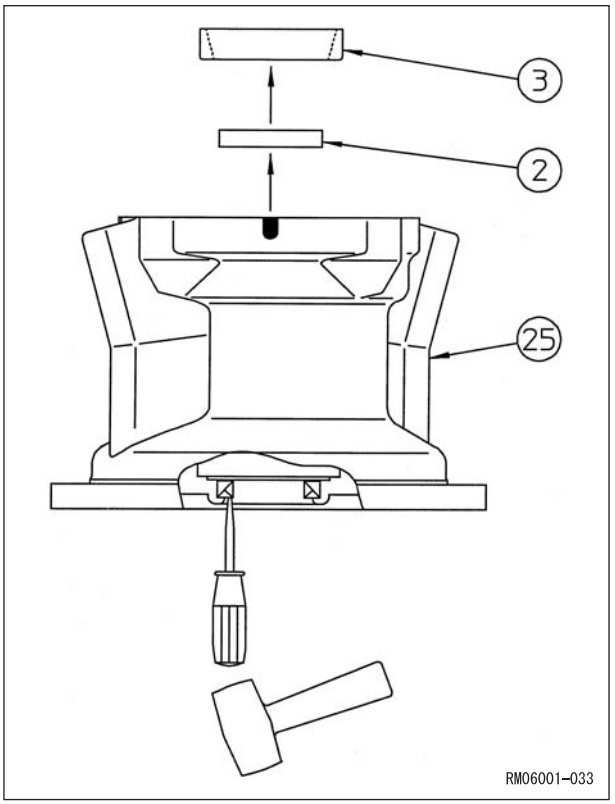
[10] Removal of cylinder assembly
Grasp the end of the cylinder (24) by hand and remove the cylinder assembly from the housing.

- Oil on the cylinder (24) makes it easy for it to slide, so be careful not to let it fall.
- The tapered roller bearing (3) outer race and the oil seal (2) should be left within the housing.
- The "A" end surface of the cylinder is the sliding surface, so cover this surface with a soft rag, etc. to prevent scratching.
- Place reference marks or numbers on the cylinder piston holes and piston assemblies (7) so that during reassembly piston assemblies are placed in the same holes they were in at disassembly.

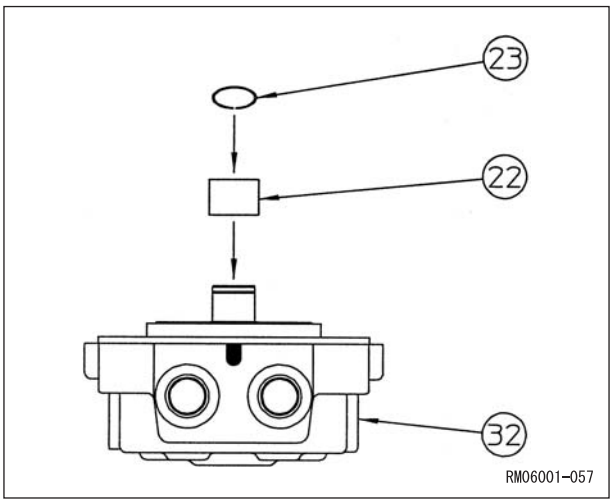


[11] Removal of tapered roller bearing outer race
Remove the tapered roller bearing (3) outer race from the housing (25).
Next, strike the oil seal (2) with a screwdriver and hammer to remove it.

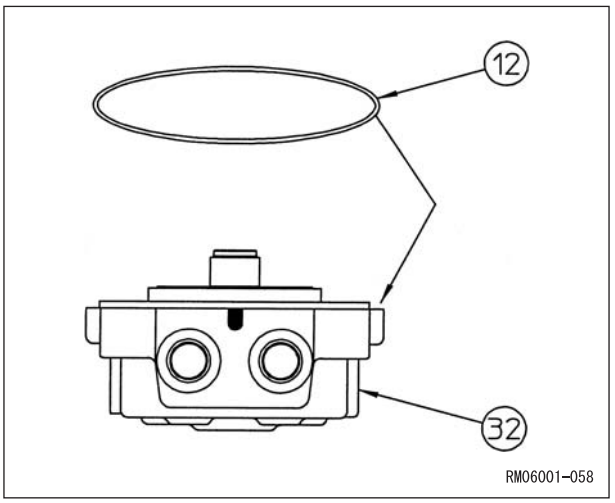
- The oil seal cannot be reused.



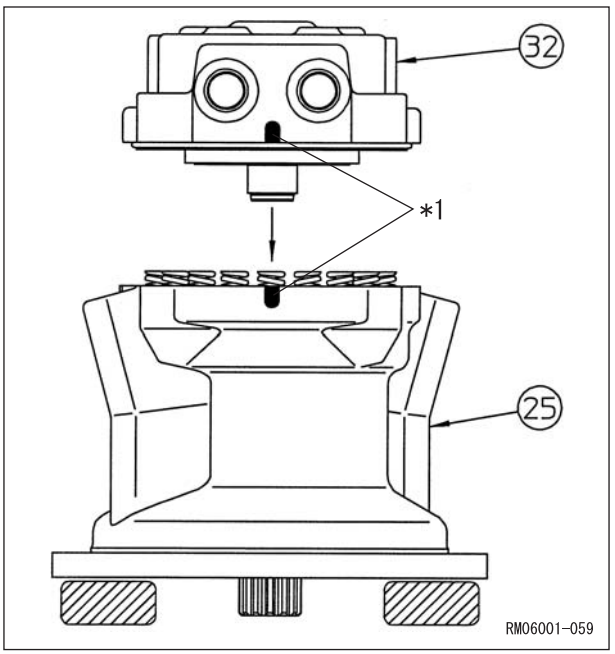
[11] Installation of inner race
Press fit the needle bearing (22) inner race onto the cover (32) and install the snap ring (23).



[12] Installation of O-ring
Attach the O-ring (12) to the cover (32).
- Apply grease to the O-ring.

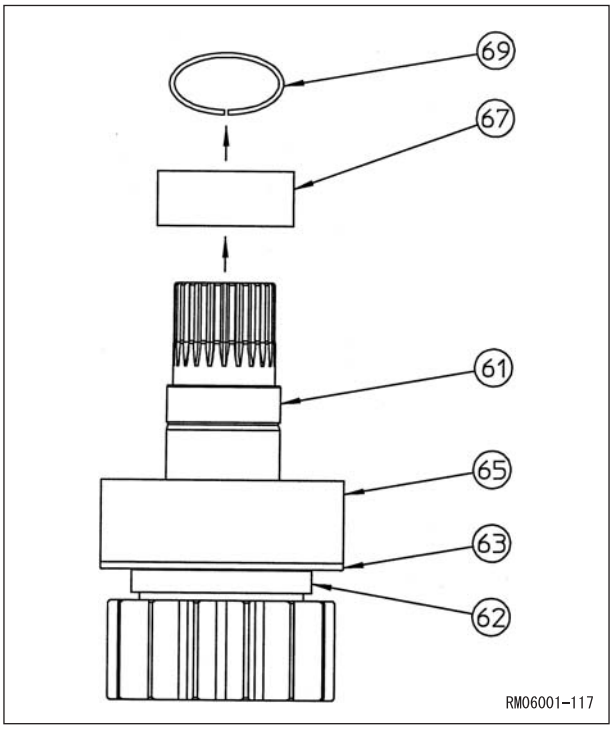


[13] Installation of cover
Clean the matching surfaces of the cover (32) and the housing (25) and lift the cover by hand to gently install it in the housing.
- Align the housing and cover using the reference mark (*1) made before disassembly.
- At this time, there is a space of about 4.5 mm between the housing and cover.



[10] Removal of collar
Remove the snap ring (69) from the pinion shaft (61) using a mark-off pin and remove the collar (67).

- Do not perform disassembly of the pinion shaft assembly beyond this. If abnormalities are found amongst the parts of the pinion shaft assembly, replace the assembly.



This completes the disassembly.

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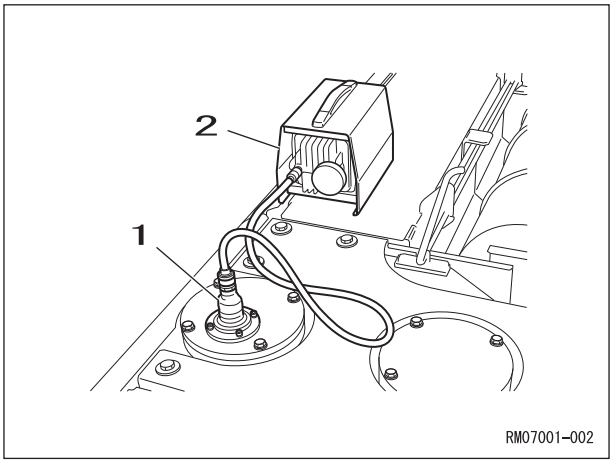
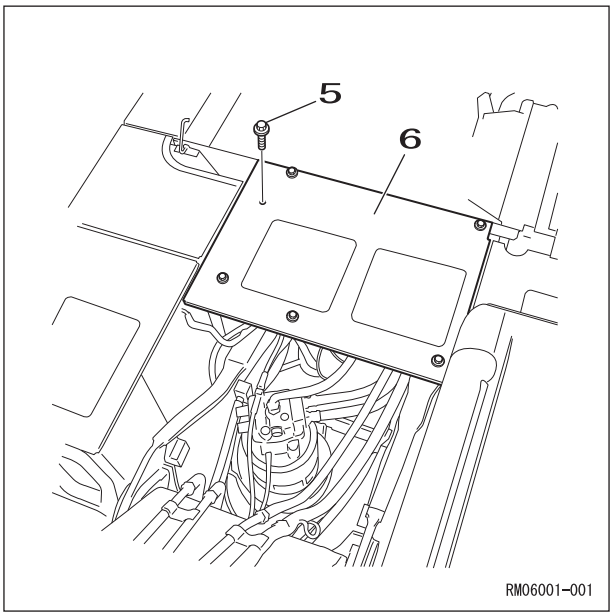
[2] Attach the specialty adapter (3) to the area where the air breather was removed, and set the vacuum pump.
Create negative pressure in the hydraulic oil tank using the vacuum pump (4).



[3] Use a wrench (19 mm) to remove the 6 bolts (5), and then remove the center cover (6).



3	Specialty adapter
4	Vacuum pump
5	Bolt
6	Center cover

1. Causes of Trouble and Solutions

[1] General cautions

This list consists of actions to be taken when an abnormality is sensed during use of the hydraulic motor.

General cautions are listed below.

1) Think before attempting to fix a problem.
   Determine the nature of the abnormality before beginning work and think whether this same kind of problem has occurred before.
   Also, reconfirm whether the motor is the source of the problem.
2) Be careful about dust and dirt.
   The cause of wear is very often dust and dirt. So be careful that dust and dirt do not get into parts during disassembly.
3) Parts handling
   Parts are manufactured with a high degree of precision, so be careful not to scratch them during handling.
4) Do not damage O-rings or gasket surfaces while performing work. Also, it is recommended that O-rings are replaced for new ones during disassembly.

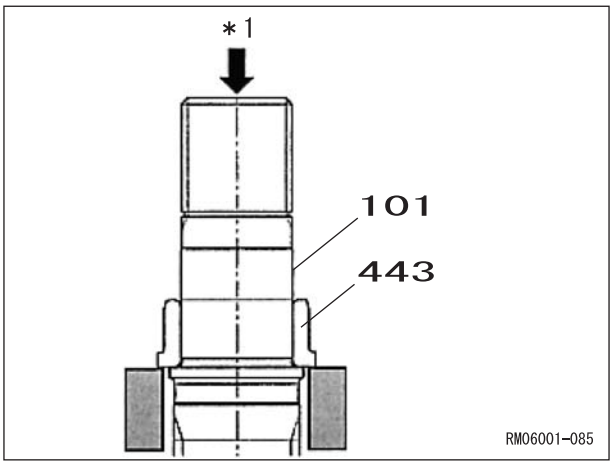
[2] Investigating abnormalities in the motor main unit

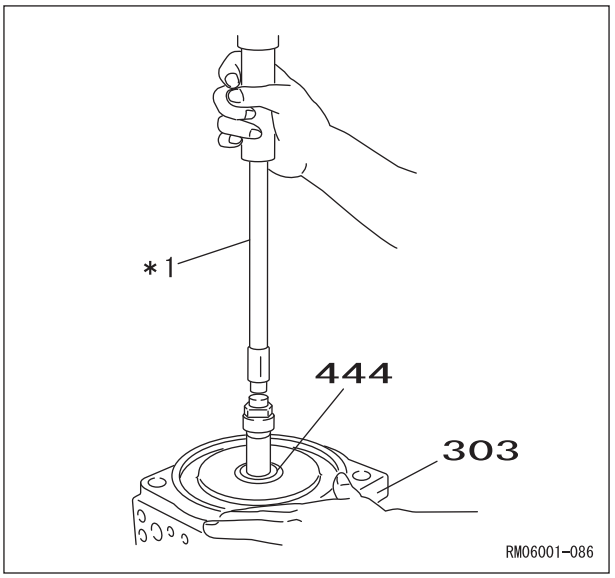
It is very difficult to search for the source of troubles in the hydraulic circuits. Inspect the following items and thoroughly investigate whether the motor is the source of troubles.

1) Inspecting oil within the casing
   Remove the drain plug and inspect the hydraulic oil within the casing. If a large amount of metal particles come out at the same time as oil, it is very likely that there is damage with parts within the motor.
2) Abnormal noise
   Check whether abnormal noise is coming from the motor main unit.
3) Measure pressure for each part.
   Do not perform disassembly inspection carelessly. Measure pressure for each part and look for abnormalities in each area.
4) Measure the amount of oil drained from the motor.
   1. Operation is normal if about 30 L/min or less of oil drains from the motor when pressurized oil is applied after the swing is locked.
   2. 2 L/min or less of drained oil at constant swing is normal.

12) Perform the following as necessary.

1. Use a press (*1) to remove the inner race of the cylinder roller bearing (443) from the drive shaft (101).
   - It is acceptable to strike the inner race of the cylinder roller bearing using a steel rod, but be careful to strike the inner race evenly and to not damage the bearing.
     Do not reuse removed bearing.
2. Lightly strike the outer race of the cylinder roller bearing (443) from the oil seal (491) housing section side using a steel rod to remove the outer race from the casing (301).
   - Do not reuse removed bearing.
3. Use the slide hammer bearing puller (*1) to remove the cylinder roller bearing (444) from the valve casing (303).
   - Do not reuse removed bearing.





This completes the disassembly. Thoroughly inspect each section for abnormalities.

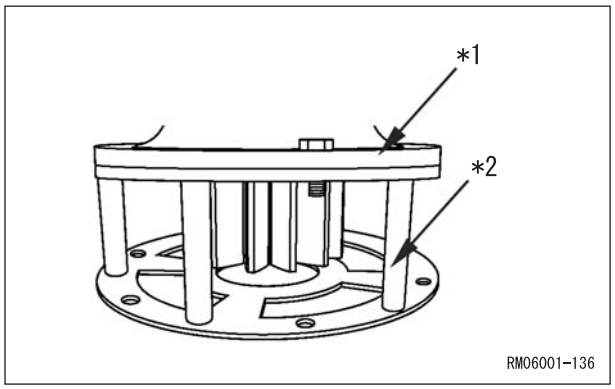
1. Disassembly

[1] Put the nylon sling around the swing motor section and lift it with a crane.

Caution Swing unit weight: about 301 kg

[2] Place the swing unit on the bracket (8098413), and secure it with the 2 bolts (M24). Secure the bracket to the work platform so that reactive force is absorbed.

: 36 mm



*1	Swing unit
*2	Bracket (8098413)

[3] Remove the drain plug (25), and then drain oil.

: 22 mm

[4] Remove the hose (24) from the housing (31).

: 22 mm

[5] Place reference marks on the matching sections of the motor (2) and ring gear (22) and the ring gear and housing (31). Loosen and remove the hexagon socket head bolts (1) and lift the motor with a crane to remove it.

: 10 mm

Caution Motor weight: 71 kg

Tip: Inserting a flathead screwdriver in the gap between the motor and ring gear will make the motor rise up and make it easier to remove.

[6] Remove the 1st stage sun gear (4) and 1st stage carrier (21) assembly from the ring gear (22).

: 8 mm

[7] Loosen and remove the hexagon socket head bolts (32) and install eyebolts (M12, 1.75 mm pitch) on the motor installation screw section of the ring gear (22). Remove the ring gear from the housing (31) lifted by the crane.

: 14 mm

Caution Ring gear weight: 27 kg

Tip: ThreeBond has been applied to the matching surfaces of the housing and ring gear. Placing a flathead screwdriver in the notch section of the matching section outer circumference raises the ring gear and makes it easier to remove.

[8] Remove the 2nd stage sun gear (20) and 2nd stage carrier (19) assembly.

Caution 2nd stage carrier assembly weight: 32 kg

[34] Lift the motor with a crane, align the reference marks made during disassembly, and install it onto the ring gear (22) with the 12 hexagon socket head bolts (1).

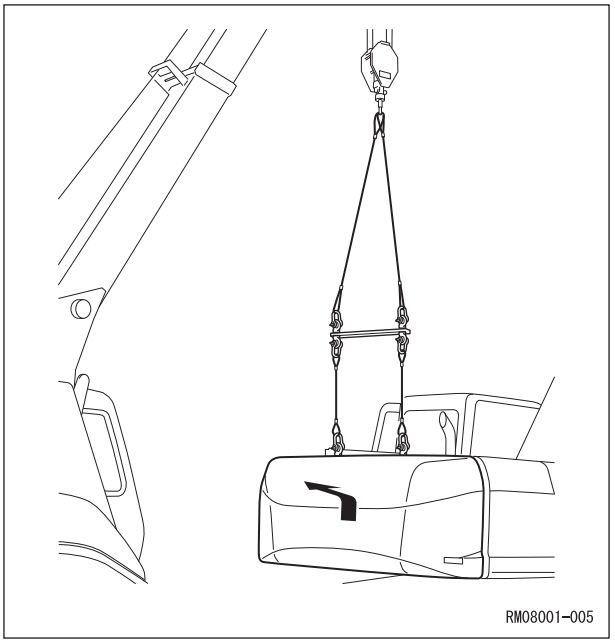
: 10 mm

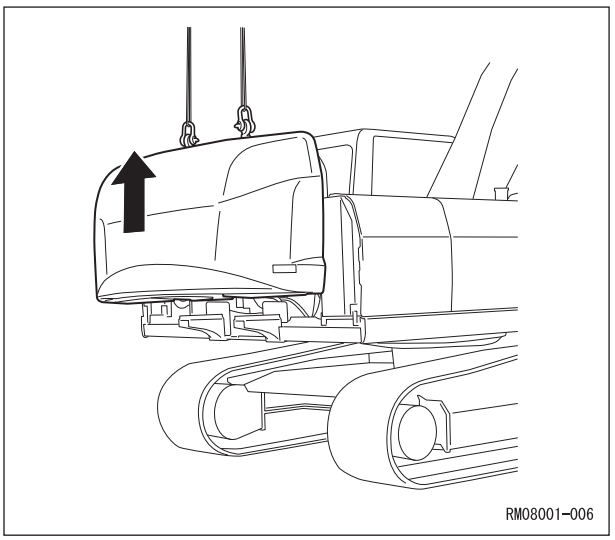
: 90 N•m

Caution Motor weight: 71 kg

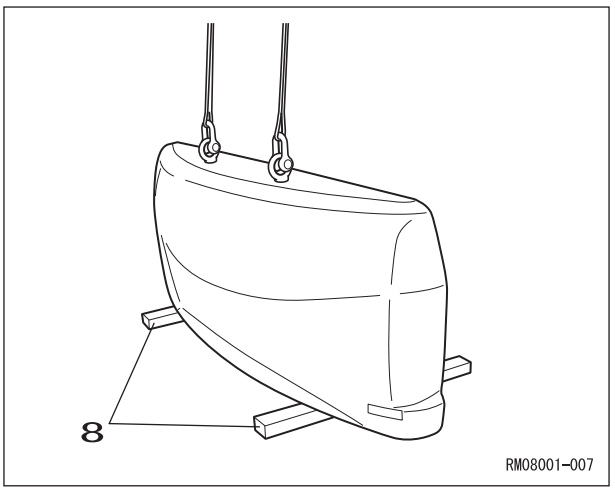
This completes the assembly.

[5] Use the wire ropes and crane to lift and remove the counterweight.
- Move the counterweight about 50 cm to the rear while lifting it so that it does not interfere with the housing, engine parts and pipes.





[6] Thoroughly check that the location is safe before lowering the counterweight on wood planks (8).
- Thoroughly secure the counterweight with the wire ropes and crane so that it does not fall over.



8	Wood plank

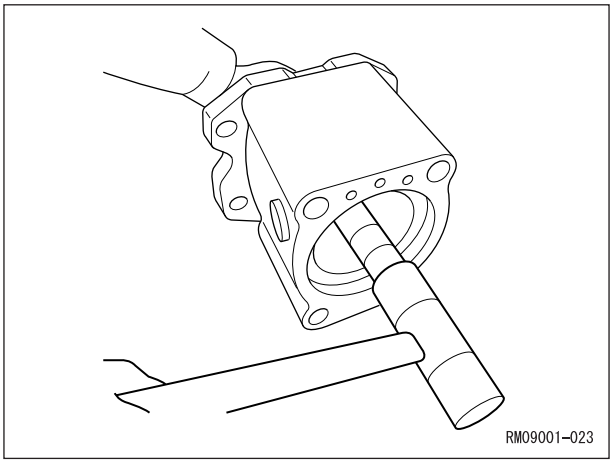
2. Installation of Counterweight

Perform the reverse of the removal procedure.

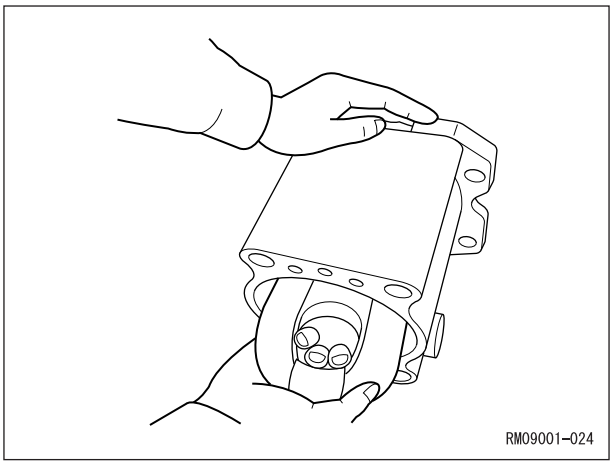
The tightening torque for the counterweight bolts is 1862 - 2058 N 疥 .

Do not apply oil, etc. to the bolts.

[10] Lightly strike the rear end sections of the drive shafts (F) (111) and (R) (113) to remove them from the swash plate support boards (251).



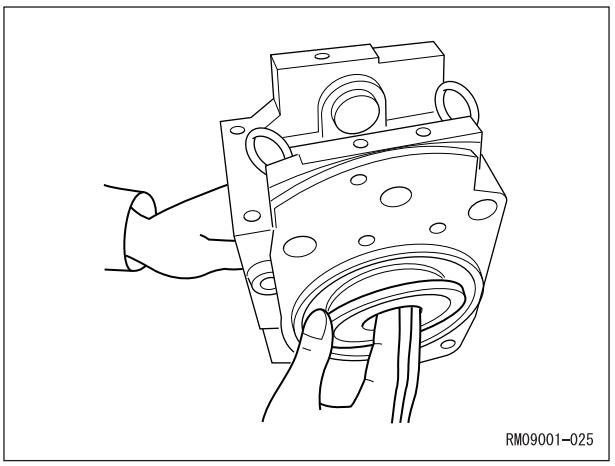
[11] Remove the shoe plates (211) and swash plates (212) from the pump casings (271).



[12] Lightly strike the installation flange sections of the swash plate support boards (251) on the pump casing (271) sides, and separate the swash plate support boards and the pump casings.

[13] Remove the valve plates (R) (313) and (L) (314) from the valve block (312).

- These can also be removed in Step [7].



[14] If necessary, remove the stoppers (L) (534), stoppers (S) (535), servo pistons (532), and tilting pins (531) from the pump casings (271), and remove the needle bearing (124) from the valve block (312).

- To avoid damaging the heads of the tilting pins, use a jig when removing them.
- Loctite has been applied to the sections where the tilting pins and servo pistons are bonded, so be careful not to damage the servo pistons.
- Try to avoid removing the needle bearings unless they are at the end of their service life.
- Do not loosen the hexagon nuts of the valve block or swash plate support boards. This changes the flow volume setting.

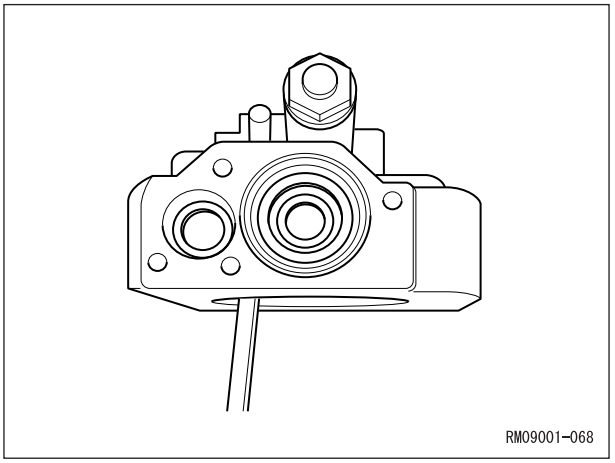
3. Attached Table and Diagram

Rotation speed (min^{-1})			1800
Maximum flow adjustment		Adjusting screw (954) tightening amount (rotation)	+1/4
		Flow amount change (L/min)	-5.2
Minimum flow adjustment		Adjusting screw (953) tightening amount (rotation)	+1/4
		Flow amount change (L/min)	+4.1
Input horsepower adjustment	Outer spring adjustment	Adjusting screw (628) tightening amount (rotation)	+1/4
		Compensation control start pressure change amount (MPa)	+1.88
		Input torque change amount (N•m)	+57.9
		A	1.87
	Inner spring adjustment	Adjusting ring (627) tightening amount (rotation)	+1/4
		Flow amount change (L/min)	+8.5
		Input torque change amount (N•m)	+44.2
Flow control characteristics adjustment		Adjusting screw (924) tightening amount (rotation)	+1/4
		Flow control start pressure change amount (MPa)	+0.15
		Flow amount change (L/min)	+11.7

Attached table 1. Regulator adjustment amount list

[12] Install the electromagnetic proportional pressure reducing valve (079) in the pilot cover (641), and tighten the hexagon socket head bolts (418).
Tightening torque: 6.9 N•m

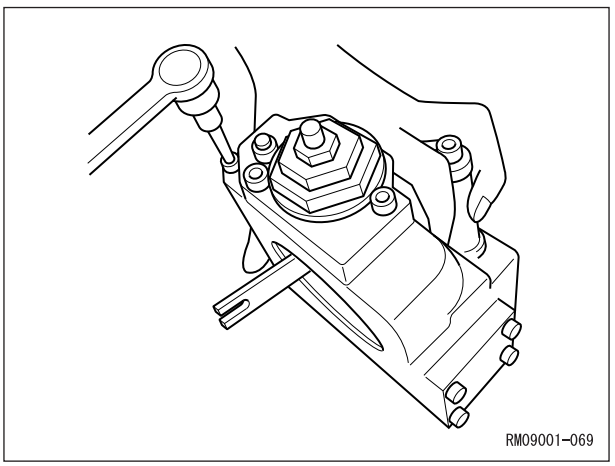
- This operation is only for the front-side regulator (KR3G-9Y04-HV).
- Be careful not to damage the connector section of the electromagnetic proportional pressure reducing valve.



[13] Install the pilot covers (641), and tighten the hexagon socket head bolts (436).
Tightening torque: 12 N•m

[14] Install the spring seatings (Q) (644), pilot springs (646), and adjusting rings (Q) (645) into the pilot holes, and install the spring seatings (Q) (624), inner springs (626), and outer springs (625) into the compensation holes.

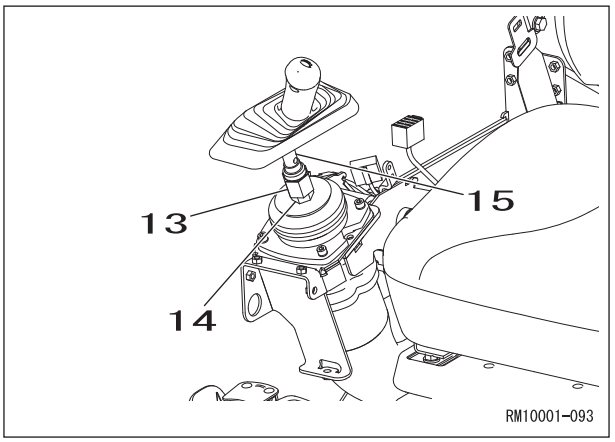
- Be careful to install the spring seatings (Q) in the correct direction.



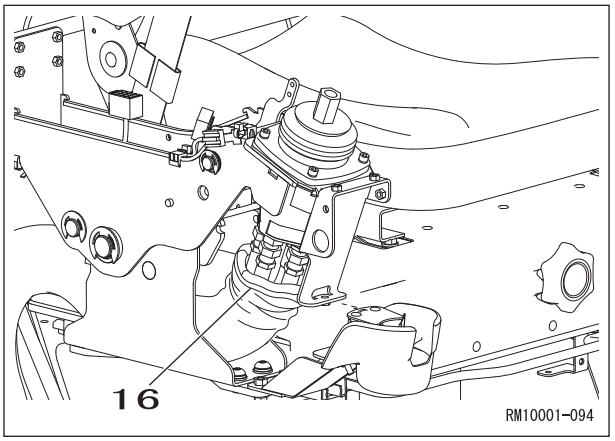
[15] Assemble the covers (C) (629) set with the adjusting screws (C) (628), adjusting rings (C) (627), lock nuts (630) ,hexagon nuts (801) and (802), hexagon socket head locking screws (924), and tighten the hexagon socket head bolts (438).
Tightening torque: 12 N•m

This completes the assembly of the regulator main units.

[8] While securing the nut (13) with a wrench (22 mm), use another wrench (19 mm) to remove the lock nut (14) and remove the control lever (15).

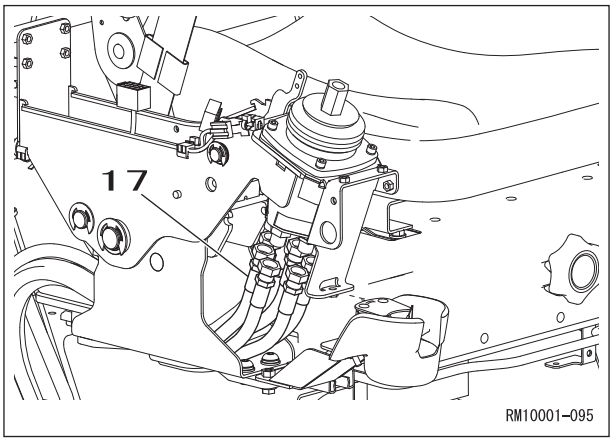


[9] Roll back the hose cover (16).



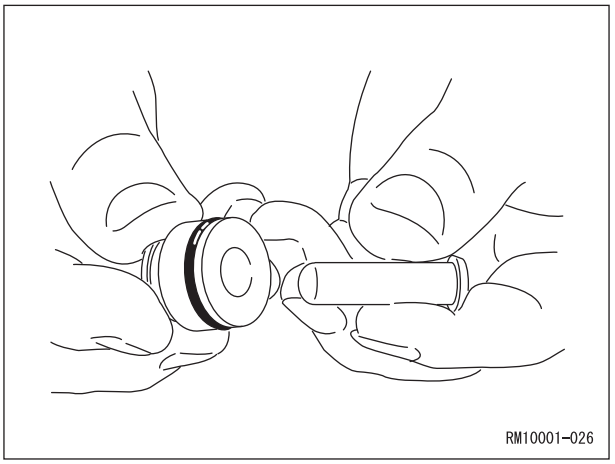
[10] Use a wrench (22 mm) to remove the 6 hoses (17).

- Mark the joystick remote control valve and hoses so that the connectors match at the time of assembly.
- Use caps and plugs to cover the joystick remote control valve and hoses to prevent any entry of water, dust or dirt.
- Clean the joystick remove control valve and hoses by spraying them with a parts cleaner to prevent scratches and prevent dirt from accumulating on the connectors.

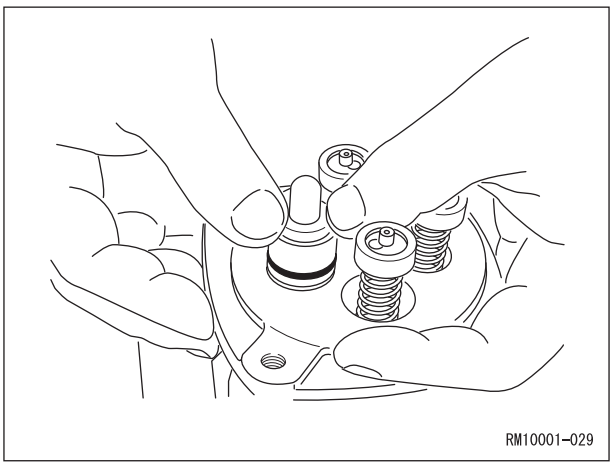


13	Nut
14	Lock nut
15	Control lever
16	Hose cover
17	Pilot hose

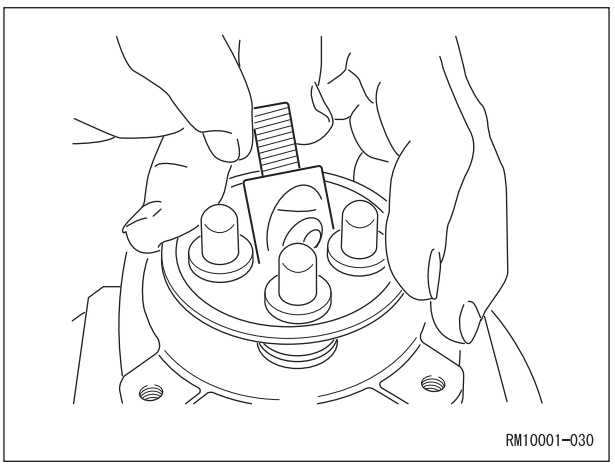
5) Install push rods (212) into the plugs (211).
   - Apply hydraulic oil to surface of the push rods.



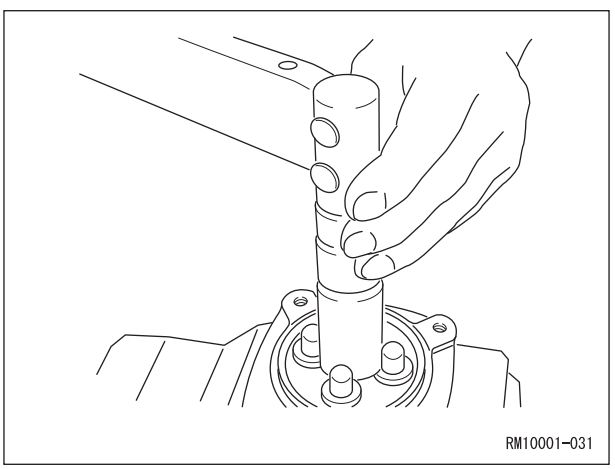
6) Install the plug assemblies into the casing (101).
   If the return springs (221) are weak, they will be stopped by the sliding resistance of the O-rings (214).
   - Be careful not to scratch the casing holes by forcing in the spools (201).



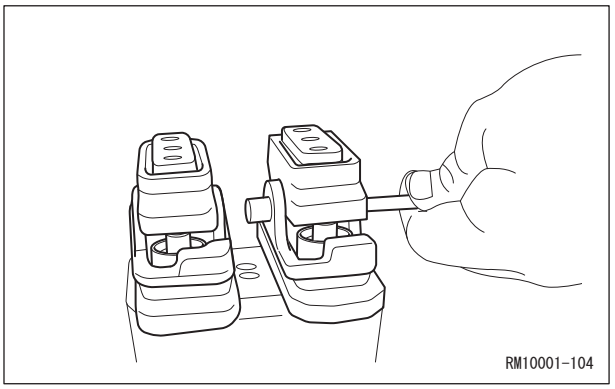
   If the return springs are strong, use the plate (151) to install all 4 plug assemblies at the same time and temporarily tighten them with the joint (301).
   - Be careful of the plug assemblies and plate flying off.



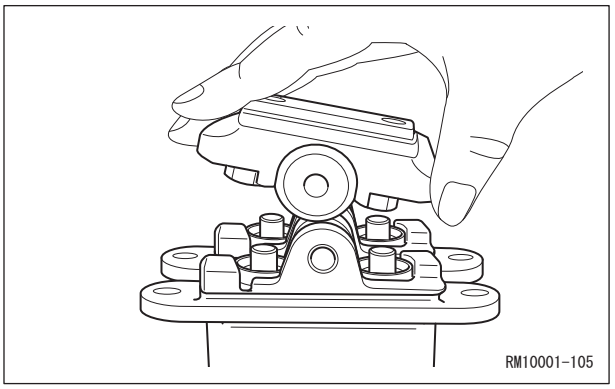
7) Install the plate (151).
8) Use a jig, and tighten the joint (301) to the casing (101) to the specified torque.
   Tightening torque: 47.1 ± 2.9 N・m



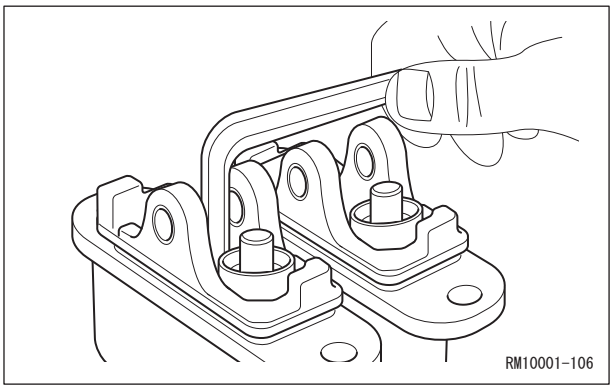
4) Place a round rod (ϕ8 mm or less) against one end of the cam shafts (413) and lightly strike it with a hammer to remove the shafts.



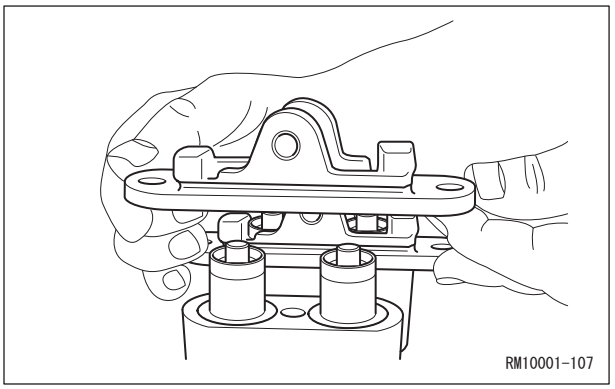
5) Remove the cams (420) as an assembly with the locking screws (471) and lock nuts (472) left attached.
Record the positions of the cams in relation to the covers (201).
Be careful when removing, as the push rods (214) may fly off.



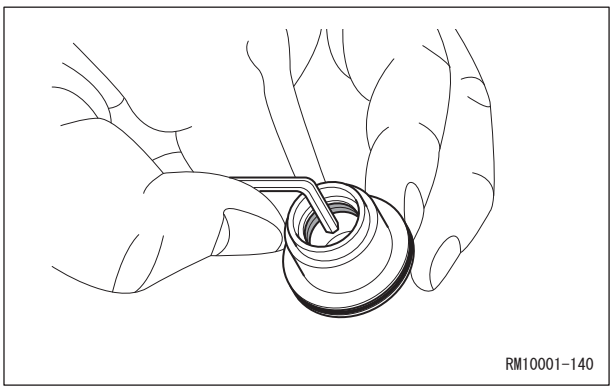
6) Use a hexagon wrench on the hexagon socket head bolts (271) to loosen and remove them.

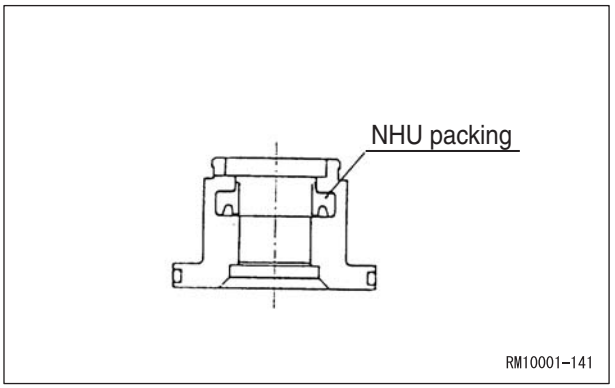


7) Remove the covers (201).
Record the positions of the covers in relation to the casing (101).
Be careful when removing, as the push rods (214) or plugs (202) may fly off due to the damping springs (336) and (337). (The plugs are only kept in the casing by the sliding resistance of the O-rings (212).)

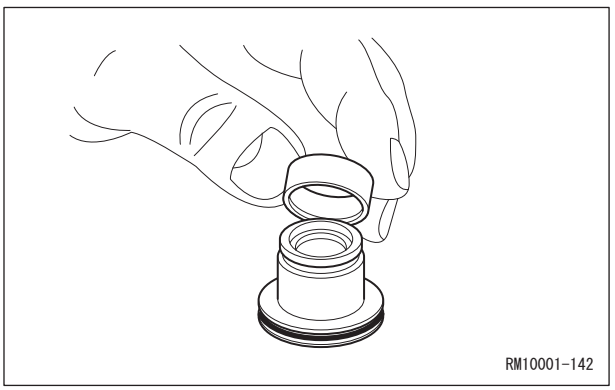


14) Install NHU packings (210) into the plugs (202).
When installing the NHU packings, be careful of the installation direction. (See the diagram.)
Before installing NHU packings, apply a thin layer of grease.

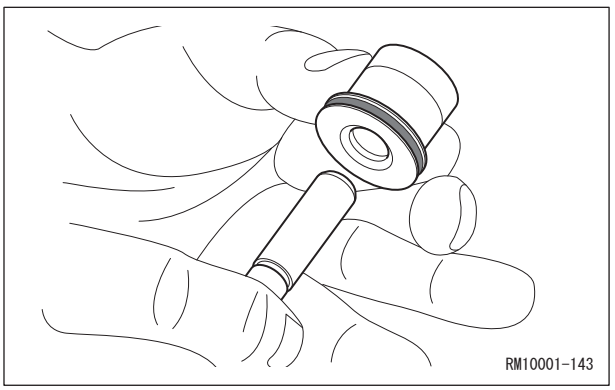




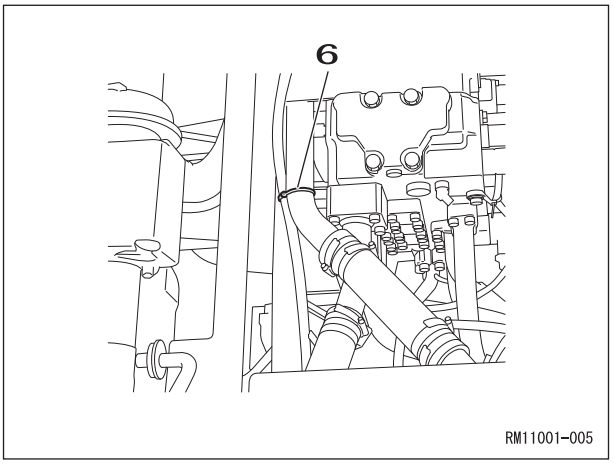
15) Install grease cups (203) into the plugs (202).



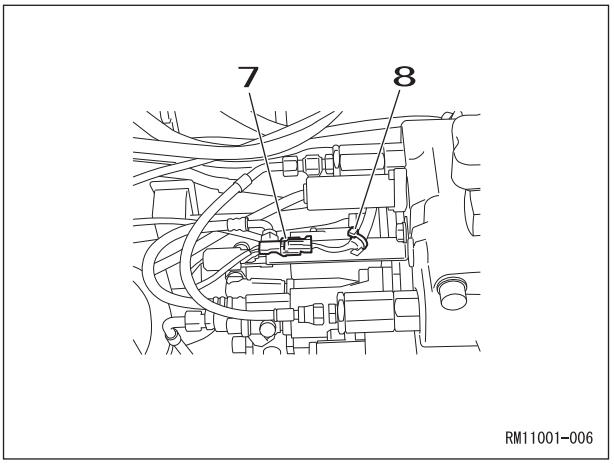
16) Install push rods (214) into the plugs (202).
Before installing push rods, apply hydraulic oil to the rod surfaces.
Do not press the rods in strongly, as this may damage the NHU packing lip sections.



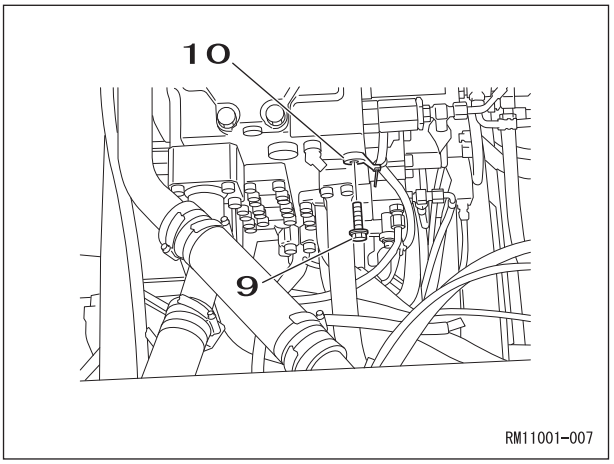
[6] Use wire cutters to cut the wire band (6).



[7] Disconnect the connector (7) and use wire cutters to cut the wire band (8).



[8] Use a wrench (17 mm) to remove the bolt (9), and then remove the clamp (10).



6	Wire band
7	Connector
8	Wire band
9	Bolt
10	Clamp

d) Disassembly of load check valve section

⚠ Caution	1. When removing the plug, pressure left within can make parts fly out dangerously. 2. Slowly loosen the plug to check that there is no resistance due to residual pressure, then disassemble.

[1] Loosen and remove the hexagon socket head bolts (75) (4 locations in each section, 8 mm hex socket diameter) for the flanges (37) (6 locations) and (61) (1 location). The (61) flange has a different shape from the other flanges, so keep it separate from (37).

[2] Remove the springs (35), poppets (34) and (51) and O-rings (36) from the valve housing. Remove the arm 2 (E-E cross section) poppet (59), spring (60), and sleeve (58).

[3] Loosen and remove the hexagon socket head bolts (75) (8 mm hex socket diameter) for the flanges (52) (2 locations) .

[4] Remove the spacers (53) from the valve housing and remove the O-rings (54) and backup rings (55) from the spacers (53).

[5] Remove the springs (35) and poppets (34) from the valve housing.

[6] Loosen and remove the plugs (72) (8 mm hex socket diameter). (D-D cross section)

[7] Remove the springs (33) and poppets (32) from the valve housing.

[8] Loosen and remove the plugs (72) (8 mm hex socket diameter). (D-D cross section)

[9] Remove the spacer (57), springs (33), and poppets (32) from the valve housing.

[10] Loosen and remove the plug assemblies (92) (36 mm hex diameter). (P4 section, H-H cross section)

[11] Loosen and remove the hexagon socket head bolts (74) (4 locations, 8 mm hex socket diameter) for the flange (43) .

[12] Remove the spring (45), poppet (44), and O-rings (36) from the valve housing.

[13] Loosen and remove the plug (46) (27 mm hex diameter) and remove the O-ring (47). (H-H cross section)

[14] Remove the spring (48) and poppet (49) from the valve housing.

e) Disassembly of antidrift valve section (Sub-parts in the assembly are expressed as [main number - sub-number].)

⚠ Caution	1. When removing the antidrift valve assembly, pressure left within can make seals and other parts fly out dangerously. 2. Slowly loosen the hexagon socket head bolt to check that there is no resistance due to residual pressure, then disassemble.

[1] Loosen and remove the hexagon socket head bolts (74) (4 locations in each section, 8 mm hex socket diameter) for the antidrift valve assemblies (67) (2 locations).

[2] Remove the O-rings (36) and (41) from the valve housing.

[3] Remove the springs (39) and poppets (38) from the valve housing.

[4] Disassembly of antidrift valve assembly

⚠ Caution	1. If parts inside the antidrift valve are disassembled with the antidrift valve installed in the valve housing, pressure left within can make parts fly out dangerously. 2. Slowly loosen the plug assembly (67-12) to check that there is no resistance due to residual pressure, then disassemble.

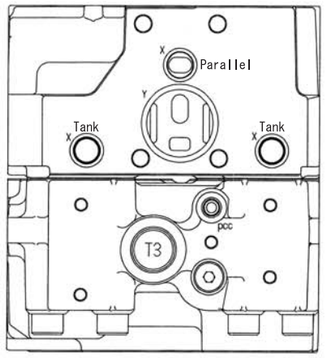
1) Loosen and remove the plug assembly (67-14) (38 mm hex diameter) and remove the O-rings.

2) Remove the piston (67-3), spool (67-4), and spring (67-6).

3) Loosen and remove the plug (67-14) (12 mm hex diameter).

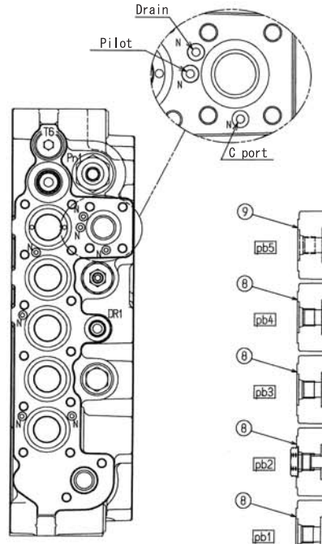
4) Remove the sleeve (67-5) and poppet (67-2) from the body and remove the O-rings (67-8) and (67-9), backup rings (67-10) and (67-11) from the outer edge of the sleeve.

5) Remove the spring seat (67-13) and spring (67-7) from deep in the hole.



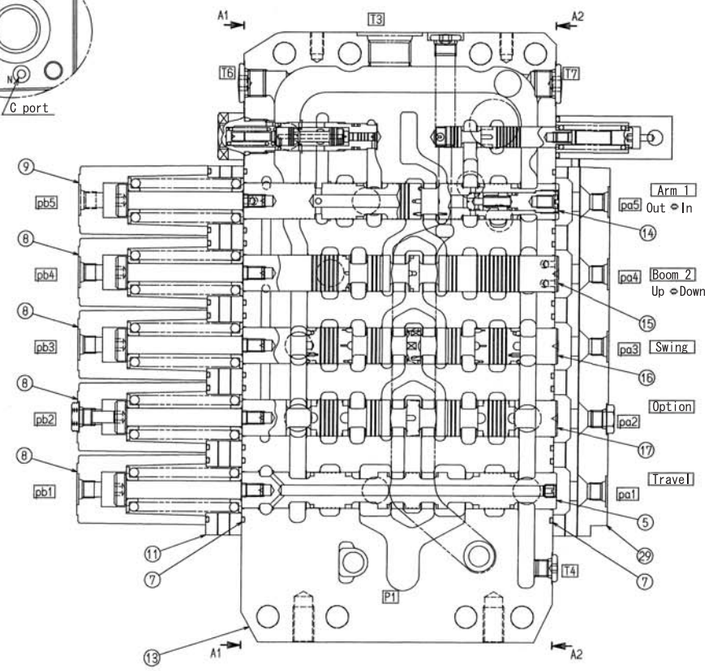
Cross section L-L

X section — ⑥④ [3 locations]
Y section — ⑤⑥ [1 location]

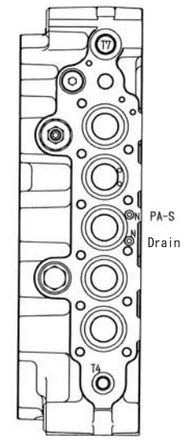


Cross section A1-A1

N section — ④① [7 locations]

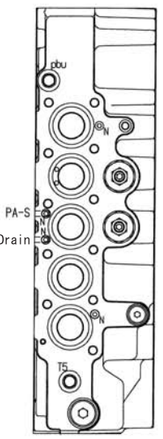


Cross section A-A



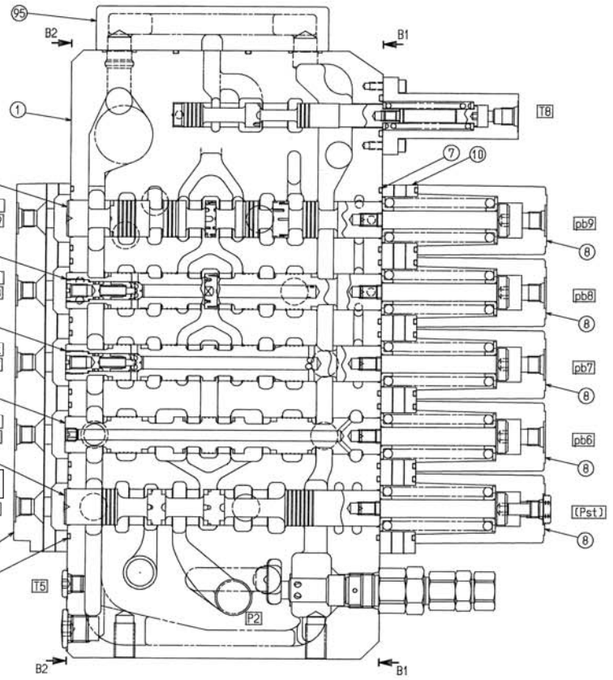
Cross section A2-A2

N section — ④① [2 locations]

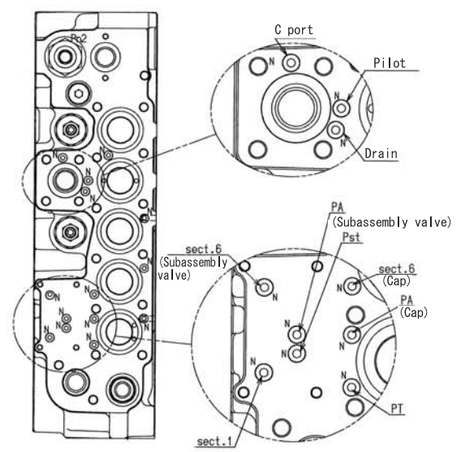


Cross section B2-B2

N section — ④① [4 locations]

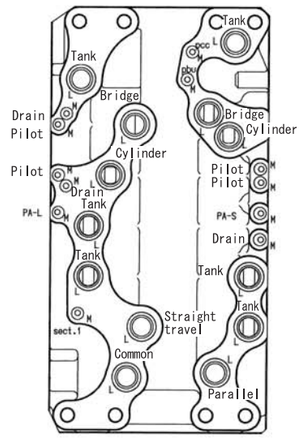


Cross section B-B



Cross section B1-B1

N section — ④① [14 locations]



Cross section M-M

L section — ⑥⑤ [13 locations]
M section — ⑥⑥ [12 locations]

RM11001-070

Relief valve

Trouble content	Conceivable cause	Countermeasure
Pressure does not rise at all.	1. Either the main poppet, sleeve, or pilot poppet is stuck open or there is debris jammed in the valve seat section.	Replace the relief valve.
The relief pressure is unstable.	1. The pilot poppet seat section is damaged.	
	2. The piston or main poppet is stuck.	
The relief pressure is wrong.	1. Seat section worn by debris	
	2. The lock nut and adjuster are loose.	Set the pressure again, then tighten the lock nut to the specified torque.
Oil leak	1. Relief valve seat section damage	Replace the relief valve.
	2. Each part is stuck due to debris.	
	3. An O-ring is worn.	Replace the adjuster or installation section O-ring.

Hydraulic system overall

Trouble content	Conceivable cause	Countermeasure
The hydraulic system is not working properly or is not working at all.	1. Pump trouble	Check the pressure or replace the pump.
	2. Relief valve trouble	Replace the relief valve.
	3. Cylinder trouble	Repair or replace.
	4. Pump load pressure is high.	Check the circuit pressure.
	5. There is a crack in the valve.	Replace the valve as an assembly.
	6. The spool does not move through its full stroke.	Check the spool movement.
	7. The tank oil level is too low.	Fill the hydraulic oil.
	8. The filter in the circuit is clogged.	Clean or replace the filter.
	9. The circuit line is throttled.	Check the line.

[5] Remove the cap screw (1) and O-ring (2).

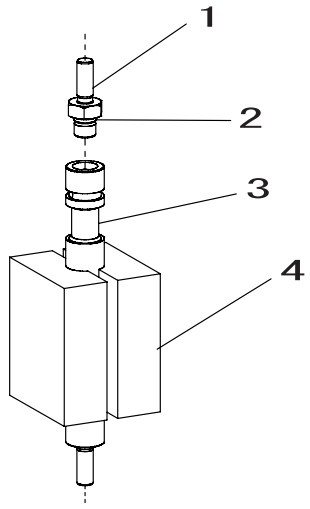


Diagram 11

1	Cap screw
2	O-ring
3	Spool
4	Piece of wood (jig)

(2) Check plunger section with throttle

[1] Remove the plugs (1) and O-rings (2).

[2] Remove the springs (3) and remove the check plungers (4).
[Caution] The check plungers have similar shapes, so identify them in such a way that no one will mix them up with each other.

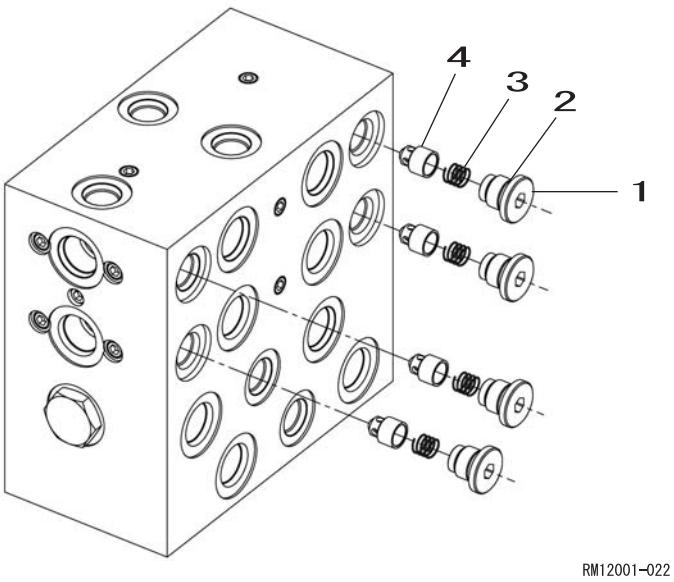
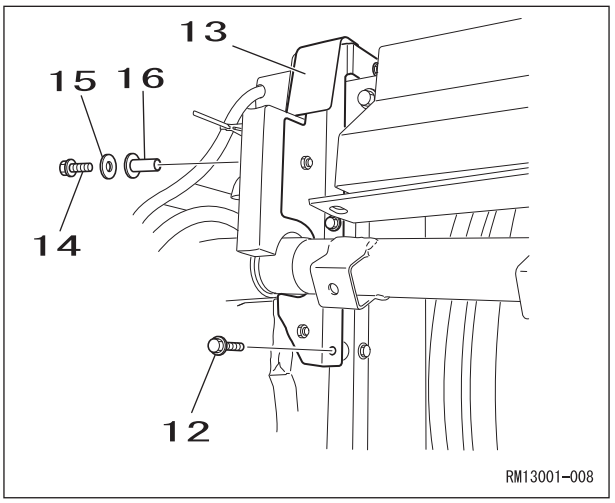


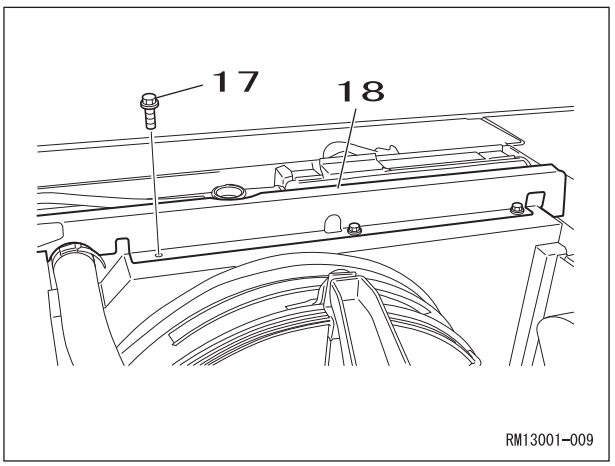
Diagram 12

1	Plug
2	O-ring
3	Spring
4	Check plunger

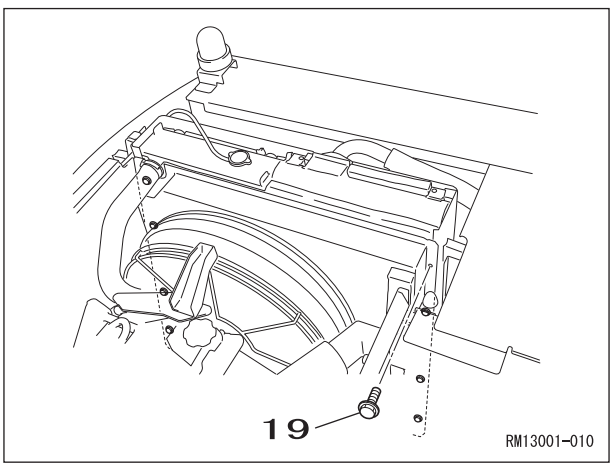
[8] Use a wrench (13 mm) to remove the 3 bolts (12), bolt (14), washer (15), and seal retainer (16), and then remove the cover.



[9] Use a wrench (13 mm) to remove the 4 bolts (17), and then remove the cover (18).

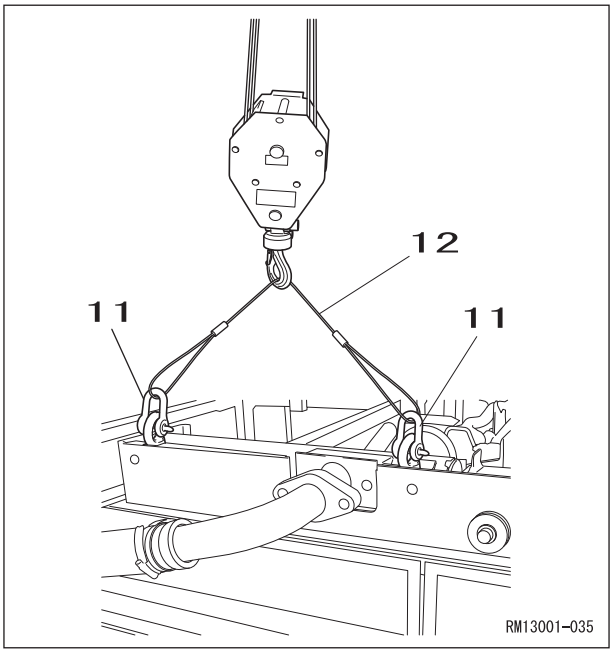


[10] Use a box wrench (12 mm) to remove the 8 bolts (19) from the radiator cover.

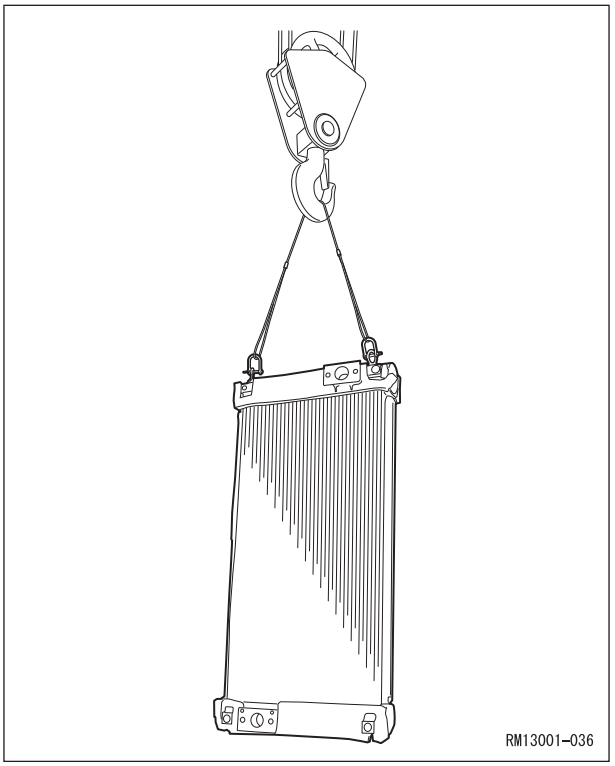


12	Bolt
13	Cover
14	Bolt
15	Washer
16	Seal retainer
17	Bolt
18	Cover
19	Bolt

[9] Install the 2 shackles (11) to the eyebolts, and then use the wire rope (12) and crane to lift the oil cooler main unit.



[10] Thoroughly check that the location is safe before lowering the oil cooler on wood planks, etc.



11	Shackle
12	Wire rope

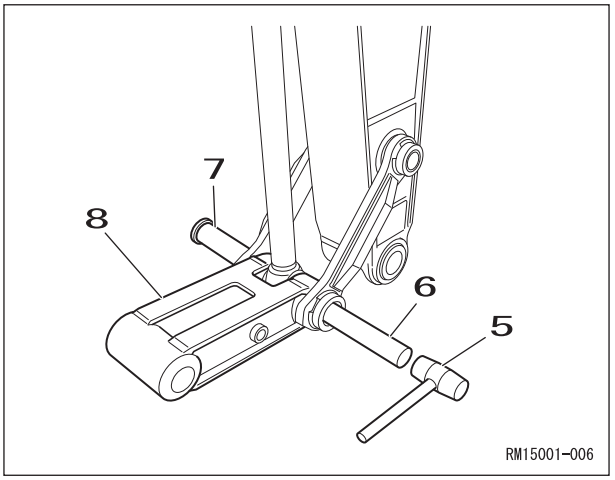
2. Installation of Oil Cooler

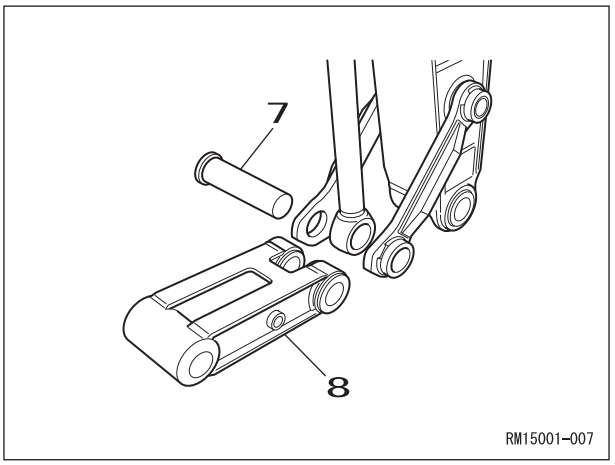
To install, perform the reverse of the removal procedure.

2. Installation of Hydraulic Oil Tank

   To install, perform the reverse of the removal procedure.
   For the tightening torque, check the "Bolt tightening torque list" in the Service Text .

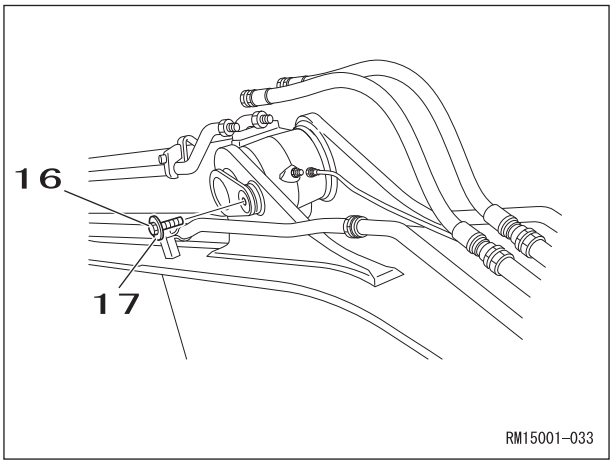
[4] Use a hammer (5) and striking rod (6) to push the pin (7) out and remove the bucket link (8).





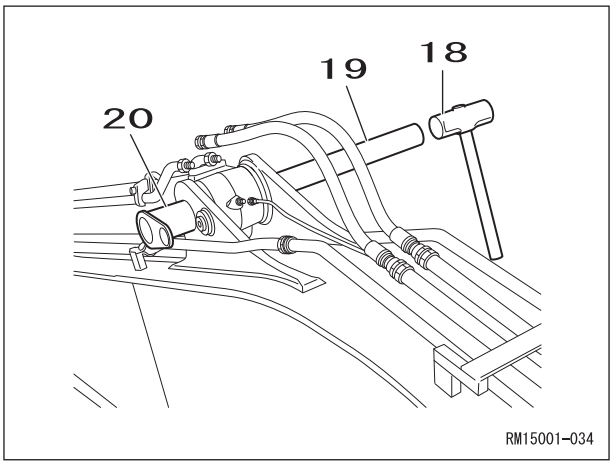
5	Hammer
6	Striking rod
7	Pin
8	Bucket link

[12] Use a wrench (19 mm) to remove the bolt (16) and washer (17).



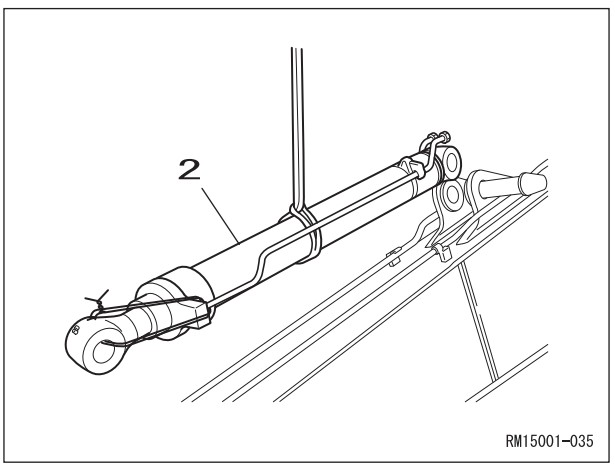
[13] Use a hammer (18) and striking rod (19) to push the pin (20) out.

- If a pin is hard to remove, there is a load on the pin.
- When removing the pins, be careful not to damage the O-rings or dust seals.



[14] Lift the arm cylinder (2).

[15] Place the arm cylinder (2) on crossties.



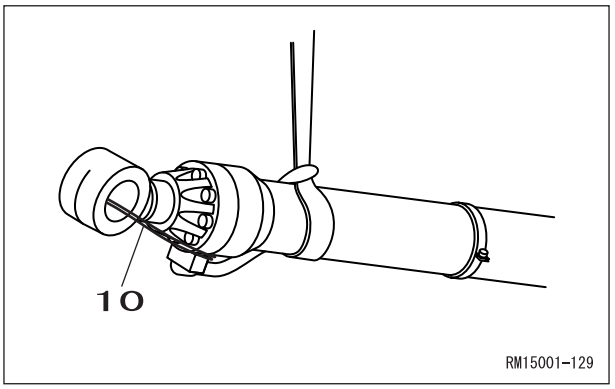
2	Arm cylinder
16	Bolt
17	Washer
18	Hammer
19	Striking rod
20	Pin

2. Installation of Arm Cylinder

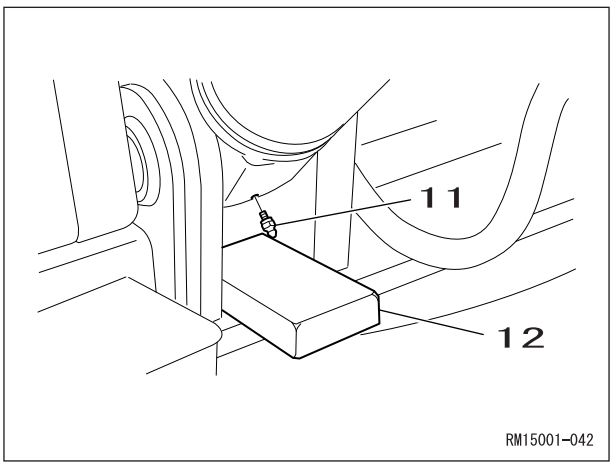
To install, perform the reverse of the removal procedure.

- Clean each pin and pin hole.
- When insetting pins, be careful not to damage the O-rings or dust seals.
- As the final step, always grease up.

[10] Tie the cylinder rod with wire (10) so that it cannot come out.

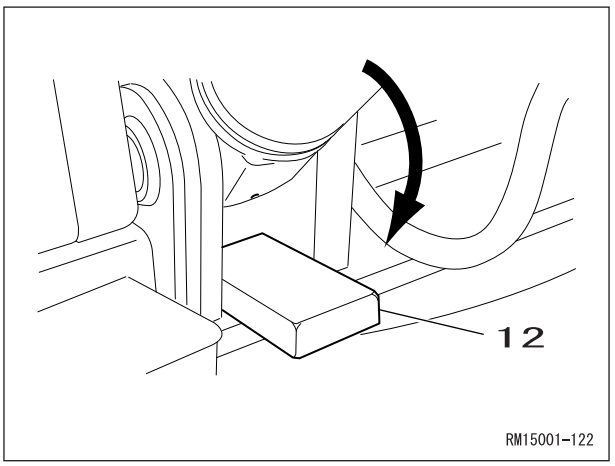


[11] Use a wrench (10 mm) to remove the grease nipple (11), and then secure the base of the boom cylinder with the batten (12).



[12] Lower the boom cylinder and let it rest on the batten (12).

[13] Remove the cab side boom cylinder from the boom in the same way.

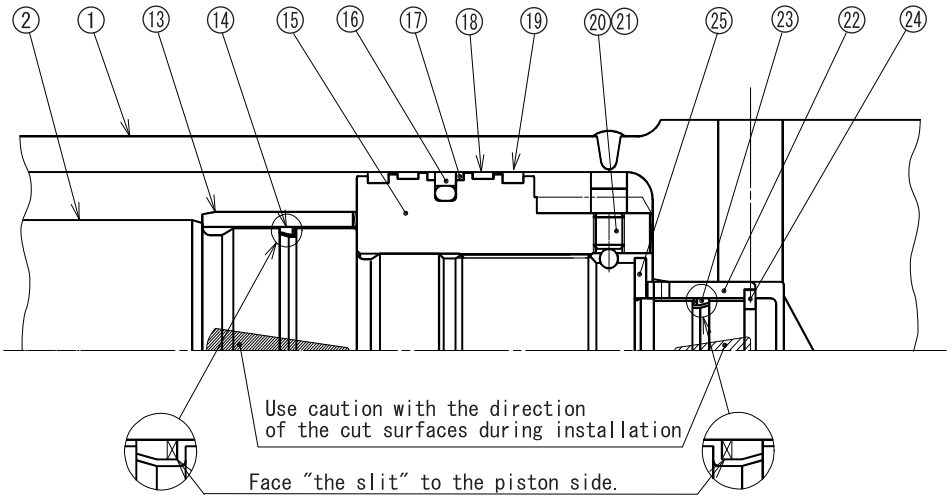


10	Wire
11	Grease nipple
12	Batten

- U-ring and backup ring
  The U-ring (7) seals the pressurized oil within the cylinder. The U-ring also has the function of forming an appropriate oil film on the surface of the piston rod in order to prevent rust of the piston rod (2). The backup ring (8) has the function of suppressing extrusion of the U-ring into the gap between the piston rod and the cylinder head (3) when the pressure operates and of improving durability.
- Wiper ring
  The wiper ring (9) is positioned in the opening where the piston rod (2) comes out from and goes into the cylinder and prevents dust and water from getting into the cylinder from the outside. It also has the function of wiping off any mud sticking to the surface of the piston rod as the piston rod moves.

2) Piston assembly

The piston assembly has the function of transmitting the propulsion of the cylinder. A seal ring (16) is mounted on the center of the piston (15) to prevent the flow of pressurized oil from either the left or right chamber to the other chamber. There are slide rings (18) and (19) mounted at each end of the seal ring. They have the function of a bearing to receive the cylinder lateral load.



RM15001-070

1	Cylinder tube	19	Slide ring
2	Piston rod	20	Locking screw
13	Cushion ring	21	Steel ball
14	Cushion seal	22	Cushion ring
15	Piston	23	Cushion seal
16	Seal ring	24	Stopper
17	Backup ring	25	Snap ring
18	Slide ring		

7. Assembly and Disassembly Procedures

(1) Preparations ・・・・・Prepare the following before starting disassembly.

[1] Work platform preparation
Prepare a sufficiently spacious, solid and stable work surface so that parts will not fall or move during work.

[2] Tool and materials preparation
Prepare the tools and materials shown on the following pages.

(2) General work precautions

[1] Clean any dirt or mud from the outside walls of the cylinder before starting disassembly.

[2] Each part has been manufactured with a high degree of precision, so be careful not to let parts bump each other or fall when handling them.

[3] If parts are struck or pulled with excessive force during work because they are tight, this may cause burrs or damage which causing reduction in performance or oil leaking. Perform work carefully and thoroughly.

[4] If a cylinder is left disassembled, humidity and dirt can cause rust on parts. If a pause in the work is unavoidable, be careful to prevent rust and keep off dust.

(3) Maintenance standards

Replace sliding parts and seal parts as follows.

[1] BushingWhen 1/4 of the circumference is worn brown over the entire length

[2] Seals and slide ringsReplace with new parts when the cylinder is disassembled.

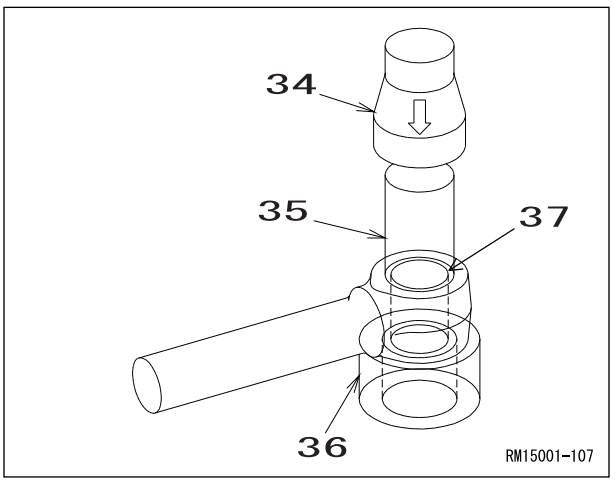
[3] Pin bushingWhen there is drastic galling

[4] Piston rodWhen the piston rod is bent more than 0.5 mm/1 m

14)Removal of pin bushing

[1] Remove the wiper ring (24) from the tube and piston rod. Remove it by using a screwdriver in the same manner as for the cylinder head.

[2] Use the metal block (35) to remove the pin bushing (37).



34	Press
35	Metal block
36	Jig
37	Pin bushing

15)Cleaning and storage

Clean the removed parts with white kerosene, and then apply hydraulic oil, cover the parts, and store them.

If they are left disassembled, there is a danger of their collecting rust and dust and not being able to function adequately after they are assembled again.

Procedures for Removal and Installation of Cab Inner and Outer Parts

Removal and Installation of Cab Assembly

⚠ Caution	・ Be sure to stop the engine before beginning work. ・ Be sure to inspect the wire rope and other lifting equipment before beginning work. ・ Do not stand or pass under the suspended load.

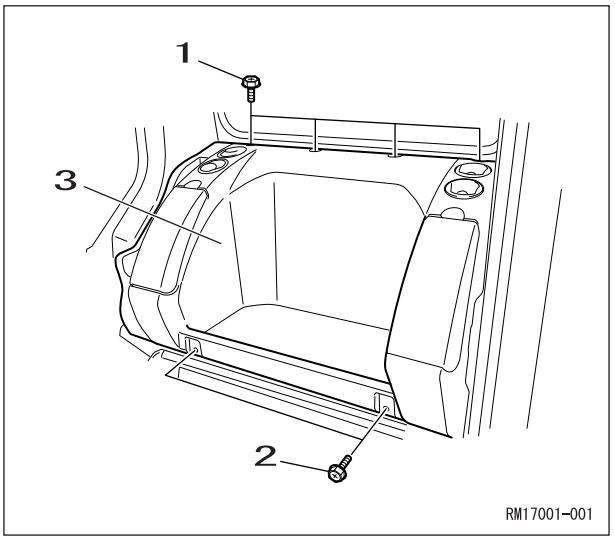
Items to prepare

- Wrenches (13 mm, 19 mm)
- Box wrenches (10 mm, 13 mm, 19 mm)
- Eyebolt (M24) x 4
- Chains (wire ropes) (with the required breaking load)
- Crane (with the required lifting capacity)
- Lubricating oil
- Rag
- Cleaning fluid
- Wood planks, etc.

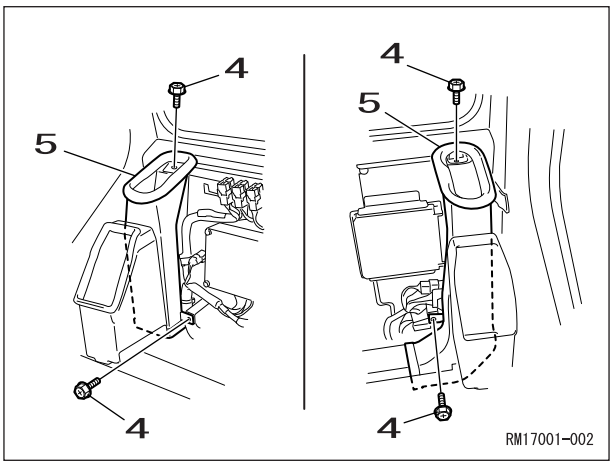
1. Removal of Cab Assembly

[1] Remove the operator's seat.
(For details, see "Removal and Installation of Operator's Seat".)

[2] Use a box wrench (10 mm) to remove the 4 bolts (1) and another box wrench (13 mm) to remove the 2 bolts (2), and then remove the rear cover (3).



[3] Use a box wrench (10 mm) to remove the 2 bolts (4), and then remove the air conditioner ducts on both sides (5).



1	Bolt
2	Bolt
3	Rear cover
4	Bolt
5	Duct

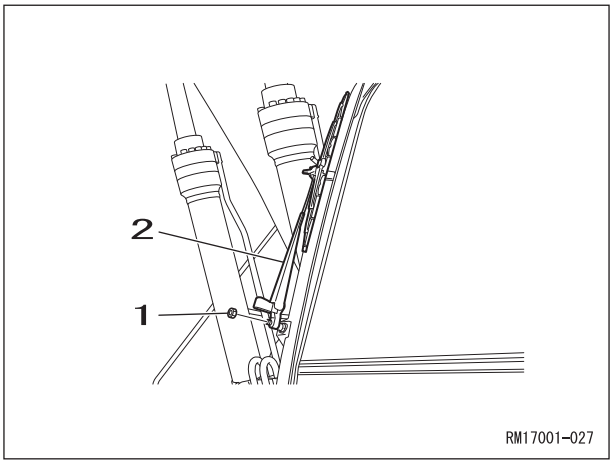
Removal and Installation of Wiper

Items to prepare

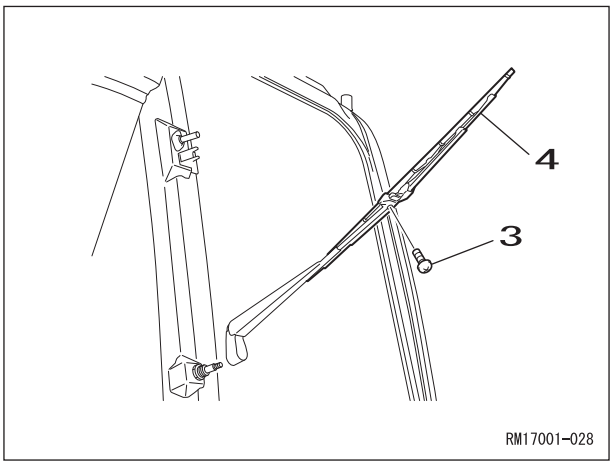
- Wrench (17 mm)
- Phillips screwdriver

1. Removal of Wiper

[1] Use a wrench (17 mm) to remove the nut (1), and then remove the wiper arm (2).



[2] Use the Phillips screwdriver to remove the screw (3), and then remove the wiper (4).

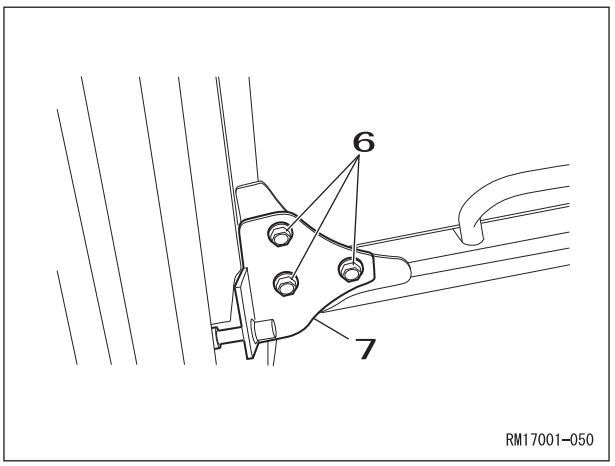


1	Nut
2	Wiper arm
3	Screw
4	Wiper

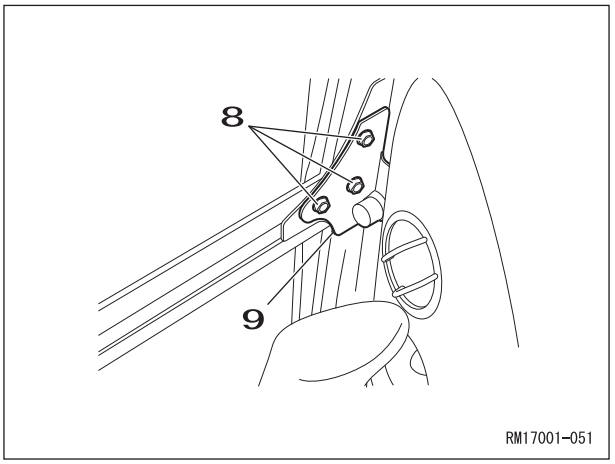
2. Installation of Wiper

To install, perform the reverse of the removal procedure.

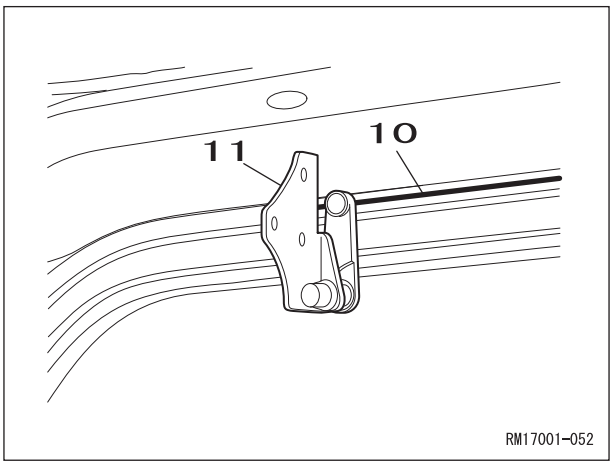
[3] Use a wrench (10 mm) to remove the 3 bolts (6), and then remove the front glass left lower bracket (7).



[4] Use a wrench (10 mm) to remove the 3 bolts (8), and then remove the front glass right lower bracket (9).



[5] Move the front glass right upper bracket (11) to a position where the wire (10) is not pulled on.



6	Bolt
7	Bracket
8	Bolt
9	Bracket
10	Wire
11	Bracket

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