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WORKSHOP MANUAL
HYDRAULIC CRANE

MODEL

UR SERIES

UR220, UR250, UR260,
UR290, UR330, UR360,
UR500

FURUKAWA UNIC CORPORATION

1989-6

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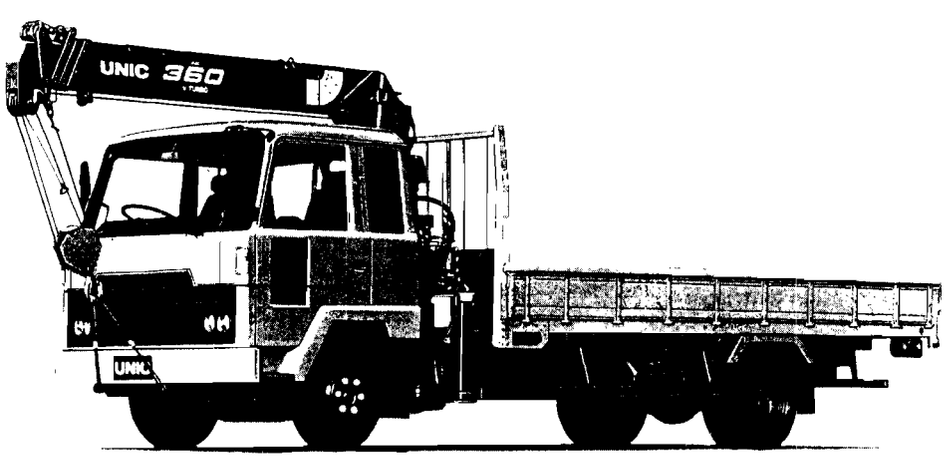
INTRODUCTION

This technical instruction manual describes the construction of the UR truck cranes and maintenance procedures for the servicemen engaged in their maintenance.

Please carefully read the manual to acquire the proper maintenance skills and provide efficient, speedy, correct services that are essential to customer trust. In this way, UNIC truck cranes will be able to deliver their superb performance and be kept in satisfactory operating condition. It is recommended that the separate parts list be referred to together with this manual.

Technical Section, Service Department

FURUKAWA UNIC CORPORATION



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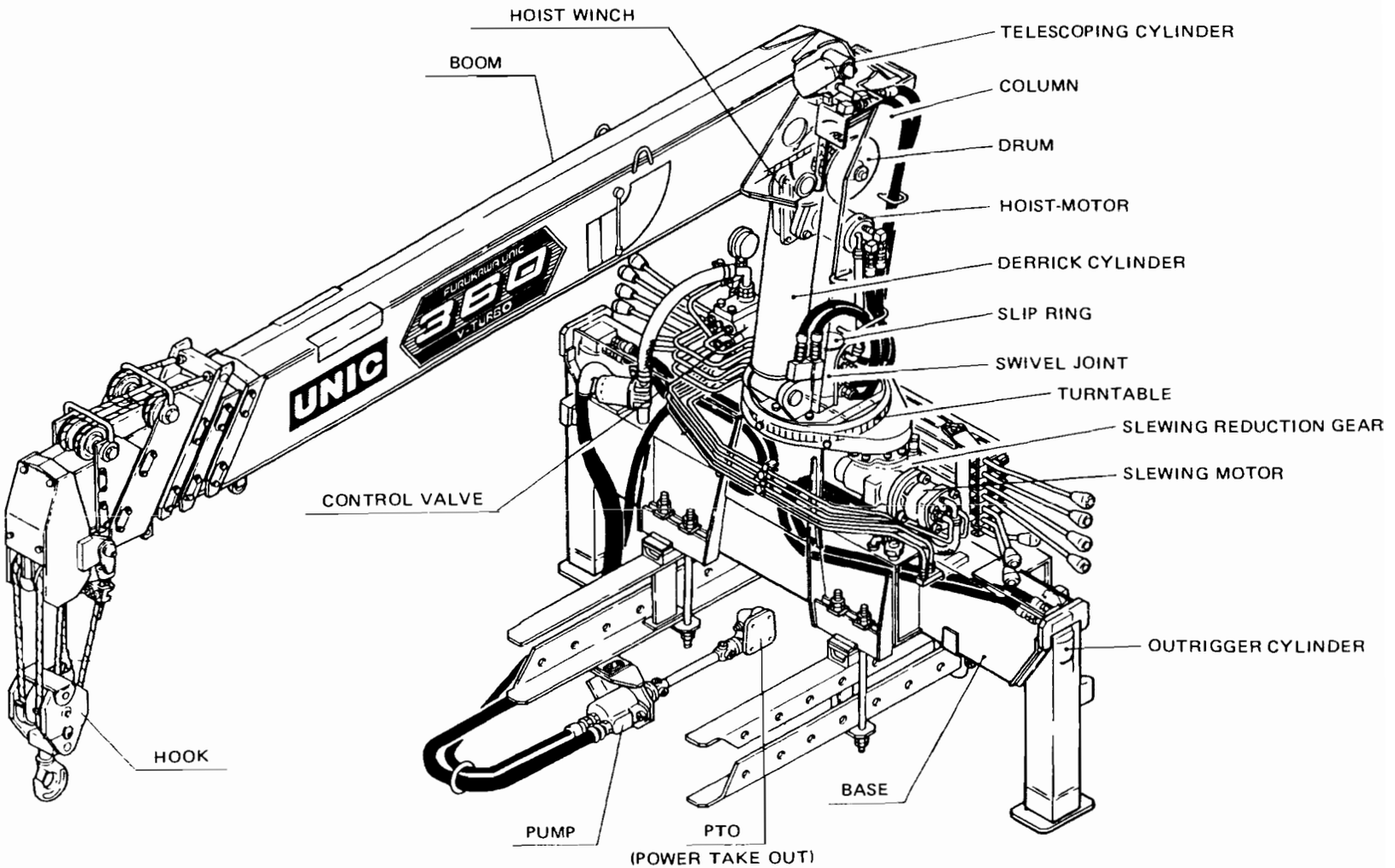

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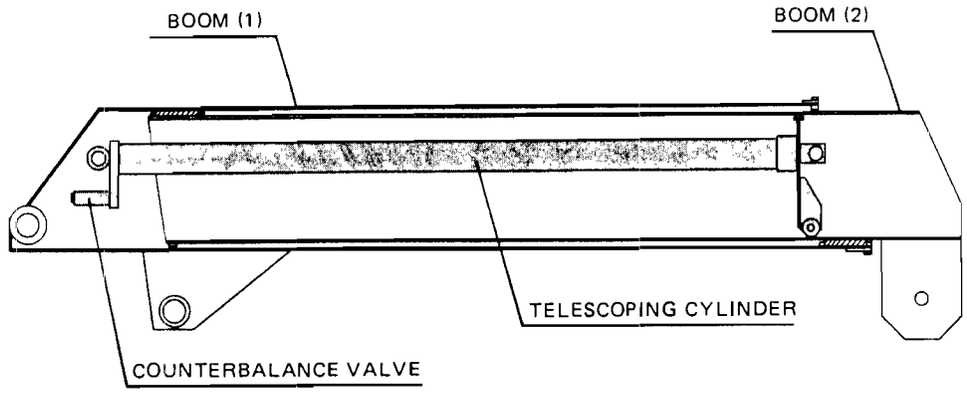
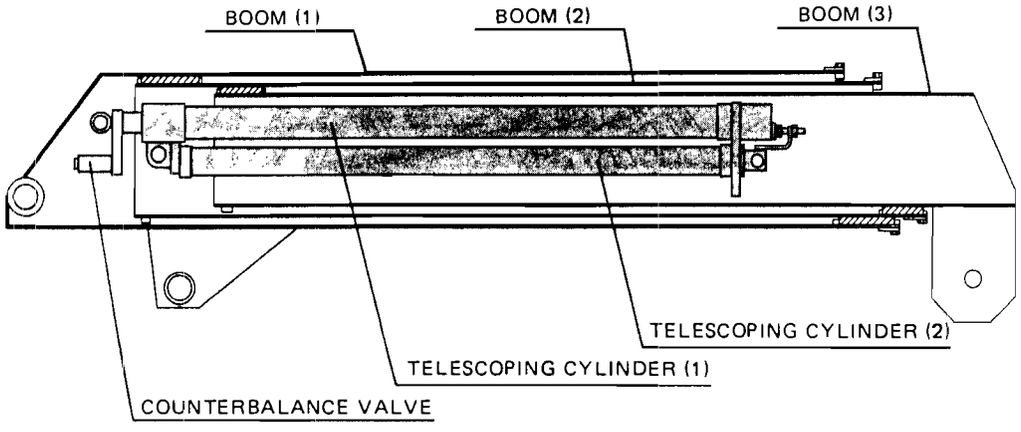
§2. BOOM

1. Construction of Boom and Telescoping Cylinder Installation

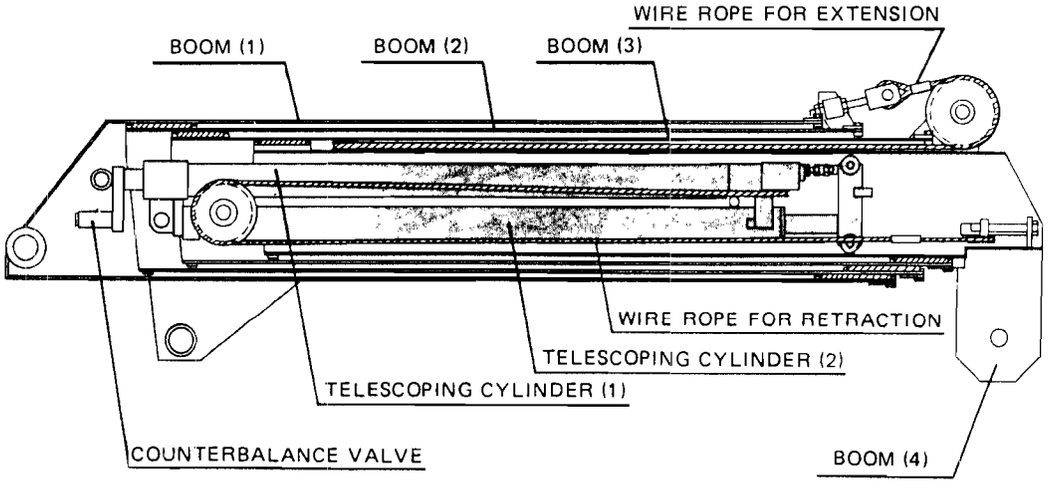
1. 2-Section Boom (Single Cylinder)



2. 3-Section Boom (Dual Cylinder)



3. 4-Section Boom (Dual Cylinder + Wire Rope)



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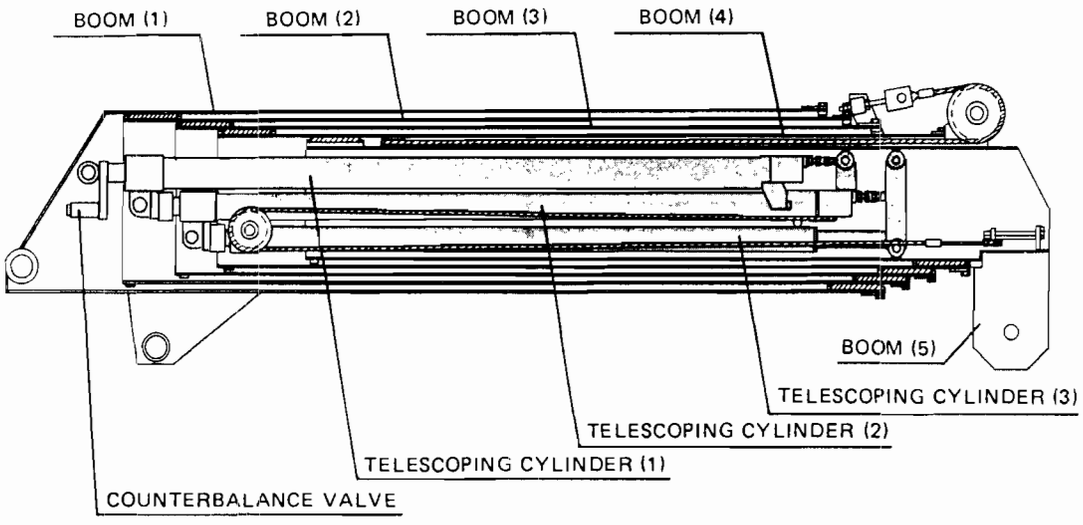
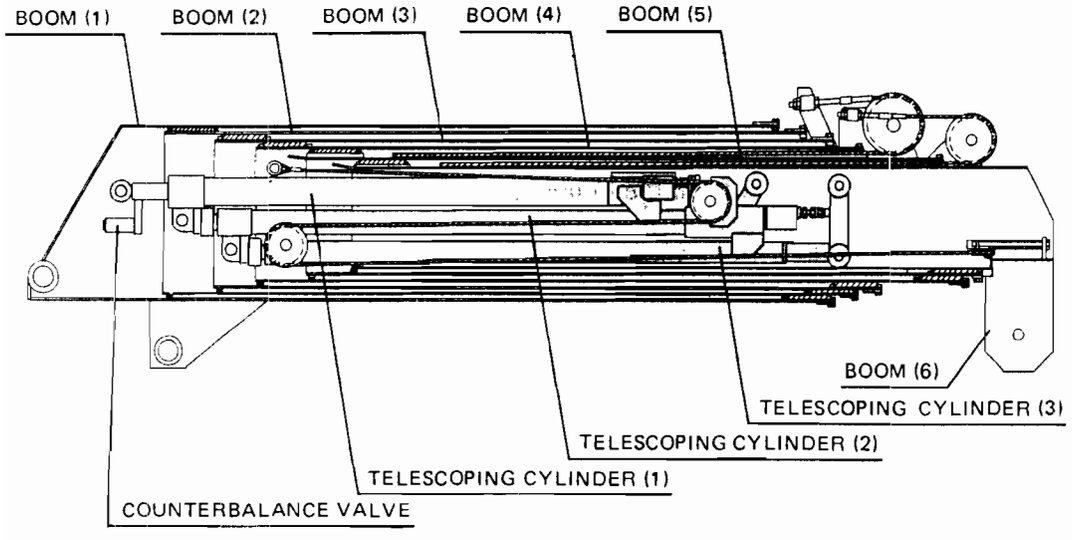
4. 5-Section Boom (Triple Cylinder + Wire Rope)



5. 6-Section Boom (Triple Cylinder + Wire Rope)



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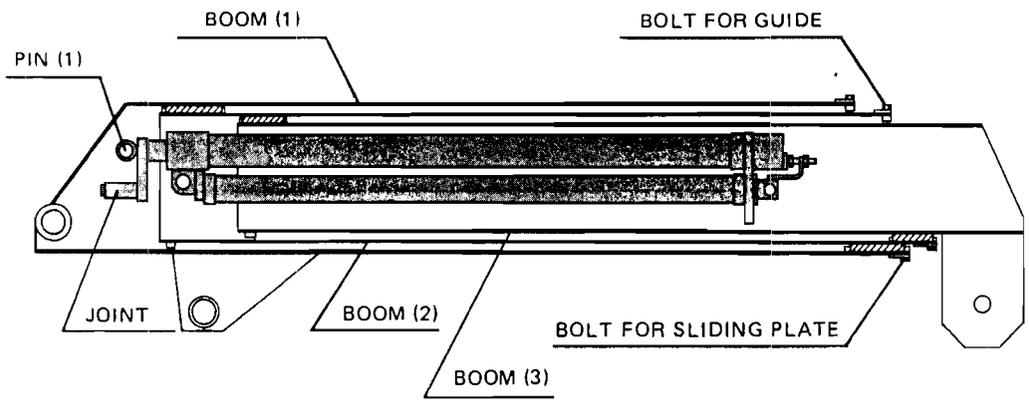
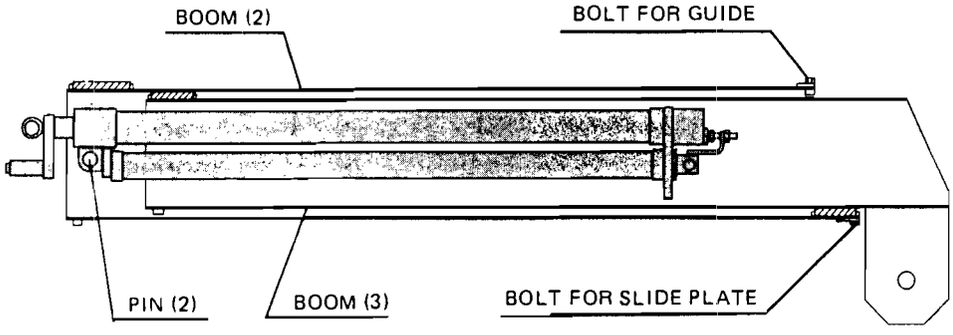
2. Boom Disassembly Procedure (3-Section Boom)

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



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

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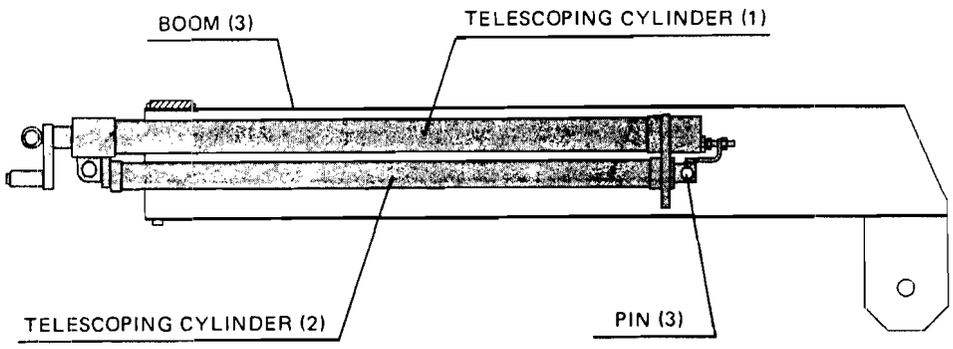
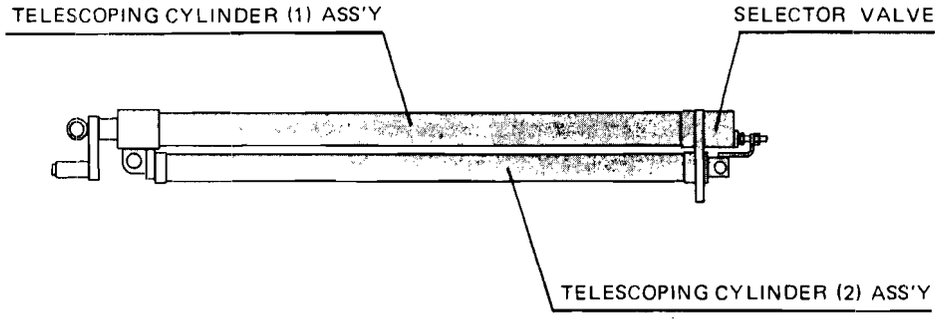
3. Pull out the telescoping cylinders (1) and (2) from the boom (3).



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 base for rust-proof purpose.
2. Apply grease (Chassis Grease No.1) to the inner surface of the bush.
3. Apply "THREE BOND #1102" to the slide plate for the purpose to prevent it from falling. To the slide plate surface apply the disulfide molybdic grease.
4. To the slide sheave pin do not apply grease.

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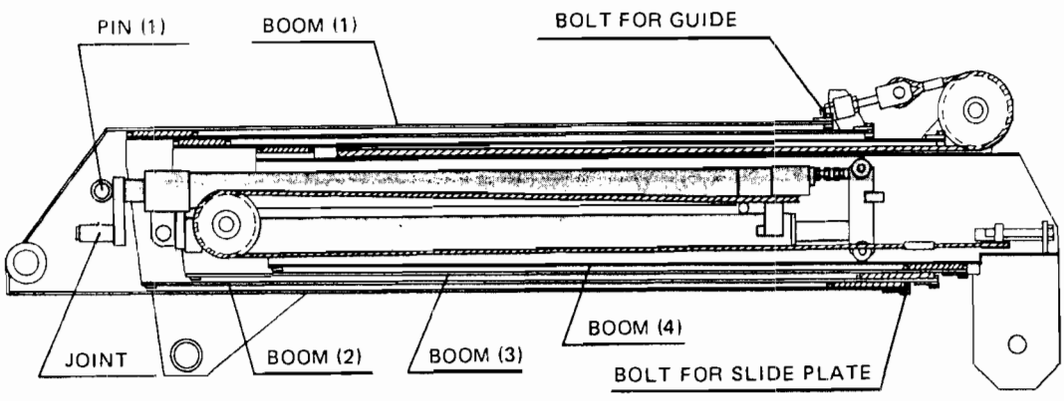
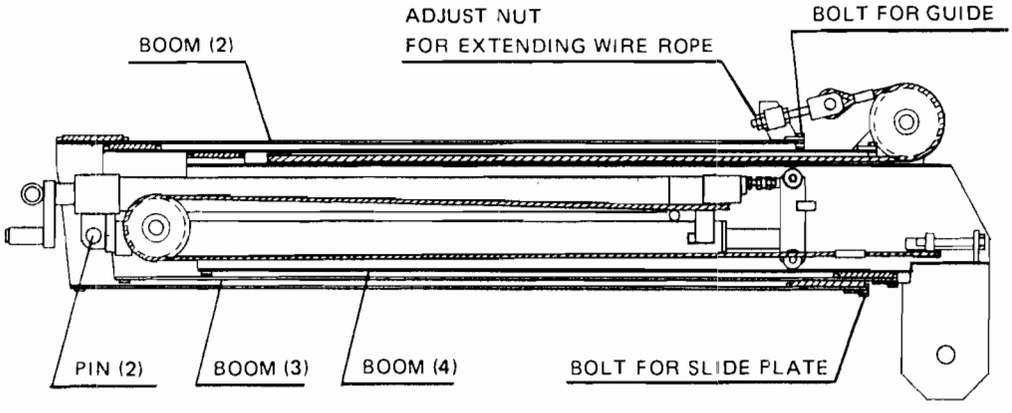
3. Boom Disassembly Procedure (4-Section Boom)

1. Pull out the booms (2), (3), and (4) from the boom (1).



1) Remove the telescoping cylinder joint (for piping).
2) Remove the slide plate and the guide.
3) Remove the pin (1) from the boom (1), and then pull out the booms (2), (3), and (4).

2. Pull out the booms (3) and (4) from the boom (2).



1) Remove the slide plates (side plate and lower plate) and the guide.
2) Remove the adjust nut for the extending wire rope.
3) Remove the pin (2) from the boom (2), and then pull out the booms (3), and (4).

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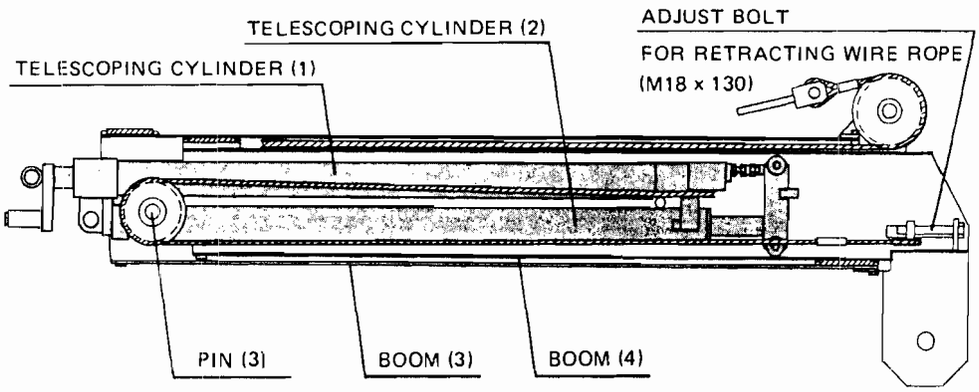
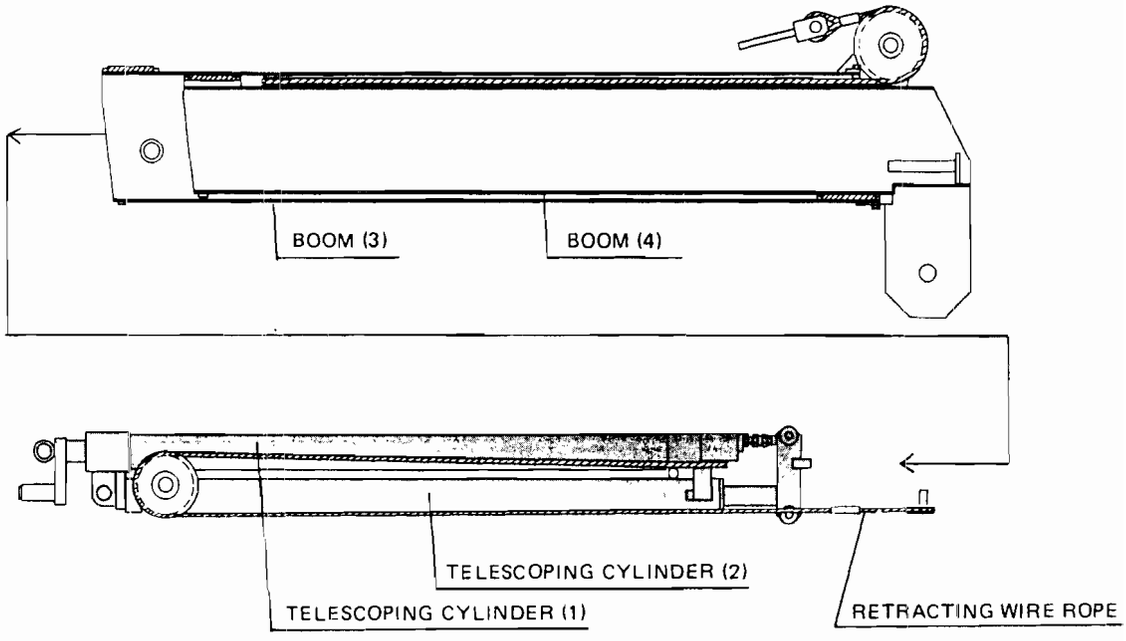
2. **Pull out the telescoping cylinders (1) and (2) from the booms (3) and (4).**



1) Remove the adjust bolt for the retracting wire rope.
2) Pull out the left and the right pins (3) from the rear end of the boom (3).
3) From the booms (3) and (4) pull out the telescoping cylinder ass'ys (1) and (2) rearward.



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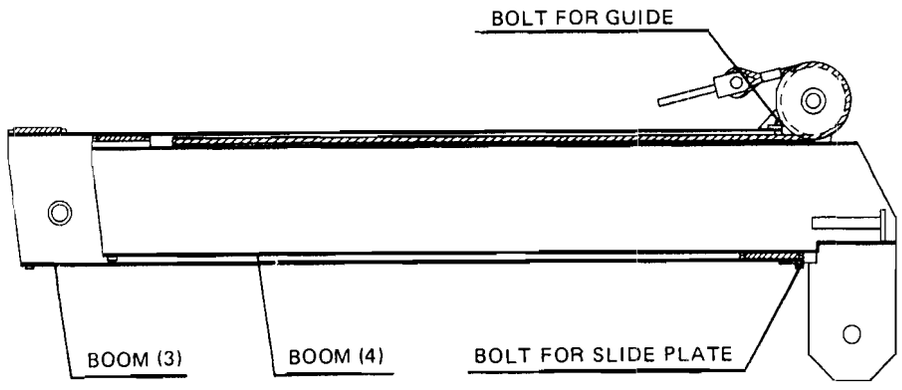
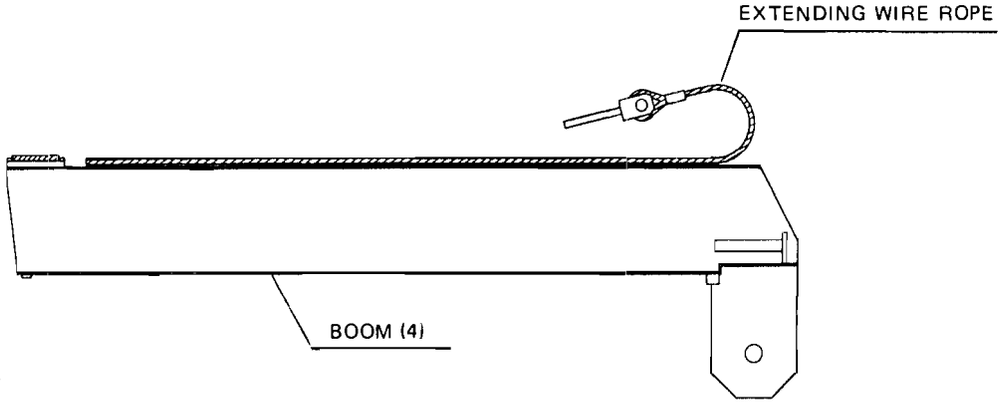
4. Pull out the boom (4) from the boom (3).



1) Remove the slide plate (lower plate) and the guide.
2) Pull out the boom (4) from the boom (3).



* Reassenbling shall be made in reverse order of the disassembly procedures.

Notes:
1. When assembling the pin, apply grease to the insde of its base for rust-proof purpose.
2. Apply grease 9Chassis Grease No.1) to the inner surface of the bush.
3. Apply "THREE BOND #1102" to the slide plate for the purpose to prevent it from falling. To the slide plate surface apply the disulfide molybdic grease.
4. To the slide sheave pin do not apply grease.

* Disassembly and assembly of 5-section booms, refer to the above procedures.

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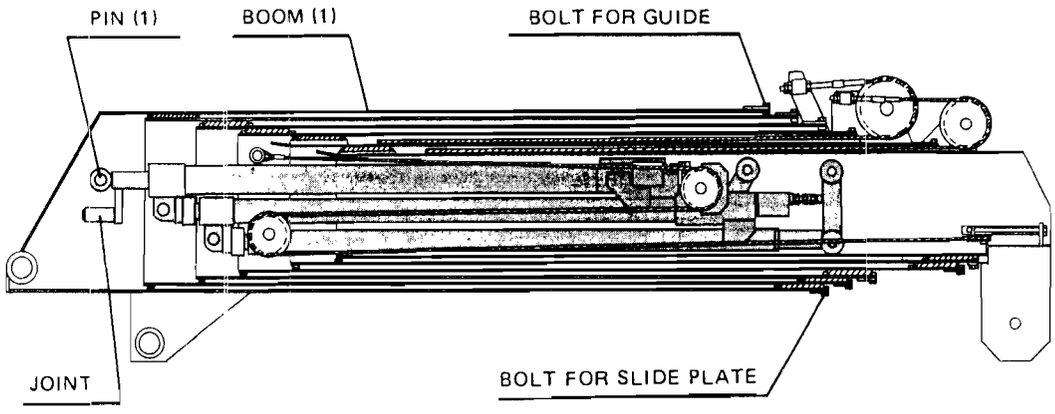
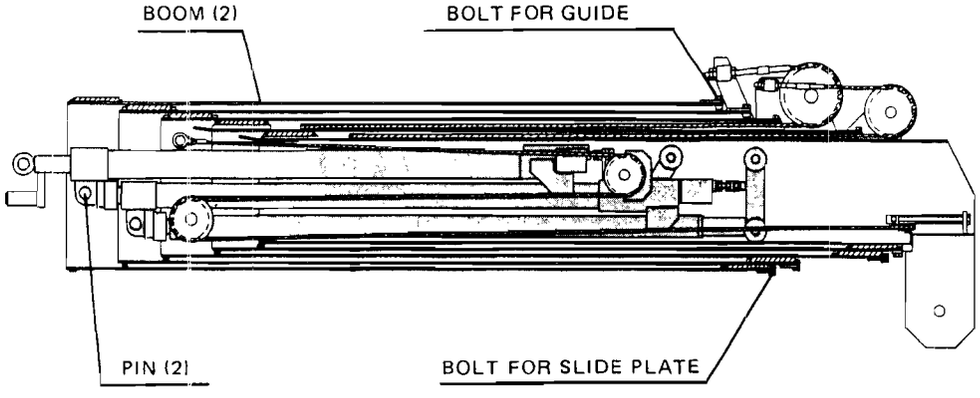
4. Boom Disassembly Procedure (6-Section Boom)

1. Pull out the booms (2), (3), (4), (5), and (6) from the boom (1).



1) Remove the joint (for piping) from the telescoping cylinder.
2) Remove the slide plates (side plate and lower plate) and guide.
3) From the boom (1) remove the pin (1) and then pull out the booms (2), (3), (4), (5) and (6).

2. From the boom (2) pull out the booms (3), (4), (5), and (6).



1) Remove the slide plates (side plate and lower plate) and guide.
2) From the boom (2) remove the pin (2) and then pull out the booms (3), (4), (5), and (6).

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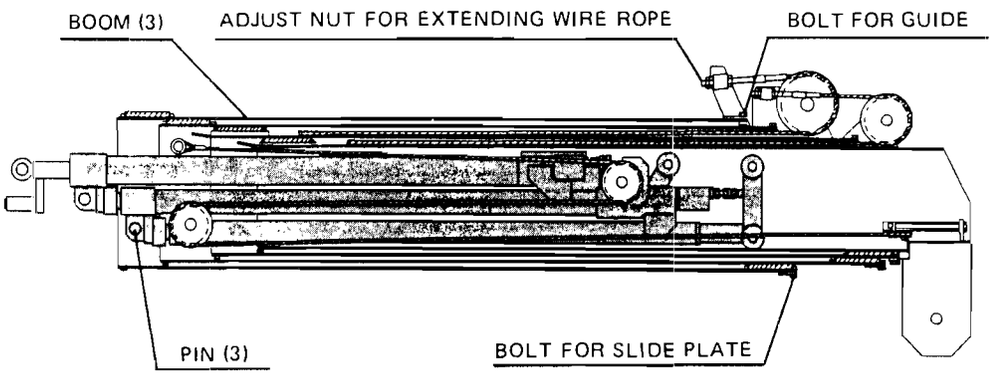
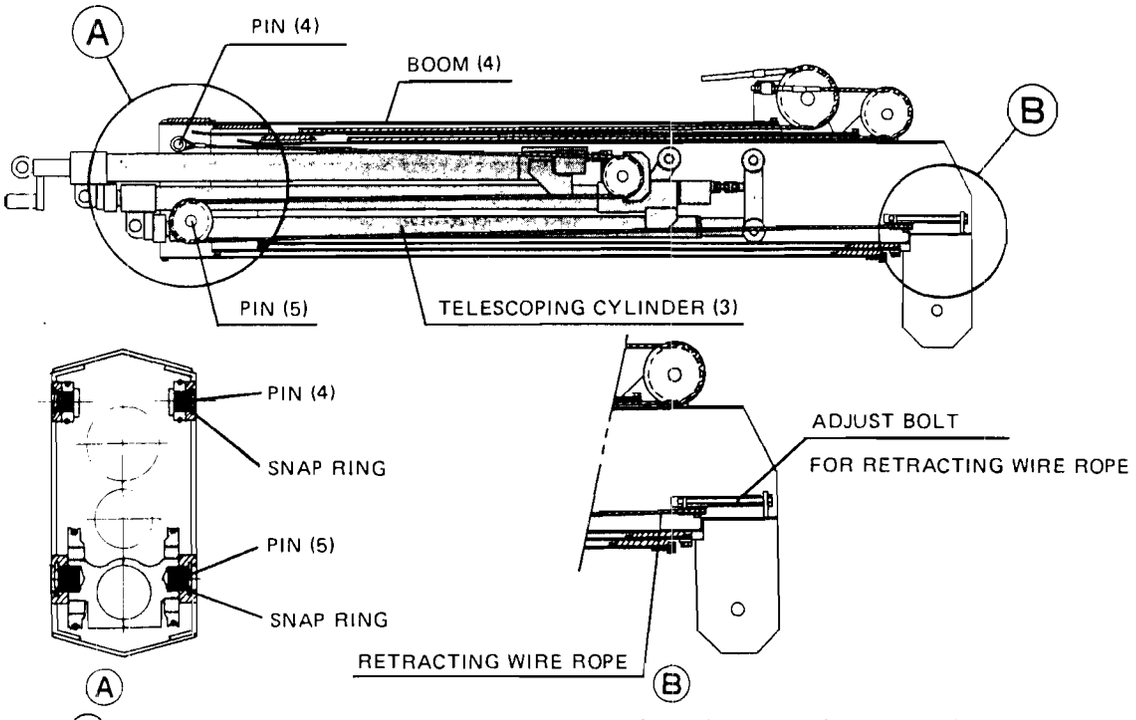
3. From the boom (3) pull out the boom (4), (5), and (6).



1) Remove the slide plates (side plate and lower plate) and guide.
2) Remove the adjust bolt for extending wire rope and pull out the tip of extending wire rope from the boom (3).
3) From the boom (3) pull out the pin (3) and then the booms (4), (5), and (6).

4. From the booms (4), (5), and (6) pull out the telescoping cylinders (1), (2), and (3).



1) (B) Loosen the adjust bolt at the top end of the boom and remove the wire rope.
2) (A) From the rear end of the boom remove the left and right pins (4) which fasten the retracting wire rope.
3) (A) From the rear end of the boom remove the left and right pins (5) which fasten the telescroping cylinder (3).

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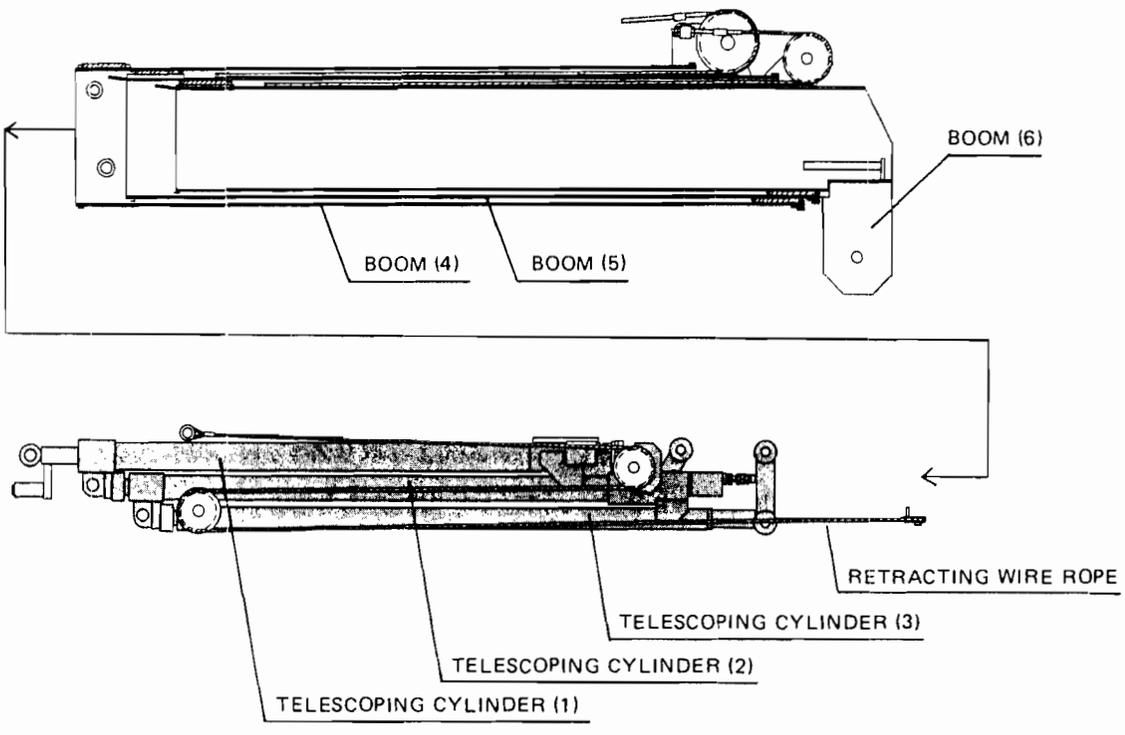
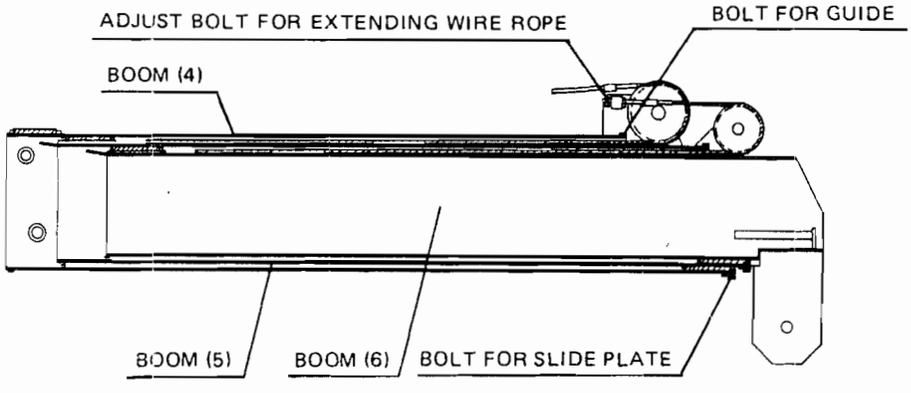
4) From the booms (4), (5), and (6) pull out the telescoping cylinder ass'ys (1), (2) and (3) rearward.



5. From the boom (4) pull out the booms (5) and (6).



1) Remove the slide plates (side plate and lower plate) and guide.
2) Remove the adjust bolt for the extending wire rope and pull out the booms (5) and (6) from the boom (4).

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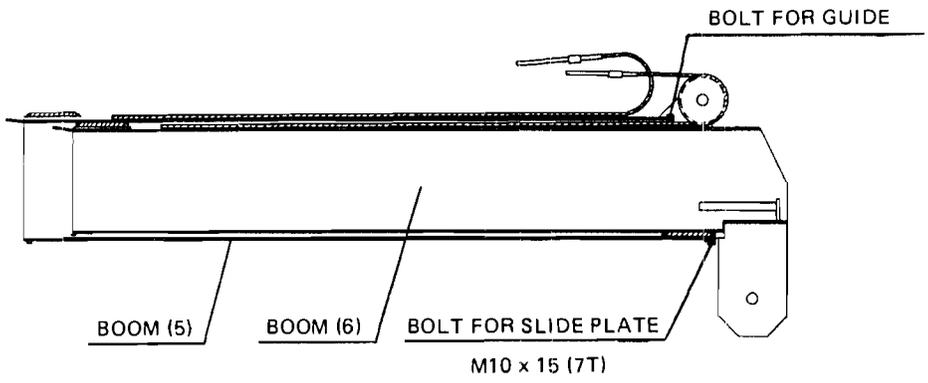
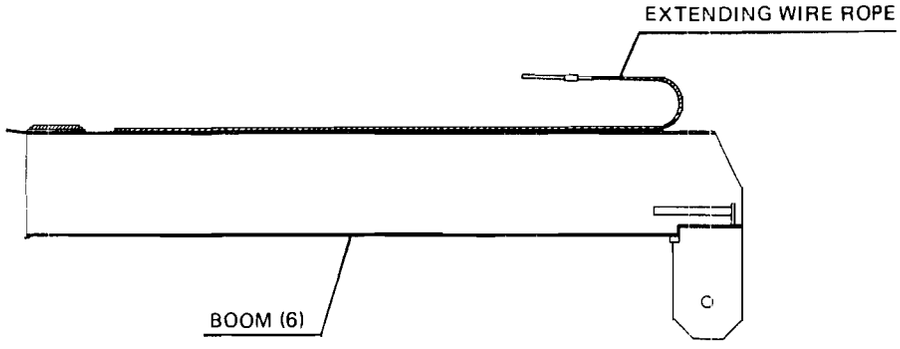
6. **Pull out the boom (6) from the boom (5).**



1) Remove the slide plates (side plate and lower plate) and the guide.
2) Pull out the boom (6) from the boom (5).



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

Notes:

1. When assembling the pin, apply grease to the inside of its base for rust-proof purpose.
2. Apply grease (Chassis Grease No.1) to the inner surface of the bush.
3. Apply "THREE BOND #1102" to the slide plate for the purpose to prevent it from falling. To the slide plate surface apply the disulfide molybdic grease.
4. To the slide sheave pin do not apply grease.

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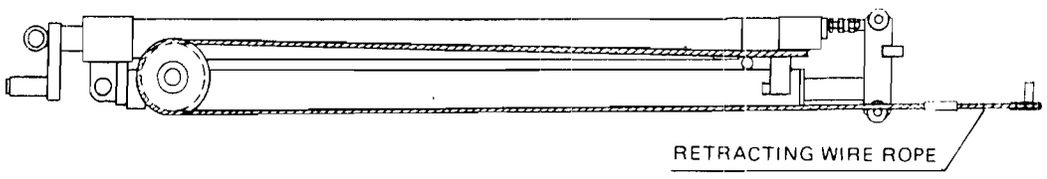
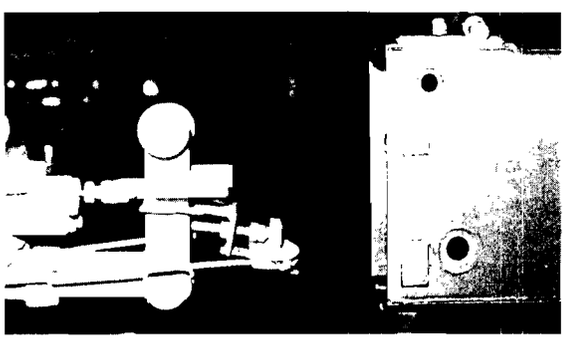
5. Procedures for Housing into the Boom the Telescoping Cylinders for 4-Section, 5-Section, and 6-Section

1. 4-Section and 5-Section

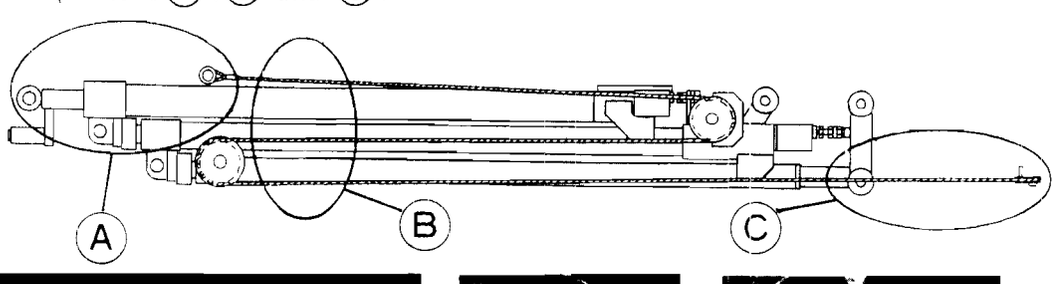


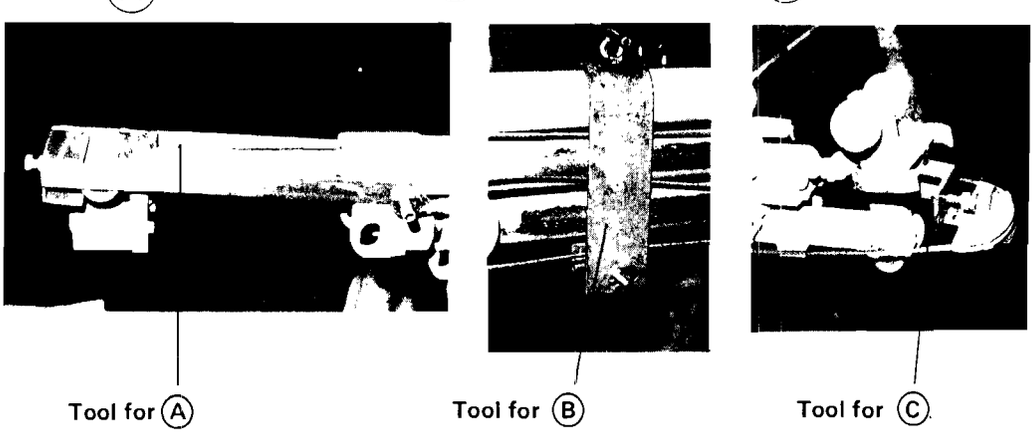
Before housing the telescoping cylinder fit a special tool to the tip of the retracting wire rope to prevent it from slackening and house into the boom in the form of the telescoping cylinder assy.



2. 6-Section

For easier housing it is recommended to fit the following tools to the portions Ⓐ, Ⓑ and Ⓒ.





Caution:

Be sure to check if the left and right retracting wire ropes are crossing each other, and then assemble.

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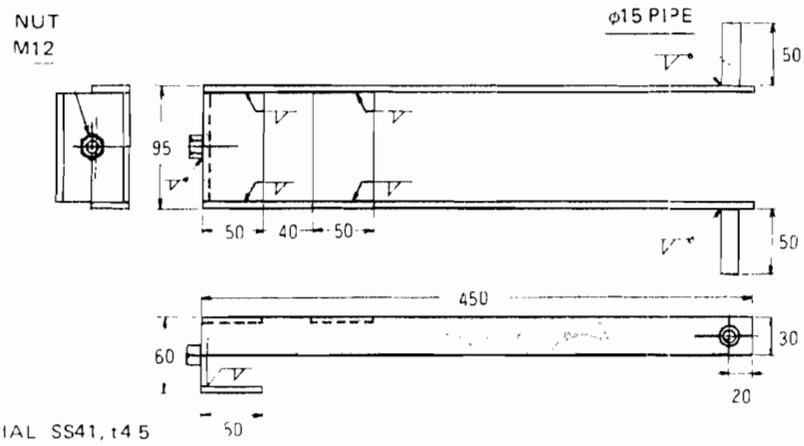
3. Detailed drawing of the special tools

1) Special tool for installing the part Ⓐ of the retracting wire rope (on the side of counterbalance)



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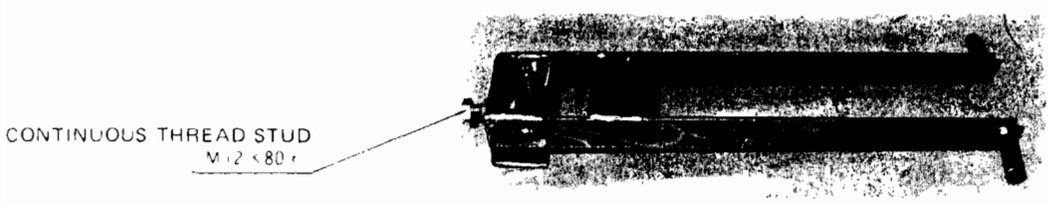
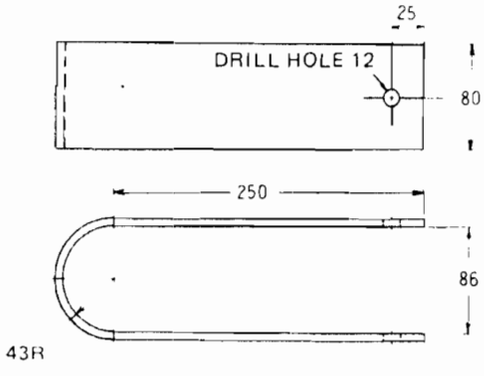
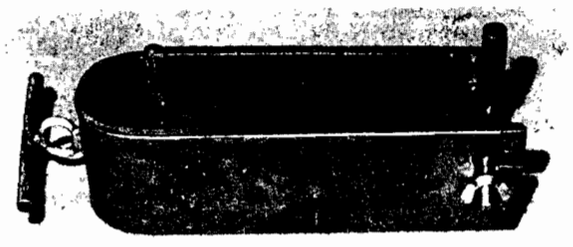


2) Special tool for fixing triple cylinders



MATERIAL SS41, t6



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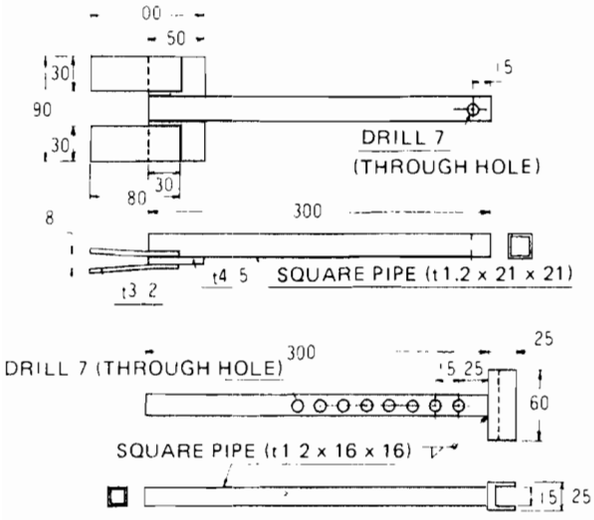
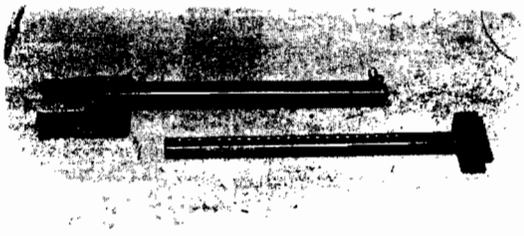
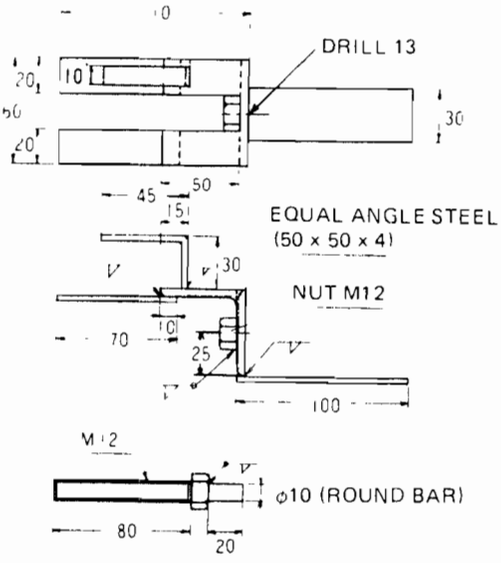
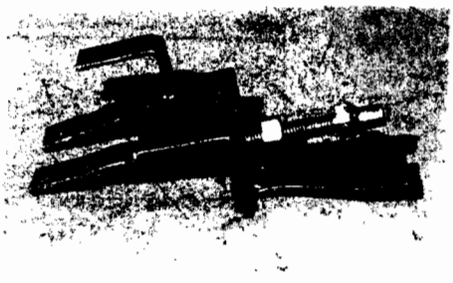
3) Special tool for installing the part C of the retracting wire rope (on the side of change-over valve)
(4-Section and 5-Section boom)





(6-Section boom)





MATERIAL SS41 t3.2

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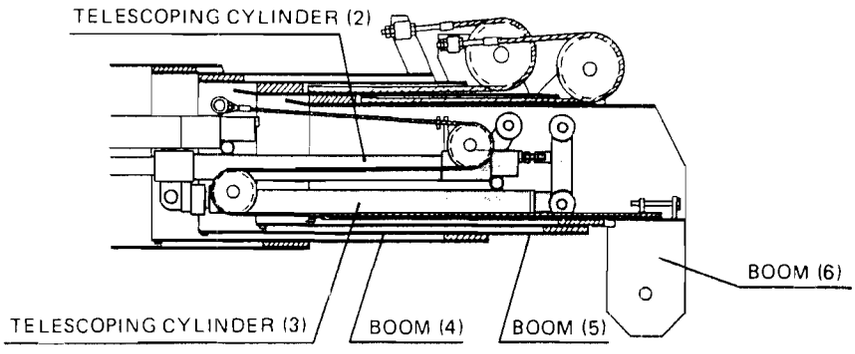
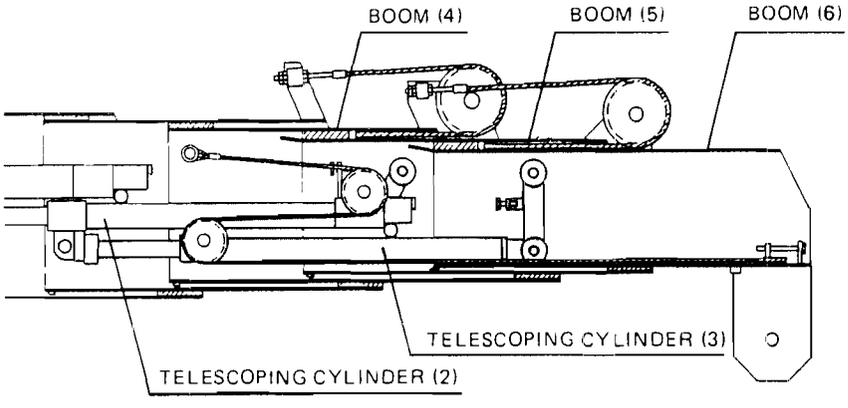
6. 6-Section Boom (Construction of Booms (4), (5) and (6) Simultaneous Extension/Retraction)

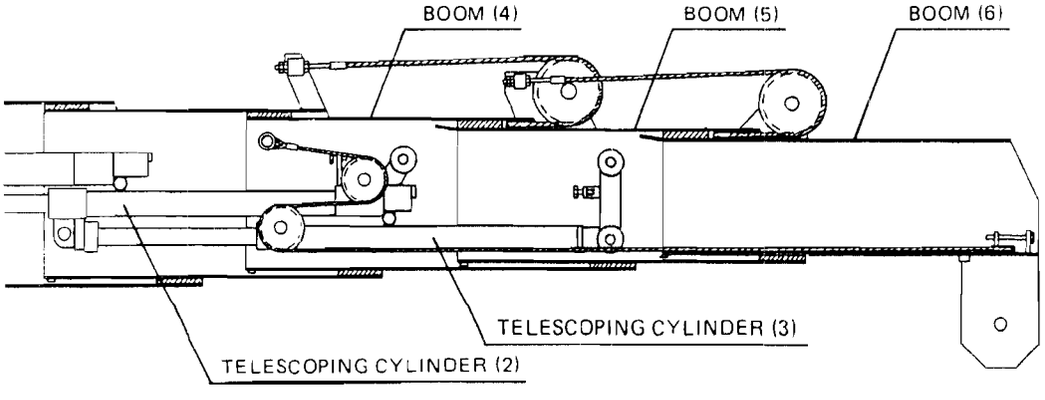
1) Booms (4), (5) and (6) are in the retracted state.



2) Booms (4), (5) and (6) are in the half-extended state.



3) Booms (4), (5) and (6) are in the fully extended state.



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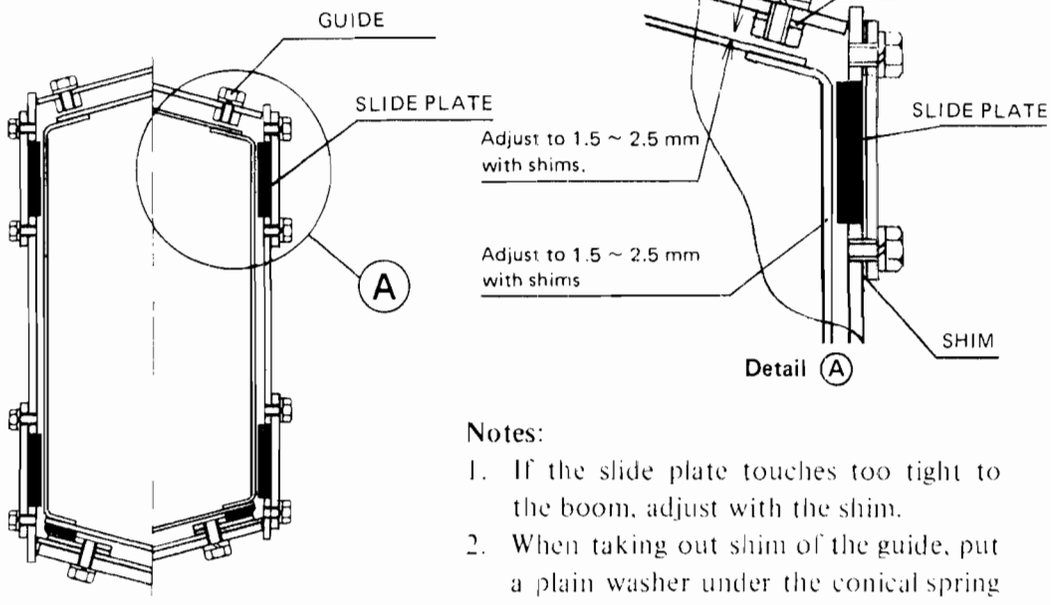
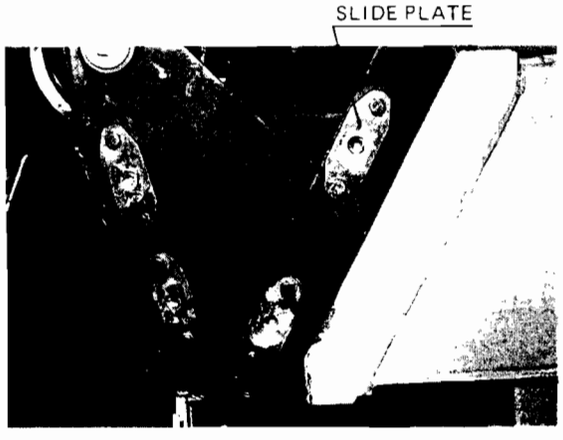
7. Installation Procedures for Slide Plate and Guide

1) Side slide plate and guide

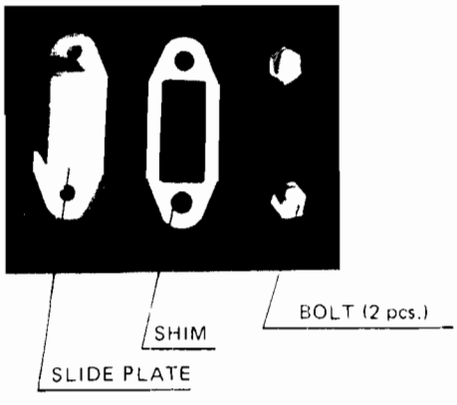


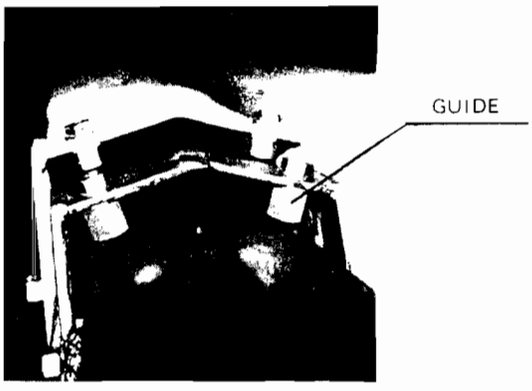
Notes:

1. If the slide plate touches too tight to the boom, adjust with the shim.
2. When taking out shim of the guide, put a plain washer under the conical spring washer.

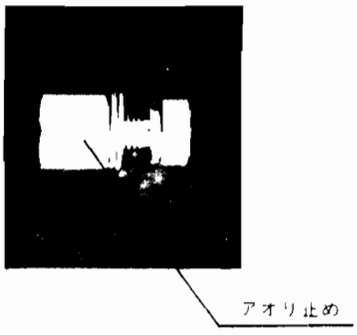


Fit slide plate to this place.





Fit wire bracket to this place.



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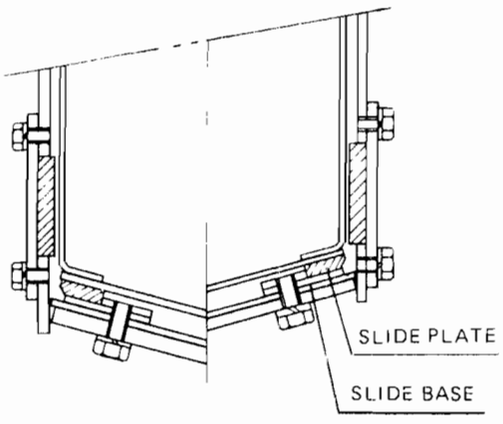
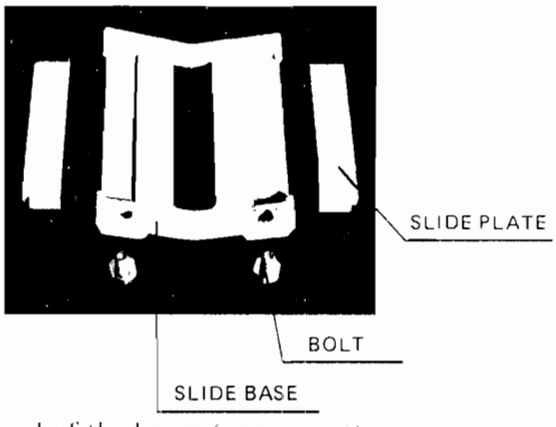
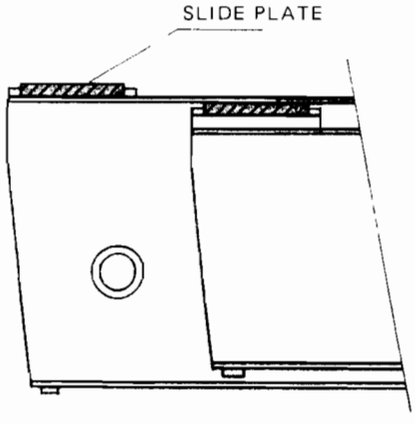
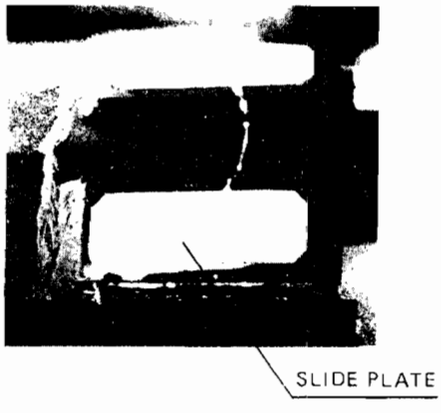
2) Installing the lower slide plate





3) Installing the slide plate at the rear end of the boom (upper part)





Note:
Apply "THREE BOND #1120" to the slide plate for preventing it from falling off

Inspection of slide plate
Measure the thickness of the slide plate and when it reaches use limit, replace it with a new one.

Slide plate (thickness in mm)

Before use	Use limit
$t = 10.5\ ^{+0.5}_{0}$	t = 8.5
$t = 9.0\ ^{+0.5}_{0}$	t = 7.0
t = 7.0	t = 5.0

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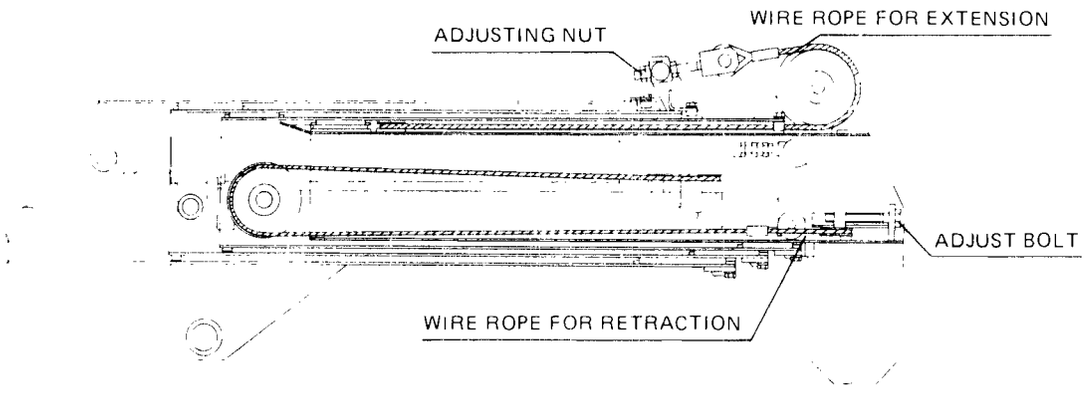
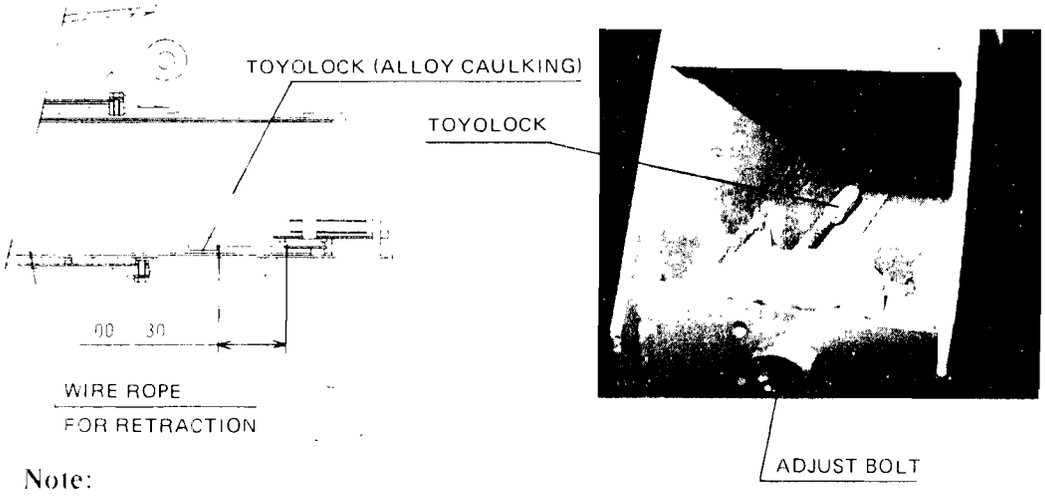
8. How to Adjust Wire Ropes for Extension/Retraction (4-Section Boom)



1. Adjusting wire rope for retraction

1) Retract the boom (3) until it touches the tip of the boom (2).
2) Tighten the adjust bolt of the wire rope for retraction until the boom (4) touches the boom (3).



Note:

When fitting the wire rope for retraction, the WIRE TOYOLOCK (alloy caulking) shall be fitted so that it will be located at the position as shown in the above illustration (100 ~ 130 mm).

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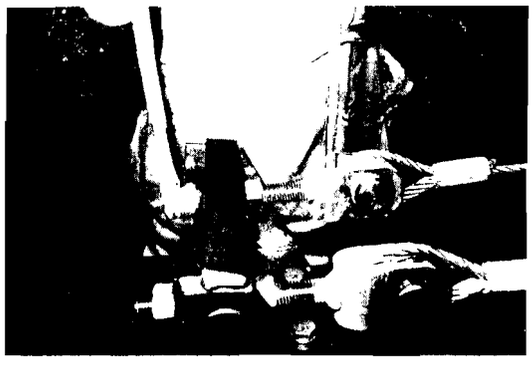
2. Adjusting the wire rope for extension

1) Adjust by tightening the adjust nut of the wire rope for extension to an extent that a gap will not be made between the boom (4) and the tip of the boom (3).
(After tightening the adjust nut, be sure to tighten the lock nut firmly.)

2) If the wire rope for extension is stretched too tight, tension of the wire rope for retraction would become larger. Therefore, adjust the tension of the wire rope for extension a little slack.



* **After checking the extension/retraction movement, retract fully and check to see if there is any gap between the tip of the boom (3) and the boom (4). If a gap is found, readjust.**

After completion of the above adjusting and checking work, fit the plate which prevents the adjust bolt of wire rope for retration from loosening.

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* Adjustment of the wire rope for extension/retraction of 5-setion boom shall be made in accordance with the same procedures as those for 4-section boom.

3. Inspection of the wire ropes for extension and retraction

1) Check to see if the element wires are broken. If negative is the case, replace the wire rope with a new one.
2) Check to see if the wire rope is deformed remarkably, kinked, corroded. When abnormality is found, replace it with a new one.
3) Check the diameter. If decreased amount of the diameter is more than 7% of the nominal diameter, replace it with a new one.
4) Check to see if the oil and grease applied are proper both in quality and quantity. If improper and insufficient, apply enough quantity of proper ones.

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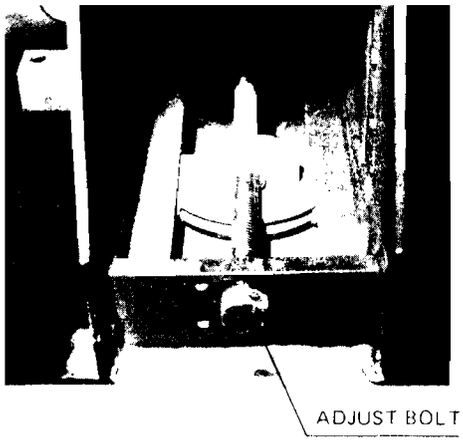
9. How to Adjust Wire Ropes for Extension/Retraction (6-Section Boom)

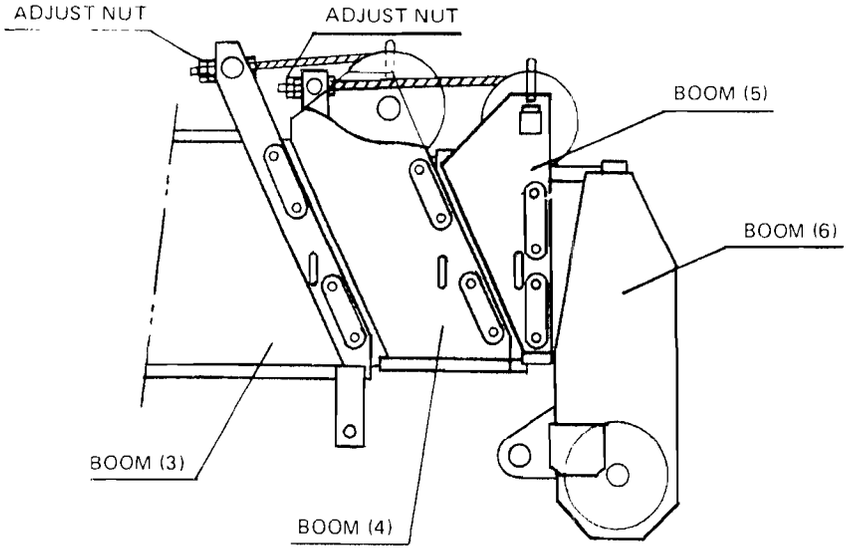
1. Adjusting wire rope for retraction

1) Retract fully the booms (4), (5), and (6).
2) Tighten adjust bolts so that the boom (6) touches to the boom (5) and the boom (5) touches to the tip of the boom (4).



2. Adjusting wire rope for extension

1) Adjust by tightening the adjust nut of the wire rope for extension to an extent that a gap will not be made between the boom (6) and the tip of the boom (5) and also the boom (5) and the tip of the boom (4).
(After tightening the adjust nut, be sure to tighten the lock nut firmly.)
2) If the wire rope for extension is stretched too tight, tension of the wire rope for retraction would become larger. Therefore, adjust the tension of the wire rope for extension a little slack.



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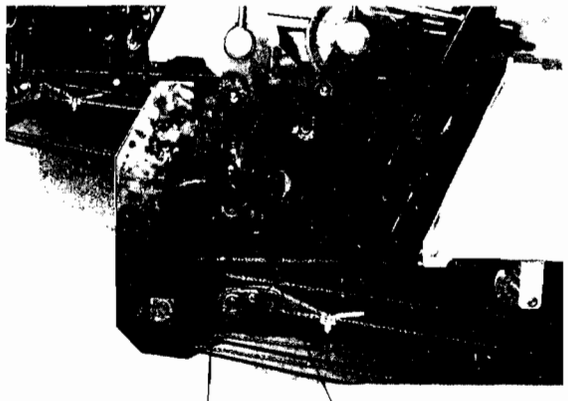
* After checking the extension/retraction movement, retract fully and check to see if there is any gap between the boom (6) and the tip of the boom (5) and also between the boom (5) and the tip of the boom (4). When a gap is found, readjust.



After completion of the above adjusting and checking work, fit the plate (just similar to the case of 4-section boom) which prevents the adjust bolt of the wire rope for retraction from loosening.

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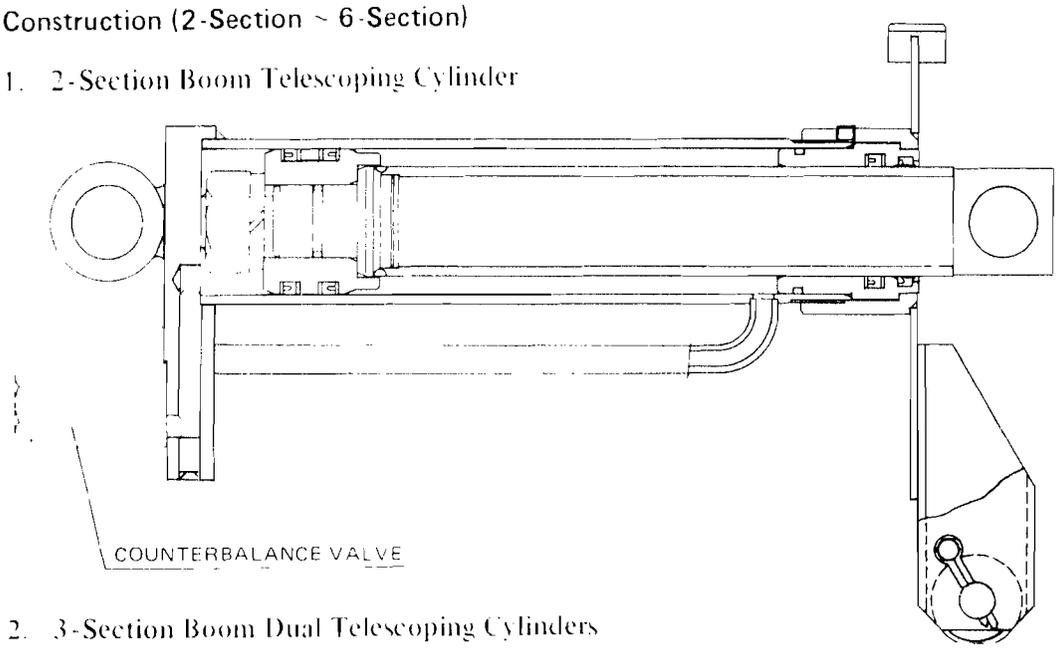
§3. TELESCOPING CYLINDER

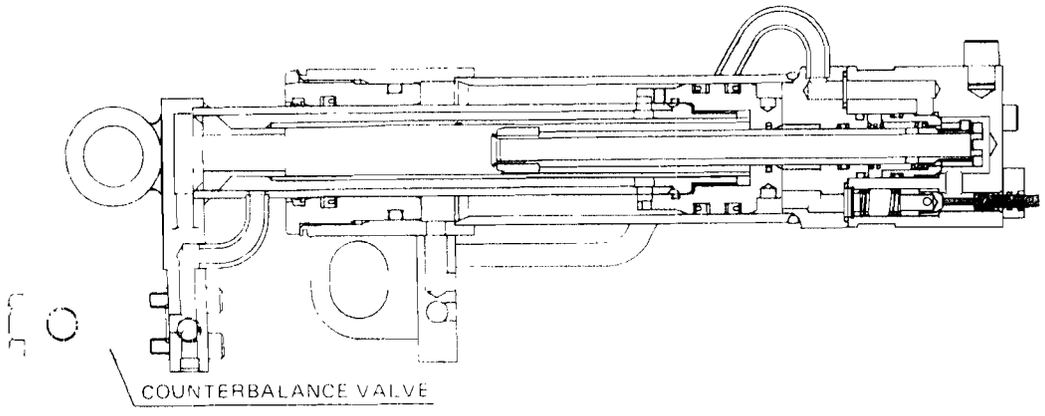
1. Construction (2-Section ~ 6-Section)

1. 2-Section Boom Telescoping Cylinder

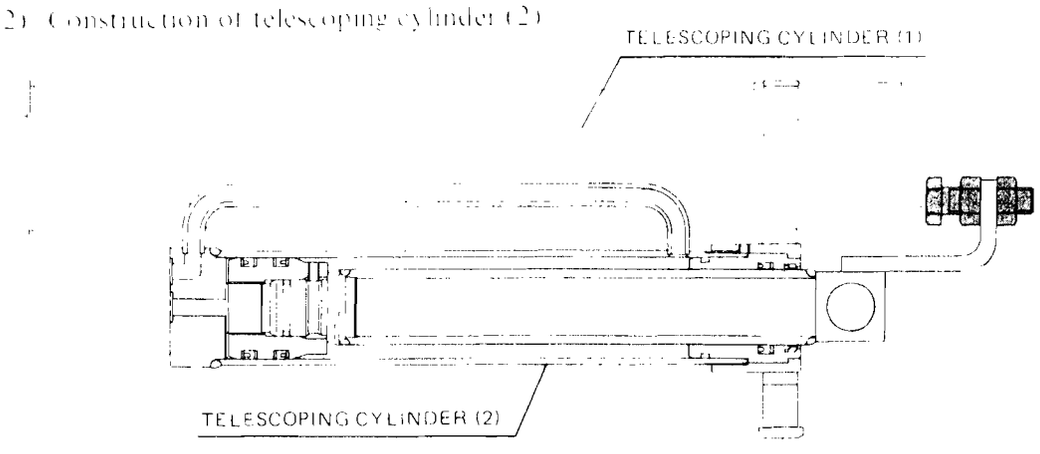


2. 3-Section Boom Dual Telescoping Cylinders

1) Construction of telescoping cylinder (1)



2) Construction of telescoping cylinder (2)



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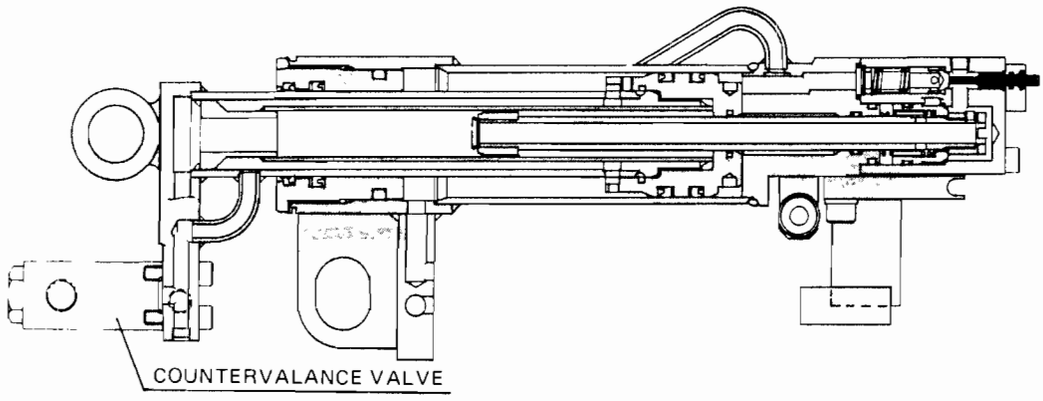
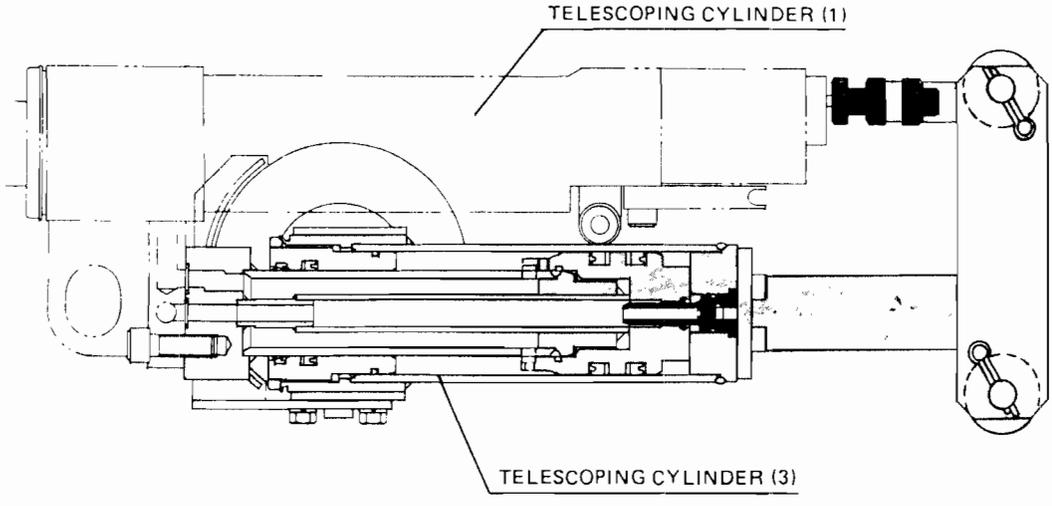
3. 4-Section Boom Dual Telescoping Cylinders

1) Construction of telescoping cylinder (1)



2) Construction of telescoping cylinder (2)



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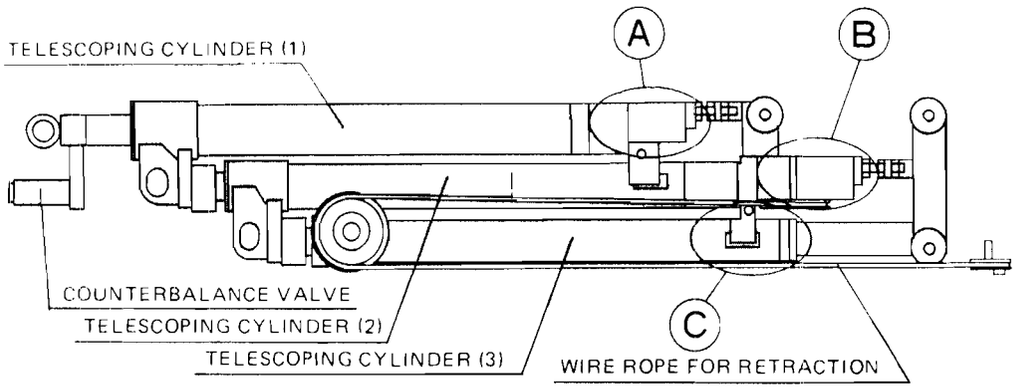
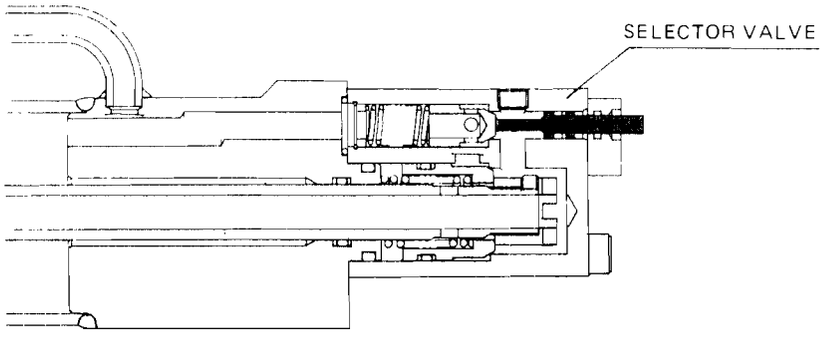
4. 5-Section Boom Triple Telescoping Cylinders

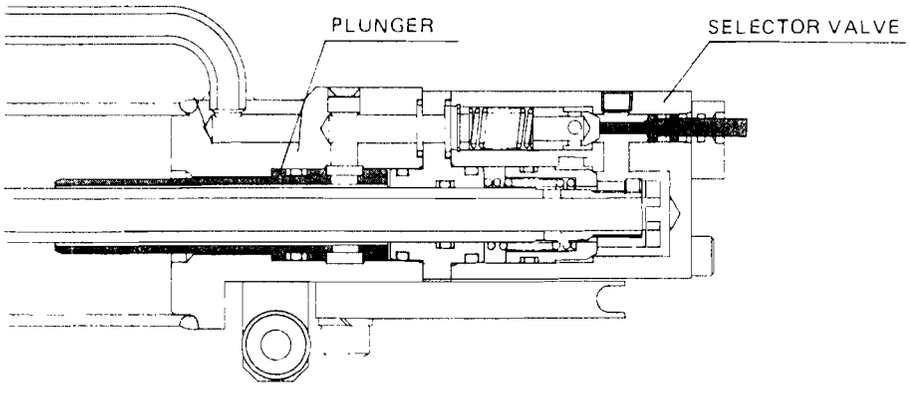
Combinational construction of triple cylinders



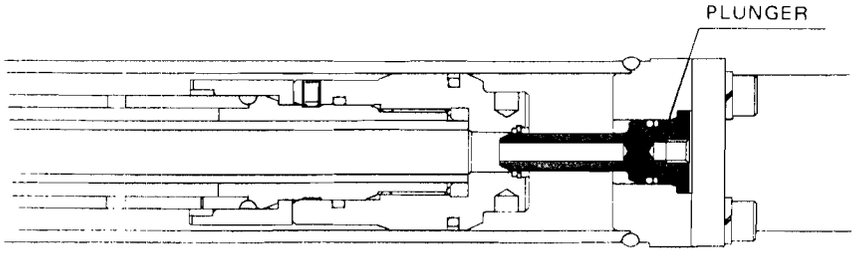
1) Telescoping cylinder (1), Sectional view of Part Ⓐ of Selector Valve



2) Telescoping cylinder (2), Sectional view of Part Ⓑ of Selector Valve



3) Telescoping cylinder (3), Sectional view of Part Ⓒ



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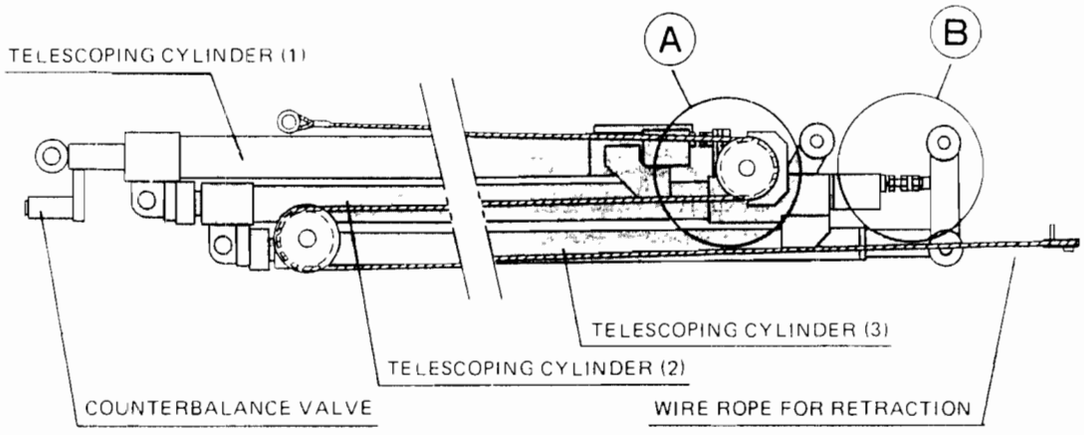
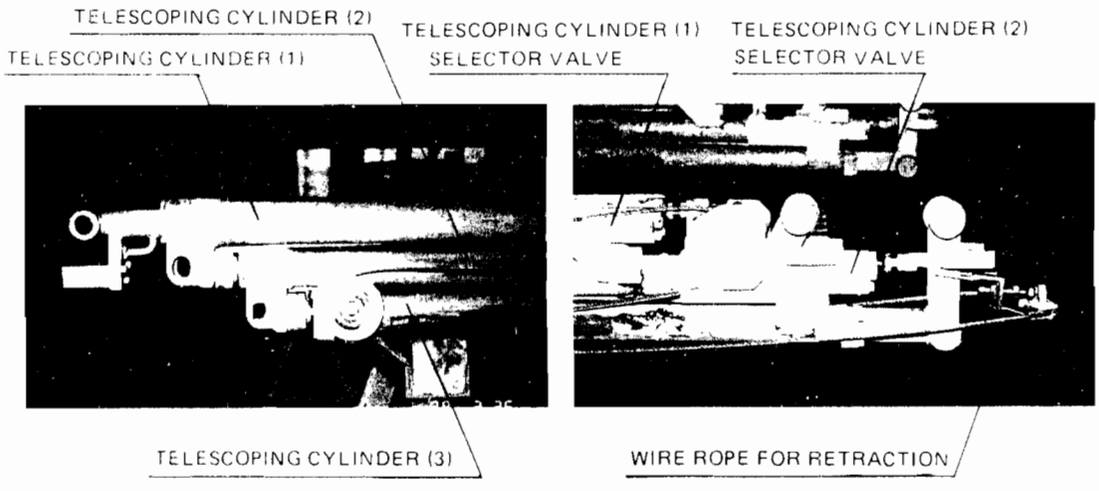
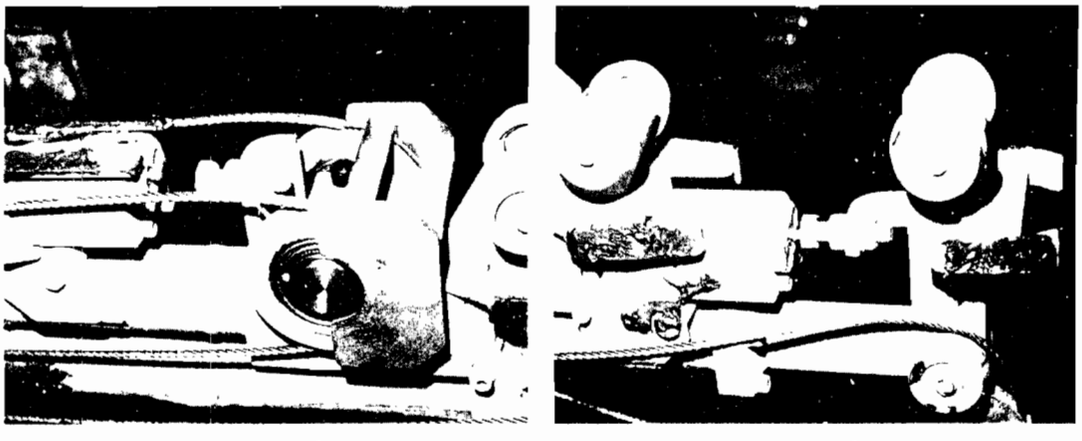
5. 6-Section Boom Triple Telescoping Cylinders

Combinational construction of 3 telescoping cylinders







PART (A) PART (B)

* Construction of the selector valve and that of the plunger for 6-section boom (triple telescoping cylinders) are same as those of 5-section boom.

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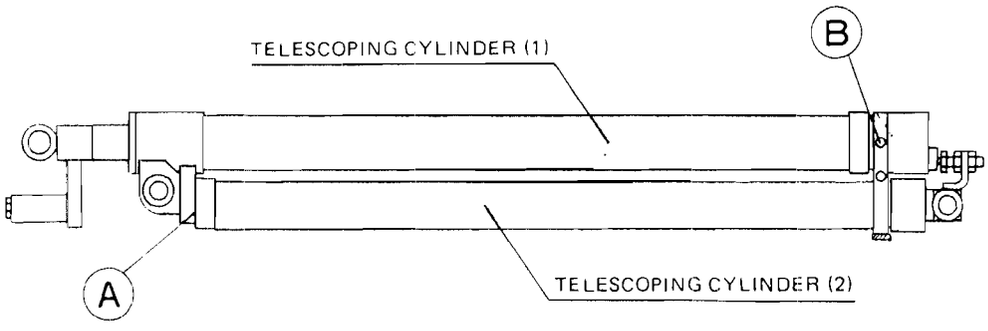
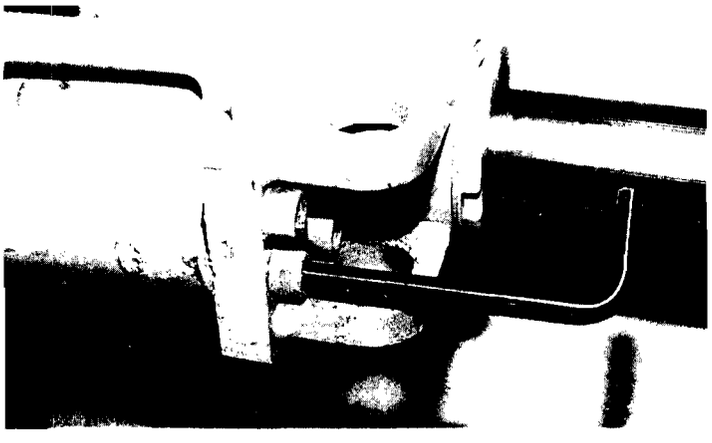
2. 3-Section Boom (Disassembly Procedures for Dual Telescoping Cylinders)

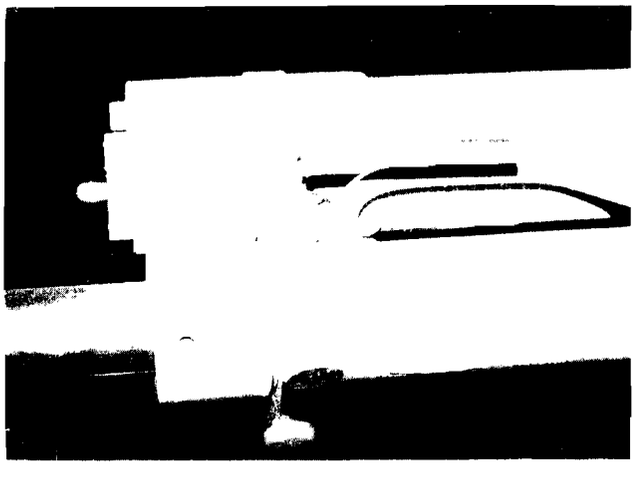
1. Remove the bolt which connects the telescoping cylinder (1) with the telescoping cylinder (2) and separate the one from the other



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



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



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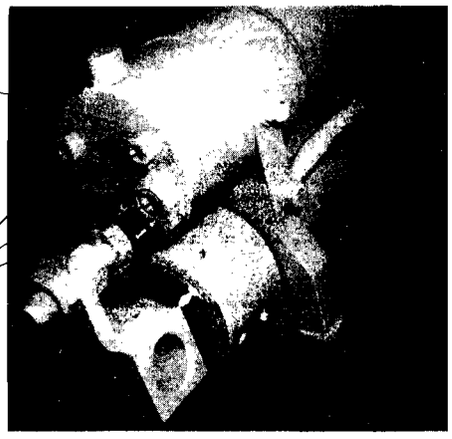
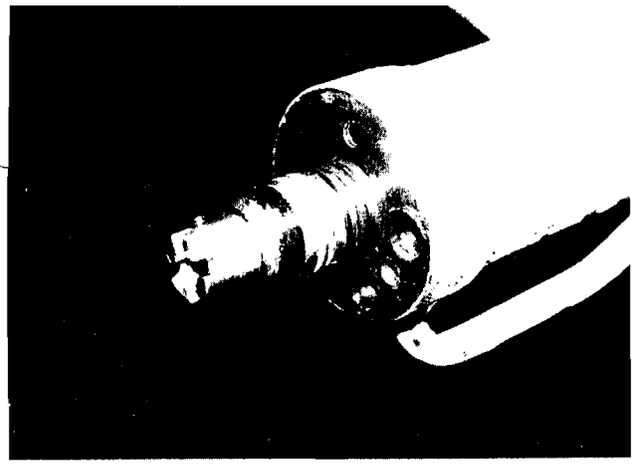
2. Disassembly Procedures for Telescoping Cylinder (1)

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

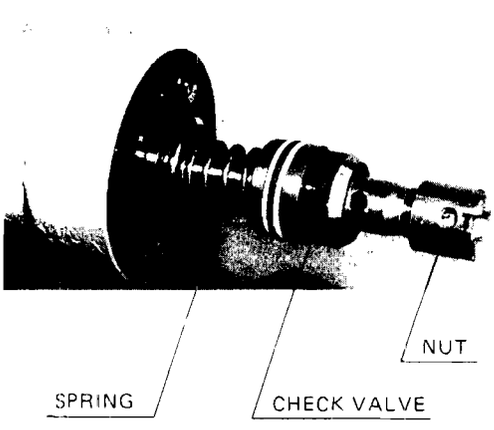


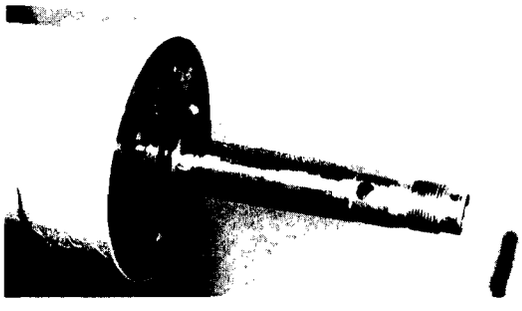
2) Remove a lock screw for nut of the slide pipe.



* When assembling, apply "LOCK TIGHT #242" to the screw.

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





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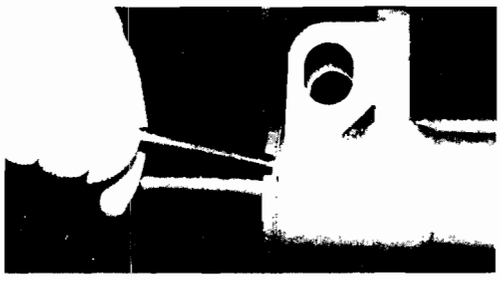
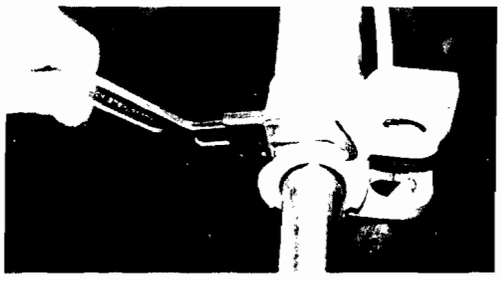
4) Compensate the revolution stopper of the gland, remove the gland from the tube with a hook-spanner, and pull out the rod ass'y from the tube (1).

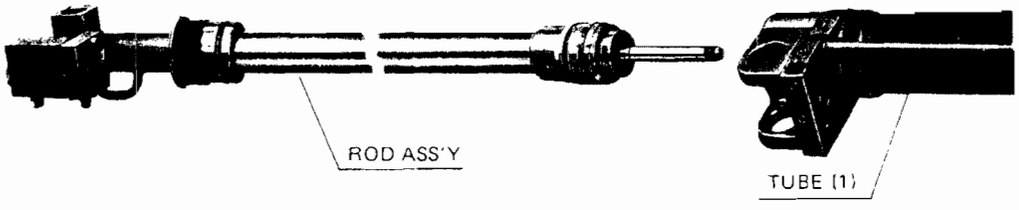


Compensate revolution stopper.

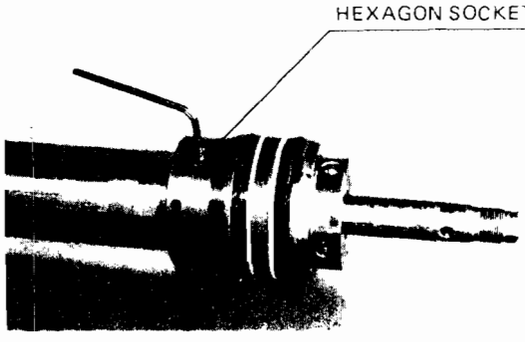


Loosen the gland.

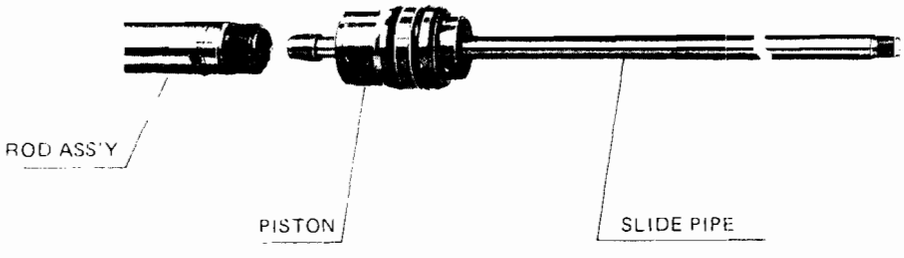
Pull out the rod ass'y from the tube (1).



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



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



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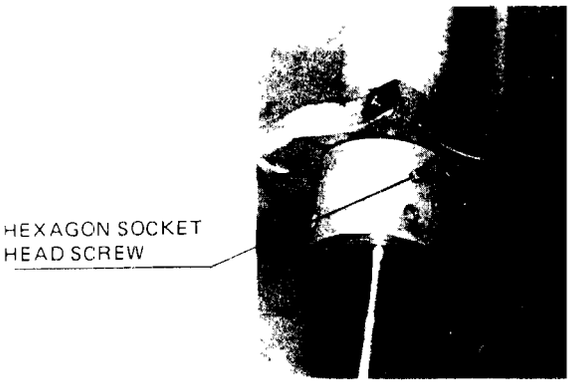
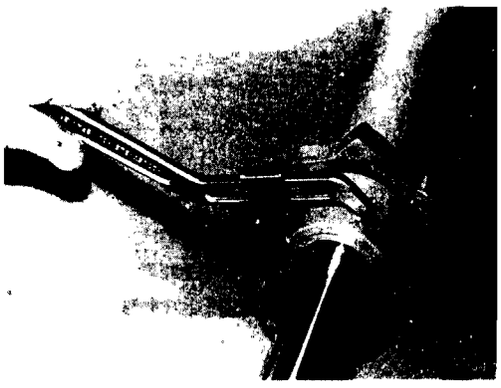
3. Disassembly Procedures for Telescoping Cylinder (2)

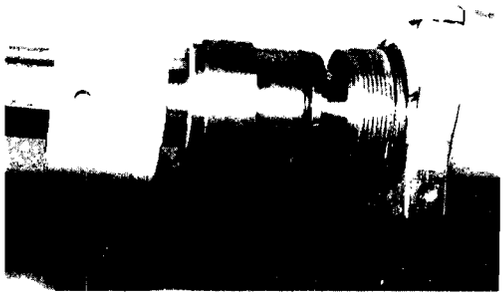


1) Remove hexagon socket head lock screw for the cylinder cover.

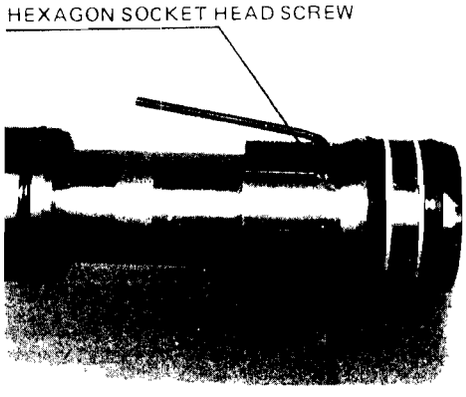
* When assembling, apply "LOCK TIGHT #242."



2) Loosen the cylinder cover with a hook-spanner.

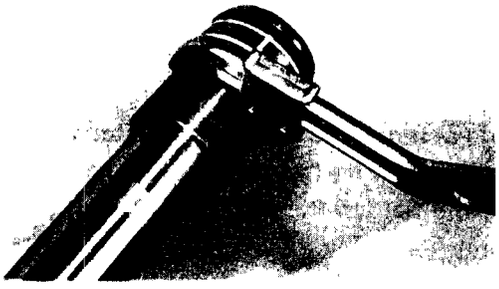


3) Pull out the rod ass'y from the tube (2)



4) Remove the lock screw of the piston.

* When assembling, apply "LOCK TIGHT #242."



5) Loosen the piston with the hook-spanner

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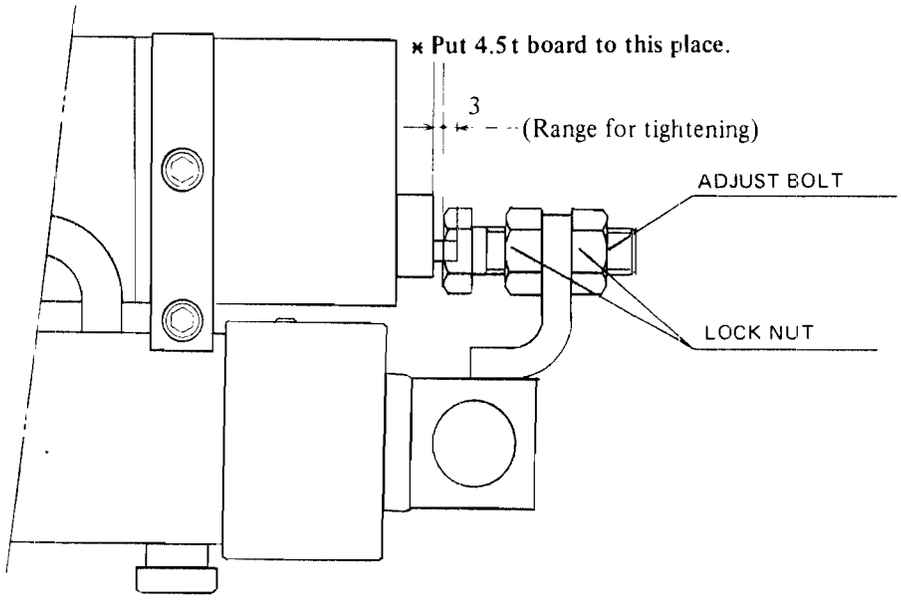
4. Inspection

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 very carefully and confirm that they are free of damage and foreign substances.

*** Assembly procedure is in the reverse order of disassembly.**

- Check that every part is free of metal powder attachment and then soak the parts in hydraulic oil.

5. Adjusting Procedure for Selector Valve with Adjust Bolt



Adjusting Procedure with Adjust Bolt

1) Put the telescoping cylinders (1) and (2) in the most retracted state.
2) Apply "LOCK TIGHT #262" to the threaded part of the adjust bolt.
3) Put 4.5t board to the part marked * and tighten the adjust bolt.
4) After adjusting, lock with the lock nut.

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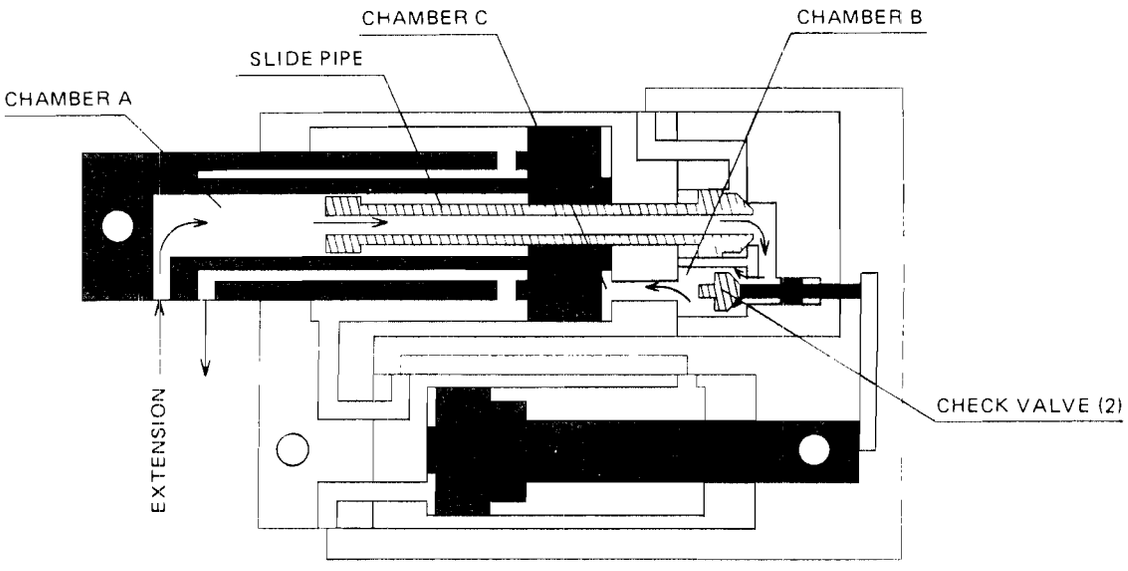
3. 3-Section Boom (Explanation of Dual Cylinder Operation)

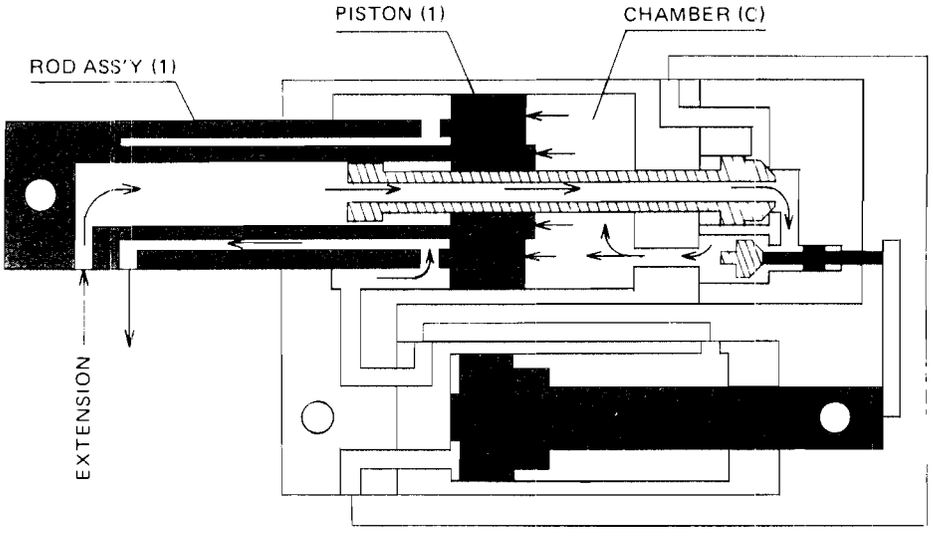
1. Just before Extending Telescoping Cylinder

Pressure oil enters into the chamber A, and passes through the slide pipe. Then it goes through the check valve (2) of the selector valve and the chamber B too. Finally it reaches the chamber C.



2. Extending Telescoping Cylinder (1)

Pressure oil entered chamber C pushes up the piston (1); and the rod ass'y (1) extends.



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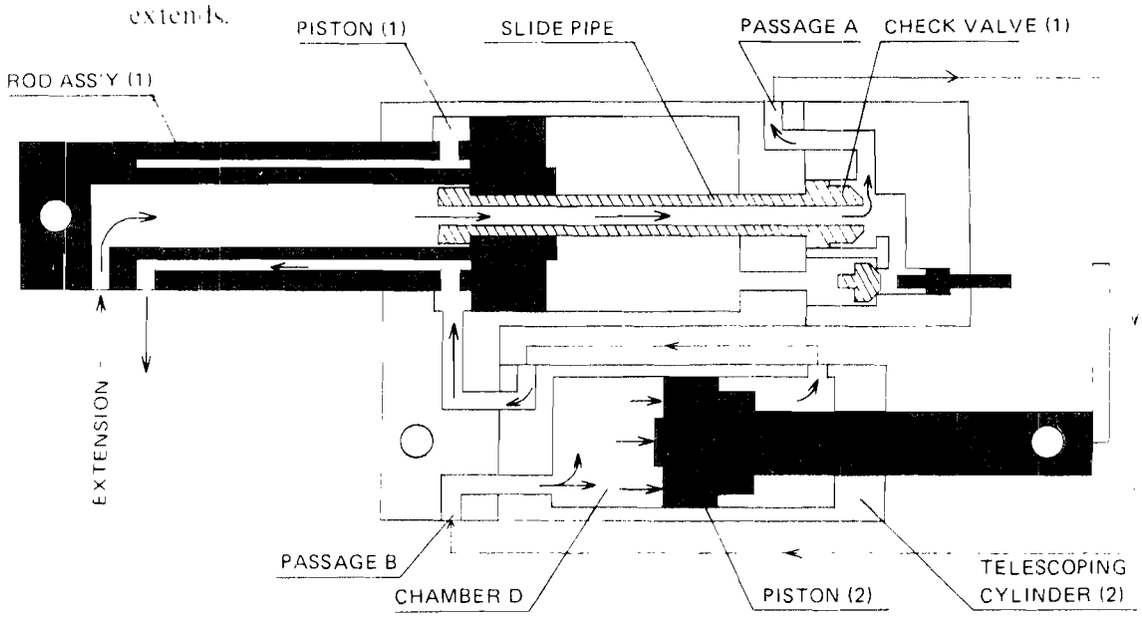
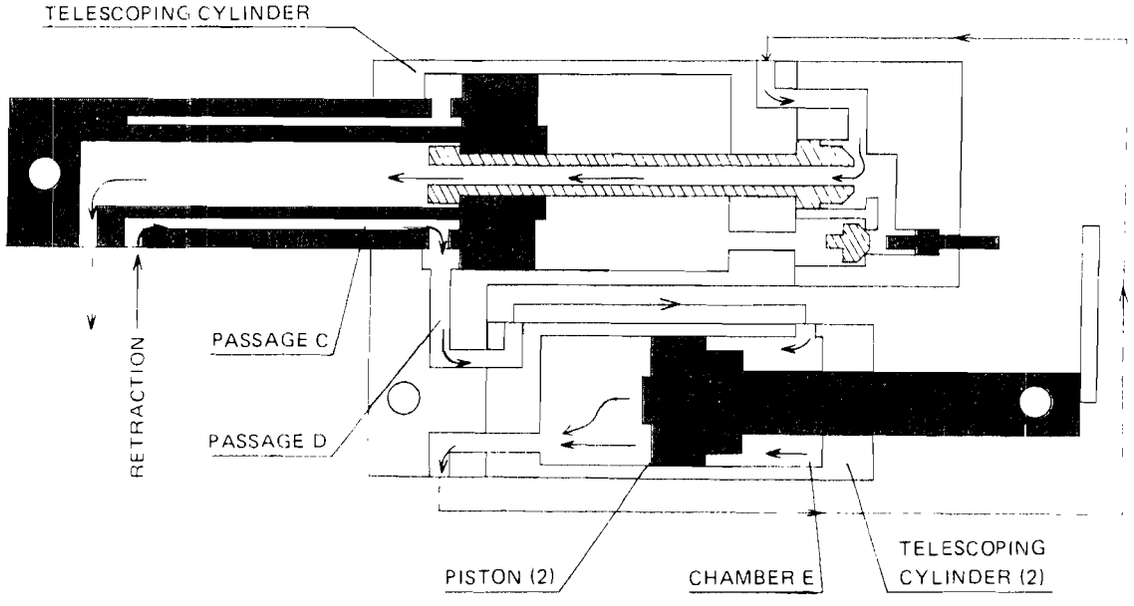
3. Extending Telescoping Cylinder (2)

Just before the rod ass'y (1) of the telescoping cylinder (1) reaches its maximum extension, the stopper of the slide pipe hits the piston (1), and both of them are pushed up. Just at the same time, the check valve (1) of the selector valve opens. The pressure oil passes through the passage A and B, and reaches the chamber D of the telescoping cylinder (2), where it pushes up the piston (2), and as a result, the telescoping cylinder (2) extends.



4. Retracting Telescoping Cylinder (2)

Through the passage C of the telescoping cylinder (1) the pressure oil flows in, and it enters into the chamber E via the passage D and pushes down the piston (2). As a result, the telescoping cylinder (2) starts retracting.



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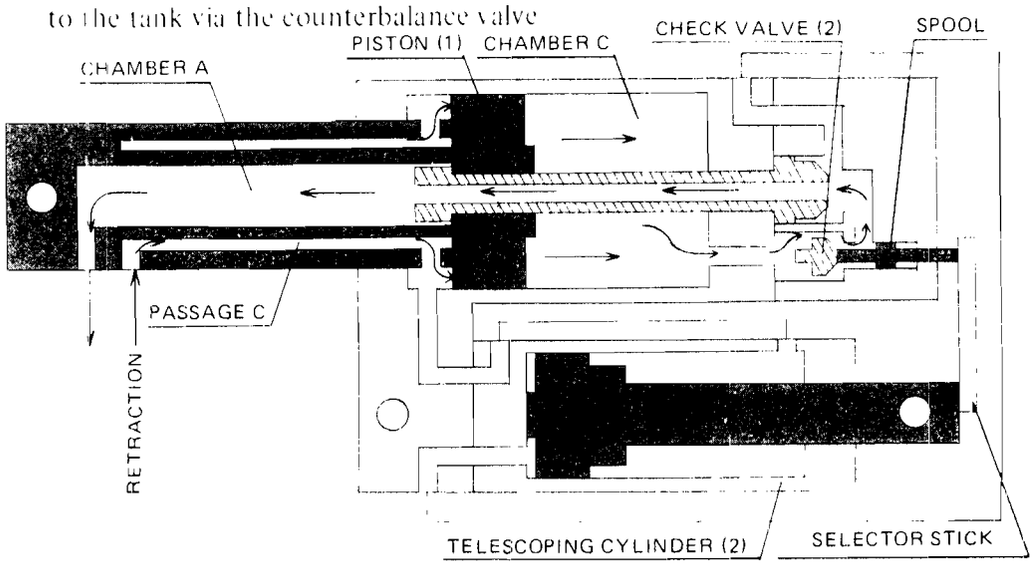
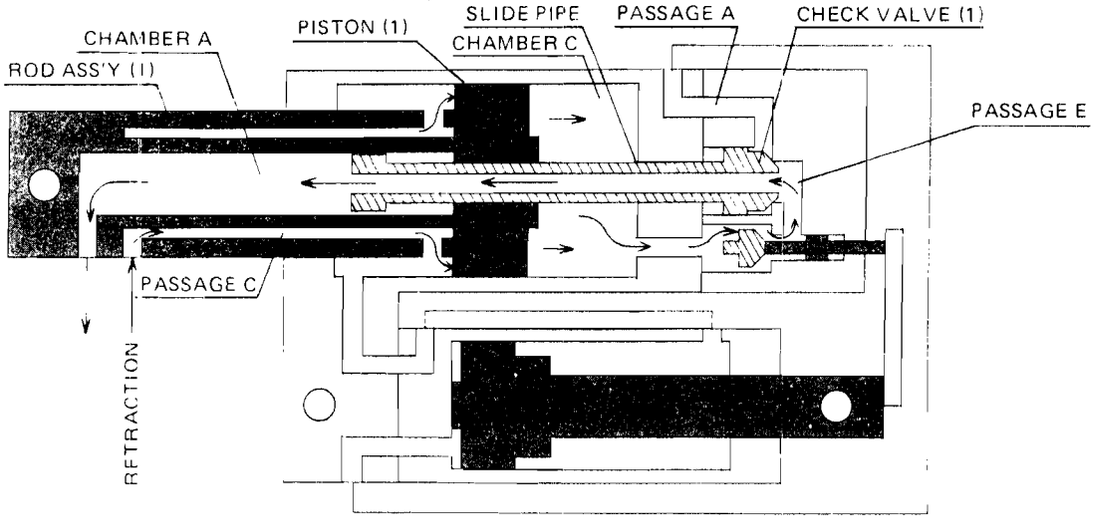
5. **Telescoping Cylinder (1) Starts Retracting**

By means of the flow of pressure oil from the passage C the telescoping cylinder (2) retracts rapidly. Just before reaching the minimum retruction, the spool is pushed by the selector stick locating at the tip of the rod ass'y (2), and the check valve (2) opens, when the piston starts to be pushed up. The pressure oil in the chamber D flows through the check valve (2) and the slide pipe, and reaches the chamber A. Then, it returns to the tank via the counterbalance valve



6. **Retraction of Telescoping Cylinder (1)**

By means of the flow of pressure oil from the passage C the piston (1) is pushed up, and the rod ass'y (1) retracts. When the rod ass'y (1) retracts, the slide pipe returns to its original position from the position to which it was pushed up by the piston (1); and the passages A and E are shut by the check valve (1). When the rod ass'y (1) retracts, all of the pressure oil in the chamber C passes through the passage E and the slide pipe and returns to the tank via the chamber A. In this way, the telescoping cylinder (1) finishes its retracting operation.



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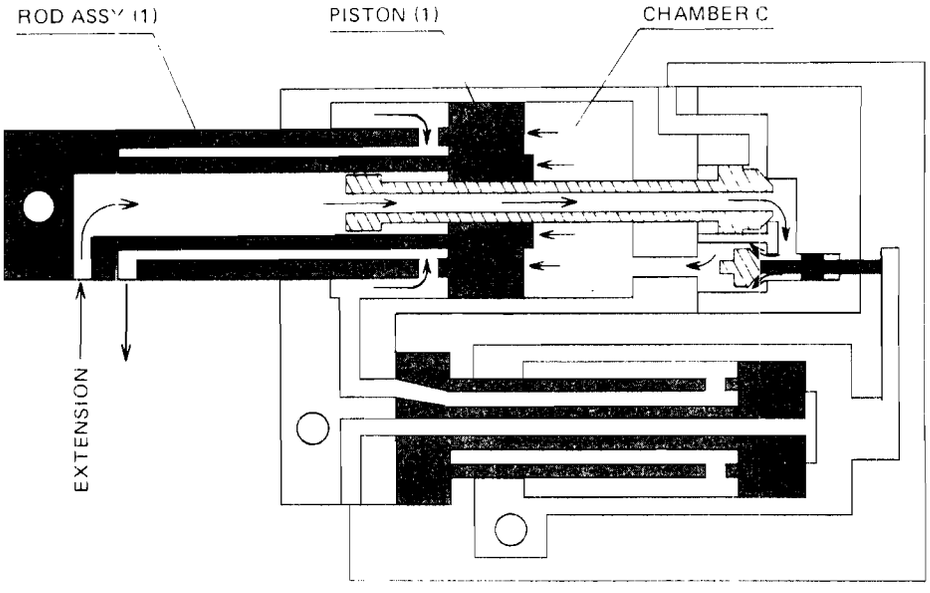
4. 4-Section Boom (Explanation of Dual Cylinder)

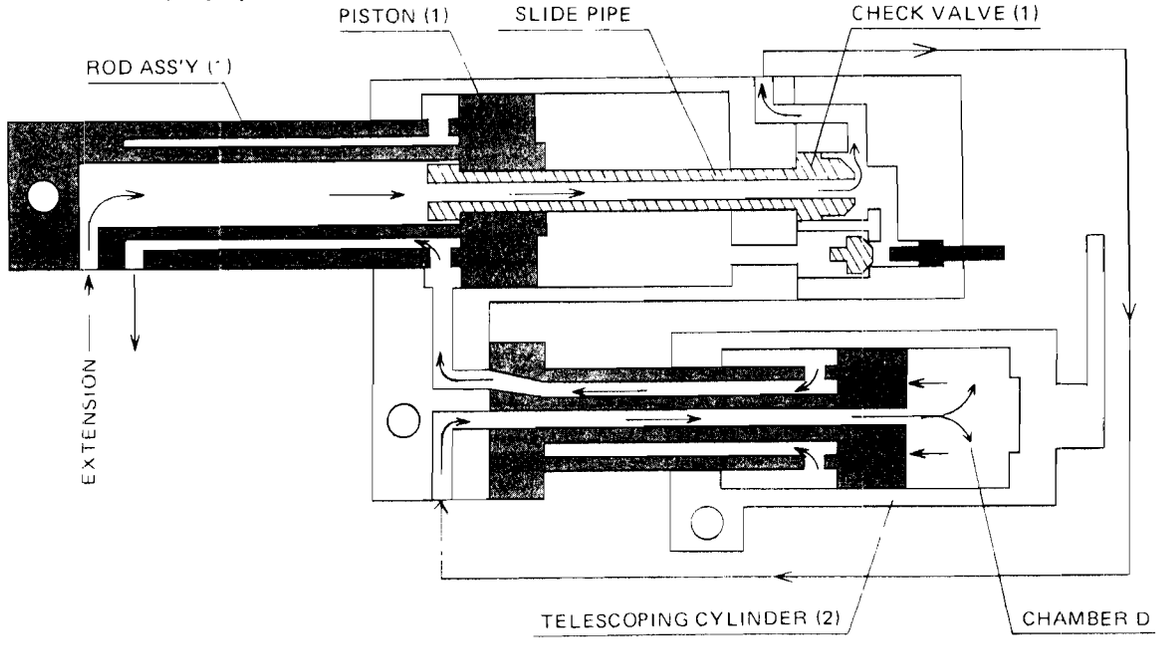
1. Extension of Telescoping Cylinder (1)

The extending process of the telescoping cylinder (1) is same as that of 3-section boom. Pressure oil entered into the chamber C pushes up the piston (1) and the rod ass'y (1) extends.



2. Extension of Telescoping Cylinder (2)

Just before the rod ass'y (1) of the telescoping cylinder (1) reaches its maximum extension, the slide pipe is pushed up by the piston (1), and the check valve (1) of the change-over valve opens. The pressure oil enters into the chamber D of the telescoping cylinder (2), and then the telescoping cylinder extends.



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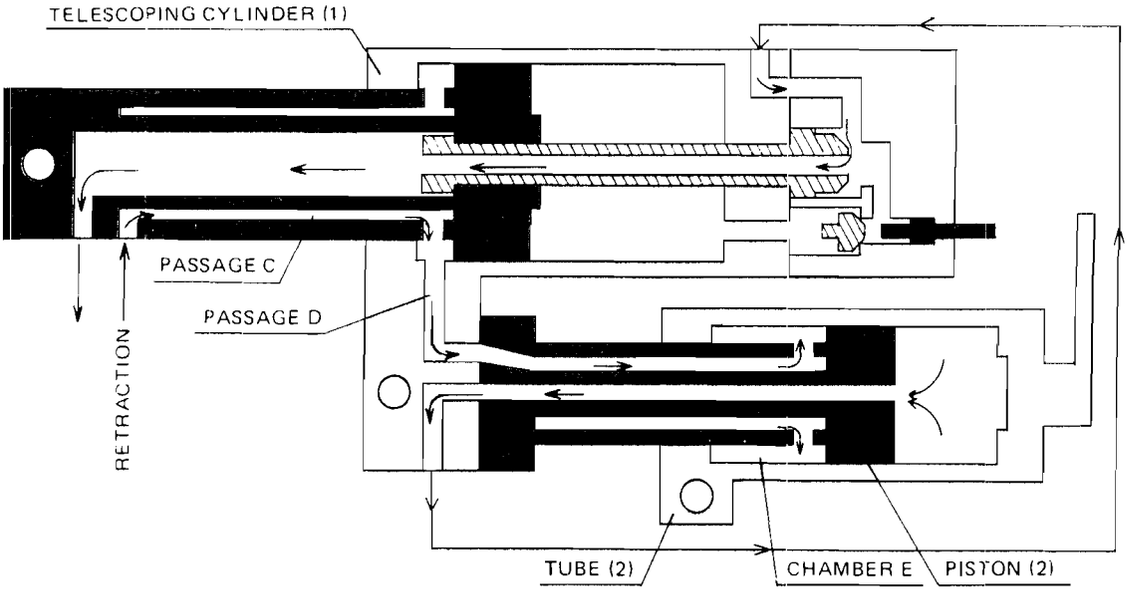
3. Retraction of Telescoping Cylinder (2)

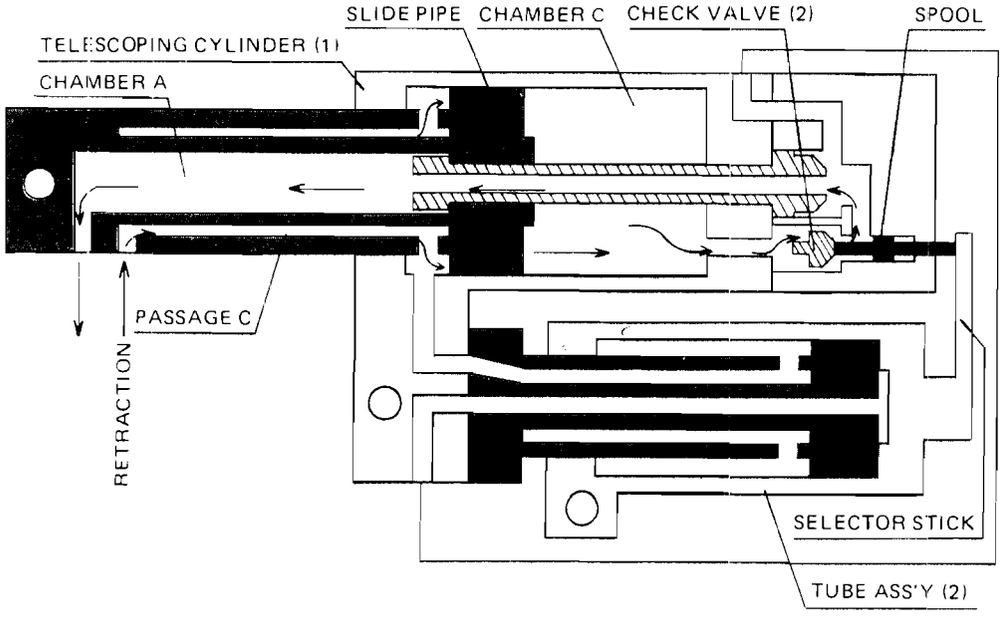
Through the passage C of the telescoping cylinder (1) the pressure oil flows in, and after passing through the passage D, it enters into the chamber E of the telescoping cylinder (2), and it pushes down the tube (2). Then telescoping cylinder (2) starts retracting operation.



4. Retraction of Telescoping Cylinder (1)

Telescoping cylinder (2) retracts following the flow of pressure oil from the passage C. Just before the retraction, the selector stick locating at the tip of the tube ass'y (2) pushes the spool to open check valve (2).

The pressure oil in the chamber C goes through the check valve (2), slide pipe, chamber A and returns to tank. In this way, the telescoping cylinder (1) retracts.



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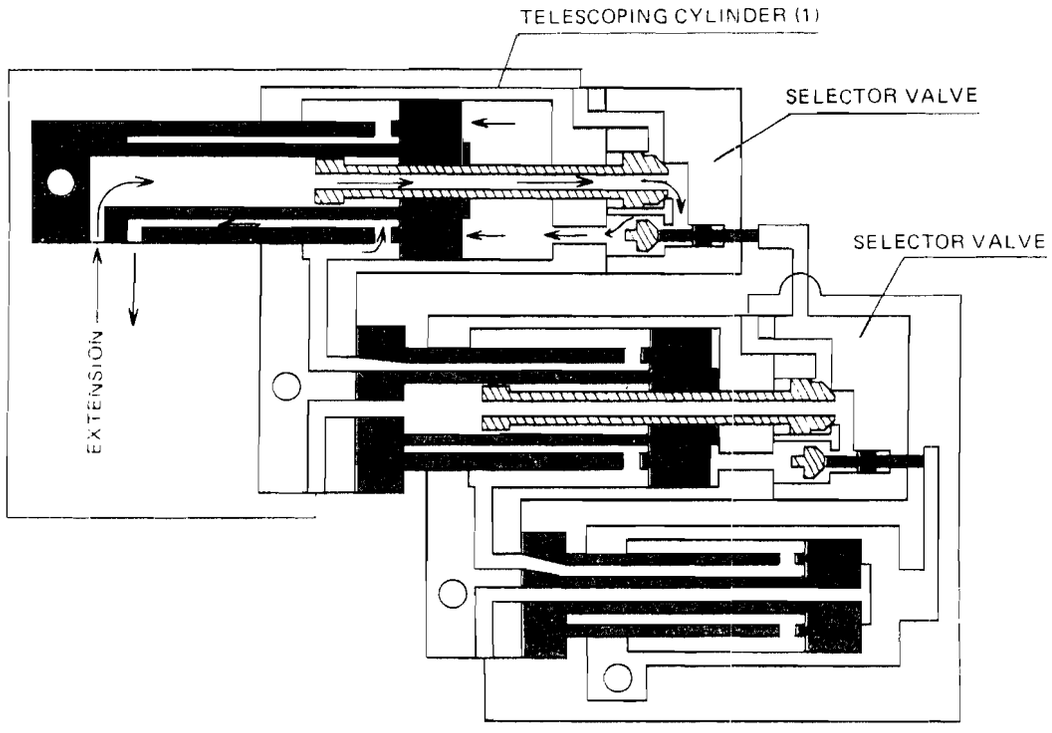
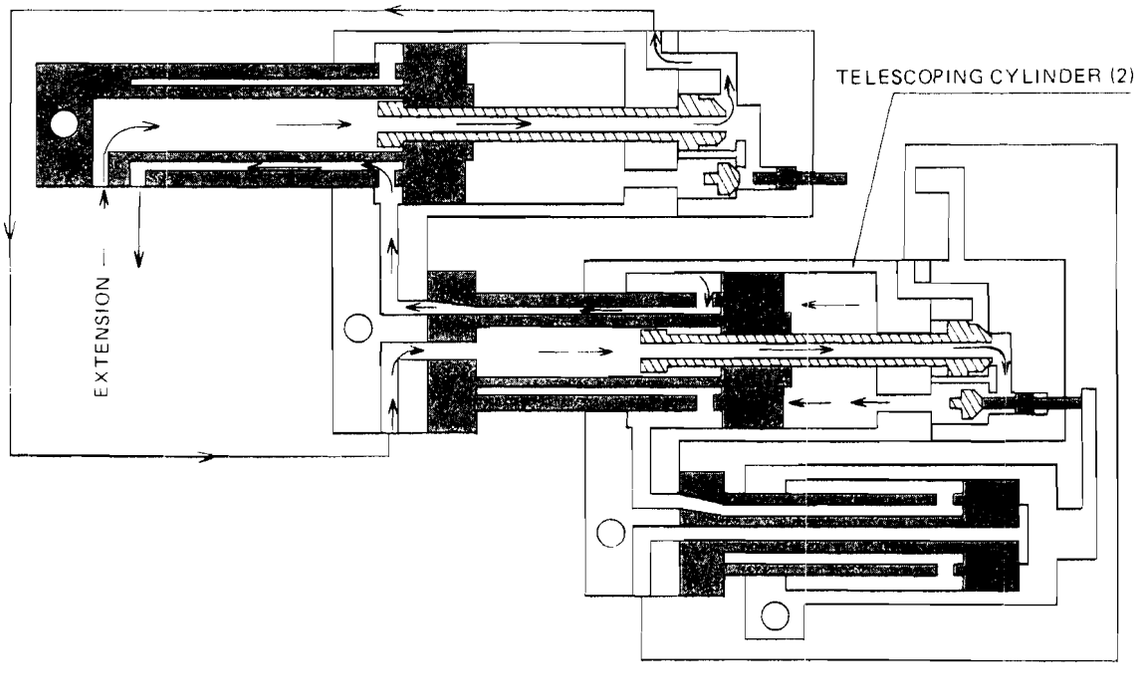
5. 5-Section Boom, 6-Section Boom (Explanation of Triple Cylinders)

Extending process of the telescoping cylinder is same as that of 4-section boom, i. e. their change-over operation is conducted by the selector valves and they extend in the order of telescoping cylinders (1), (2), and (3).

1. When Extending Telescoping Cylinder (1)



2. When Extending Telescoping Cylinder (2)



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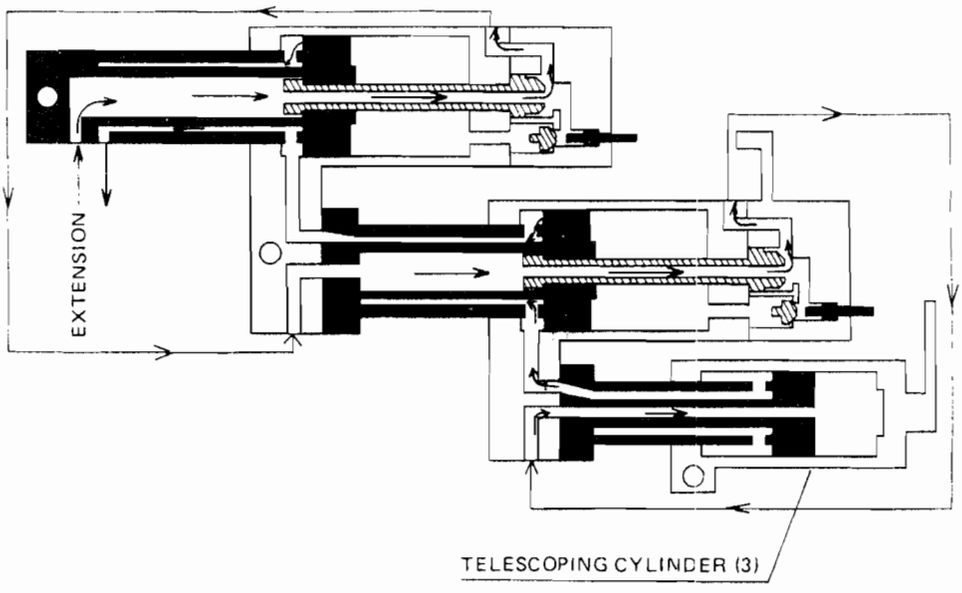
3. When Extending Telescoping Cylinder (3)



* Retracting operation is in the reverse order of extending, and the telescoping cylinders retract in the order of (3), (2), and (1).

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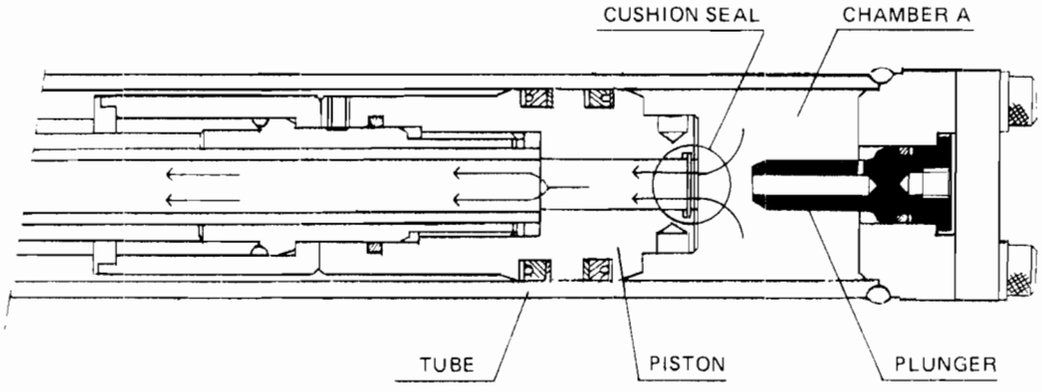
6. Explanation on Function and Working of Cushion Seal

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

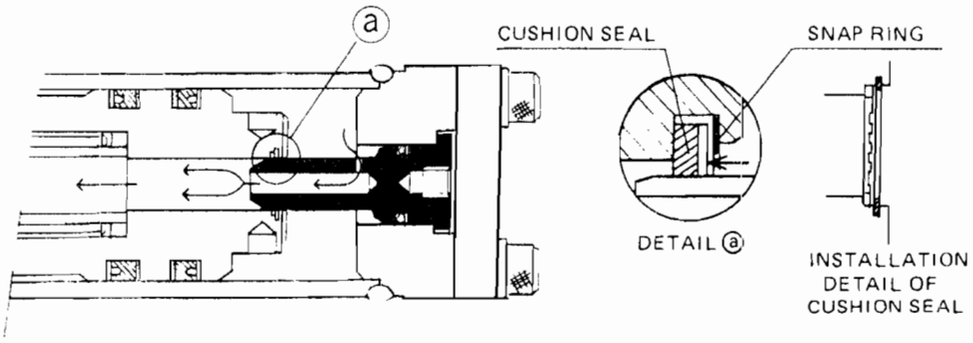
1. Flow of Pressure Oil When Retracting

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 ⓐ. 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.



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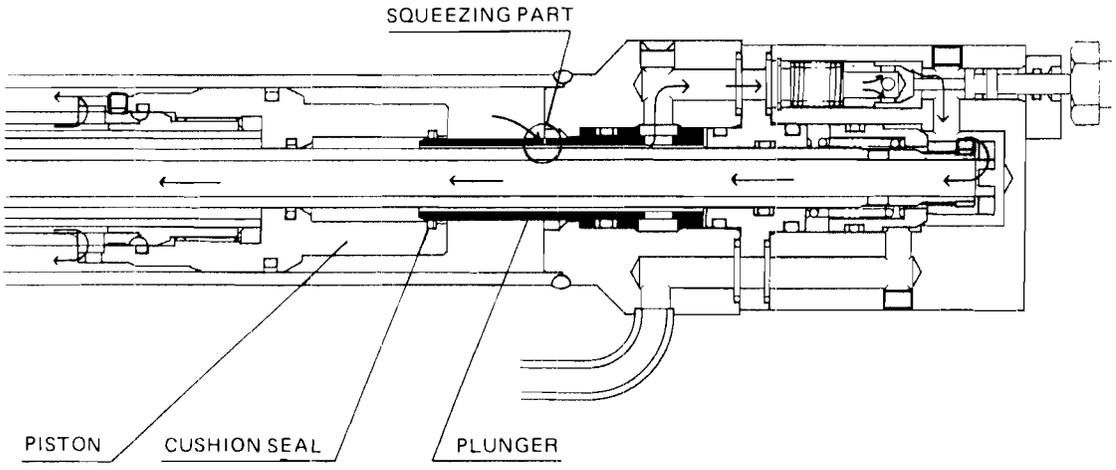
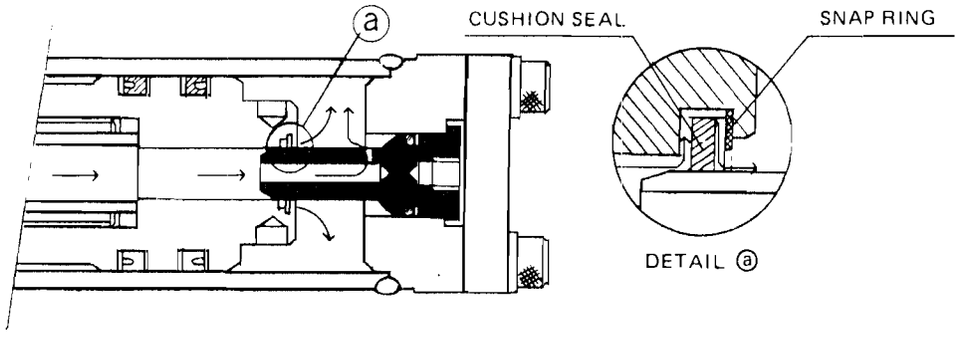
3) Cushion mechanism of the telescoping cylinder (2) for 5-section and 6-section booms

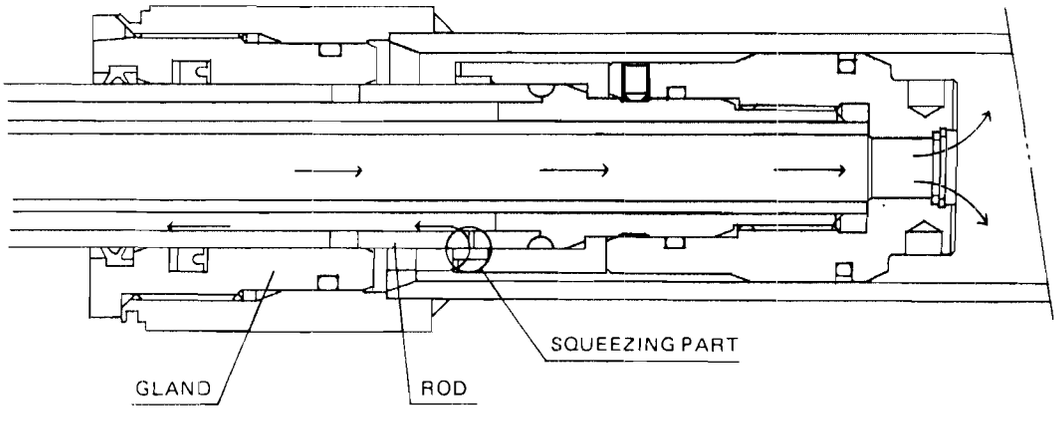


2. Flow of Pressure Oil When Extending

1) When extending, the cushion seal ⓐ is pushed to the snap ring side, 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 boom 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.



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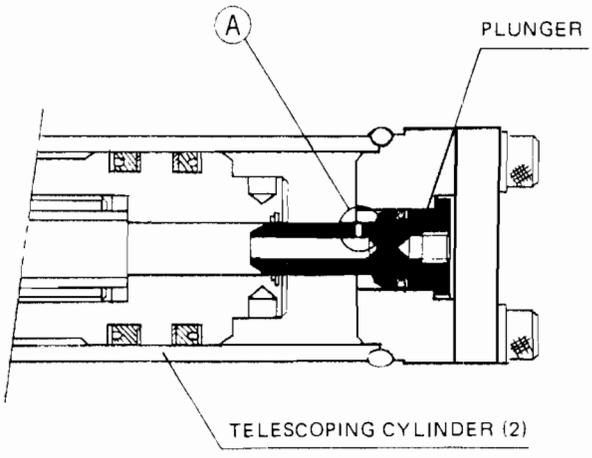
3. Cause of Troubles and Remedy

(4-section boom)

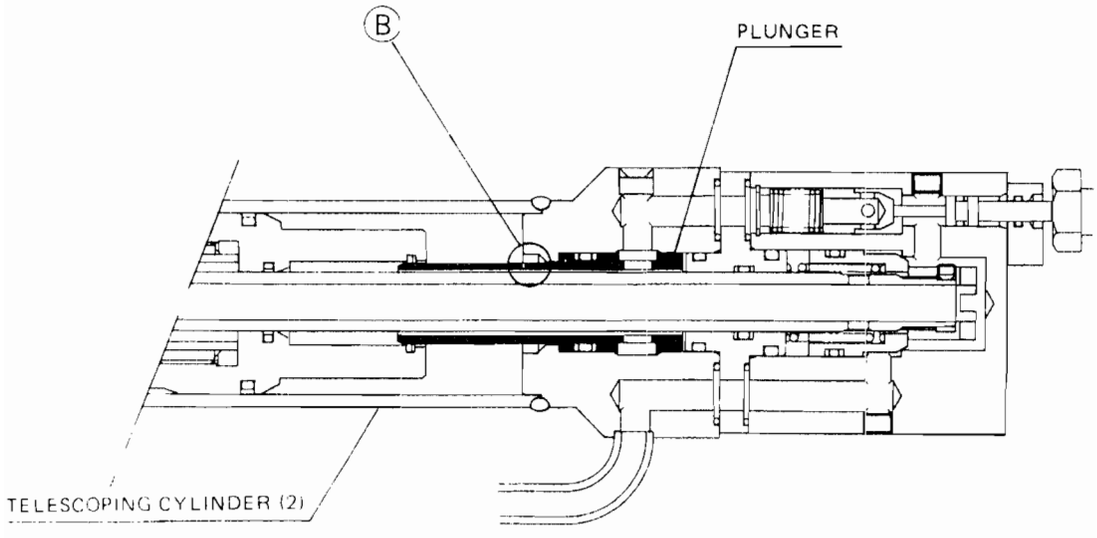
1) Just before the full retraction of the booms (3) and (4), and before changing over to the boom (2), i. e. 30 ~ 40 mm before changing over to the boom (2), retracting operation has suddenly stopped. In such a case, it is presumed that some foreign substance clogged a drill hole at the position Ⓐ of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



(5-section, 6-section booms)

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 Ⓑ of the plunger of the telescoping cylinder (2).



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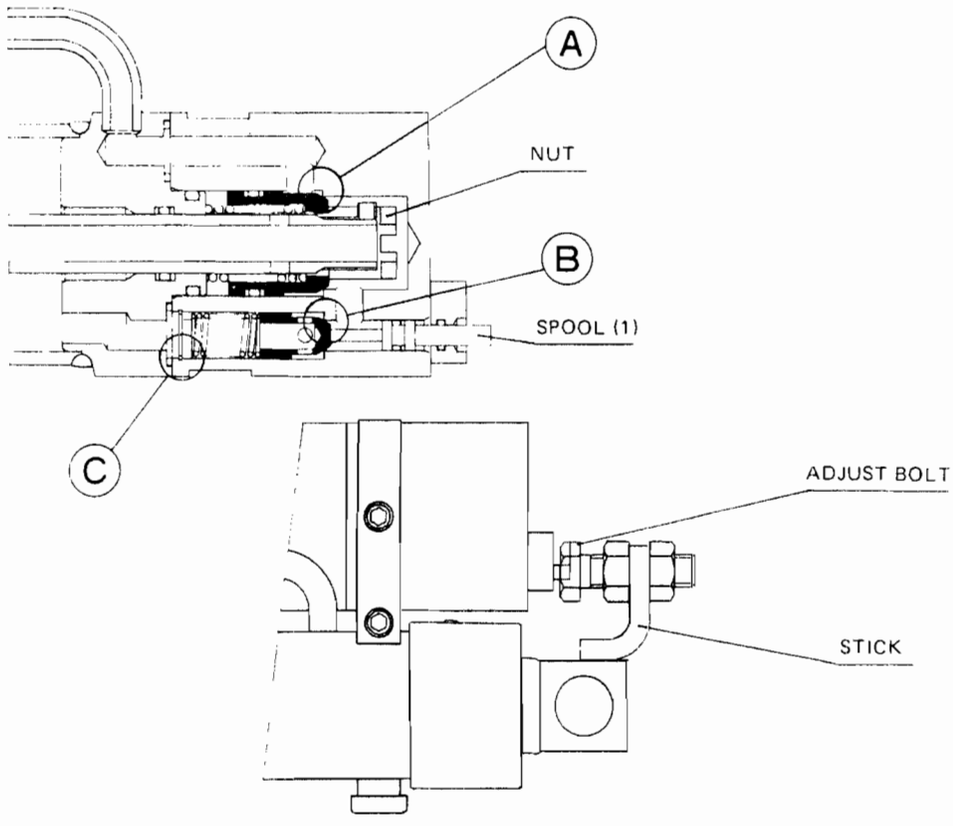
4. Cause of Troubles and Remedy



1) 3-section boom (Dual cylinders)

Abnormal phenomenon	Presumed cause	Remedy
1. Retraction is normal, but extending operation and sequence are not in a good order.	a) The part (A) of the selector valve is clogged with foreign substances.	• Disassemble selector valve and clean it, or replace it with a new one.
2. Extension is normal, but retracting operation and sequence are not in a good order.	a) The part (B) of the selector valve is clogged with foreign substances. b) Snap ring of the part (C) got out of place.	• Disassemble selector valve and clean it, or replace it wiht a new one. • Rearrange snap ring.
3. Boom (2) extends but boom (3) does not extend.	a) Nut at the slide pipe of telescoping cylinder (1) loosened.	• Disassemble telescoping cylinder (1) and tighten the nut.
4. After full extension of booms, boom (3) retracts but boom (2) does not retract.	a) Adjust bolt pushing the spool of selector valve loosened or the stick was bended. b) Selector valve spool (1) was bended.	• Adjust the bolt. • Straighten bended stick. • Replace selector valve ass'y with a new one.

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2) 5-section boom and 6-section boom (Triple cylinders)

Abnormal phenomenon	Presumed cause	Remedy
1. Retraction is normal; but when extending, booms (2) and (3) extend at the same time, in another word "disorderly."	a) Some foreign substances clogged the part Ⓐ of selector valve of telescoping cylinder (1).	• Disassemble selector valve and clean it, or replace it with a new one.
2. Extension is normal; but when retracting, booms (3), (4), (5) and (6) retract at the same time, in another word "disorderly."	a) Some foreign substances clogged the part Ⓐ of selector valve of telescoping cylinder (2).	
3. Extension is normal; but when retracting, booms (3), (4), (5) and (6) retract at the same time, in another word "disorderly."	a) Some foreign substances clogged the part Ⓑ of selector valve of telescoping cylinder (2). b) Snap ring at the part Ⓒ of selector valve of telescoping cylinder (2) got out of place.	• Disassemble selector valve and clean it, 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 another word "disorderly."	a) Some foreign substances clogged the part Ⓑ of selector valve of telescoping cylinder (1). b) Snap ring at the part Ⓒ of selector valve of telescoping cylinder (1) got out of place.	
5 Boom (2) extends, but boom (3) does not extend.	a) Nut at slide pipe of telescoping cylinder (1) loosened.	• Disassemble telscoping cylinder (1) and tighten the nut.
6 Booms (2) and (3) extend, but booms (4), (5) and (6) do not extend.	a) Nut at slide pipe of telescoping cylinder (2) loosened.	• Disassemble telescoping cylinder (2) and tighten the nut.
7. After full extension, booms (4), (5) and (6) retract but boom (3) does not retract.	a) Adjust bolt pushing the spool of selector valve of telescoping cylinder (2) loosened. b) Selector valve spool of telescoping cylinder (2) was bended.	• Adjust the bolt. • Replace selector valve ass'y with a new one.
8. Booms (3), (4), (5) and (6) retract but boom (2) does not retract.	a) Adjust bolt pushing the spool of selector valve of telescoping cylinder (1) loosened. b) Selector valve spool of telescoping cylinder (1) was bended.	

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

* As to the 4-section boom check the cause of troubles following the procedures for 5-section and 6-section booms.

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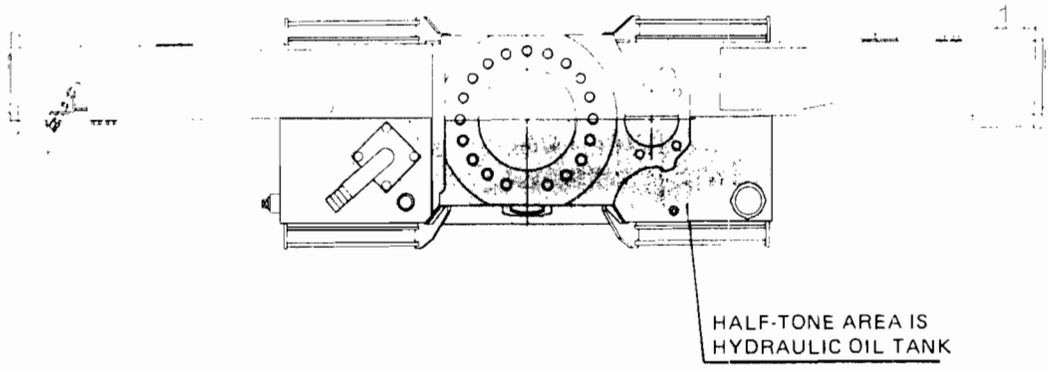
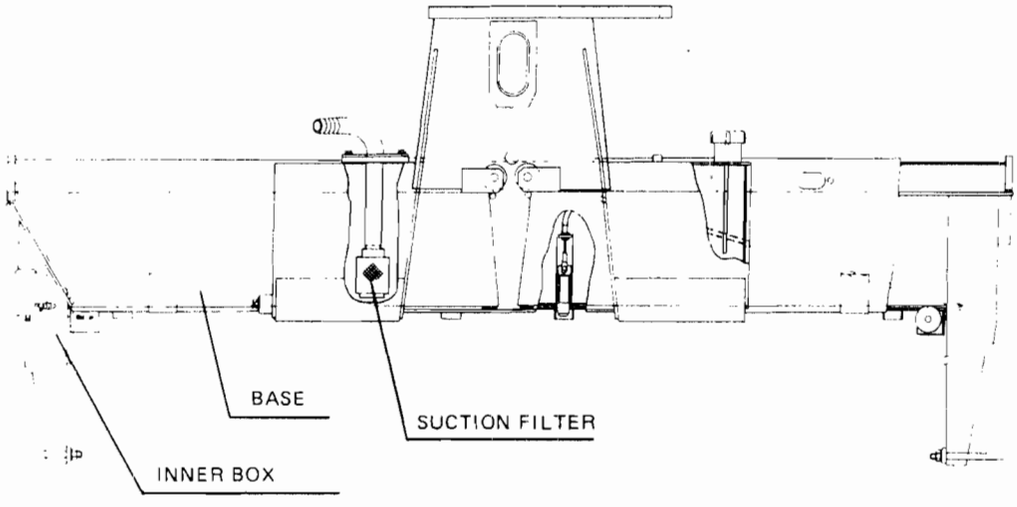
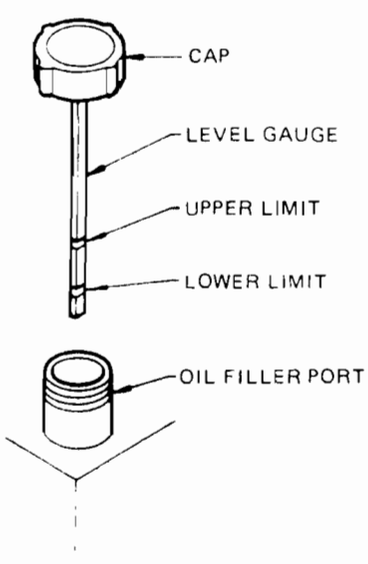
§4. BASE

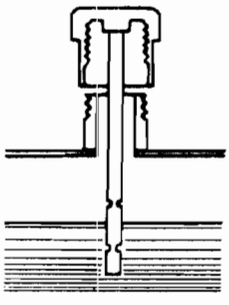
1. Construction of Base







When checking oil quantity, just put the cap on the inlet but not screw gauge in.



Standard oil quantity is the middle between upper and lower limits of oil gauge.
When checking quantiy, just put the cap on the oil inlet but not screw the gauge in.

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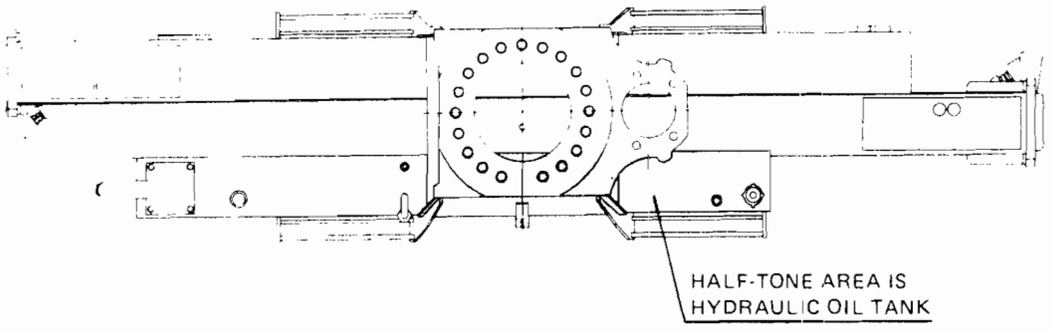
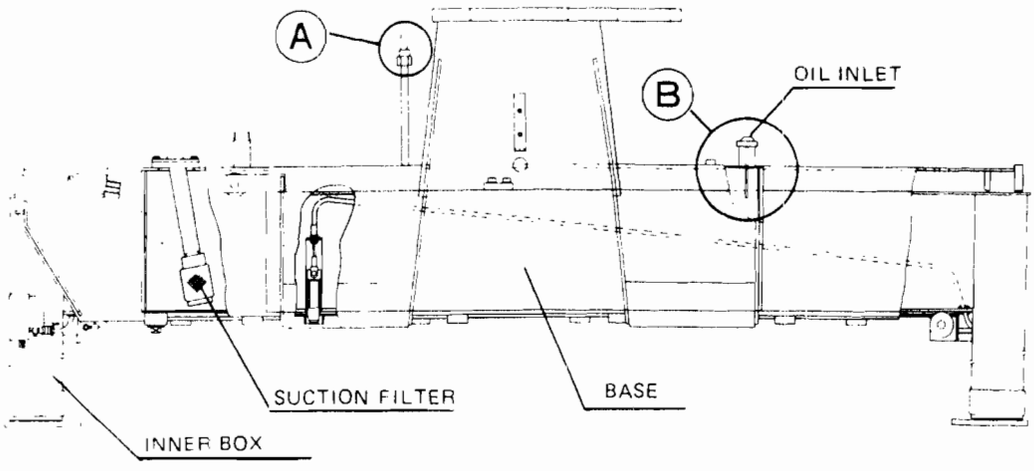
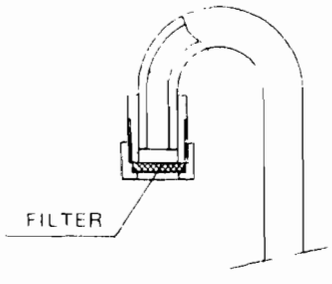
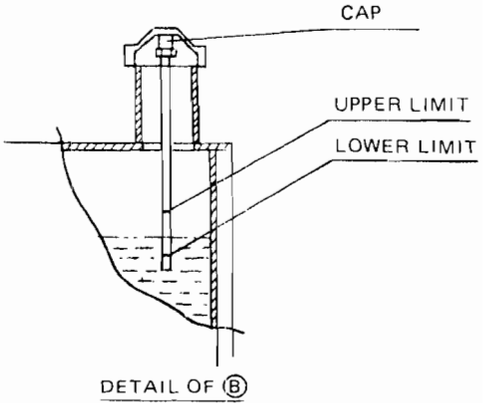
2. Construction of the Base (Differential Type)







DETAIL OF Ⓐ FILTER FITTING



DETAIL OF Ⓑ

Standard oil quantity is the middle between upper and lower limits of oil gauge.

When checking quantiy, just put the cap on the oil inlet but not screw the gauge in.

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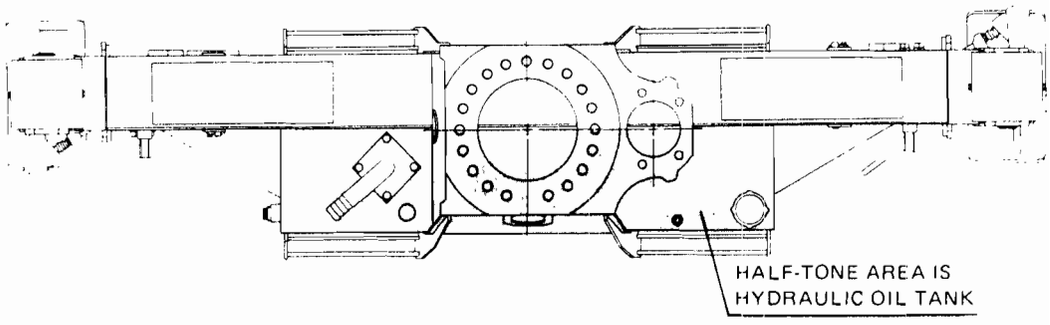
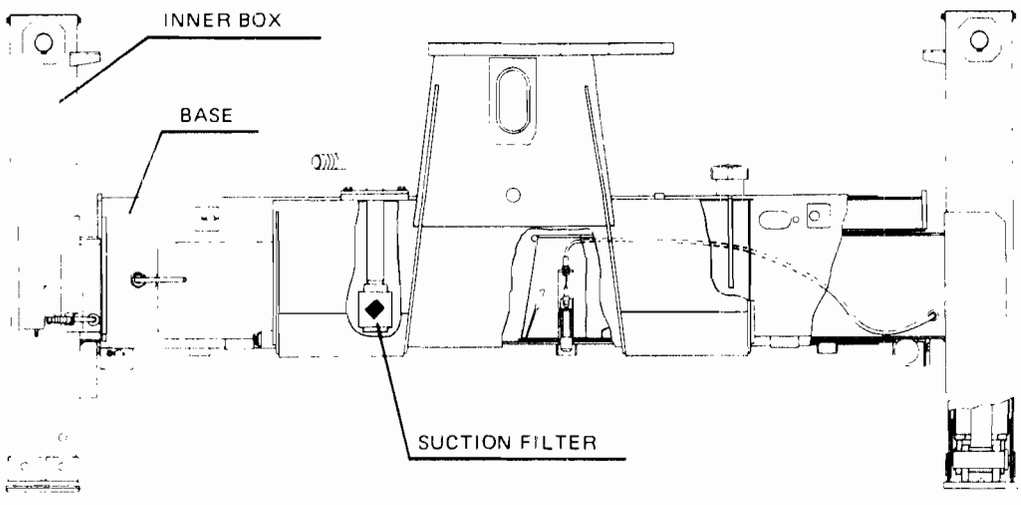
3. Construction of the Base





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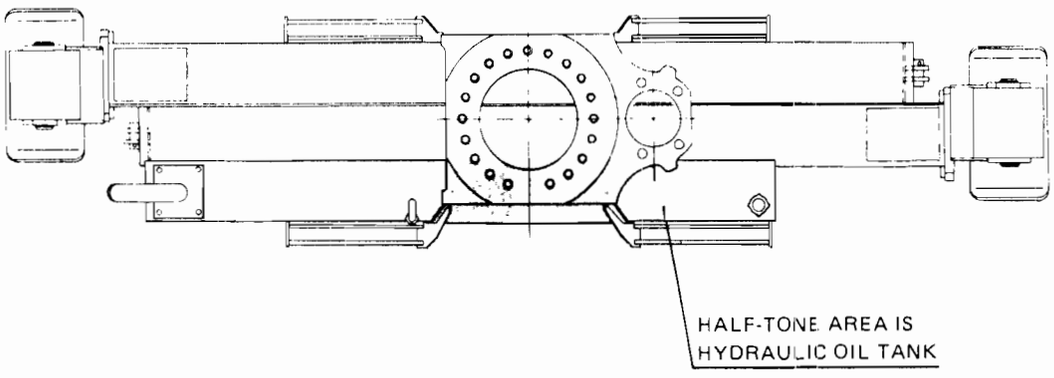
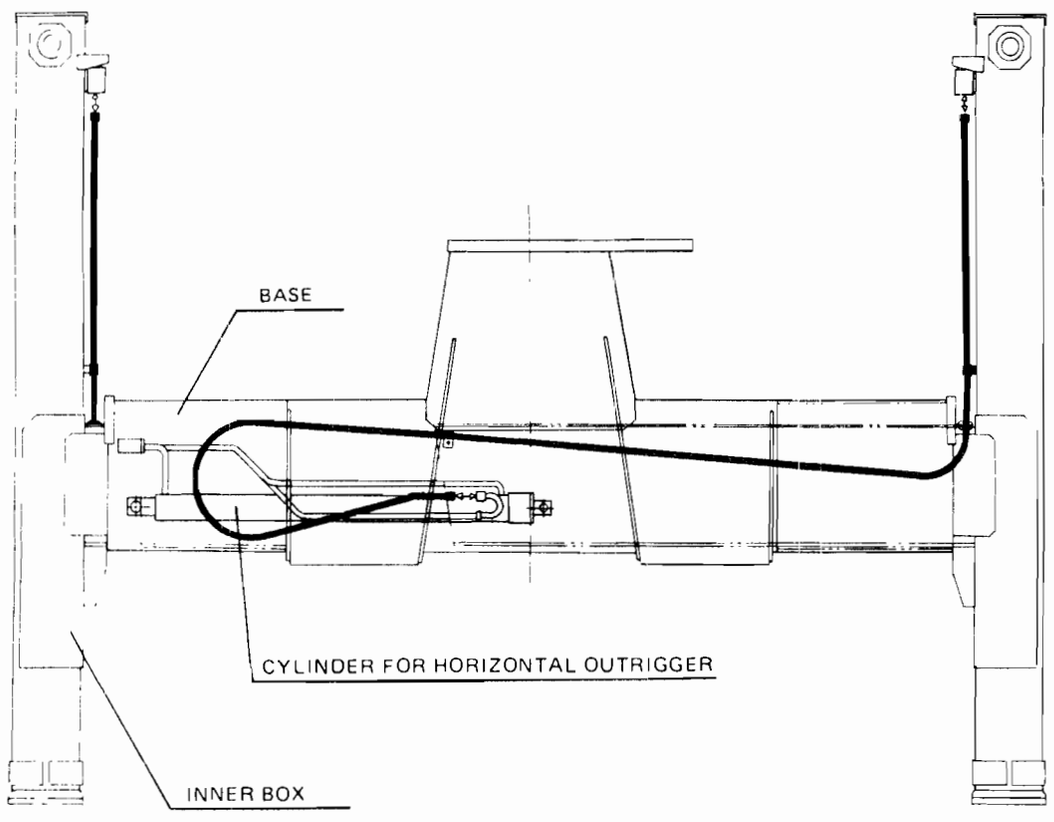
4. Construction of the Base (Differential Type)





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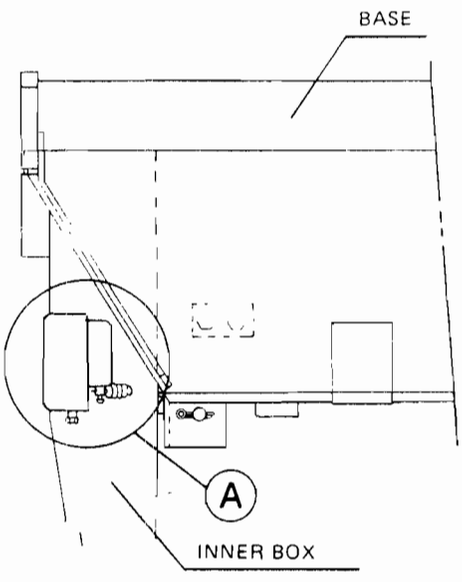
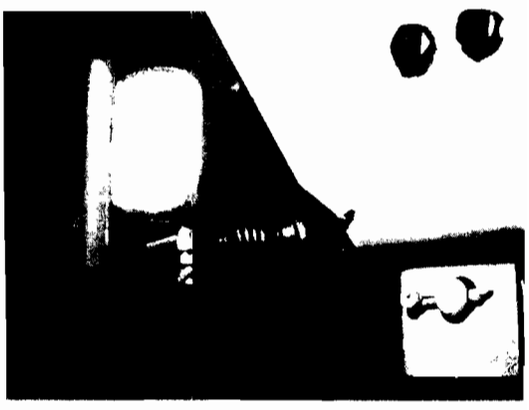
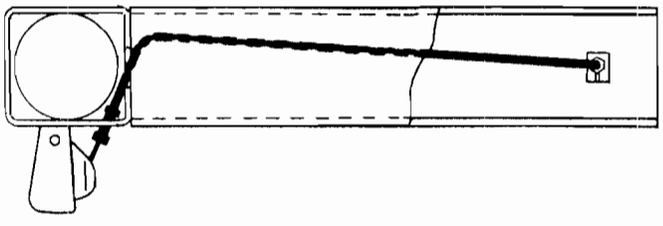
5. Construction of the Inner Box Extension Cable Installation

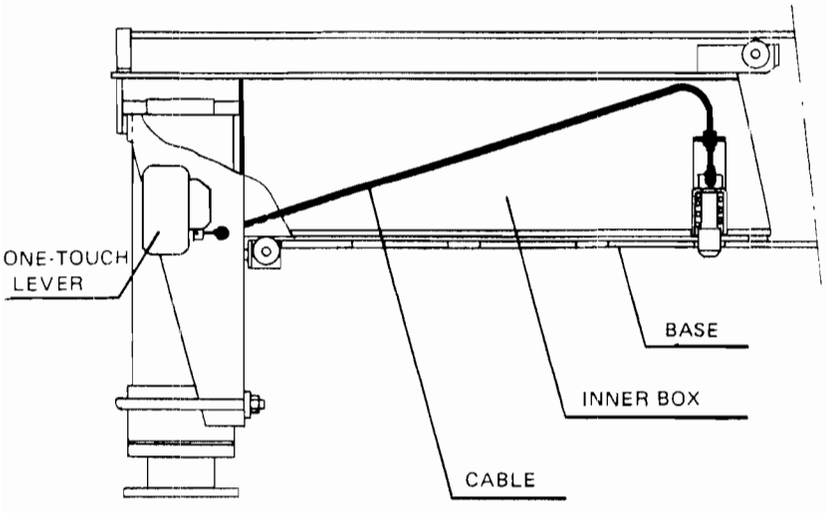


CONSTRUCTION OF INSTALLATION



ONE-TOUCH LEVER Ⓐ





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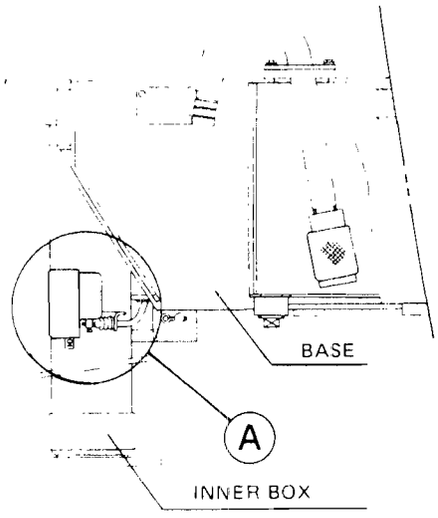
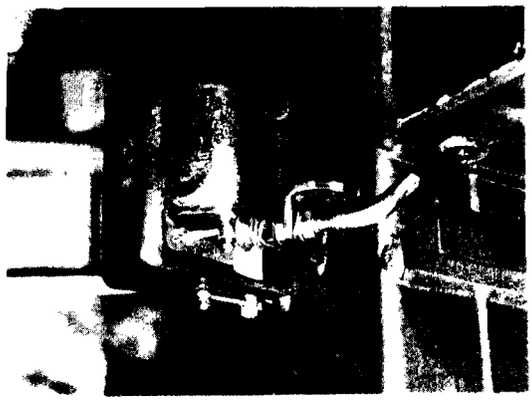
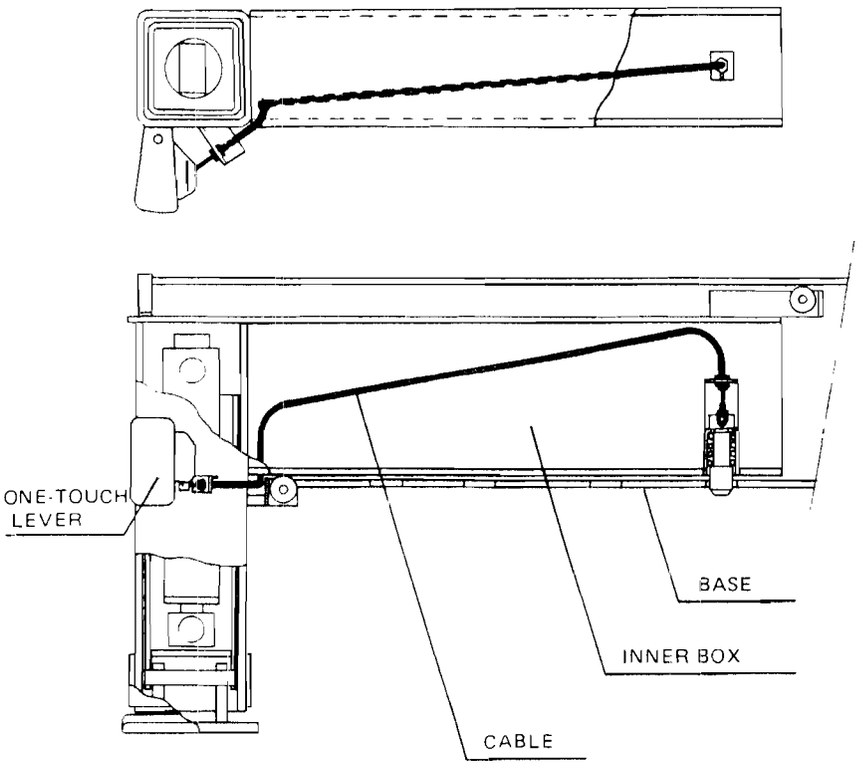
6. Construction of the Inner Box Extension Cable Installation (Differential Type)





ONE-TOUCH LEVER (A)

CONSTRUCTION OF INSTALLATION



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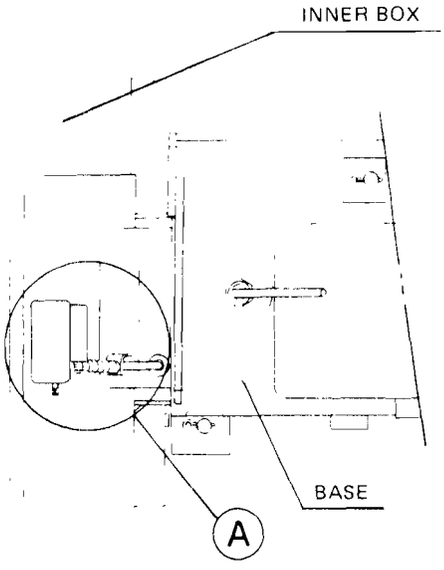
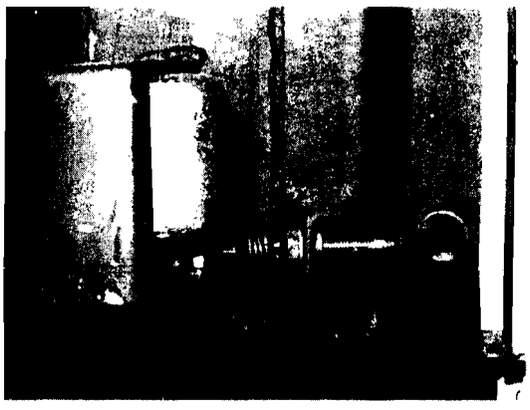
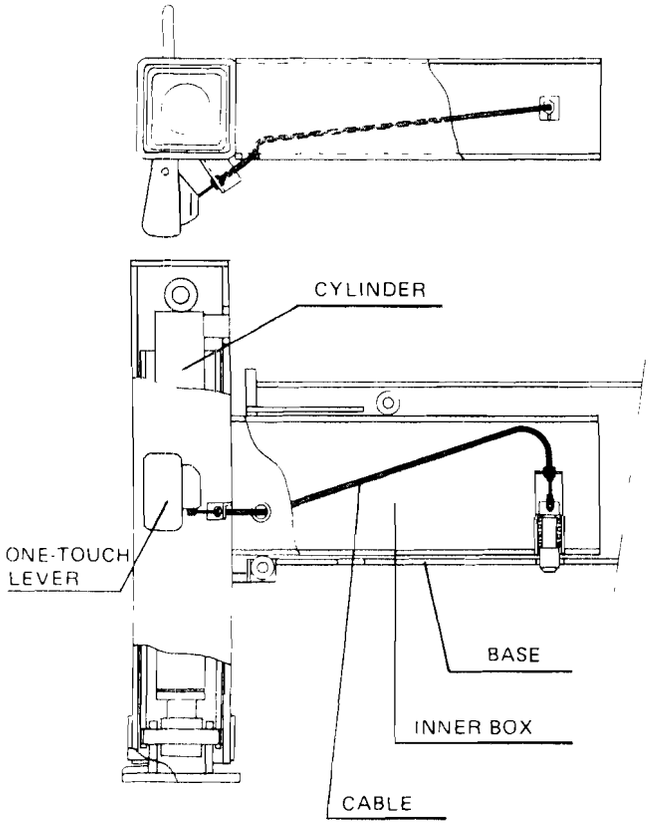
7. Construction of the Inner Box Extension Cable Installation



CONSTRUCTION OF INSTALLATION



ONE-TOUCH LEVER (A)



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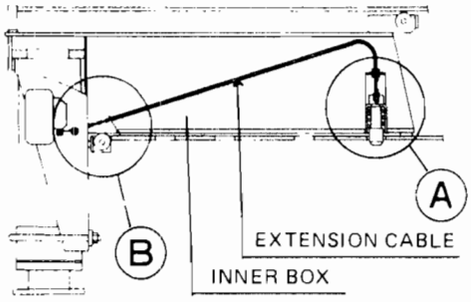
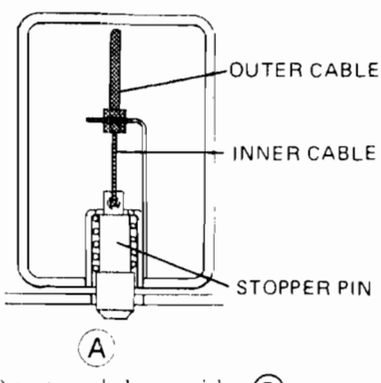
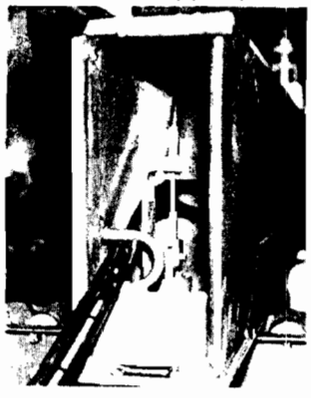
8. Extension Cable Installation Procedure



1) Stopper Pin (A)

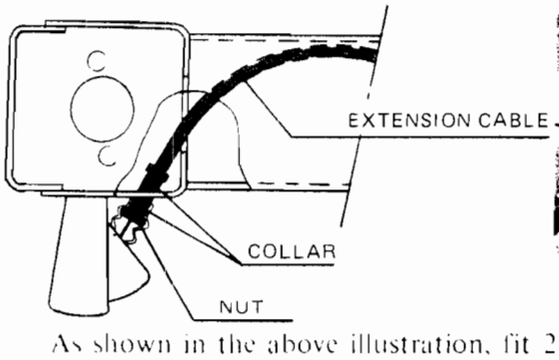
Inner and outer cables are connected to the stopper pin.

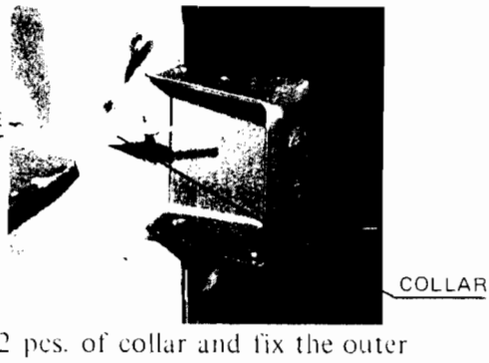




2) One-touch lever side (B)

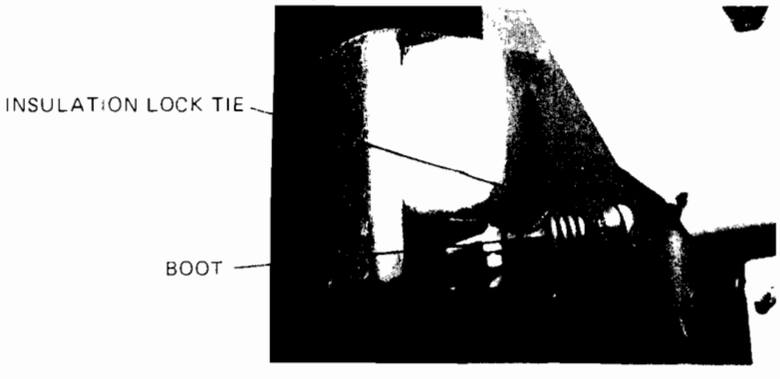
Connect outer cable.





As shown in the above illustration, fit 2 pcs. of collar and fix the outer cable by tightening the nuts.

3) Fit a boot to prevent entrance of water, dust, etc.



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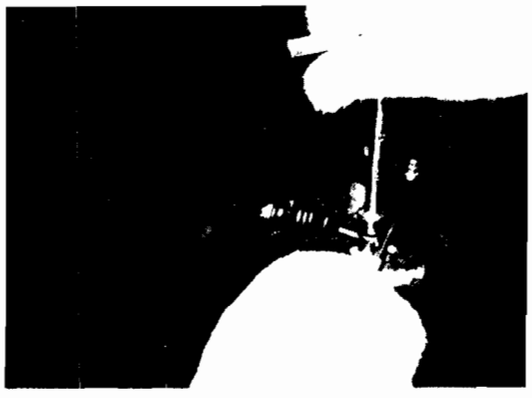
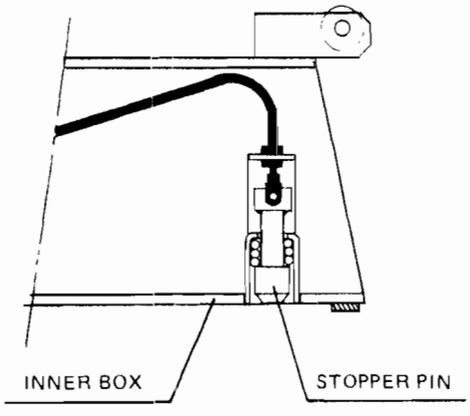
4) Fit the inner cable to the one-touch lever.
For fixing the inner cable to the lever, pull the inner cable with a thin nose plier to the position where the stopper pin starts to move. At this position fix the cable with an M5 x 8ℓ bolt.



Note: Tighten firmly the bolt so that the cable will not come off.

5) After connecting, pull the lever and check to see if the tip of the stopper pin is in the state as shown in the below illustration:

Lever is in the state of being pulled.



Caution: When the lever is pulled, the tip of the stopper pin must not be protruded or retracted too much from the bottom face of the inner box.

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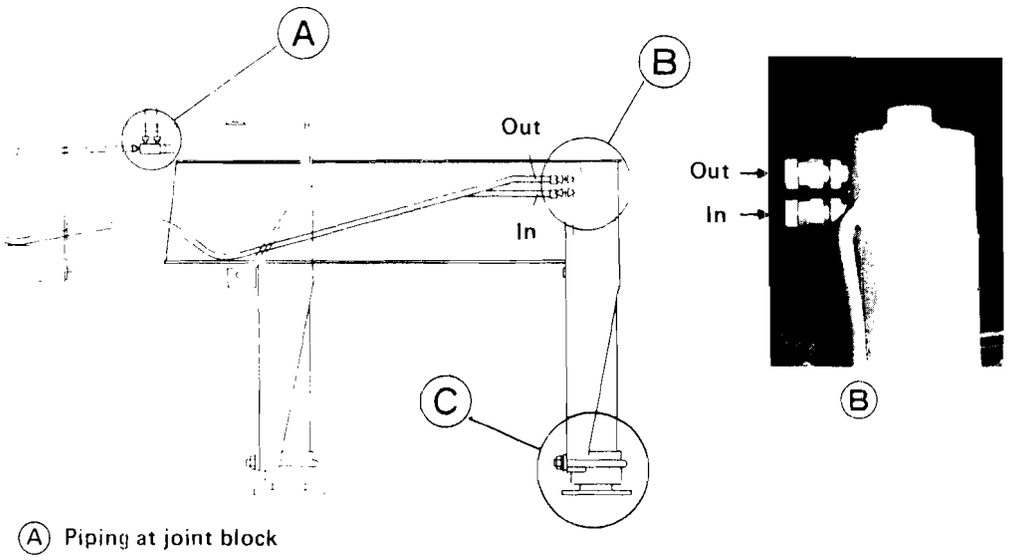
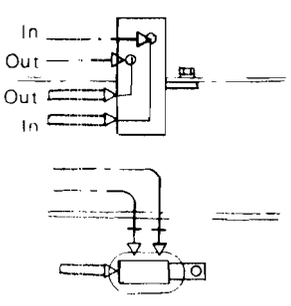
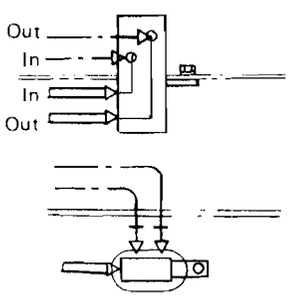
9. Piping to Outrigger Cylinder

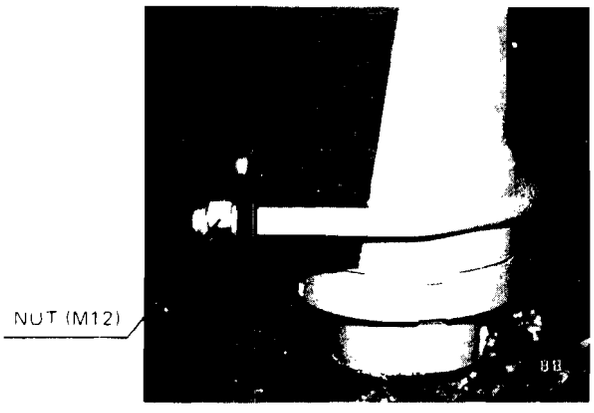


(A) Piping at joint block

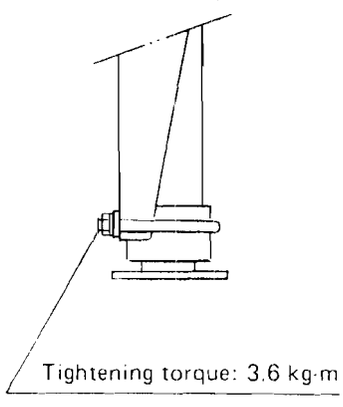
	(SPECIFICATION)		(SPECIFICATION)
	STD SH		S H

Caution: When connecting high pressure nylon hose, take special care not to twist the hose. Also when stretching or retracting outriggers, the hose should not be rubbed with the inside wall of the box.

* Tightening torque for the nut to fasten the band



(C)



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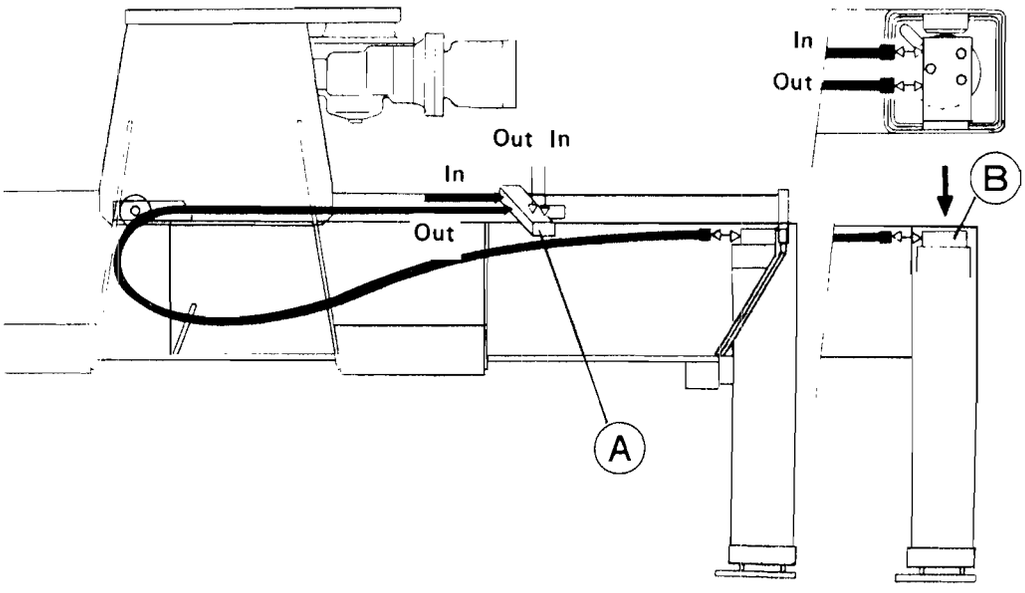
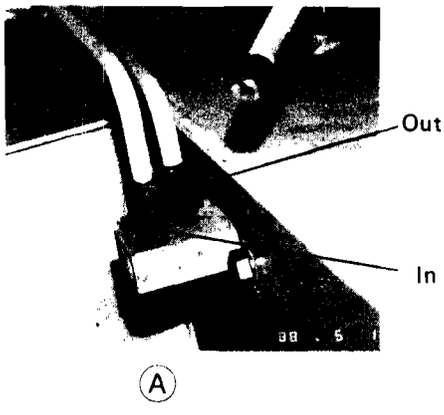
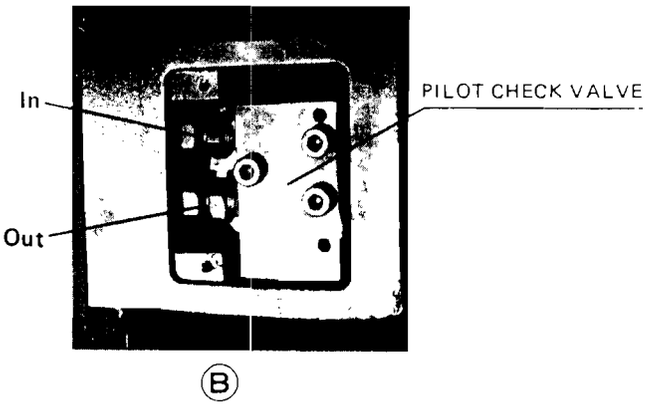
10. Piping to Outrigger Cylinder







Caution: When connecting high pressure nylon hose, take special care not to twist the hose. Also when stretching or retracting outriggers, the hose should not be rubbed with the inside wall of the box.

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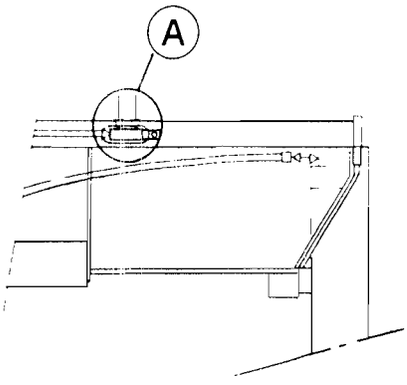
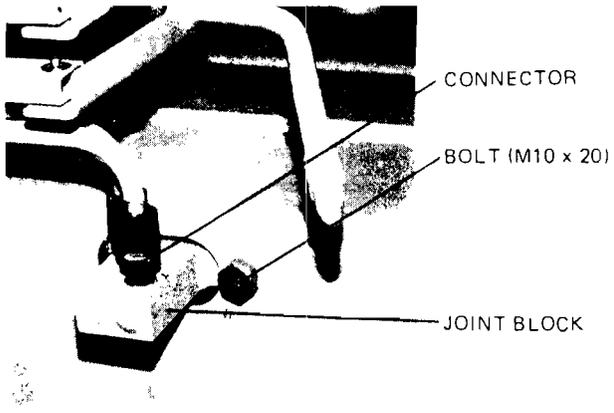
11. Pulling out Order of Horizontal Inner Box

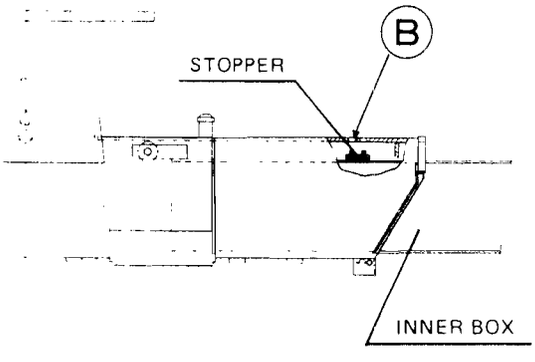
1) Remove the connector for pipes (A).
2) Remove the bolt which fastens joint block.

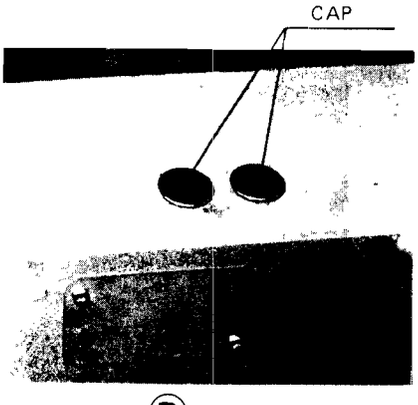




(A)

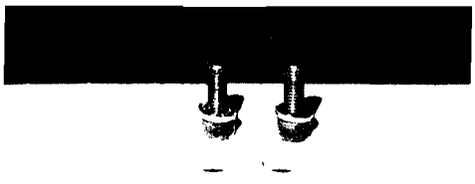
3) Remove 2 pcs. of cap (B).
4) Pull out the inner box and put the bolt position of the stopper upon the part (B).





(B)

5) Remove 2 pcs. of hexagon socket head bolt (M10 x 25) which fasten the stopper
6) Take out the stopper through the window of the side plate.
7) Carefully pull out the inner box so as not to damage the hose.



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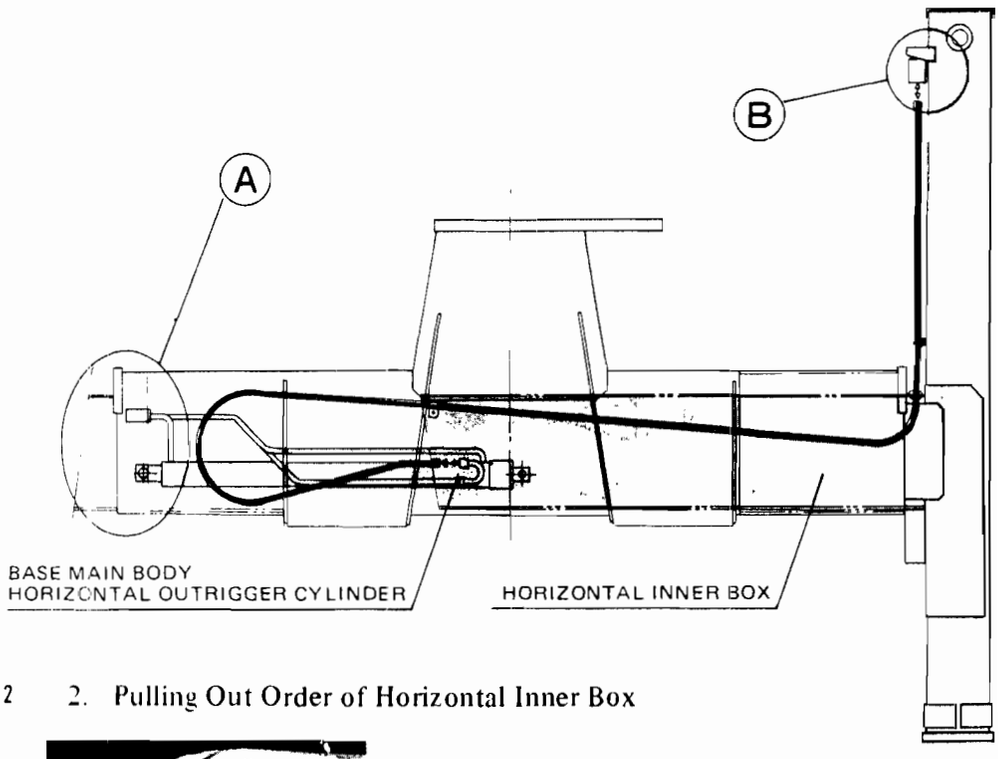
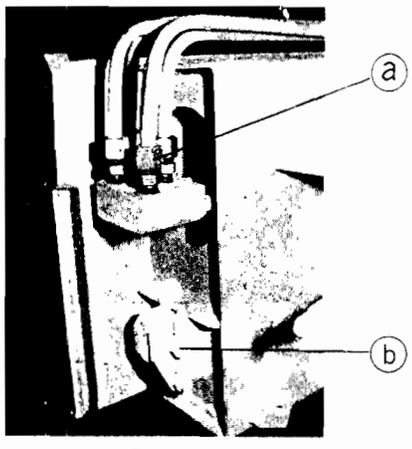
12. High Outrigger

1. Horizontal Type Inner Box Hydraulic Pressure Stretching Construction

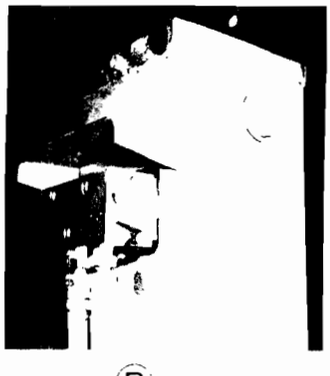


2 2. Pulling Out Order of Horizontal Inner Box



Ⓐ

1) Remove 4 pipe connectors ⓐ.
2) Pull out the pin which fixes the horizontal cylinder ⓑ.
3) Pull out the horizontal inner box.



Ⓑ

Installation of pilot check valve

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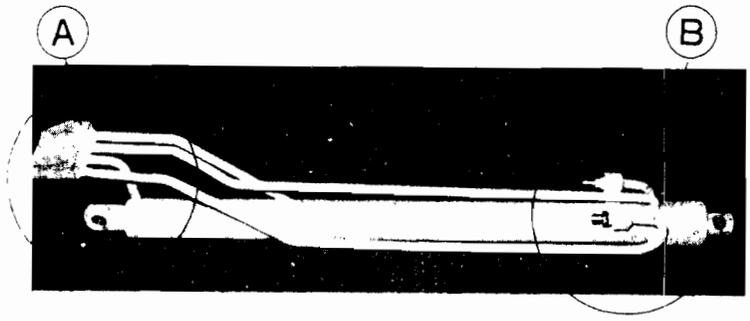
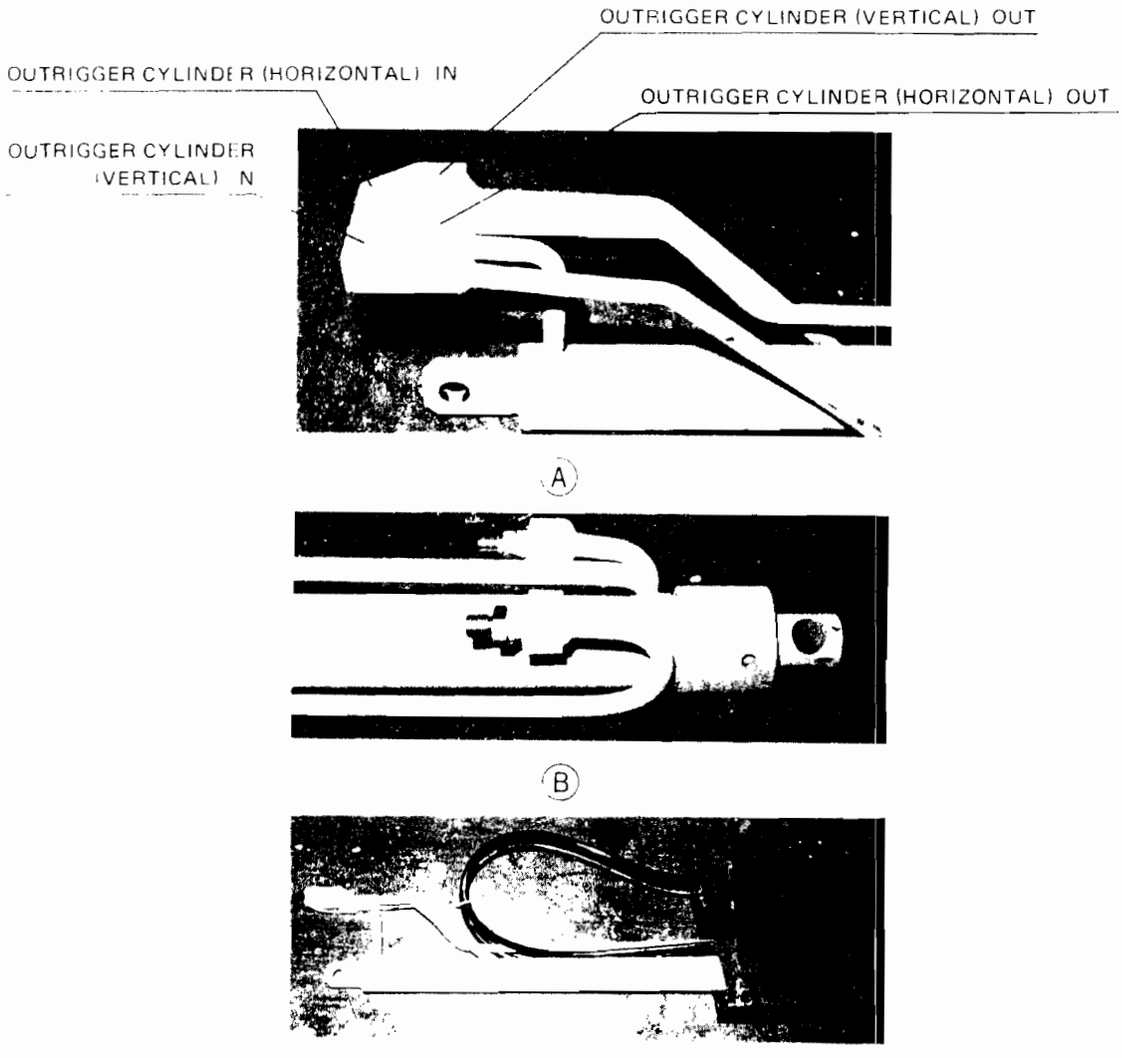
3. Horizontal Outrigger Cylinder





This photo shows that the horizontal cylinder is assembled in the inner box.

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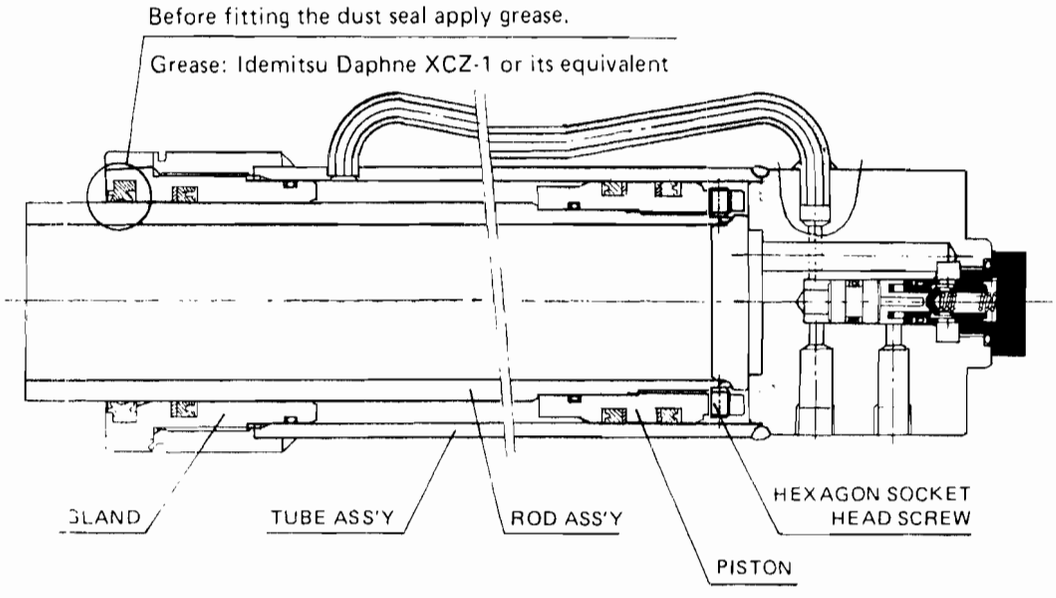
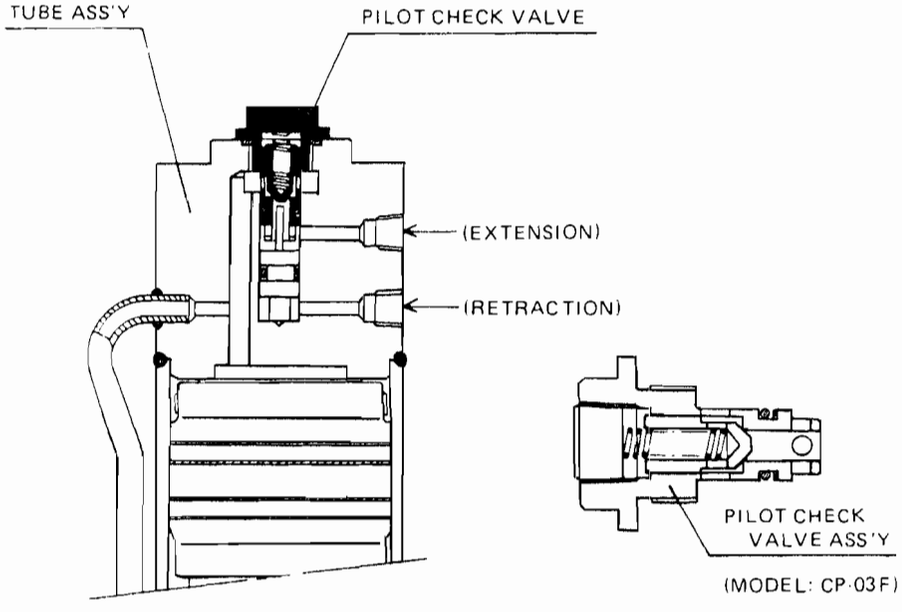
§5. OUTRIGGER CYLINDER

1. Construction of Vertical Outrigger Cylinder



Note: Before fastening hexagon socket head screw for piston, apply "LOCK-TIGHT #242." (After applying, do not flow hydraulic oil for about 1 hour.)

2. Construction of the Part where Pilot Check Valve is Fitted



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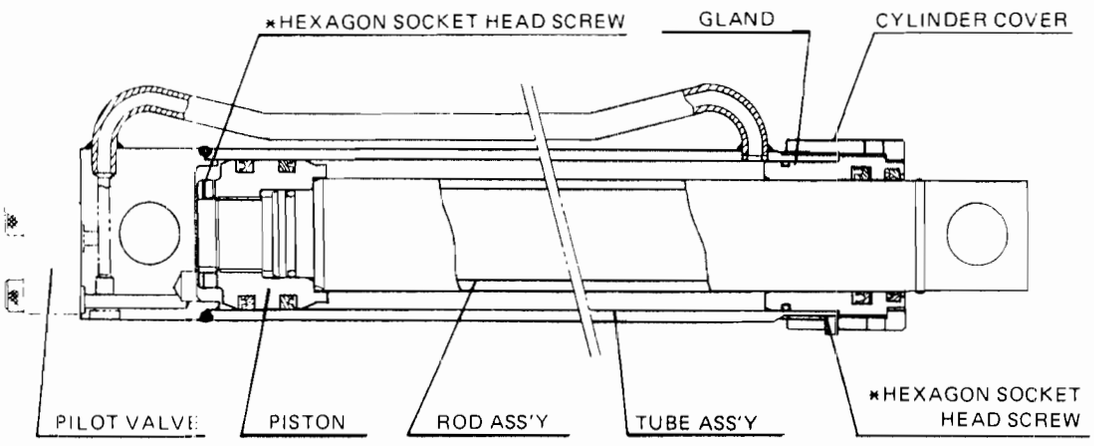
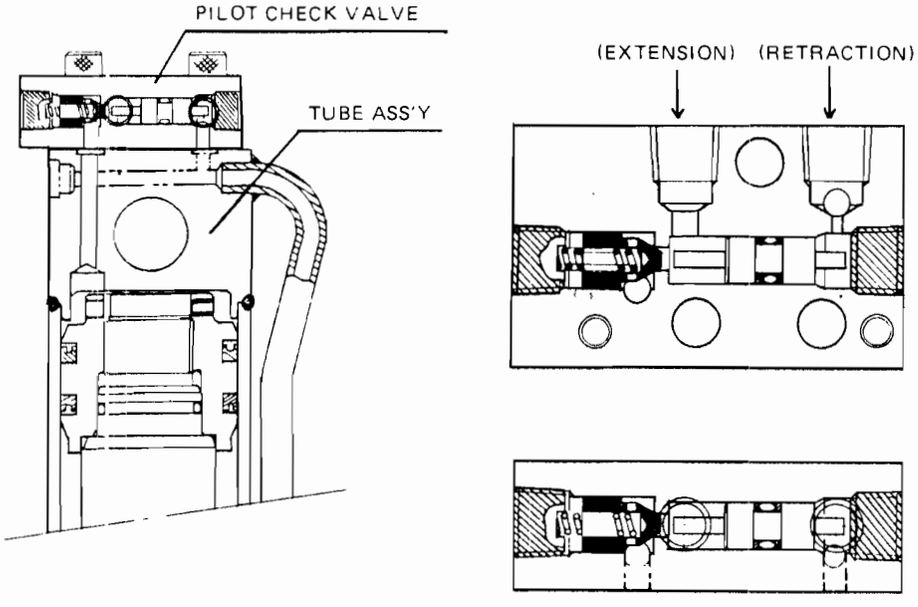
3. Construction of Vertical Outrigger Cylinder



Note: Before fastening hexagon socket head screws for the cylinder cover and piston, apply "LOCKTIGHT #242."

4. Construction of the Part where Pilot Check Valve is Fitted



PILOT CHECK VALVE ASS'Y
(MODEL: CP-02F)

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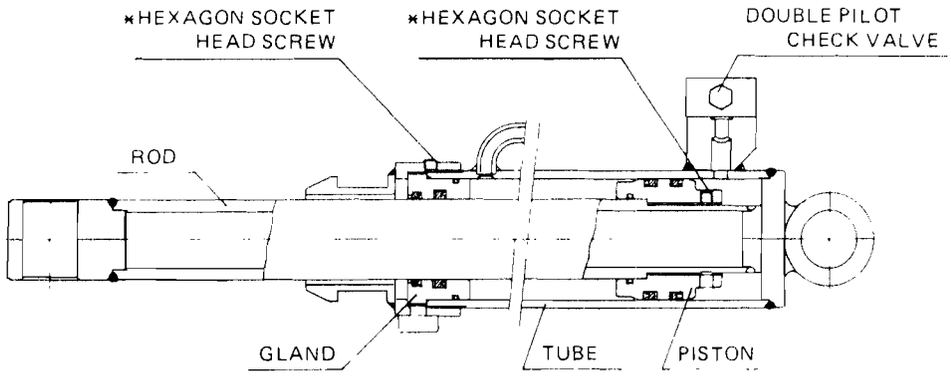
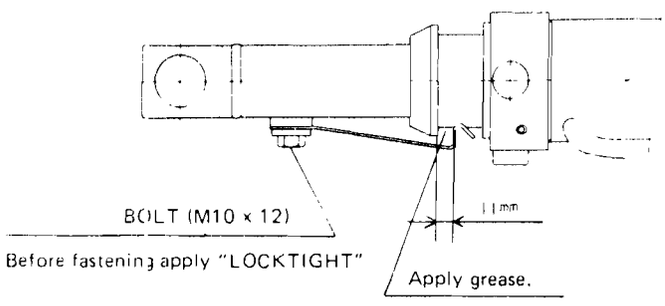
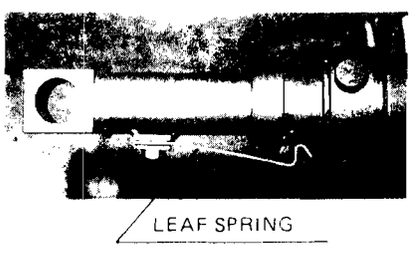
5. Construction of Vertical Outrigger Cylinder (High Outrigger)



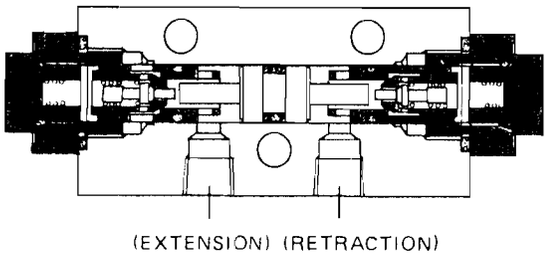
Note: Before fastening hexagon socket head screws for the cylinder cover and piston, apply "LOCKTIGHT #242."

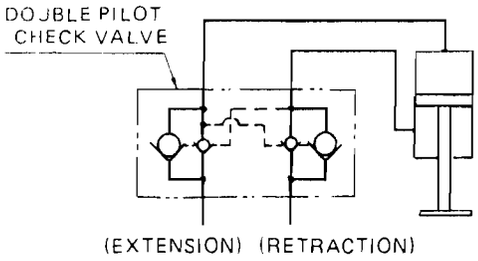
Detail of leaf spring fitting

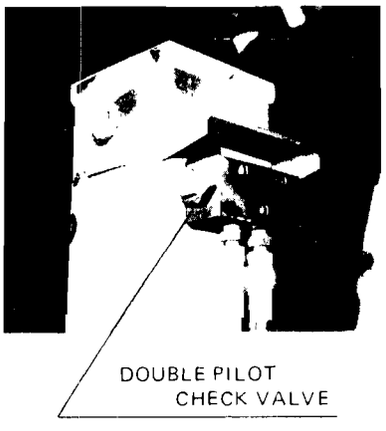




Construction of Pilot Check Valve (CP-03G)







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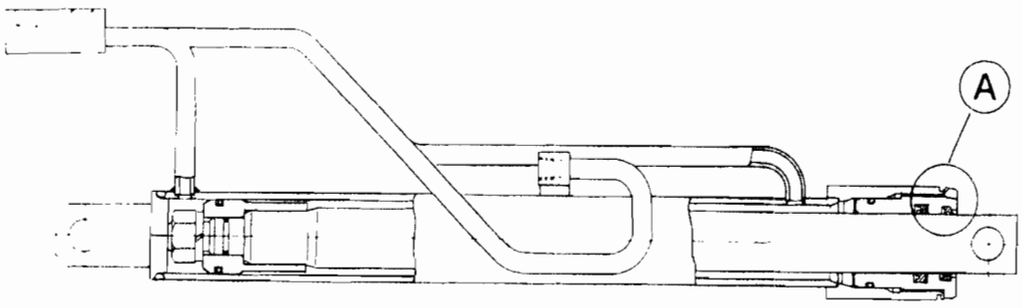
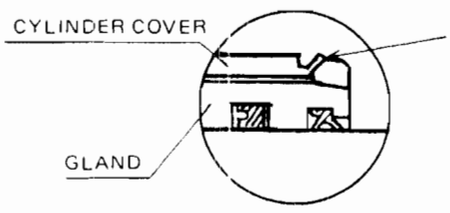
6. Construction of Horizontal Outrigger Cylinder





DETAIL of Ⓐ

Revolution stopper of gland:
After tightening the gland, fold a part of the cylinder cover flange to the side of the gland.

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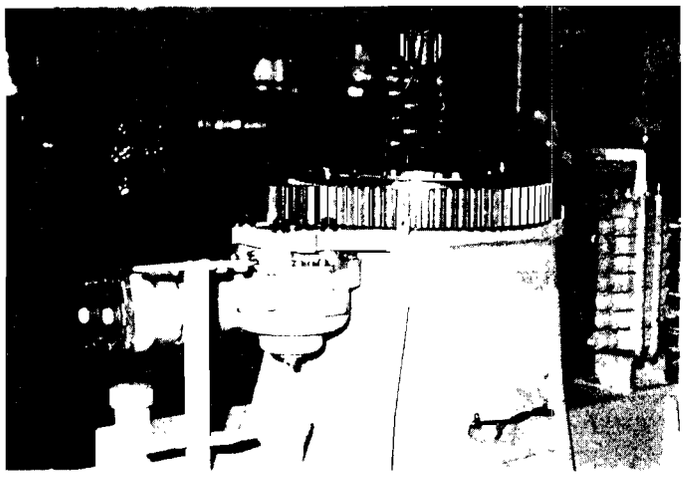
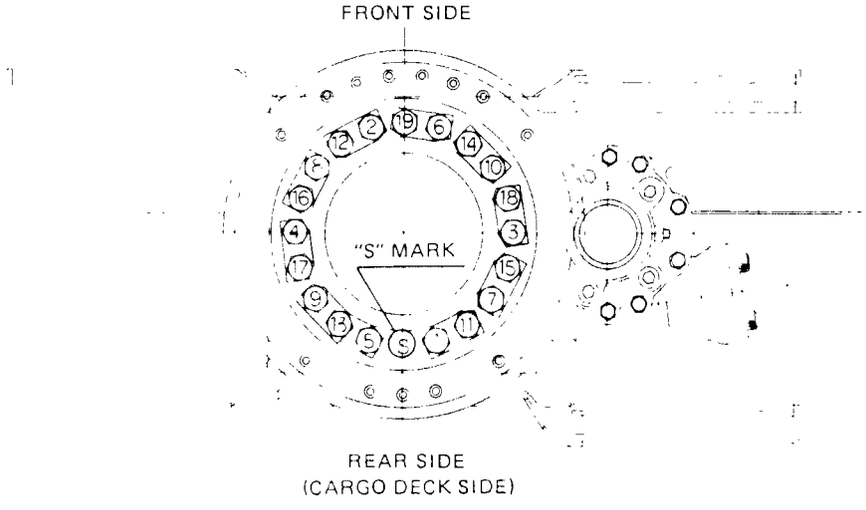
§6. SLEWING DEVICE



1. Position of Soft Zone "S" on the Turntable



- When mounting the turntable, the inner soft zone marked "S" on the turntable must be positioned on the rear side (cargo deck side).

2. Tightening Order of Turntable Bolts

- Tighten the bolts in the numerical order as shown in the above illustration.

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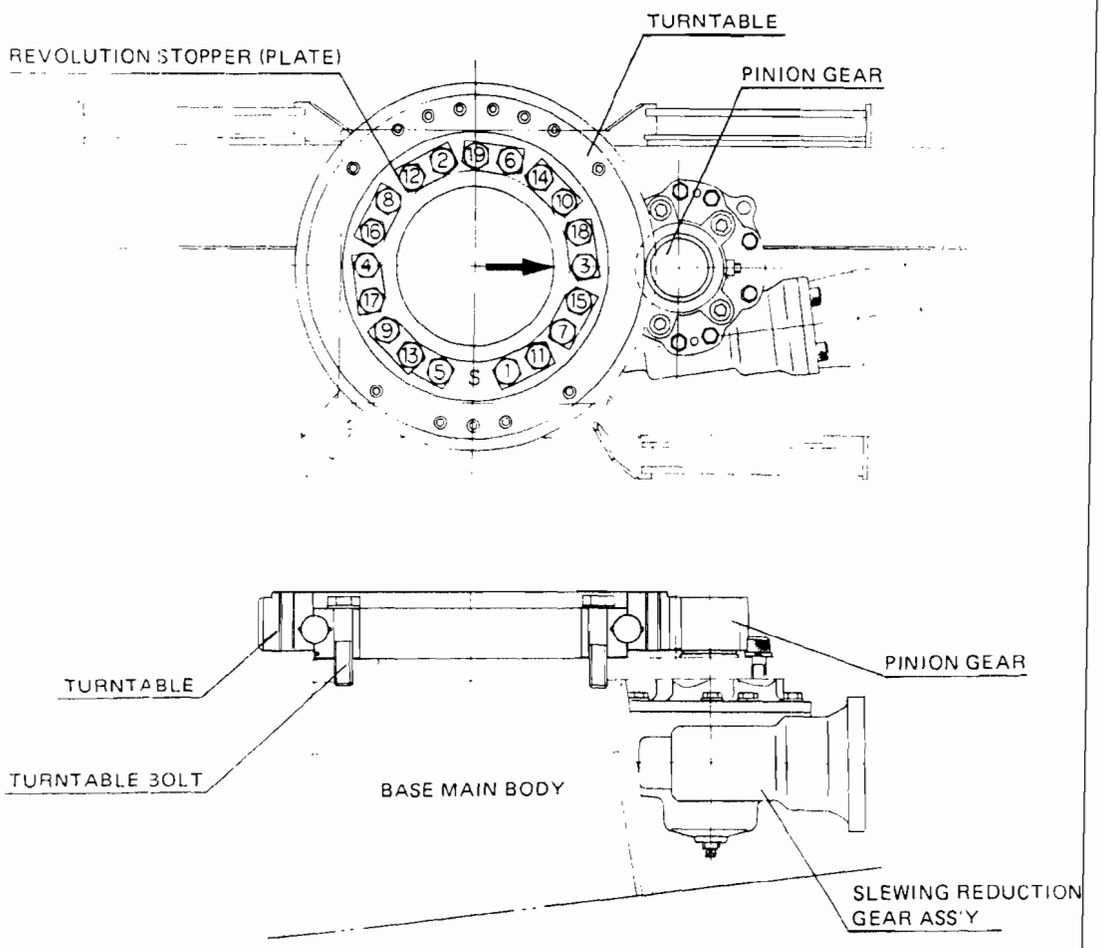
3. Turntable Mounting Procedure



1) Install the slewing reduction gear ass'y to the base main body.
2) Mount the turntable on the base and screw lightly the turntable bolts in the base main body

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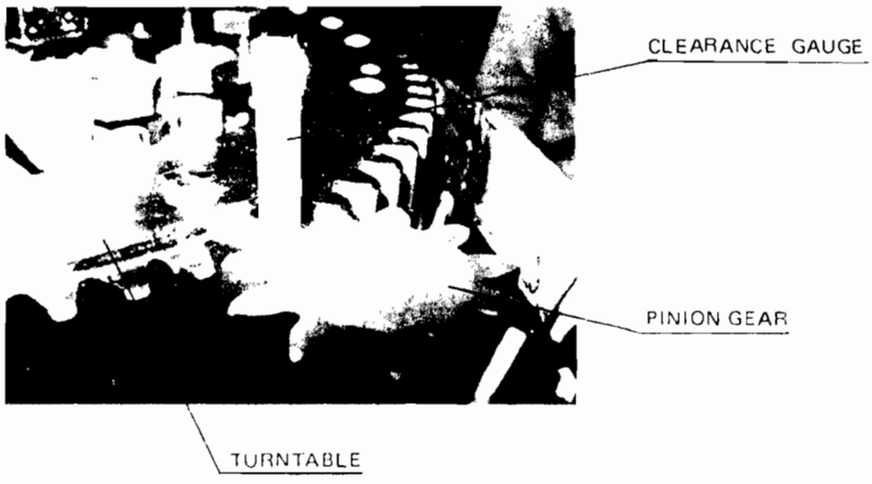
3) Insert the clearance gauge (0.1 ~ 0.2 mm) into the space between the turntable gear and the pinion gear, and press strongly the turntable to the pinion gear.



4) Fasten turntable bolts following the specified tightening torque and the numerical order so that it will not part from the pinion gear.

5) After tightening turntable bolts, fold the inside square corner of the revolution stopper plate to follow one flat side of the hexagon bolt head.

6) After assembling, apply grease to engaging tooth surfaces of the gears.

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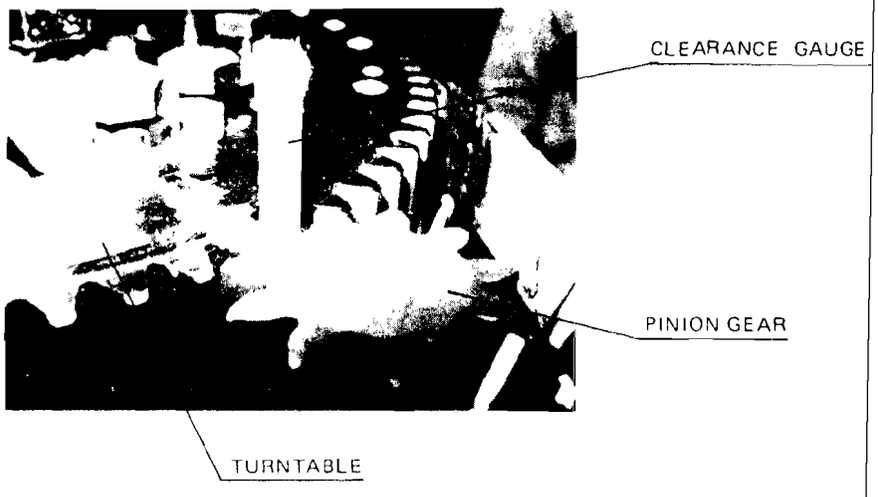
3) Insert the clearance gauge (0.1 ~ 0.2 mm) into the space between the turntable gear and the pinion gear, and press strongly the turntable to the pinion gear.



4) Fasten turntable bolts following the specified tightening torque and the numerical order so that it will not part from the pinion gear.

5) After tightening turntable bolts, fold the inside square corner of the revolution stopper plate to follow one flat side of the hexagon bolt head.

6) After assembling, apply grease to engaging tooth surfaces of the gears.

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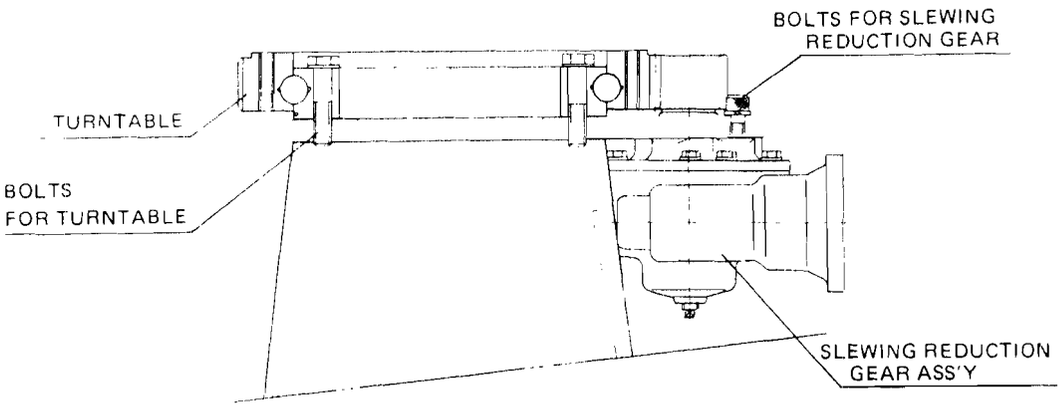
4. Tightening Torque for Bolts Fastening Turntable and Slewing Reduction Gear



Model	Place of use	Part Name	Tightening torque
UR220 Series	Slewing reduction gear	Tempered bolt M14 x 40ℓ (10T)	15 ~ 19 kg-m (Desired value: 17 kg-m)
UR250 Series	Turntable (Turntable inner ring)	Tempered bolt M18 x 75ℓ (12T)	33 ~ 39 kg-m (Desired value: 36 kg-m)
UR290 Series	Slewing reduction gear	Tempered bolt M14 x 45ℓ (10T)	15 ~ 19 kg-m (Desired value: 17 kg-m)
	Turntable (Turntable inner ring)	Tempered bolt M20 x 75ℓ (10T)	45 ~ 51 kg-m (Desired value: 48 kg-m)
UR330 Series	Slewing reduction gear	Tempered bolt M15 x 50ℓ (10T)	23 ~ 29 kg-m (Desired value: 26 kg-m
US360 Series	Turntable (Turntable inner ring)	Tempered bolt M20 x 92ℓ (12T)	45 ~ 51 kg-m (Desired value: 48 kg-m)
UR500 Series	Slewing reduction gear	Tempered bolt M16 x 50ℓ (10T)	23 ~ 29 kg-m (Desired value: 26 kg-m)
	Turntable (Turntable inner ring)	Tempered bolt M20 x 95ℓ (12T)	45 ~ 51 kg-m (Desired value: 48kg-m)

Note: The bolts for the turntable (tempered bolts) must be UNIC genuine bolt, on the head of which "UNIC 10" or "UNIC 12" is inscribed.

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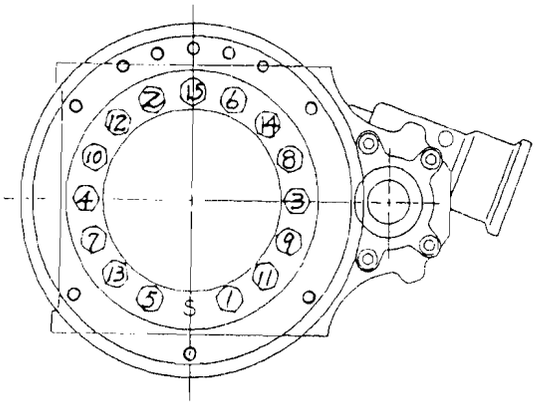
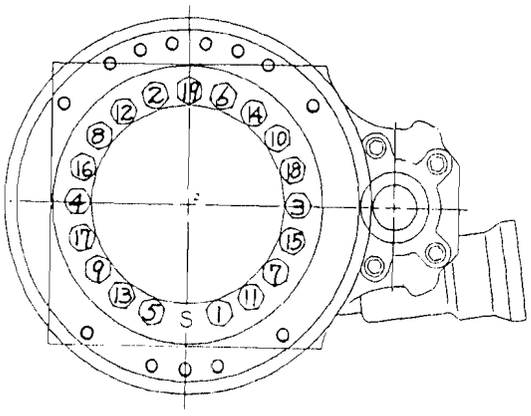
5. Numerical Tightening Order of Turntable Bolts

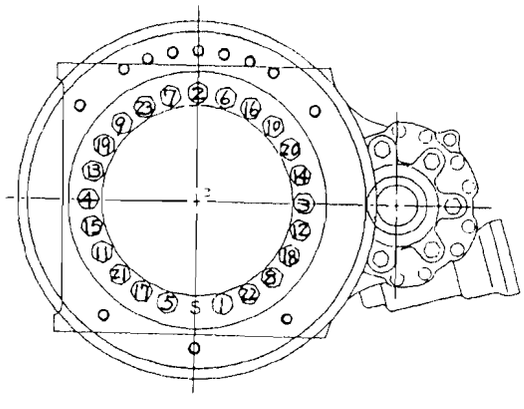
When tightening, follow the below illustrated numerical tightening order.



Models UR220, 250 and 290 Series



Models UR330 and 360 Series



Model UR500 Series

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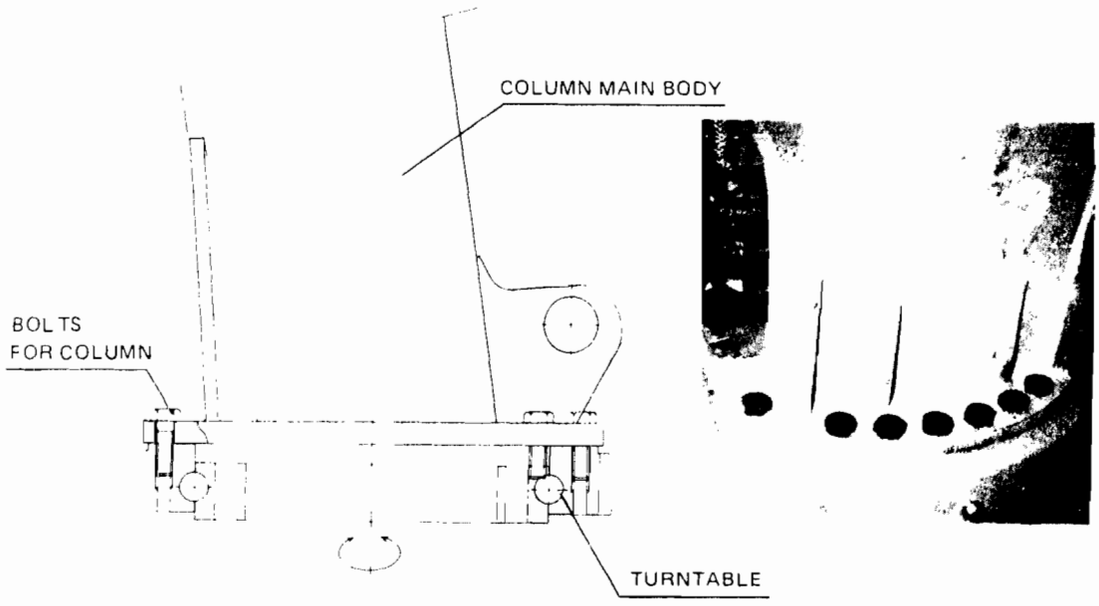
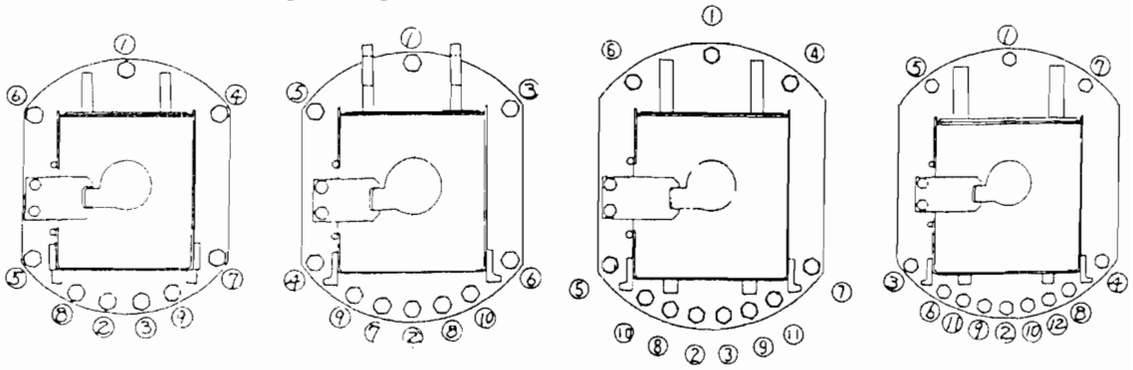
6. Tightening Torque for Bolts Fastening Column



Model	Place of use	Part Name	Tightening torque
UR220 Series UR250 Series	Column (Turntable outer ring)	Tempered bolt M16 x 50ℓ (12T)	23 ~ 27 kg-m (Desired value: 25 kg-m)
UR290 Series	Column (Turntable outer ring)	Tempered bolt M16 x 50ℓ (12T)	23 ~ 27 kg-m (Desired value: 25 kg-m)
UR330 Series UR360 Series	Column (Turntable outer ring)	Tempered bolt M16 x 50ℓ (12T)	23 ~ 27 kg-m (Desired value: 25 kg-m)
UR500 Series	Column (Turntable outer ring)	Tempered bolt MJ18 x 55ℓ (10T)	32 ~ 36 kg-m (Desired value: 34 kg-m)

Note: Before tightening the bolts for column, apply "LOCKTIGHT #262."

Numerical Tightening Order



UR220 UR250 Series | UR290 Series | UR330 UR360 Series | UR500 Series

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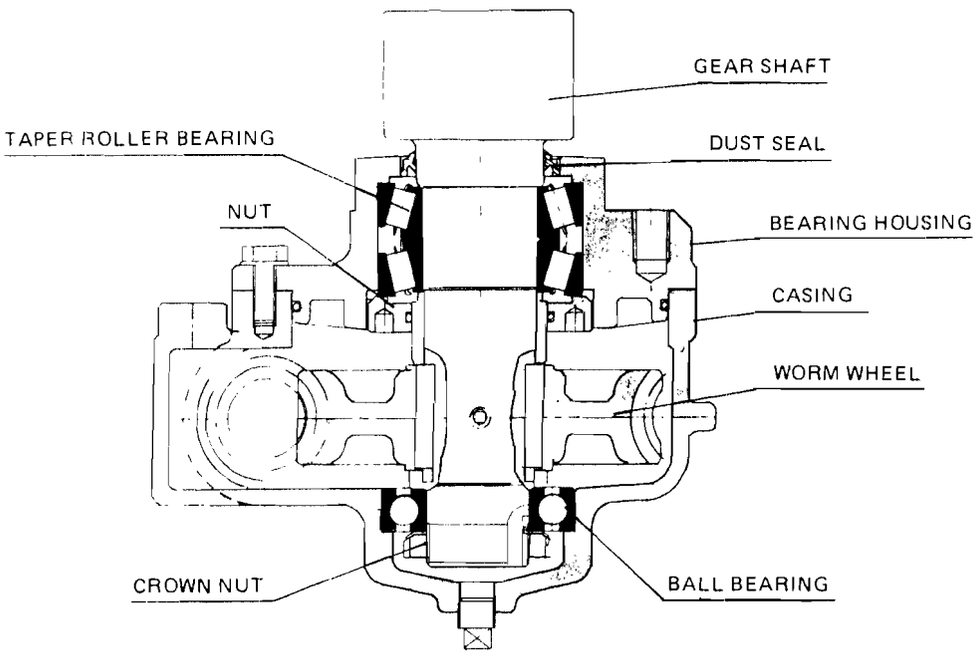
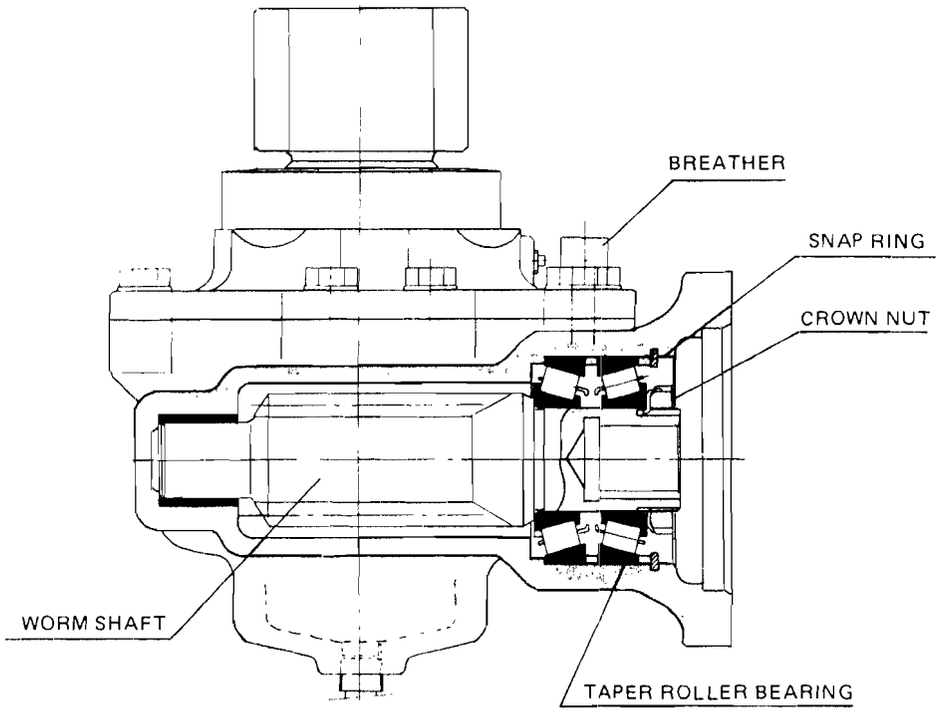
§7. SLEWING SPEED REDUCER

1. Construction





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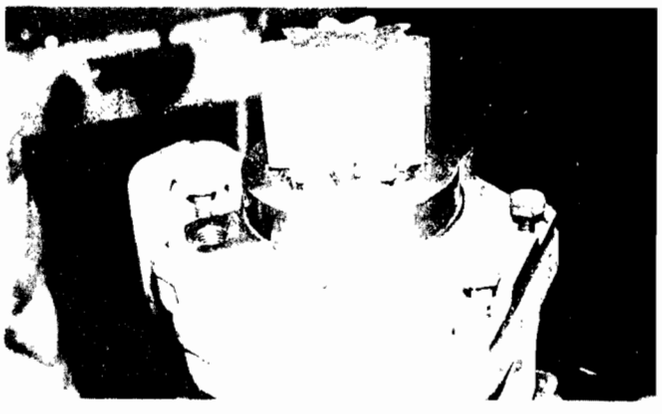
2. Speed Reducer Disassembly Procedure

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

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

* For special tool, refer to page 73.

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



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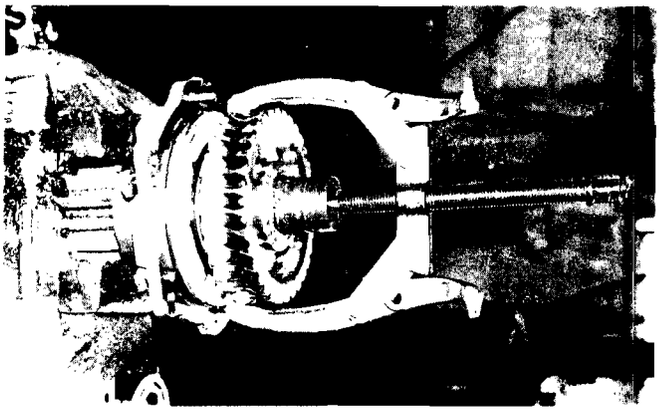
4. This photo shows the pulled out housing with gear shaft and worm wheel.

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.

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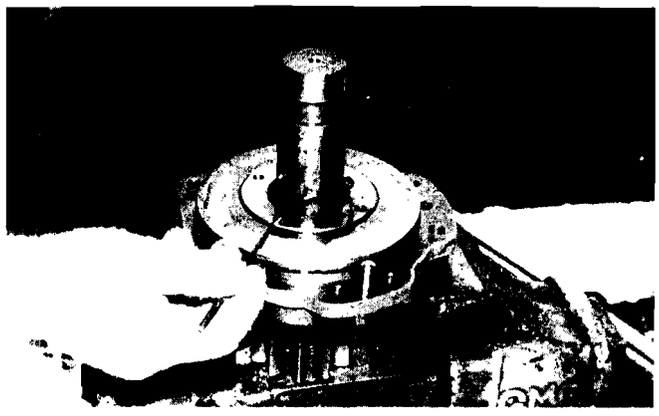
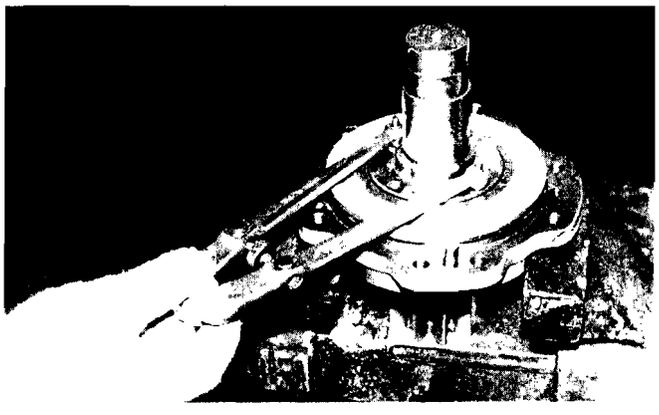
7 Pull out the O-ring which is assembled in the nut.



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



Note: To the threaded part of the nut "LOCKTIGHT" was applied. Therefor, when loosing, warm up lightly the threaded part with gas flame, and then loosen. When reassembling, be sure to apply "LOCKTIGHT #262" to the threaded part.

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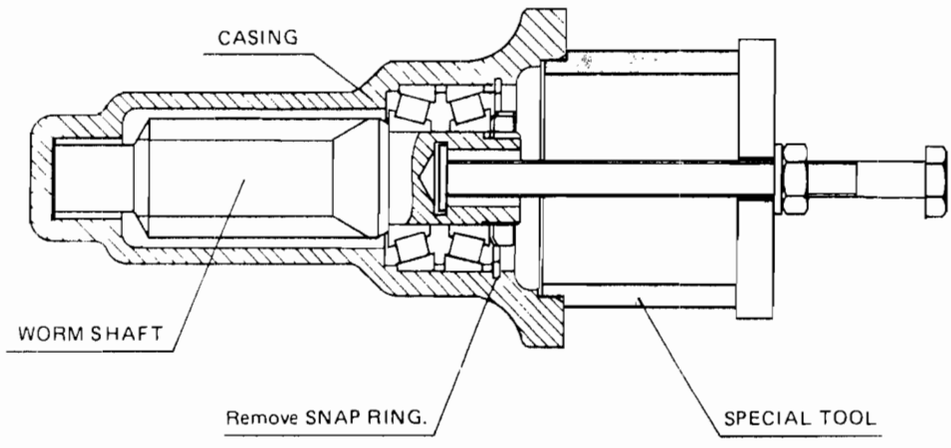
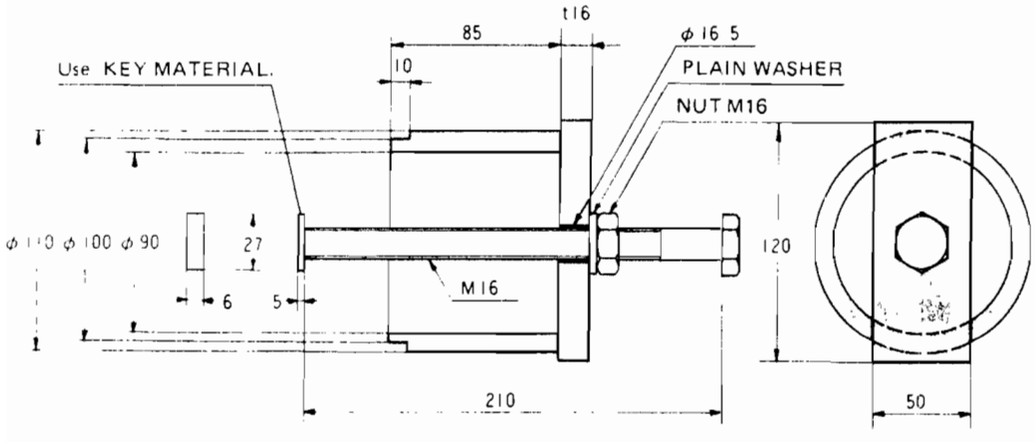
* Special tool for removing the worm shaft from the slewing reduction gear

(Sectional view of worm shaft in assembly)



DETAILED DRAWING OF SPECIAL TOOL



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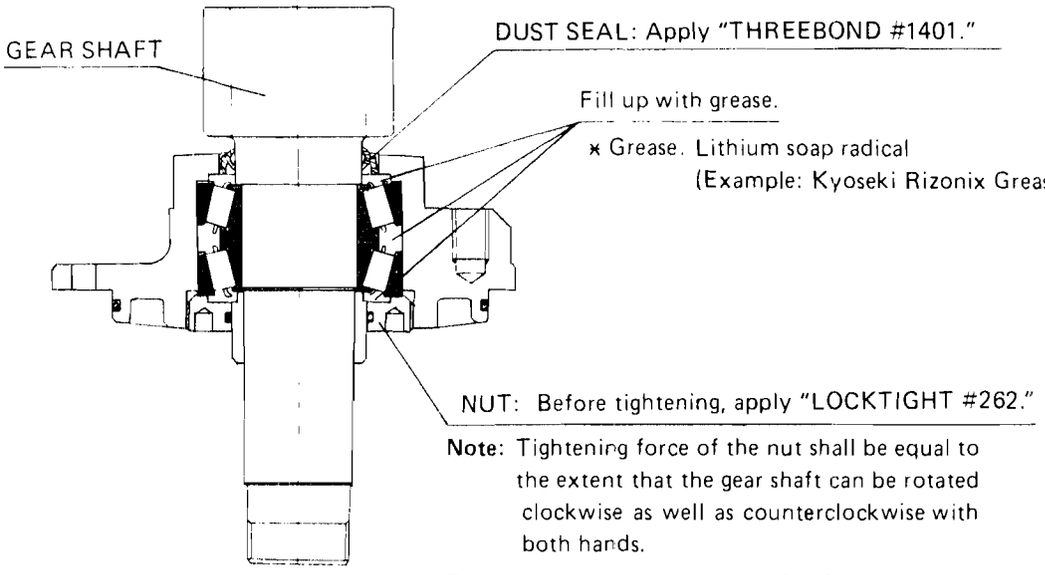
3. Precautions When Assembling Slewing Reduction Gear

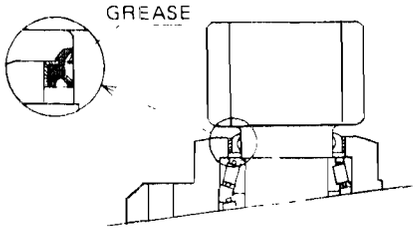
1



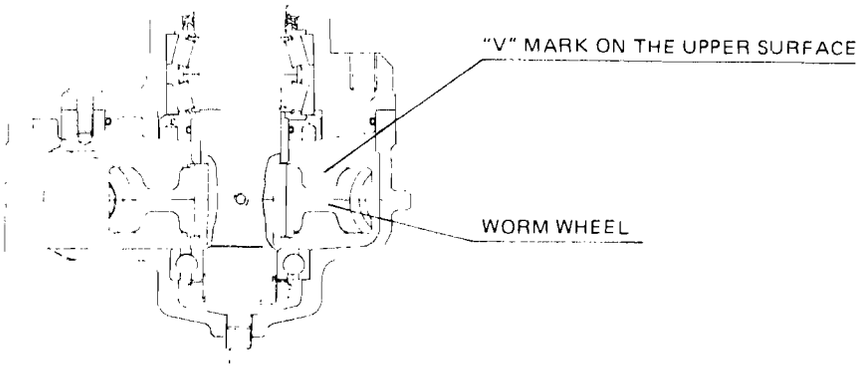
Note: Tightening force of the nut shall be equal to the extent that the gear shaft can be rotated clockwise as well as counterclockwise with both hands.

Reference tightening torque: 1.7 ~ 2.4 kg-m
(Desired value: 2kg-m)

2 Apply grease to the inside of lip of the dust seal.



3. When assembling, be sure to have the side with the "V" face up.



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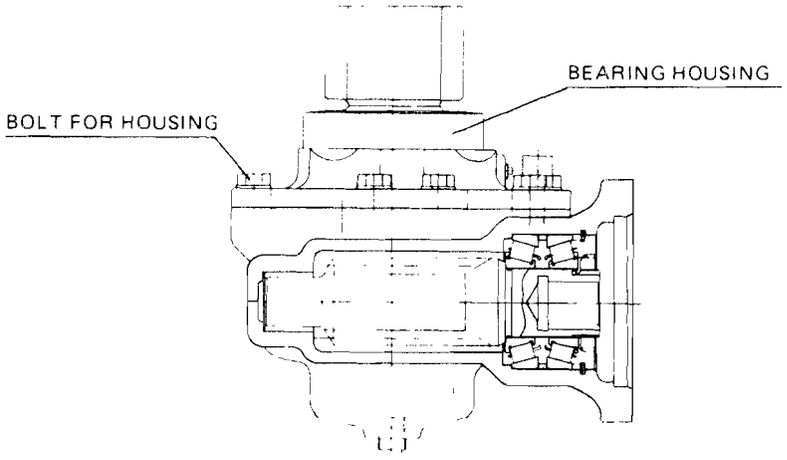
4. Bolt Tightening Torque for Bearing Housing



Model	Place of use	Part name	Tightening torque
UR220 Series UR250	Installation of Slewing reduction gear housing	Tempered bolt M8 x 18ℓ (10T)	2 ~ 4 kg-m Desired value; 3kg-m
UR290 Series	Installation of Slewing reduction gear housing	Tempered bolt M8 x 20ℓ (10T)	2 ~ 4 kg-m Desired value: 3kg-m
UR330 Series UR360	Installation of Slewing reduction gear housing	Tempered bolt M10 x 25ℓ (7T)	5 ~ 7 kg-m Desired value: 6 kg-m
UR500 Series	Installation of Slewing reduction gear housing	Tempered bolt M10 x 25ℓ (7T)	5 ~ 7 kg-m Desired value: 6 kg-m

Note: Before tightening tempered bolts, remove oil or grease from the bolts, and then apply "LOCKTIGHT #262."

Gear Oil for Speed Reducer

Model	API Service Classification	Quantity of Gear Oil
UR220 Series UR250	GL-4 #90 Kyoseki P Gear Y90	Approx. 0.3 liter
UR290 Series	GL-4 #90 Kyoseki P Gear Y90	Approx. 0.3 liter
UR330 Series UR360	GL-4 #90 Kyoseki P Gear Y90	Approx. 0.7 liter
UR500 Series	GL-4 #90 Kyoseki P Gear Y90	Approx. 1.05 liter

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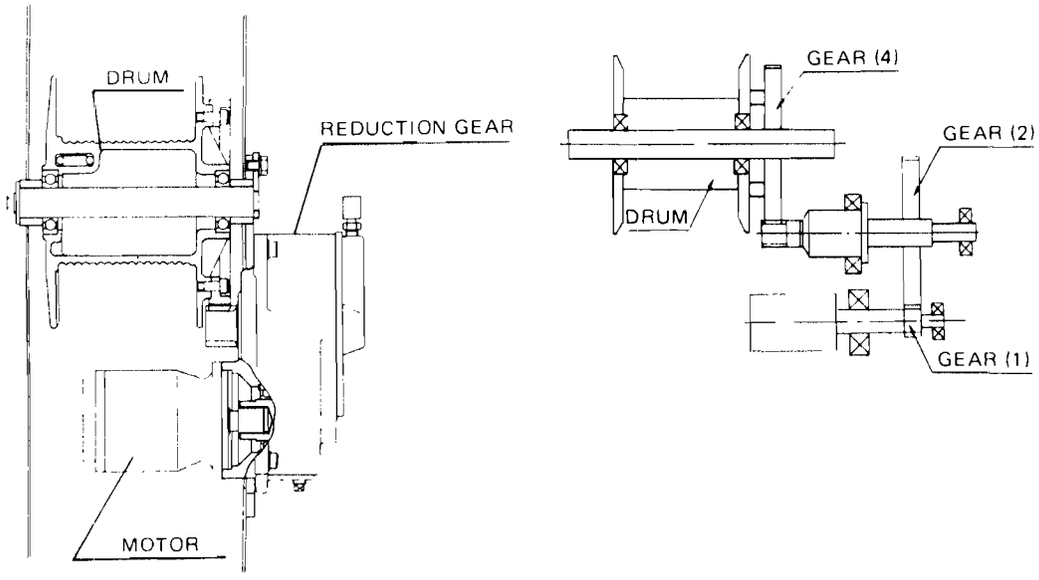
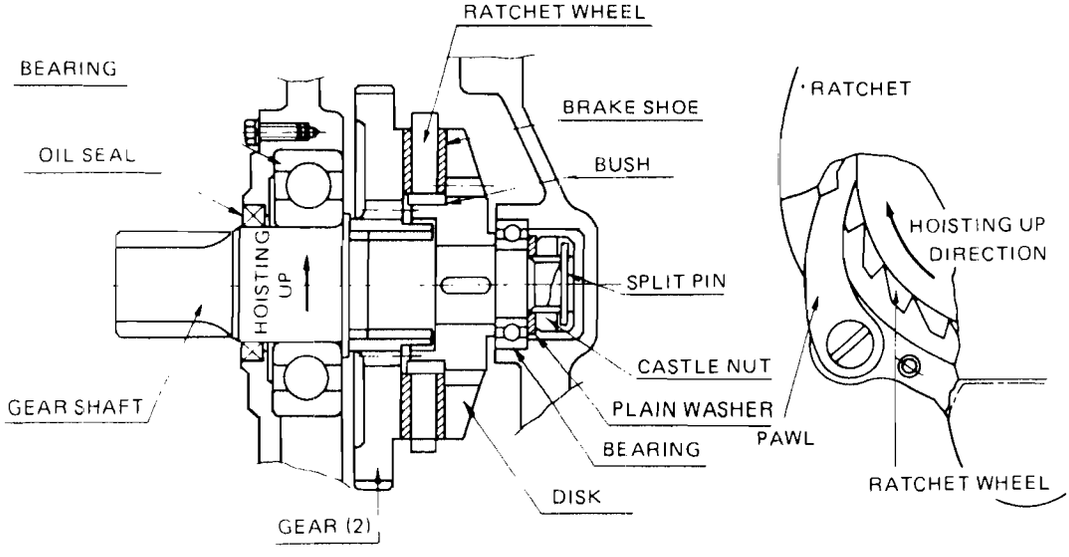
§8. HOIST WINCH (SILENT WINCH)

1. Construction of Winch



2. Construction of Brake

Brake shoe is put in the space between the gear (2) and ratchet wheel, and also in the space between the disk and ratchet wheel. Ratchet wheel can freely be rotated as long as the direction of rotation is winding up. However, when lowering, rotation is stopped by a pawl, and the gear (2) is pressed against the ratchet wheel through the brake shoe. Thus, the brake is applied in the lowering direction



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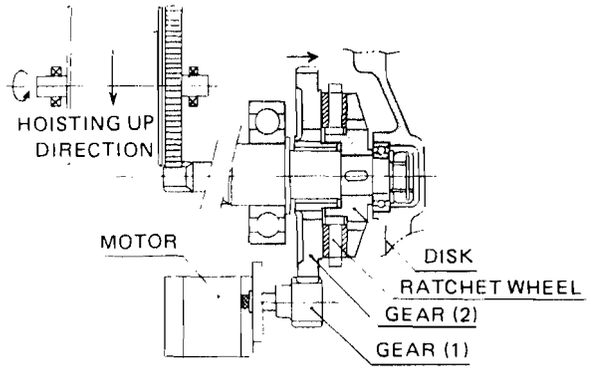
3. Explanation of Operation

(When hoisting up)

When hoisting up, the gear (2) is rotated clockwise. As the gear (2) and gear shaft are engaged each other by left-handed screw, gear (2) moves toward arrow (→) direction and is pressed against the ratchet wheel.

Ratchet wheel is free during clockwise rotation, and accordingly both the ratchet wheel and the gear (2) are incorporated in one solid body.

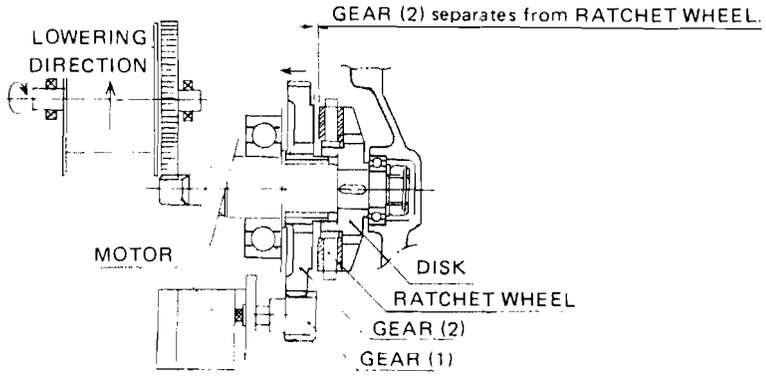


(When lowering)

When lowering, the gear (2) is rotated counterclockwise, and it moves arrow (←) direction against the gear shaft. With the ratchet wheel being locked on, the gear (2) is lowered in the state that it is parted from the ratchet.

When lowering speed of suspended load is faster than that of motor, the gear shaft is forced to turn counterclockwise and as a result the gear (2) is moved towards arrow (→) direction, and is pressed against the ratchet wheel. Because of this reason, suspended load will not fall.

Only when the gear (2) is rotated by the gear (1), the gear (2) parts from the ratchet wheel and lowering can be conducted.



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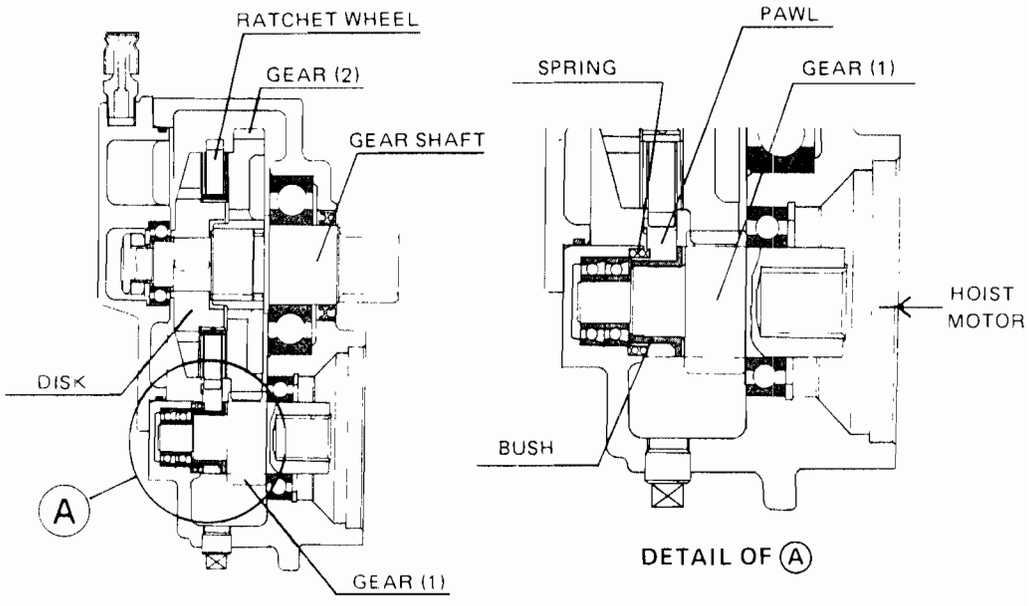
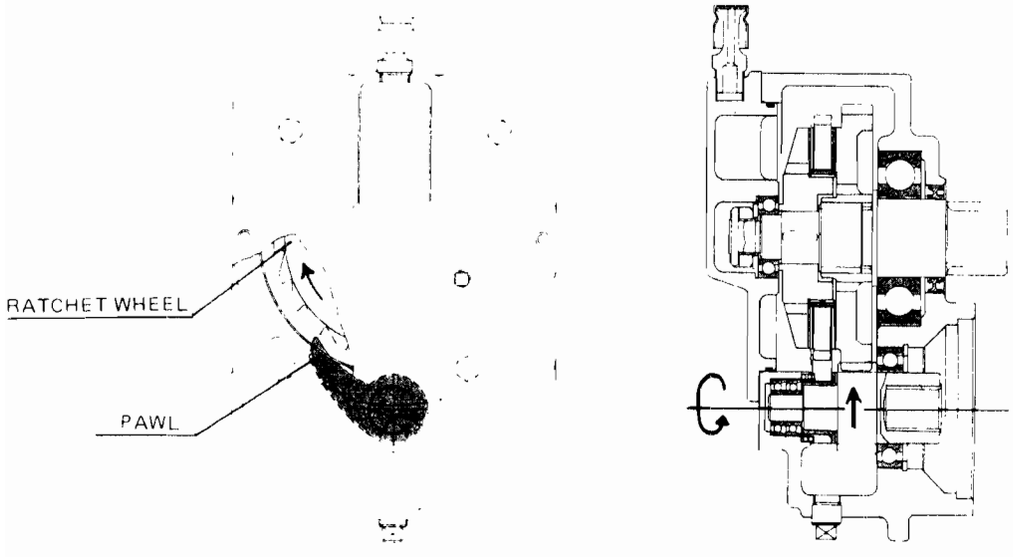
4. Construction of Reduction Gear



Pawl and bush at Ⓐ are one solid body, and with the force of spring it is always pressed against the side face of the gear (1). Accordingly, the pawl rotates following the rotating direction of the gear (1).

(When hoisting up)



When hoisting up, the pawl is moved towards parting directing from the ratchet wheel. Therefore, ratchet wheel does not hit the pawl; and accordingly no noise is made during hoisting operation.

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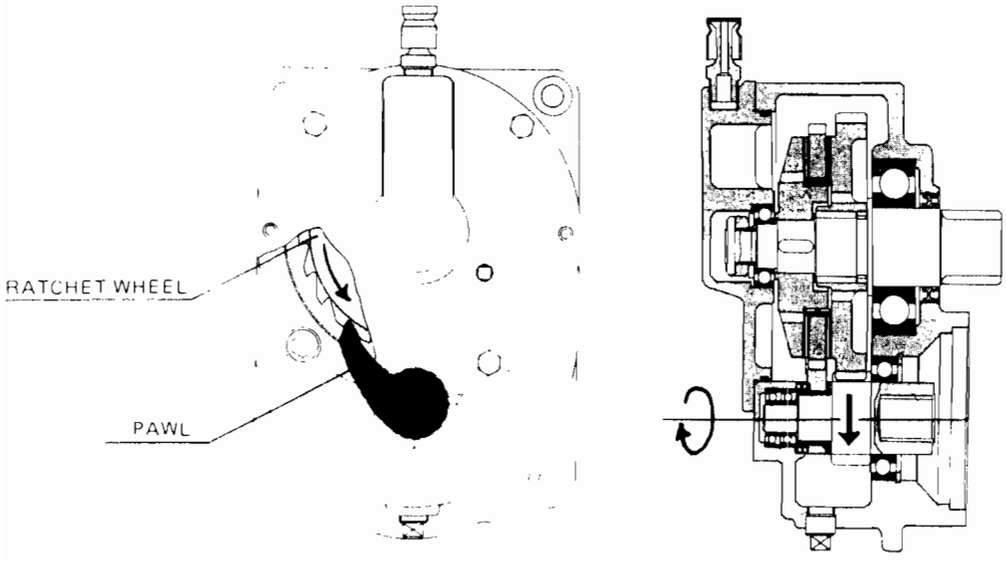
(When lowering)



When lowering, the pawl is pushed towards the teeth of the ratchet wheel and engages. Lowering rotation of the ratchet wheel is stopped by the pawl, and lowering speed is braked to a fixed and constant one with a brake shoe.

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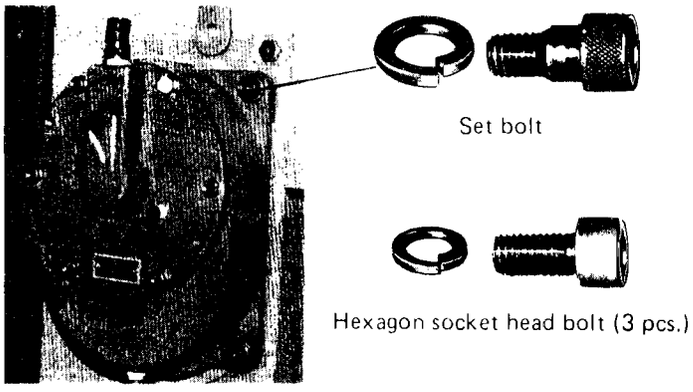
5. Bolt Fastening Reduction Gear Casing

Bolt locating at the upper right of the reduction gear casing is a set bolt for positioning the casing. Other 3 pcs. are hexagon socket head bolts.



Note: **Tightening order of bolt**: Set bolt for positioning is the first, and then tighten the hexagon socket head bolts diagonally.

6. Gear Oil for Reduction Gear

The air goes in and out freely the inside of the gear case, and accordingly, water and dust are mixed in the gear oil. Also the gears themselves produce abrasion powder during operation. Therefore, make initial gear oil change at the time 6 months after the first use, and thereafter, make gear oil change once every 2 years.

Classification of API Service	Quantity of oil
GL-4 #90 (When shipping from the factory, the gear case is filled with Kyoseki EP Gear Y90.)	Approx. 0.8 liter (0.9 liter for new crane)

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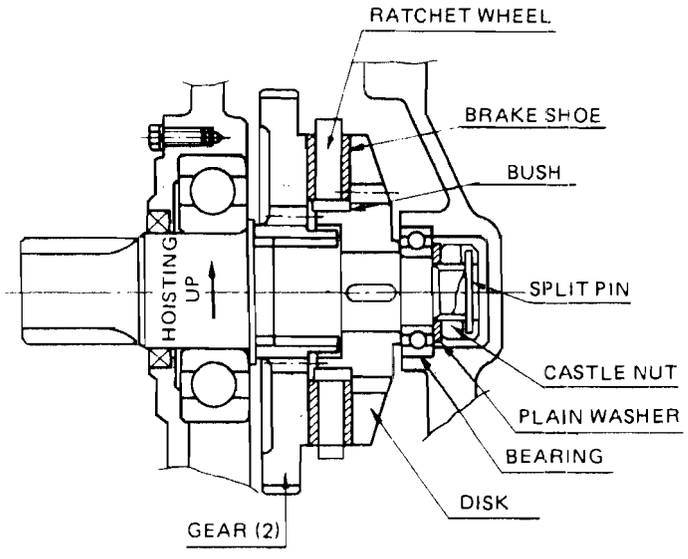
7. Brake Shoe Adjusting Procedure



Assemble in the order of gear (2), brake shoe, ratchet wheel, disk, and plain washer; and tighten castle nut with a spanner. Then loosen the castle nut for 1/6 turn and within this range match the hole for split pin in the gear shaft to the groove of the castle nut; and fix with the split pin. If tightened too much, it may cause hunting.

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8. Cause of Troubles and Remedy

Hoist Winch

Abnormal phenomenon	Presumed cause	Remedy
1. Pressure does not rise.	a) Pump is faulty. (Pressure does not rise at idling rpm.) (Total pressure required for operation is insufficient.)	• Replace.
	a) Relief set of control valve is faulty. (Pressure rises but not enough.)	• Adjust or replace.
	a) O-ring and other parts of relief valve of control valve are faulty. (Adjust bolt of relief valve is tightened but unable to control pressure.)	• Replace parts or replace relief ass'y with a new ones.
	a) Hoist motor is faulty. (Quantity of drain is smaller than specified one.)	• Replace.
2. Pressure rises but hoisting up is impossible.	a) Drum or internal mechanism of speed reducer is faulty.	• Disassemble reduction gear. • Inspect the drum.
3. Pressure rises but lowering is impossible.	a) Drum or internal mechanism of speed reducer is faulty.	• Too much tightening of brake shoe • Disassemble reduction gear. • Inspect the drum.
4. Unable to maintain suspended load	a) Brake shoe is faulty b) Pawl is faulty.	• Replace brake shoe. • Replace pawl.
5. When lowering, hunting occurs.	a) Brake shoe is faulty. b) Too much tightening of brake shoe c) Internal mechanism of speed reducer is faulty.	• Inspect brake shoe and check quantity of oil. • Adjust tightening of nut. • Disassemble reduction gear.
6. When hoisting up, clattering sound is heard.	a) Spring to press the pawl against slide plate is faulty. b) Bush at the part of fitting pawl worn out.	• Replace spring. • Replace bush.

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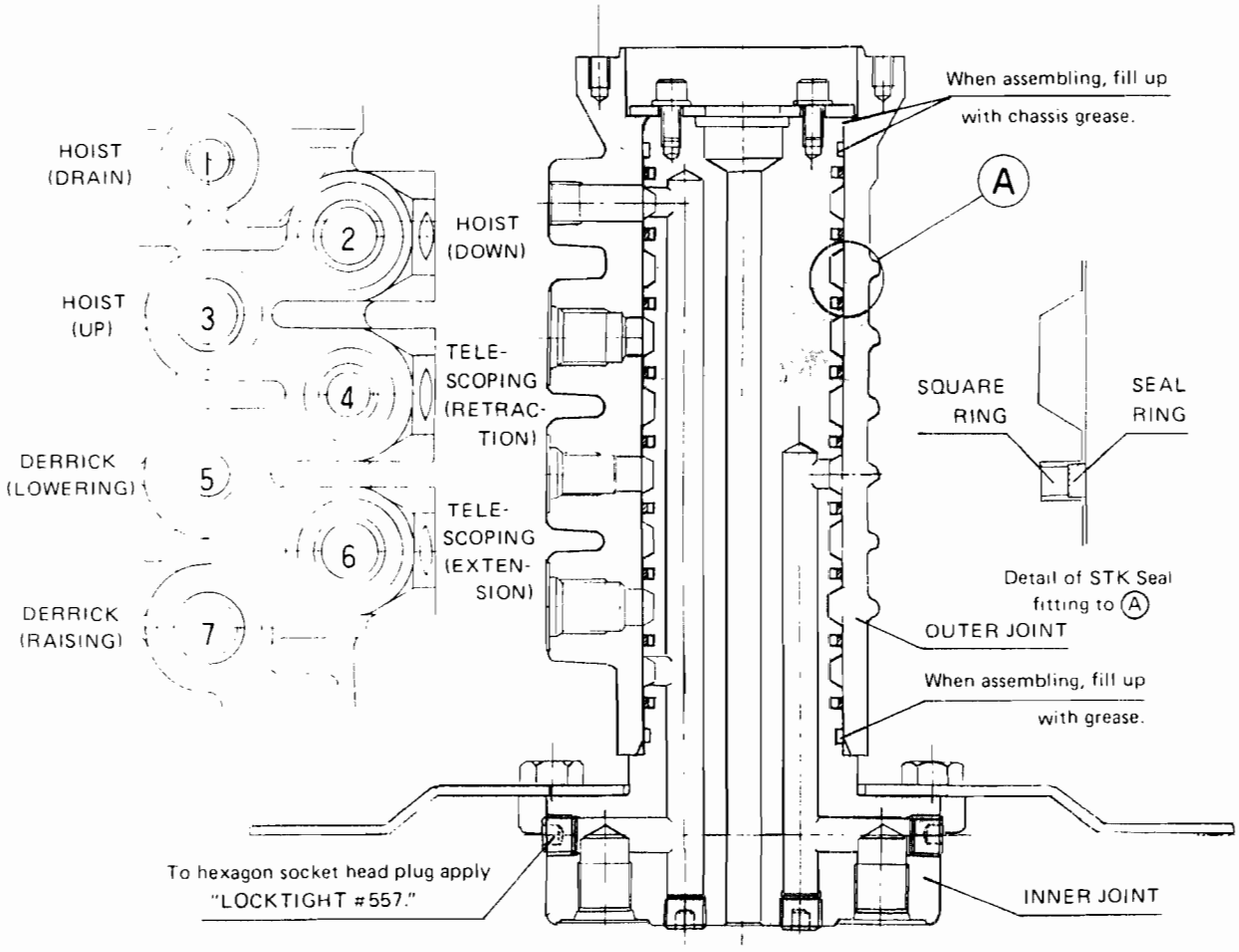
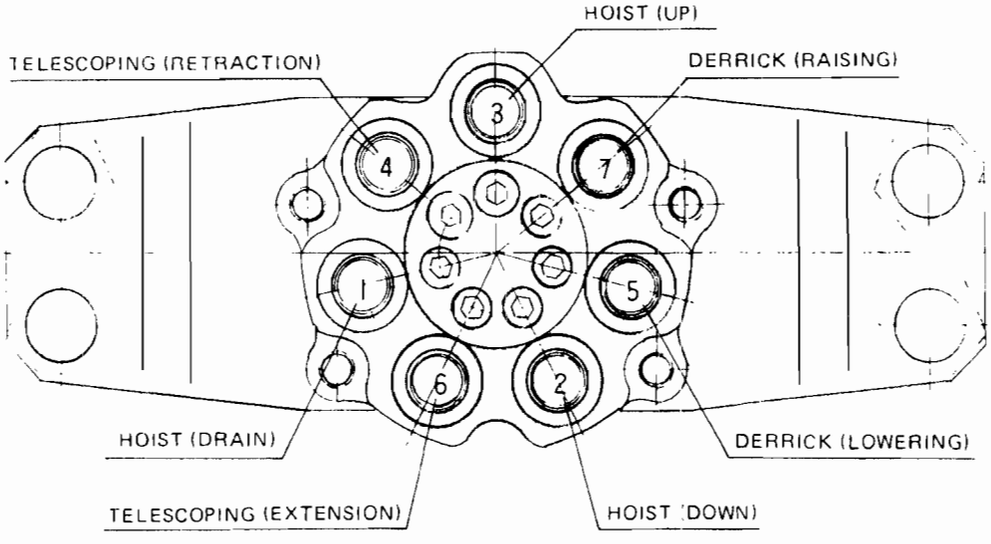
§9. SWIVEL JOINT

1. Construction of Swivel Joint and Positions of Hoses





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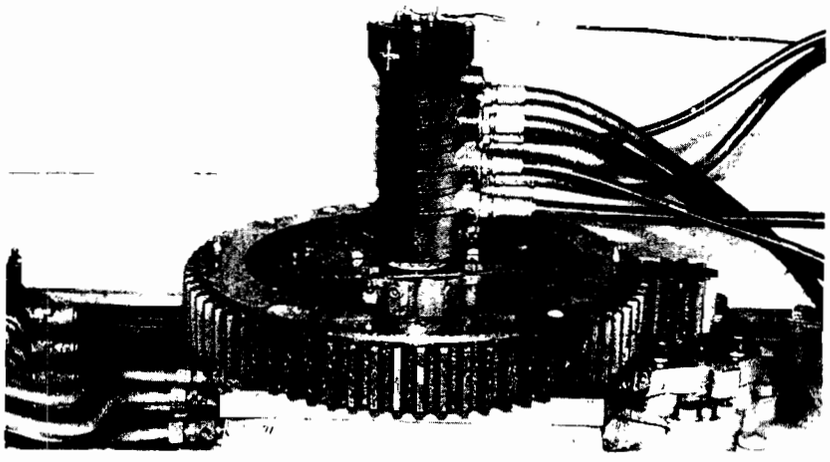
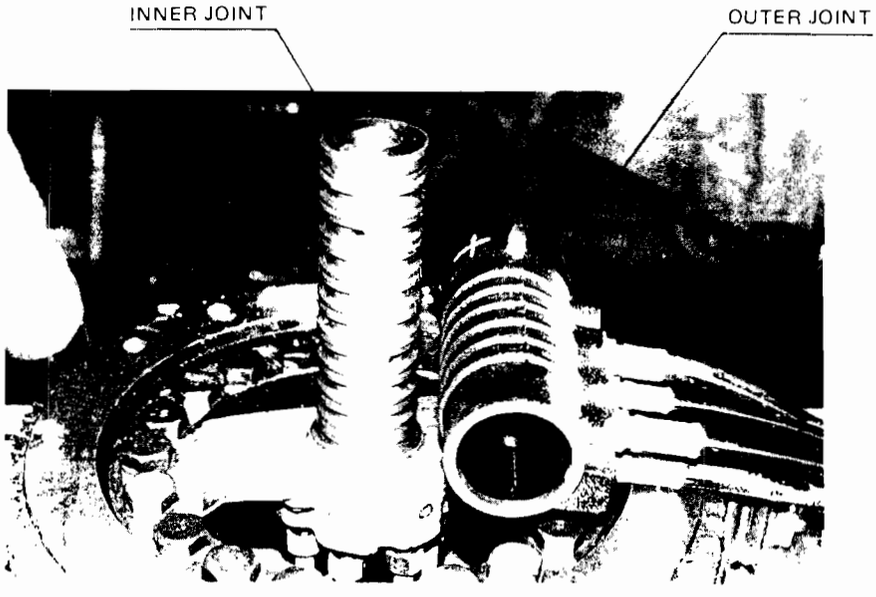
1) Photo shows Swilvel Joint is installed.



2) Photo shows Outer Joint is taken out.



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2. Swivel Joint Assembling Procedure

1

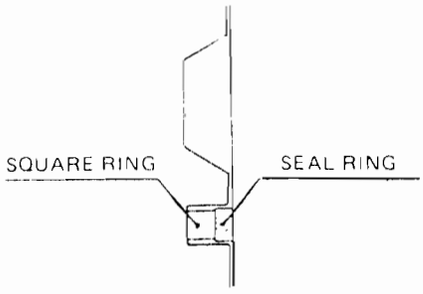
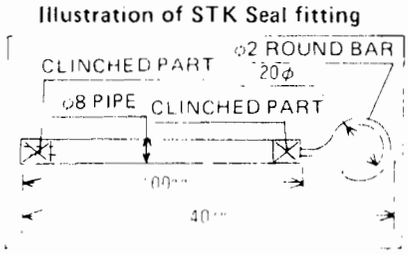
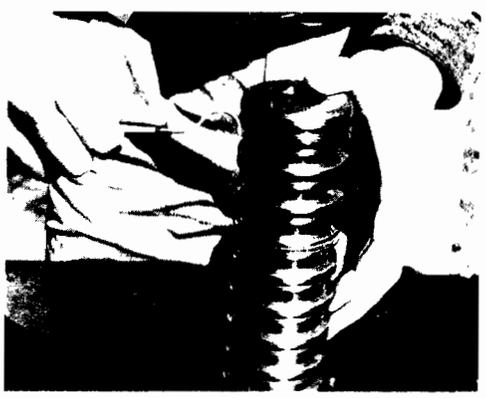


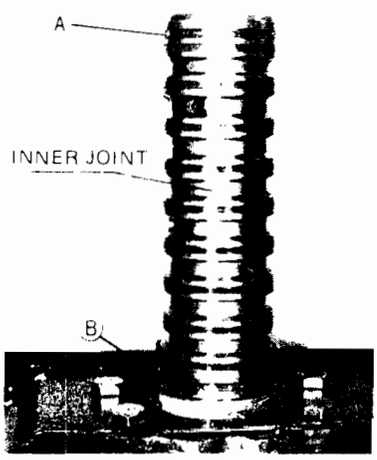
Illustration of STK Seal fitting



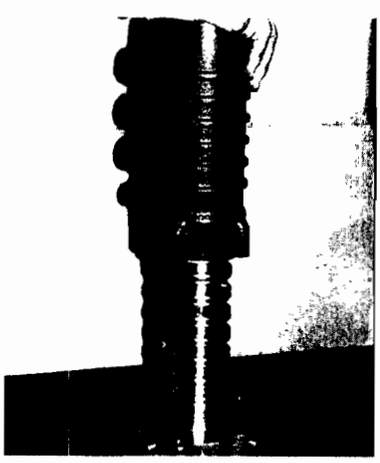
- After fitting the square ring, check to see if it is twisted, then fit the seal ring.

* When fitting seal ring, it is recommended to use the jig as shown below.





- The upper most (A) and the lower most (B) of the inner joint must be filled up with grease.
- To the part where STK seal is to be fitted apply chassis grease thinly.



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

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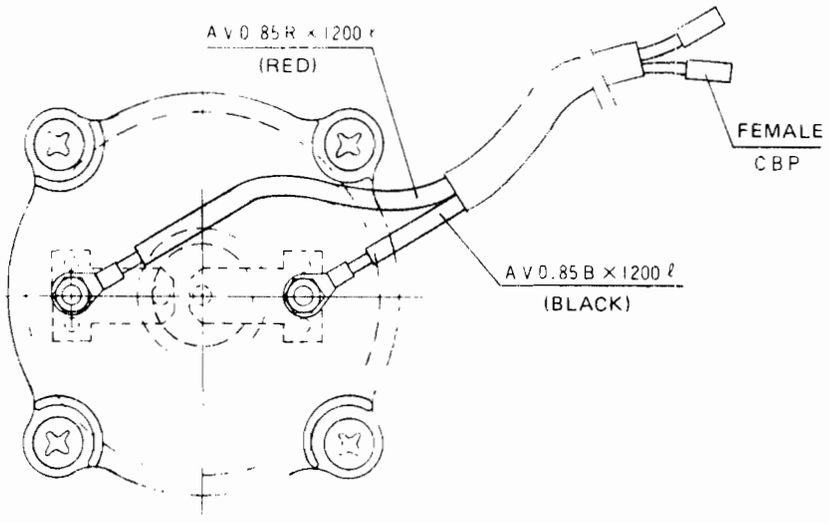
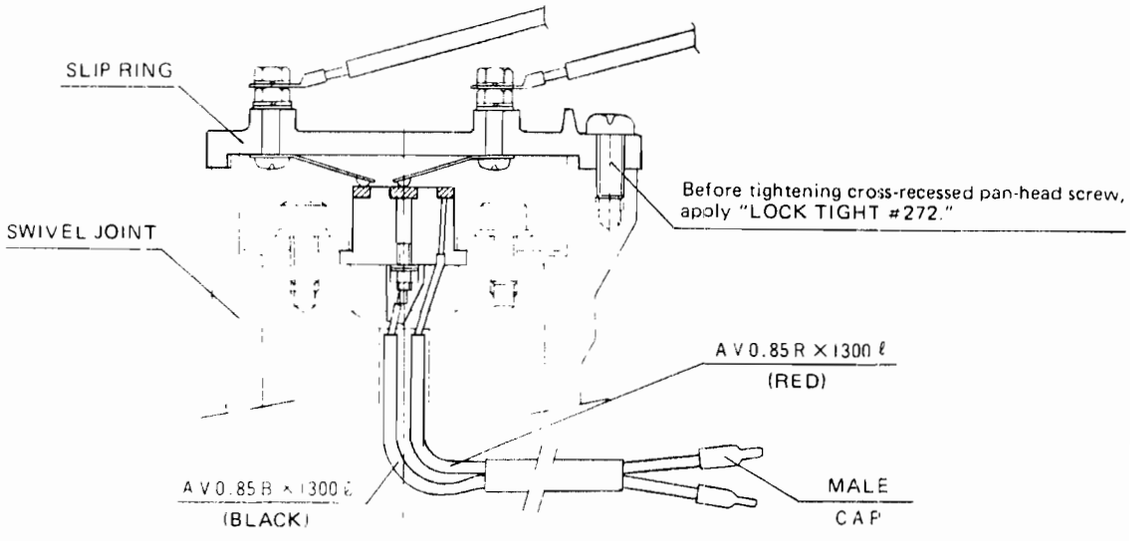
§10. SLIP RING

1. Construction of Slip Ring and Its Fitting Position





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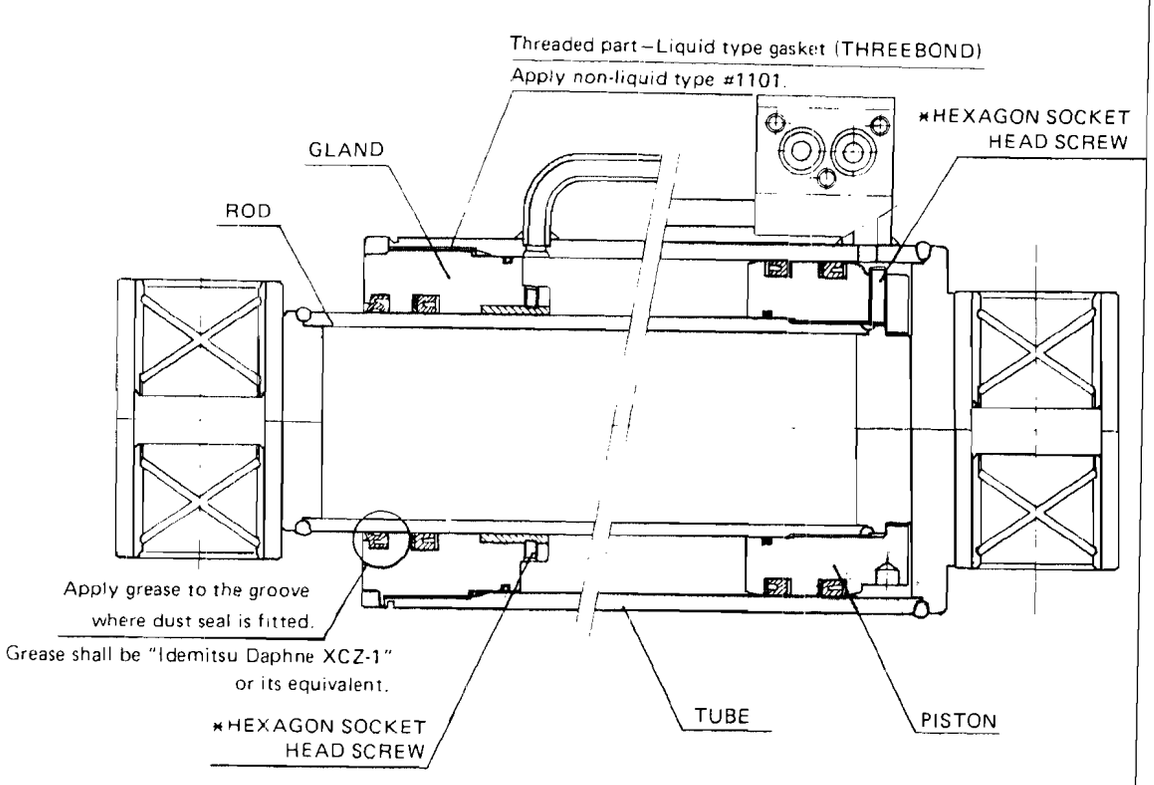
§11. DERRICK CYLINDER

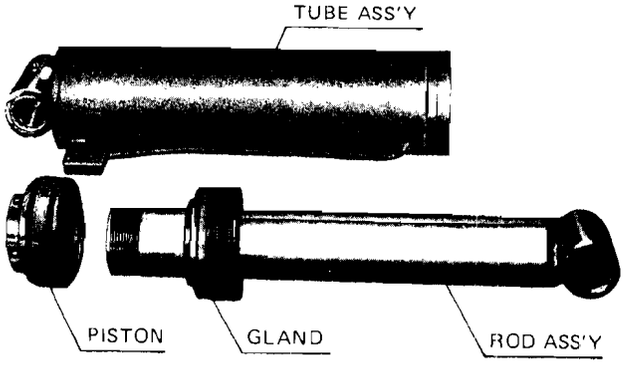
1. Construction



Note: Before tightening hexagon socket head screws to the piston and gland, apply "LOCKTIGHT #242."
(After applying, do not flow hydraulic oil.)

2. Disassembling Procedure

1) Remove the counterbalance valve.
2) Compensate rotation stopper of the gland and then loosen and remove it from the cylinder tube. Pull out the piston rod.
3) Remove hexagon socket head screw which stops rotation of the piston. Pull out the piston from the rod ass'y.



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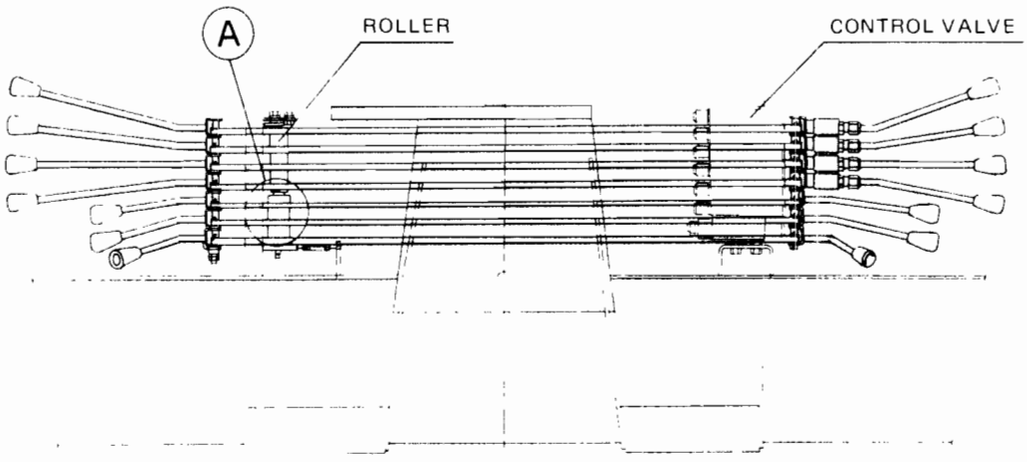
§12. CONTROL



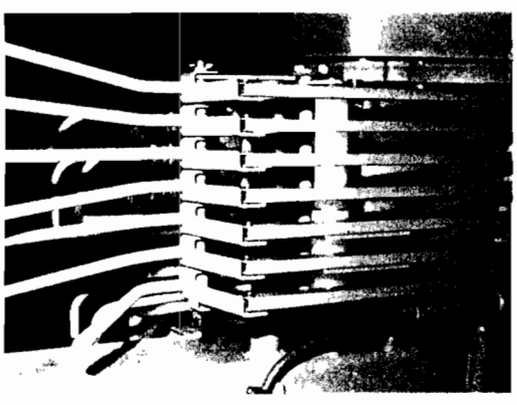


Photo shows the side the roller is installed.

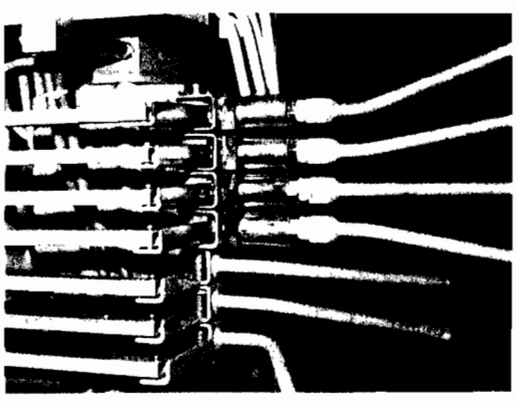
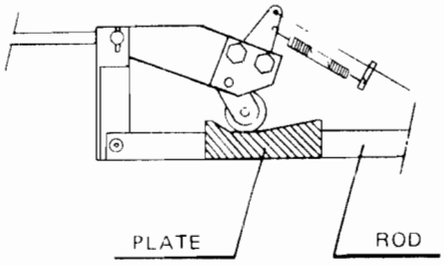
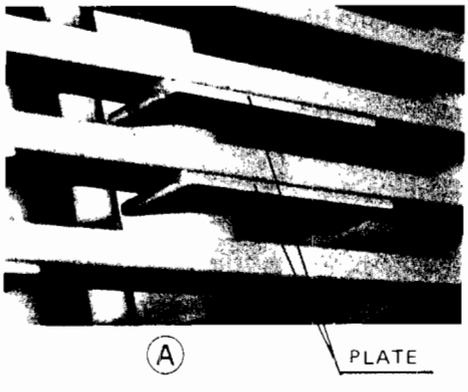


Photo shows the side the control valve is installed.

Both the left and the right outriggers shall be installed to the control rod. Fit the plates to the place where the roller is touching. Within the range of spool stroke, the engine revolution can be accelerated.





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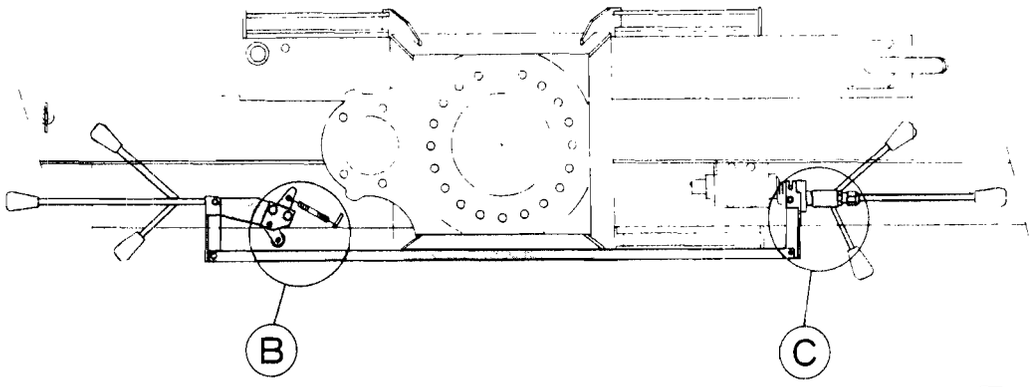
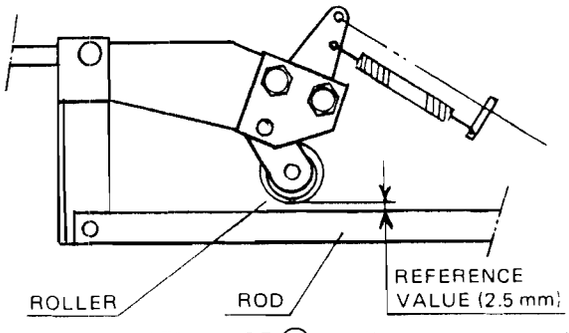
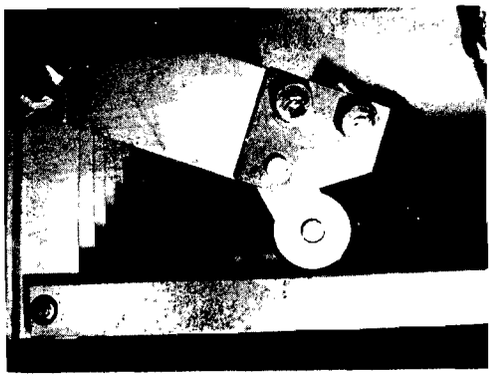
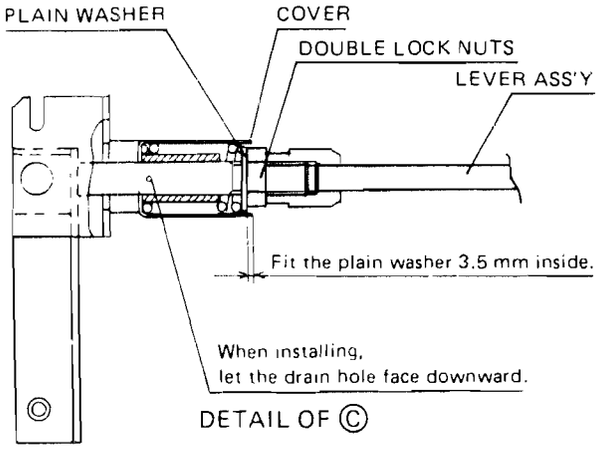




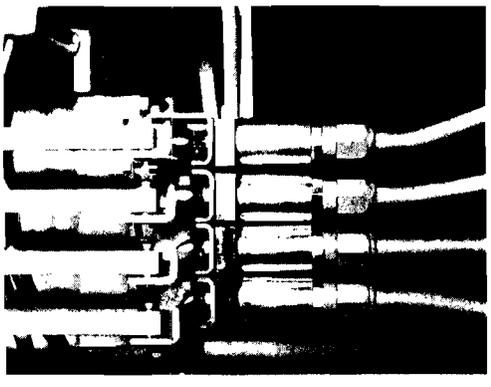
DETAIL OF Ⓑ



When assembling, set the clearance between the rod and roller will become 2.5 mm.



DETAIL OF Ⓒ



Installation Procedure

1) When installing the lever ass'y, tighten the double lock nut so that the plain washer is pushed into the place 3.5 mm inside from the end face of the cover.
2) Then tighten the lever ass'ys until it reaches the double lock nuts.

Caution: If the direction of the lever is not proper, loosen within one revolution and tighten the double lock nuts with the tightening torque of 10 kg-m and up.

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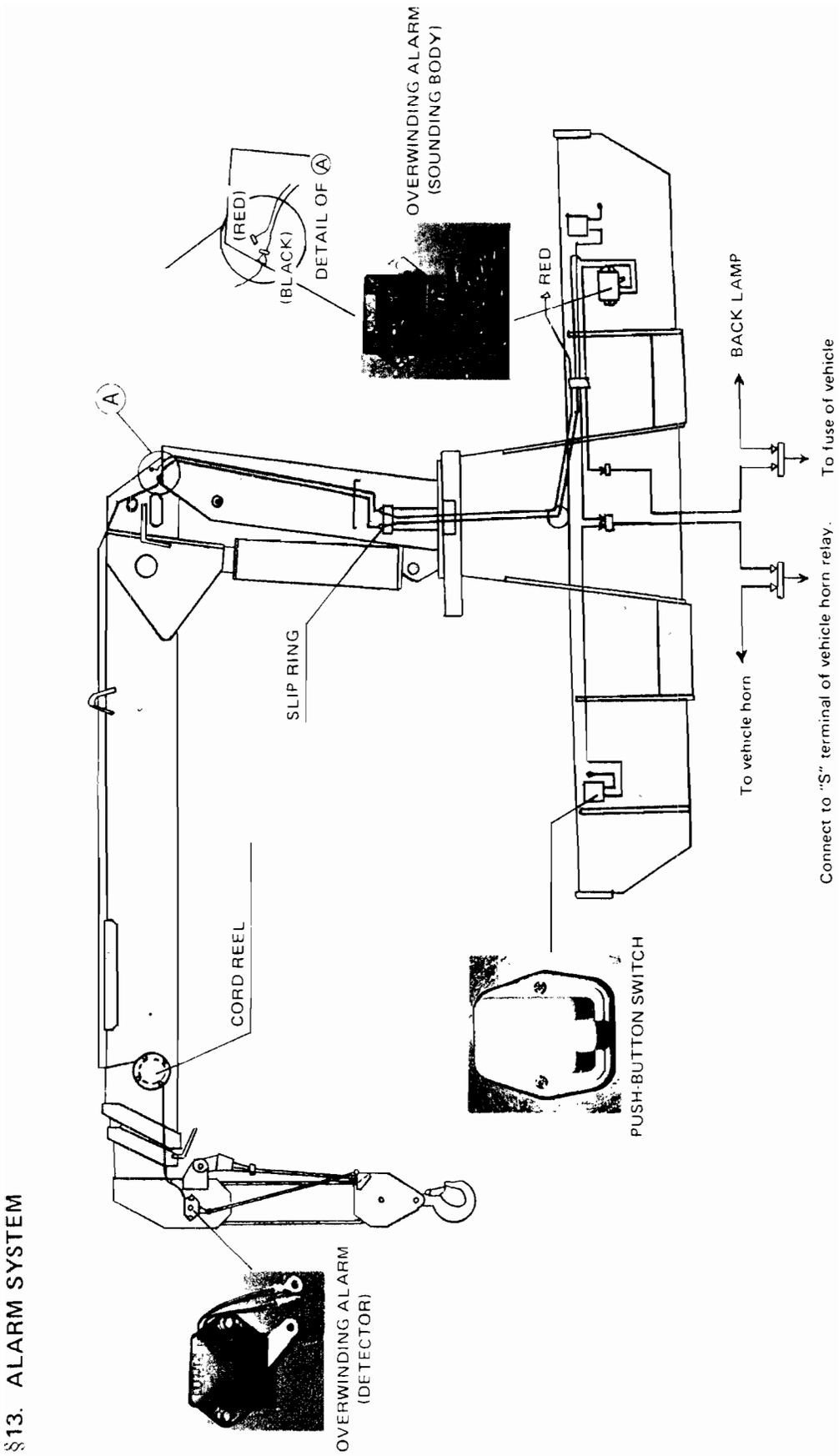
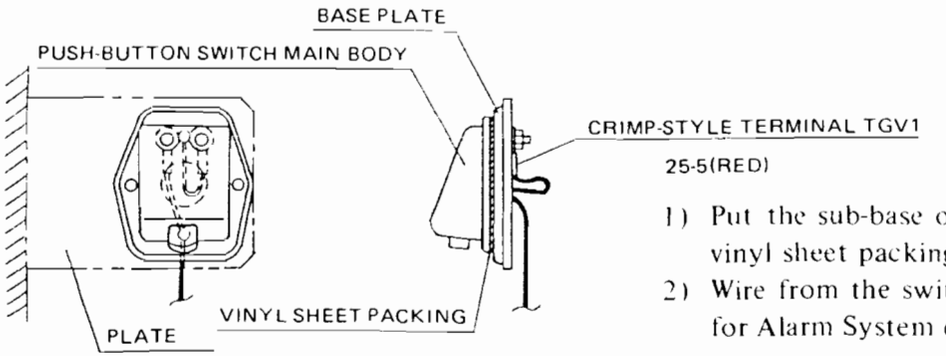
§13. ALARM SYSTEM

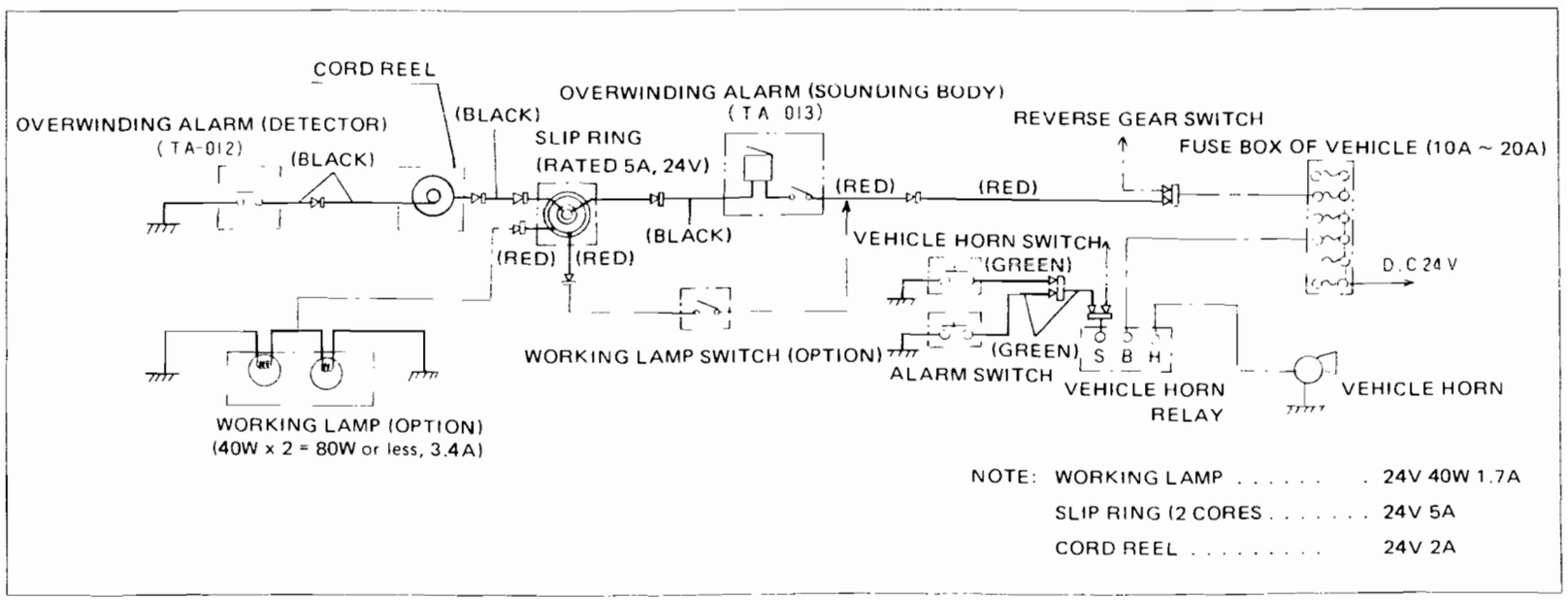


1. Push-button Switch Installing Procedure



1) Put the sub-base on the plate which is welded to the base, and fit the vinyl sheet packing and push-button switch main body to the sub-base.
2) Wire from the switch shall be connected following the Wiring Diagram for Alarm System described in "Common Manual for Mounting."

2. Wiring Diagram



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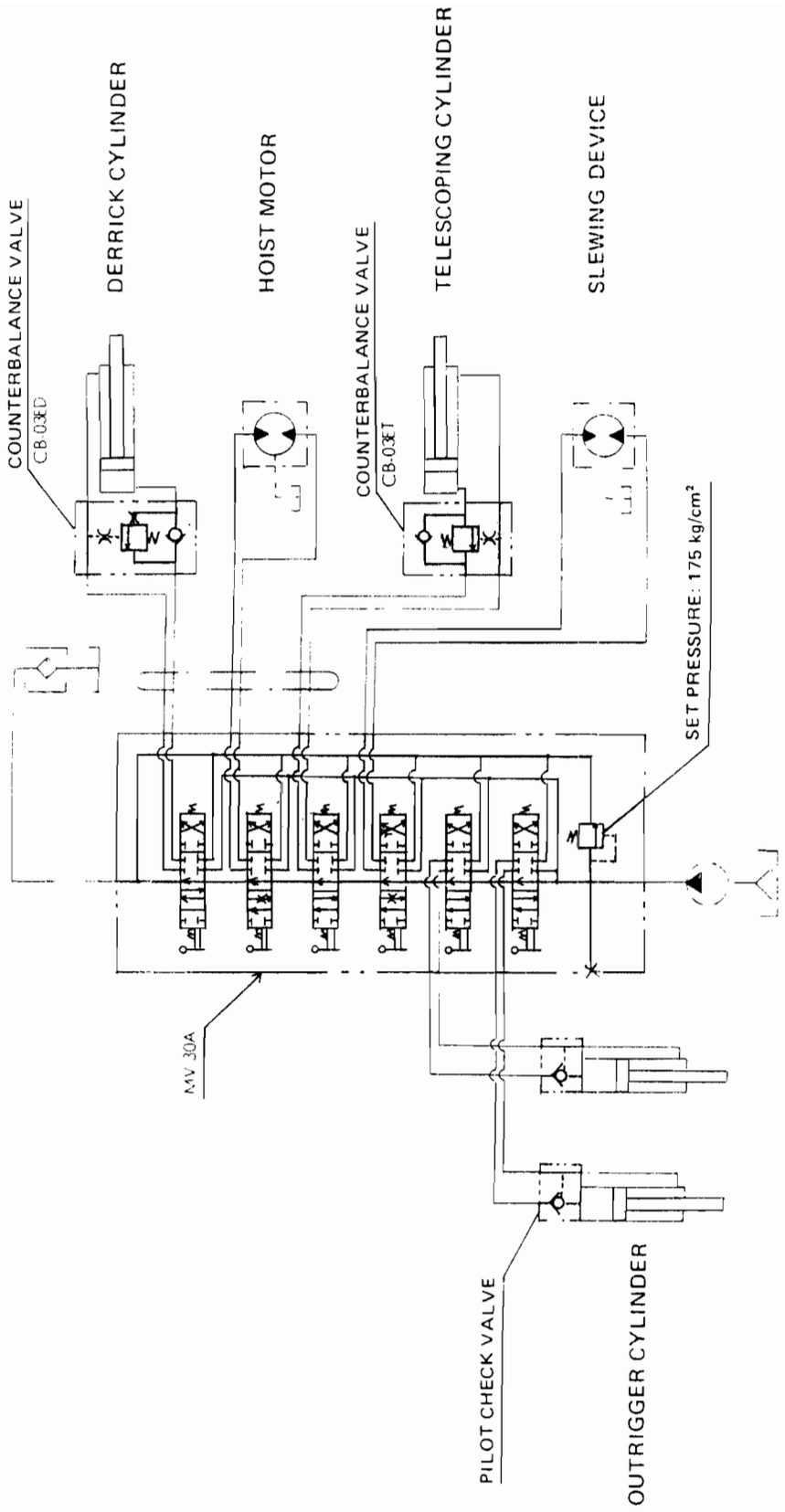
§14. HYDRAULIC CIRCUIT

1. UR Series Standard



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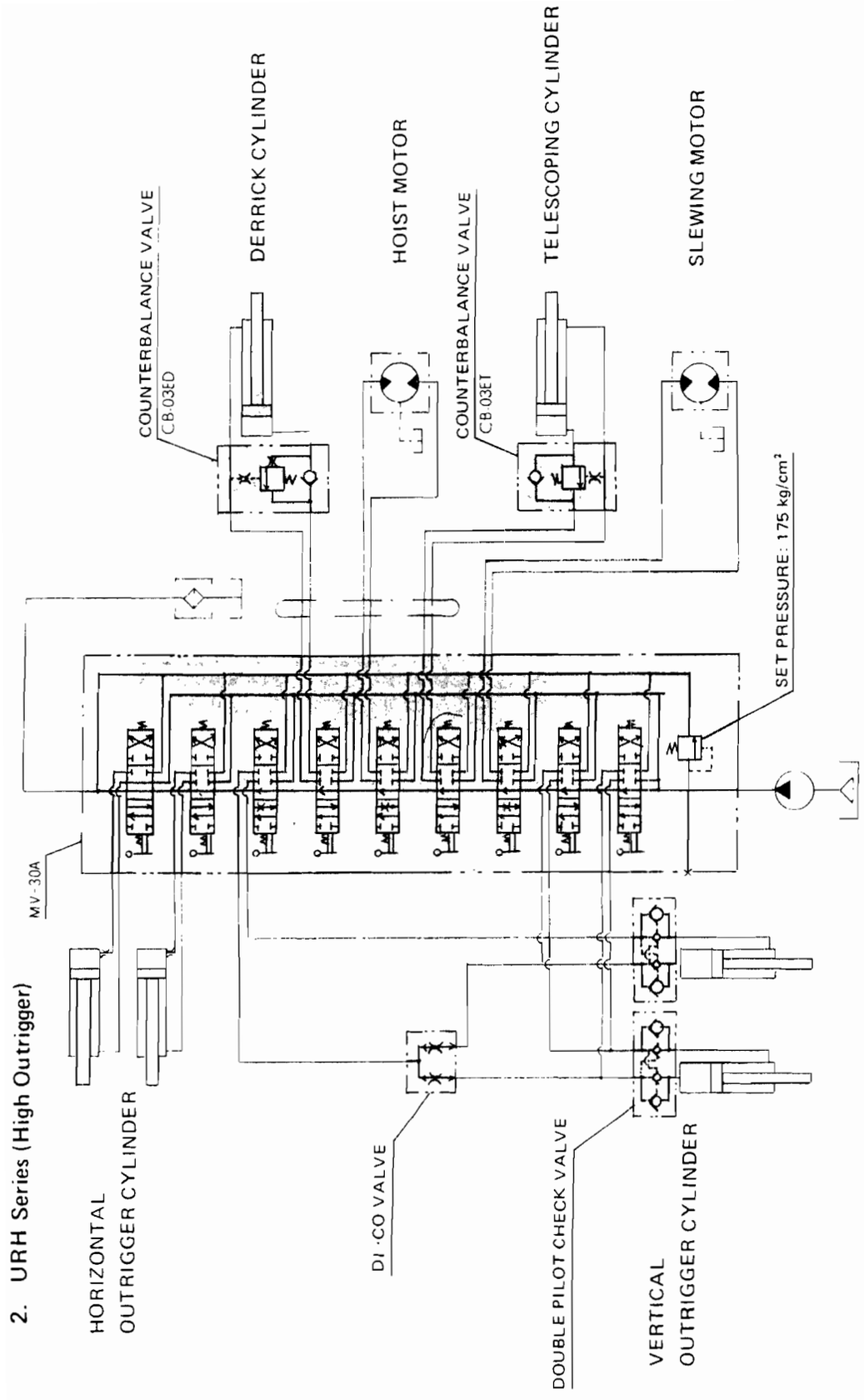
2. URH Series (High Outrigger)



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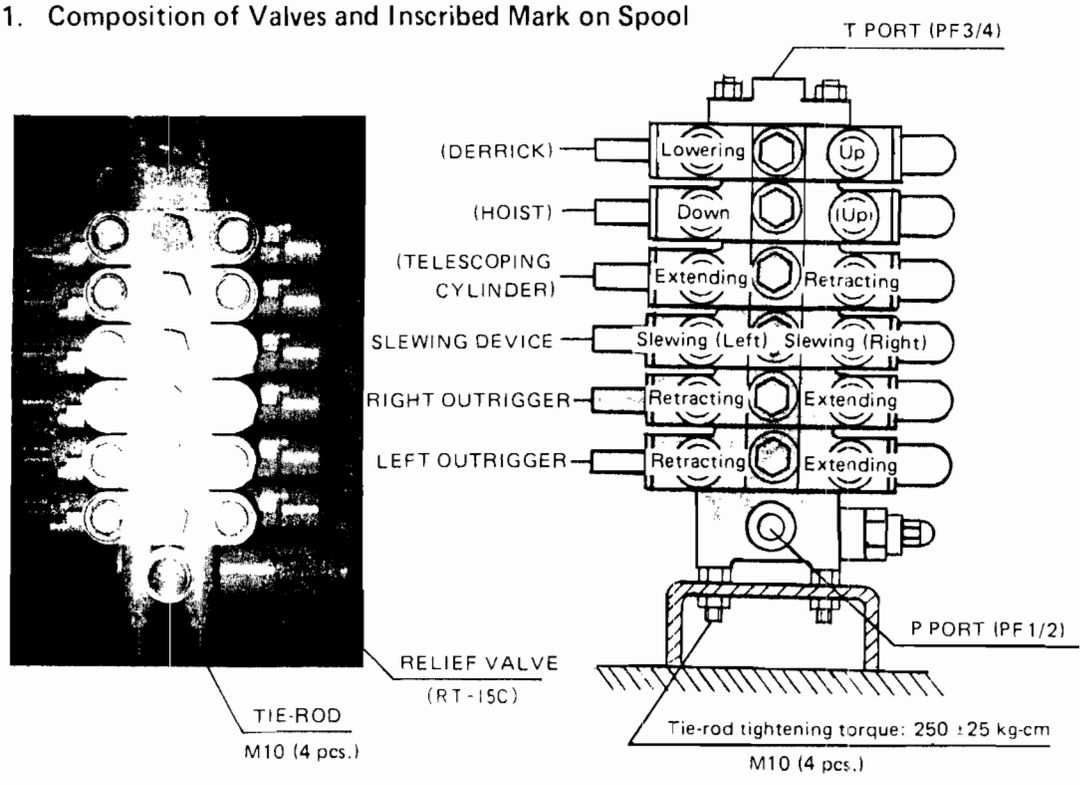
§15. CONTROL VALVE (MODEL: MV-30A)

1. Composition of Valves and Inscribed Mark on Spool



* Control valves control working of every actuator of crane. The spools assembled in the control valves are different each other according to respective actuator

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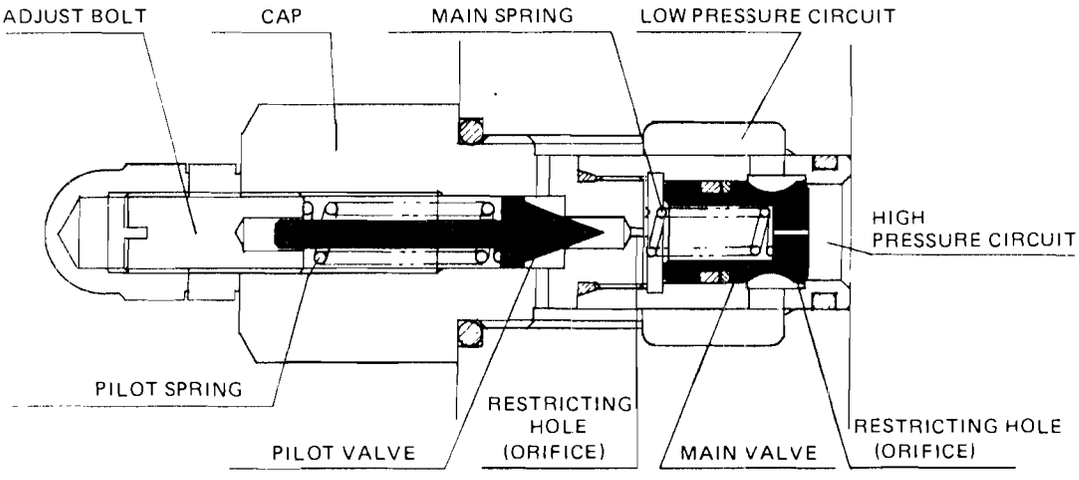
2. Relief Valve (RT-15C)

The relief valve is a preventive valve to control the pressure in the hydraulic circuit would not become higher than specified pressure.

1. Construction of Valve



2. Adjusting Procedure

The hydraulic pressure in the relief valve is decided by the movable allowance of its adjust screw. For adjusting the pressure, loosen the cap and nut, and turn the screw clockwise with a (−) driver to increase the pressure, while on the contrary turn the screw counterclockwise for reducing the pressure.

- When setting up : Be sure to watch the pressure meter.
- After setting up : Be sure to tighten the nut and the cap securely so as not to be loosened.

When tightening the nut and the cap, hold the screw with the (−) driver as it is feared that loosening of screw is apt to happen while tightening.

Caution:

Engine rpm at the time of setting up the hydraulic pressure should conform to the rated revolution of the pump, which is 1600 rpm. Never set up the hydraulic pressure when the engine is running at idling speed or high speed.

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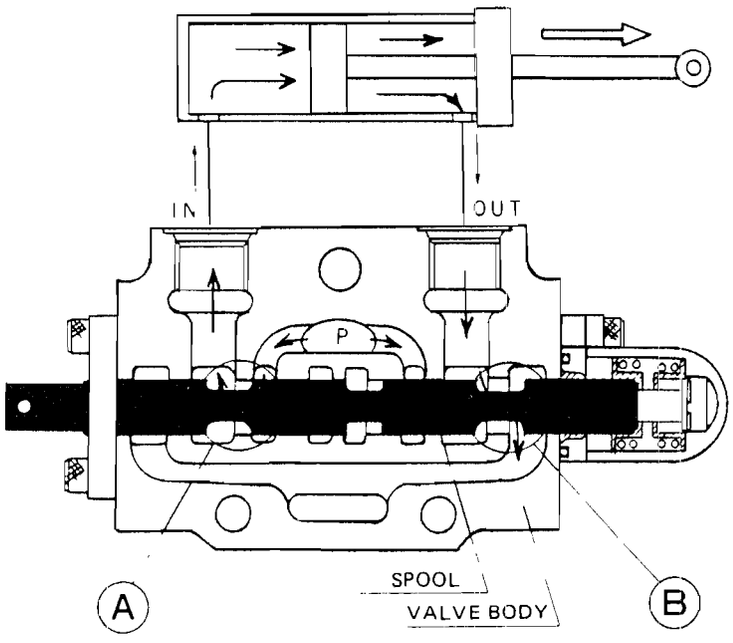
3. Explanation of Meter-in/Meter-out Spool

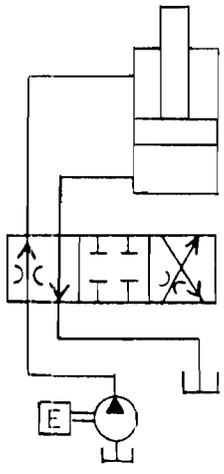
1) Meter-in



As shown in the above illustration, the hydraulic oil sent from the pump flows through the high pressure feeder passage P and is restricted at the spool notch (A) and sent to the cylinder. Returning oil in the cylinder will be sent back to the tank without being restricted at B . In this way, the hydralic oil is restricted at the "IN" side of the actuator.

- Meter-in Spool

The meter-in spool is fitted to the cylinder circuit. If the inflow oil speed is higher than that of return oil, the internal pressure in the tube would become higher and there is a fear that the internal pressure may expand the tube. Therefore, start time of return oil from the cylinder is set faster than that of inflow oil.



* **Thus, the meter-in circuit spool is assembled in the control valves of the telescoping cylinder, derrick cylinder and outrigger cylinder.**

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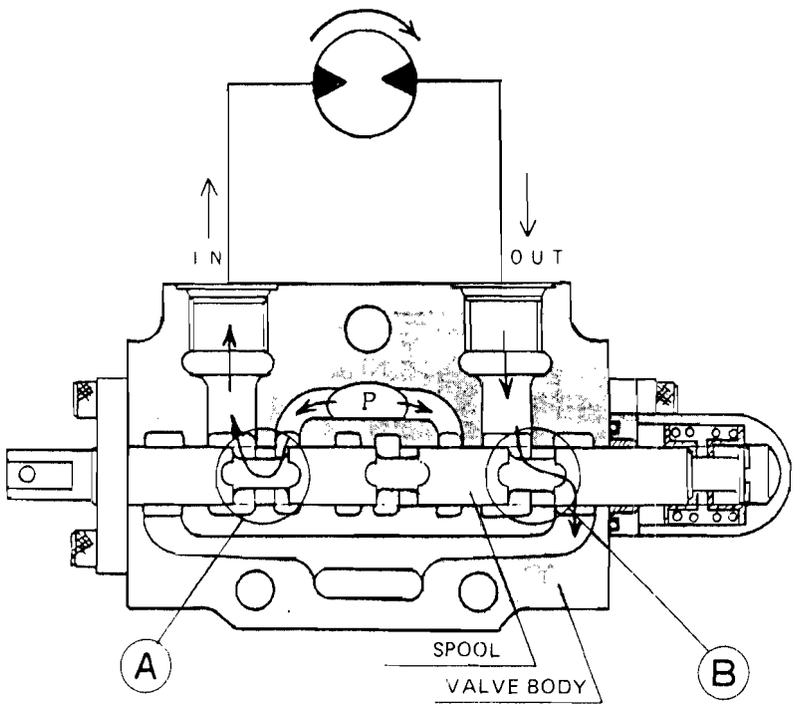
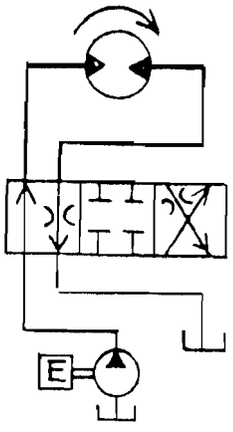
2) Meter-out Circuit



As shown in the above illustration, the hydraulic oil sent from the pump is sent to the motor via the high pressure feeder passage P without being restricted at (A) . Return oil in the motor is restricted by the spool notch at B and flows back to the tank. Thus, the hydraulic oil is restricted at the "OUT" side of the actuator.

- Meter-out Spool

The meter-out spool is fitted to the motor circuit. If the speed of return oil from the motor is faster than the inflow oil speed, there should be a fear that the motor is forced to rotate by the load. In order to overcome this phenomenon, start time of return oil from the motor is set slower than that of inflow oil.



* **Thus the meter-out circuit spool is assembled in the motors of the hoist and slewing device.**

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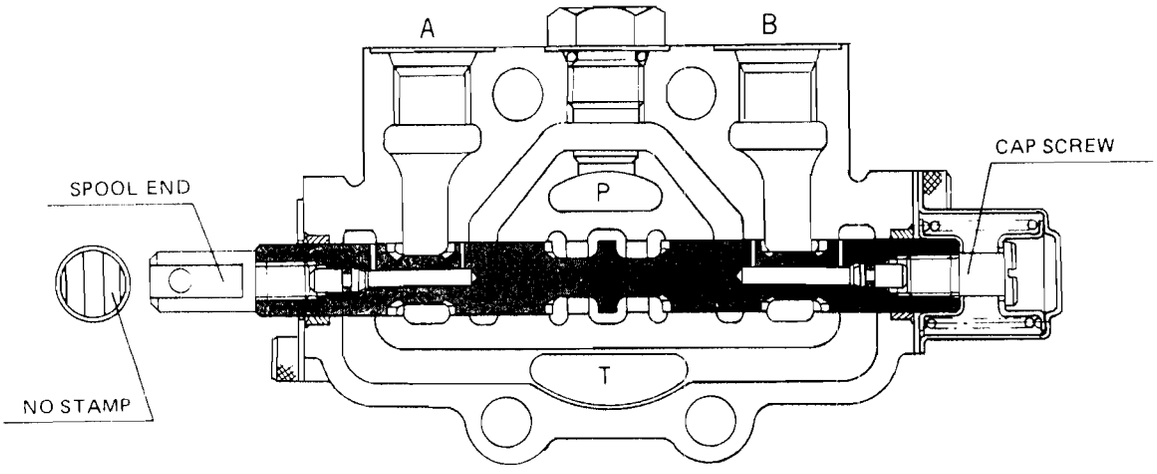
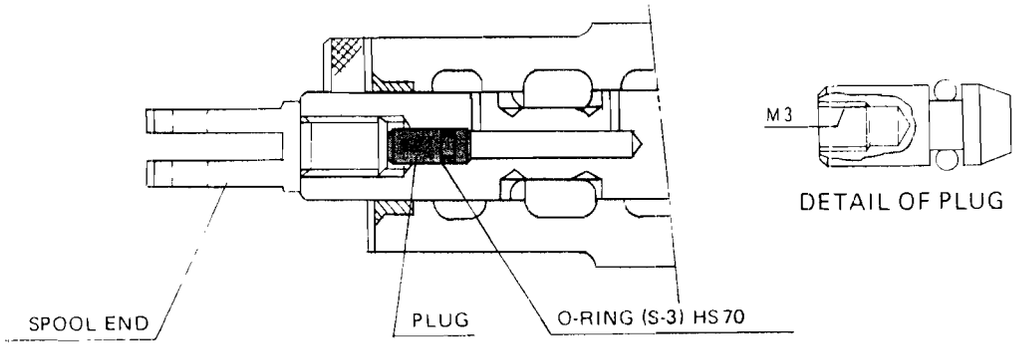
-H Series

★ The construction of the spool for High Outrigger (H) Crane specification (outrigger cylinder, telescoping cylinder, and Di-Co valve) is shown in the below illustration:



Note: Before assembling, apply "LOCKTIGHT #242" to the threaded part of the cap screw and spool end.

★ How to remove the plug from the inside of the spool



1) Remove the cap screw and spool end.
Before removing soak the spool in the 80°C or up hot water for about 10 minutes because "LOCKTIGHT" was applied to the various parts.

2) Pull out the plug.
Plug is threaded with M3, so use a screw driver for removing.

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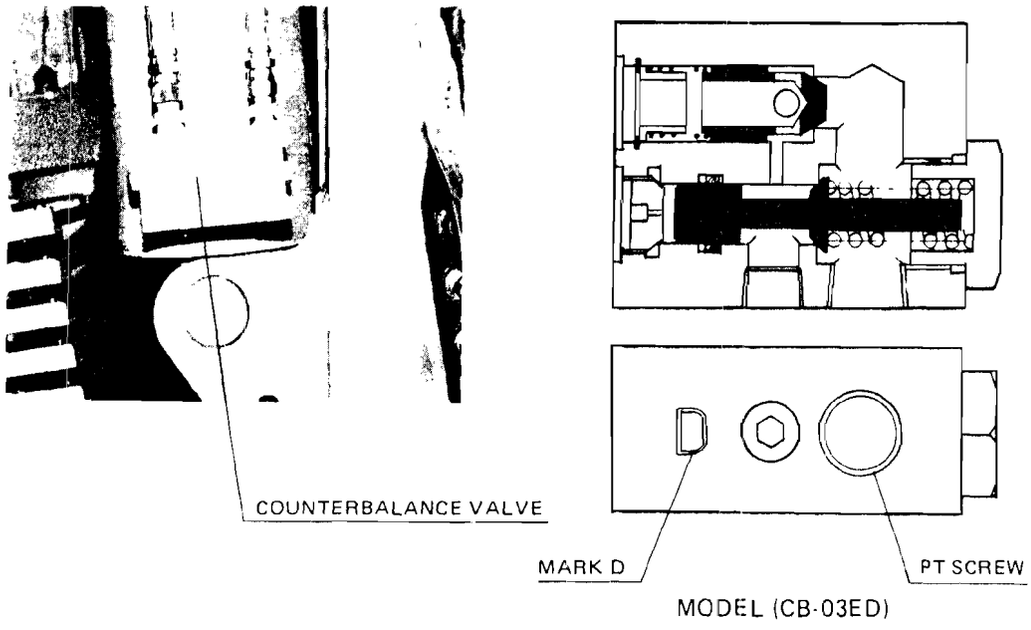
§16. COUNTERBALANCE VALVE

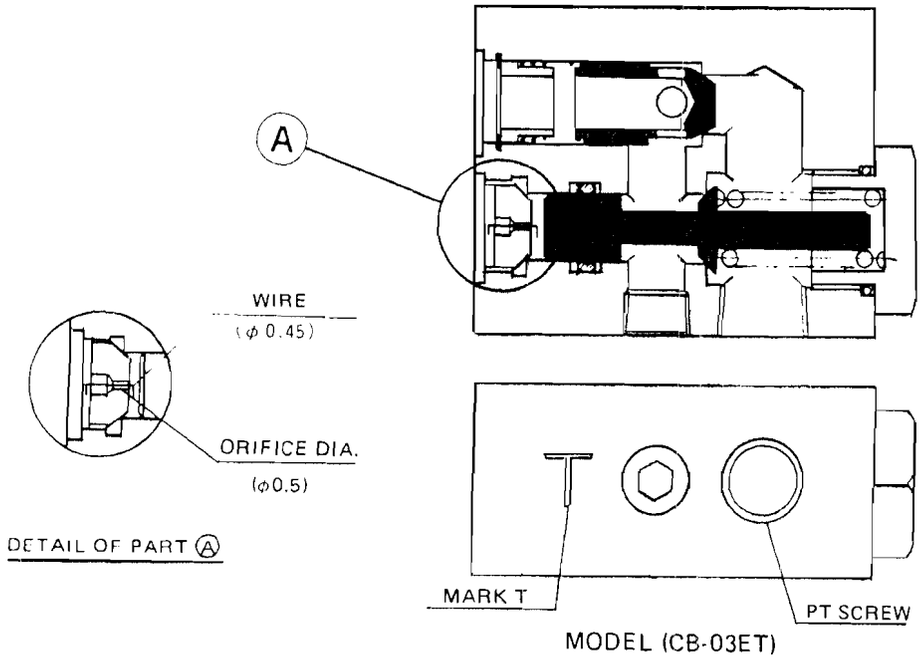
1. Construction of Counterbalance Valve (for Derrick)



MODEL (CB-03ED)

2. Construction of Counterbalance Valve (for Telescoping Cylinder)

* The counterbalance valve for telescoping cylinder has a wire in the part Ⓐ shown below (to prevent hunting when the telescoping cylinder is retracted).



MODEL (CB-03ET)

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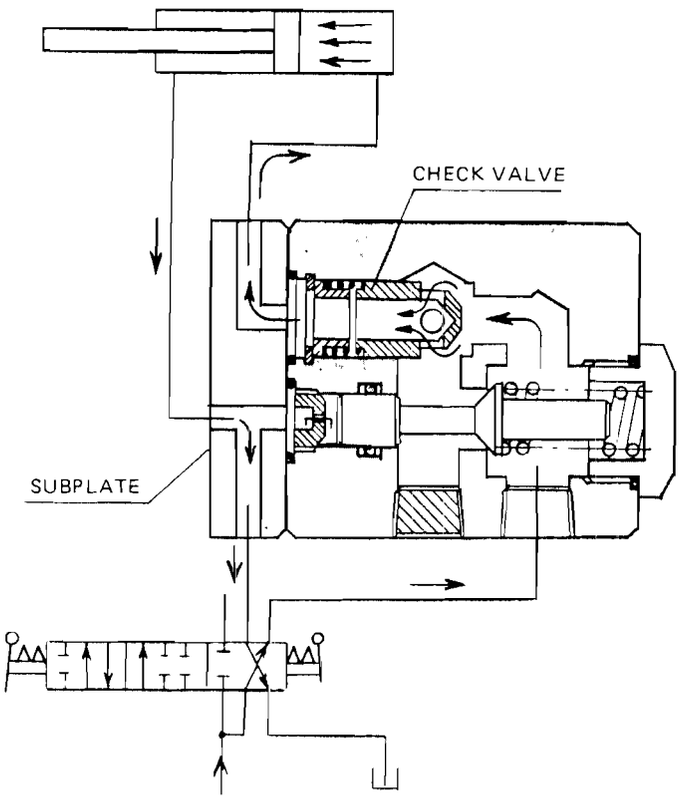
3. Explanation of Counterbalance Valve Operation

1. Extending Cylinder



In extending the cylinder, the oil flowing out of the control valve pushes the check valve in the counterbalance valve to enter the extending side of the cylinder. The oil in the retracting side of the cylinder flows directly through the subplate to return to the tank.
The oil in the extending side of the cylinder flows pushing the check valve that is pressed by a spring, so it will not flow back even though the load should apply a cylinder retracting force.
If the check valve was not used here, the oil in the extending side of the cylinder would flow back due to the load applied to the cylinder the moment the cylinder started to extend (when the spool of the control valve began to open), thus retracting the cylinder instead of extending it.

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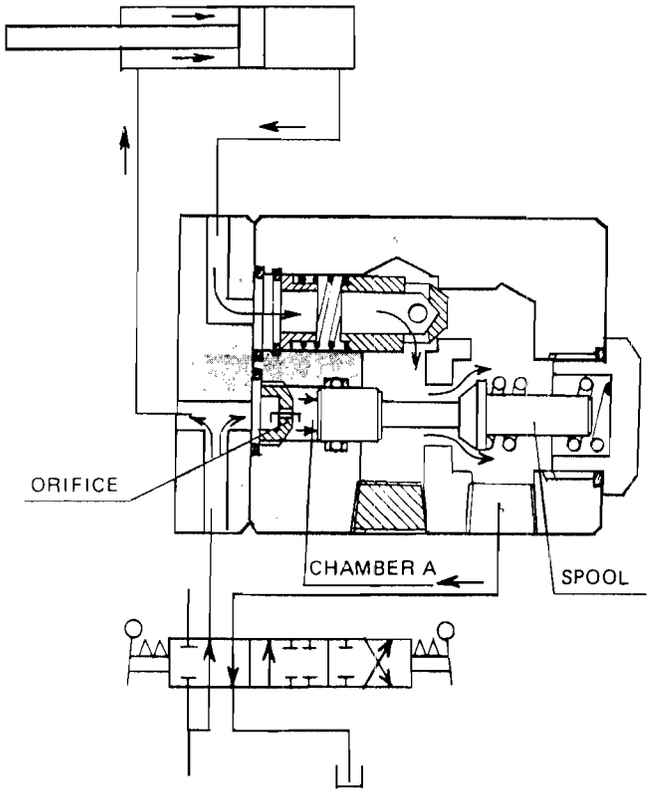
2. Retracting Cylinder



In retracting the cylinder, the control valve changes the direction of oil flow to the retracting side of the cylinder through the subplate.
At the same time, the oil flows into chamber A through the orifice in the valve.
If the spool does not move, the oil in the extending side of the telescoping cylinder is blocked because the circuit is closed by the check valve and the check part of the spool.
But, because oil flows from the control valve to the retracting side of the cylinder, the pressure on the retracting side increases, and the oil in back of the spool (in chamber A) combines to generate a pressure higher than the spring pressure to move the spool to the right.
This results in a clearance between the valve body and the check part of the spool, through which the oil in the extending side of the cylinder flows through port P back into the control valve.
The cylinder is so designed that the oil in the extending side will not flow unless the pressure of the oil flowing into the retracting side of the cylinder reaches a specific level. So the cylinder will not suddenly retract in the event of damage, through the load remains suspended.

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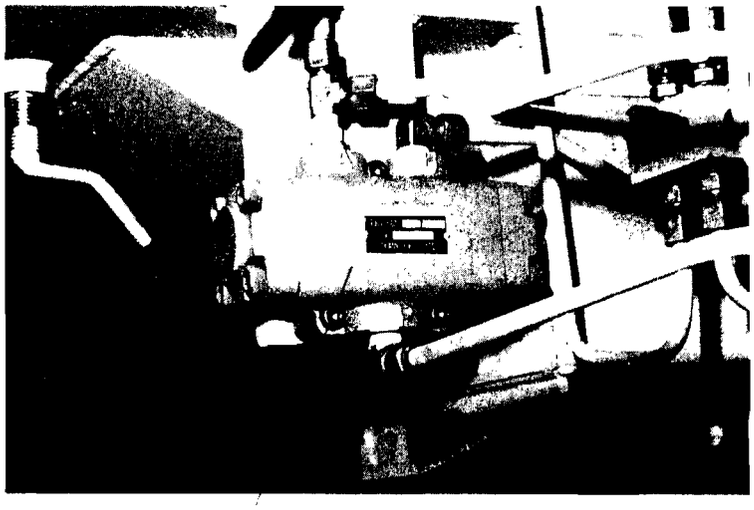
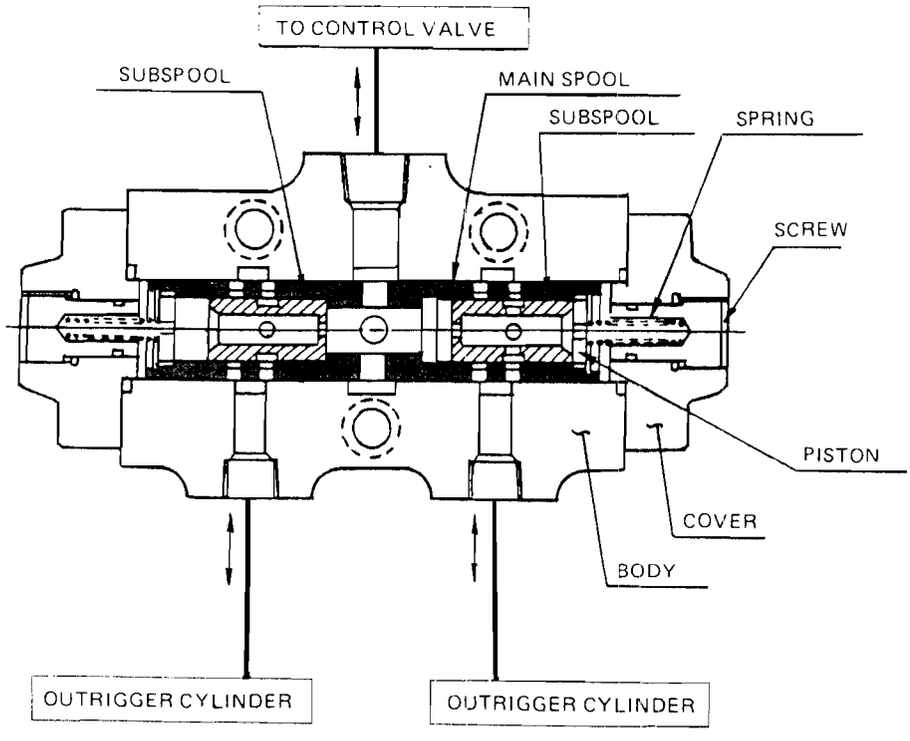
§17. DI-CO VALVE (DIVIDER-COLLECTOR VALVE)



DI-CO VALVE

1. Construction of DI-CO Valve

The DI-CO valve is a hydraulic mechanism combining the functions of a divider valve and collector valve, and is used in simultaneously extending or retracting the right and left high-outriggers.



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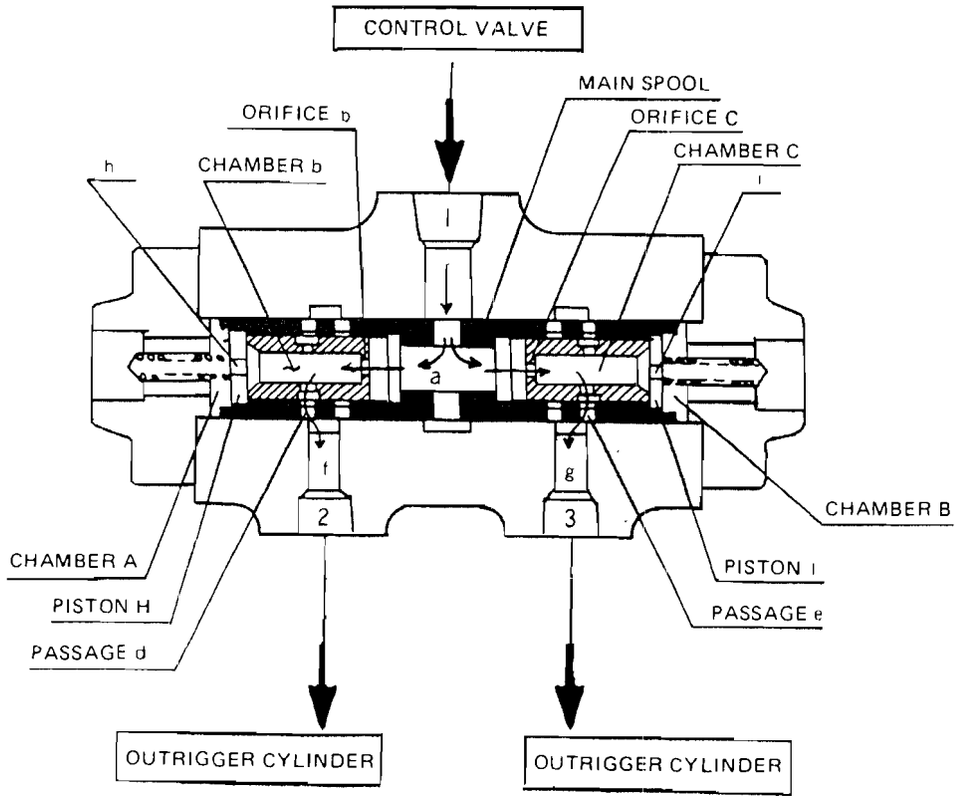
2. Explanation of DI-CO Valve Operation

1. Extending

The DI-CO valve operates as a divider valve as described below.
Pressure oil enters chamber a through port 1, flows from the center of the subspools to the right and left, and via orifices b and c to passages d and e, from which the oil flows through passages f and g to ports 2 and 3. Chambers A and B are connected to chambers b and c through small holes h and i.
If the resistance of port 2 increases to be greater than the resistance of port 1, the pressure on part 2 increases to reduce the pressure difference between chambers a and b so that the flow of oil to port 2 decreases. Thus, the pressure oil passing orifice b reaches chamber A, and the pressure inside chamber A increases. When a pressure difference arises between chambers A and B, the pressure oil in chamber A pushes piston H up to move the main spool to the right. As a result, the clearance between passages g and e narrows to reduce the flow of oil to port 3 until there is no pressure difference between ports 2 and 3. At this point the main spool stops, and oil is supplied to ports 2 and 3 at the same rate.



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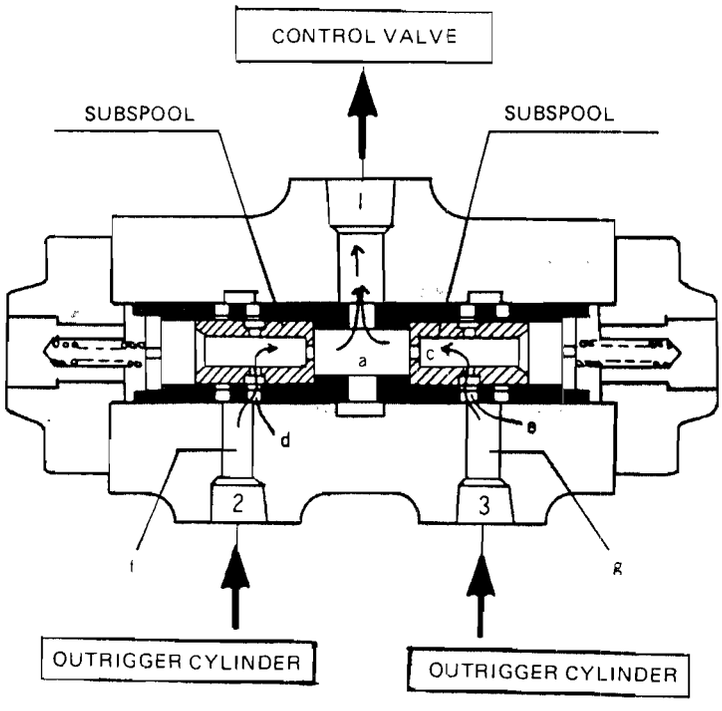
2. **Retracting**

The DI-CO valve operates as a collector valve as described below. Pressure oil flows from ports 2 and 3 to passages d and e via passages f and g to move the right and left subspools to the center. The oil then flows from passages f and g into chambers b and c via passages d and e, and to port 1 via orifices b and c. When there is a resistance difference between ports 2 and 3, the valve operates in the same way as the divider valve to supply the oil from port 1 at the same rate.



3. **DI-CO Valve Handling Precautions**

1) When mounting the valve, make sure that the spools inside are level.
2) If either port 2 or port 3 is closed, the other port is also closed to block oil flow.
3) Completely vent air from the piping, etc.
4) Before correcting errors in the synchronized operation of the outrigger cylinders, apply pressure to retract the outrigger cylinders all the way.
5) Errors in the synchronized operation of the outrigger cylinders will increase if oil flow is reversed halfway in their stroke.

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4. Failure in the Synchronized Operation of Outrigger Cylinders

- Lack of oil flow
- Air trapped inside
- Oil leakage
- Insufficient pressure
- Resistance difference between right and left in inner box

Check the above and if nothing wrong is found, disassemble and check the decompression valve.

Disassembling Procedure

1) Remove the cover on one side.
2) Push the main spool with your finger and see if it returns to the original position by the force of the spring. Also check the subspools for operation.
3) If any spool fails to return to its original position, or does not move properly, remove it and clean it of foreign matter.
4) Make sure to install the spools in the correct direction after cleaning.

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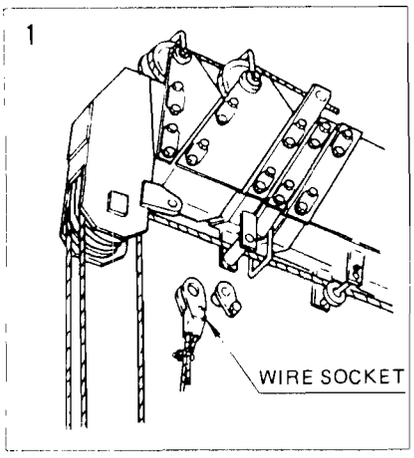
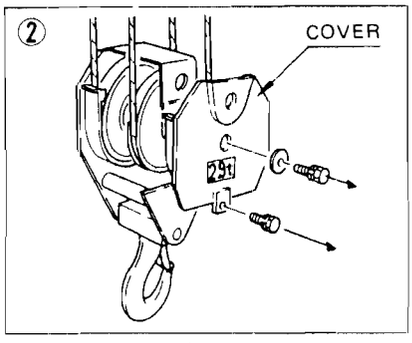
§18. CONSTRUCTION OF HOOK (FOR 6-SECTION BOOM)

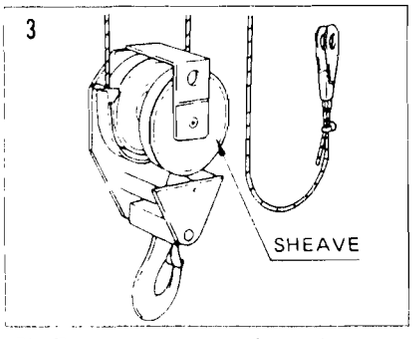
1. Procedure for Changing Wire Rope Sling from 4 to 3 Ropes



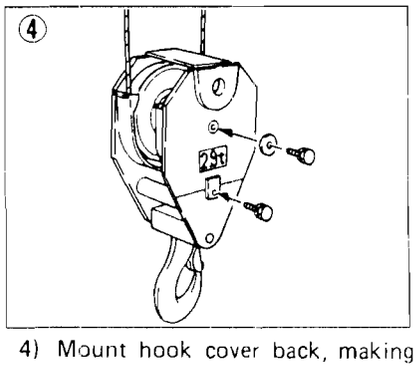
1) Remove wire socket from boom.



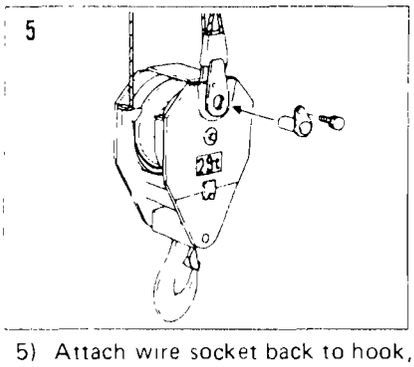
2) Remove hook cover.



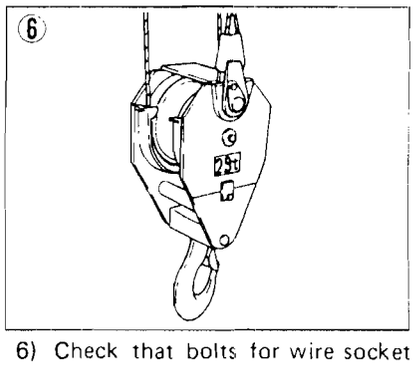
3) Remove wire rope from sheave.



4) Mount hook cover back, making sure that bolts are tightened firmly.



5) Attach wire socket back to hook, making sure that bolt is tightened securely.



6) Check that bolts for wire socket and cover are tightened securely.

Precautions

* The maximum hoisting load for 3-rope sling is 2.2 tons.
* If the hook touches the ground when changing the number of wire ropes, the ropes on the drum will loosen. Before starting work after removing or adding wire ropes, be sure to wind the wire ropes tense and tight.

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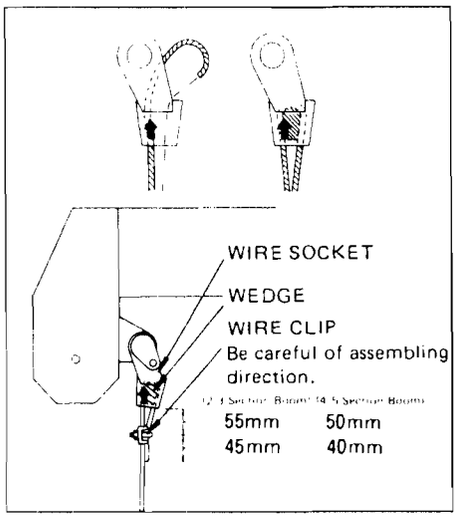
§19. HOW TO HANDLE WIRE ROPES

1. Passing Wire Rope into Wire Socket and Fastening It



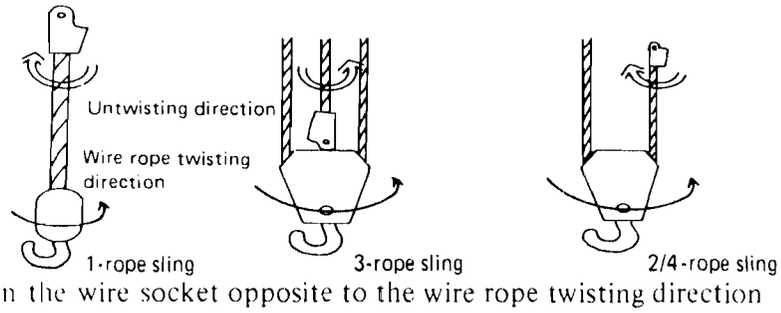
Pass the end of a wire rope into the wire socket along the arrow mark on the socket. If the wire rope is inserted in the opposite direction, it will be kept bent and last short.
Do not forget to attach the wedge and wire clip.

When attaching the wire socket to the boom, make sure that the arrow mark on the face of the wire socket faces outward as shown at left.

2. Twisted Wire Rope Adjusting Procedure

Wire rope tends to turn in the untwisting direction under tension. When the hook carries two or more wire ropes, they can easily turn, especially when they are still new. Wire ropes becomes steady with use.
Observe the wire rope adjustment procedure below in such a case.

1) Extend the boom fully.
2) Set the boom to an angle of about 65°.
3) Hoist a load so that the wire ropes will be tense.
4) Check the wire ropes for the number of turns.
5) Remove the wire socket, and turn it in the wire rope untwisting direction by the number of wire rope turns multiplied by the number of wire ropes. However, the wire socket may be turned only up to 4 times.
6) After attaching the wire socket back to position, wind up and down the wire ropes all the way and repeat it a few times to check that they are back to normal. If there is still a twist remaining, repeat the above process.



Note: Turn the wire socket opposite to the wire rope twisting direction except in the case of 3-rope sling in which case the wire socket should be turned in the same direction.

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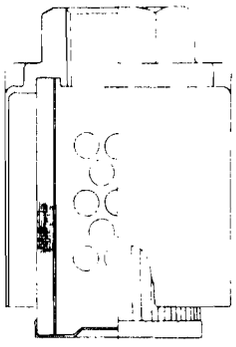
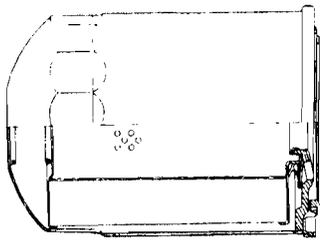
§20. FILTERS

1. Suction Filter and Line Filter (for UR330, 360)



SUCTION FILTER
Part No.740582023



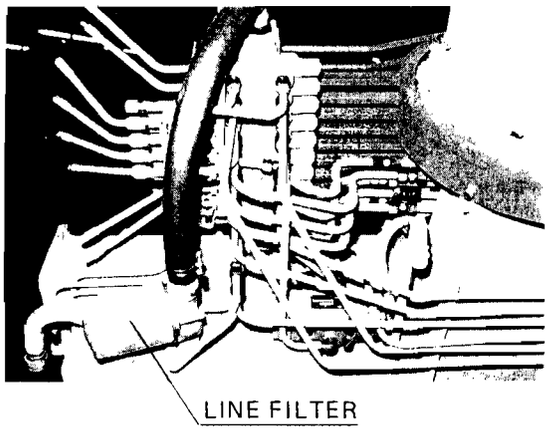
LINE FILTER
Part No.740580204

2. Suction Filter

The suction filter is attached to the end of the pump suction pipe in the oil tank. 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 intervals vary 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



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§21. LUBRICATION

Apart from the hydraulic oil that is necessary for hydraulically driving the crane. Lubrication (oiling and greasing) is required to ensure smooth operation of the crane parts, reduce their wear, and extend life.

1. Selection of Hydraulic Oil

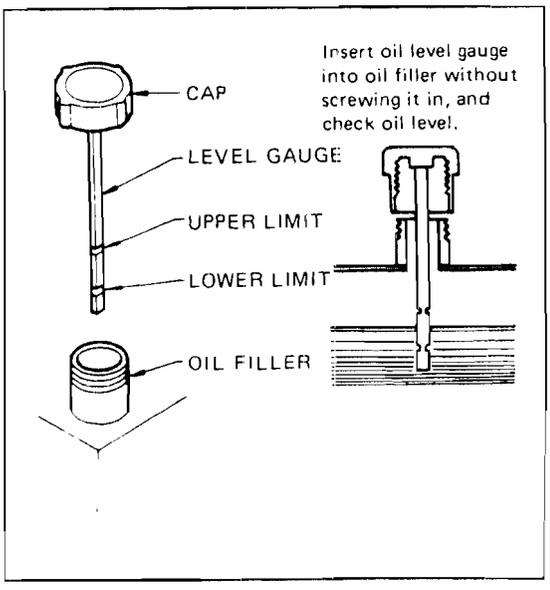
Use the genuine hydraulic oils specified below for UNIC truck crane.

General	UNIC HYDRO 56	
For cold season	UNIC HYDRO 32	For areas with sub-zero temperature in winter

2. Changing Hydraulic Oil

Air carries foreign matter and moisture into the oil tank. The hydraulic parts produce metal dust little by little with use. Change the hydraulic oil three months after the new crane is first used. Thereafter, change it once a year in early autumn. If ambient temperature falls below 0°C, water in the tank and hydraulic circuit may freeze. Changing the hydraulic oil in early autumn is effective for preventing it.

To check oil level, insert the level gauge into the oil filler without screwing it in, and check that oil level is halfway between the upper and lower limits on the gauge.



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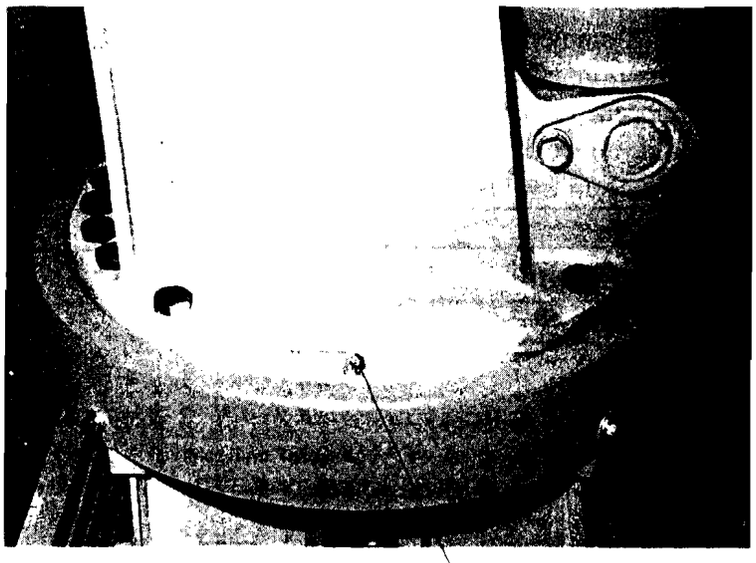
3. Greasing

1) Use the grease specified below for UNIC truck cranes.

Chassis grease	No.1 (Viscosity 310 ~ 340)
Molybdenum disulfide	No.2 (Viscosity 265 ~ 295)

2) Greasing Swivel Bearing

Be sure to grease the swivel ball bearing. If it is not well lubricated, the bearing may make abnormal noise. Grease it once a month, or if the crane is fequently used, once a week, while turning the swivel.



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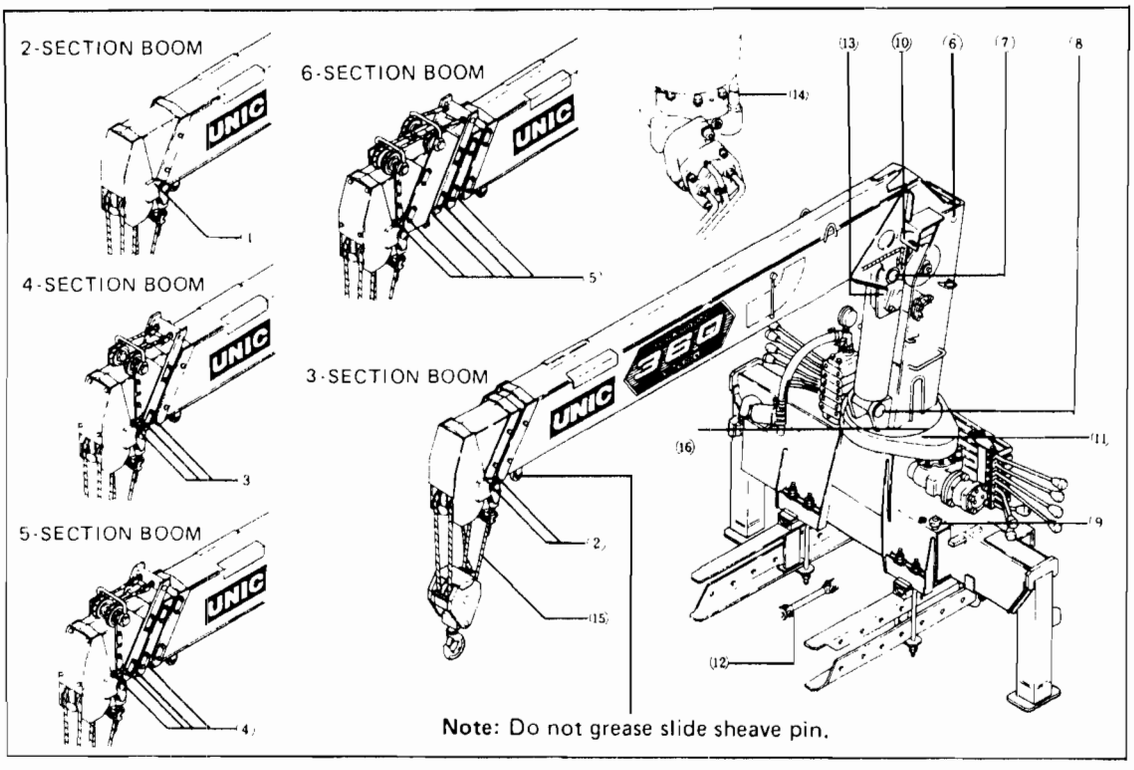
3) Greasing Chart



Note: Do not grease slide sheave pin.

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Lubrication intervals	Lubricating point	No. of points	Lubricant	Method
Daily	1) Boom slide plate (bottom and sides of section 2) 2-section boom	1	Molybdenum grease	Manual
	2) Boom slide plate (bottom and sides of sections 2, 3) 3-Section boom	2	Molybdenum grease	Manual
	3) Boom slide plate (bottom and sides of sections 2, 3, 4) 4-Section boom	3	Molybdenum grease	Manual
	4) Boom slide plate (bottom and sides of sections 2, 3, 4, 5) 5-Section boom	4	Molybdenum Grease	Manual
	5) Boom slide plate (bottom and sides of sections 2, 3, 4, 5, 6) 6-Selection boom	5	Molybdenum Grease	Manual
	6) Boom foot pin	1	Chassis grease	Grease gun
	7) Derrick cylinder upper support pin	1	Chassis grease	Grease gun
	8) Derrick cylinder lower support pin	1	Chassis grease	
	9) Oil tank (32.5 liters/32 liters)	1	Hydraulic oil (Mid point between upper and lower limits of level gauge)	
Weekly	10) Winch drum gear	1	Chassis grease	Grease gun
	11) Swivel gear	1	Chassis grease	Manual gun
	12) Propeller shaft	3	Chassis grease	Grease gun
Monthly	13) Winch reduction gear (about 0.8 liter)	1	Gear oil	
	14) Swivel reduction gear (about 0.7 liter)	1	Gear oil	
	15) Wire rope	1	Chassis grease	Manual
	16) Swivel bearing	2	Chassis grease	Grease gun

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