

UNIC HYDRAULIC CRANE

URV SERIES

MODEL

URV230, URV260, URV290, URV300
URV340, URV370, URV500

WORK SHOP MANUAL

FURUKAWA UNIC CORPORATION

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INTRODUCTION

This technical instruction manual describes the construction of the **UNIC URV SERIES** crane and maintenance procedures for those who engage in its maintenance.

Please carefully read the manual to acquire the proper maintenance skills and provide efficient, speedy, correct service that are essential to customer trust. In this way, UNIC truck crane will be able to deliver their superb performance and be kept in satisfactory operating condition.

It is recommended that separate parts list be referred to together with this manual.

Technical Section, Service Department
FURUKAWA UNIC CORPORATION

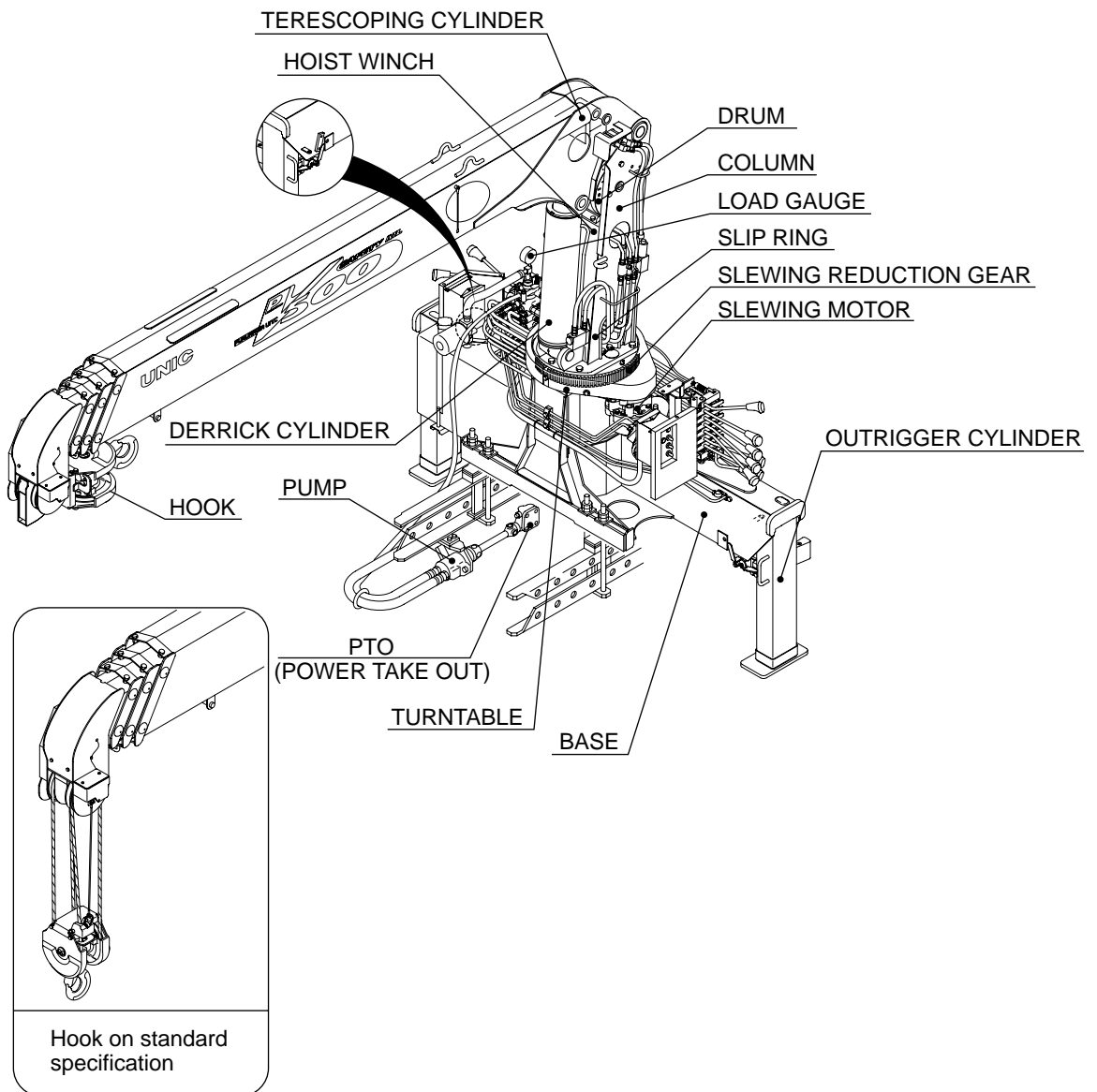
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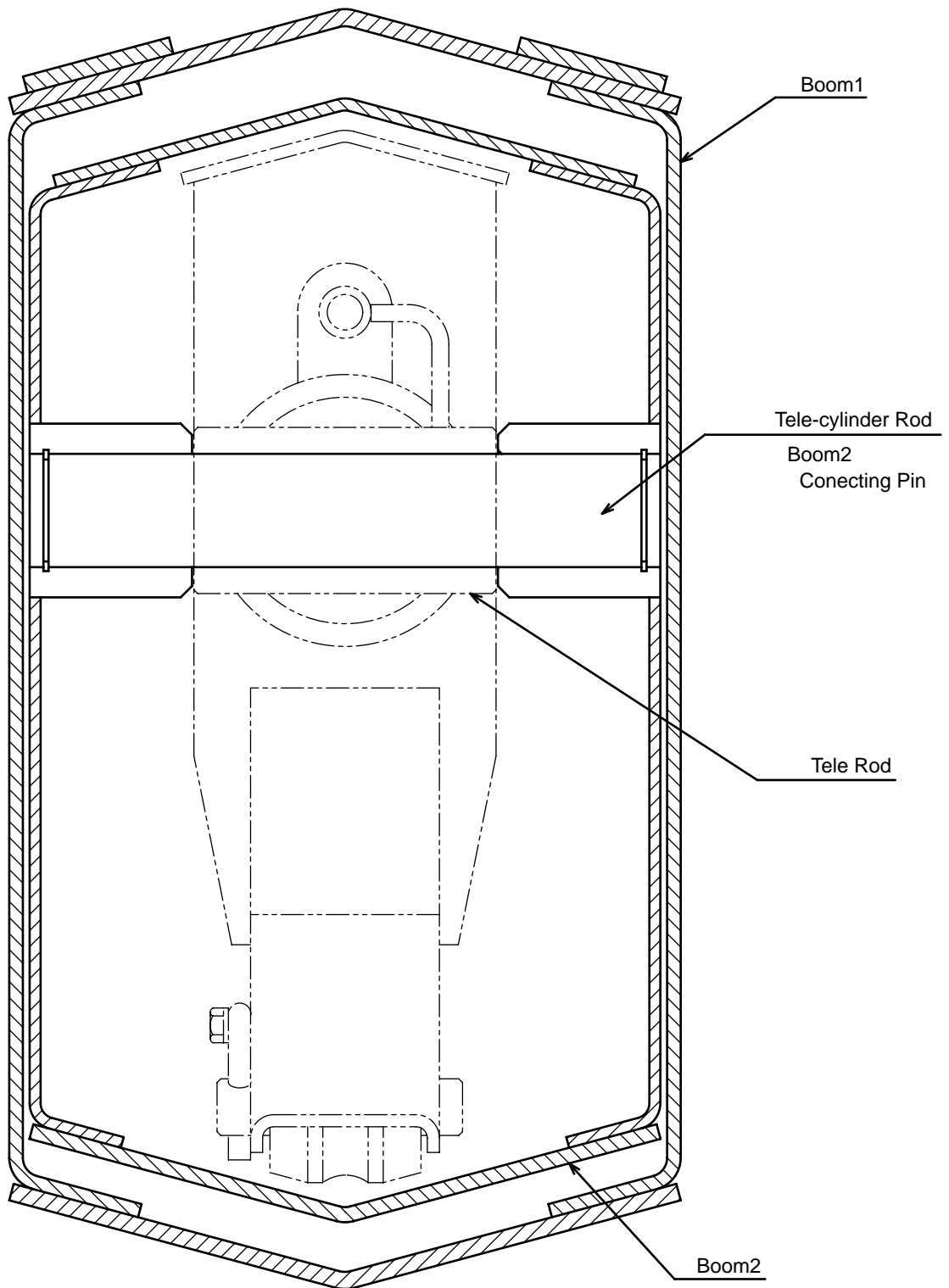
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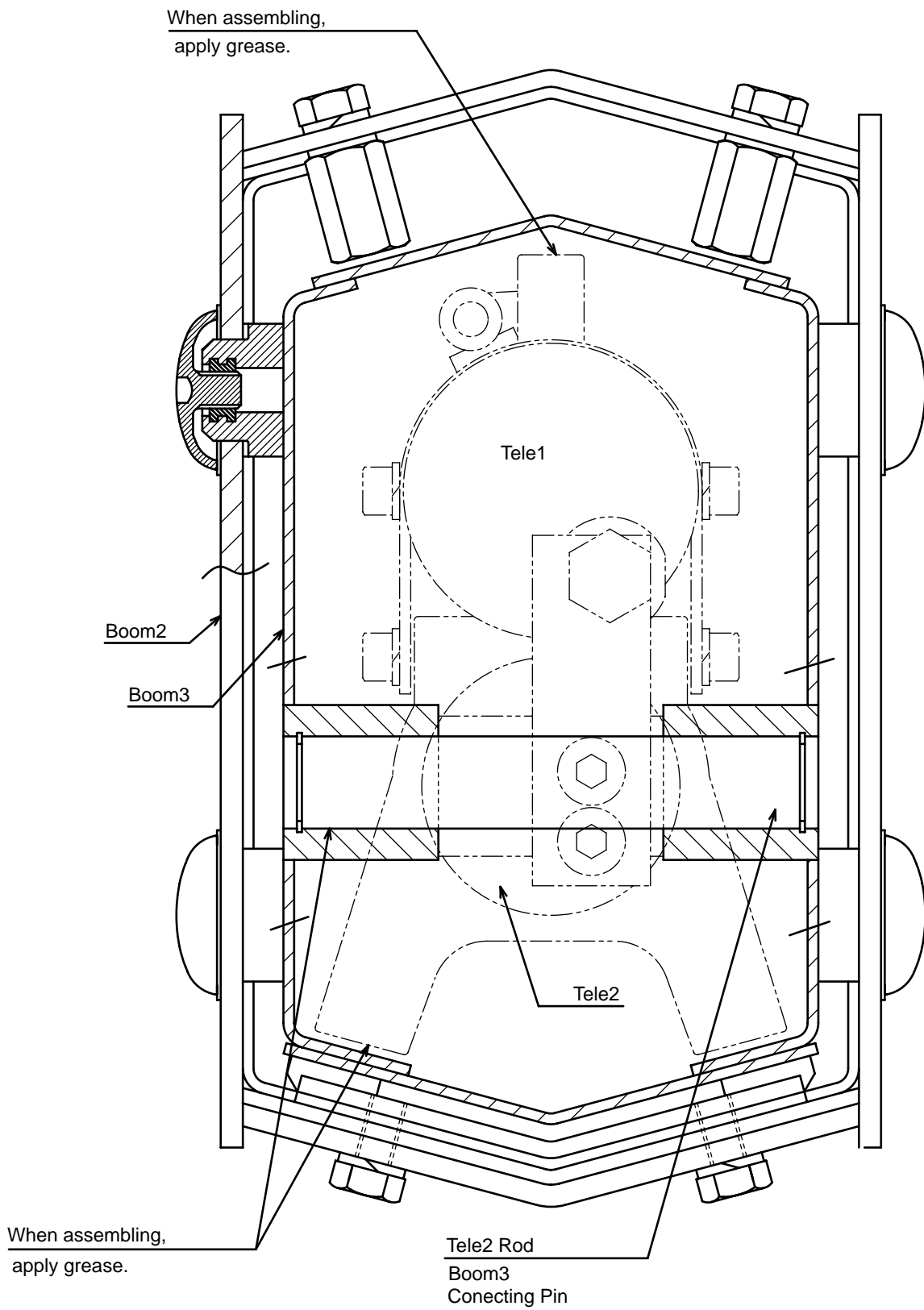
§ 1. GENERAL VIEW



(2) Boom 1, 2 front side section in detail



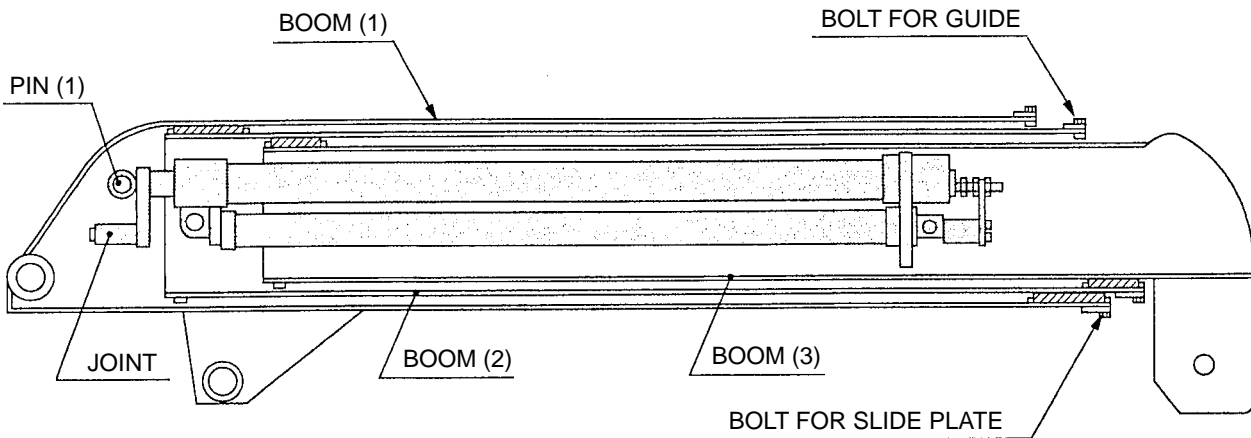
(2) Boom 2, 3 front side section in detail



(3) Boom Disassembly Procedures

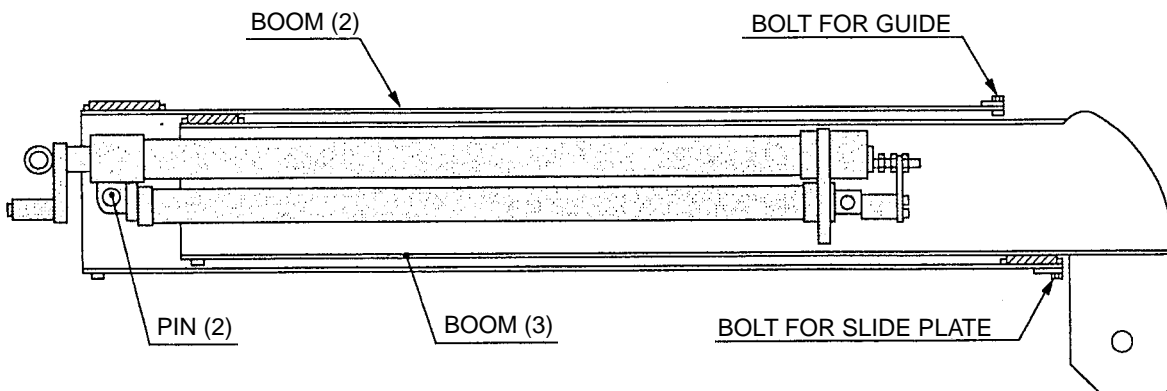
(1) 3-Section Boom

- ① Pull out the booms (2) and (3) from the boom (1).



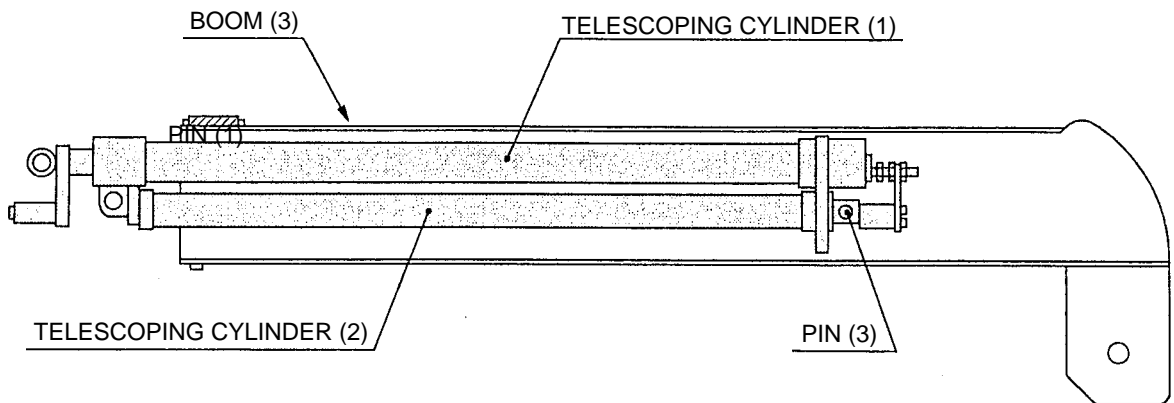
1. Remove the joint (for piping) of the telescoping cylinder.
2. Remove the slide plates (side and lower plates), and the guide.
3. Remove the pin (1) from the boom (1), and pull the booms (2) and (3) out of the boom (1).

- ② Pull out the boom (3) from the boom (2).

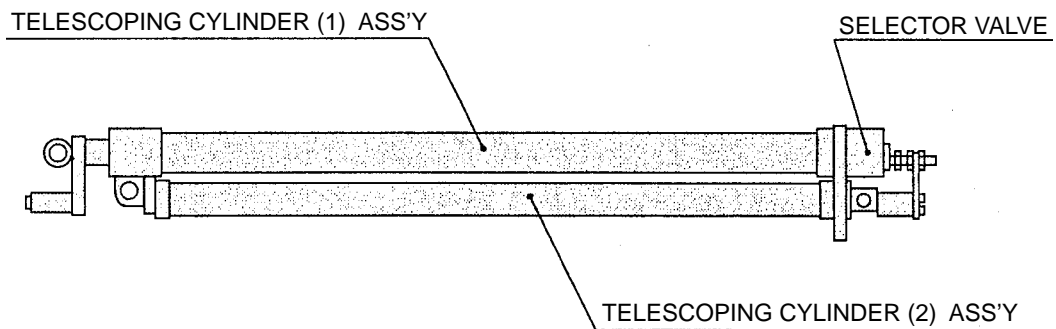


1. Remove the slide plates (side and lower plates) and the guide.
2. Remove the pin (2) from the boom (2), and pull out the boom (3).

- ③ Pull out the telescoping cylinder (1) and (2) from the boom(3).



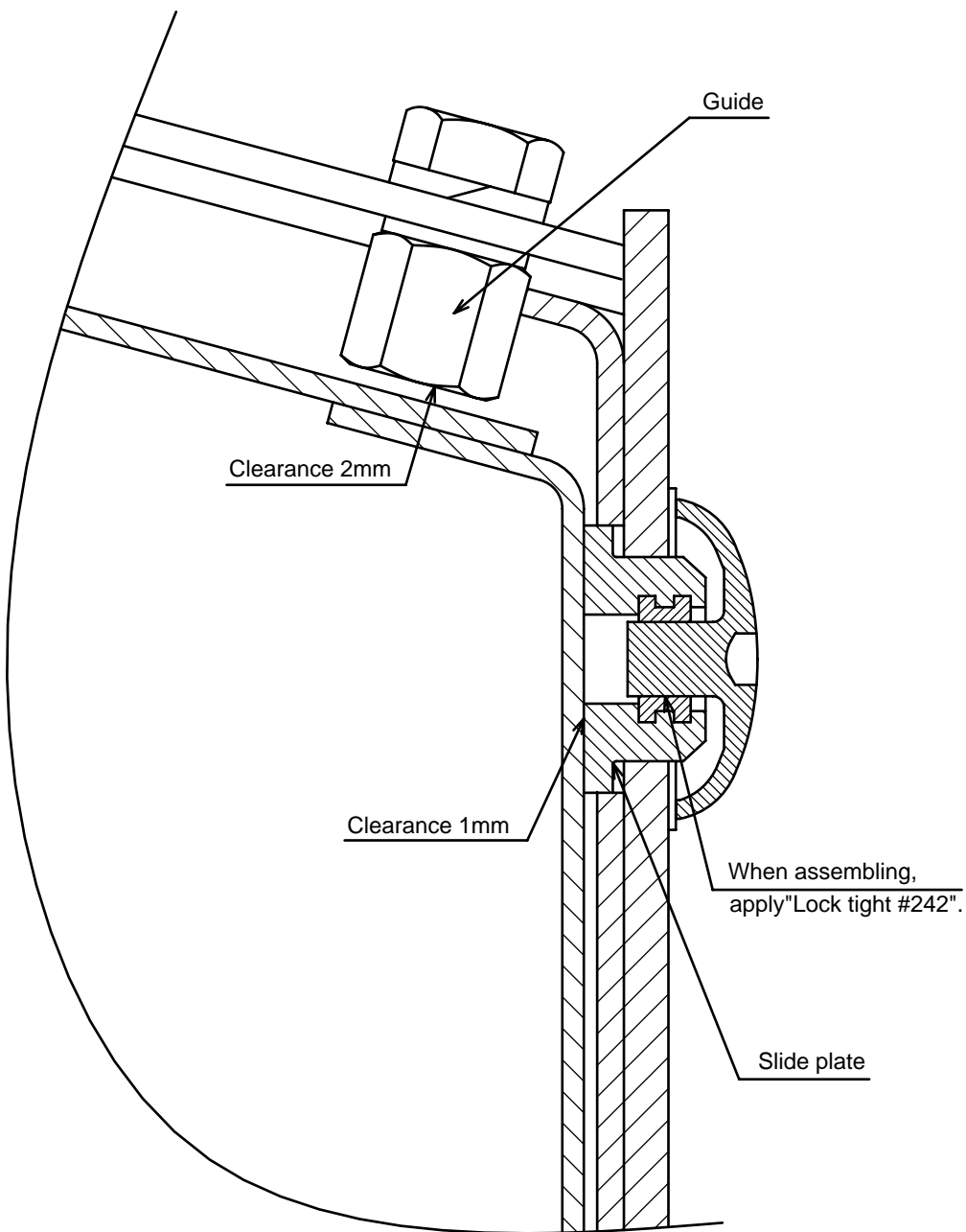
1. Pull out the telescoping cylinder (2) and the pin (3) from the boom (3).
2. From the boom (3), pull out the telescoping cylinder ass'y (1) and the telescoping cylinder ass'y (2) in the direction towards the rear.



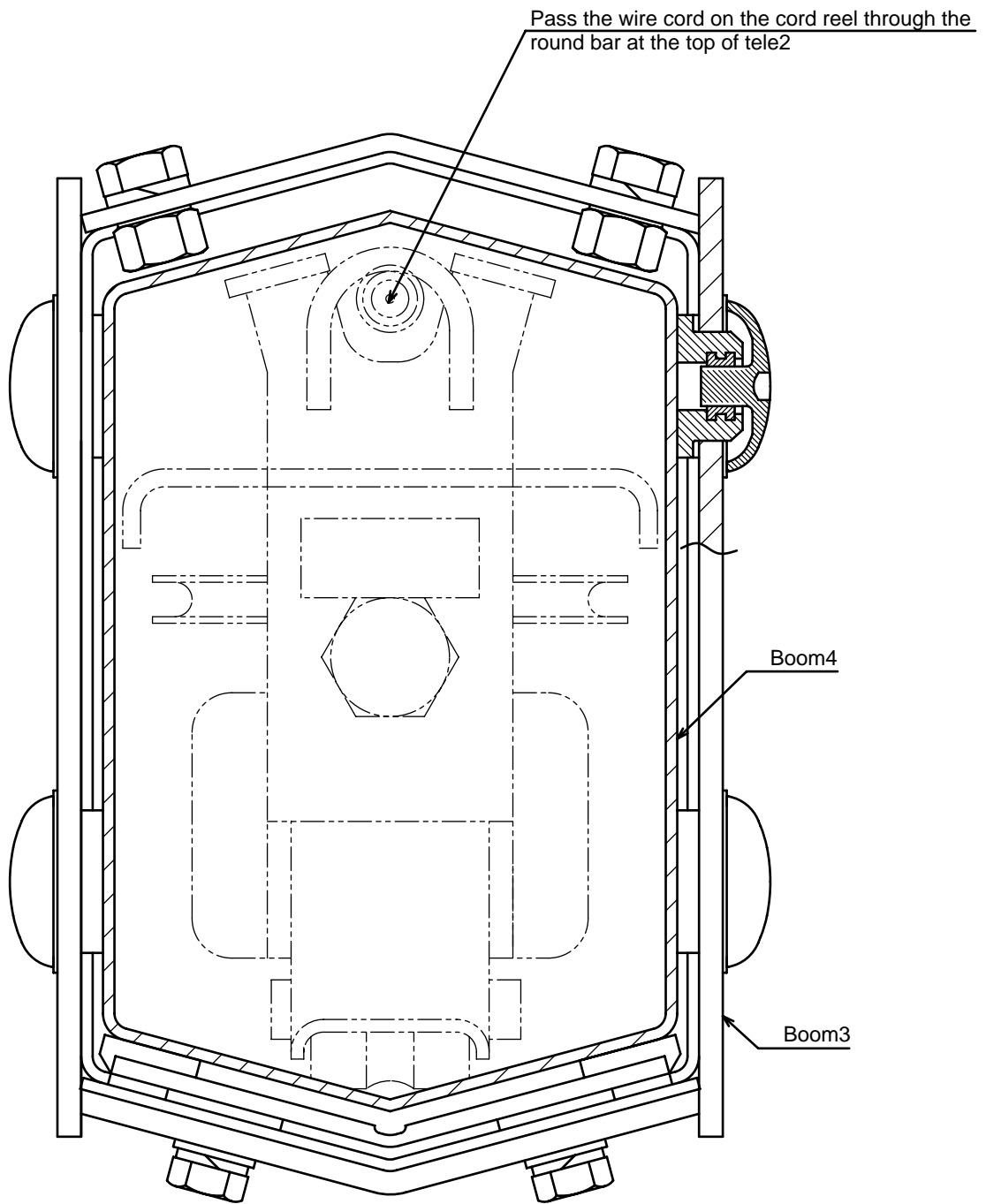
☞ Reassembling shall be made in reverse order of the disassembly procedures.

- Notes :**
1. When assembling the pin, apply grease to the inside of its boss for rustproof purpose.
 2. Apply grease (Chassis Grease No.1) to the inner surface of the bushing.
 3. Apply "THREE BOND #1102" to the slide plate to prevent it from falling. Apply the disulfide molybdenum grease to the slide surface.
 4. Do not apply grease to the slide sheave pin.

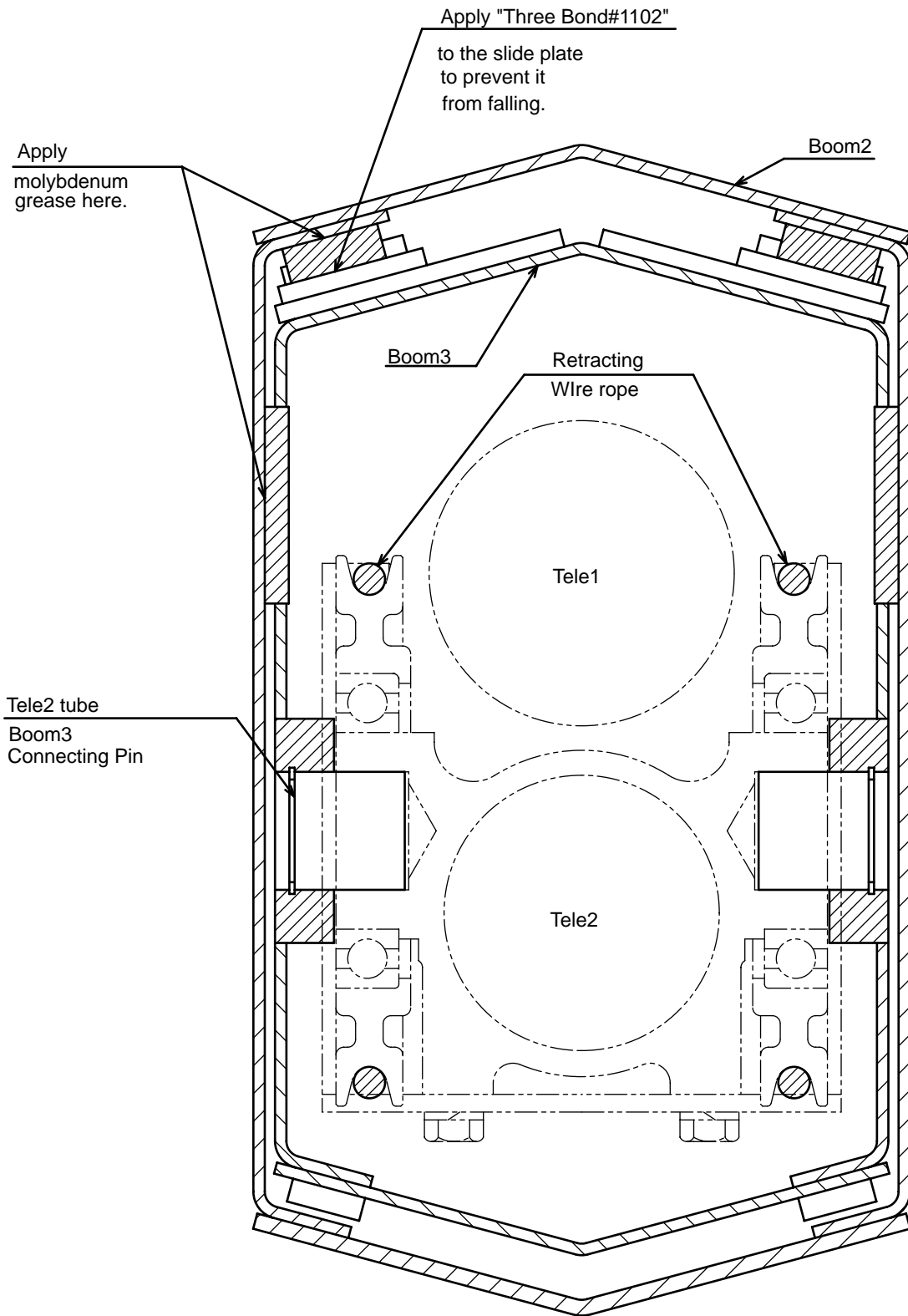
(3) Installation procedures for slide plate and guide
It has similar construction irrespective of number of boom section



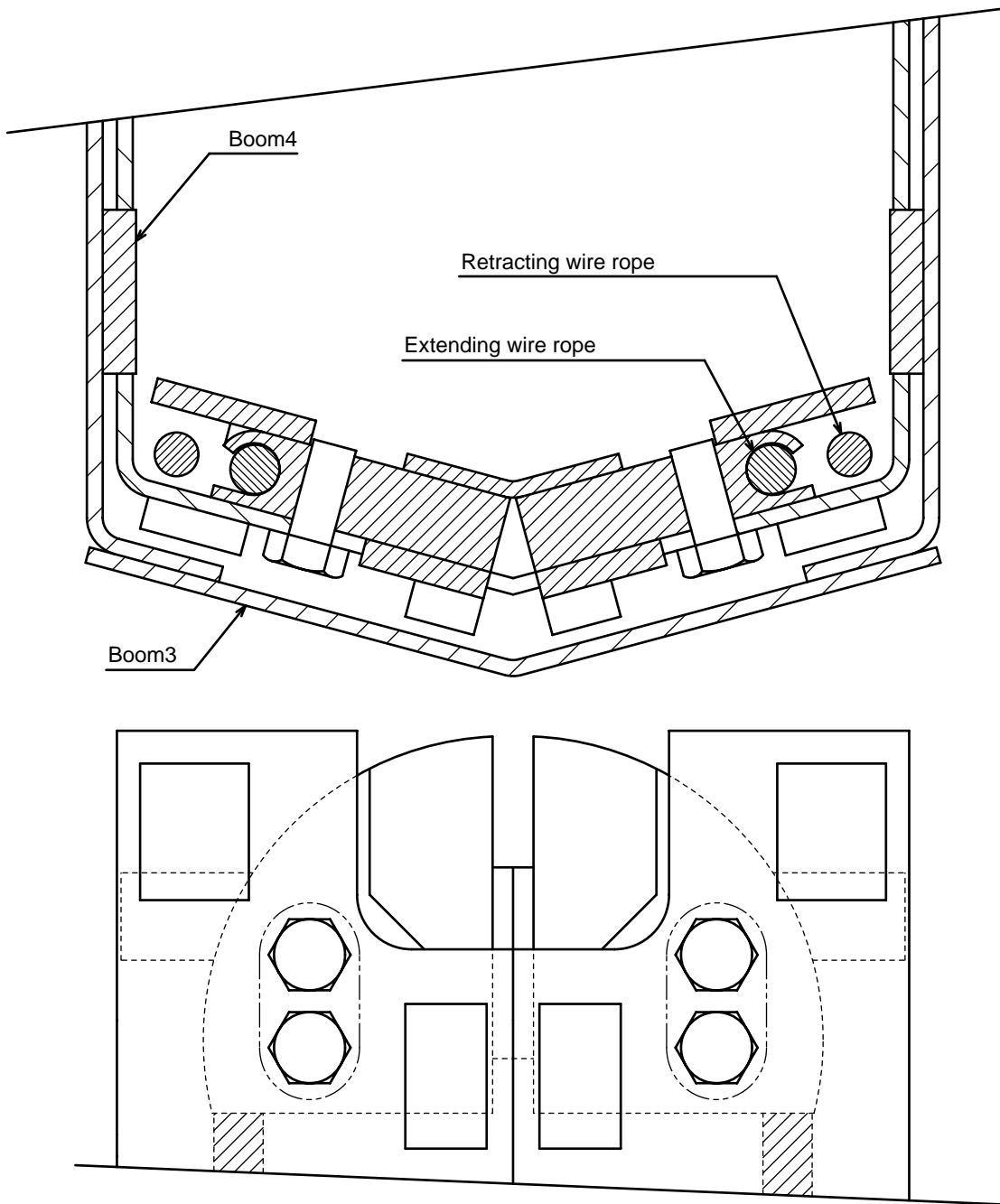
(4) Boom 3, 4 front side section in detail



(5) Boom 2, 3 rear side section in detail

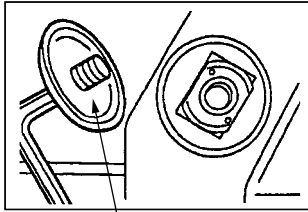


(6) Boom 3, 4 rear side section in detail

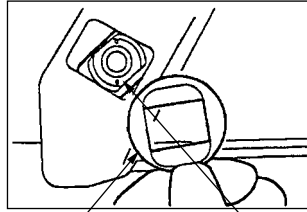


(7) How to disassemble 4-section boom of URV-series

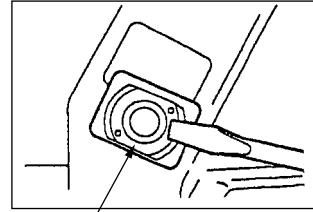
- ① Extend the boom by approx. 500mm (release pressure with the engine stopped).
- ② Remove the wire and the cord reel.
- ③ Remove the slide base mounting for boom up/down and the bolts for the stopper.
- ④ Remove the slide plate on the boom side.



"Lock Tight #242" has been applied here.

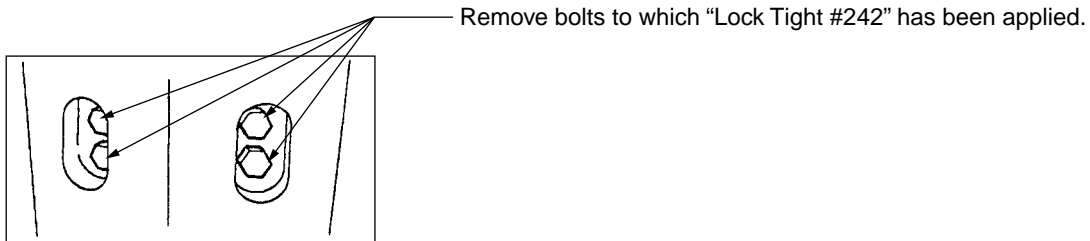


Remove the plate (Rotate the slide plate by 90°).

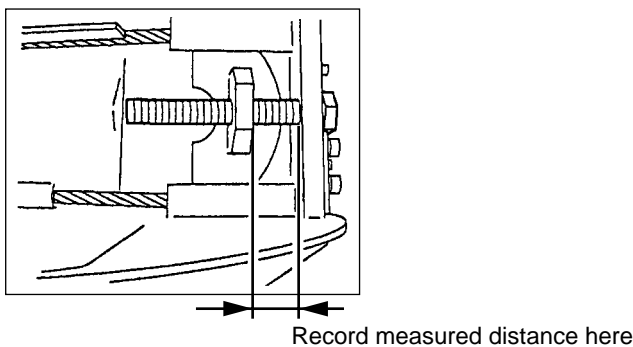


Slide plate (Put some shims if a gap exists).

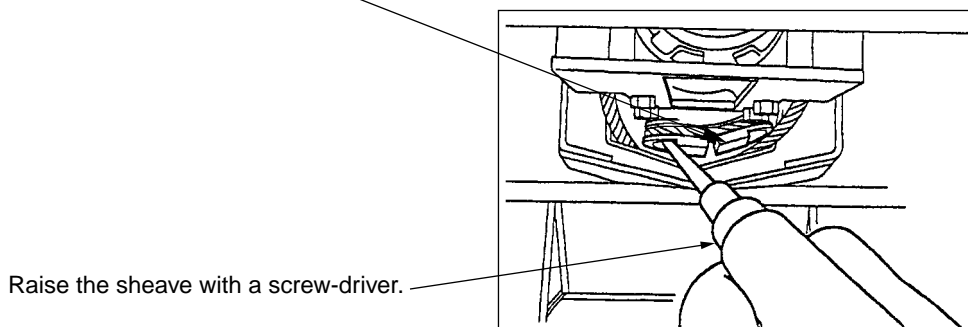
- ⑤ Remove piping to telescoping cylinder, extract the rod-end pin for telescoping cylinder, and extract booms 2, 3, and 4 out of boom1.
- ⑥ With the booms (2~4) assembled (as in step ⑤), remove the slide base at the top of boom2, the stopper, the bolts, and the slide plate, and extract the pin at the base of boom2 to extract booms 3 and 4 out of boom2.
- ⑦ With the booms 3 and 4 assembled (as in step ⑥), remove the bolts fitting the sheave for pulling-out wire located at the bottom of rear end of the boom.



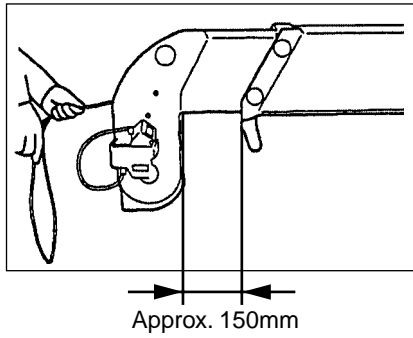
- ⑧ With the booms 3 and 4 assembled (as in step ⑦), measure and record the position of adjusting bolt for pulling-in wire located at the boom top then remove it.



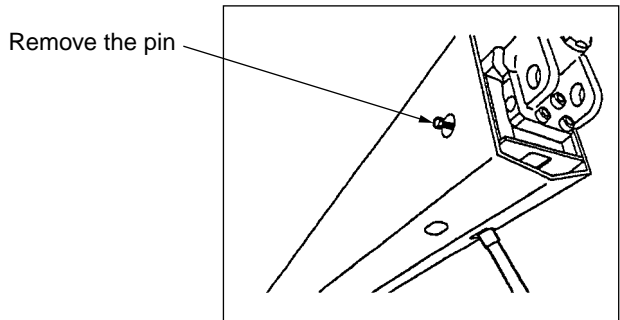
- ⑨ Unfasten the catch for the sheave for pulling-out wire located at the rear end of the boom.



⑩ Pull out boom4 by approx. 150mm.

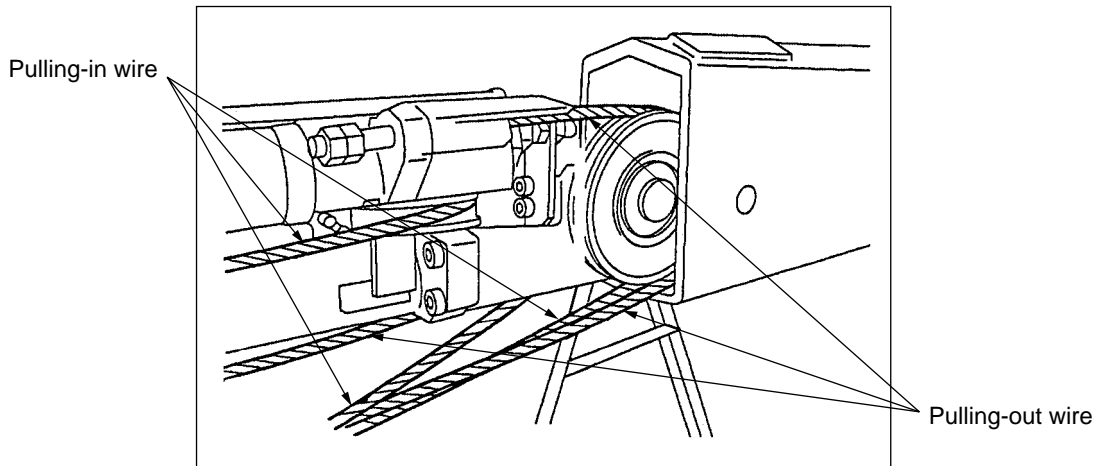


⑪ Remove the pin mounting tele2 at the rear end of boom3.

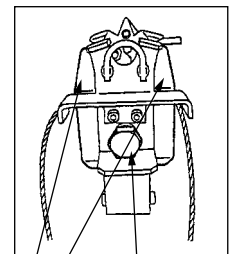
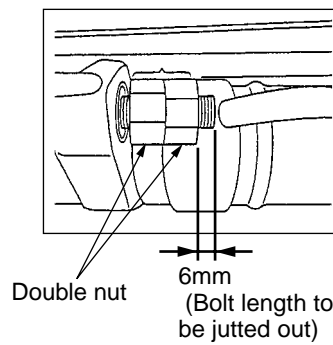
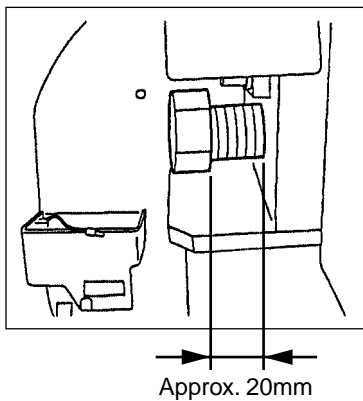


⑫ Extract the cylinder out of boom.

(When hanging the cylinder, pull it out to the slinging implement, and the pulling-in wire should not be slung.)



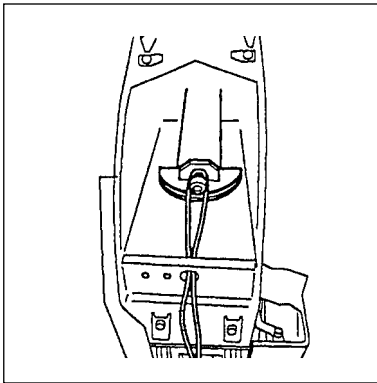
(8) When fitting the cylinder to the boom.



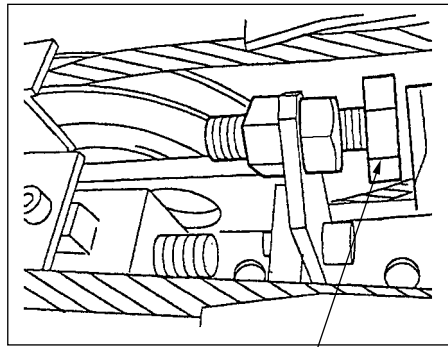
Sheave for pulling-out wire

Adjusting bolt for pulling-out wire

- ① With the boom4 extended by approx. 150mm, pass a string or the like as illustrated so that the pulling-in wire equalizer sheave can be pulled in the boom.



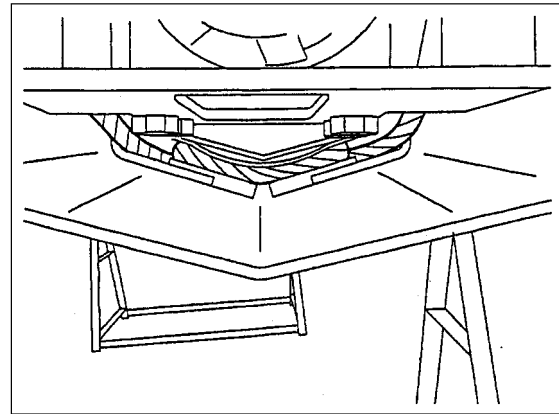
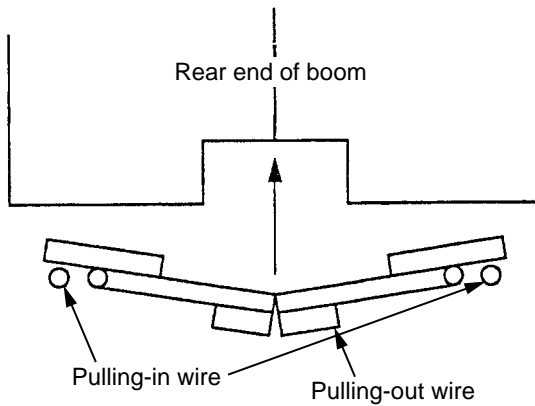
Insert the cylinder while pulling the string when it is being fitted.



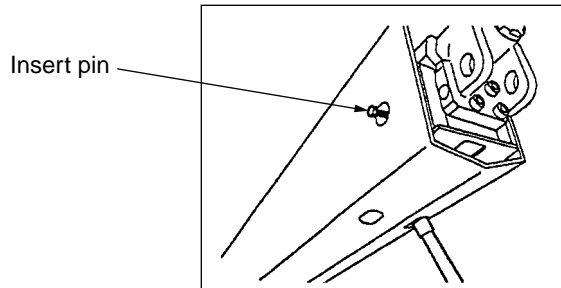
Check the contact between the change over bolt and the spool before putting the cylinder in the boom.

Allow both the pulling-out wire and the pulling-in wire to be free (do not hitch them in a slinging implement) when suspending the cylinder.

- ② Dealing with the wire on rear end of boom when the telescoping cylinder is inserted.



- ③ After the telescoping cylinder has been inserted, insert the pin for fixing cylinders on both sides at the rear end of boom3.



- ④ After the pin has been inserted, push in the boom4 until both booms 3 and 4 hit their ends. Secure the sheave for pulling-out wire by tightening the bolts.

★ Apply screw lock agent #262.

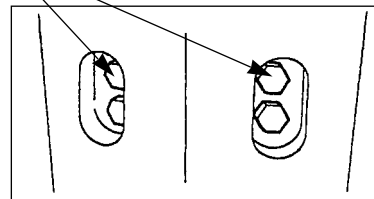
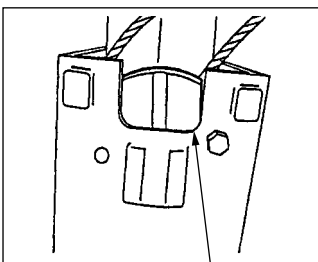
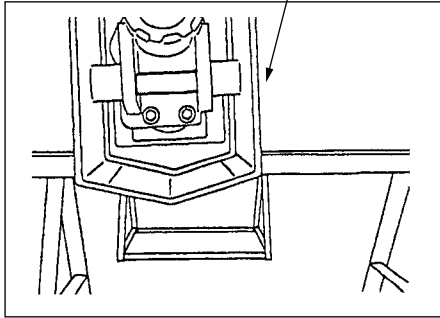


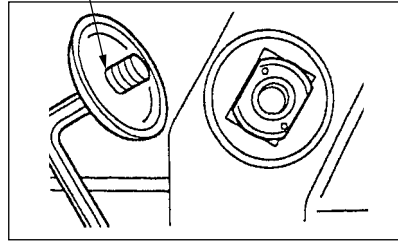
Illustration shows that the sheave for pulling-out wire has been fitted in the boom4.

⑤ Insert the booms 3 and 4 into the boom4.

Insert the pin for fixing cylinder at the rear end of boom2.



After they have been inserted, fit the slide base at the top of boom2, the slide plate, and the bolts for stopper. Apply screw lock agent #262.



Slide base mounting bolt.
Apply screw lock agent #262.

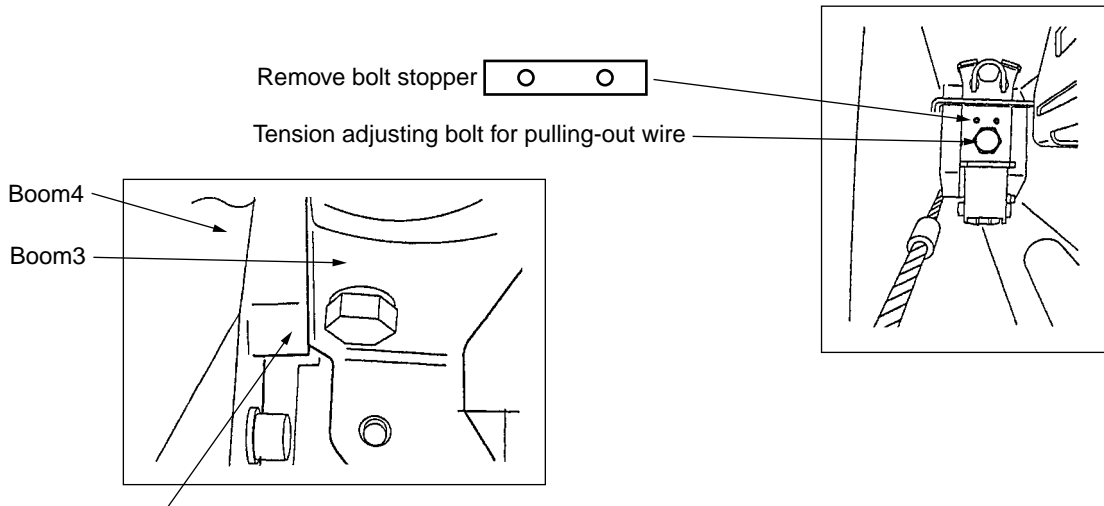
⑥ Insert the booms 2 through 4 into the boom1 and fit the slide base at the top of boom etc. in the same manner as in the step ⑤.

Insert the rod-end pin for telescoping cylinder 1 at the base of boom1.

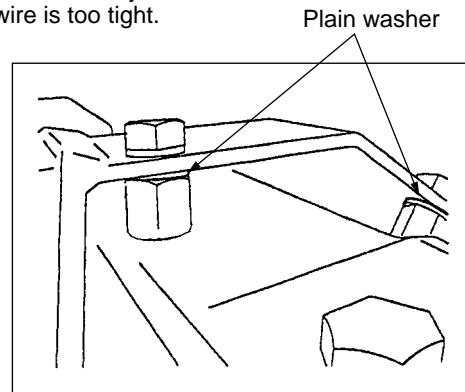
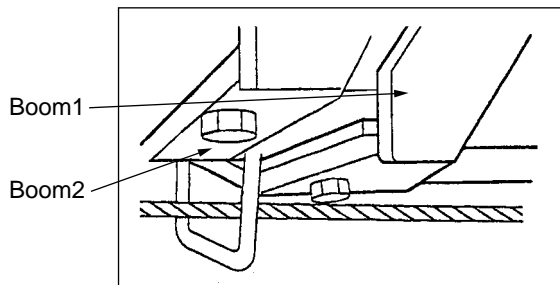
⑦ Although this reaches the state in which the booms can be tested for telescoping, operate the booms with the release switch turned ON because the reel cord has not been fitted yet.

After testing the booms for telescoping, check the pulling-out wire for tension at the opening on the side of boom3 with the booms fully extended.

If it is found too weak, retract the booms to their minimum to tighten the adjusting bolt at the boom top.



While booms 3 and 4 have been retracting, this portion must be closely touched. Note that it will not be touched if tension of pulling-out wire is too tight.

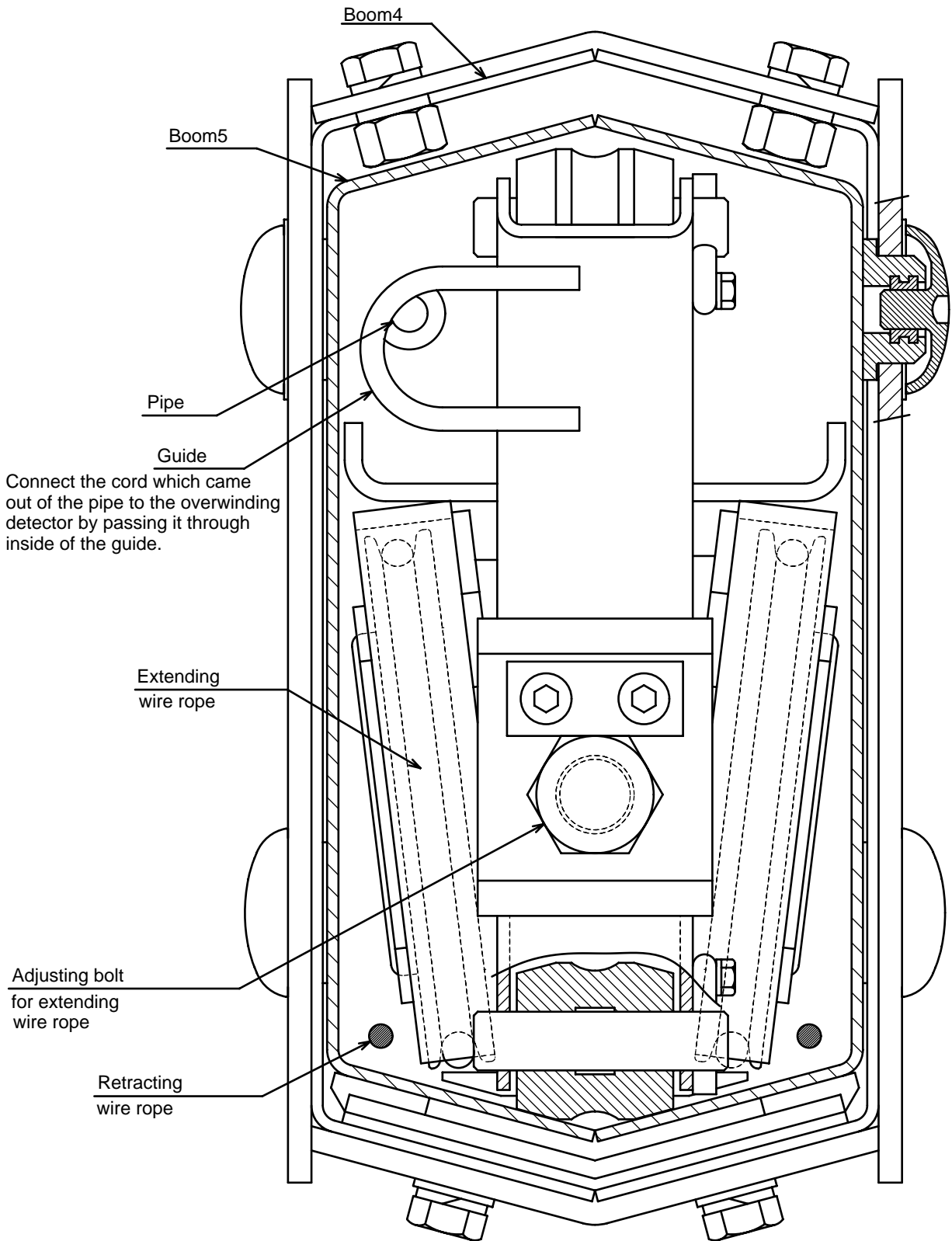


Note that a piece of plain washer is inserted on each side under the bottom of slide base at the top of boom1. While the booms are being retracted from the position fully extended, hunting might occur when the retraction switches from the booms 3 and 4 to the boom2.

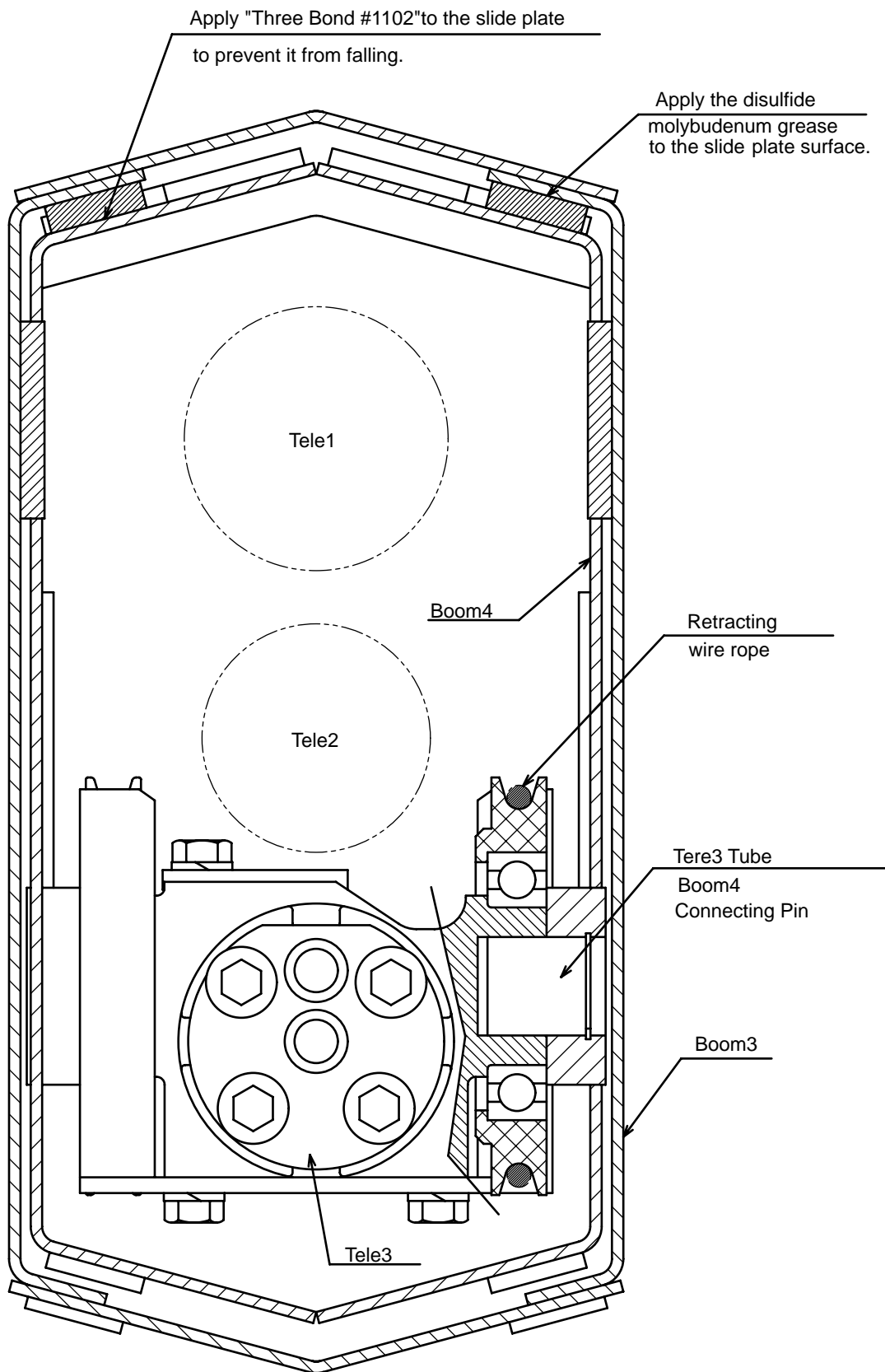
In this case, remove the plain washer on the side of stopper and add a piece of washer to each side under the bottom of slide base.

Pay attention to the items marked with , and this completes the procedures after fitting the cord reel and the hook.

(2) Boom 4, 5 front side section in detail



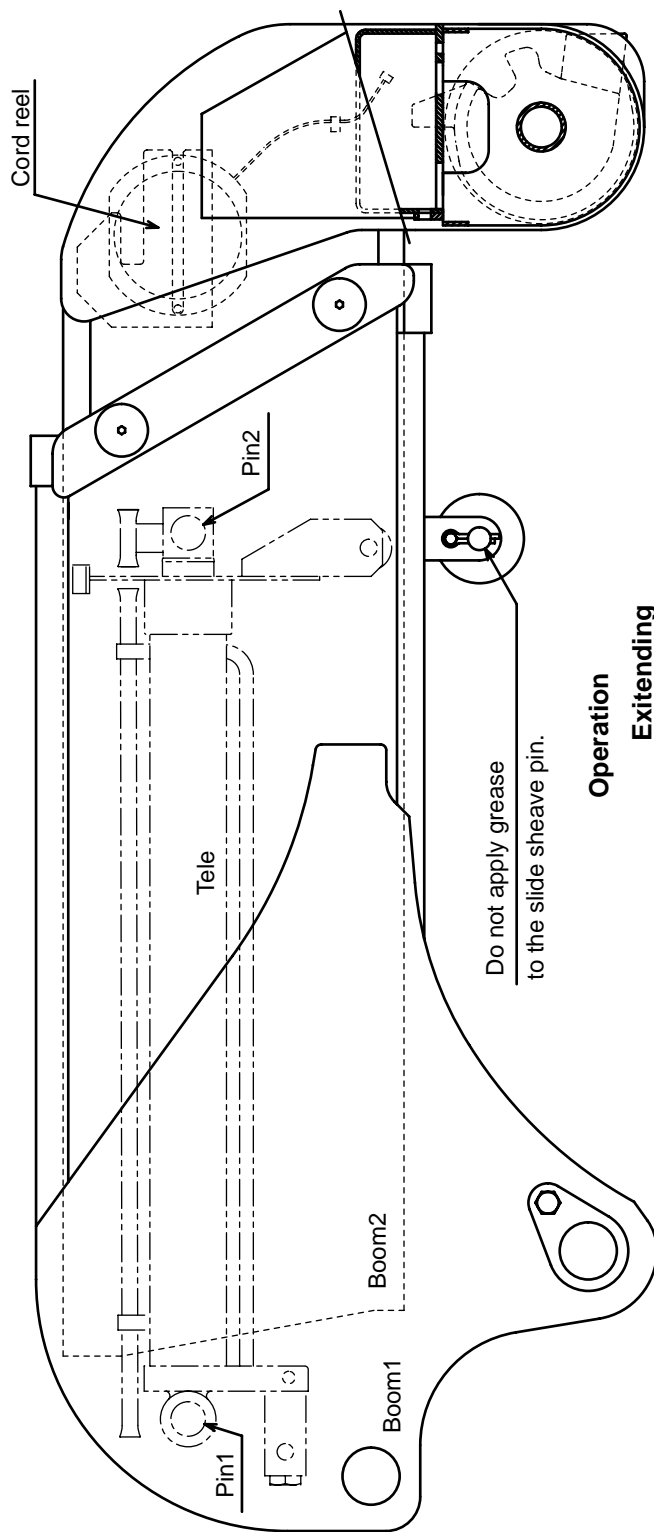
(3) Boom 3, 4 rear side section in detail



§ 2. BOOM

2.1 2-Section Boom

(1) Construction of boom and operation



Inspection of Plate-Slide

Replace the slide plate with a new one when it is worn out by 2mm or more.

Operation

Extending

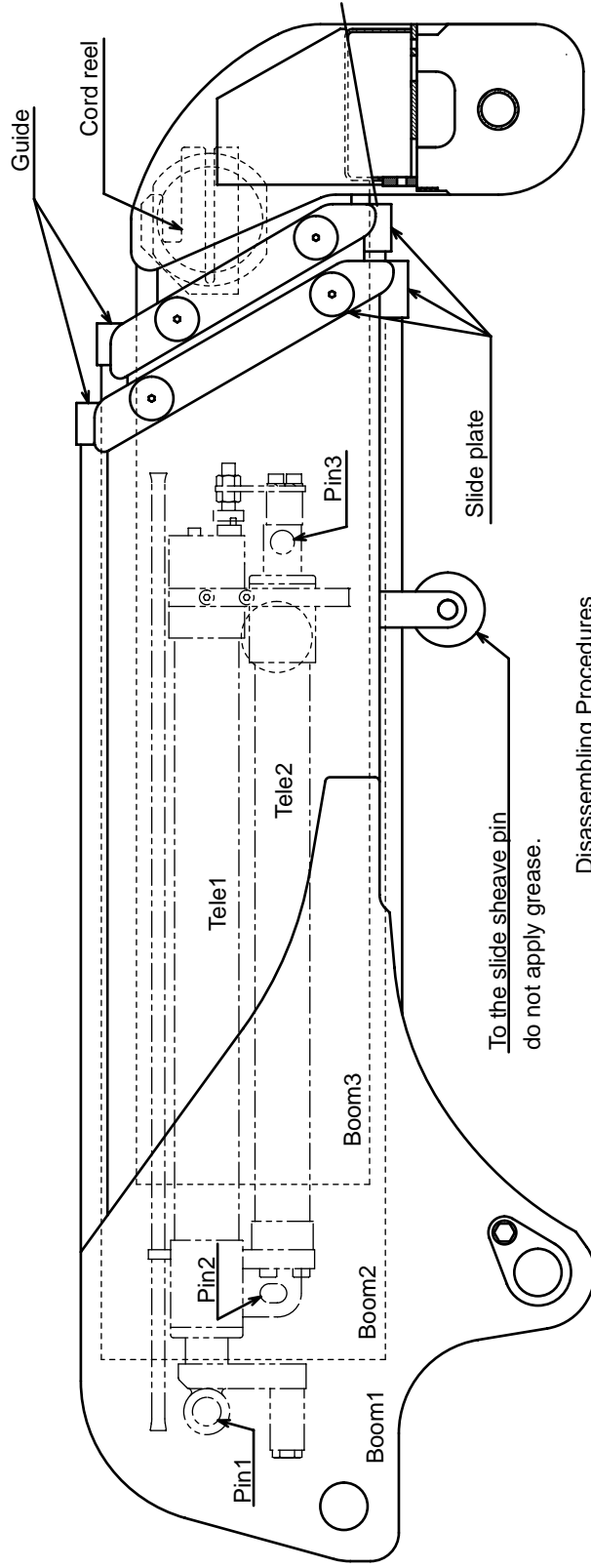
Extension of tele allows boom2 to extend.

Retracting

Retraction of tele allows boom2 to retract.

2. 2 3-Section Boom

(1) Construction, operation, and disassembling procedures



Operation

Extend

- Extension of tele 1 allows boom2 to extend.
- Extension of tele2 allows boom3 to extend.

Retract

- Retraction of tele1 allows boom2 to retract.
- Retraction of tele2 allows boom3 to retract.

Inspection of Slide plate

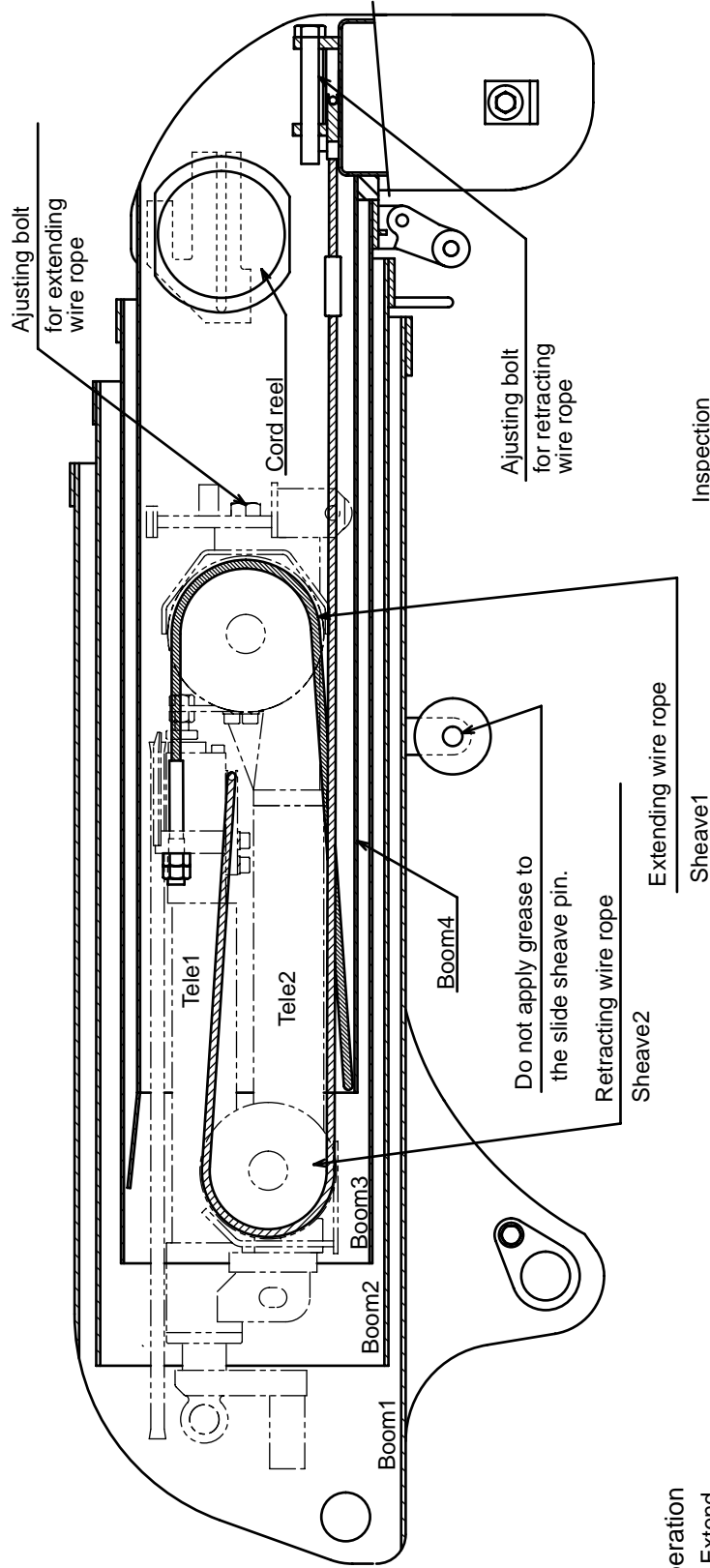
- Replace the slide plate with a new one when it is worn out by 2mm or more.

Disassembling Procedures

1. Store the boom to release pressure remained in the telescoping cylinder.
2. Remove wire rope, cord-reel, and the joint (for piping) of the telescoping cylinder.
3. Remove the slide plates (side and lower plates) and the guide from boom1.
4. Remove the pin1 from the boom1, and extract the booms2,3 out of the boom1.
5. Remove the slide plates (side and lower plates) and the guide from boom2.
6. Remove the pin2 from the boom2, and pull out the boom3.
7. Pull out the pin3 from the boom3.
8. Pull out the tele1, 2 assemblies in the direction towards the rear.

2. 3 4-Section Boom

(1) Construction of boom and operation Simultaneous telescoping of boom 3 and boom4



Operation

Extend

Extension of tele1 allows boom2 to extend.
 Extension of tele2 allows boom3 to extend.
 Extension of tele2 allows sheave 1 to shift and boom4 is to be extended as it is pulled by extending wire.

Retracting wire follows accordingly.

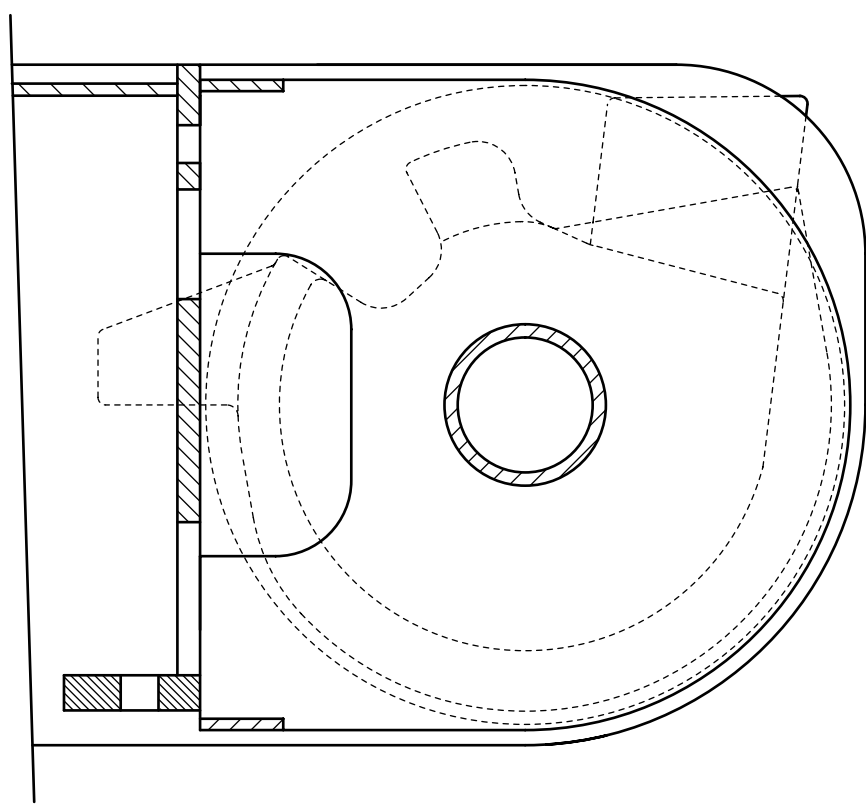
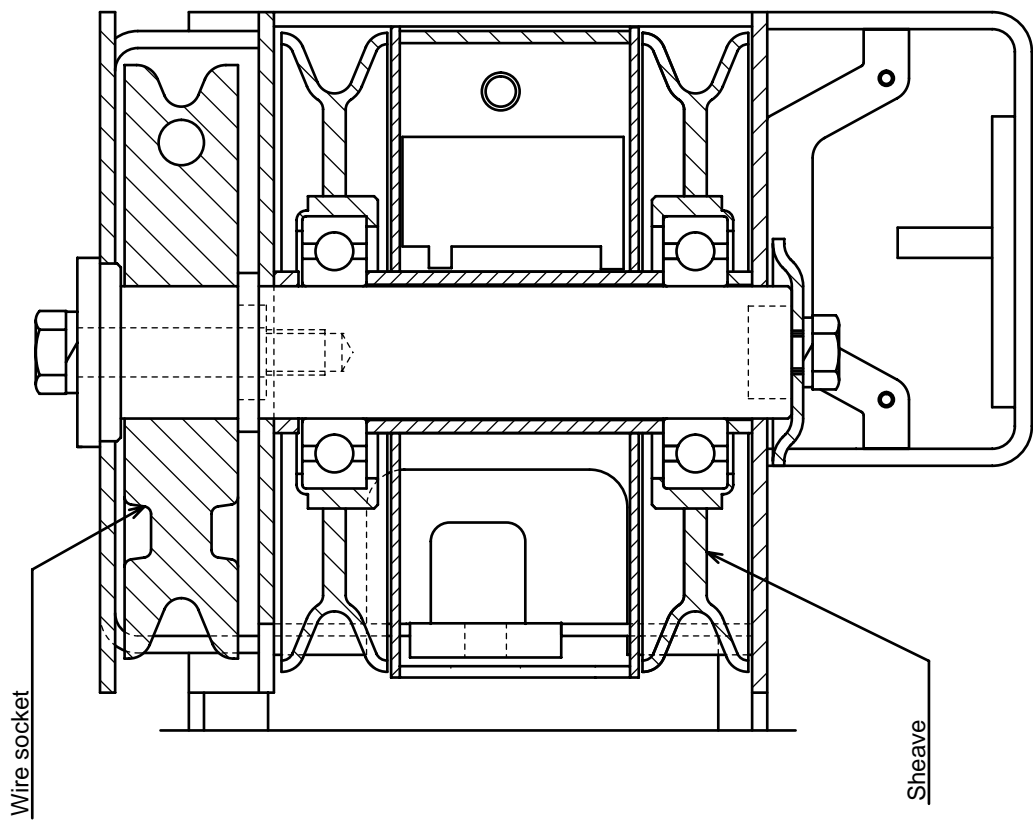
Retract

Retraction of tele1 allows boom2 to retract.
 Retraction of tele2 allows boom3 to retract.
 Retraction of tele2 allows sheave 2 to shift and boom4 is retracted as it is pulled by retracting wire.
 Extending wire follows accordingly.

Inspection

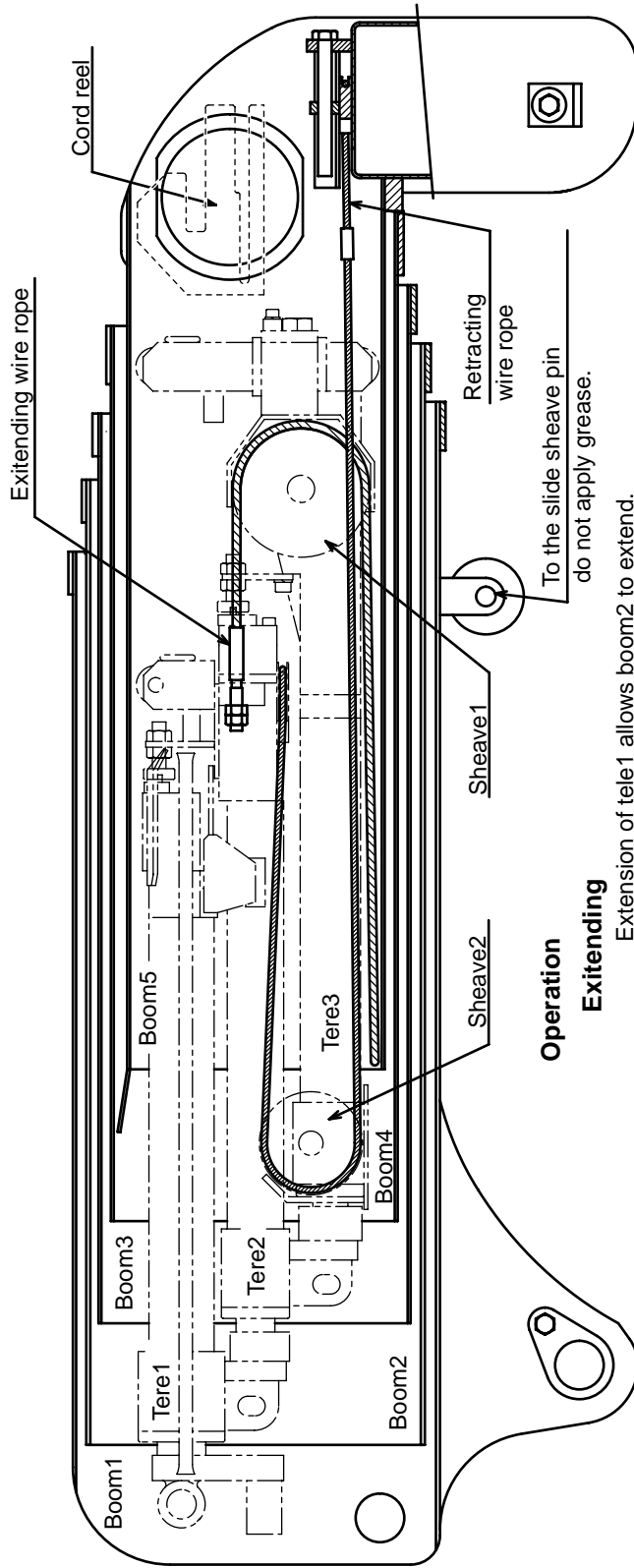
of Slide plate
 Replace the slide plate with a new one when it is worn out by 2mm or more.

(2) How boom-top sheave is mounted



2. 4 5-Section Boom

(1) Simultaneous telescoping of boom4 and boom5



Operation

Extending

- Extension of tele1 allows boom2 to extend.
- Extension of tele2 allows boom3 to extend.
- Extension of tele3 allows boom4 to extend.
- Extension of tele3 allows sheave 1 to shift and boom5 is to be extended as it is pulled by extending wire.
- Retracting wire follows accordingly.

Retracting

- Retraction of tele1 allows boom2 to retract.
- Retraction of tele2 allows boom3 to retract.
- Retraction of tele3 allows boom4 to retract.
- Retraction of tele3 allows sheave 2 to shift and boom5 is to be retracted as it is pulled by retracting wire.
- Extending wire follows accordingly.

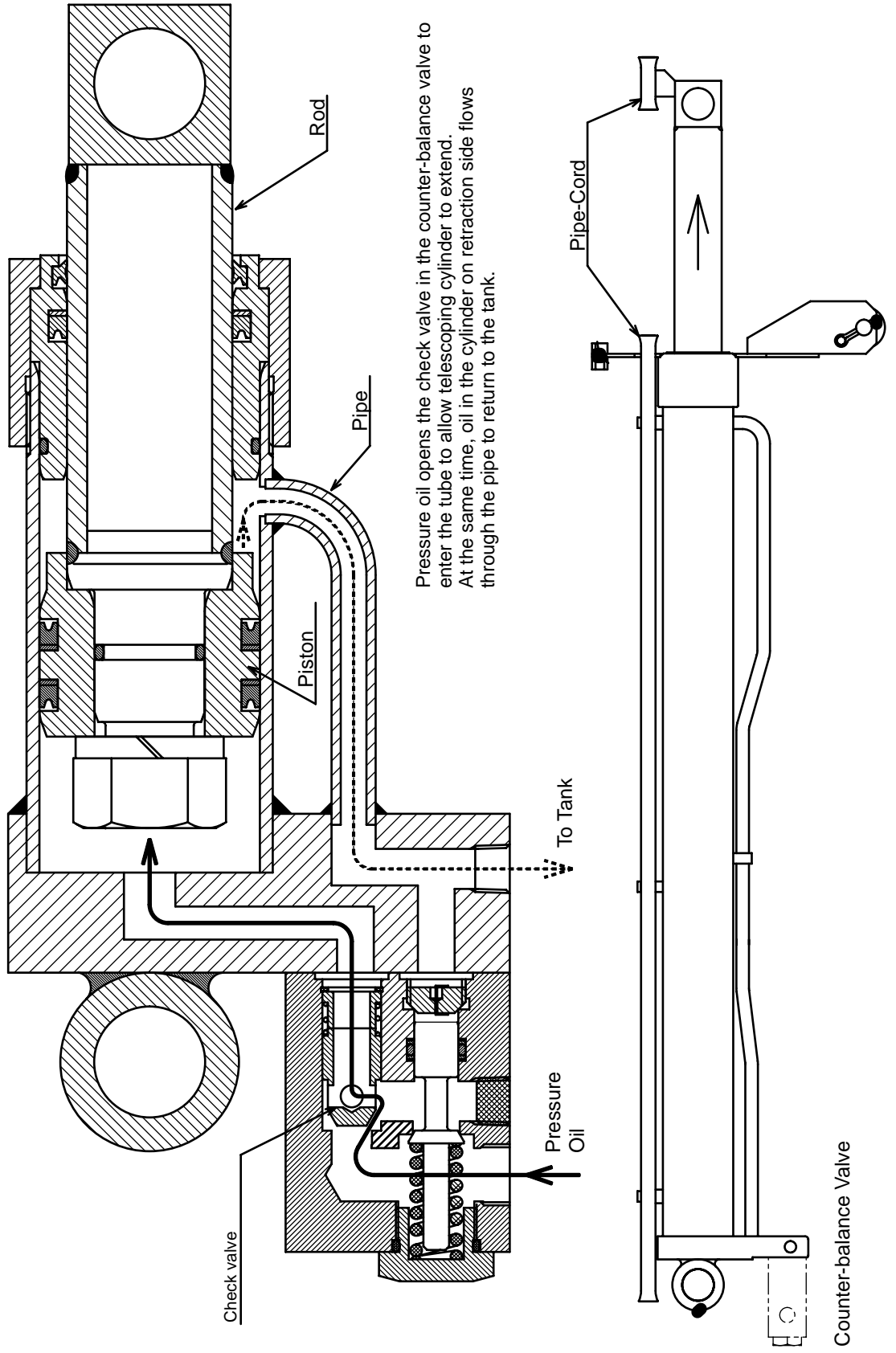
Inspection of slide plate

Replace the slide plate with a new one when it is worn out by 2mm or more.

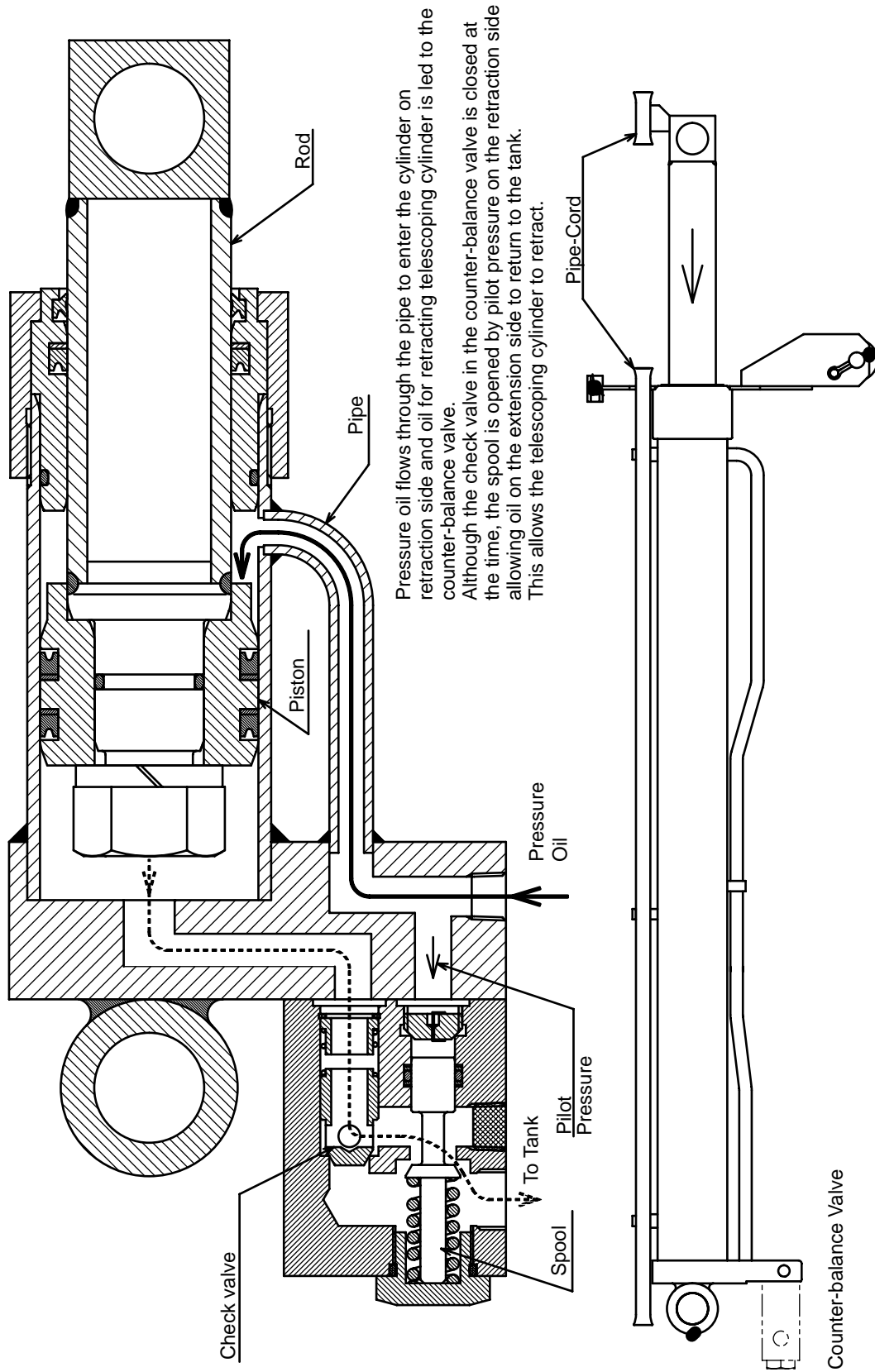
§ 3. TELESCOPING CYLINDER

3.1 2-Section Boom (Single Cylinder) Operation

(1) When Telescoping Cylinder extends



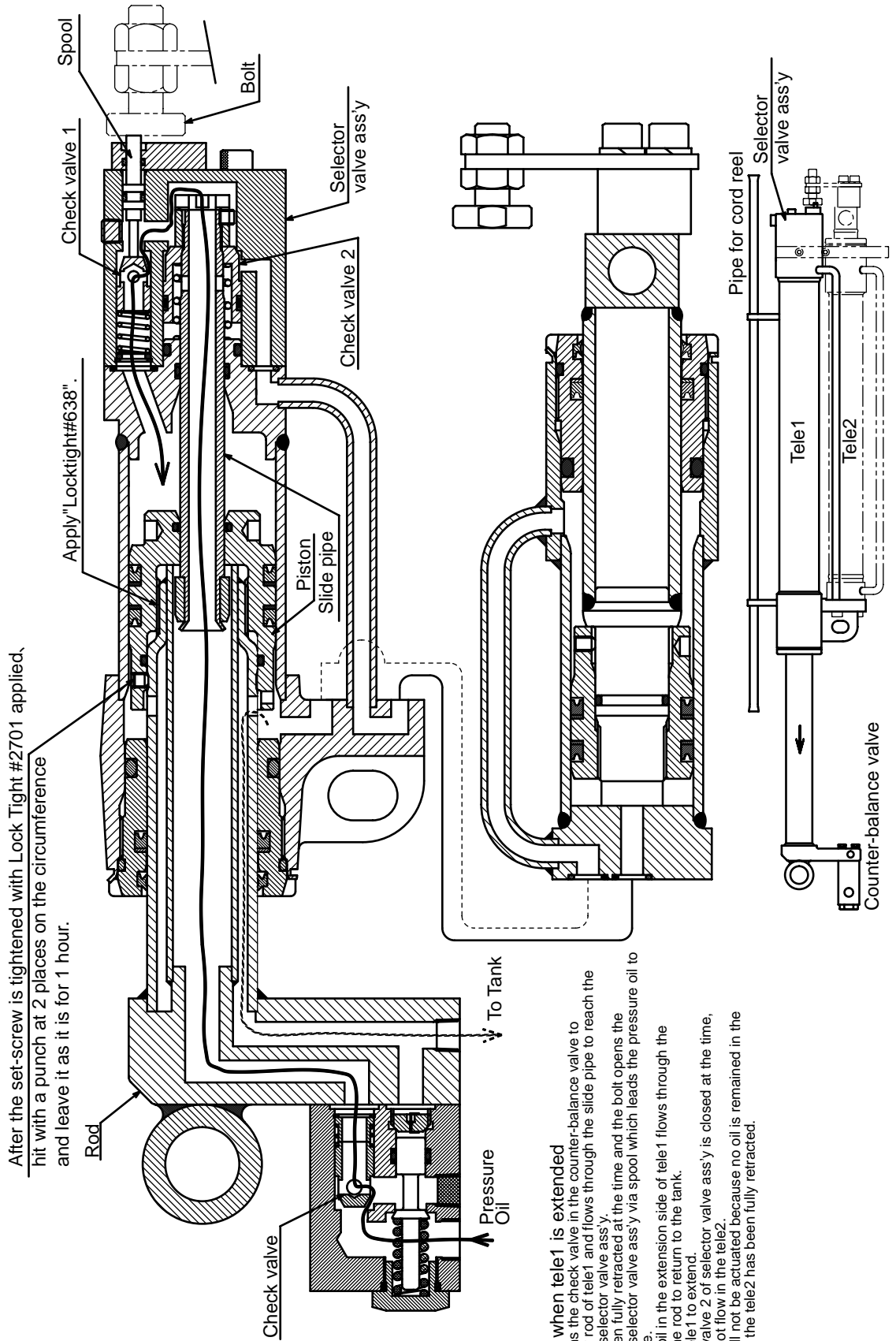
(2) When Telescoping Cylinder retracts



Pressure oil flows through the pipe to enter the cylinder on retraction side and oil for retracting telescoping cylinder is led to the counter-balance valve. Although the check valve in the counter-balance valve is closed at the time, the spool is opened by pilot pressure on the retraction side allowing oil on the extension side to return to the tank. This allows the telescoping cylinder to retract.

3. 2 3-Section Boom (Dual Cylinder) Operation

(1) When Telescoping Cylinder1 extends

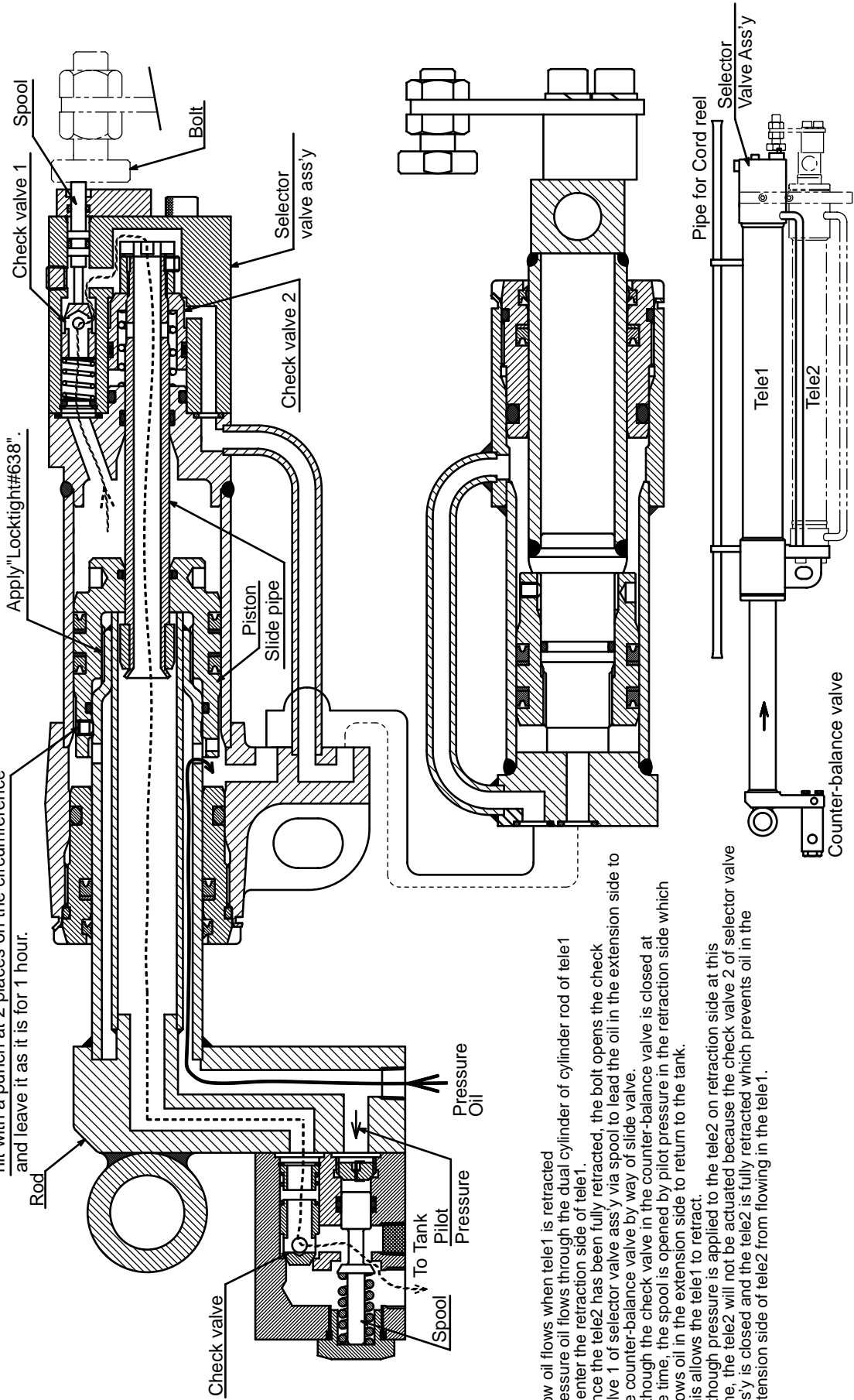


After the set-screw is tightened with Lock Tight #2701 applied, hit with a punch at 2 places on the circumference and leave it as it is for 1 hour.

How oil flows when tele1 is extended
 Pressure oil opens the check valve in the counter-balance valve to enter the cylinder rod of tele1 and flows through the slide pipe to reach the check valve 1 of selector valve ass'y.
 The tele2 has been fully retracted at the time and the bolt opens the check valve 1 of selector valve ass'y via spool which leads the pressure oil to the extension side.
 Simultaneously, oil in the extension side of tele1 flows through the dual cylinder in the rod to extend.
 This allows the tele1 to extend.
 Since the check valve 2 of selector valve ass'y is closed at the time, pressure oil will not flow in the tele2.
 Also, the tele2 will not be actuated because no oil is remained in the retraction side as the tele2 has been fully retracted.

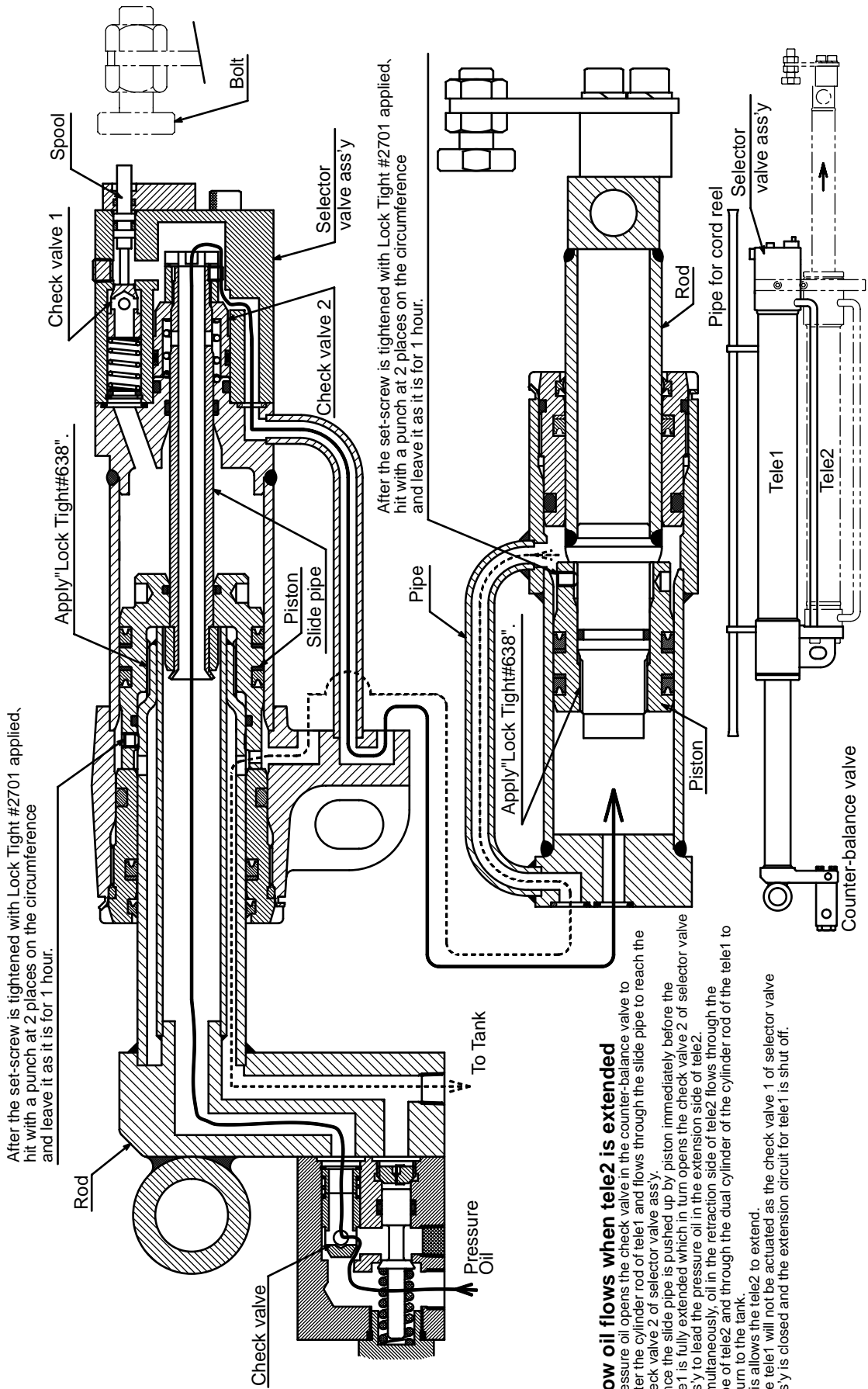
(2) When Telescoping1 Cylinder1 retracts

After the set-screw is tightened with Lock Tight #2701 applied, hit with a punch at 2 places on the circumference and leave it as it is for 1 hour.

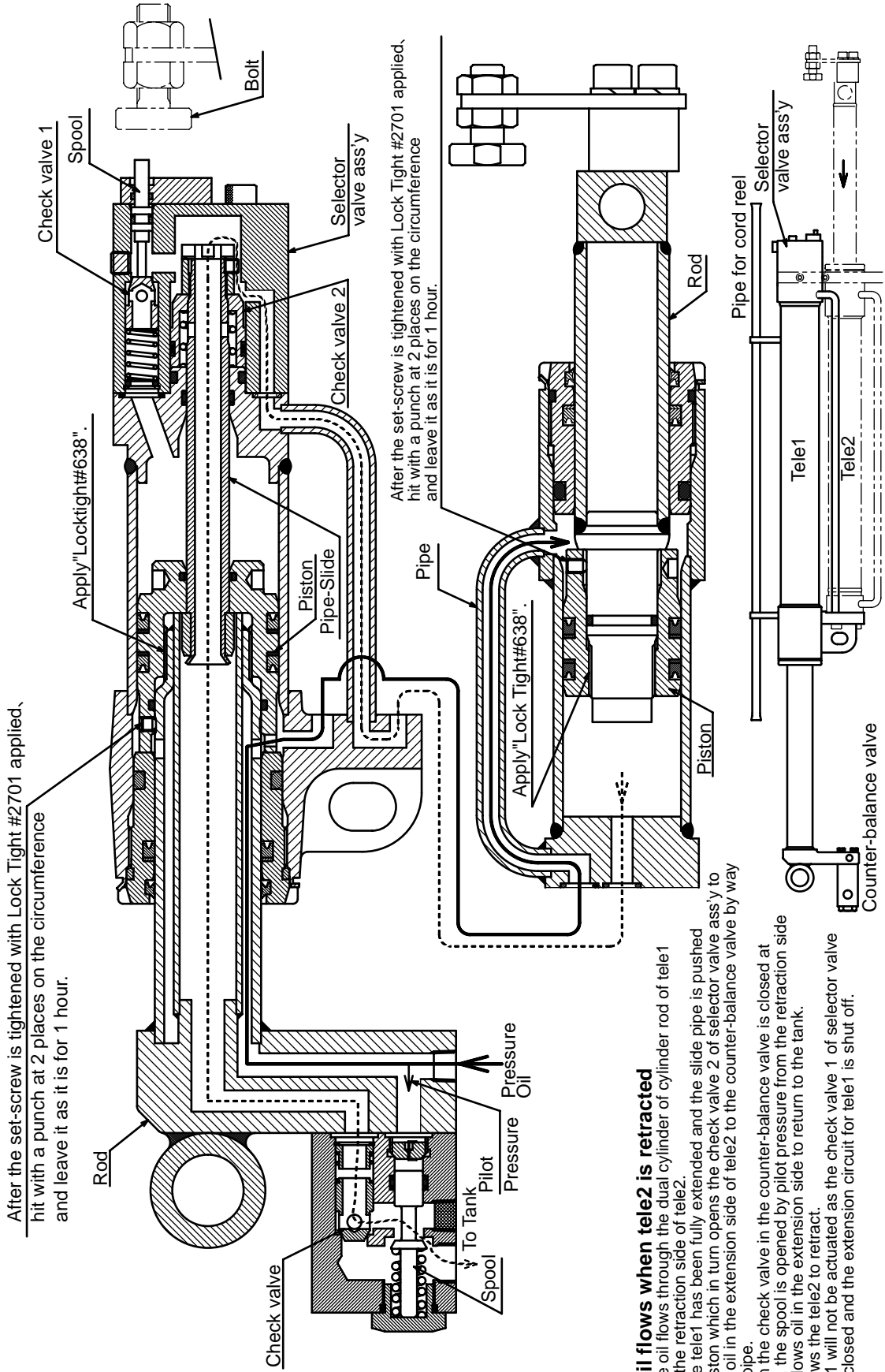


How oil flows when tele1 is retracted
 Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele1.
 Since the tele2 has been fully retracted, the bolt opens the check valve 1 of selector valve ass'y via spool to lead the oil in the extension side to the counter-balance valve by way of slide pipe.
 Although the check valve in the counter-balance valve is closed at the time, the spool is opened by pilot pressure in the retraction side which allows oil in the extension side to return to the tank.
 This allows the tele1 to retract.
 Although pressure is applied to the tele2 on retraction side at this time, the tele2 will not be actuated because the check valve 2 of selector valve ass'y is closed and the tele2 is fully retracted which prevents oil in the extension side of tele2 from flowing in the tele1.

(3) When Telescoping Cylinder2 extends



(4) When Telescoping Cylinder2 retracts

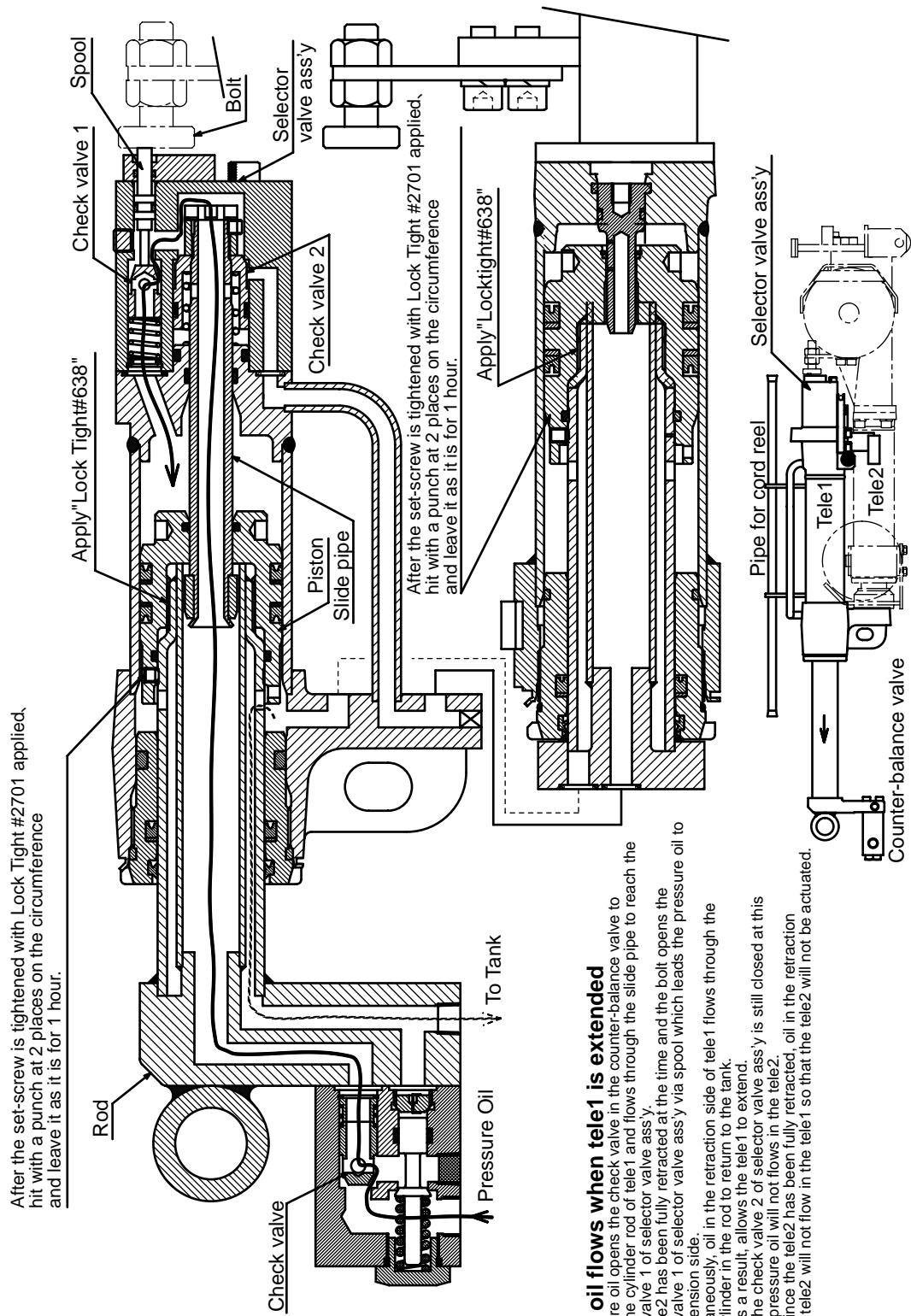


How oil flows when tele2 is retracted

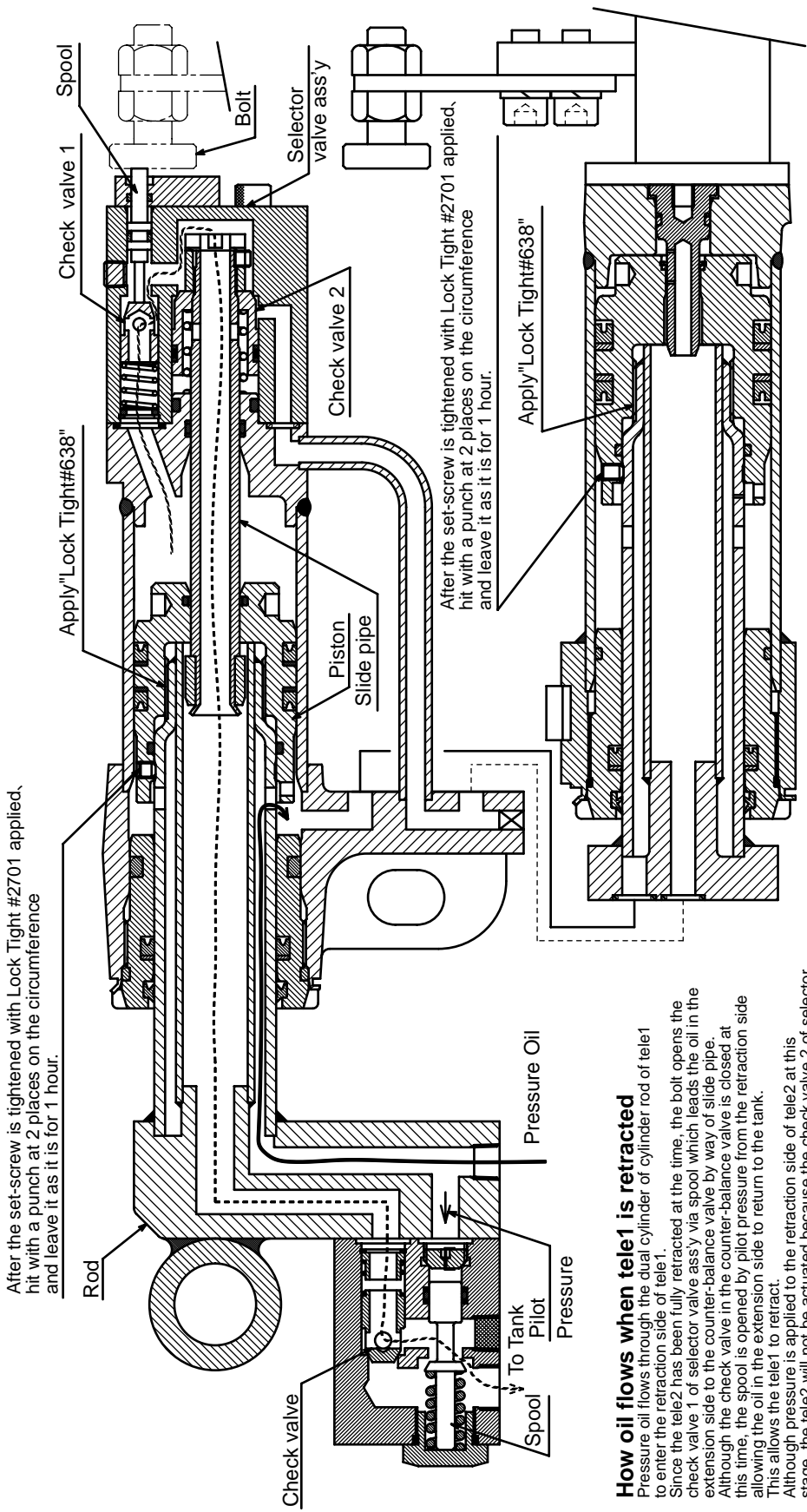
Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele2. Since the tele1 has been fully extended and the slide pipe is pushed up by piston which in turn opens the check valve 2 of selector valve ass'y to lead the oil in the extension side of tele2 to the counter-balance valve by way of slide pipe. Although the check valve in the counter-balance valve is closed at the time, the spool is opened by pilot pressure from the retraction side which allows oil in the extension side to return to the tank. This allows the tele2 to retract. The tele1 will not be actuated as the check valve 1 of selector valve ass'y is closed and the extension circuit for tele1 is shut off.

3. 3 4-Section Boom (Dual Cylinder) Operation

(1) When Telescoping Cylinder1 extends



(2) When Telescoping1 Cylinder1 retracts

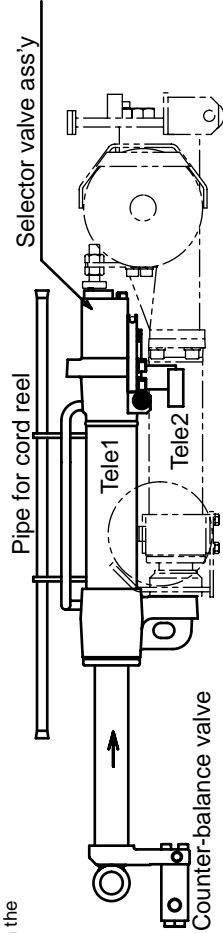


After the set-screw is tightened with Lock Tight #2701 applied, hit with a punch at 2 places on the circumference and leave it as it is for 1 hour.

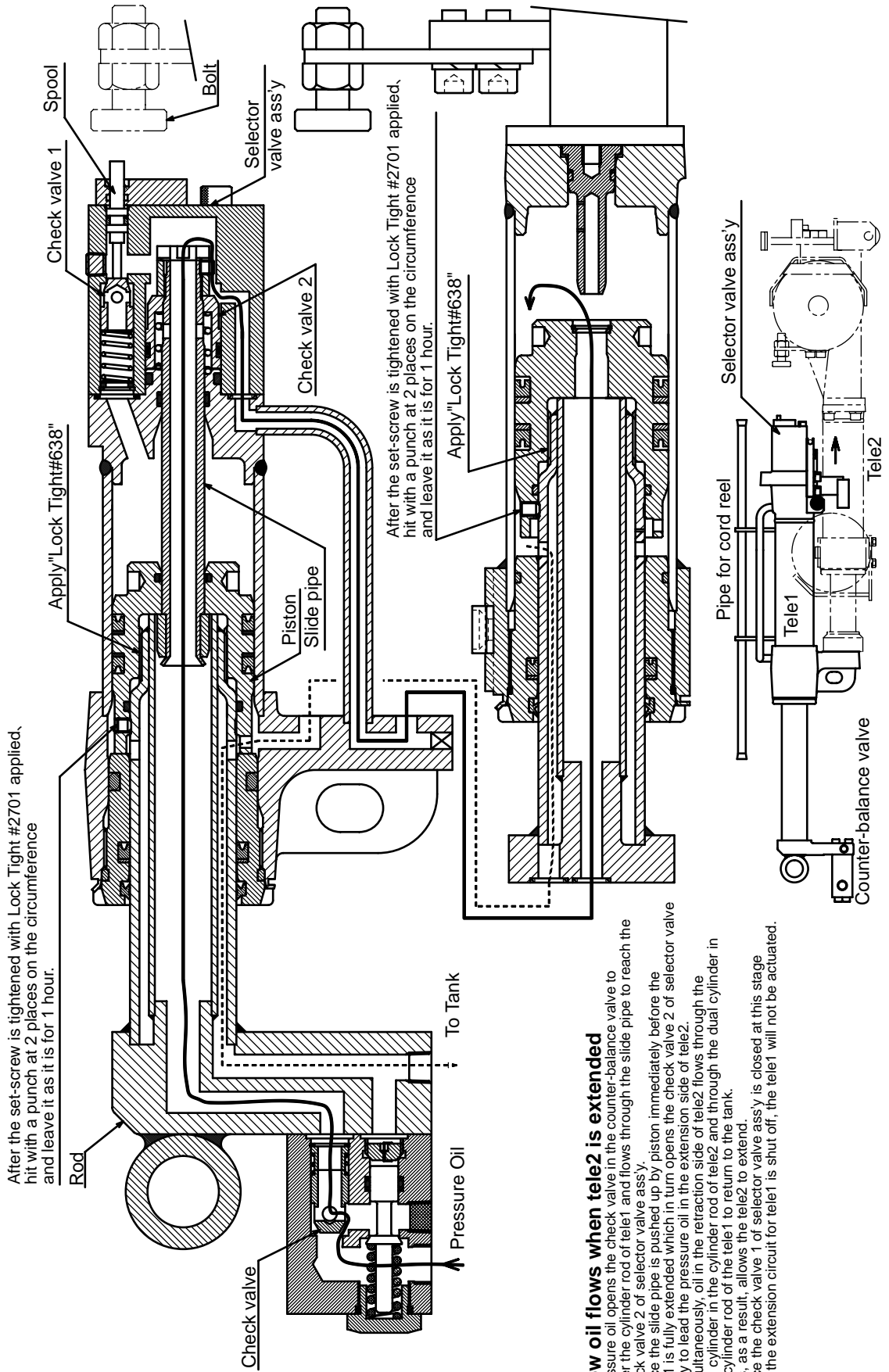
After the set-screw is tightened with Lock Tight #2701 applied, hit with a punch at 2 places on the circumference and leave it as it is for 1 hour.

How oil flows when tele1 is retracted

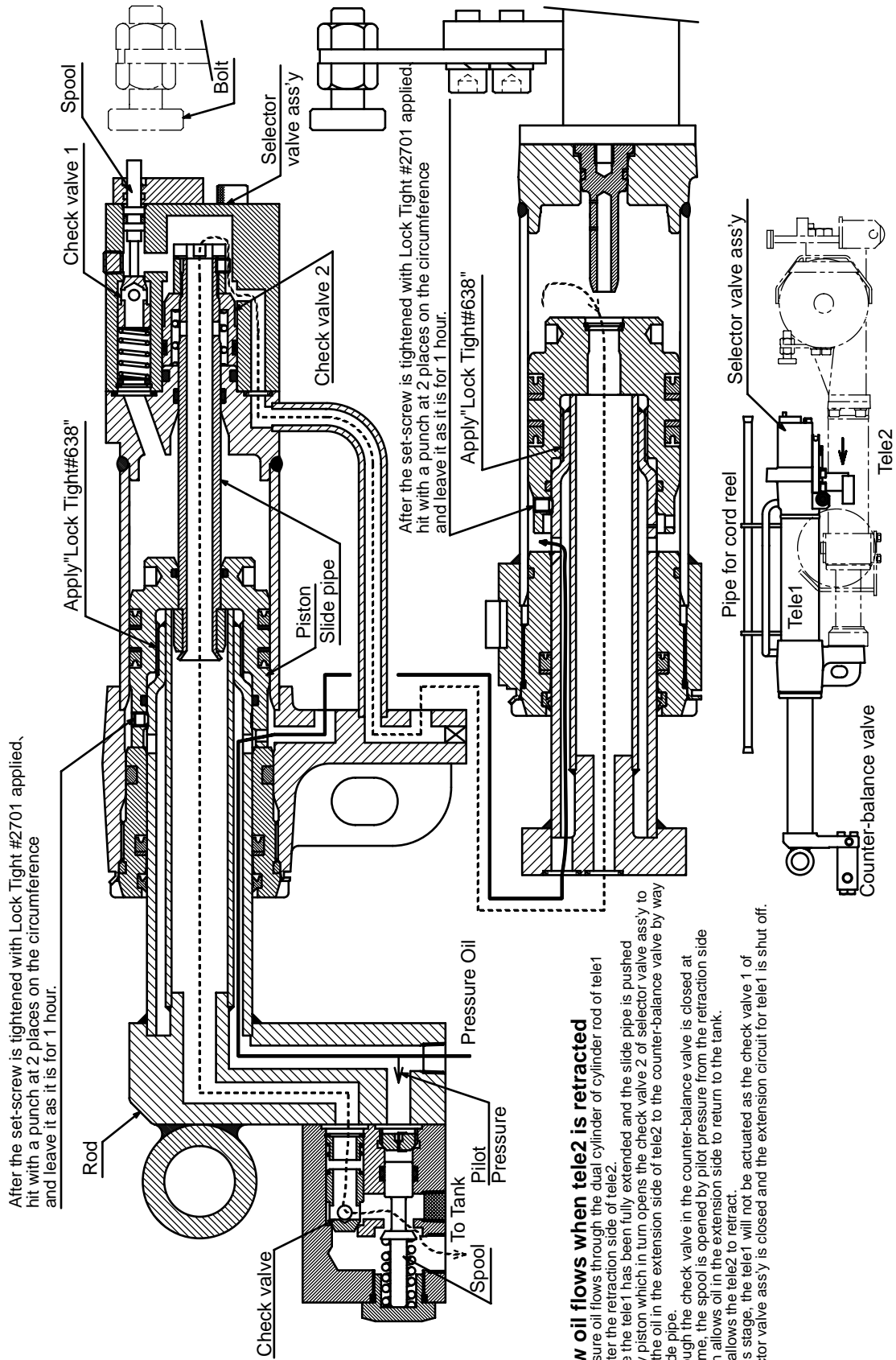
Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele1. Since the tele2 has been fully retracted at the time, the bolt opens the check valve 1 of selector valve ass'y via spool which leads the oil in the extension side to the counter-balance valve by way of slide pipe. Although the check valve in the counter-balance valve is closed at this time, the spool is opened by pilot pressure from the retraction side allowing the oil in the extension side to return to the tank. This allows the tele1 to retract. Although pressure is applied to the retraction side of tele2 at this stage, the tele2 will not be actuated because the check valve 2 of selector valve ass'y is closed and the tele2 is fully retracted which prevents oil in the extension side of tele2 from flowing in the tele1.



(3) When Telescoping Cylinder2 extends



(4) When Telescoping Cylinder2 retracts

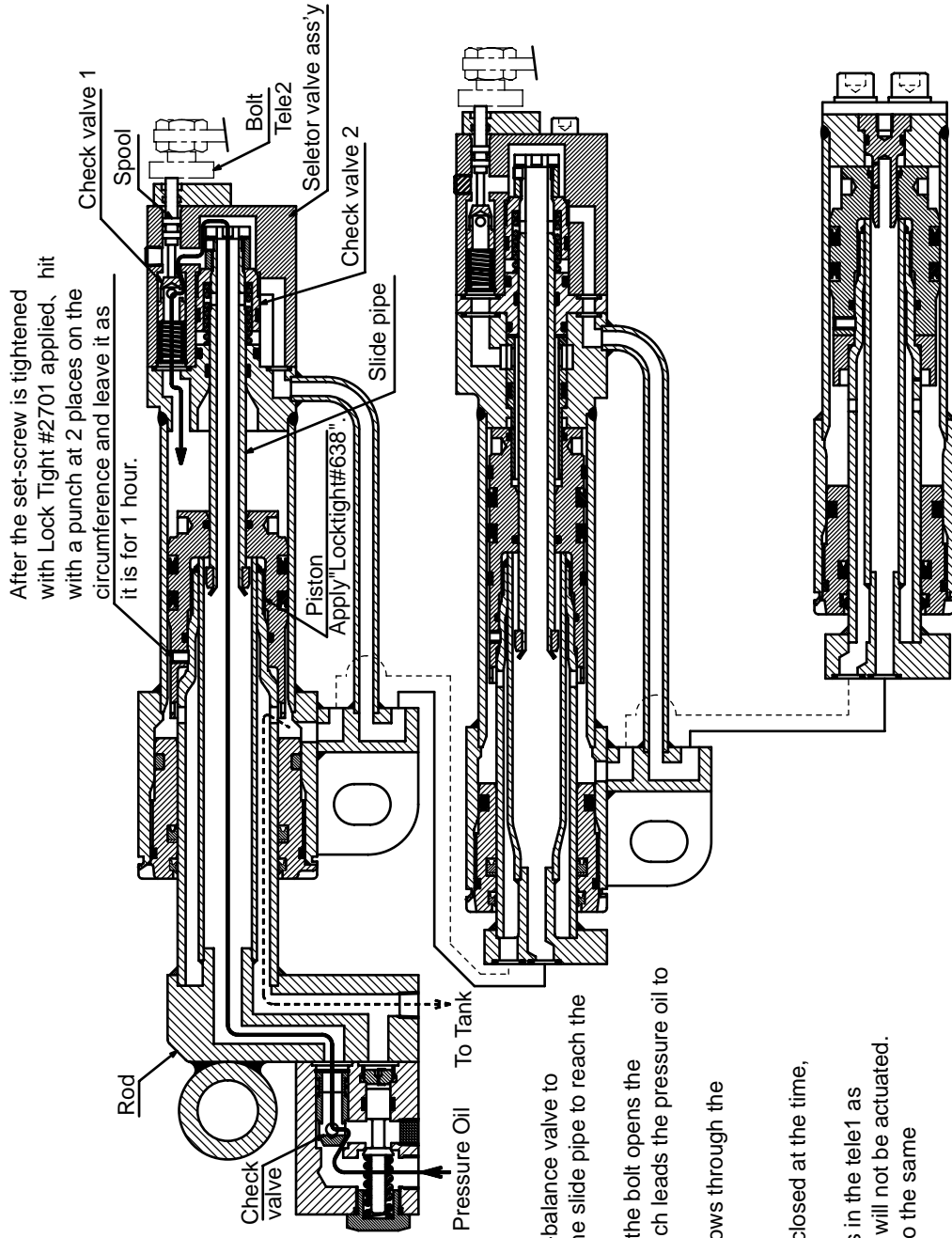


How oil flows when tele2 is retracted

Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele2. Since the tele1 has been fully extended and the slide pipe is pushed up by piston which in turn opens the check valve 2 of selector valve ass'y to lead the oil in the extension side of tele2 to the counter-balance valve by way of slide pipe. Although the check valve in the counter-balance valve is closed at the time, the spool is opened by pilot pressure from the retraction side which allows oil in the extension side to return to the tank. This allows the tele2 to retract. At this stage, the tele1 will not be actuated as the check valve 1 of selector valve ass'y is closed and the extension circuit for tele1 is shut off.

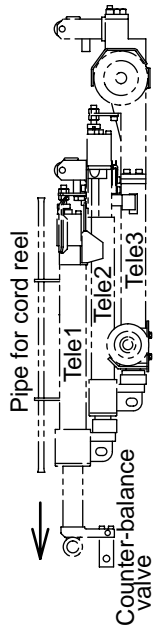
3. 4 5-Section Boom (Dual Cylinder) Operation

(1) When Telescoping Cylinder1 extends

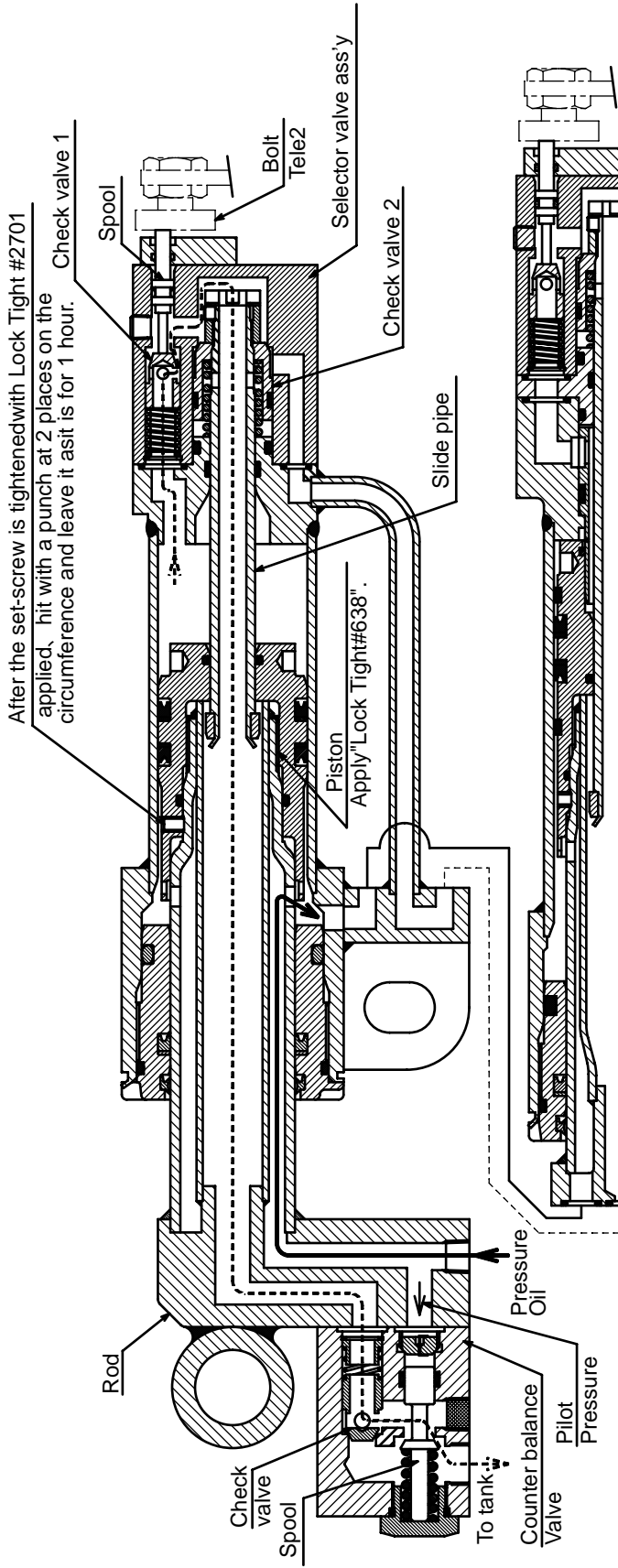


How oil flows when tele1 is extended

Pressure oil opens the check valve in the counter-balance valve to enter the cylinder rod of tele1 and flows through the slide pipe to reach the check valve 1 of selector valve ass'y. The tele2 has been fully retracted at the time and the bolt opens the check valve 1 of selector valve ass'y via spool which leads the pressure oil to the extension side. Simultaneously, oil in the retraction side of tele1 flows through the dual cylinder in the rod to return to the tank. This allows the tele1 to extend. Since the check valve 2 of selector valve ass'y is closed at the time, pressure oil will not flow in the tele2. Also, oil in the retraction side of tele2 will not flow in the tele1 as the tele2 has been fully retracted so that the tele2 will not be actuated. And the tele3 also will not be actuated according to the same reasons as in the tele2.

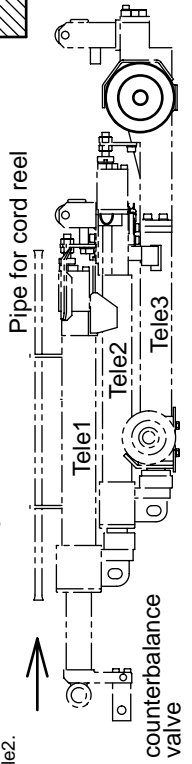
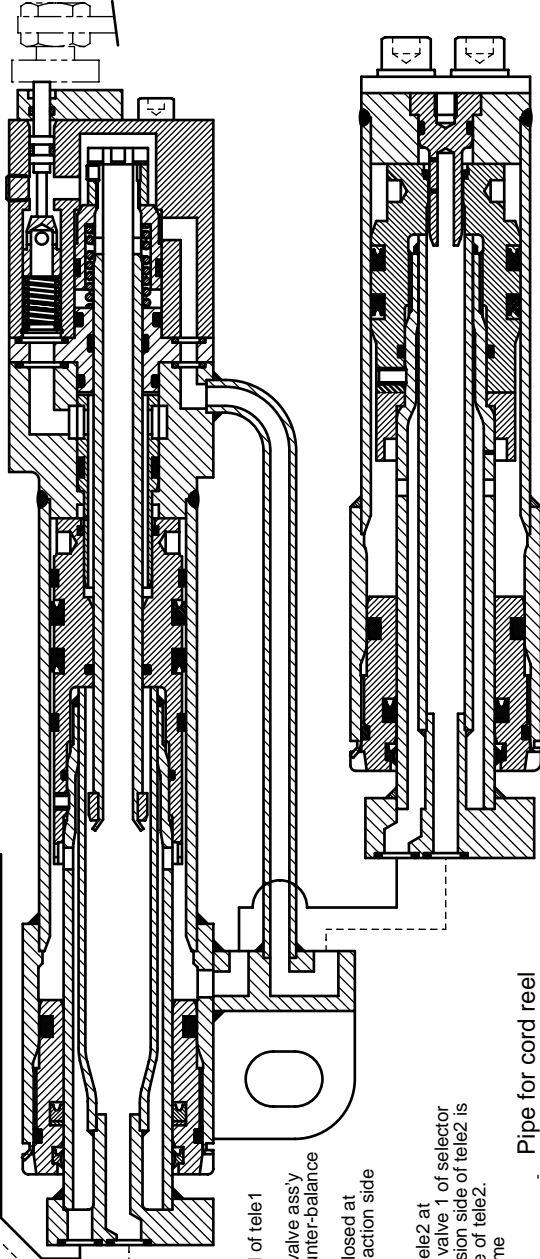


(2) When Telescoping1 Cylinder1 retracts

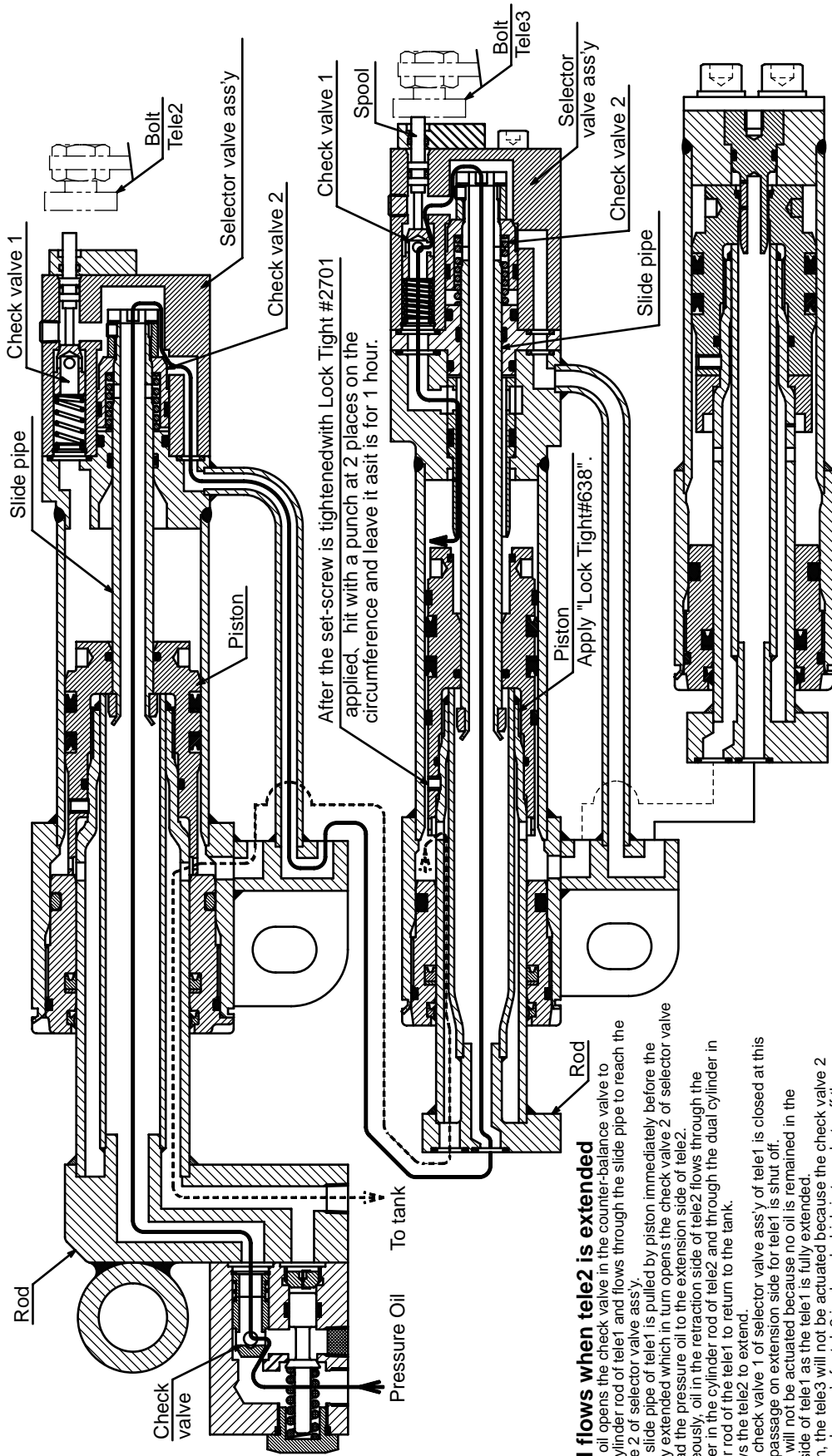


How oil flows when tele1 is retracted

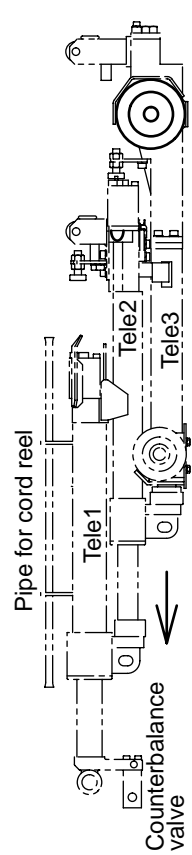
Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele1.
 At this stage, the bolt opens the check valve 1 of selector valve ass'y via spool which leads the oil in the extension side to the counter-balance valve by way of slide pipe.
 Although the check valve in the counter-balance valve is closed at this time, the spool is opened by pilot pressure from the retraction side allowing the oil in the extension side to return to the tank.
 This allows the tele1 to retract.
 Although pressure is also applied to the retraction side of tele2 at this stage, the tele2 will not be actuated because the check valve 1 of selector valve ass'y for tele1 is closed and the passage to the extension side of tele2 is shut off so that no oil is to be remained in the extension side of tele2.
 And the tele3 also will not be actuated according to the same reasons as in the tele2.



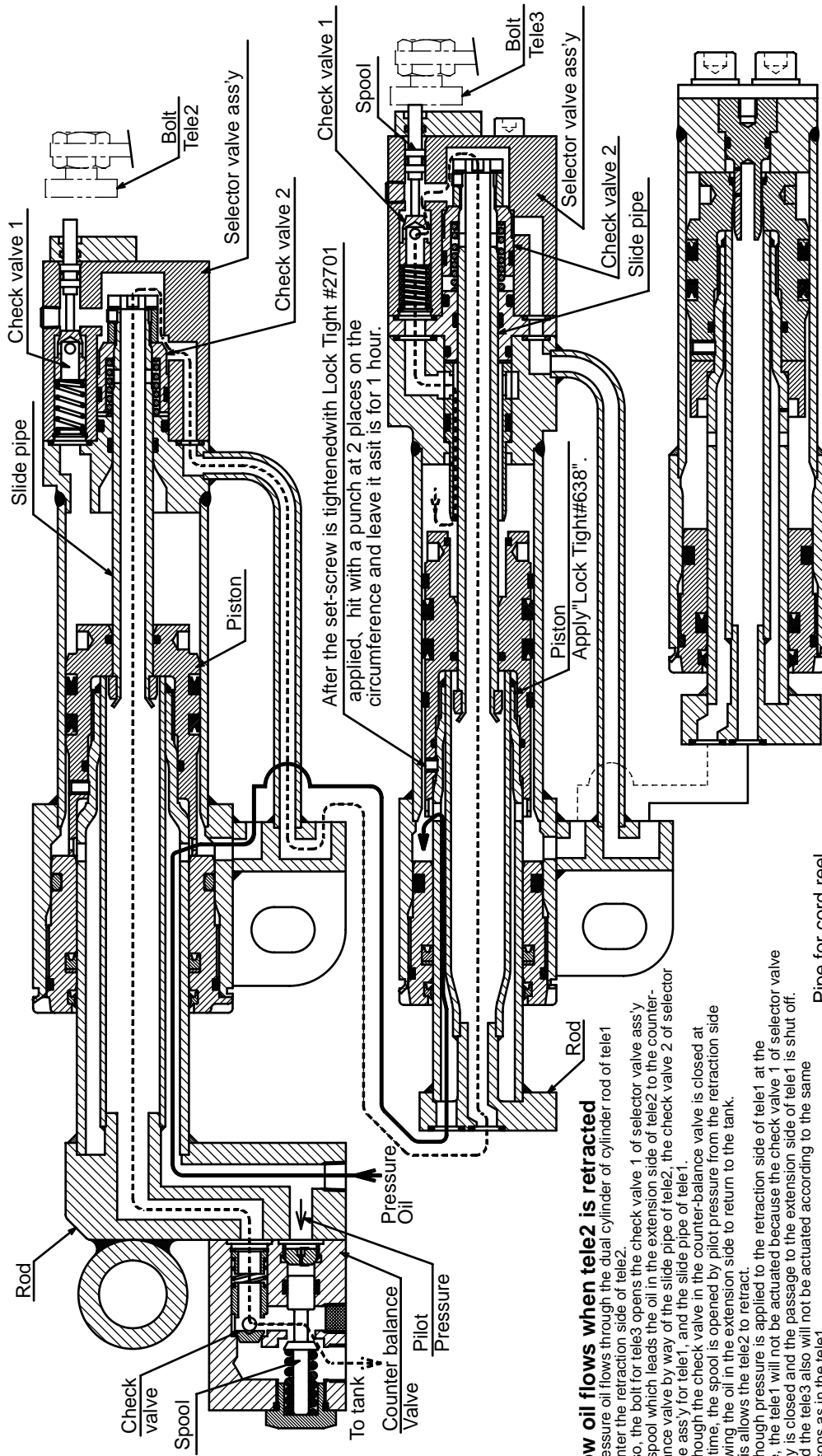
(3) When Telescoping Cylinder 2 extends



How oil flows when tele2 is extended
 Pressure oil opens the check valve in the counter-balance valve to enter the cylinder rod of tele1 and flows through the slide pipe to reach the check valve 2 of selector valve ass'y.
 Since the slide pipe of tele1 is pulled by piston immediately before the tele1 is fully extended which in turn opens the check valve 2 of selector valve ass'y to lead the pressure oil to the extension side of tele2.
 Simultaneously, oil in the retraction side of tele2 flows through the dual cylinder in the cylinder rod of tele2 and through the dual cylinder in the cylinder rod of the tele1 to return to the tank.
 This allows the tele2 to extend.
 Since the check valve 1 of selector valve ass'y of tele1 is closed at this stage, the passage on extension side for tele1 is shut off.
 The tele1 will not be actuated because no oil is remained in the retraction side of tele1 as the tele1 is fully extended.
 In addition, the tele3 will not be actuated because the check valve 2 of selector valve ass'y for tele2 is closed which in turn shuts off the passage to extension side of tele3.

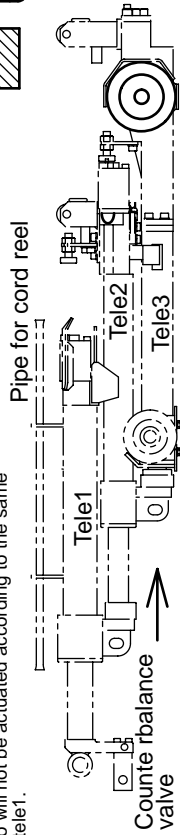


(4) When Telescoping Cylinder 2 retracts

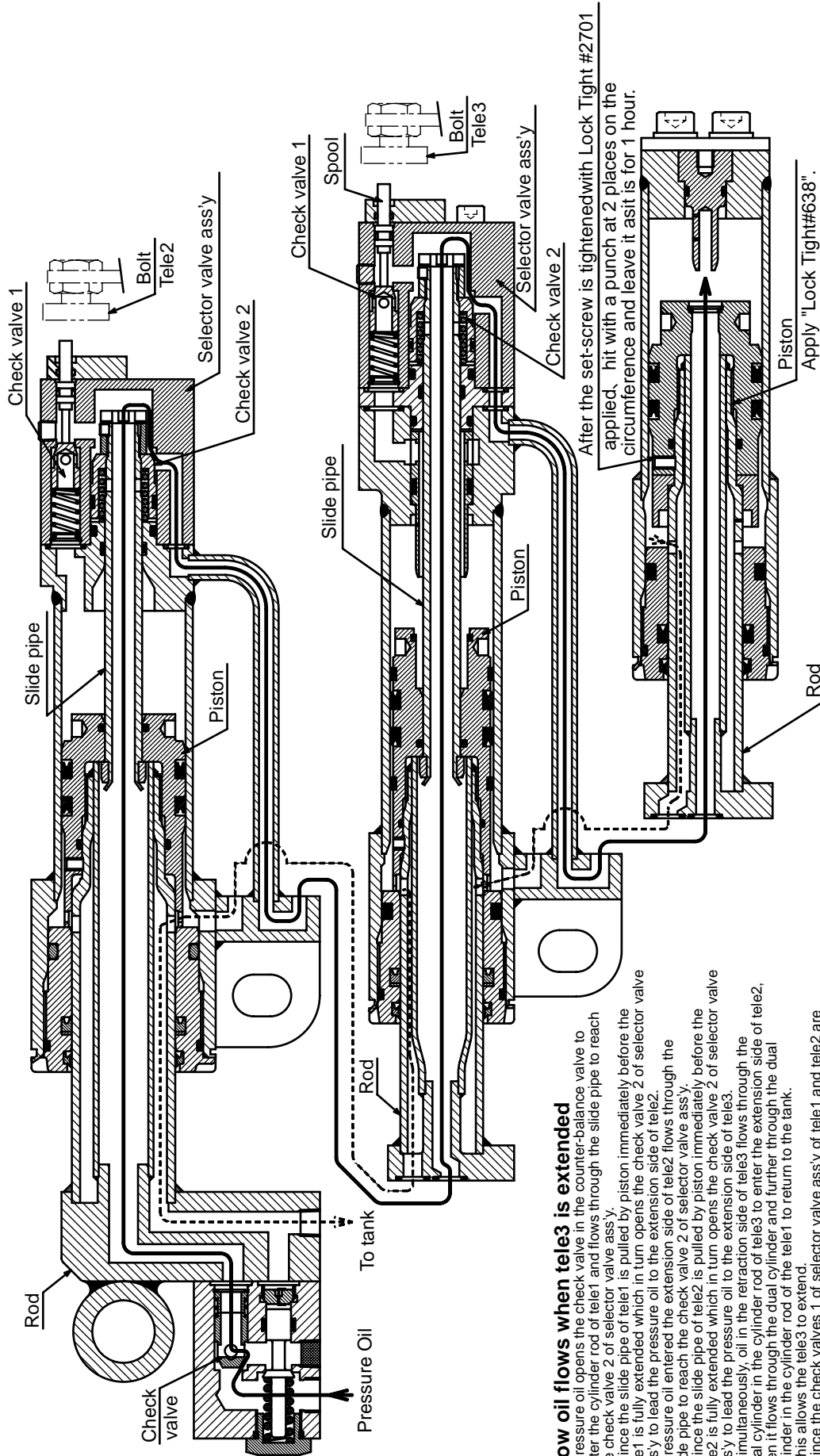


How oil flows when tele2 is retracted

Pressure oil flows through the dual cylinder of cylinder rod of tele1 to enter the retraction side of tele2.
 Also, the bolt for tele3 opens the check valve 1 of selector valve ass'y via spool which leads the oil in the extension side of tele2 to the counter-balance valve by way of the slide pipe of tele2, the check valve 2 of selector valve ass'y for tele1, and the slide pipe of tele1.
 Although the check valve in the counter-balance valve is closed at this time, the spool is opened by pilot pressure from the retraction side allowing the oil in the extension side to return to the tank.
 This allows the tele2 to retract.
 Although pressure is applied to the retraction side of tele1 at the time, the tele1 will not be actuated because the check valve 1 of selector valve ass'y is closed and the passage to the extension side of tele1 is shut off.
 And the tele3 also will not be actuated according to the same reasons as in the tele1.



(5) When Telescoping Cylinder3 extends



How oil flows when tele3 is extended

Pressure oil opens the check valve in the counter-balance valve to enter the cylinder rod of tele1 and flows through the slide pipe to reach the check valve 2 of selector valve ass'y.

Since the slide pipe of tele1 is pulled by piston immediately before the tele1 is fully extended which in turn opens the check valve 2 of selector valve ass'y to lead the pressure oil to the extension side of tele2.

Pressure oil enters the extension side of tele2 flows through the slide pipe to reach the check valve 2 of selector valve ass'y.

Since the slide pipe of tele2 is pulled by piston immediately before the tele2 is fully extended which in turn opens the check valve 2 of selector valve ass'y to lead the pressure oil to the extension side of tele3.

Simultaneously, oil in the retraction side of tele3 flows through the dual cylinder in the cylinder rod of tele3 to enter the extension side of tele2, then it flows through the dual cylinder and further through the dual cylinder in the cylinder rod of the tele1 to return to the tank.

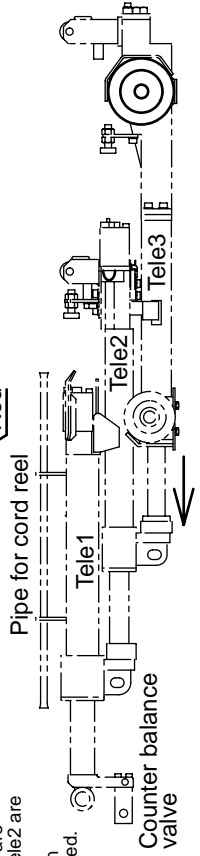
This allows the tele3 to extend.

Since the check valves 1 of selector valve ass'y of tele1 and tele2 are closed at this stage, the passages of extension side for tele1 and tele2 are shut off.

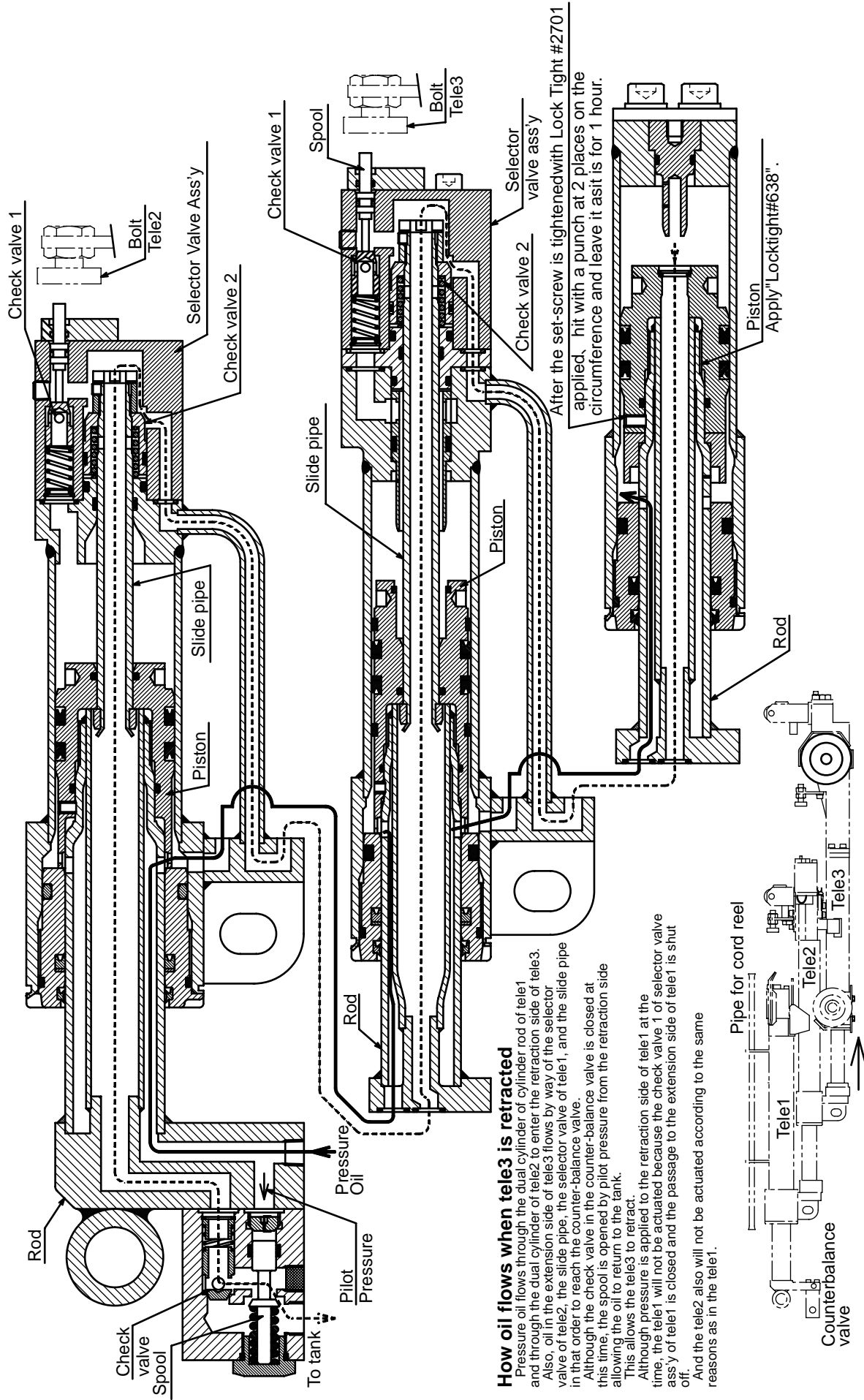
Both tele1 and 2 will not be actuated because no oil is remained in the retraction side of tele1 and 2 as the tele1 and 2 are fully extended.

After the set-screw is tightened with Lock Tight #2701 applied, hit with a punch at 2 places on the circumference and leave it as it is for 1 hour.

Apply "Lock Tight #638".



(6) When Telescoping Cylinder3 retracts

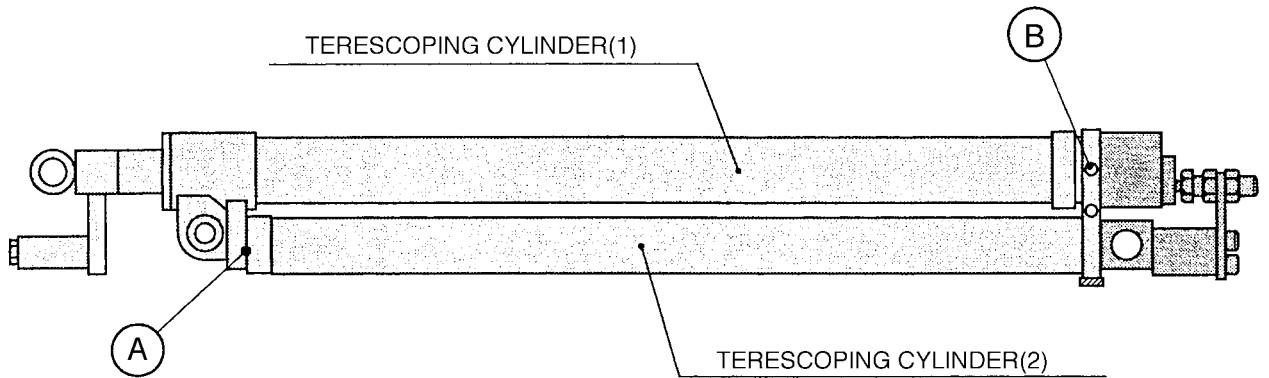


How oil flows when tele3 is retracted

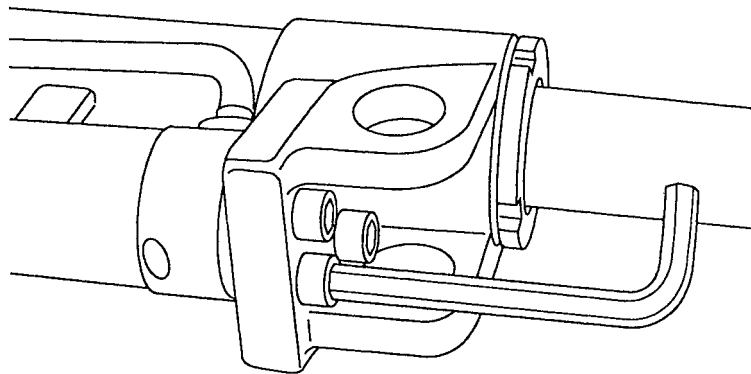
Pressure oil flows through the dual cylinder of cylinder rod of tele1 and through the dual cylinder of tele2 to enter the retraction side of tele3. Also, oil in the extension side of tele3 flows by way of the selector valve of tele2, the slide pipe, the selector valve of tele1, and the slide pipe in that order to reach the counter-balance valve. Although the check valve in the counter-balance valve is closed at this time, the spool is opened by pilot pressure from the retraction side allowing the oil to return to the tank. This allows the tele3 to retract. Although pressure is applied to the retraction side of tele1 at the time, the tele1 will not be actuated because the check valve 1 of selector valve ass'y of tele1 is closed and the passage to the extension side of tele1 is shut off. And the tele2 also will not be actuated according to the same reasons as in the tele1.

3. 5 3-Section Boom (Dual Telescoping Cylinder) Disassembly Procedures

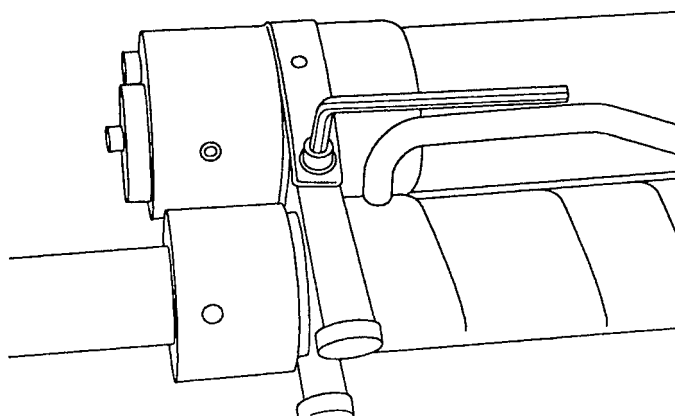
Remove the bolt which connects the telescoping cylinder (1) with the telescoping cylinder (2) and separate the one from the other.



① Remove 3 pcs. of hexagon socket head bolt from the part ① .

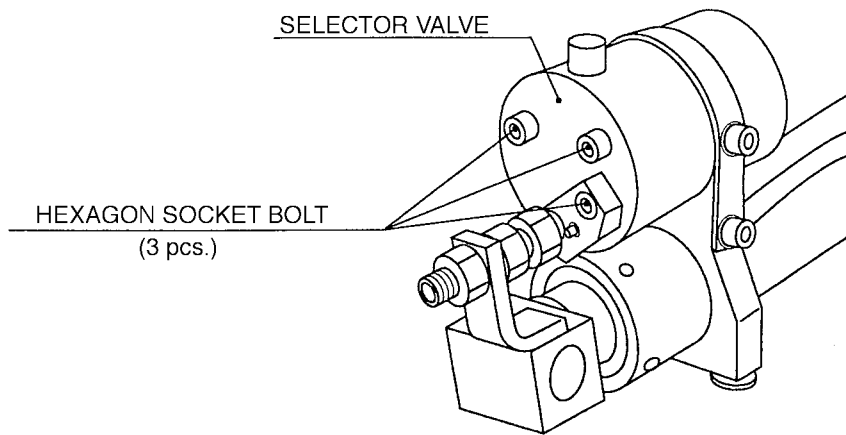


② Next, remove 4 pcs. of hexagon socket head bolt from the part ② .

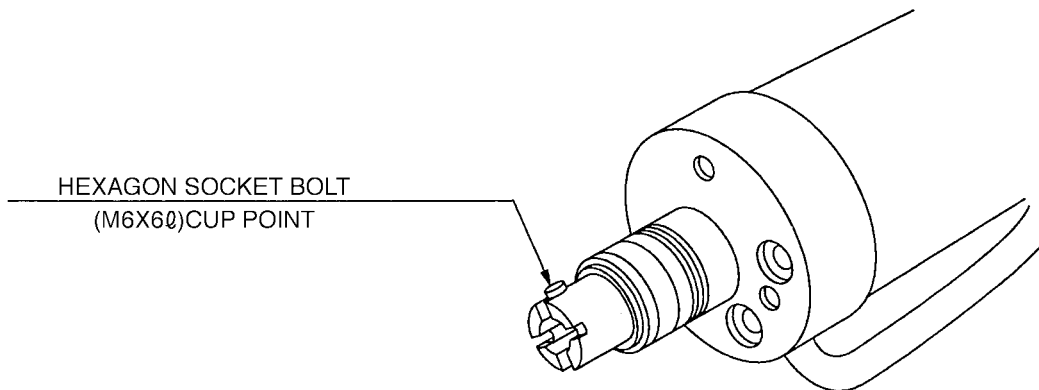


(1) Disassembly Procedures for Telescoping Cylinder 1

- ① Remove 3 pcs. of hexagon socket head bolt which fasten the selector valve.

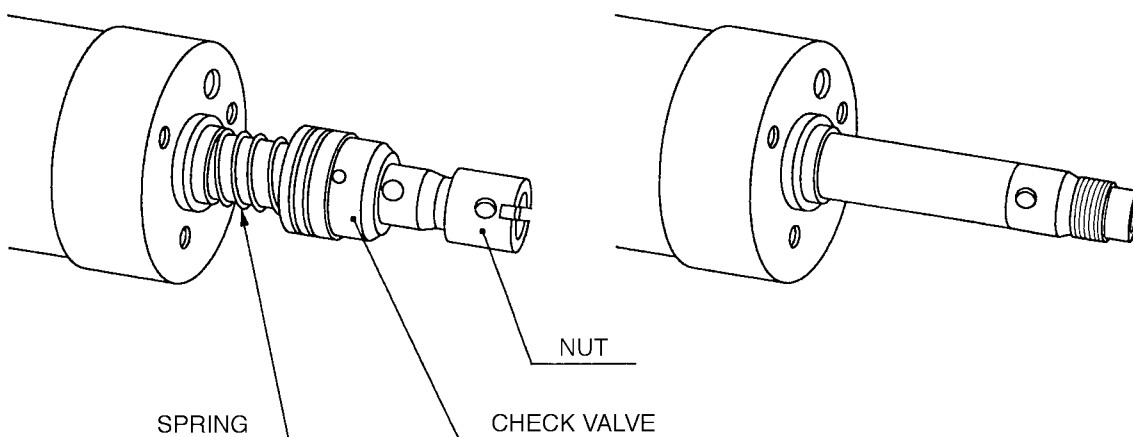


- ② Remove a lock screw for nut of the slide pipe.

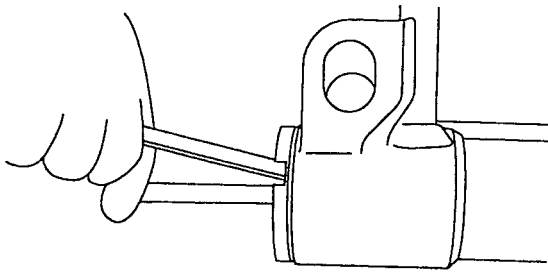


☞ When assembling, apply
"LOCK TIGHT #2701" to the screw.

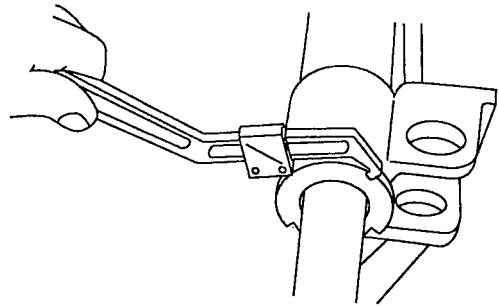
- ③ From the slide pipe remove the nut, the check valve, and the spring.



- ④ Compensate the revolution stopper of the gland, remove the gland from the tube with a hook-spanner, and pull out the rod ass'y from the tube (1).

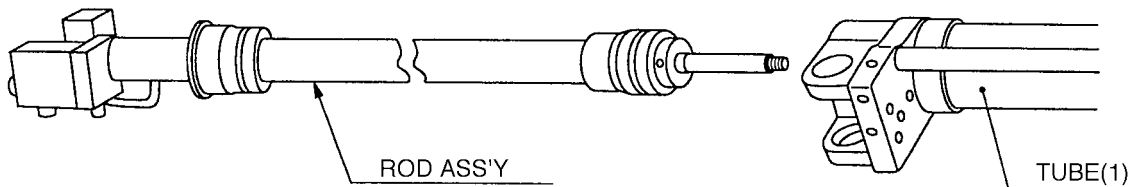


Compensate revolution stopper.



Loosen the gland.

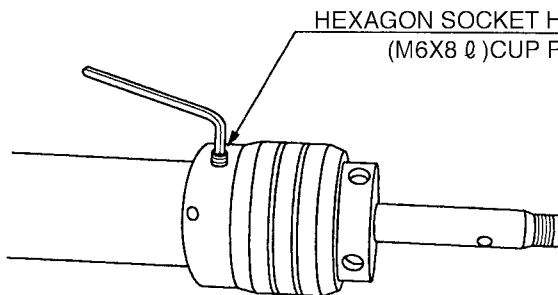
Pull out the rod ass'y from the tube (1).



ROD ASS'Y

TUBE(1)

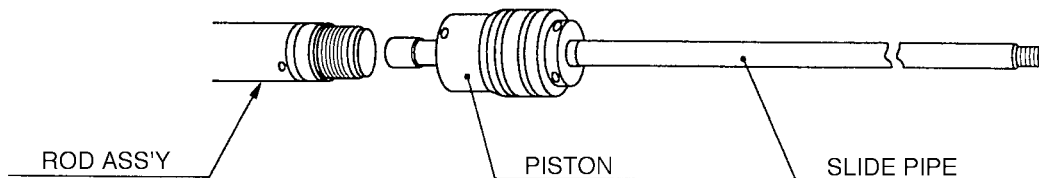
- ⑤ Loosen the screw which stops revolution of the piston, and take out the piston from the rod ass'y.



HEXAGON SOCKET HEAD SCREW
(M6X8 \varnothing) CUP POINT

☞ When assembling, apply
"LOCK TIGHT #2701" to the screw.

- ⑥ From the rod ass'y, pull out the piston and the slide pipe at the same time.

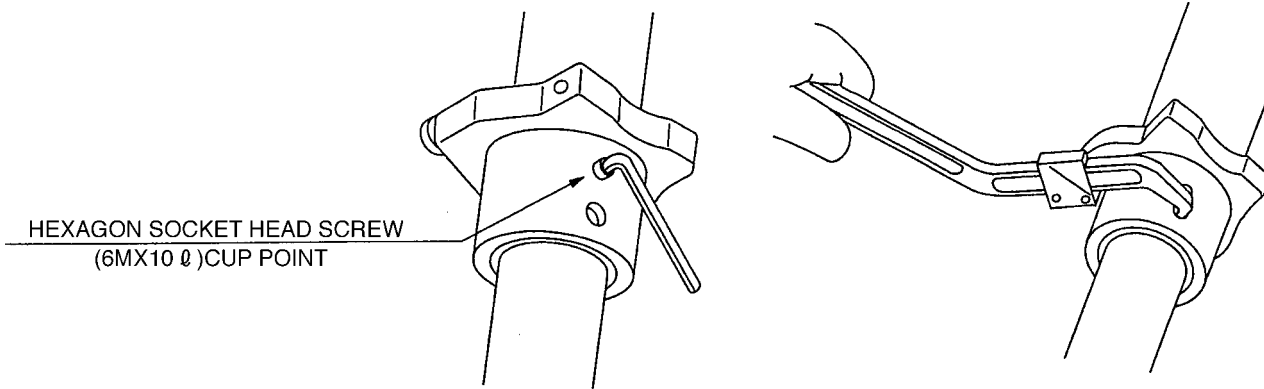


ROD ASS'Y

PISTON

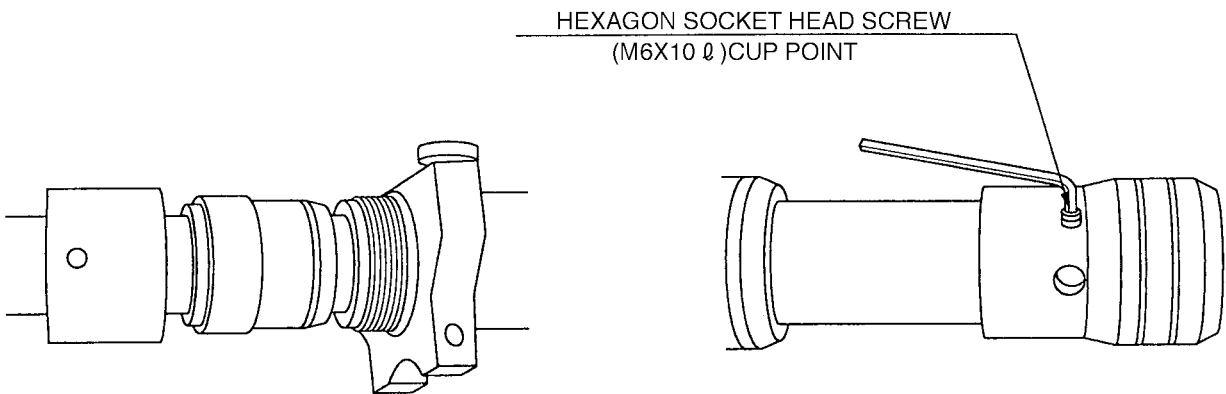
SLIDE PIPE

(2) Disassembly Procedures for Telescoping Cylinder 2



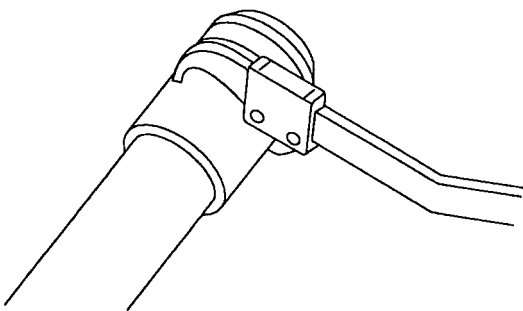
- ① Remove the lock screw for the cylinder cover.
☞ **When assembling, apply “LOCK TIGHT #2701”.**

- ② Loosen the cylinder cover with a lock-spanner.



- ③ Pull out the rod ass’y from the tube (2).

- ④ Remove the lock screw securing the piston.
☞ **When assembling, apply “LOCK TIGHT #2701”.**

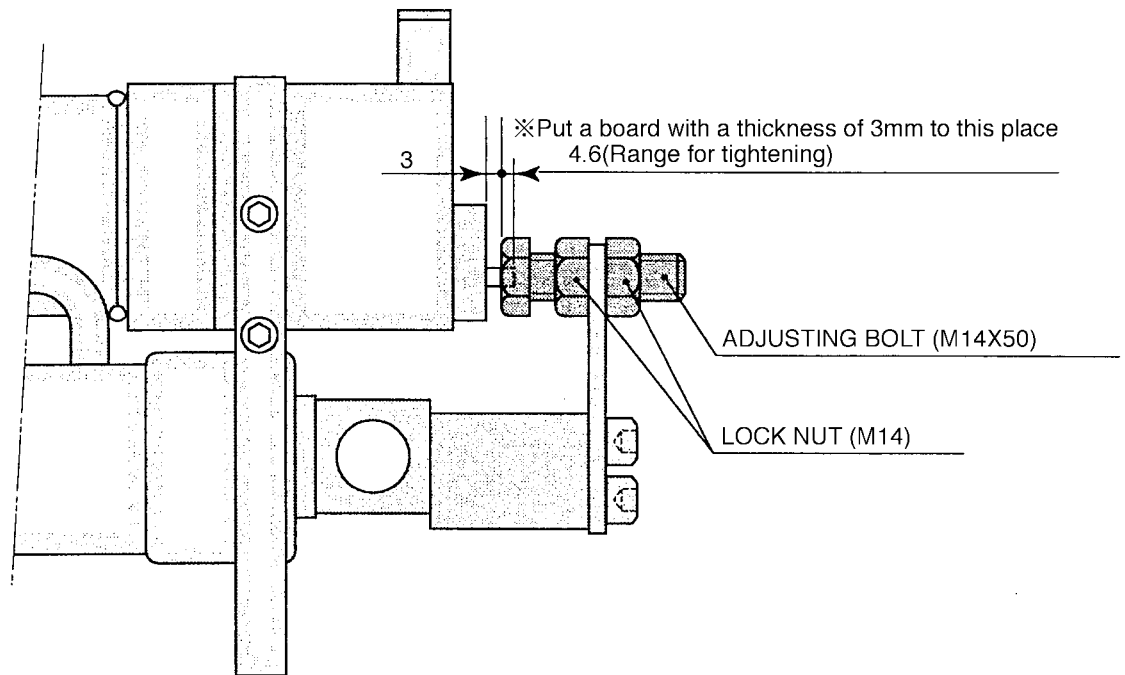


- ⑤ Loosen the piston with the hook-spanner.

(3) Inspection

- ① Check all the parts that they are free of harmful defects for operation such as flaw, crack, deformation, rust, burr, etc.
 - ② Check that every part is free of attachments of metal powder, foreign substances, etc.
 - ③ Check to see if the piston rod sliding surface is free of damages harmful for operation.
 - ④ In principle, packings and seals shall be replaced with new ones when disassembled. However, if these parts are forced to be reused, check them very carefully and confirm that they are free of damage and foreign substances.
- ☞ **Reassembling shall be made in reverse order of the disassembly procedures.**
- Check that every part is free of metal powder attachment and then soak the parts in hydraulic oil.

(4) Adjusting Procedures for Selector Valve with Adjusting Bolt



☞ Adjusting Procedures with Adjusting Bolt

- ① Retract telescoping cylinders (1) and (2) to their minimum.
- ② Apply “LOCK TIGHT #242” to the threads of the adjusting bolt.
- ③ Put a board with a thickness of 3mm to the part marked with* and tighten the adjusting bolt.
- ④ After adjusting, lock with the lock nut.

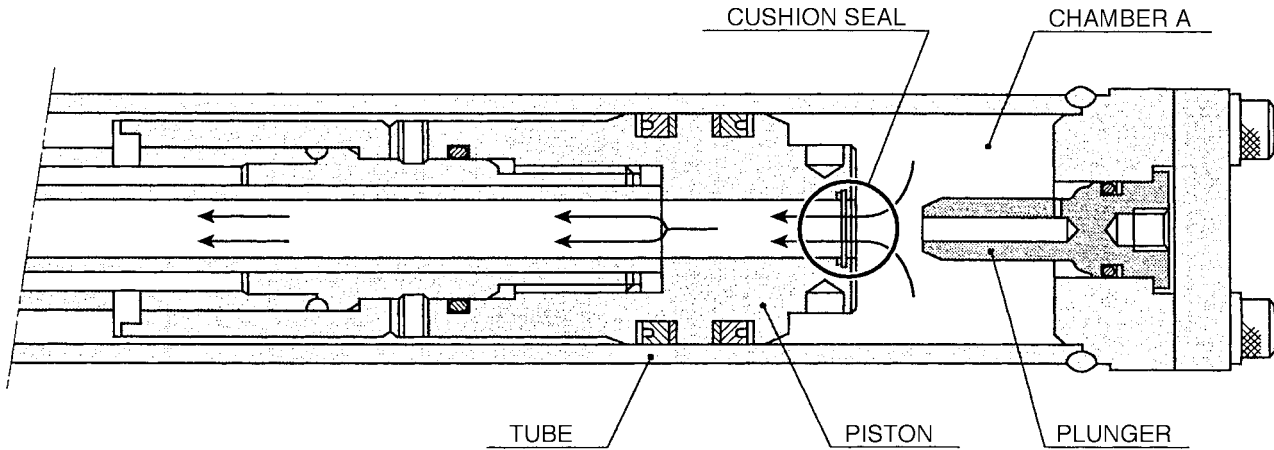
3. 6 Function and Working of Cushion Seal

For the purpose of absorbing a piston shock to the stroke end, the 4-section boom and 6-section boom have the cushion seal in the part of piston of the telescoping cylinder (2), while the 5-section boom has the cushion seal in its telescoping cylinder of (2) and (3).

(1) Flow of Pressure Oil When Retracting

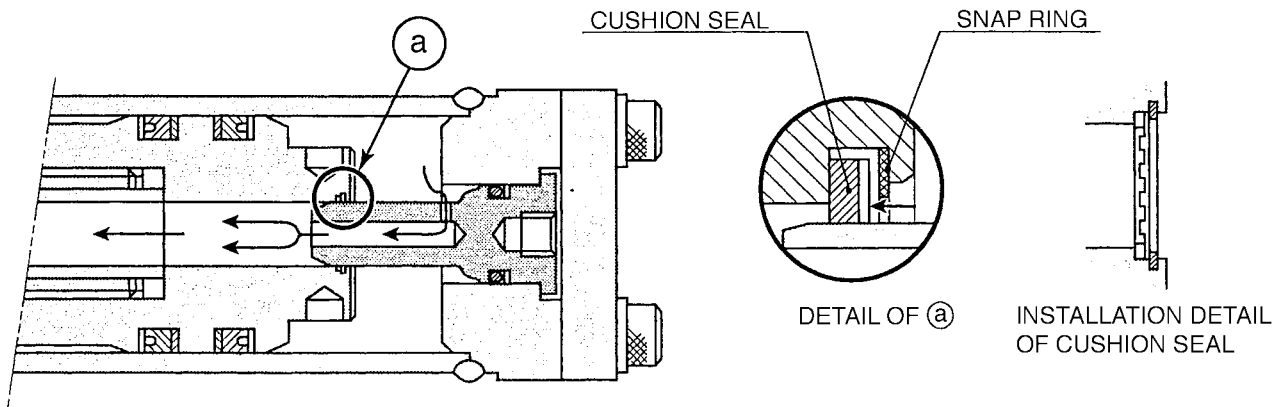
Cushion mechanism of the telescoping cylinder (2) for 4-section boom and that of the telescoping cylinder (3) for 5-section and 6-section booms.

- ① In the retracting process, before the piston gets in the plunger, the pressure oil in the chamber A flows through the central part of the piston as shown in the illustration and returns to the tank without being squeezed.

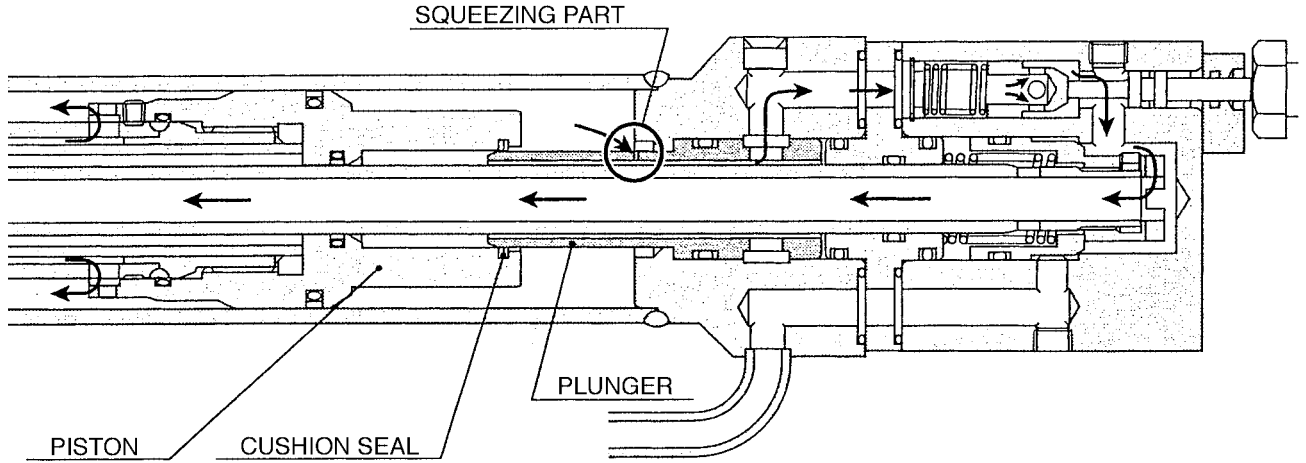


- ② At the same time when the piston gets in the plunger, the chamber A is closed with the cushion seal (a).

As a result, the pressure oil in the chamber A is forced to return only through a drilled $\phi 1$ hole in the state of being squeezed. Thus the piston shock at the stroke end is absorbed.

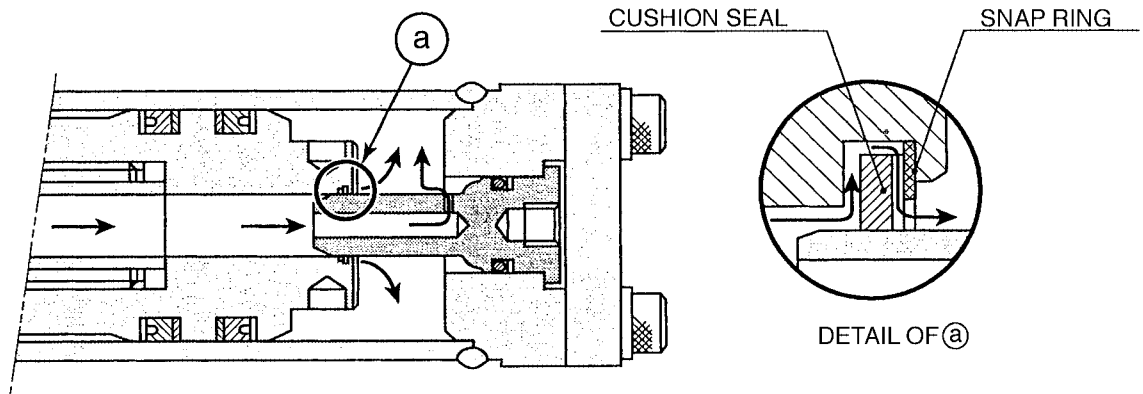


③ Cushion mechanism of the telescoping cylinder (2) for 5-section and 5-section boom.

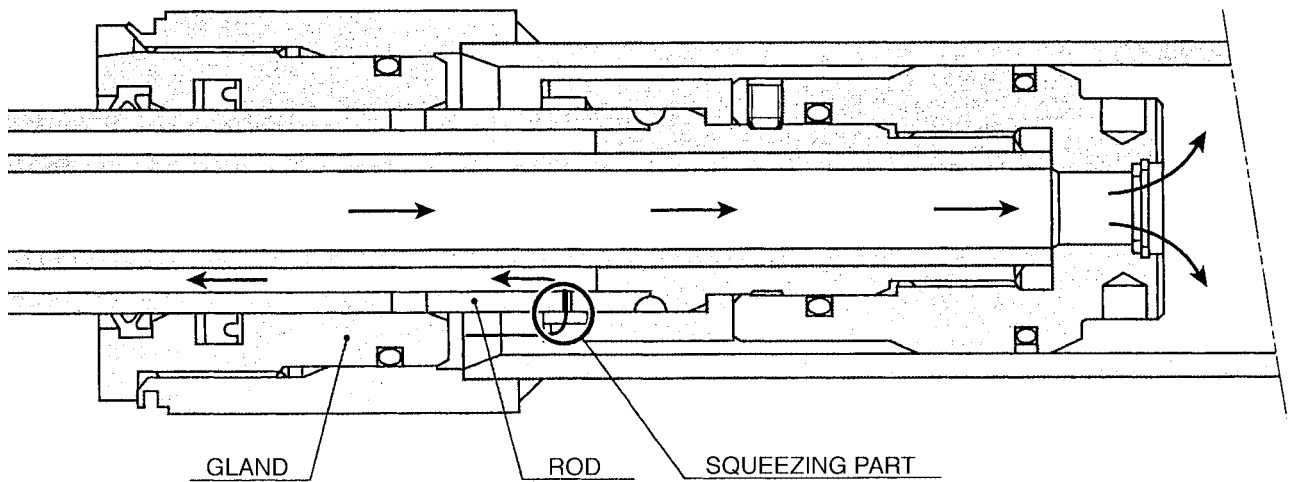


(2) Flow of Pressure Oil When Extending

① When extending the cushion seal (a) is pushed to ward the snap ring, and the pressure oil flows into the chamber A without being shut as shown in the illustration. In this way, the telescoping cylinder extends.



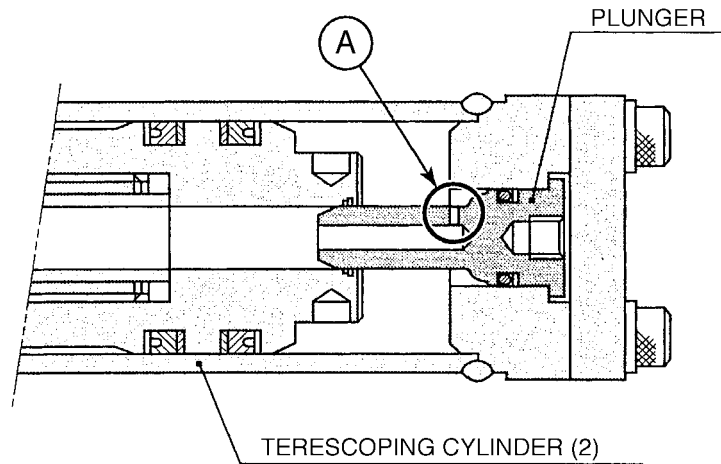
② Cushion mechanism of the telescoping cylinder for 5-section and 6-section booms is to squeeze the return pressure oil at the position just before the end of extension and absorb the piston shock to the stroke end.



3. 7 Cause of Troubles and Measures to be Taken

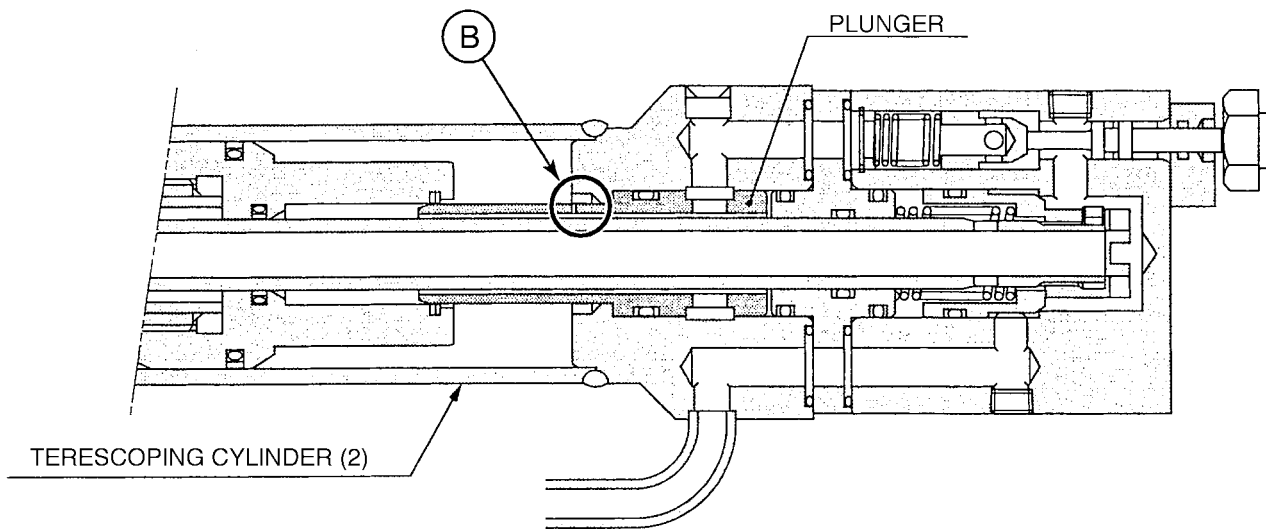
(1) 4-section boom

- ① Immediately before the full retraction of the booms (3) and (4), and before changing over to the boom (2), i.e. 30~40mm before changing over to the boom (2), retracting operation may suddenly be stopped. In such a case, it is presumed that a drill hole is clogged with foreign substances at the position ① of the plunger of the telescoping cylinder (2).

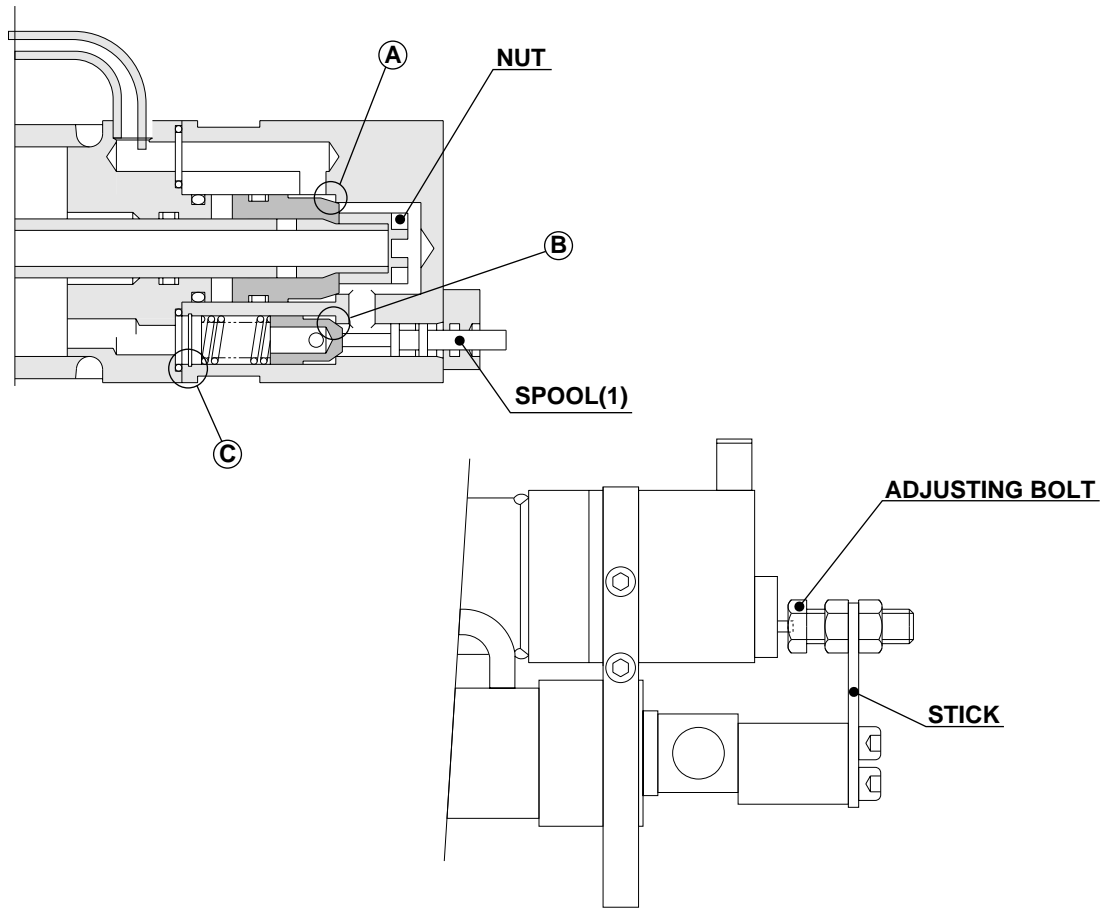


(2) 5-section, 6-section boom

- ① When retraction of the boom (3) becomes impossible at the position just before full retraction of the booms (4), (5) and (6), inspect the plunger which is assembled in the telescoping cylinder (3).
- ② When the boom (3) does not change over to the boom (2), and retraction becomes impossible at the position just before full retraction, inspect the drilled hole at the position ② of the plunger of the telescoping cylinder (2).



(3) Cause of Troubles and Remedy



① 3-section boom(Dual cylinders)

Troubles	Possible cause	Measures to be taken
① Retractions is normal, but extending operation and sequence are not in a good order	<ul style="list-style-type: none"> ● Take part ① of the selector valve is clogged with foreign substances. 	<ul style="list-style-type: none"> ● Disassemble selector valve for cleaning or replace it with new one.
② Extension is normal, but retracting operation and sequence are not in a good order.	<ul style="list-style-type: none"> ● Take part ② of the selector valve is clogged with foreign substances. ● Snap ring of the part ③ got out of place. 	<ul style="list-style-type: none"> ● Disassemble selector valve for cleaning or replace it with new one. ● Rearrange the snap ring.
③ Boom (2) extend but boom (3) does not extend.	<ul style="list-style-type: none"> ● Nut at the slide pipe of telescoping cylinder (1) is loosened. 	<ul style="list-style-type: none"> ● Disassemble telescoping cylinder (1) and tighten the nut.
④ After full extension of booms, boom (3) retracts or extends but boom (2) does not retract.	<ul style="list-style-type: none"> ● Adjusting bolt pushing the spool of selector valve is loosened or the stick is bent. ● Selector valve spool (1) is bent. 	<ul style="list-style-type: none"> ● Adjust the bolt. ● Straighten the bent stick. ● Replace selector valve ass'y with a new one.

② 5-section boom (Triple cylinders)

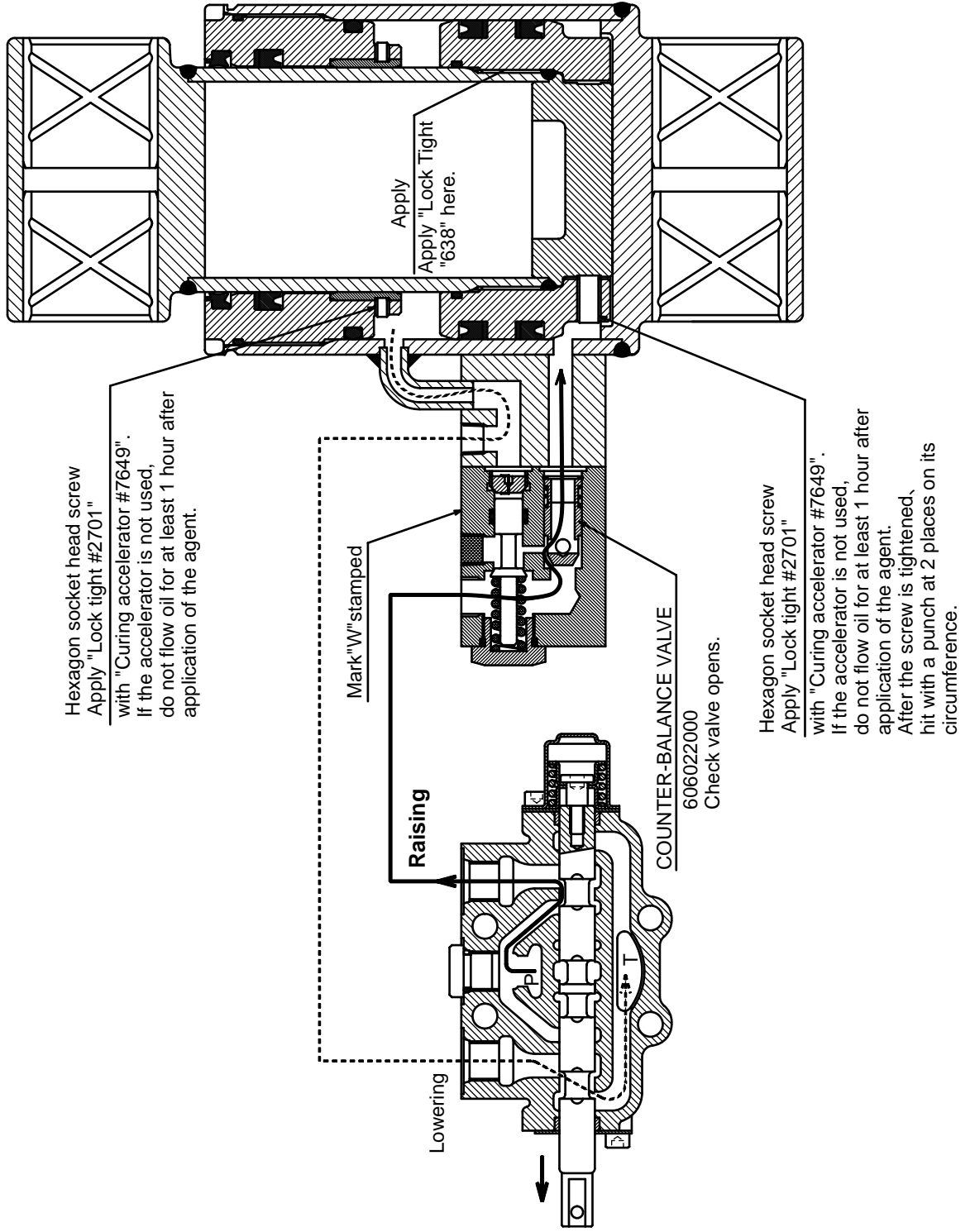
Troubles	Possible cause	Measures to be taken
① Retraction is normal, but when extending, booms (2) and (3) extend at the same time, in other words “disorderly”.	●Some foreign substances are clogging the part ① of selector valve of telescoping cylinder (1).	●Disassemble selector valve for cleaning, or replace it with a new one.
② Extension is normal, but when retracting, booms (3) (4) and (5) retract at the same time, in other words “disorderly”.	●Some foreign substances are clogging the part ① of selector valve of telescoping cylinder (2).	
③ Extension is normal, but when retracting, booms (3), (4) and (5) retract at the same time, in other words “disorderly”.	●Some foreign substances are clogging the part ② of selector valve of telescoping cylinder (2). ●Snap ring at the part ③ of selector valve of telescoping cylinder (2) got out of place.	●Disassemble selector valve for cleaning, or replace it with a new one.. ●Rearrange snap ring.
④ Extension is normal, but when retracting, booms (2) and (3) retract at the same time, in other words “disorderly”.	●Some foreign substances are clogging the part ② of selector valve of telescoping cylinder (1). ●Snap ring at the part ③ of selector valve of telescoping cylinder (2) got out of place.	
⑤ Boom (2) extends but boom (3) does not extend.	●Nut at slide pipe of telescoping cylinder (1) was loosened.	●Disassemble telescoping cylinder (1) and tighten the nut.
⑥ Boom (2) and (3) extend, but boom (4) and (5) does not extend.	●Nut at slide pipe of telescoping cylinder (2) loosened.	●Disassemble telescoping cylinder (2) and tighten the nut.
⑦ After full extension, booms (5) retracts but boom (3) does not retract.	● Adjusting bolt pushing the spool of selector valve of telescoping cylinder (2) was loosened. ● Selector valve spool of telescoping cylinder (2) was bent.	● Adjust the bolt. ● Replace selector valve ass'y with a new one.
⑧ Boom (3), (4) and (5) retracts but boom (2) does not retract.	● Adjusting bolt pushing the spool of selector valve of telescoping cylinder (1) was loosened. ● Selector valve spool of telescoping cylinder (1) was bent.	

Note: During operation test after disassembling and repairing, the reason why the booms (4), (5) and (6) stop extending halfway is presumed that the left and the right wire ropes for extension were crossed when reassembling.

☞ As to the 4-section boom and 6-section boom, check the cause of troubles by following the procedures for 5-section boom.

§ 4. DERRICK CYLINDER

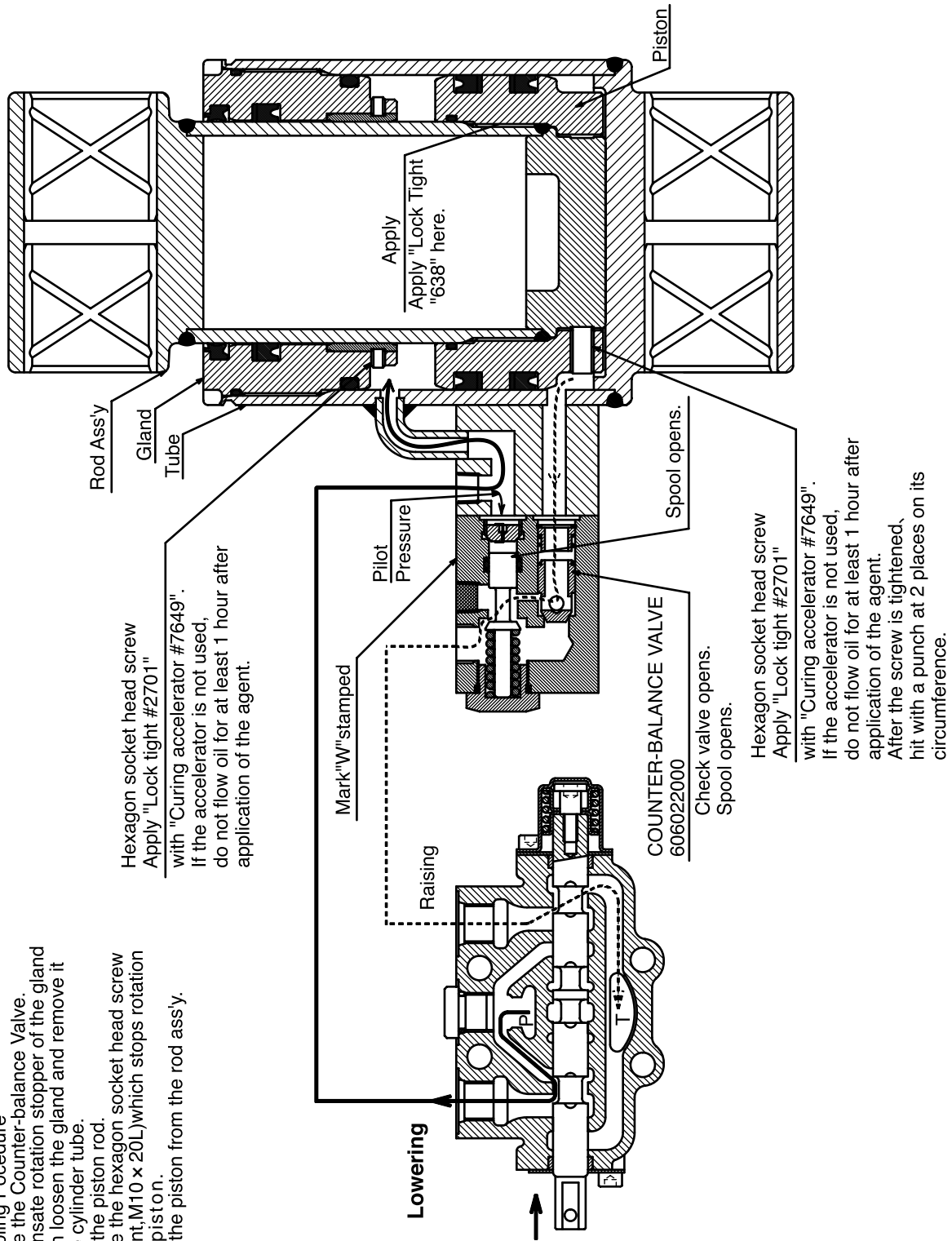
4. 1 Flow of oil, when raising



4. 2 Flow of oil, when lowering

Disassembling Procedure

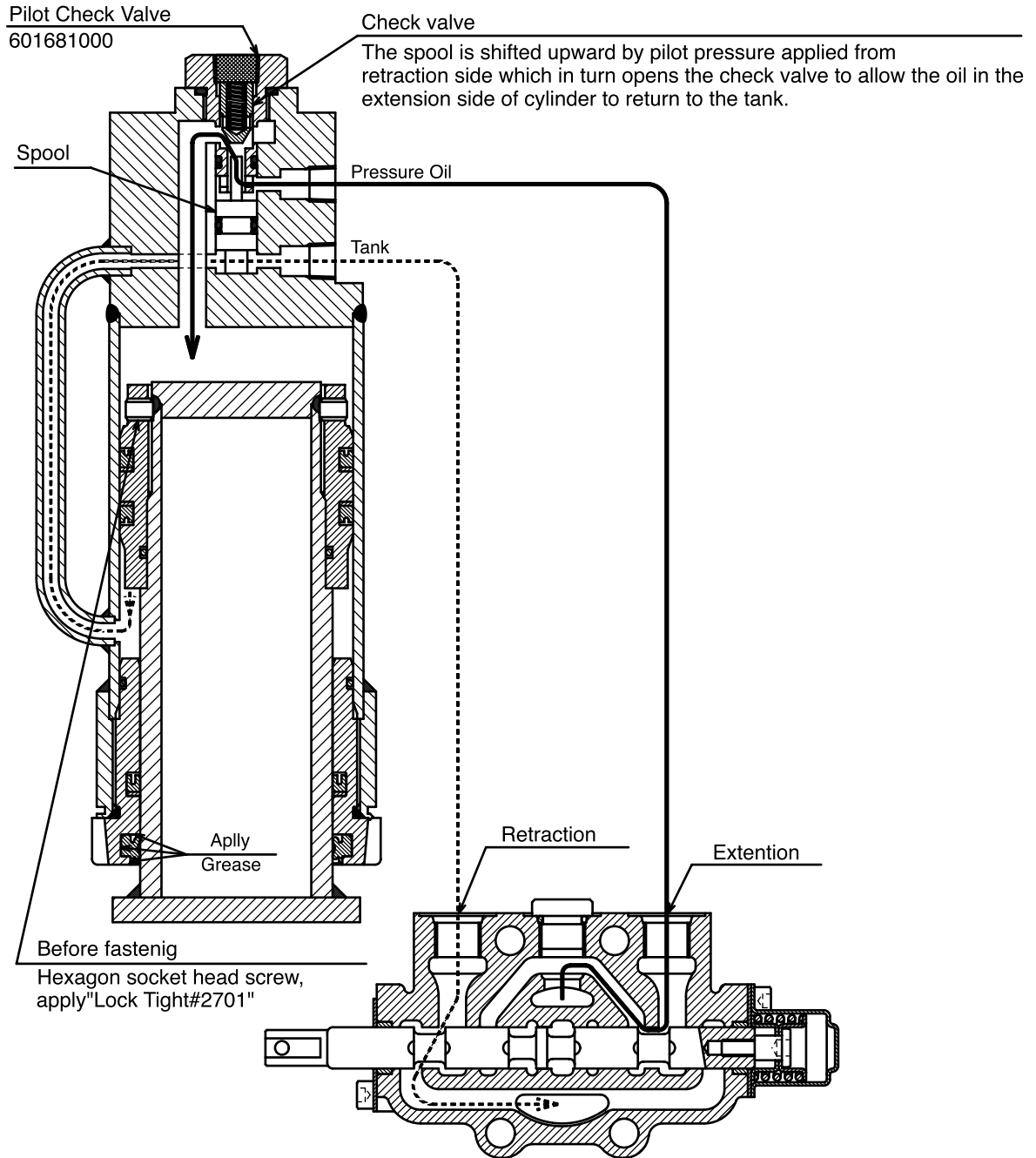
1. Remove the Counter-balance Valve.
2. Compensate rotation stopper of the gland and then loosen the gland and remove it from the cylinder tube.
Pull out the piston rod.
3. Remove the hexagon socket head screw (cup point; M10 x 20L) which stops rotation of the piston.
Pull out the piston from the rod assy.



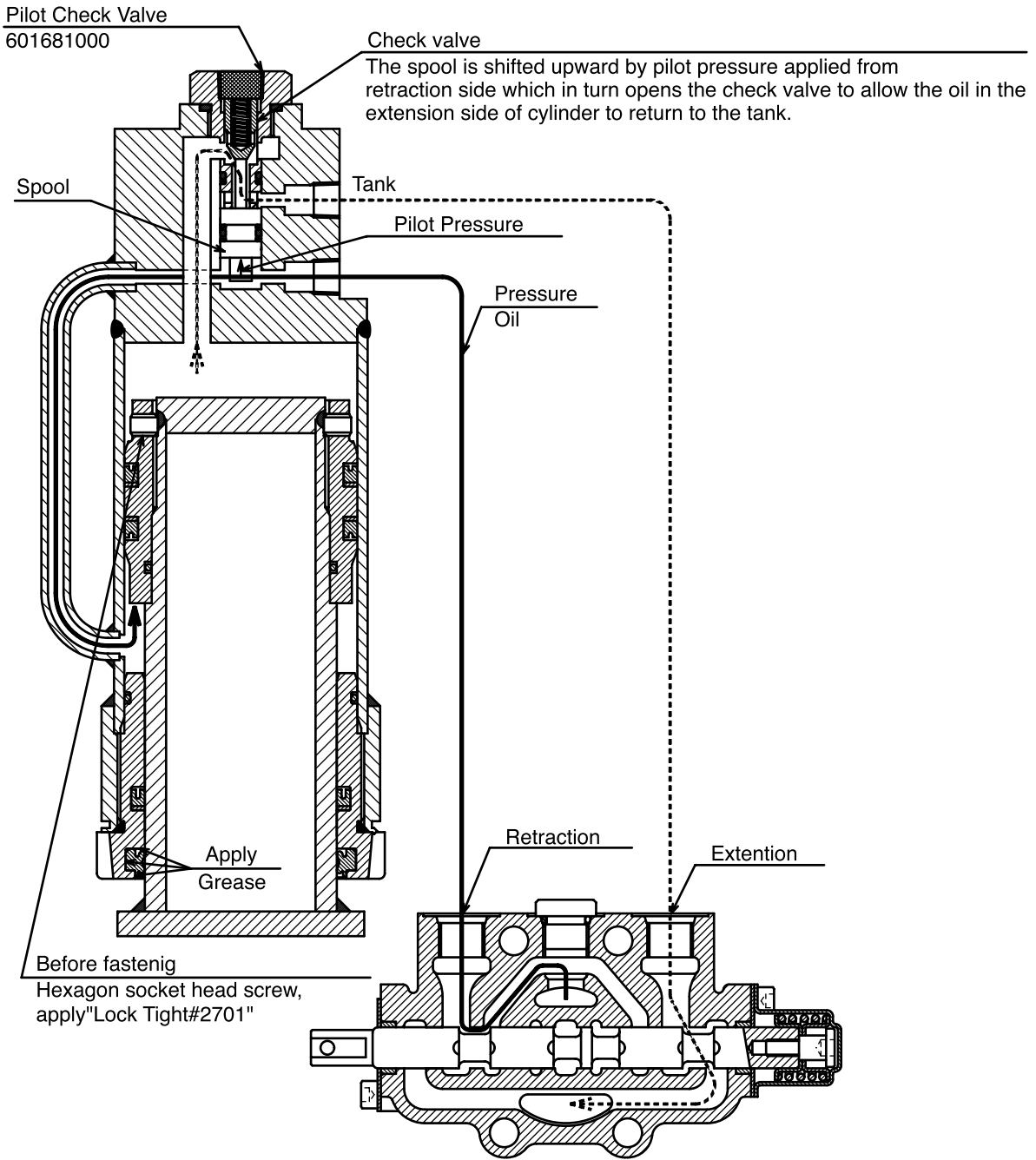
§ 5. OUTRIGGER

5.1 Outrigger Cylinder (URV230, V260, V290, V300, V340)

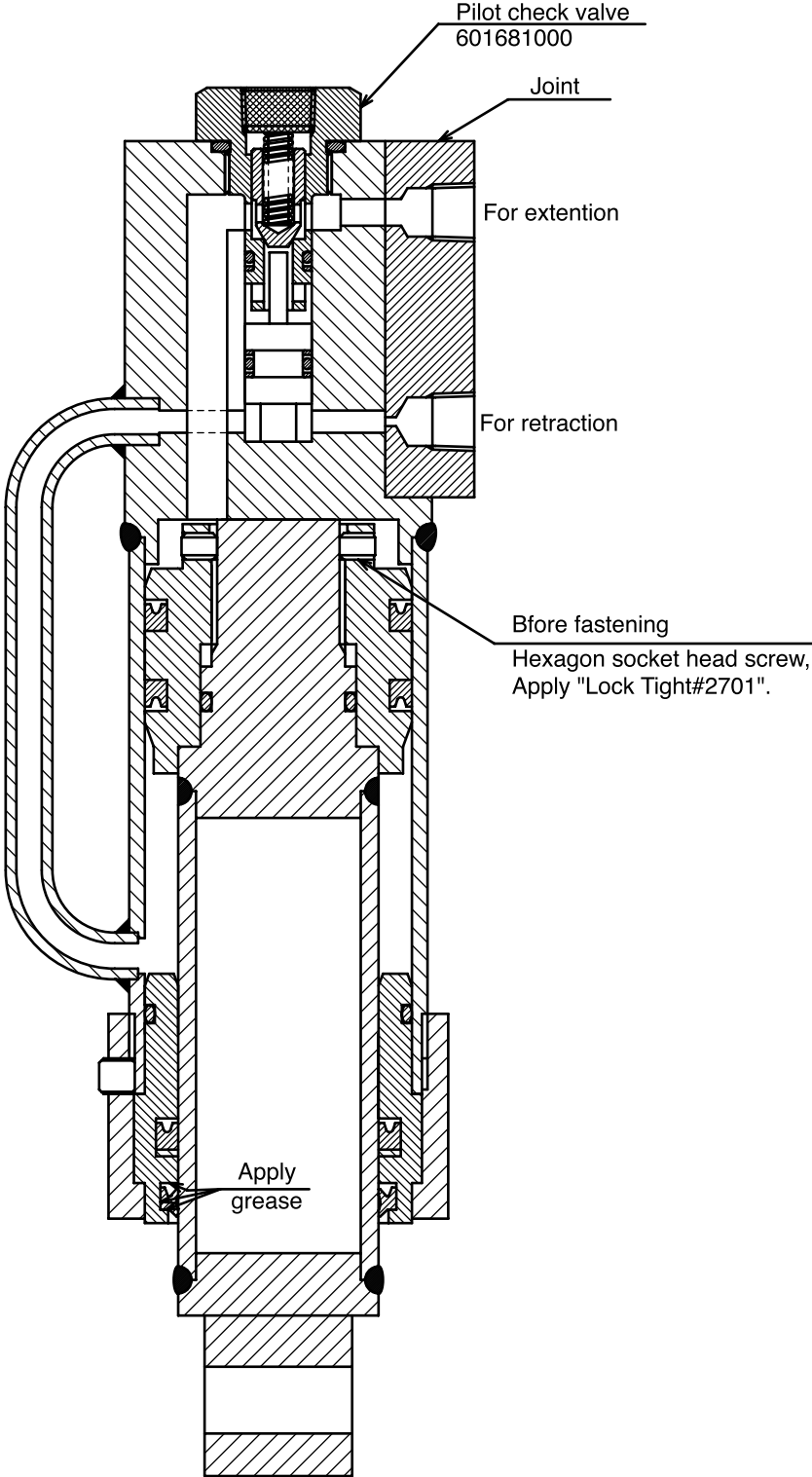
(1) Flow of oil when extending



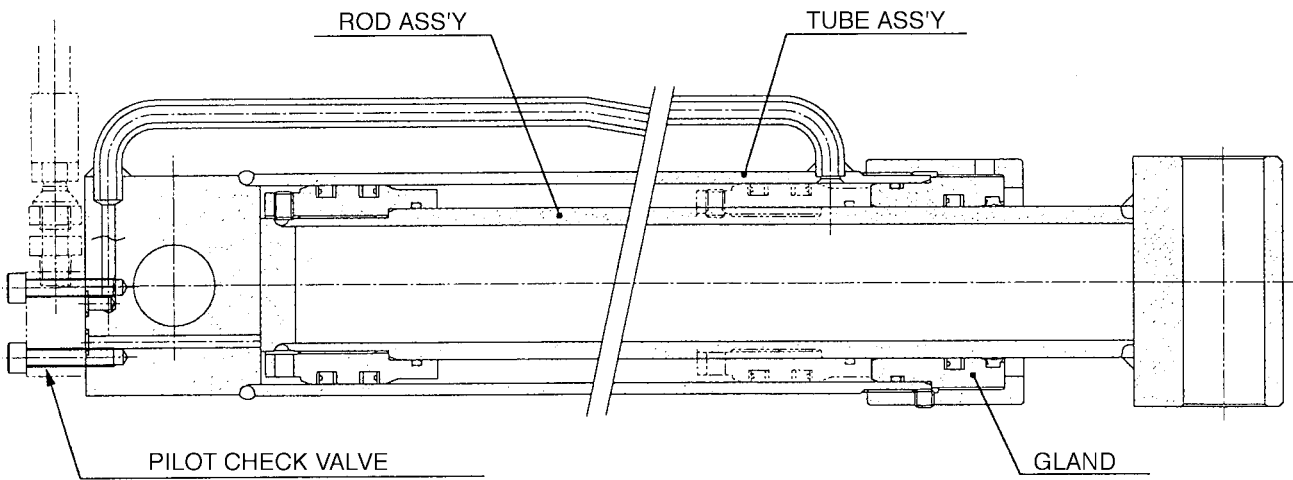
(2) Flow of oil when retracting



5.2 Construction of outrigger cylinder (URV370)

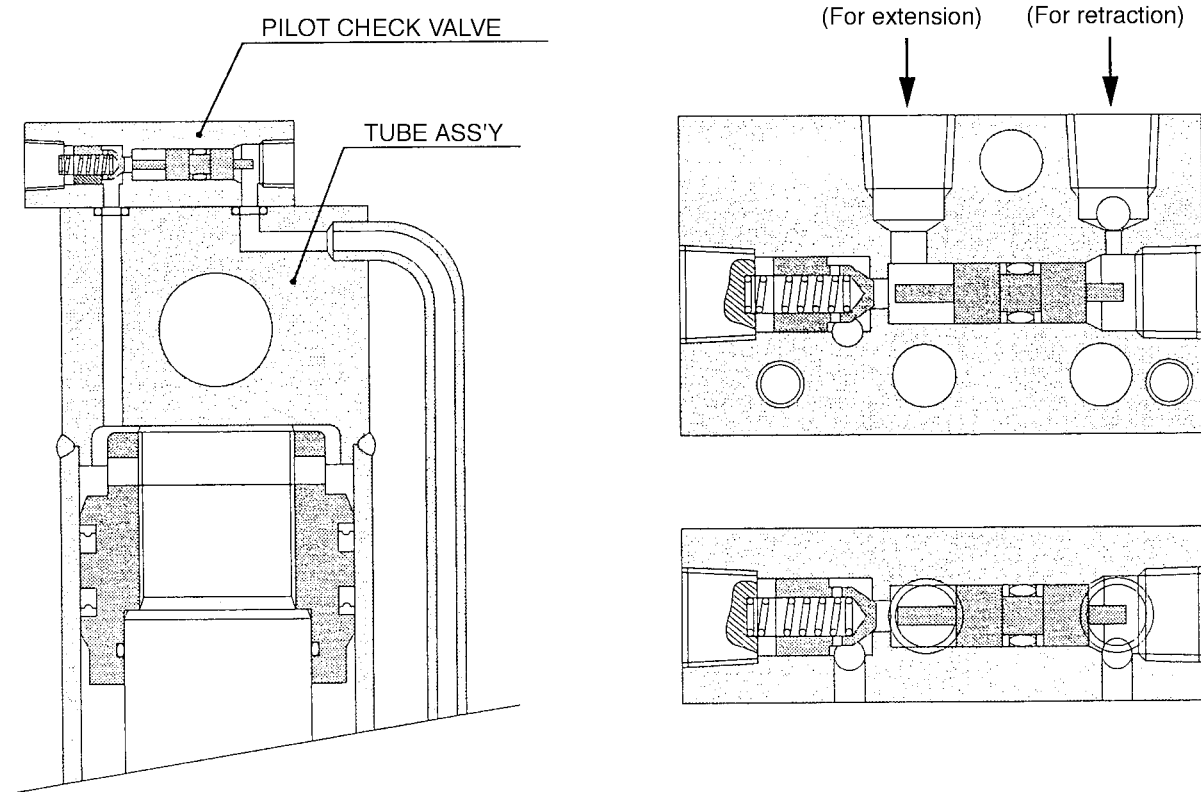


5.3 Construction of outrigger cylinder (URV500) URV500 Series Standard



☞ Before fastening hexagon socket screw for the cylinder cover and piston, apply “LOCK TIGHT #2701”.

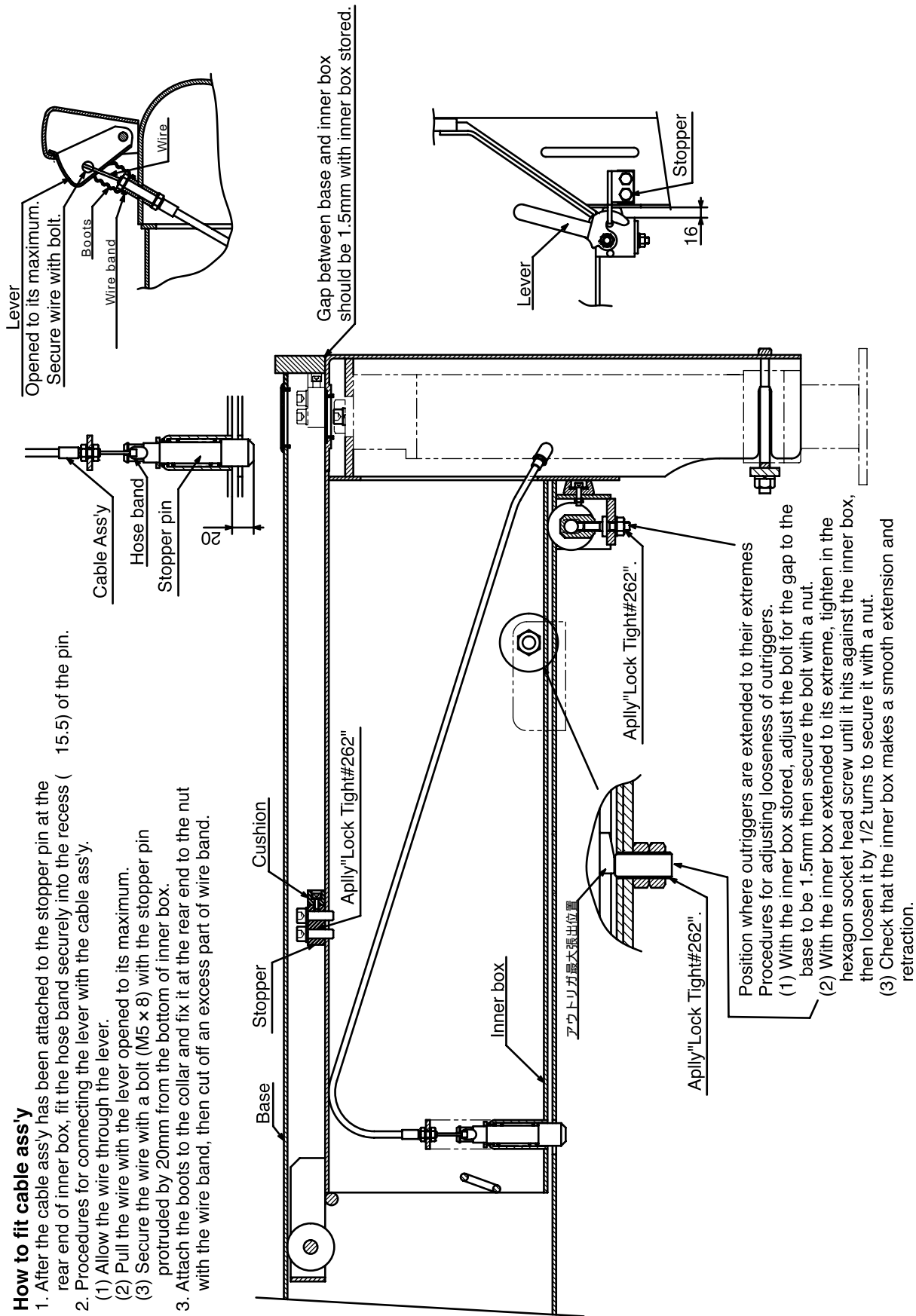
Construction of the Part where Pilot Check Valve is Fitted



5. 4 Construction of inner box

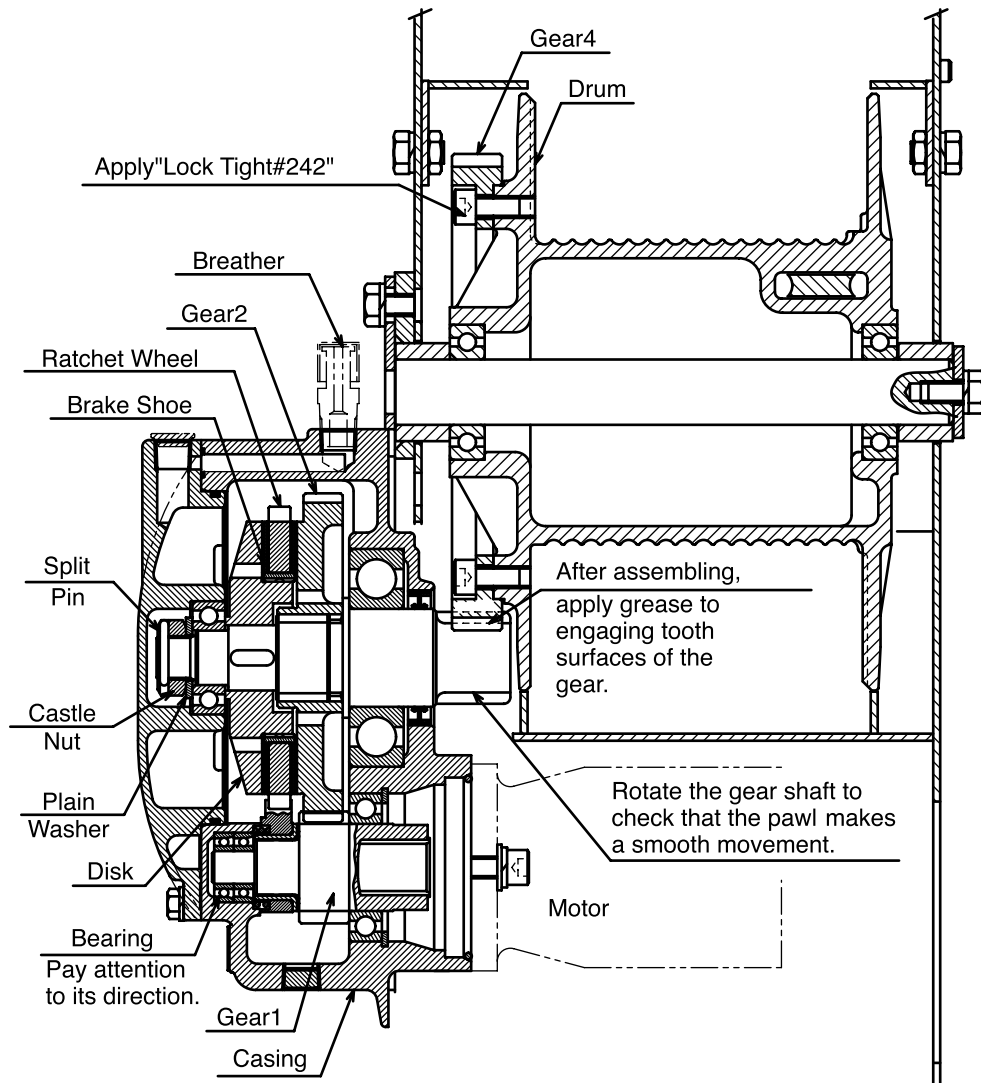
How to fit cable assy

1. After the cable assy has been attached to the stopper pin at the rear end of inner box, fit the hose band securely into the recess (15.5) of the pin.
2. Procedures for connecting the lever with the cable assy.
 - (1) Allow the wire through the lever.
 - (2) Pull the wire with the lever opened to its maximum.
 - (3) Secure the wire with a bolt (M5 x 8) with the stopper pin protruded by 20mm from the bottom of inner box.
3. Attach the boots to the collar and fix it at the rear end to the nut with the wire band, then cut off an excess part of wire band.



§ 6. HOIST WINCH

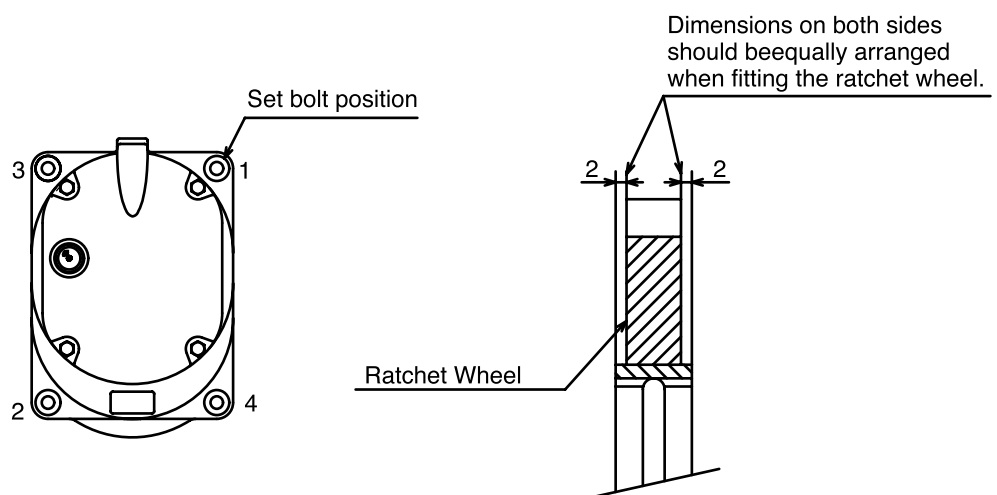
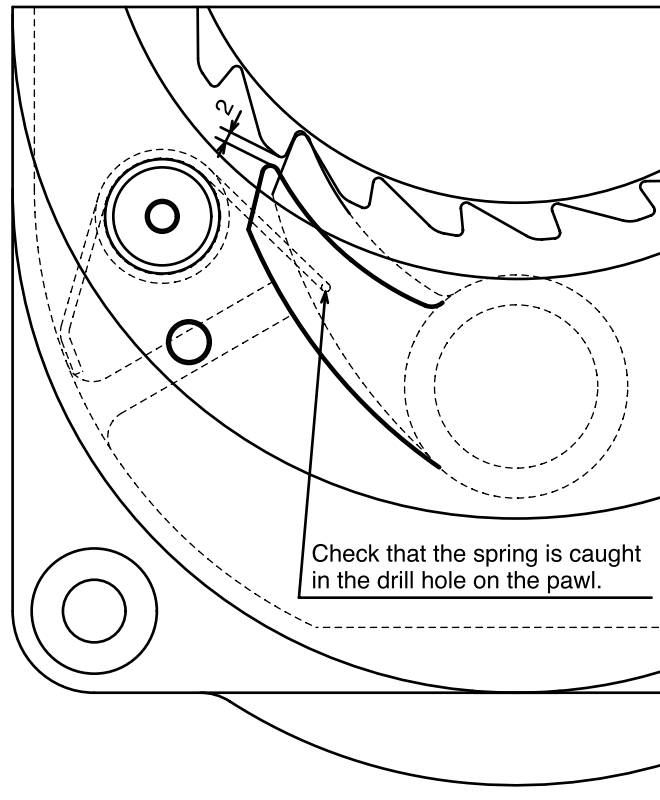
6. 1 Construction of Hoist Winch and brake shoe adjusting procedure



Brake Shoe Adjusting procedures

1. Tighten the castle nut lightly with a spanner.
2. After tightening, loosen the castle nut for approx. 1/6 turn and within this range align the castle nut with the hole in the gear shaft; and fix it with the split pin.
3. Replace the brake shoe every 3 years.

6. 2 Caution to be taken when reassembling hoist winch



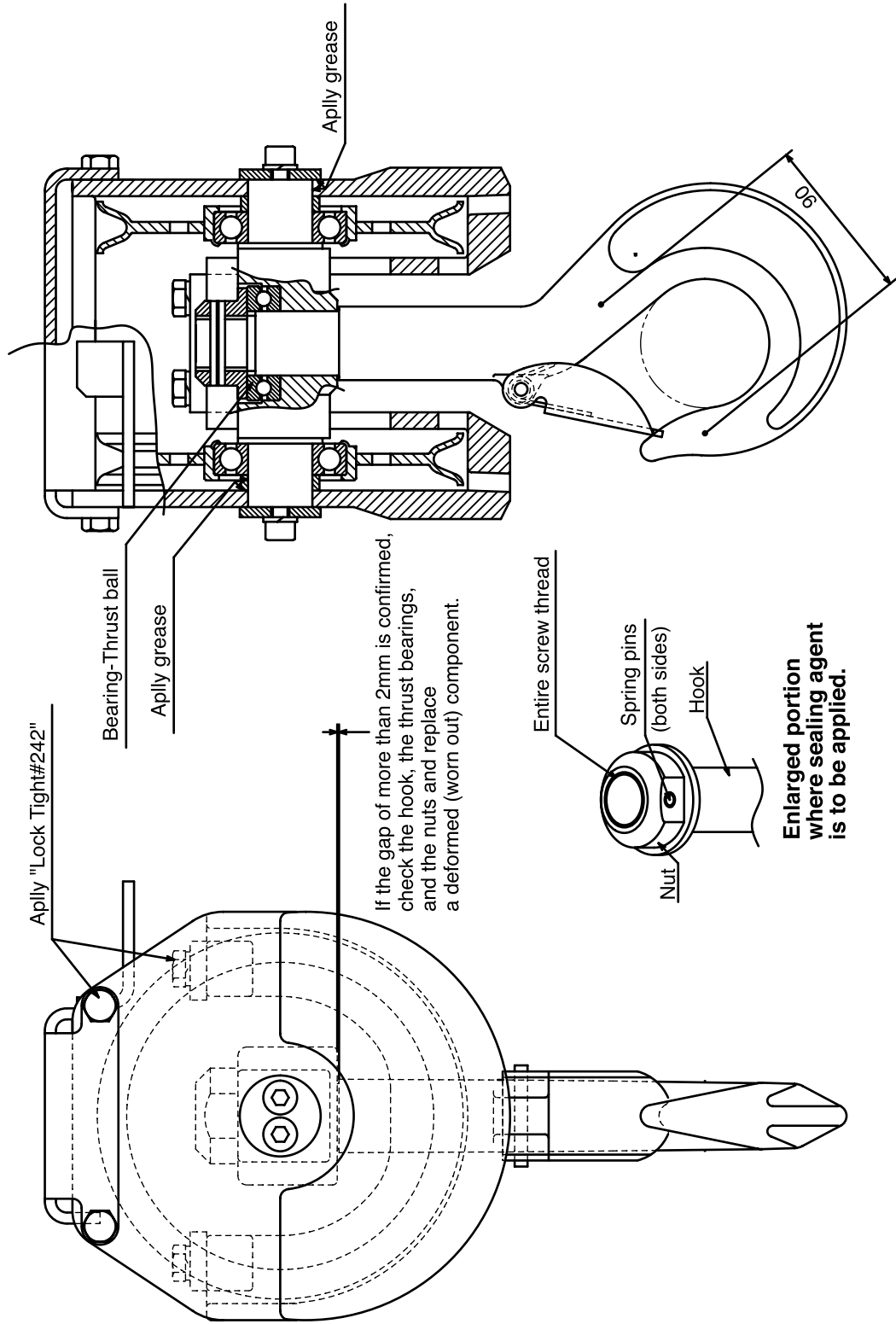
Tightening order of bolts for mounting reduction gear
Tighten the hexagon socket head screws in diagonal order after the set bolt has been fastened first to align each screw hole.

6. 3 Cause of Troubles and Measures to be Taken

(1) Hoist winch

Problems	Possible cause	Measures to be taken
① Pressure does not rise.	<ul style="list-style-type: none"> • Pump is faulty. (Pressure does not rise at idling speed.) (Total pressure required for operation is insufficient.) 	<ul style="list-style-type: none"> • Replace.
	<ul style="list-style-type: none"> • Relief set of control valve is faulty. (Pressure rises but not enough.) 	<ul style="list-style-type: none"> • Adjust or replace.
	<ul style="list-style-type: none"> • O-ring and other parts of relief valve of control valve are faulty. (Adjusting bolt of relief valve is tightened but unable to control pressure.) 	<ul style="list-style-type: none"> • Replace parts or replace relief ass'y with new one.
	<ul style="list-style-type: none"> • Hoist motor is faulty. (Quantity of drain is larger than the specified.) 	<ul style="list-style-type: none"> • Replace.
② Pressure rises but hoisting up impossible.	<ul style="list-style-type: none"> • Drum or internal mechanism of reduction gear is faulty. 	<ul style="list-style-type: none"> • Overhaul reduction gear. • Inspect the drum
③ Pressure rises but lowering is impossible.	<ul style="list-style-type: none"> • Brake shoe is over-tightened.. • Drum or reduction gear is defective. 	<ul style="list-style-type: none"> • Adjust tightening of brake shoe. • Overhaul reduction gear. • Check drum.
④ Unable to maintain suspended load.	<ul style="list-style-type: none"> • Brake shoe is faulty. • Pawl is faulty. 	<ul style="list-style-type: none"> • Replace brake shoe. • Replace pawl.
⑤ When lowering, hunting occurs.	<ul style="list-style-type: none"> • Brake shoe is faulty. • Over-tightening of brake shoe. • Internal mechanism of reduction gear is faulty. 	<ul style="list-style-type: none"> • Inspect brake shoe and check quantity of oil. • Adjust tightening of nut. • Disassemble reduction gear.
⑥ When hoisting up, clattering sound is heard.	<ul style="list-style-type: none"> • Spring pressing the pawl against slide plate is faulty. • Bushing the part of fitting pawl is worn out. 	<ul style="list-style-type: none"> • Replace spring. • Replace bushing.

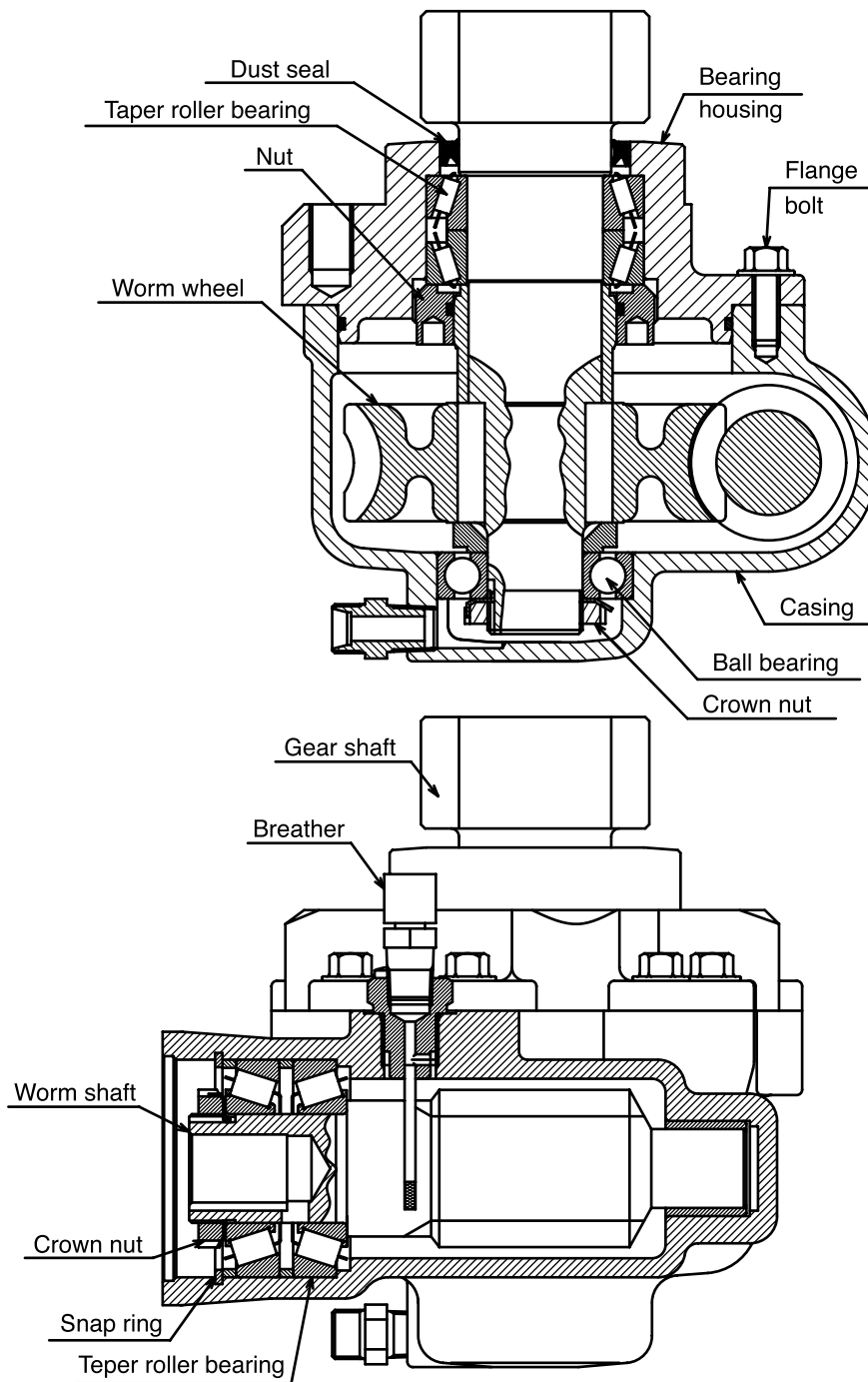
§7. HOOK



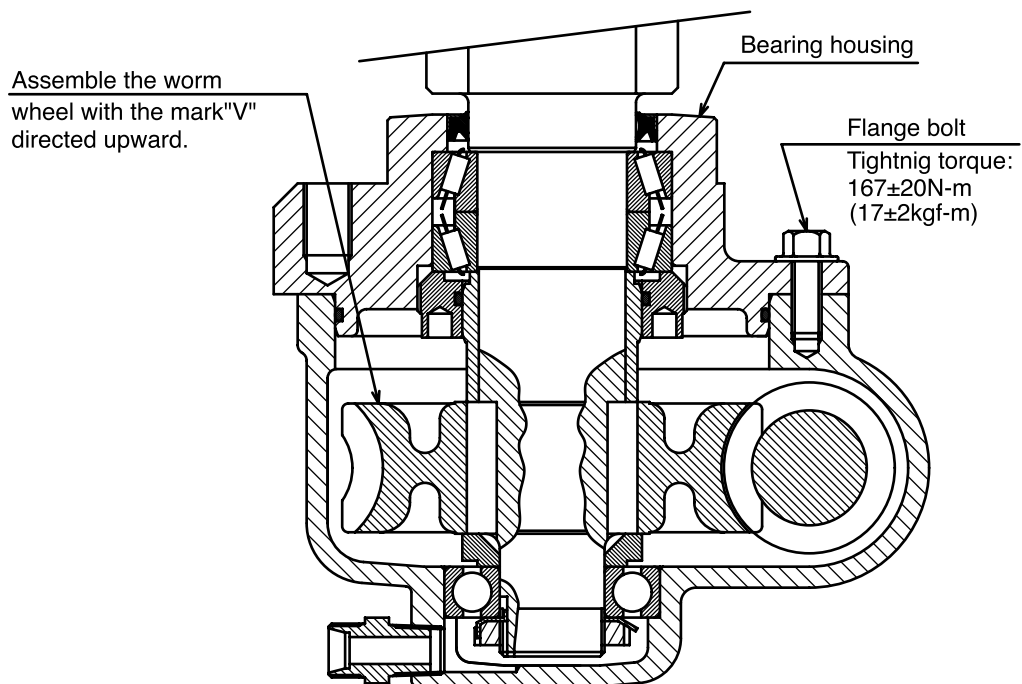
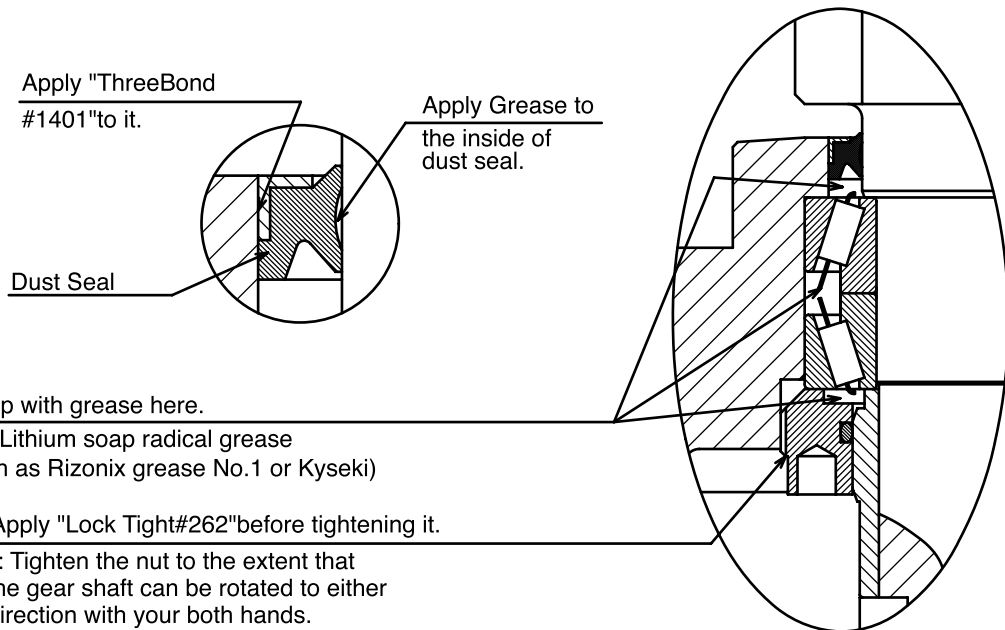
§ 8. SLEWING

8.1 Slewing reduction gear

(1) Construction of slewing reduction gear

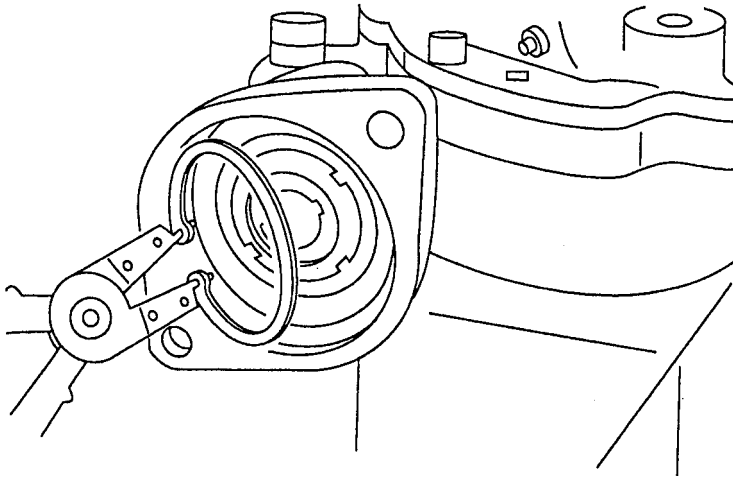


(2) Construction to be taken when reassembling slewing reduction gear

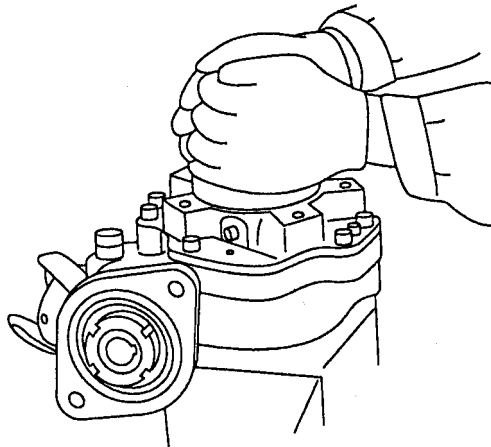


(3) Slewing reduction gear disassembly procedures

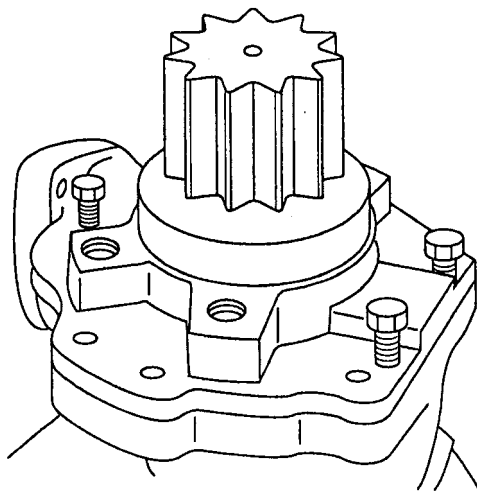
- ① Remove a snap ring (H-80) retaining the taper roller bearing which sustains the worm shaft.



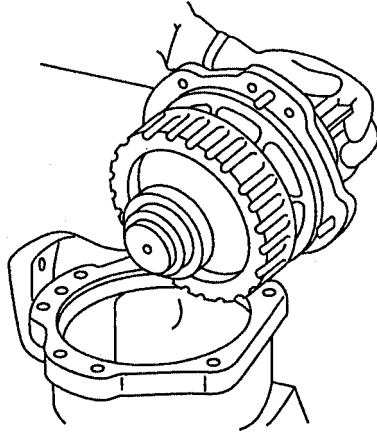
- ② Turn the gear shaft counterclockwise, and pull out the worm shaft from the casing. (Use of special tool for removing worm shaft is recommended.)



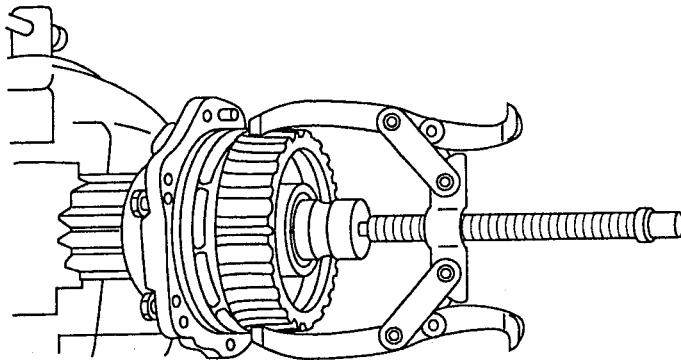
- ③ Remove 8 pcs. of bolt (M10 X 25 \varnothing) which fasten the bearing housing and pull out the housing, utilizing 3 pcs. of bolt for 3 through holes in the housing.



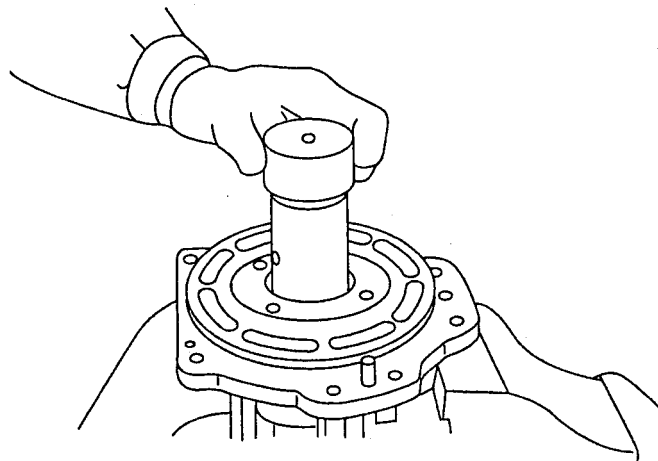
④ This figure shows the pulled out housing with gear shaft and worm wheel.



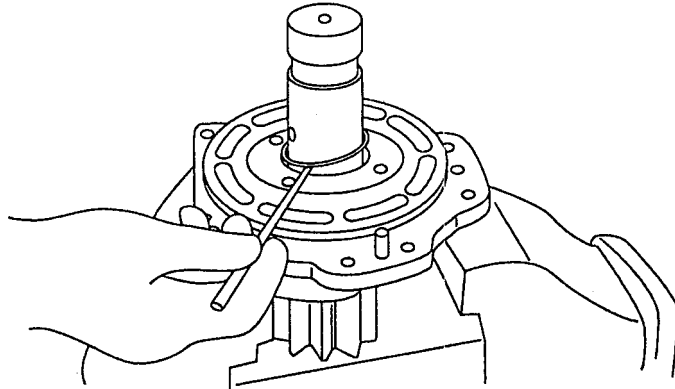
⑤ Grip the housing with a vice and pull out the worm wheel with a gear puller.



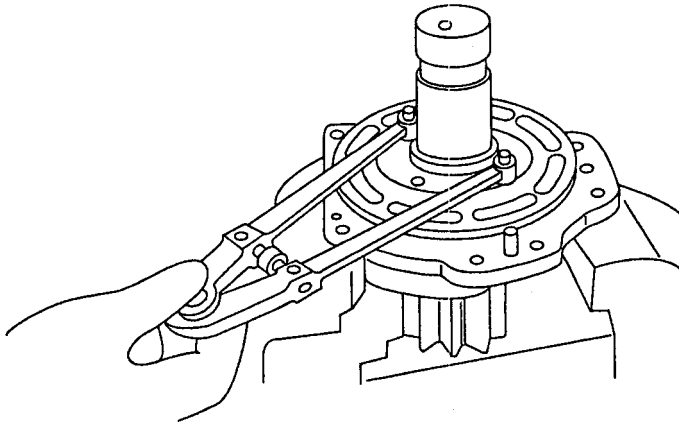
⑥ Pull out the collar which is assembled in the nut.



⑦ Pull out the O-ring which is assembled in the nut.



⑧ With a pin spanner, remove the nut which retains the taper roller bearing.

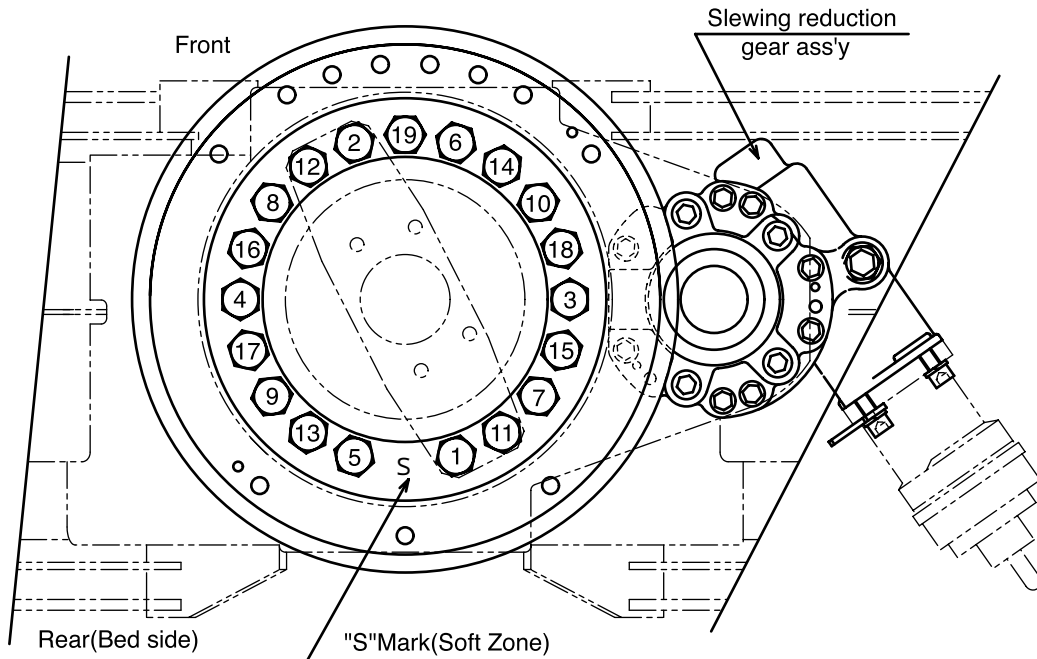


Note: To the threaded part of the nut, “LOCK TIGHT” was applied. Therefore, when loosening, warm up lightly the threaded part with gas flame, and then loosen. When reassembling, be sure to apply “LOCK TIGHT #262” to the threaded part.

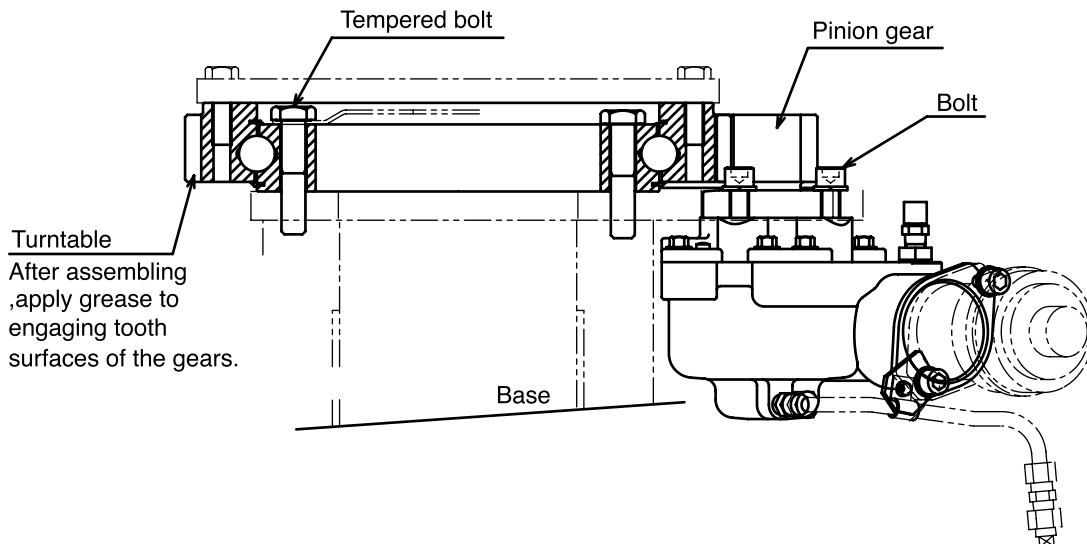
8. 2 Turntable Mounting Procedures

(1) Turntable mounting procedures

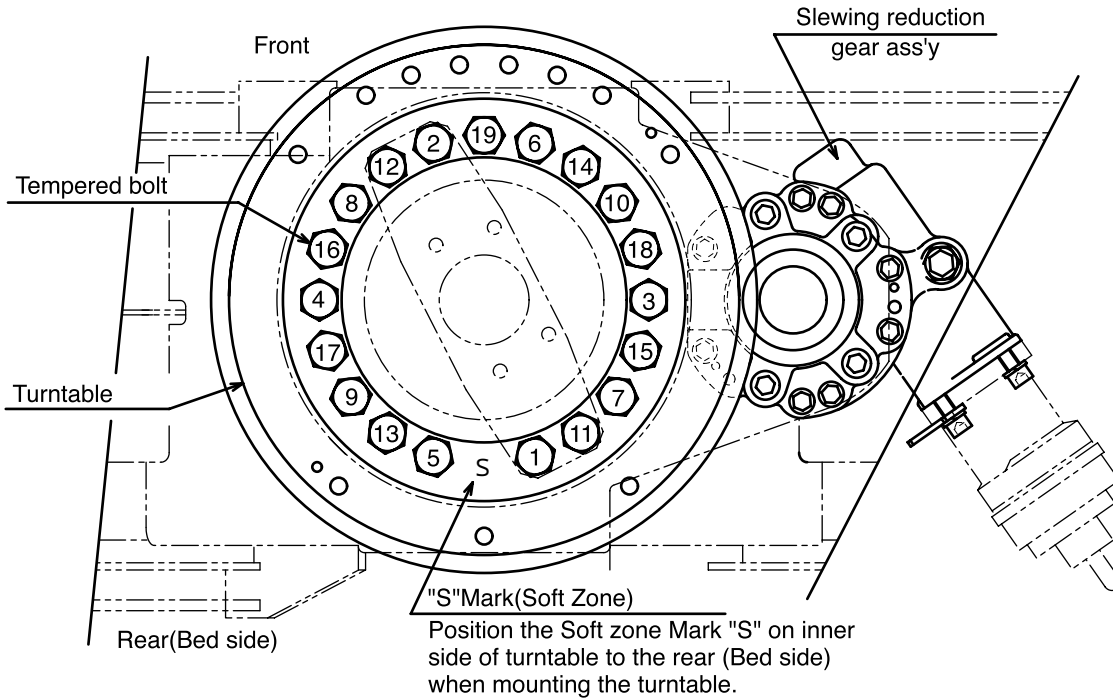
1. Install the slewing reduction gear to the base.
2. Set the turntable on the base to screw-in the bolts for mounting turntable lightly.
3. Insert the thickness gauge(0.1 ~ 0.2mm)into the space between the turntable gear and the pinion gear,and press strongly the turntable to the pinion gear.



Position the Soft zone Mark "S" on inner side of turntable to the rear (Bed side) when mounting the turntable.



(2) Position of soft zone, tightening sequence of bolts and tightening torque



Tightning sequence of bolt for mounting turntable

Tighten the bolts in the numerical order as illustrated in the figure above.

Tightning torque for bolts fastening slewing reduction gear ass'y

Model	Parts Name	Torque
V23*, V26* V29*	Bolt M14X40L 716114D40	167±20N-m (17±2Kgf-m)
V34*, V37* V50*	Bolt M16X50L 716116050	255±29N-m (26±3Kgf-m)

Tighten the mounting bolts in diagonal order.

Tightning torque for bolts fastening turntable

Model	Parts Name	Torque
V23*, V26* V29*	Tempered Bolt M20X80L(12T) 093T41020	471±39N-m (48±4Kgf-m)
V34*, V37* V50*	Tempered Bolt M20X95L(12T) 088541040	471±39N-m (48±4Kgf-m)

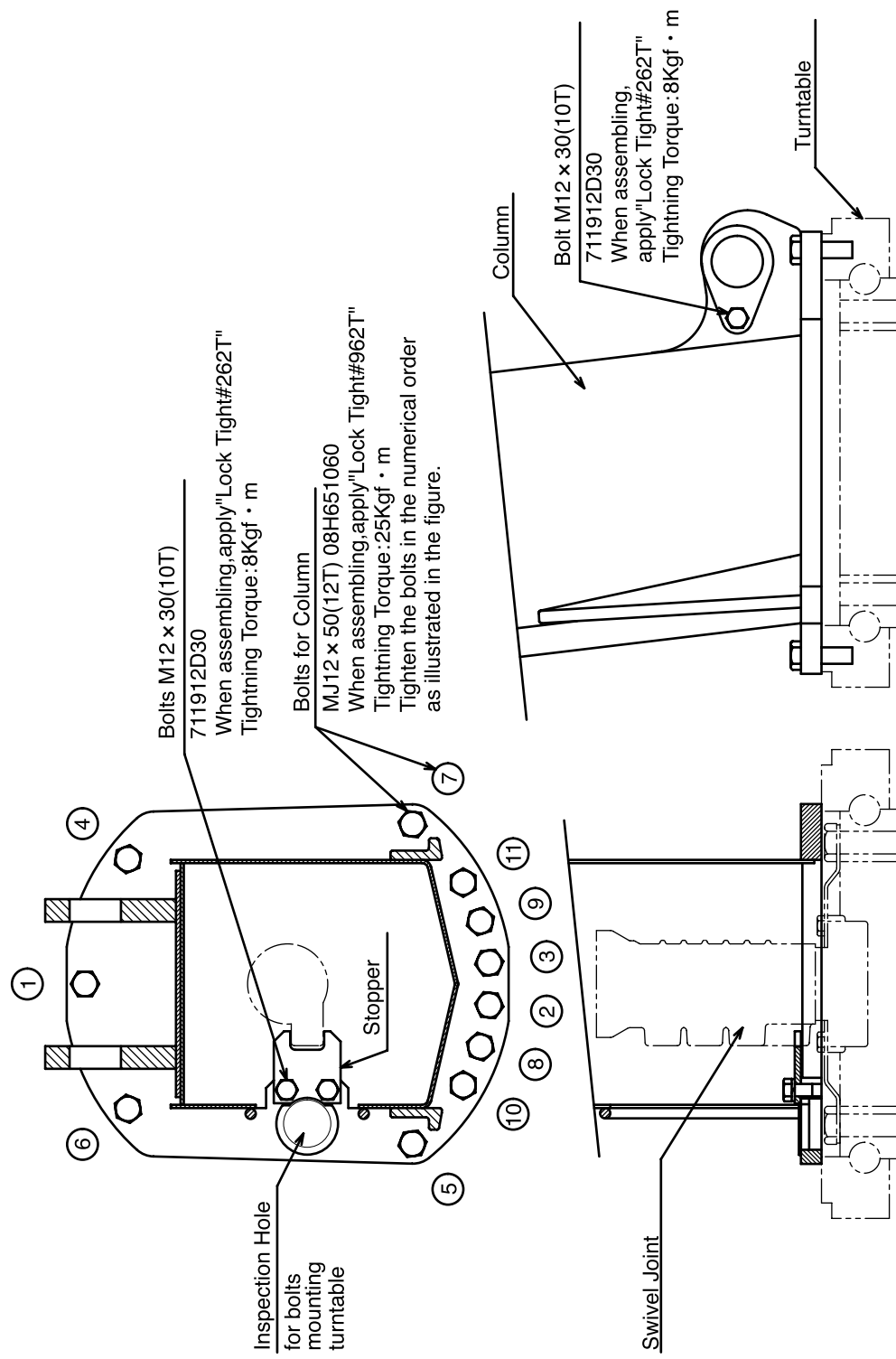
Before mounting bolts are tightened, degrease the bolts and the tapped holes to apply "Lock Tight #262" to the bolts and tighten them with an equal torque.



Note: The bolts for fastening the turntable (tempered bolts) must be UNIC genuine bolts, on which mark "UNIC12" is inscribed on the head.

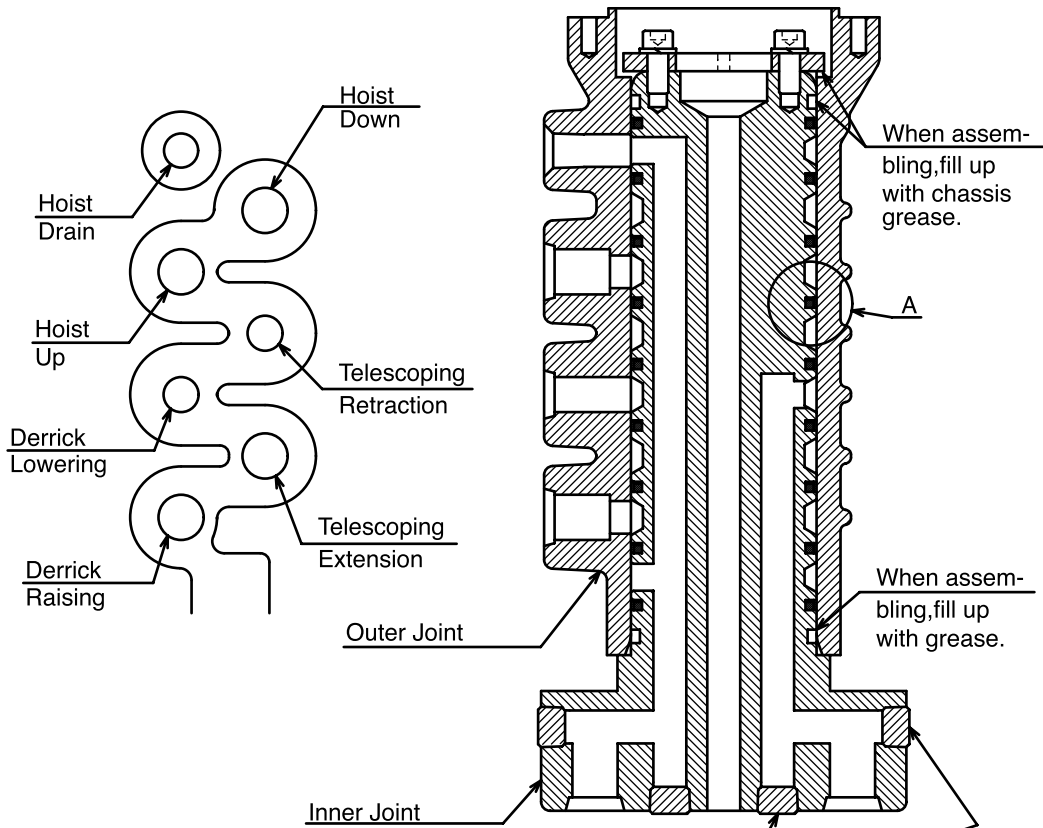
§ 9. COLUMN

9. 1 Tightening torque for bolts fastening column and tightening order

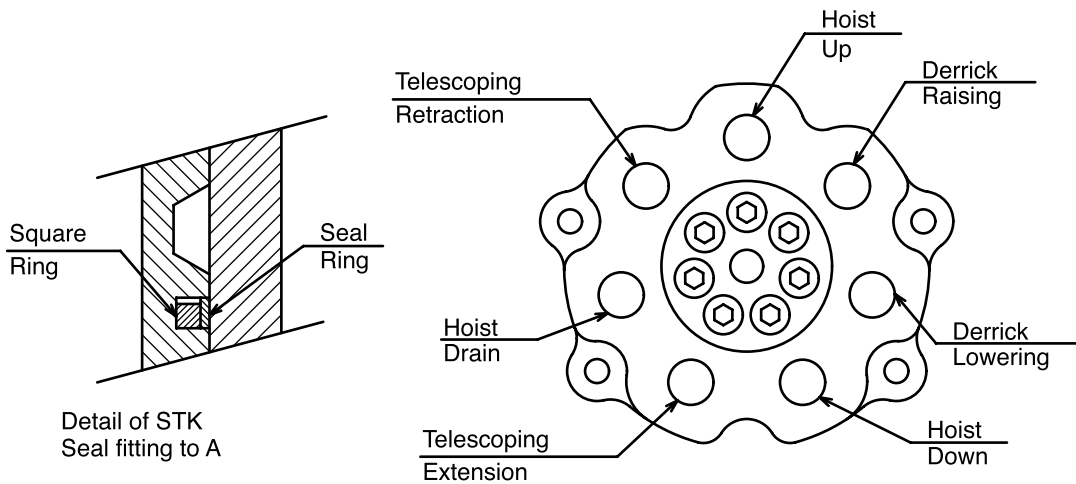


§ 10. SWIVEL JOINT

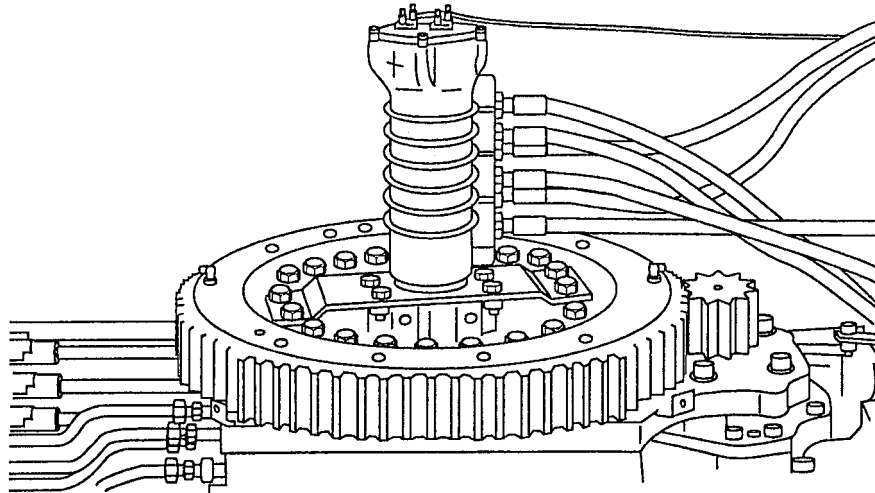
10. 1 Construction of swivel joint and position of hoses



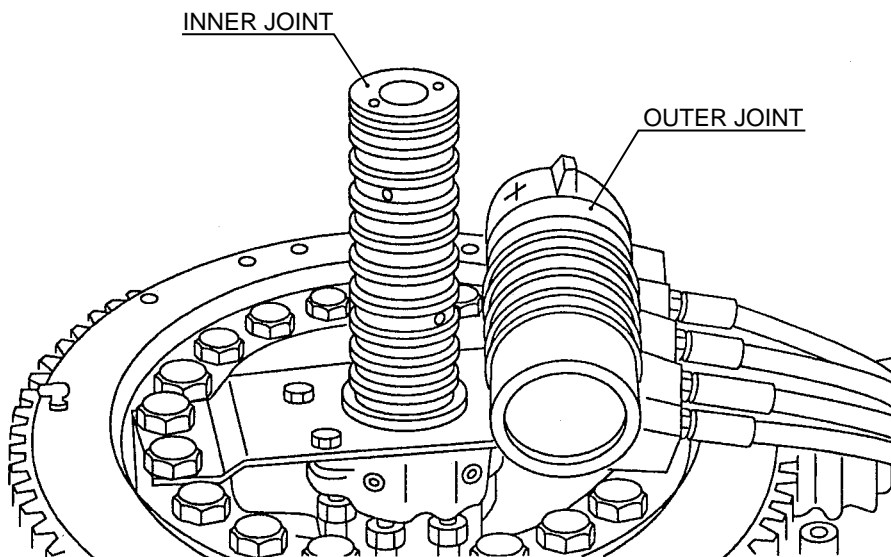
To hexagon socket head plug, apply "Lock Tight#202" before tightening. (Don't use a sealing tape.)



① Figure shows swivel joint is installed.



② Figure shows outer joint is taken out.



10. 2 Swivel joint assembling procedures

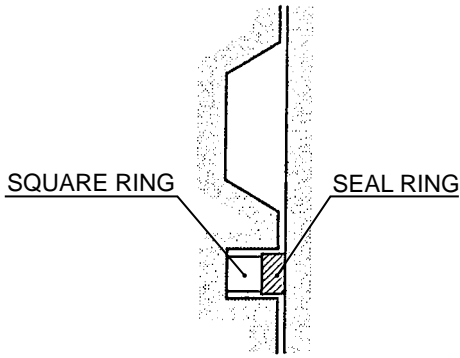
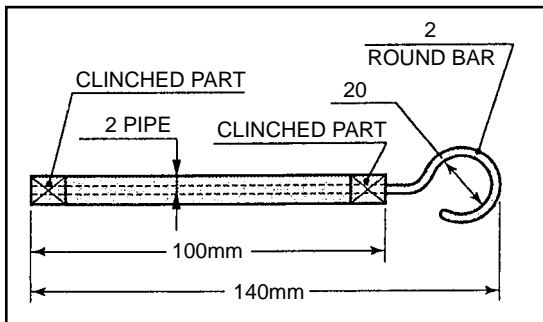
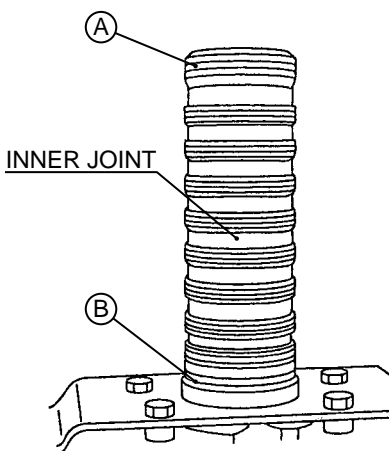
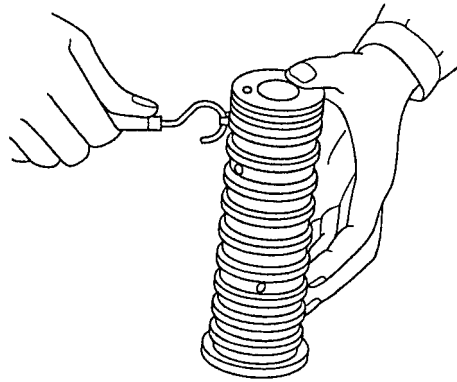


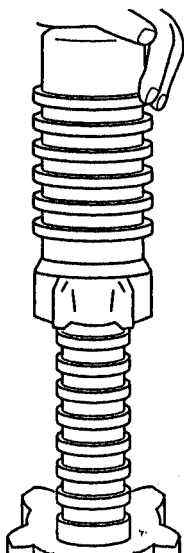
Illustration of STK Seal fitting



- After fitting the square ring, check to see if it is twisted, then fit the seal ring.
- ☞ When fitting seal ring, it is recommended to use the jib as shown below.



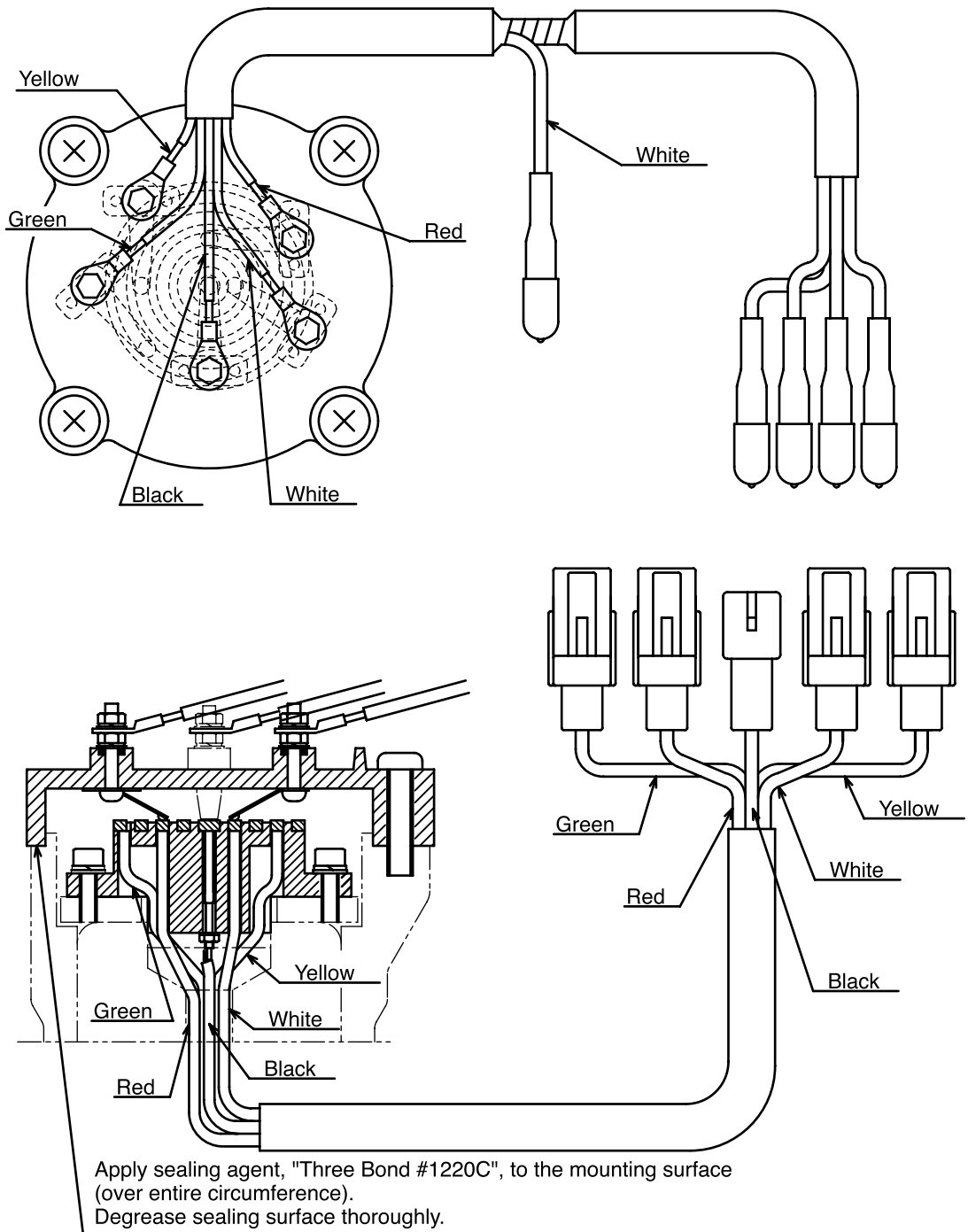
- The upper most (A) and the lower most (B) of the inner joint must be filled up with grease. To prevent the mix of water or others and the corrosion).
- To the part where STK seal is to be fitted, apply chassis grease sparingly.



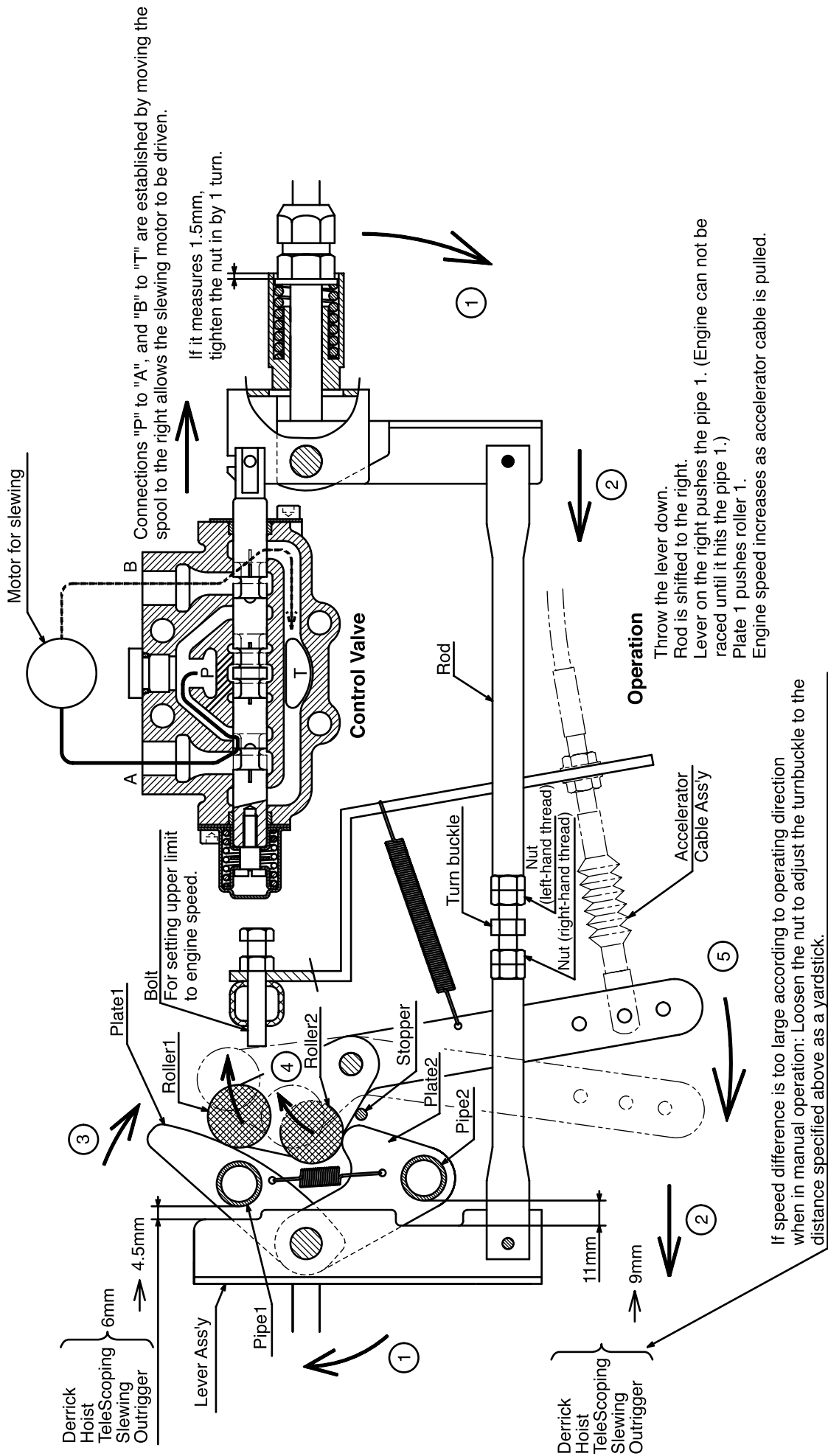
- Put the outer joint over the inner joint while taking care that the STK seal fitted to the inner joint will not be bit.

§ 11. SLIP RING

11. 1 Construction of slip ring and its fitting position

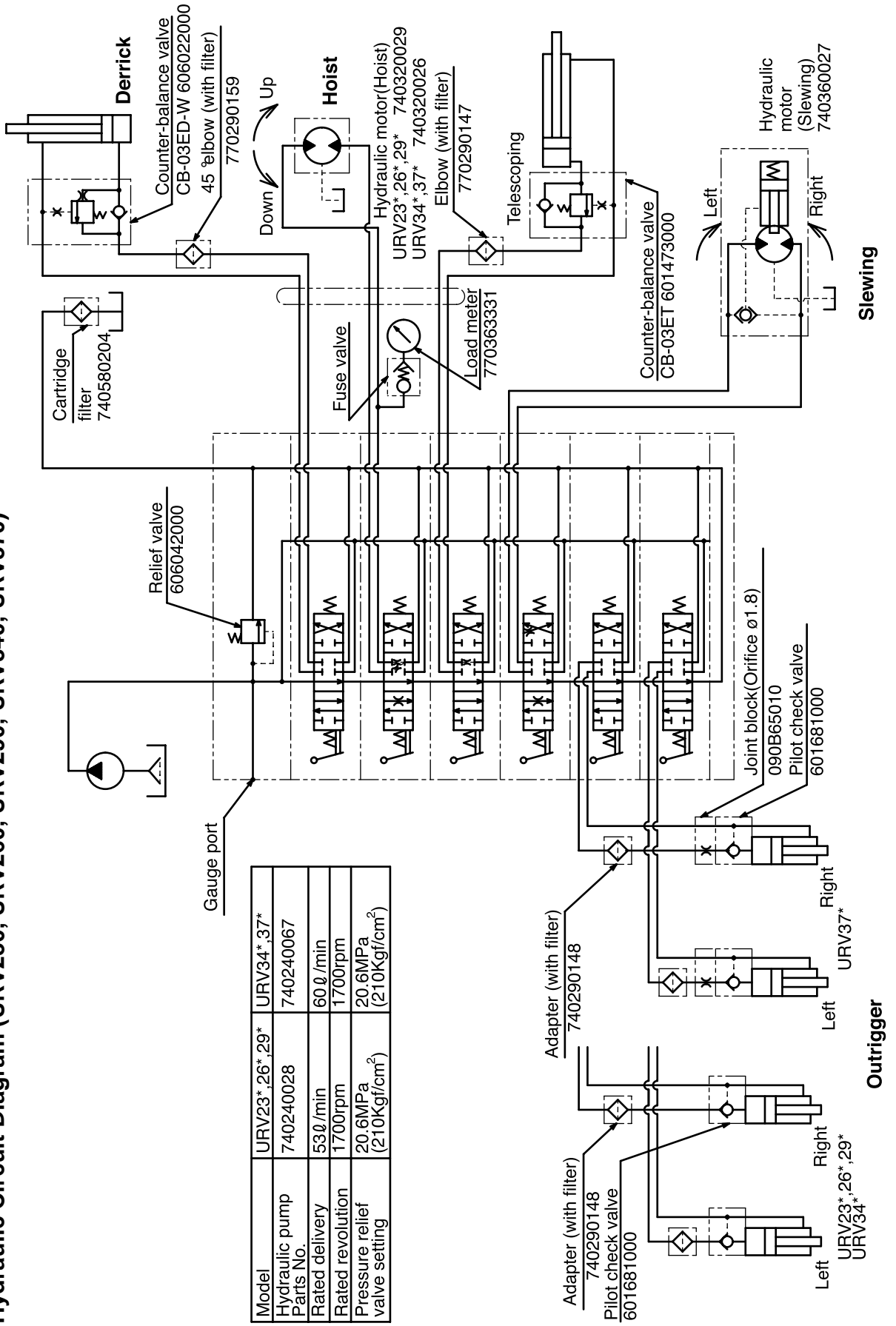


§12. CONTROL

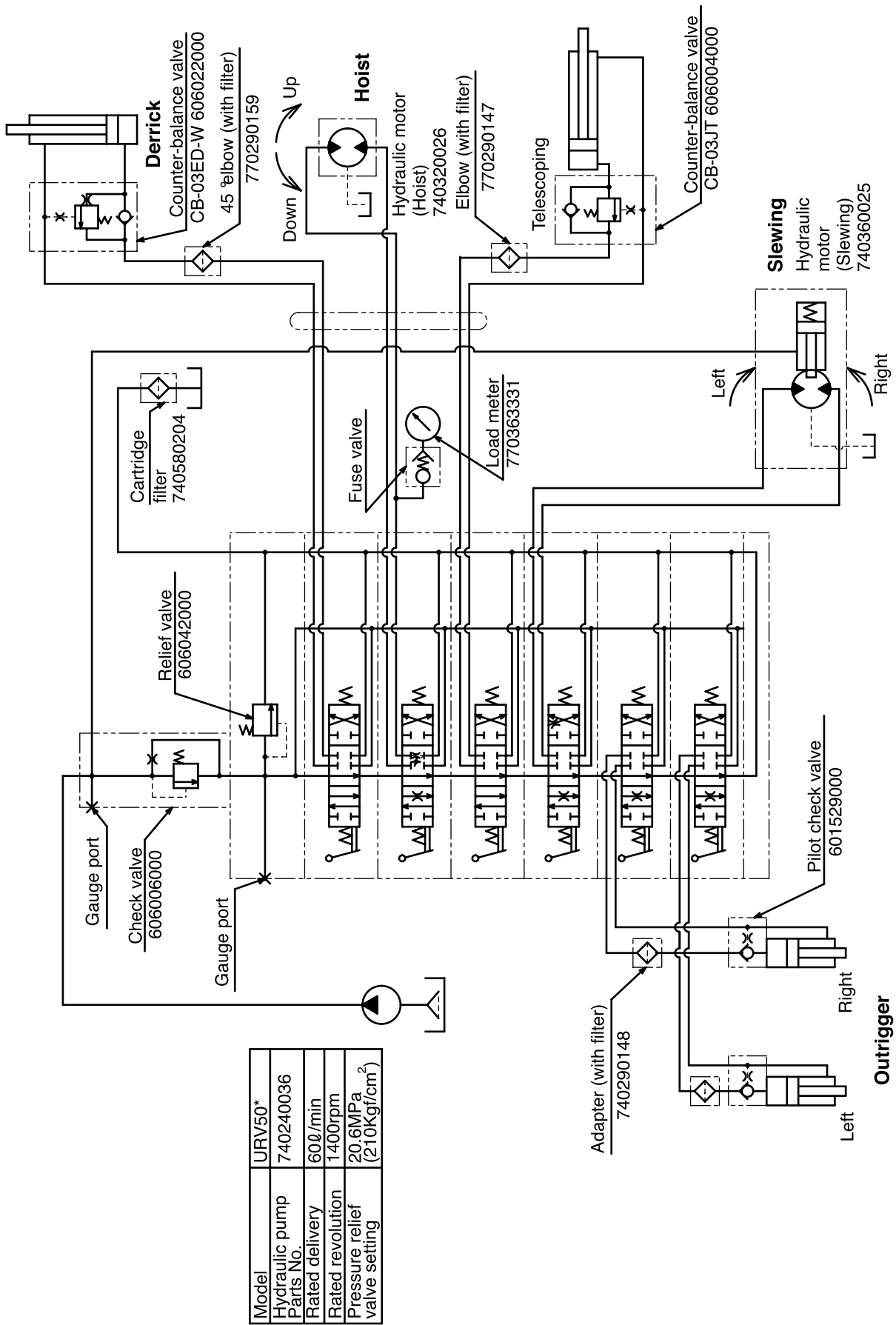


§ 13. HYDRAULIC CIRCUIT DIAGRAM

13. 1 Hydraulic Circuit Diagram (URV230, URV260, URV290, URV340, URV370)



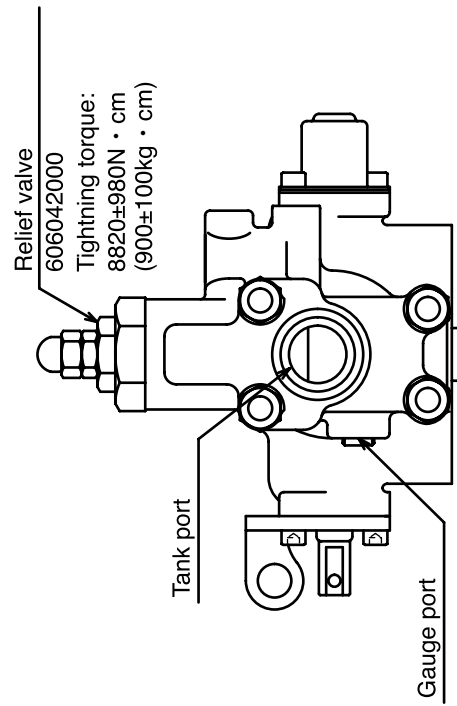
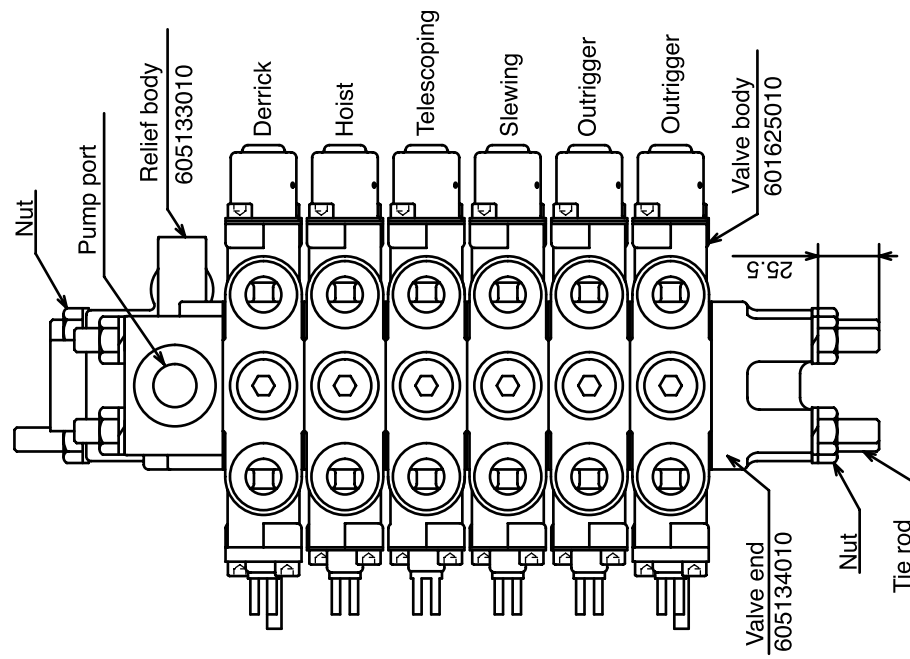
13. 2 Hydraulic Circuit Diagram (URV500)



Model	URV50*
Hydraulic pump Parts No.	740240036
Rated delivery	60.0/lmin
Rated revolution	1400rpm
Pressure relief valve setting	20.6MPa (210Kgf/cm ²)

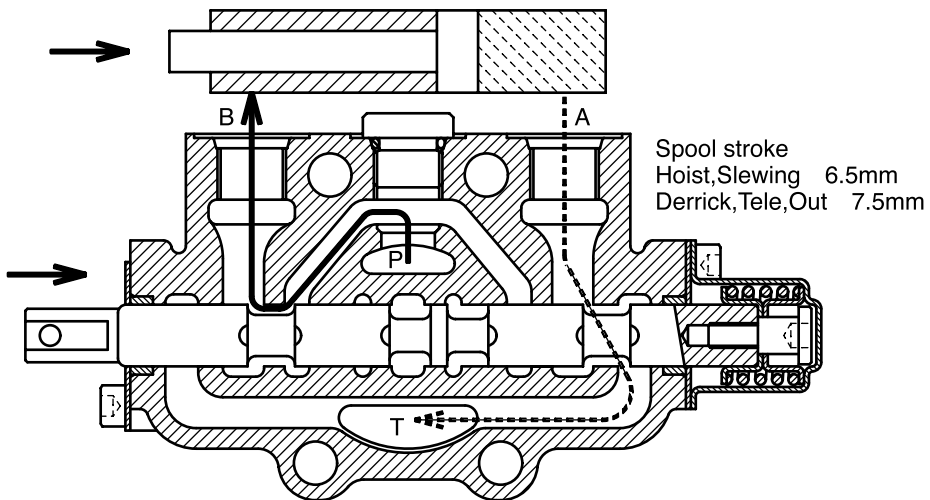
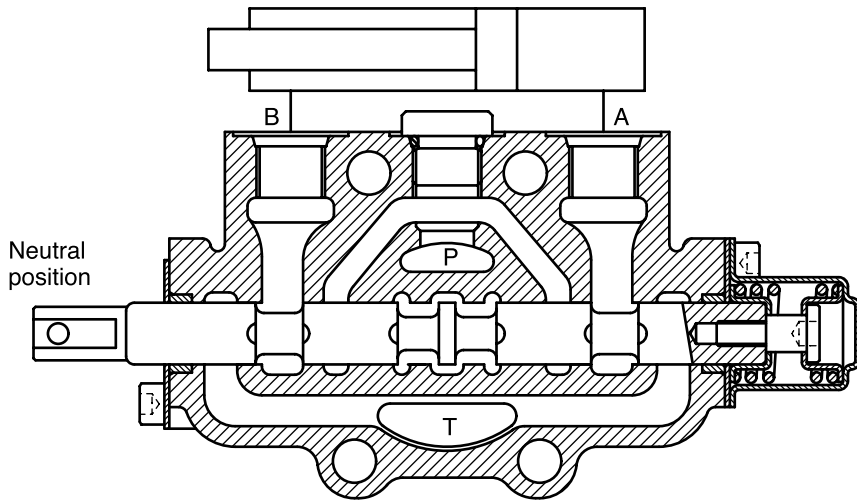
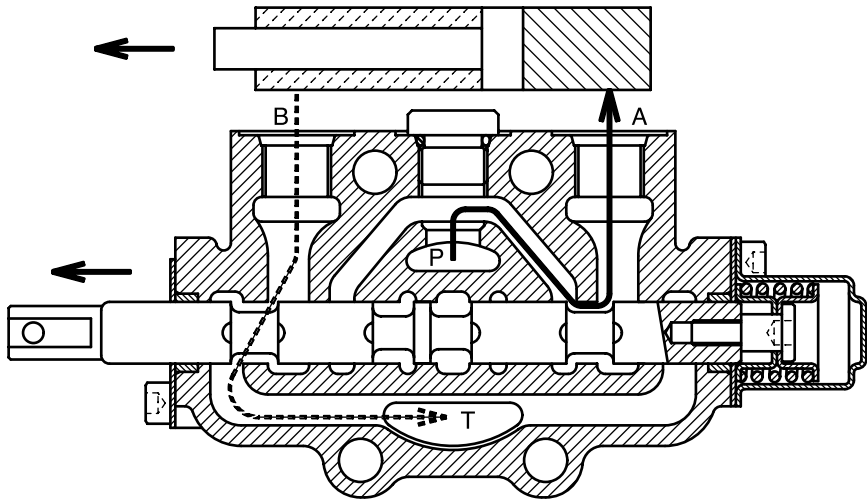
§ 14. CONTROL VALVE

14. 1 General view and specifications



Specifications	
Rated delivery	60 ℓ /min
Rated pressure	20.6MPa _a (210kg/cm ²)
Tightening torque of tie rod	2450±245N · cm (250±25kg · cm)
Maximum permissible pressure of tank port	0.3MPa (3kg/cm ²)

14. 2 How oil flows in control valve

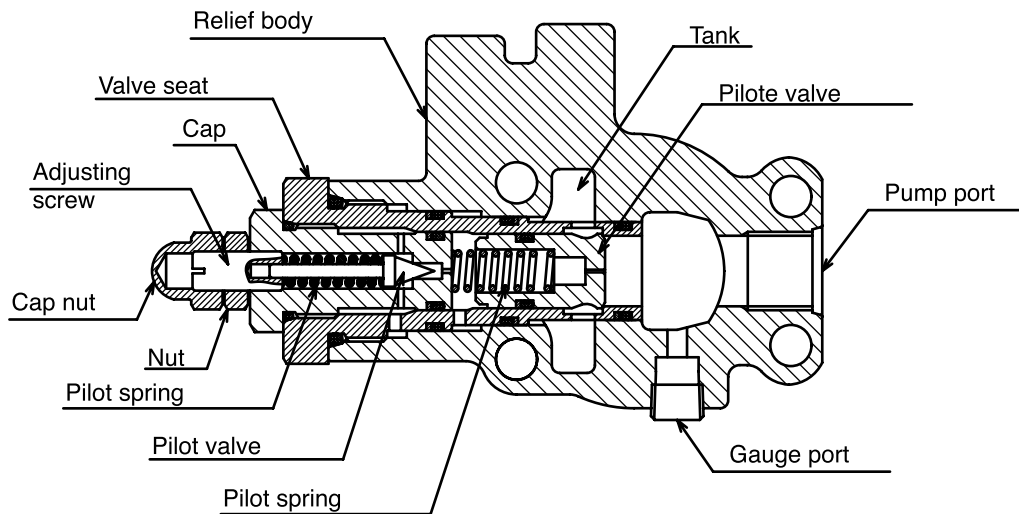


14. 3 Relief valve

The relief valve is a preventive valve to control the pressure in the hydraulic circuit.

The pressure should not become higher than the specified.

(1) Construction of relief valve



(2) Adjusting procedures

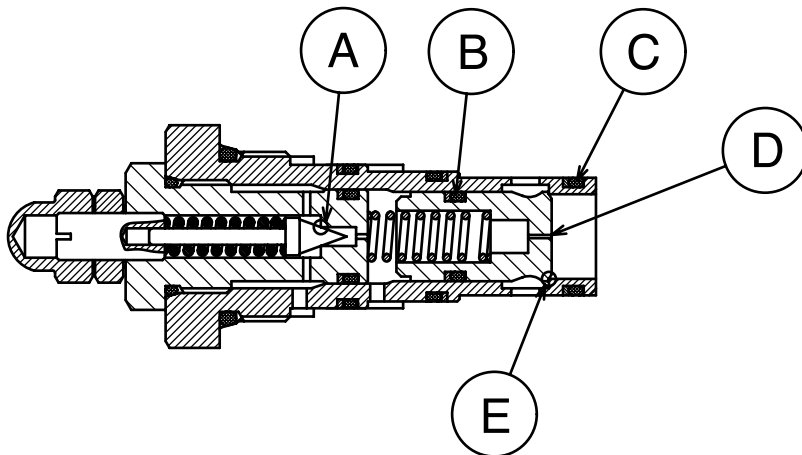
The hydraulic pressure in the relief valve is decided by the movable allowance of its adjusting screw.

For adjusting the pressure,loosen the cap nut and the nut to turn the screw clockwise with a screwdriver to increase the pressure.Turn the screw counterclockwise to reduce the pressure.

- ① Remove the cap nut and loosen the nut.
- ② Turn the screw clockwise with a screwdriver to increase the pressure.
Turn the screw counterclockwise to reduce the pressure.
- ③ When setting up,be sure to watch the pressure meter while one of the cylinders (outrigger or telescoping or derrick)is being retracted.
Engine speed at the time of setting up the hydraulic pressure should conform to the rated revolution of the pump.
Never set up the hydraulic pressure when the engine is running at idling speed or higher speed.
- ④ When tightening the nut and the cap nut,the adjusting screw may be loosened.
Therefore, hold the screw with a screwdriver and lock the nut with spanner when tightening the nut.

(3) Check points of relief valve

If the pressure it not increase, check the points of the relief valve as shown below.



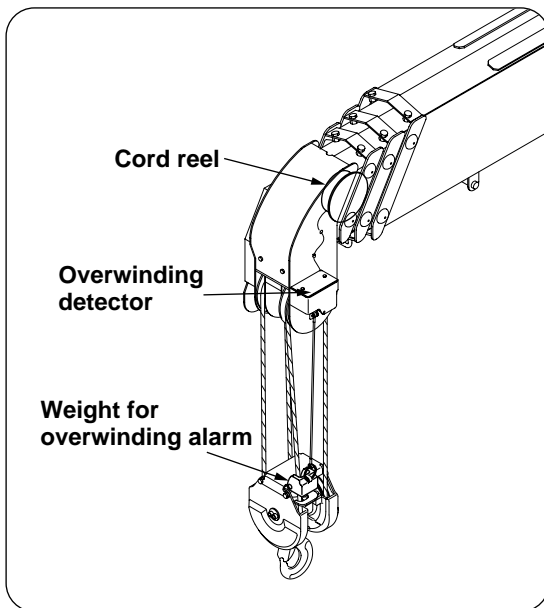
- ① Foreign substance is caught in (A) section and the seat surface is damaged.
- ② The O-ring in (B) section is broken.
- ③ The O-ring in (C) section is broken.
- ④ Foreign substance is caught in the drill hole of the (D) main valve.
- ⑤ Foreign substance is caught in (E) section and the seat surface is damaged.

Note : If the above-mentioned points have no trouble,the hydraulic pump is defective.

§ 15. OVERWINDING ALARM

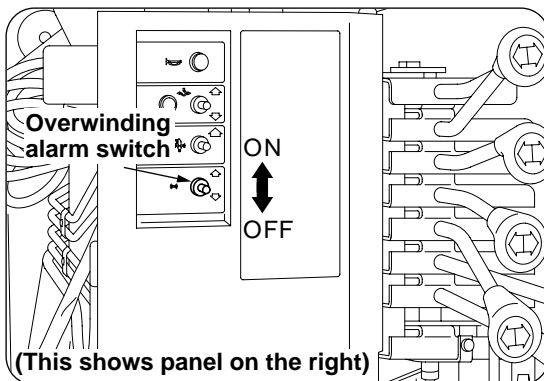
15. 1 Function of overwinding alarm and procedures for operation

(1) Function of overwinding alarm



The device automatically makes an alarm sound to warn that the wire rope is overwound when the hook comes close to the boom top.

(2) Procedures for operation



1. Turn ON the overwinding alarm switch before starting the crane operation.
If the alarm sounds while the hook is being hoisted or the boom is being extended, stop the crane operation immediately and lower the hook or retract the boom.
2. Turn the switch OFF after completion of the crane work.

CAUTION

★ The overwinding alarm will not function even if the hook is under overwound condition with the overwinding alarm switch turned OFF.

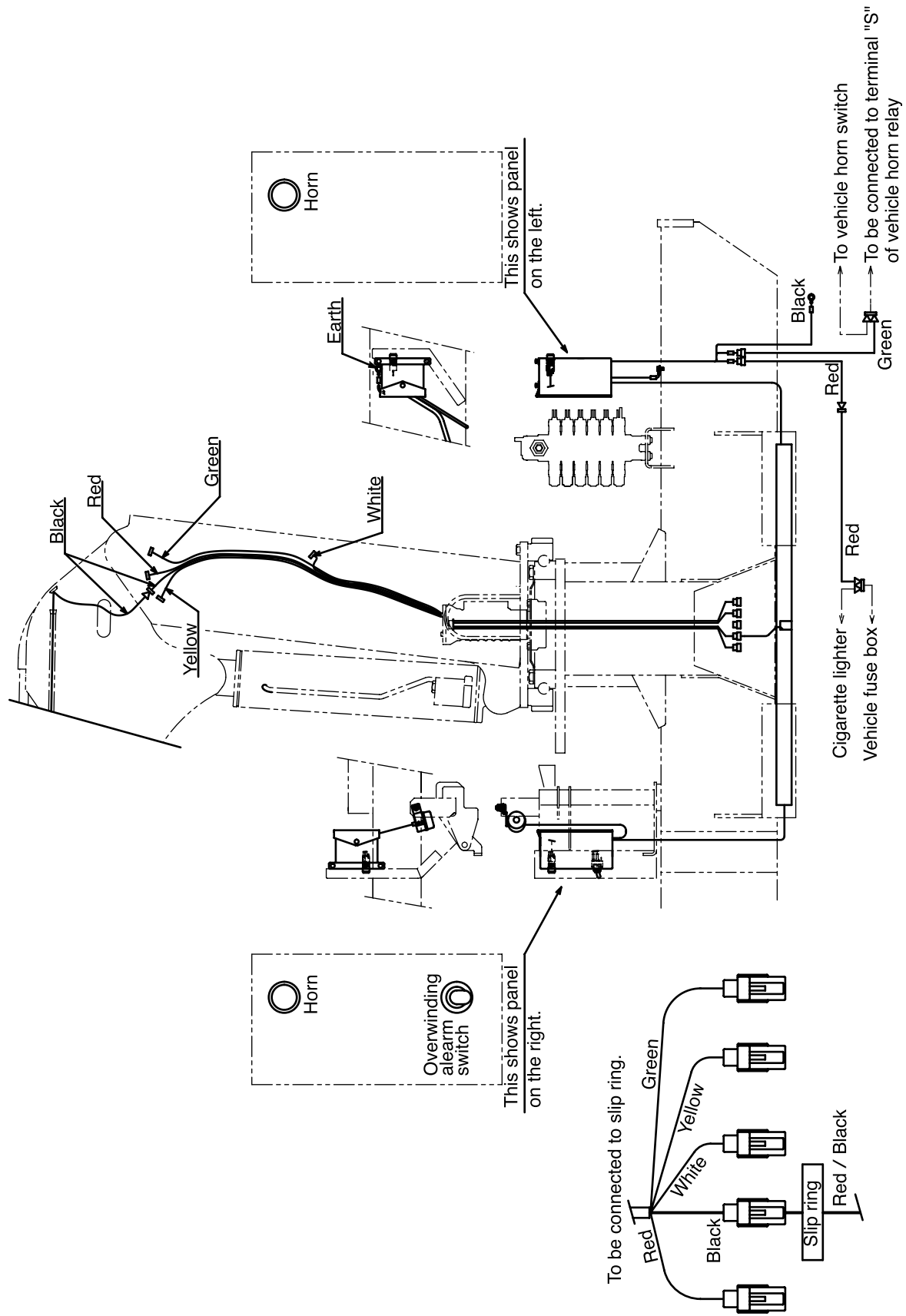
Be sure to turn the switch ON before starting crane work and check that the alarm sounds every time when the weight for overwinding alarm is lifted up.

★ Since the length of wire rope hanging the weight is specified by laws and regulations concerned, do not make it short at random.

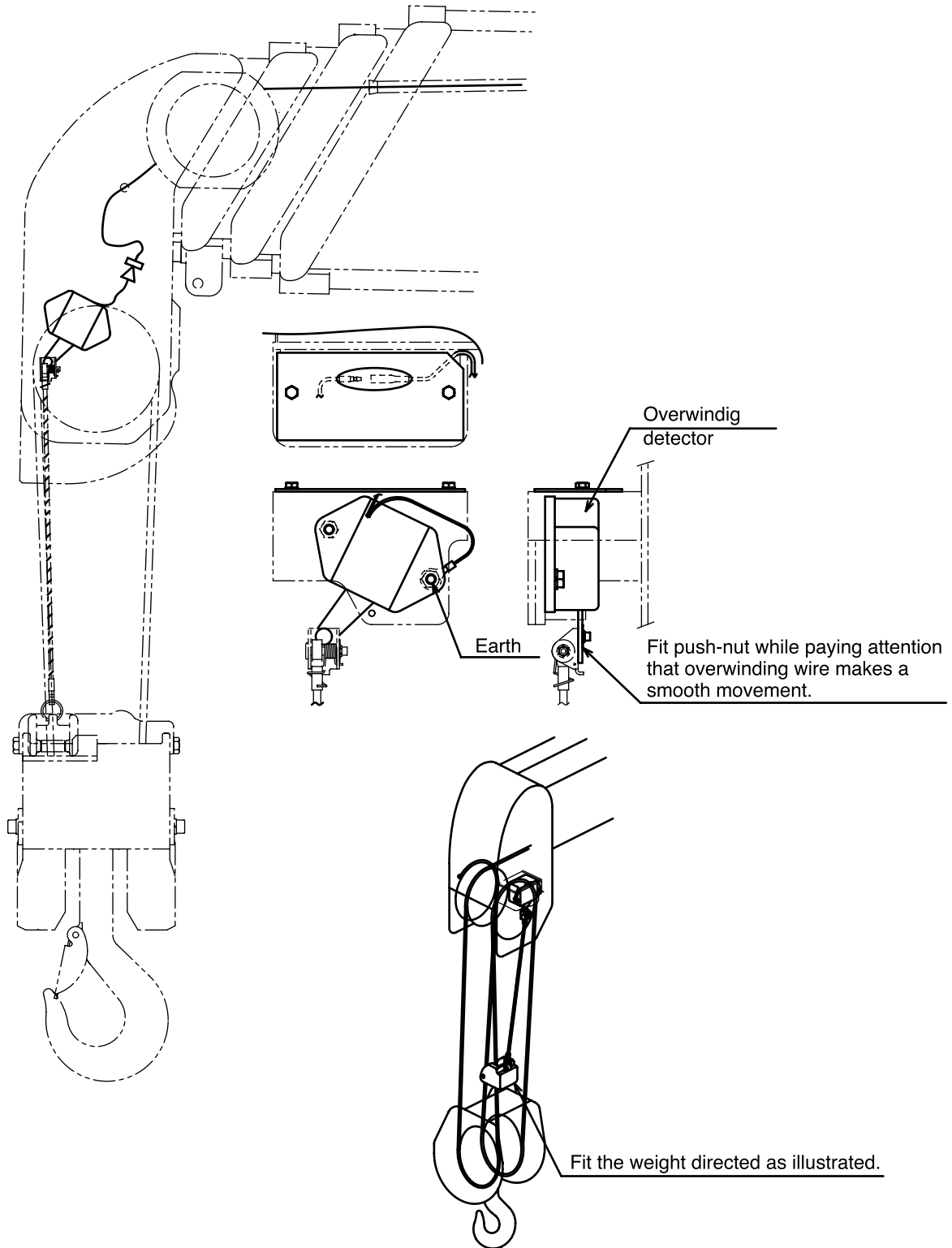
★ The alarm will not sound if the wires(cords) connected to the overwinding detector at the boom top is broken.

Pay attention to the wires(cords).

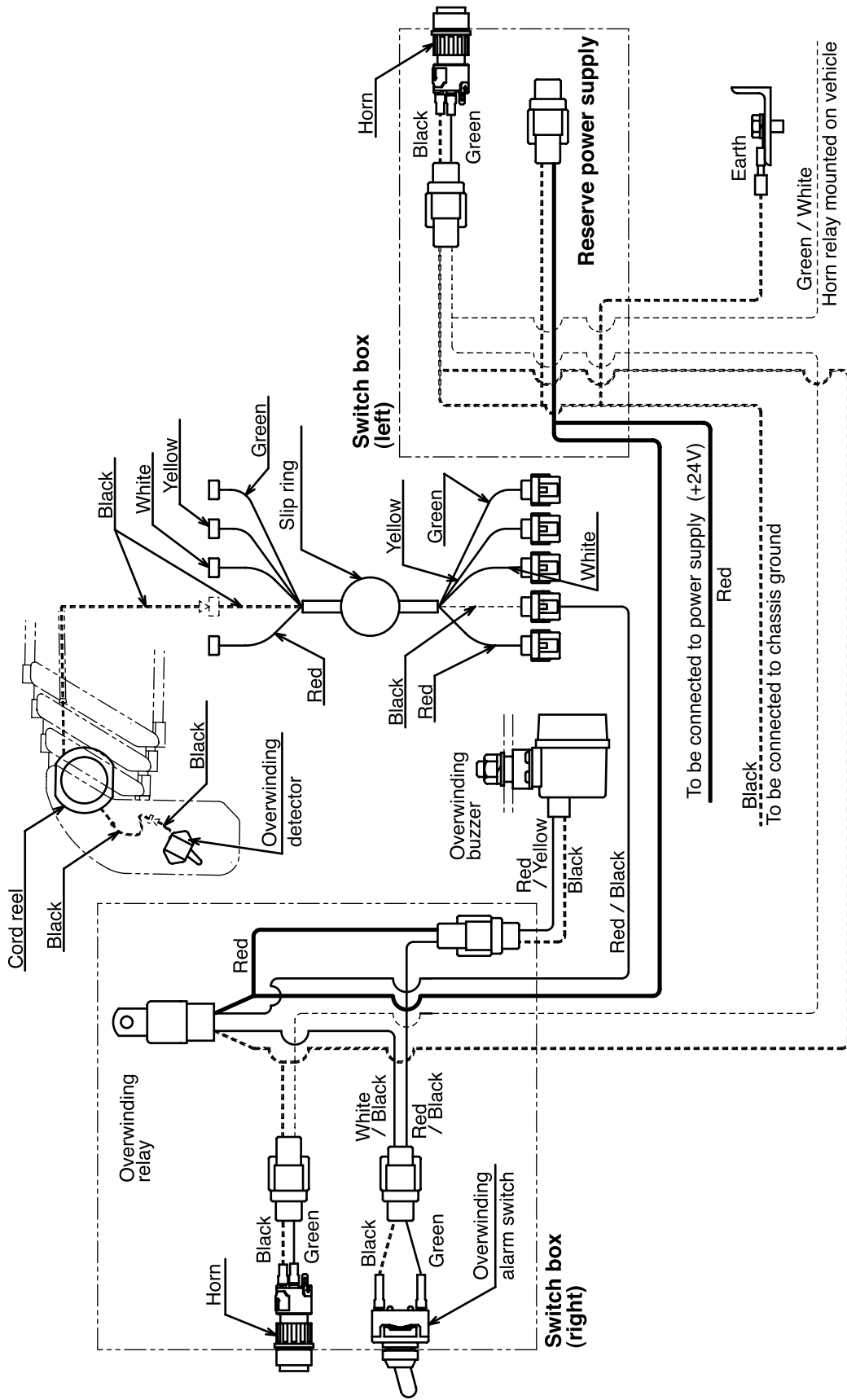
15. 2 General view



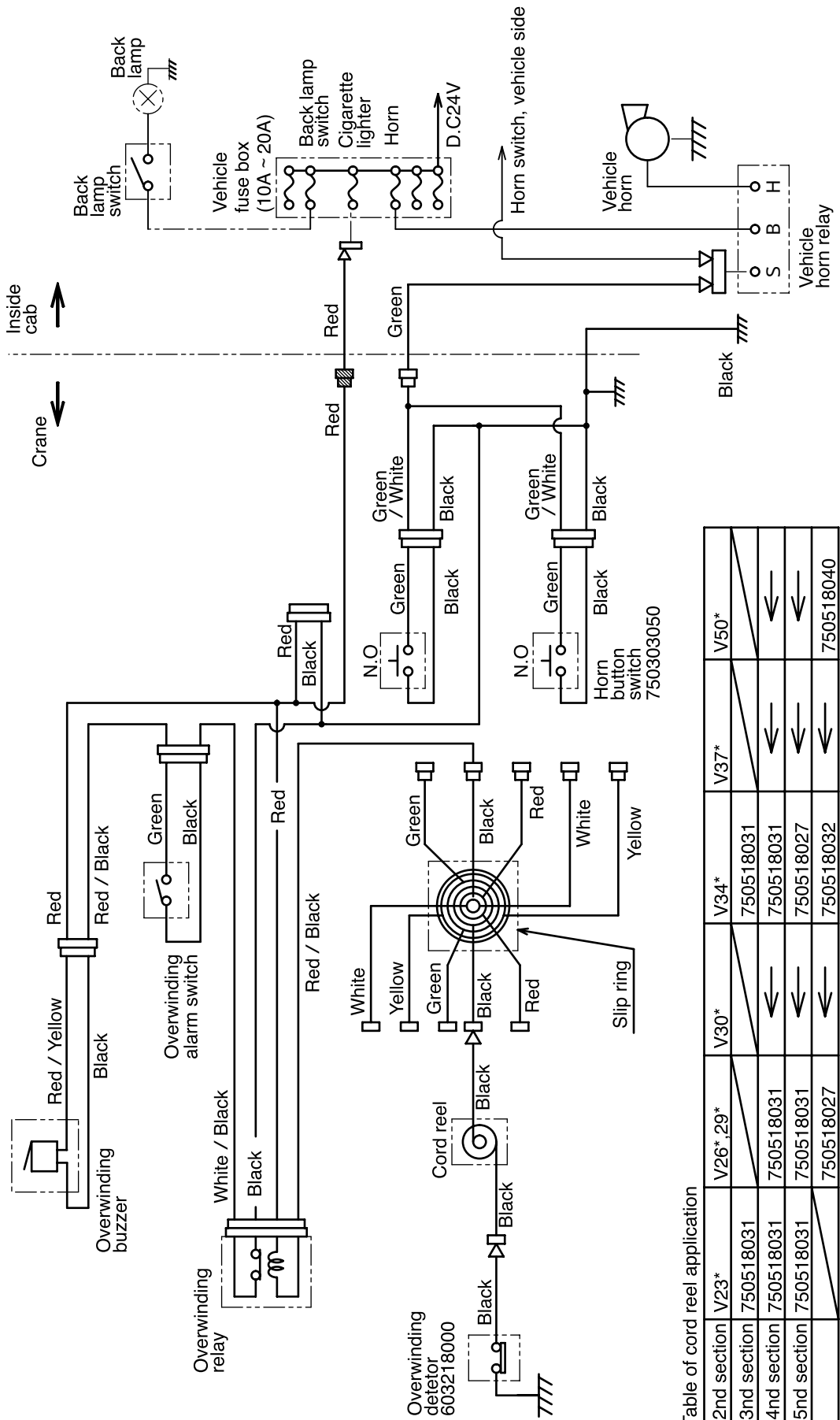
(1) Boom top in detail



15. 3 Illustrated wiring diagram, overwinding alarm

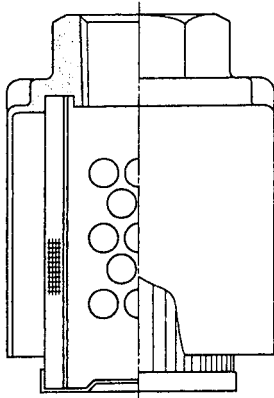


15. 4 Electric circuit diagram

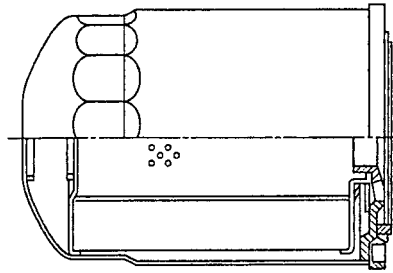


§ 16. FILTERS (Suction Filter and Line Filter)

(1) Suction filter and line filter



SUCTION FILTER



LINE FILTER

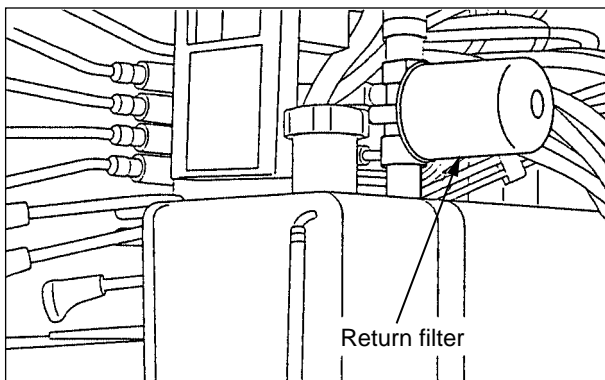
(2) Suction filter

The suction filter is attached to the inside of the oil tank at the end of the pump suction pipe. It is a notch-wire type. When changing hydraulic oil, check the filter that it is not clogged up. If it is, clean it.

Care must be taken against a clogged-up filter because it will adversely affect pump suction, possibly causing cavitation, abnormal noise, and pump failure.

(3) Line filter

The line filter is installed halfway between the control valve and oil tank. It is a filter paper type with a bypass valve. Filter replacing interval varies depending on the frequency of use. Generally, however, replace it for the first time three months after initial use of the crane, and once a year thereafter.



§ 17. CYLINDERS, HOW TO PUNCH

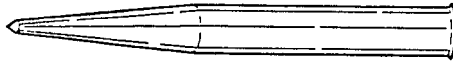
(1) Purpose

Troubles injuring the inside surface of cylinder tube due to screws mounting piston being loosened have been happened.

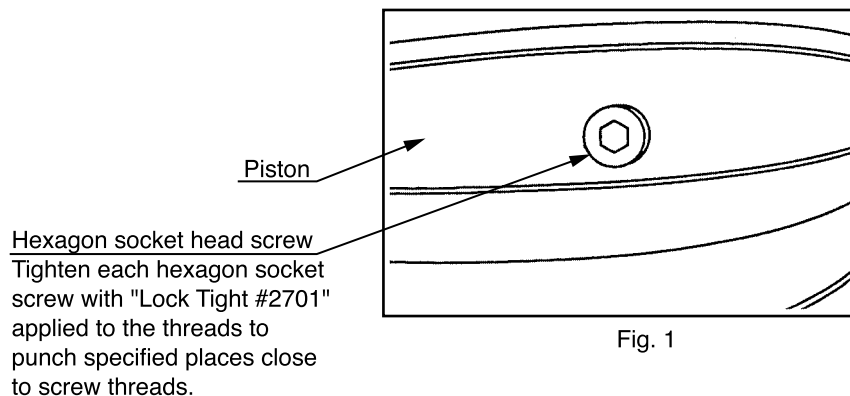
Therefore, we not only upgraded the screw lock agent “LOCK TIGHT #262” to “#2701” to strengthen adhesion but also added punching process (partly carried out for derrick cylinder). The section defines how to punch.

(2) Punching procedures

1. Use a punch whose tip is hard and sharp enough.



2. Hit the punch head hard enough with a hammer with the punch put at a distance of 1 ~1.5mm from the screw end.
3. Hit the punch head so hard that the diameter of punch mark will be more than 1.5mm
4. Punch 2 places around the screw thread in diagonal position.



Points to remember

1. Take care not to break the target piston while punching.
2. Make the clear punch mark as illustrated in Fig. 1.
3. Punch within 5 minutes after “LOCK TIGHT” has been applied.
(Try not to give shock to the area where “LOCK TIGHT” has been applied as it starts curing.)

§ 18. TELESCOPING/DERRICK CYLINDER ASS'Y, MEASURES TO PREVENT PISTON FROM BEING LOOSE

Description

In order to ensure preventing the pistons of telescoping and derrick cylinders from becoming loose, fix the screw threads on the rods and the pistons with the adhesive "LOCK TIGHT #638" (excepting for telescopic cylinders).

Besides, securing piston with screws and punching after application of "LOCK TIGHT #2701" are also to be carried out as before

(Rods and pistons are to be fixed perfectly by application of adhesive "LOCK TIGHT #638".)

Main points

Rods and pistons are fixed by tightening after application of "LOCK TIGHT" to the threads on the rods and on the pistons.

Apply "LOCK TIGHT" to the entire circumference of 2nd to 3rd threads from the thread end.

Apply the primer as the gap in the effective diameter of threads exceeds 0.1mm.

Use type #7474 (primer T) for the primer.

(Although type #7469 is being used currently, type #7474 is more effective as the target adhesion is to be at between metal components.)

Note : Pay special attention to observing the points to notice illustrated below while working as curing itself and curing time of "Lock Tight" depends largely on how the adhesion procedures have been carried out.

Points to notice on procedures to apply "LOCK TIGHT"

Procedures

1. Degreasing and cleaning → 2. Priming coating → 3. Application of "LOCK TIGHT" → 4. Assembly → 5. Curing

(1) Degreasing and cleaning

- Separate the oil well enough which has been applied to the threads (of rod/piston) to wipe it off with a rag or blow it off with compressed air.
When blowing it off with air, remember that the unclean oil will not be blown off but will just escape along the threads.
- In case of spray cleaning as well, target oil will not be removed but return if doing nothing but just spraying.
- After carrying out degreasing and cleaning, wait until cleaning fluid is dried up completely.

(2) Priming coating

- After primer #7471 has been applied, do not wipe it off but allow as it is for 5~10 minutes to dry naturally.
(Application of "LOCK TIGHT" without complete drying may result in reduction of adhesive strength by half.)
- Although a component primed is effective for 7 days, store it by preventing dust and/or oil from being stuck before use.
- When "LOCK TIGHT" is applied to a component and it is shut off air, curing will start after 5 minutes from application and will reach approx. 70% of curing in about 2 hours.
(Curing time will be shortened by priming, but theoretical adhesive strength will be 85% against a component without priming.)
- Do not dip a primed component in "LOCK TIGHT" agent directly.
- Carry out priming at a place where well ventilated because priming agent escapes into air as vapor.

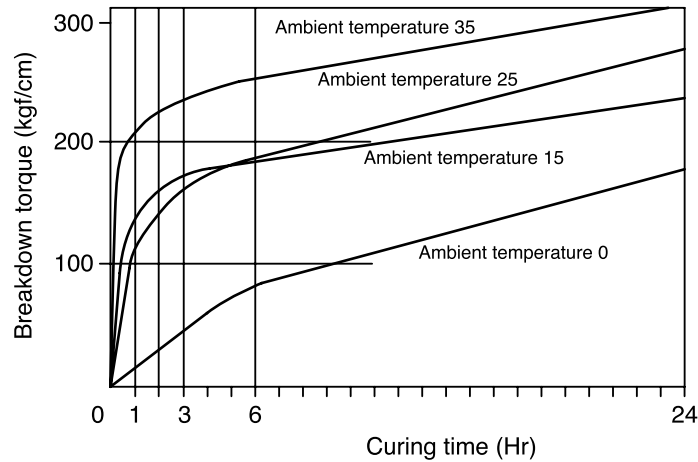
(3) Application of "Lock Tight"

- Apply "LOCK TIGHT" sufficiently to the threads to fill them.
Apply "LOCK TIGHT" to the component mounting o-ring (piston) at the 2nd to 3rd threads from the thread end.
(Refer to "Estimated adhesive consumption" illustrated below.)
- "LOCK TIGHT #638" is an anaerobic adhesive so that the part forced out will not cure because it is in contact with air. In addition, sticking of "#638" to o-rings and packings may cause the rubber to be deteriorate (as in crack).
(When it is possible to be stuck on the rubber such as o-rings and packing, apply "LOCK TIGHT" to the threads on piston side to avoid sticking to them.)
- Try shortening the working period from the time when application of the "LOCK TIGHT" to a primed component to completion of fitting the component.

(4) Assembly

- Tighten the component after application so that applied “LOCK TIGHT” may spread entirely to the threads of the component.
- Since “LOCK TIGHT” forced out of the threads will not be cured, take care not the “LOCK TIGHT” to be out during application as hydraulic oil is to be contaminated with it.
- Work quickly as the “LOCK TIGHT” in the treads starts curing.
- Curing speed differs according to temperature (ambient temperature included) of target component. Since curing time becomes excessively longer at a temperature below 10°C, work with the component temperature raised to 15°C or over.

Chart of breakdown torque vs. curing time Bolt: M10 × P1.5- L2S
 When using "Lock Tight #638" Nut: M10 × P1.5
 with primer #7471 (primer T) Material: Soft steel (raw)



(5) Curing

- This is a period while an adhesive is being joined.
 Store the components still during the period.
 (Recommended conditions is at an component temperature of 15°C min. for more than 1 hour.)

Reference:

Estimated adhesive consumption when it is applied to 3 spirals of thread entirely.

Threading diameter	Amount to be applied
M40	0.46 cc
M60	0.69 cc
M80	0.92 cc
M100	1.15 cc
M120	1.38 cc

Which primer of #7649 and #7471 should be used together with “Lock Tight #638”.
 Curing speed of #7469 is faster than that of #7471 but adhesion strength is lower.
 If adhesion is to be carried out between metal articles, #7471 gives better result.
 Type #7471 is to be used in normal case (refer to manufacturer’s comment and catalog specifications).

§ 19. INSUPECTION PROCEDURES WHEN CYLINDER SINKE

19. 1 Inspection of telescoping cylinder (3-section or 4-section boom)

(1) Preparation before inspection

- ① Allow booms to be horizontal and extend them fully to put a mark on each boom section (refer to Fig. 1).
- ② Raise booms to their maximum to sling a load.
- ③ In order to release pressure remained in the telescoping system, stop the engine and shift the manual lever for telescoping booms.

(2) Starting inspection

- ④ Remove the retraction hose to check if oil overflows continuously out of the cylinder port of retraction side.
At the same time, also check that which boom section sinks how far to grasp condition of booms as a whole.
If no oil flows out of the port of retraction side, the cylinder is normal.
- ⑤ Next, remove the extension hose, and if oil overflows continuously out of counter-balance valve port of extension side, there may be faulty on the seat surface of counter-balance valve (refer to Fig. 3).
In addition, check how far boom3 sinks simultaneously.

Caution:

In order to release pilot pressure in the retraction side, be sure to remove the extension hose after the retraction hose has been removed (refer to Fig. 2).

Since overflowing oil out of the port on retraction side means internal leakage in the cylinder, check tele1 and tele2 separately.

Be sure to measure the how far each boom sinks as it is an important point for judging that it is normal or abnormal.

(3) Inspection of tele1

- ⑥ Extend booms to a position where it is a little bit shorter than 2-section boom to put a mark on the boom (refer to Fig. 4).
- ⑦ Raise booms to their maximum to sling a load.
- ⑧ In order to release pressure remained in the telescoping system, stop the engine and shift the manual lever for telescoping booms.
- ⑨ Remove the retraction hose.
If oil overflows out of cylinder port of retraction side and boom2 sinks, there may be internal oil leakage in tele1.
In addition, check how far boom2 sinks simultaneously.

(4) Inspection of tele2

- ⑩ Allow booms to be horizontal and extend them fully to put a mark on each boom section (refer to Fig. 1).
- ⑪ Raise booms to their maximum to sling a load.
- ⑫ In order to release pressure remained in the telescoping system, stop the engine and shift the manual lever for telescoping booms.
- ⑬ Remove the retraction hose.
If oil overflows out of cylinder port of retraction side and boom3 sinks, there may be internal oil leakage in tele2.
In addition, check how far boom3 sinks simultaneously.

The same procedures in checking boom sinkage are applied for 5-section boom

Be sure to check the boom sections one by one reliably.

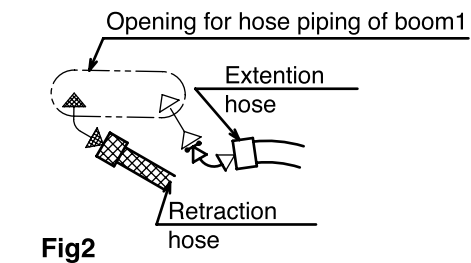
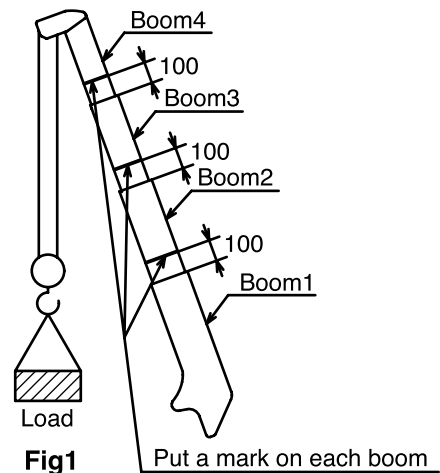


Fig2

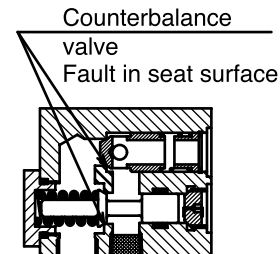


Fig3

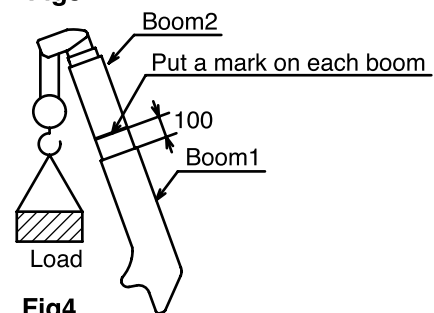


Fig4

19. 2 Inspection of derrick cylinder

(1) Preparation before inspection

- ① Raise booms to an angle of approx. 30°.
- ② Put a mark on the rod with a felt pen (refer to Fig. 1).
- ③ In order to release pressure remained in the derrick system, stop the engine and shift the manual lever for raising/lowering of booms.

(2) Starting inspection

- ④ Remove the lowering hose to check if oil overflows continuously out of the cylinder port of lowering side. At the same time, check also that how far the rod shifts. If no oil flows out of the port of lowering side, the cylinder is normal.
- ⑤ Next, remove the raising hose, and if oil overflows continuously out of counter-balance valve port of raising side, there may be faulty on the seat surface of counter-balance valve (refer to Fig. 3). In addition, check how far the cylinder sinks simultaneously.

Caution:

In order to release pilot pressure in the lowering side, be sure to remove the raising hose after the lowering hose has been removed (refer to Fig. 2).

If oil overflows out of the port on lowering side, it suggests internal leakage in the cylinder.

Be sure to measure the how far each boom sinks as it is an important point for judging that it is

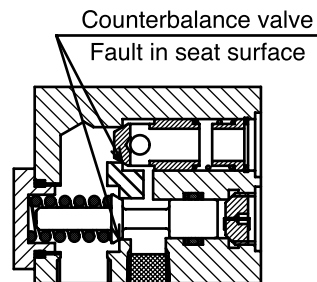
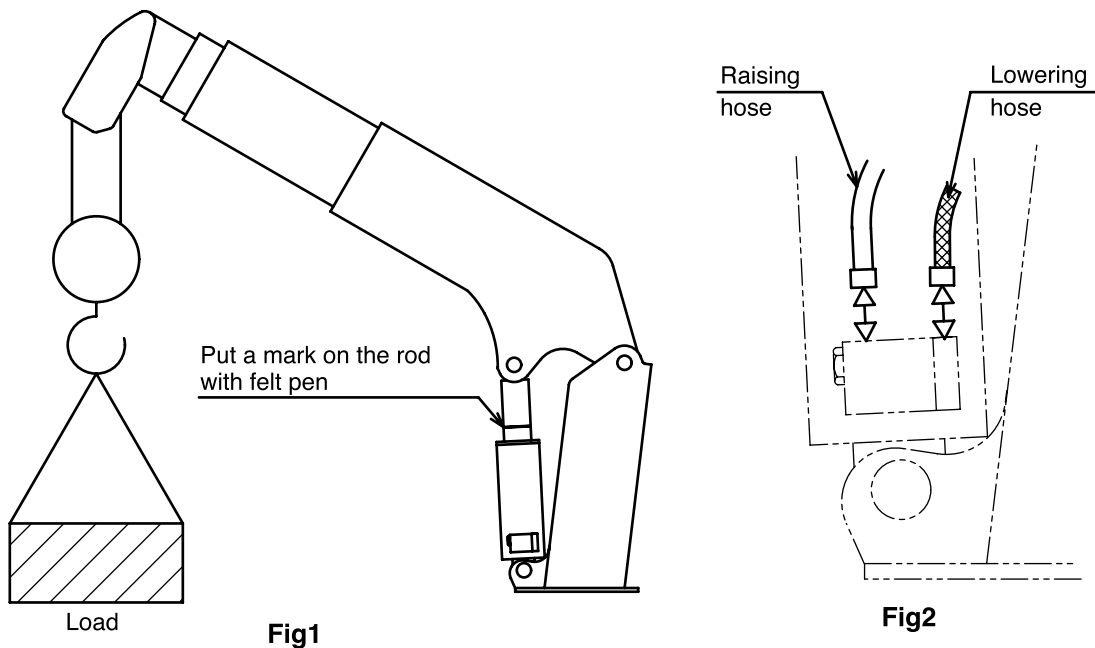


Fig3

19. 3 Inspection of outrigger cylinder

(1) Preparation before inspection

- ① Extend outrigger cylinders to their extremes.
- ② Put a mark on the rod with a felt pen (refer to Fig. 1).
- ③ In order to release pressure remained in the outrigger system, stop the engine and shift the manual levers for extension/retraction of outriggers.

(2) Starting inspection

- ④ Remove the retraction pipe to check if oil overflows continuously out of the cylinder port of retraction side. At the same time, check also that how far the rod shifts. If no oil flows out of the port of lowering side, the cylinder is normal.
- ⑤ Next, remove the extension pipe, and if oil overflows continuously out of the pilot check valve port of raising side, there may be faulty on the seat surface of pilot check valve (refer to Fig. 2). In addition, check how far the cylinder sinks simultaneously.

Caution:

In order to release pilot pressure in the retraction side, be sure to remove the extension pipe after the retraction pipe has been removed (refer to Fig. 1).

If oil overflows out of the port on retraction side, it suggests internal leakage in the cylinder.

Be sure to measure the how far each boom sinks as it is an important point for judging that it is

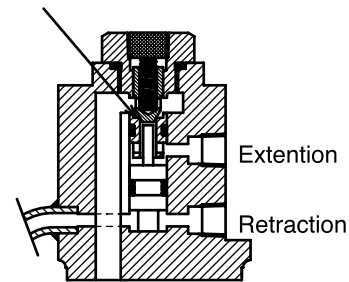


Fig2

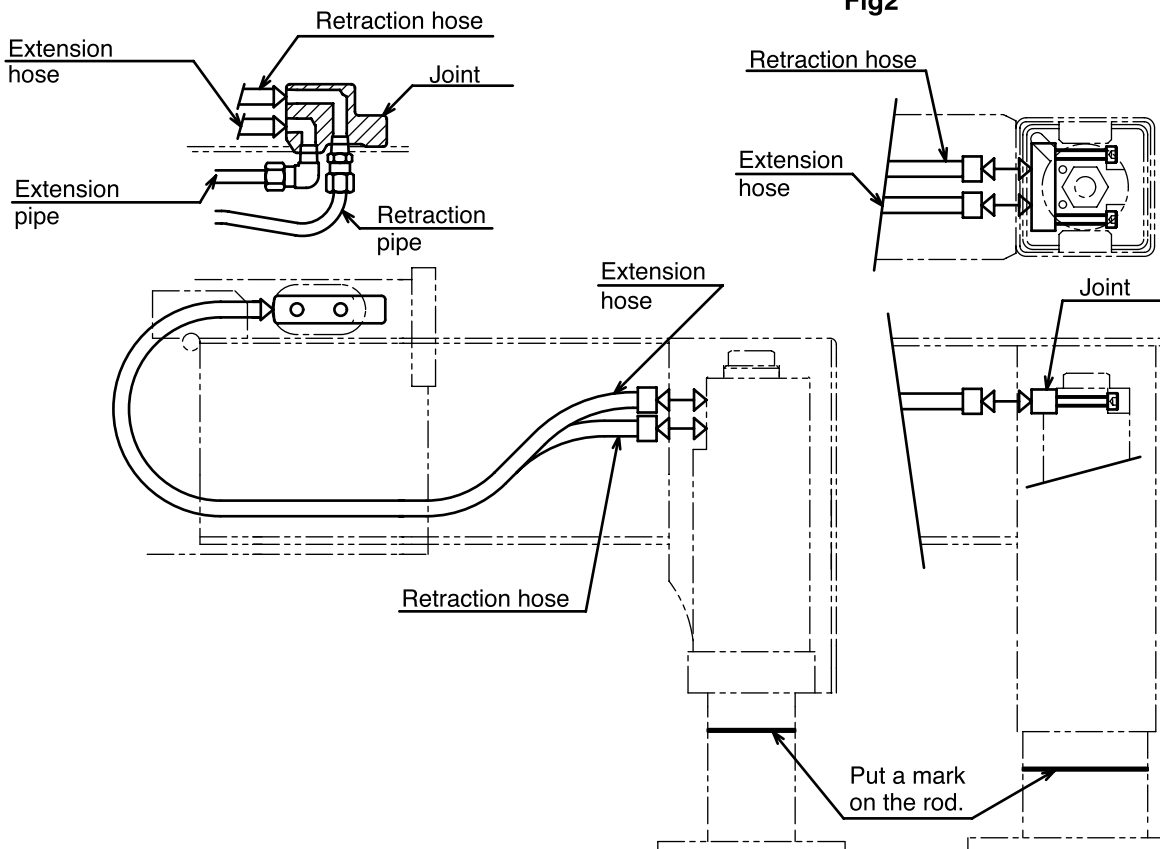


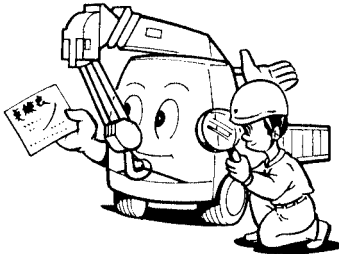
Fig1

URV230,260,290
URV300,340

URV370,500

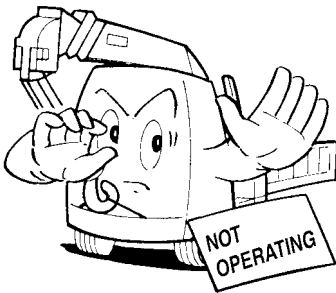
§ 20. MAINTENANCE AND INSPECTION

WARNING



★ Inspection before operation and periodical inspection.

Perform the inspection before operation and independent periodical (monthly and annual) inspection, and make repairs immediately when anything abnormal is found.

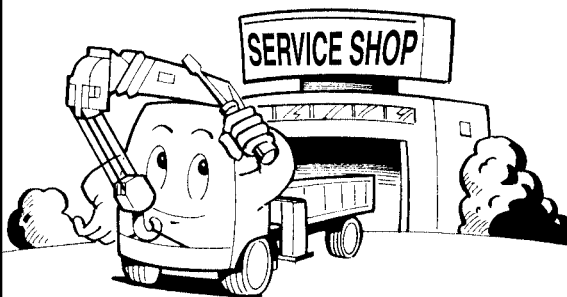


★ Caution signboard

Whenever carrying out maintenance and inspection, be sure to hang out a "caution signboard" and do not try operating the crane.

★ Be sure to replace consumable items according to the replacement criteria.

Failure to observe the replacement as specified may cause a breakdown and warranty will not be given even if it is within the period to be applied.



★ When parts need to be replaced or anything abnormal is found, ask an authorized UNIC service shop for inspection or repair as soon as possible.

20. 1 Inspection\

(1) Inspection before operation

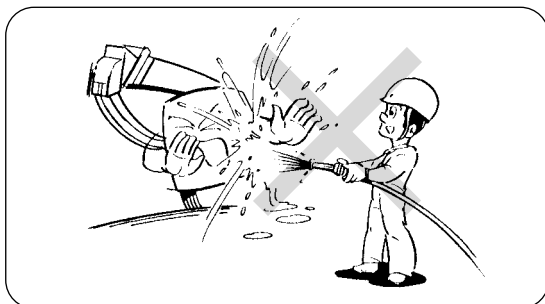
In order to secure safe operation and improve working efficiency, be sure to inspect each part of the crane according to the table as follows;

Device	Inspection for:
P.T.O.	Oil leakage, Unusual noise
Hydraulic oil tank	Oil level, Oil leakage
Outriggers	Operation, Deformation, Damage, Oil leakage, Cracks
Hoisting winch	Operation, Braking function, Irregular winding
Slewing device	Operation, Oil leakage
Boom(derrick-ing)	Operation, Oil leakage, Mounting of foot-pin
Boom(telescoping)	Operation, Oil leakage, Deformation, Cracks, Mounting of fixing pin
Hook	Rotation of hook, Function of hook safety latch

Device	Inspection for:
Wire rope	Damage, Condition of rope-end
Overwinding alarm	Operation, Buzzer sound
Load meter	Oil leakage, Operation
Warning horn	Operation
Piping(hydraulic)	Oil leakage
Base	Fastening tightness of crane body mounting bolts
Slings implements	Missing necessary items
Uni-hook	Operation of automatic stop and storing function

CAUTION

★ Always keep the machine in good condition so that it is ready for normal operation.



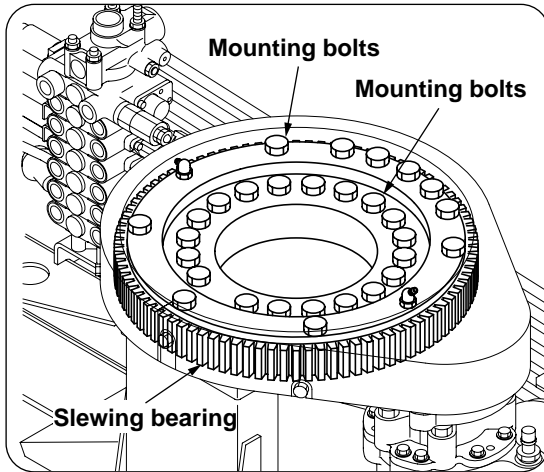
Cleaning

Keep the machine clean at any time.

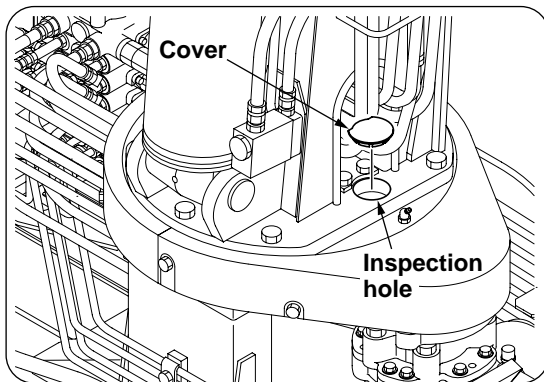
Sand and fine dust may cause an abnormal wear of the machine.

Do not wash the machine by splashing water with high-pressure to prevent the water from entering into the electric system which may cause malfunction of the machine.

(2) Inspection of the slewing bearing mounting bolts



When the slewing device makes an unusual noise while operating or traveling of the crane, or when a gap is created on the mounting surface, contact a UNIC authorized service shop for inspection and/or repair.

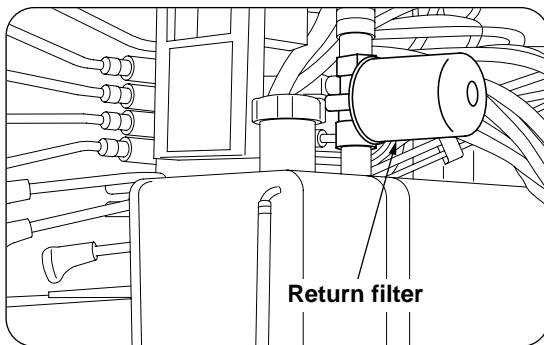


◆ Inspection of mounting bolts located inner race

1. Remove the cover to inspection hole.
2. Slew the boom so that each mounting bolt comes to the center of inspection hole for inspection.
3. Fit the cover as it was after inspection.

20. 2 Replacement

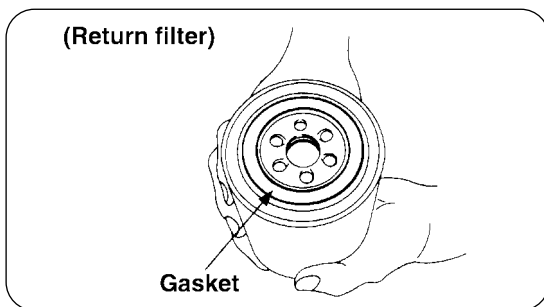
(1) Replacement of return filter



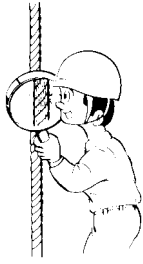
The replacement of the return filter is depends on how often the crane has been operated, however, as a general rule, replace it after 3 months of initial operation and once a year thereafter.

How to replace

- Give the gasket a thin coat of oil.
- Screw in the cartridge and tighten it with your hand securely.



(2) Replacement of wire rope (for winding-up)



Wire rope is an expendable article and it will be damaged or broken in its strand wires through a long period of use. Replace the rope according to following criteria.

◆1. Replacement criteria

1. A rope in which amount of broken strand wires (except filler wires) comes to more than 10% within a pitch of strand. Replace the wire ropes intended for use with this crane if 13 pieces of strand wire have been broken within a pitch of strand.

2. A rope being kinked.

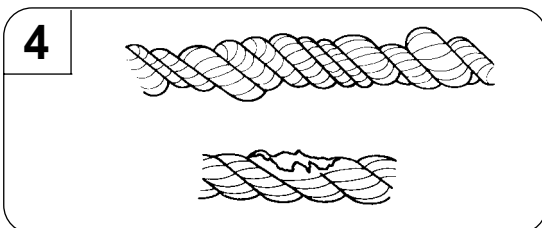
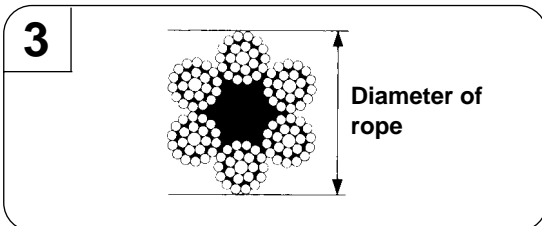
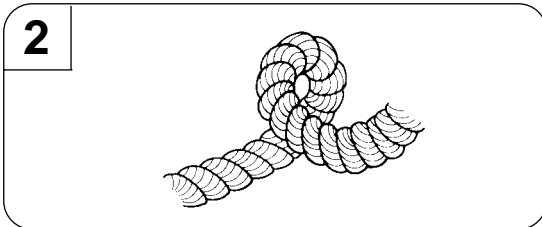
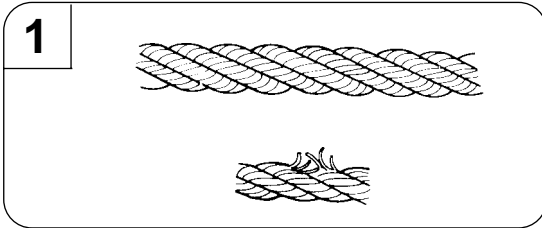
3. A rope from which its diameter has decreased by more than 7% of the nominal diameter.

For example, if wire rope with a nominal diameter of 8mm is used, replace it when the diameter becomes 7.5mm.

For length and construction of the wire rope for winding-up.

4. A rope which has been deformed and/or corroded excessively.

★ Be sure to replace a wire rope when it comes under the criteria, item 1 through 4, illustrated above.

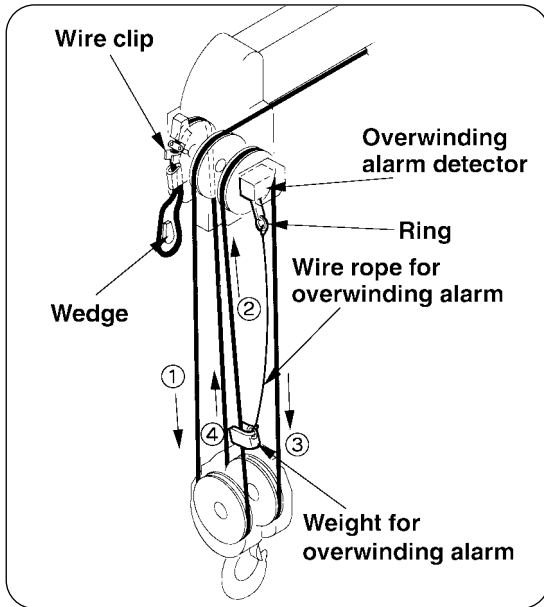


 **CAUTION**

★ Wear leather gloves when replacing wire ropes.

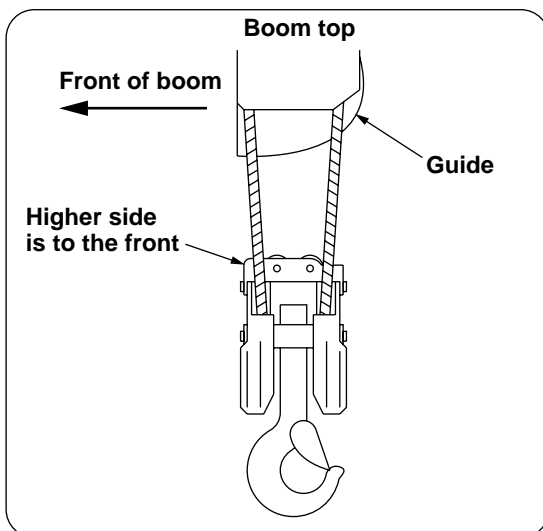
◆2. How to replace wire rope

1. Refer to the figure in the left for how to hook the wire ropes for hoisting and for where to mount the weight for overwinding alarm.



For Uni-hook type

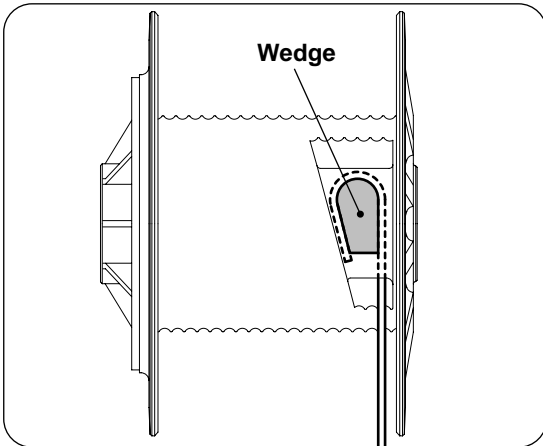
Refer to the figure in the left for how to install hook.



2. How to fix the wire rope end

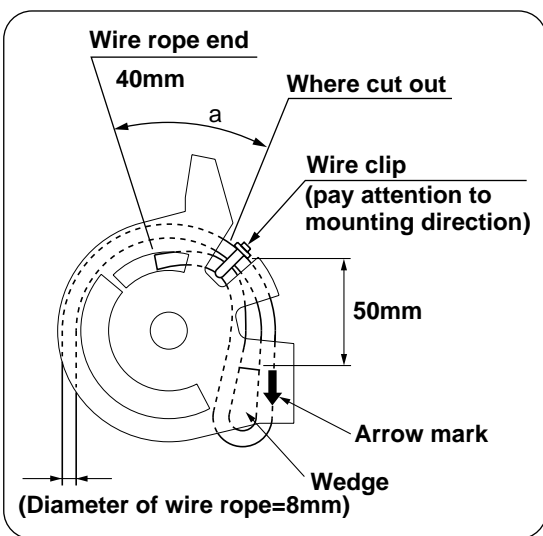
● Winch drum

- ① When passing a wire rope end through the winch drum, pass it so that the rope end comes inside as illustrated in the left.
- ② Pay attention that wire rope end will not be jugged out of the winding-up area of winch drum.
- ③ In order to avoid irregular winding, wind up a wire rope slowly on the drum along its groove with a proper tension applied to the rope to form the 1st layer. From the 2nd layer on, wind up the rope over the wound-up layer so that it is fit in each gutter formed between ropes wound side by side of the layer below.

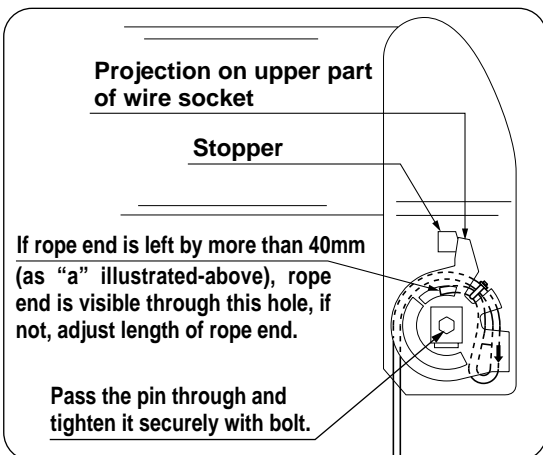


● Wire socket

- ① When passing a wire rope end through the wire socket, be sure to pass it as indicated by the arrows on the socket. Leave the wire rope end more than 40 mm as "a" illustrated in the figure in the left. If it is passed from the opposite direction, service life of the wire rope shrinks as the wire rope is kept bent all the time.
- ② Do not forget to mount the wedge and the wire clip as illustrated in the figure in the left.



- ③ Pass the pin through with the wire socket held with your hand and tighten it with the bolt securely.



◆3. How to correct the twisted wire ropes

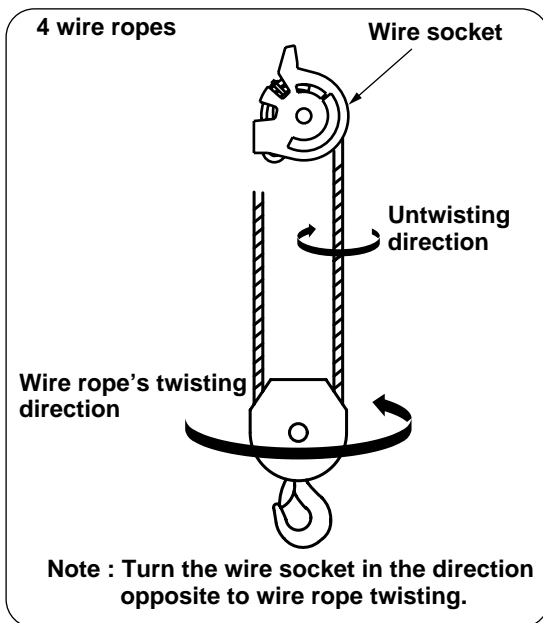
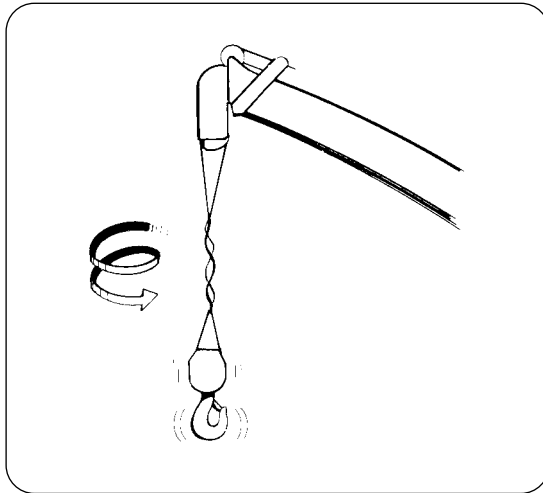
Wire ropes tend to turn in the untwisting direction when they are under tension.

If two or more wire ropes are hooked together, they tend to be twisted particularly while they are new.

The twist will decrease as the ropes are getting fit to the crane.

If wire ropes are twisted, correct them as follows;

1. Unload the hook.
2. Extend the boom fully.
3. Set the boom to an angle of approximately 65° .
4. Unwind the hook until it comes close to the ground.
5. Check how many turns the wire rope has been twisted.
6. Hoist the hook and retract the boom to be on a stored condition.
7. Remove the wire socket and turn the socket in the untwisting direction by as many turns as the wire ropes have been twisted multiplied by the number of wire ropes hooked. Remember, however, that the wire socket may be turned up to 4 turns at a time.
8. Attach the wire socket and repeat hoisting and lowering the rope 2 or 3 times between extremes of lift. Then check if twist of the wire ropes is corrected. If they remain twisted, repeat the procedures shown above.

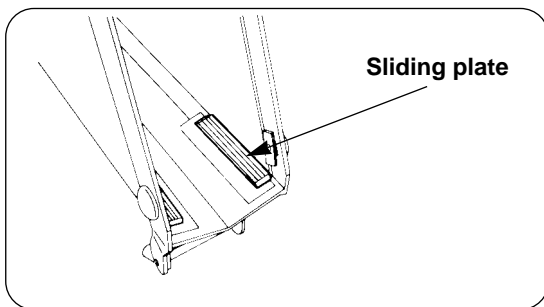


(3) Replacement of expendable parts

◆1. Replacement of gaskets and seals for each cylinder

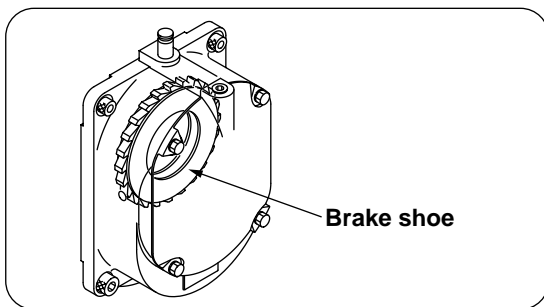
Although timing of replacing a part varies according to how frequently the crane has been operated, replace gaskets and seals used in each cylinder after every 3 years of operation (period during which crane is not operated is included) in order to operate the crane safely.

Ask a local UNIC authorized service shop for replacement of gaskets and/or seals.



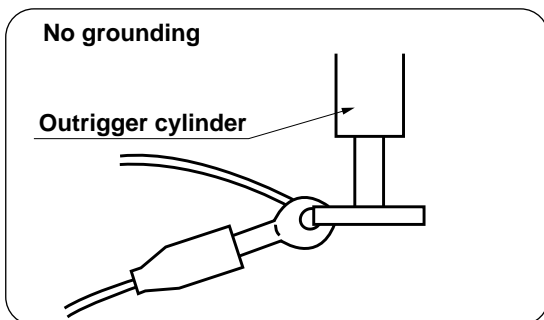
◆2. Replacement of sliding plate of boom

Replace it every 3 years.



◆3. Replacement of brake shoe in hoisting winch

Replace it every 3 years.



Welding precautions

When welding is needed for some reason, do not use outrigger cylinder for welding ground as the cylinder rod and/or the piston may be damaged by electric sparks due to current flow in the inner part of cylinder.

§ 21. LUBRICATION

WARNING



★ Do not carry out maintenance and service while temperature of hydraulic oil is still high.

★ Temperature of both hydraulic and gear oils is high immediately after crane operation so that accumulated high pressure still remains inside.

Uncapping the filler port, draining oil, and replacing filter while oil temperature is high allow hydraulic and/or gear oils to spout out and a scald may result.

21. 1 Precautions on lubrication



Lubricate according to "Lubrication chart" and keep the following instructions in mind when carrying out lubrication.

1. Thoroughly clean filler ports and grease nipples before lubrication.
2. Always supply new lubricant and prevent dusts from entering inside.
3. When supplying grease into each nipples, be sure to inject it until old grease is forced out of it.

CAUTION

★ In order to ensure smooth operation of each part of the crane, minimum wear, and longer service life, be sure to supply lubricant as well as hydraulic oil which is necessary to drive hydraulic equipment.

★ Warranty will not be given, even if it is within the period to be applied, for failure to observe the replacement of lubricant as specified.

(1). List of recommended lubricants

RECOMMENDED GREASE

(a) Chassis grease

Use NLGI No. 1 grade.

Petroleum Maker	Brand
ESSO	Chassis grease L
MOBIL	HP221
CALTEX	Multifak EPI
SHELL	RETINAX-CD

(b) Molybdenum grease

Use NLGI No. 2 grade.

Petroleum Maker	Brand
ESSO	Beacon Q2
MOBIL	Mobilplex Special
CALTEX	Molytex Grease EP2
SHELL	Retinax AM

RECOMMENDED GEAR OIL

Use API Service GL-4 gear oils.

Petroleum Maker	Brand
ESSO	Standard gear oil 90
MOBIL	Mobilube SAE 90
CALTEX	Universal Thuban SAE 90
SHELL	Shell Spirax EP 90

RECOMMENDED HYDRAULIC OIL

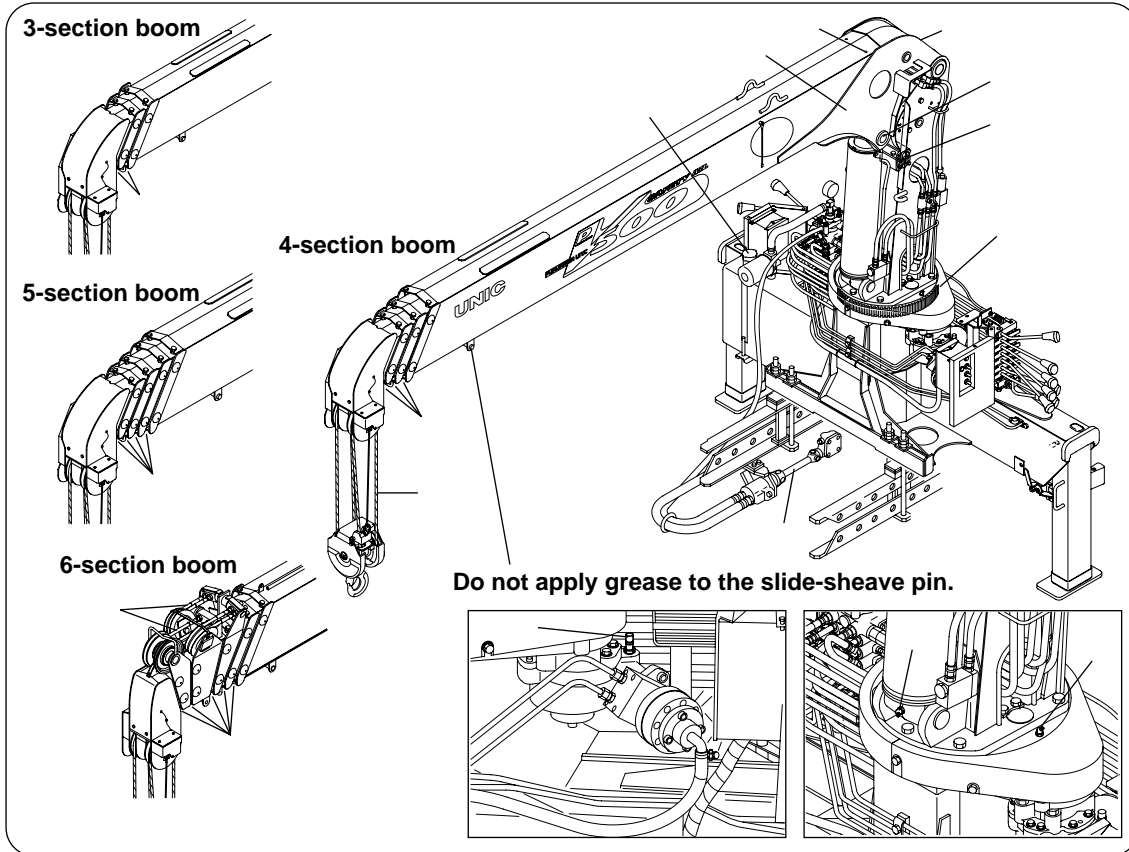
Use industrial-type hydraulic oil;

ISO VG 46 for most temperatures

ISO VG 32 extremely low temperatures

Petroleum Maker	Brand	
	ISO VG 32	ISO VG 46
ESSO	UNVICE J32	Teresso 46
MOBIL	Mobil DTE 13	Mobil DTE 25
CALTEX	Rando Oil HD AZ32	Rando Oil 46
SHELL	Shell Tellus Oil 32	Shell Tellus Oil 46

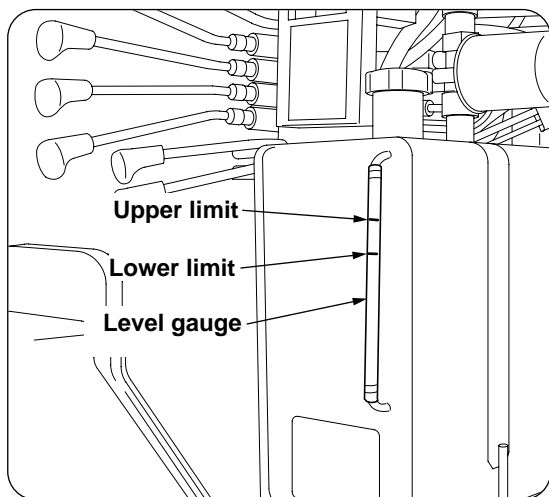
(2) Lubrication chart



Service interval	Part to be lubricate	No. of part	Lubricant	Tool
Daily	Boom slide plate(Underside/sides of boom sections ,) 3-section boom	2	Molybdenum grease	Manual application
	Boom slide plate(Underside/sides of boom sections , ,) 4-section boom	3	Molybdenum grease	Manual application
	Boom slide plate(Underside/sides of boom sections , , ,) 5-section boom	4	Molybdenum grease	Manual application
	Boom slide plate(Underside/sides of boom sections , , , ,) 6-section boom	5	Molybdenum grease	Manual application
	Boom slide plate(Upper side of boom section)	2	Molybdenum grease	Grease pump
	Boom foot pin	1	Chassis grease	Grease pump
	Upper support pin of derrick cylinder	1	Chassis grease	Grease pump
	Lower support pin of derrick cylinder	1	Chassis grease	Grease pump
	Oil tank(59l)	1	Hydraulic oil(up to middle of level gauge)	
Weekly	Winch drum gear	1	Chassis grease	Grease pump
	Slewing gear(to gear-teeth)	1	Chassis grease	Manual application
	Propeller shaft	3	Chassis grease	Grease pump
Monthly	Winch reduction gear(approx.1.0l)	1	Gear oil	
	Slewing reduction gear(approx.1.2l)	1	Gear oil	
	Wire rope	1	Rope grease	Spray gun
	Slewing bearings	2	Chassis grease	Grease pump
	Wire rope for boom extension		Rope grease	Spray gun

21. 2 Lubrication

(1) Replacement of hydraulic oil



★ The amount required for oil change is 22 liters when filled up to the middle between upper and lower limits of the level gauge.

★ The oil should be replaced at early autumn because there is possibility of freezing moisture in the tank as well as in the hydraulic circuit when temperature goes below the freezing point. (Depending on the countries)

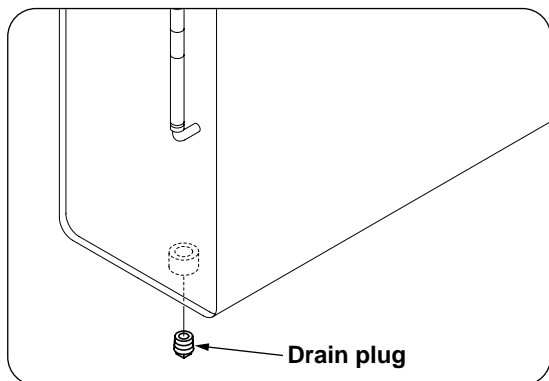
★ Air entering in the oil tank brings dirt and moisture. In addition, since hydraulic equipment gradually wears to produce worn particles, replace the oil 3 months after the start of crane operation then once a year thereafter.

★ Tighten the cap securely with your hand after oil has been refilled. Remember that hydraulic oil may leak out if the cap is loosely tightened.

CAUTION

★ Do not mix a different brand of hydraulic oil as properties of mixed oil deteriorates and damage to hydraulic equipment results.

(2) Draining hydraulic tank

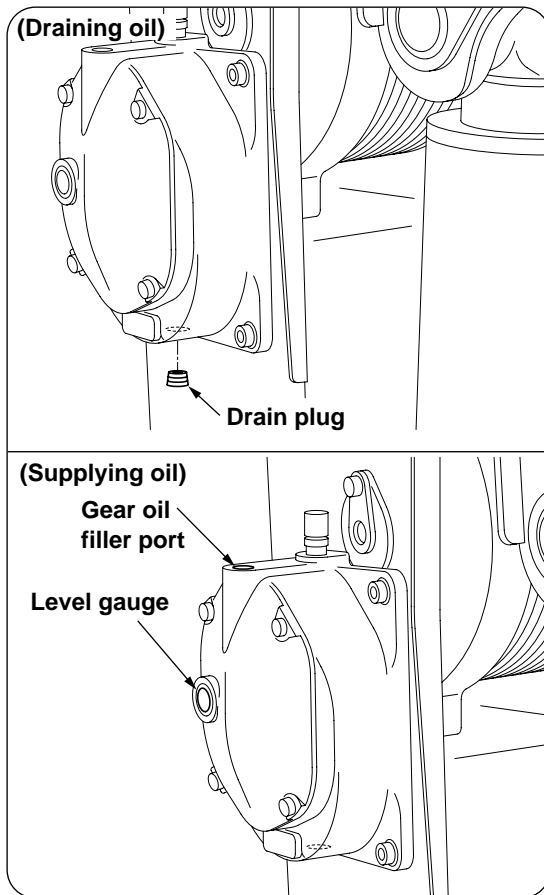


Remove moisture in the hydraulic tank.

Moisture may enter through the air-breather and it is mixed with the hydraulic oil when the crane has been operated for a long time. Remove the drain plug located at the bottom of the tank to drain the water.

(2) Replacement of gear oil(Winch reduction gear-Slewing reduction gear)

Winch reduction gear



★ Air enters in and out of the gear case so that dirt and moisture are brought in the gear case.
In addition, since hydraulic equipment gradually wears to produce worn particles, replace the oil 6 months after the start of operation.

★ After that replace gear oil;

·Once a year for winch reduction gear, and.

·Once every 2 years for slewing reduction gear.

CAUTION

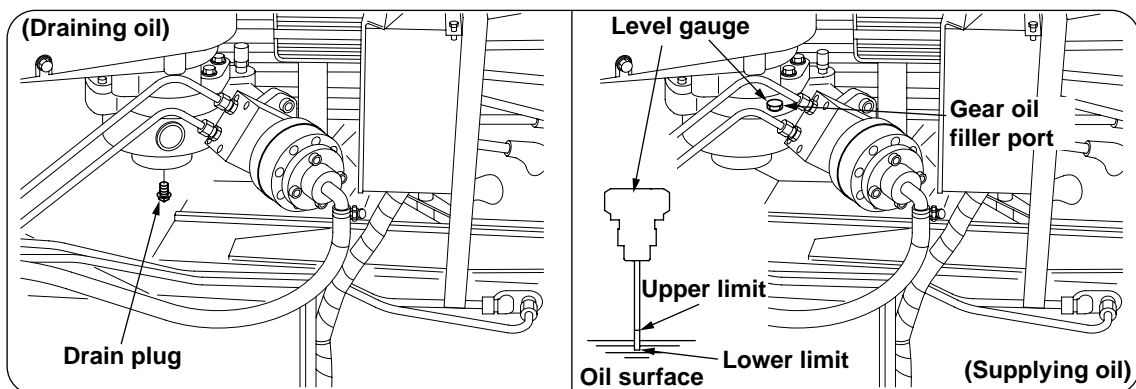
★ Replace gear oil after oil temperature has dropped.

★ For gear oil to lubricate winch reduction gears, fill it up to the middle of the oil level gauge (approx. 1.0 liter).

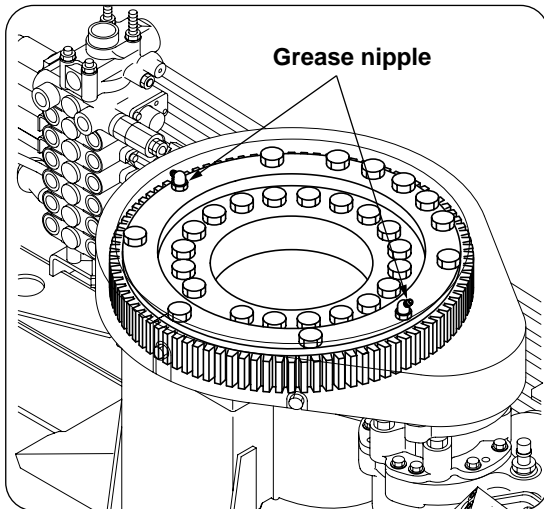
★ For gear oil to lubricate slewing reduction gears, fill it up to a level between upper and lower limit marks of the oil level gauge (approx. 1.2 liters).

Check oil level not by tighten up the oil level gauge cap but by just inserting the gauge in the filler port.

Slewing reduction gear

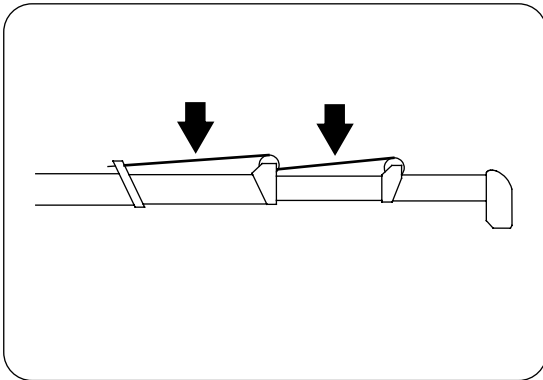


(3) Lubrication to slewing bearings



The machine uses ball bearing as the slewing bearing. Be sure to lubricate the bearing as insufficient lubrication may cause it to make unusual noise. Grease in the nipples while slewing the boom once a month for moderate operation, and once a week for heavy-duty operation.

(4) Lubrication to wire rope for boom extension



Spray the rope grease sufficiently once a month to the wire ropes with the boom fully extended.

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