

UNIC HYDRAULIC CRANE

MODEL

UR1500 SERIES

WORK SHOP MANUAL

FURUKAWA UNIC CORPORATION

HEAD OFFICE : Center Bldg., 3-12, Higashishinagawa 2-chome,
Shinagawa-ku, Tokyo 140, JAPAN

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INTRODUCTION

This technical instruction manual describes the construction of the UNIC UR1500-Series crane and maintenance procedures for the servicemen engaged in its 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 crane will be able to deliver their superb performance and be kept in satisfactory operating condition.

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

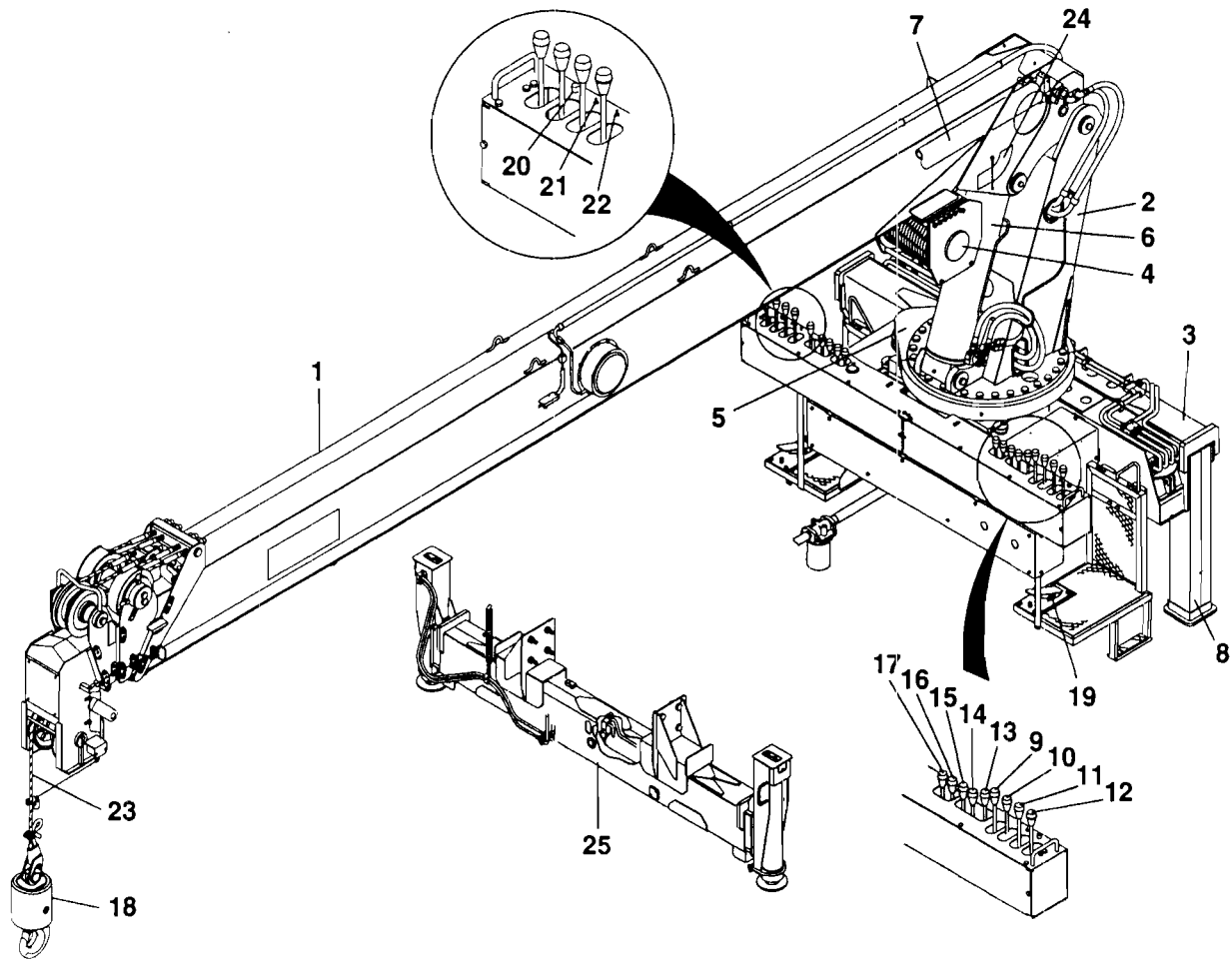
Technical Section, Service Department
FURUKAWA UNIC CORPORATION

CONTENTS

§ 1. GENERAL VIEW	1
§ 2. PERFORMANCE.....	2
§ 3. BOOM ASS'Y	4
1) Telescoping mechanism of boom	5
§ 4. COLUMN	6
§ 5. BASE	7
§ 6. TELESCOPING CYLINDER	8
1) Construction	9
§ 7. DERRICKING CYLINDER.....	10
§ 8. OUTRIGGER CYLINDER	
1) Horizontally extending cylinder	11
2) Vertical outrigger cylinder.....	12
§ 9. SLEWING DEVICE	13
1) Slewing lock mechanism.....	14
2) Caution to be taken when re-assembling slewing reduction gear	15
§ 10. REDUCTION GEAR FOR SLEWING	
1) Construction	16
2) Points to be noticed when assembling reduction gear	17
§ 11. SWIVEL JOINT	18
§ 12. SLIP RING	
1) Construction of slip ring and where it is mounted	19
§ 13. HYDRAULIC CIRCUIT DIAGRAM.....	20
§ 14. CONTROL VALVES	
1) For hoisting, telescoping, and derricking.....	21
2) For controlling slewing and outrigger.....	22
§ 15. TROUBLES AND MEASURES TO BE TAKEN	
1) Crane will not be operated at all	23
2) How to operate when in an emergency.....	24
3) Adjusting procedures for unloading valve	25
4) Solenoid valve of unloading mechanism.....	26
§ 16. VALVES	
1) Main relief valve (RT15C) — STD specification.....	28
2) Outrigger cylinder (Construction of pilot check valve).....	30
3) Rear-outrigger cylinder (Construction of pilot check valve)	30
4) Horizontally extending cylinder (Construction of check valve)	31

§ 17. ELECTRIC CIRCUIT DIAGRAM	32
1) Electric wiring diagram	33
2) Electric wiring.....	34
§ 18. CONTROL	35
1) Crane controls	36
2) Outrigger controls.....	37
§ 19. REAR OUTRIGGER	38
1) Connecting the high-pressure hose for rear outrigger	39
§ 20. MOUNTING THE HOOK	40
§ 21. MAINTENANCE SECTION	
1) Periodic maintenance / Monthly	42
2) Periodic maintenance / Annual	44
3) Periodic maintenance / Replacement of expendable parts.....	48
4) Periodic maintenance / Weekly.....	49
§ 22. OTHERS	
1) Recommended grese	50
2) Recommended gear oil.....	50
3) Recommended hydraulic oil	51

§ 1. GENERAL VIEW



No.	Description
1	Boom
2	Column
3	Base
4	Hoist winch
5	Swing device
6	Topping cylinder
7	Telescoping cylinder
8	Outrigger
9	Boom topping control lever
10	Winch control lever
11	Boom telescoping control lever
12	Swing control lever
13	Lever to control outriggers for extension/retraction
14	Selector lever for controlling vertical or horizontal outriggers (Curb side)

No.	Description
15	Selector lever for controlling vertical or horizontal outriggers (Street side)
16	Selector lever for controlling vertical or horizontal rear outriggers (Curb side)
17	Selector lever for controlling vertical or horizontal rear outriggers (Street side)
18	Hook block
19	Accelerator pedal
20	Warning horn
21	Engine switch (START/STOP)
22	Emergency release switch
23	Wire rope
24	Boom angle chart
25	Rear outrigger

§ 2. PERFORMANCE

CRANE CAPACITY

LIFTING CAPACITY	: Max. 30000 lbs. at 4 ft. : Max. 113.6 kN {13620 kgf} at 1.22 m with 4-parting of loadline.
SHEAVE HEIGHT	: Max. 9.12 ft. 115.1 ft. (with 24 ft. jib) : Max. 27.8 m 35.1 m (with 7.3 m jib)
WORKING RADIUS	: Max. 80.4 ft. : Max. 24.5m

BOOM

	4-section box beam type telescoping boom
Boom Length;	25 ft. to 8.2 ft. 7.62 m to 25.0 m
Boom Telescoping Cylinder;	Double acting type with counter balance valve
Boom Extending Speed;	57 ft./63 sec. 17.38 m/63 sec.
Boom Raising Cylinder;	Double acting type with counter balance valve
Boom Raising Speed;	-10° to 82°/16.2 sec.

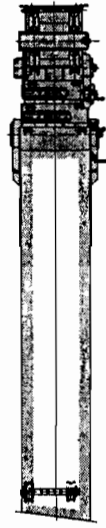
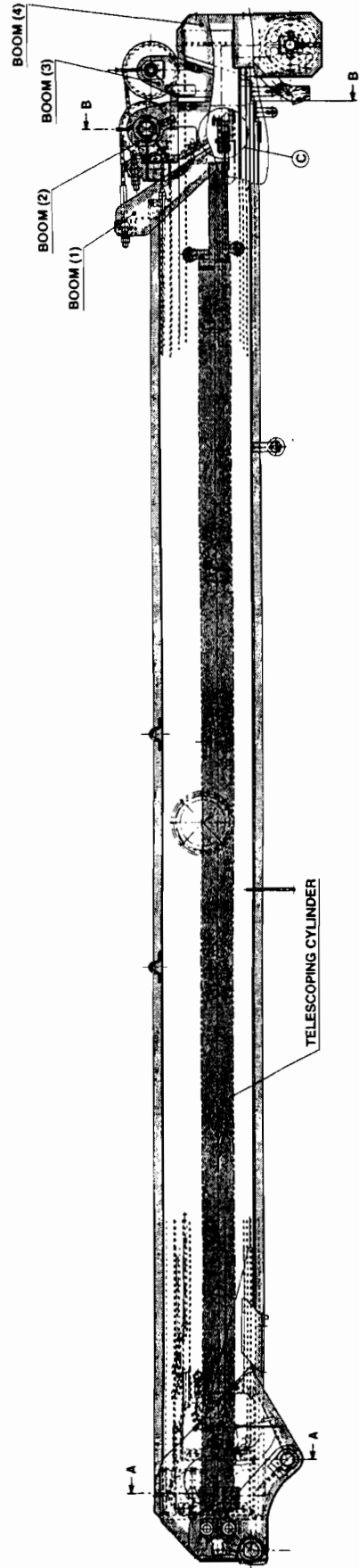
JIB (option)

	2-section manual pullout
Jib Length;	15 ft. to 24 ft. 4.57 m to 7.32 m

WINCH

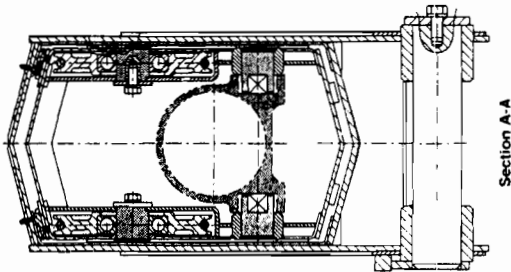
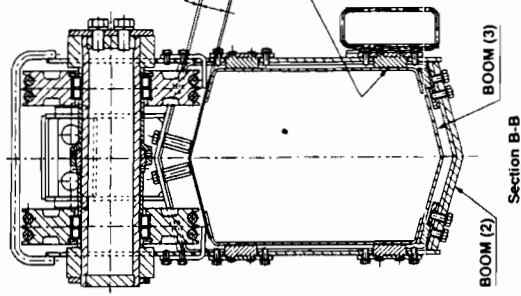
	Hydraulic motor driven, planetary gear reduction with automatic mechanical brake.
Single Line Pull;	8700 lbs. at 1st layer 38.7 kN {3950 kgf} at 1st layer
Single Line Speed	Lo; 112 FPM at 3rd layer 34.0 m/min at 3rd layer Hi; 223 FPM at 3rd layer 68.0 m/min at 3rd layer
Hydraulic Motor	Trochoid type
Downhaul Weight;	9400 lbs. Capacity 41.8 kN {4260 kgf} Capacity
Hook Block (option);	30000 lbs. Capacity, 3 sheaves block with latch 133.6 kN {13620 kgf} Capacity, 3 sheaves block with latch
Wire Rope	
Construction;	6 x WS (31) IWRC
Diameter x Length;	9/16 in. x 236 ft. 14 m x 72 m
Breaking Strength;	33920 lbs. 151 kN {15400 kgf}

S3. BOOM ASSY



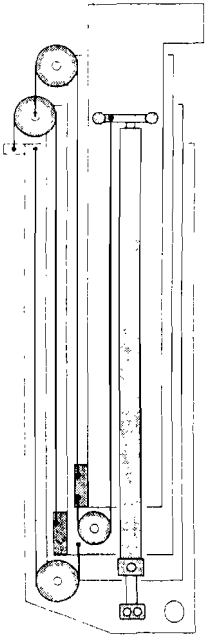
2 (two) shims
Adjust it to 1.5-2.5mm with shims
(Designed nominal gap: 2.2mm
with 2 shims)

Adjust it to 0.5-1.0mm with shims
(Designed nominal gap: 0.5mm
with 1 shims)

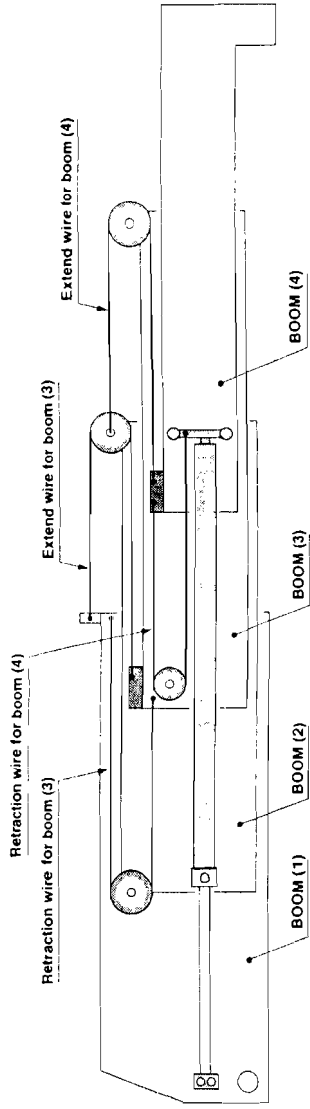


Detail C

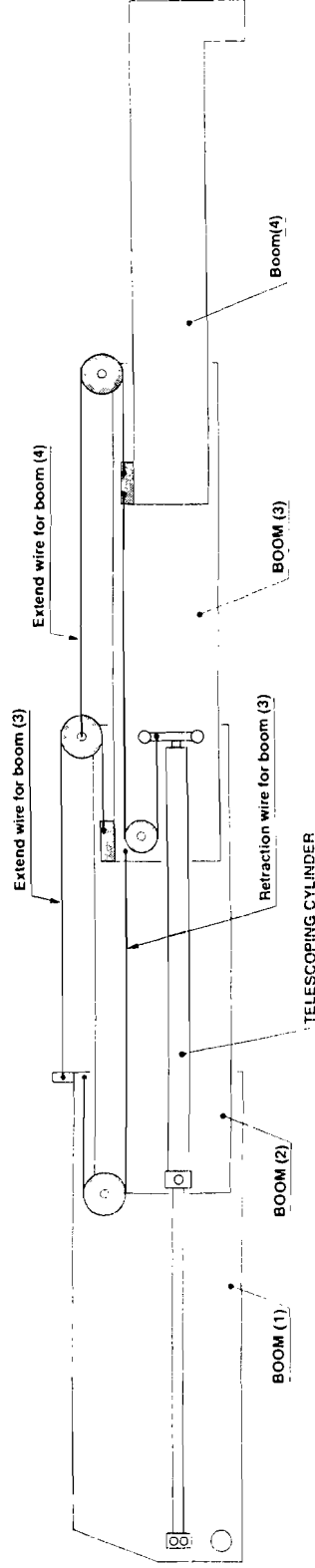
1) Telescoping mechanism of boom
 (1) When booms are retracted



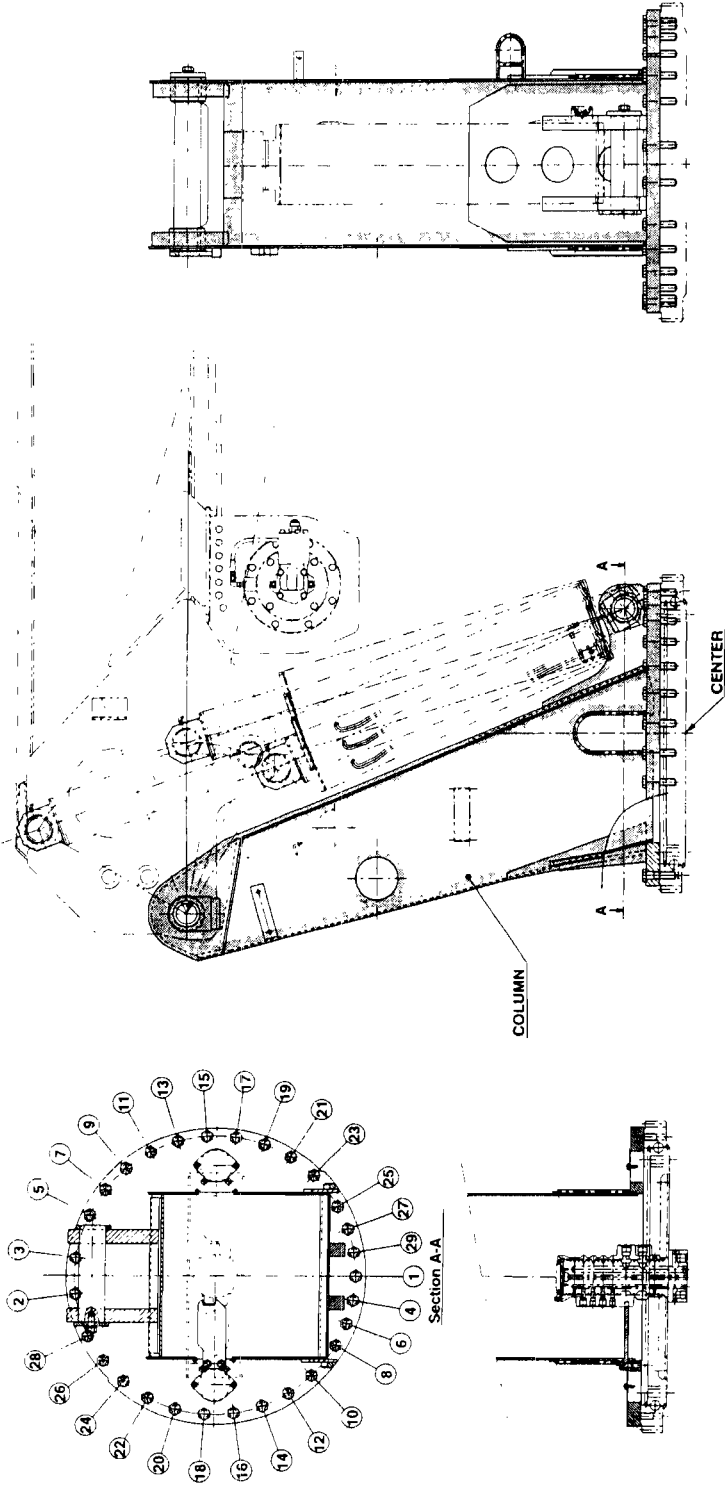
(2) When booms are extended halfway



(3) When booms are fully extended

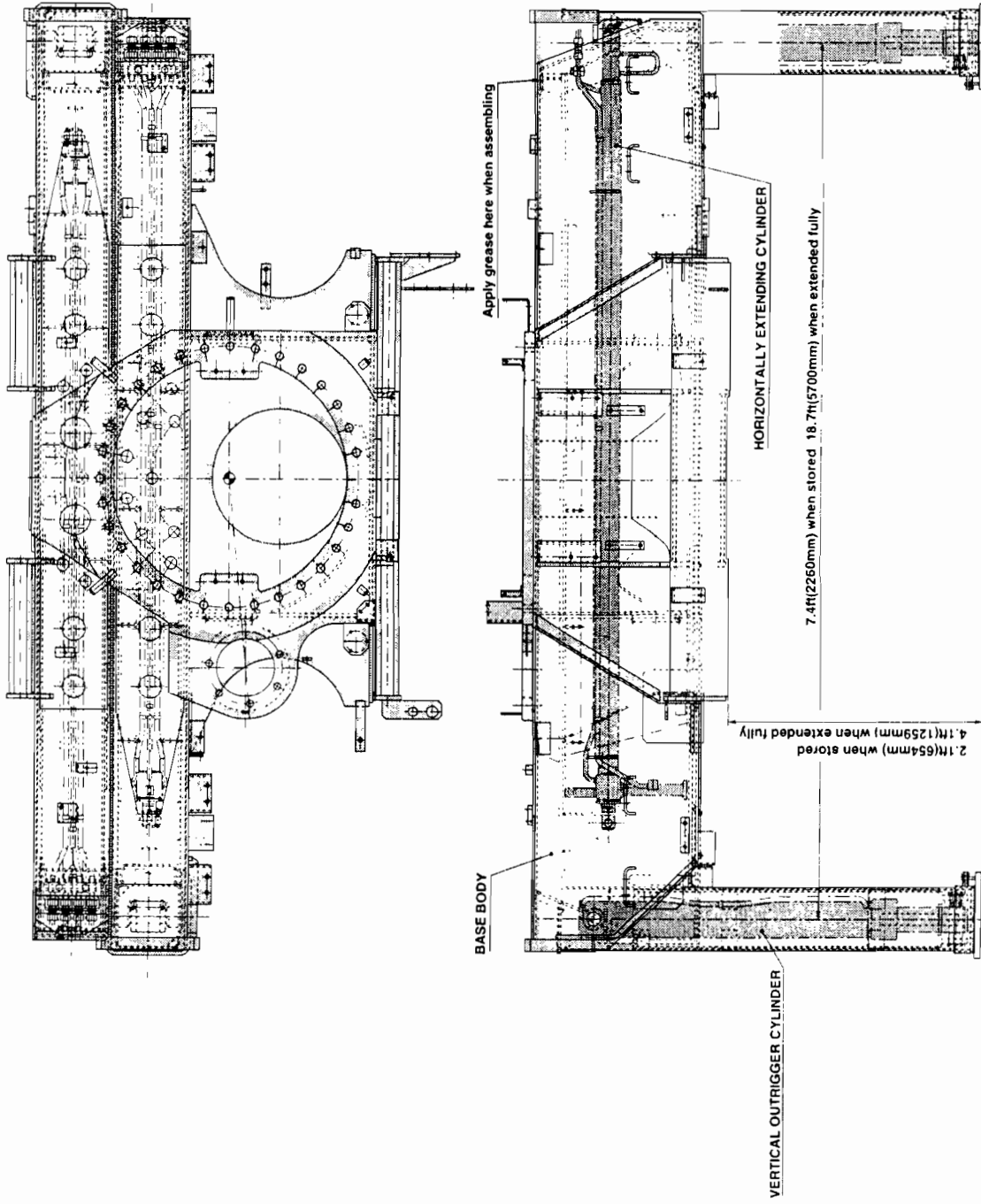


S 4. COLUMN

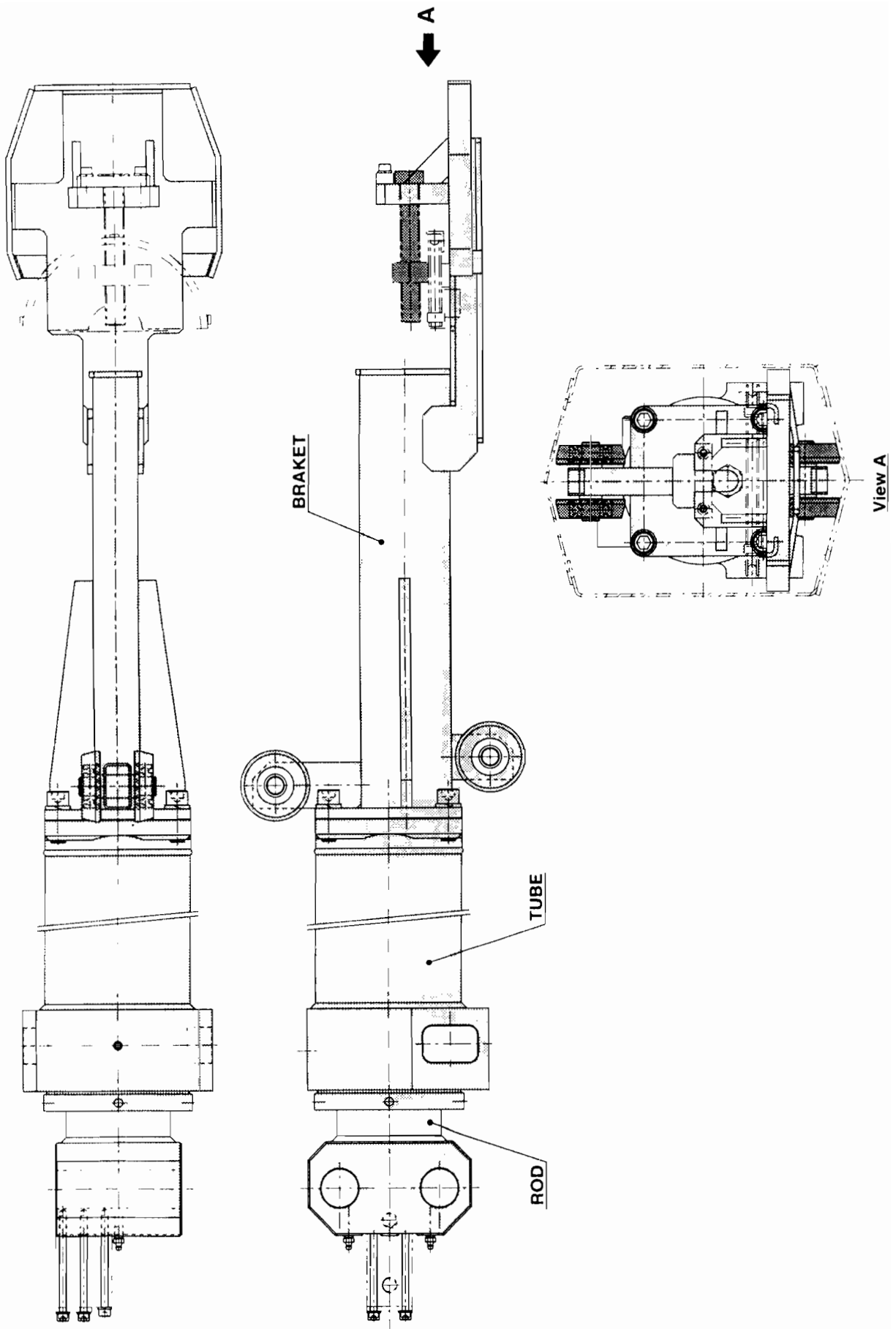


1. When assembling the column, tighten the turntable mounting bolt with "LOCK TIGHT #262 or #962" applied to the bolts.
2. Set tightening torque of mounting bolt at $231.4-260.310\text{lbs}$ ($34 \pm 2\text{kg/m}$) (as frictional resistance decreases after application of "LOCK TIGHT" specified above) and tighten the bolts equally
3. Order of tightening bolts must strictly be followed in numerical sequence as illustrated in section A-A above
4. Use bolts with the letter of "10T" on each bolt head for the turntable mounting bolt

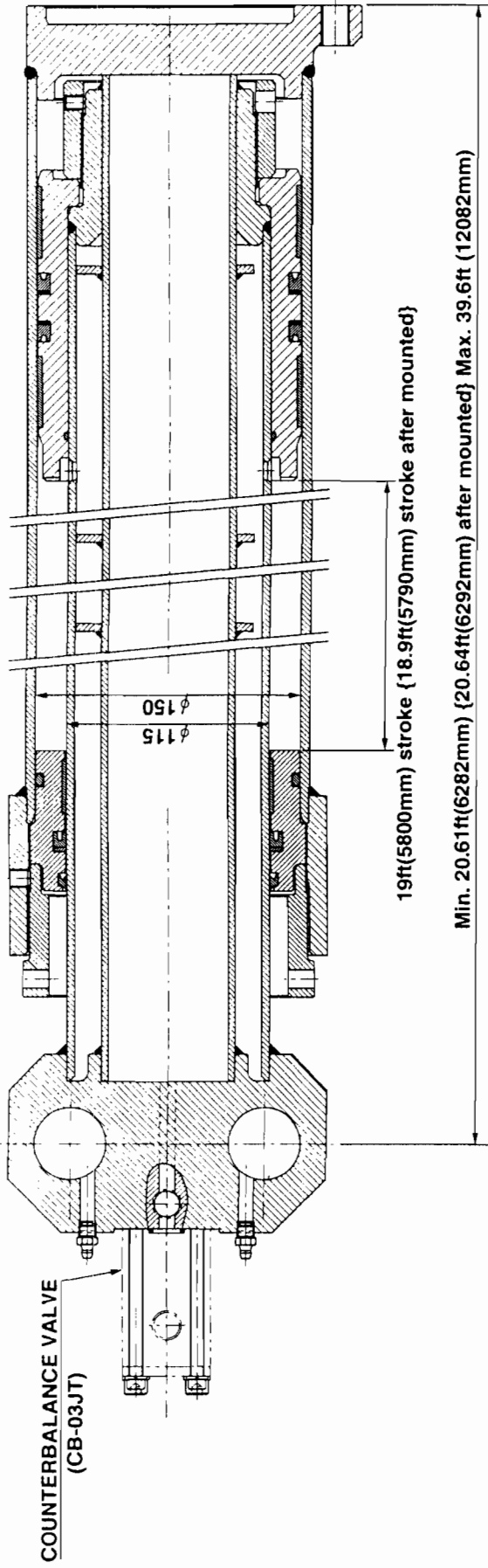
§5. BASE



S6. TELESCOPING CYLINDER

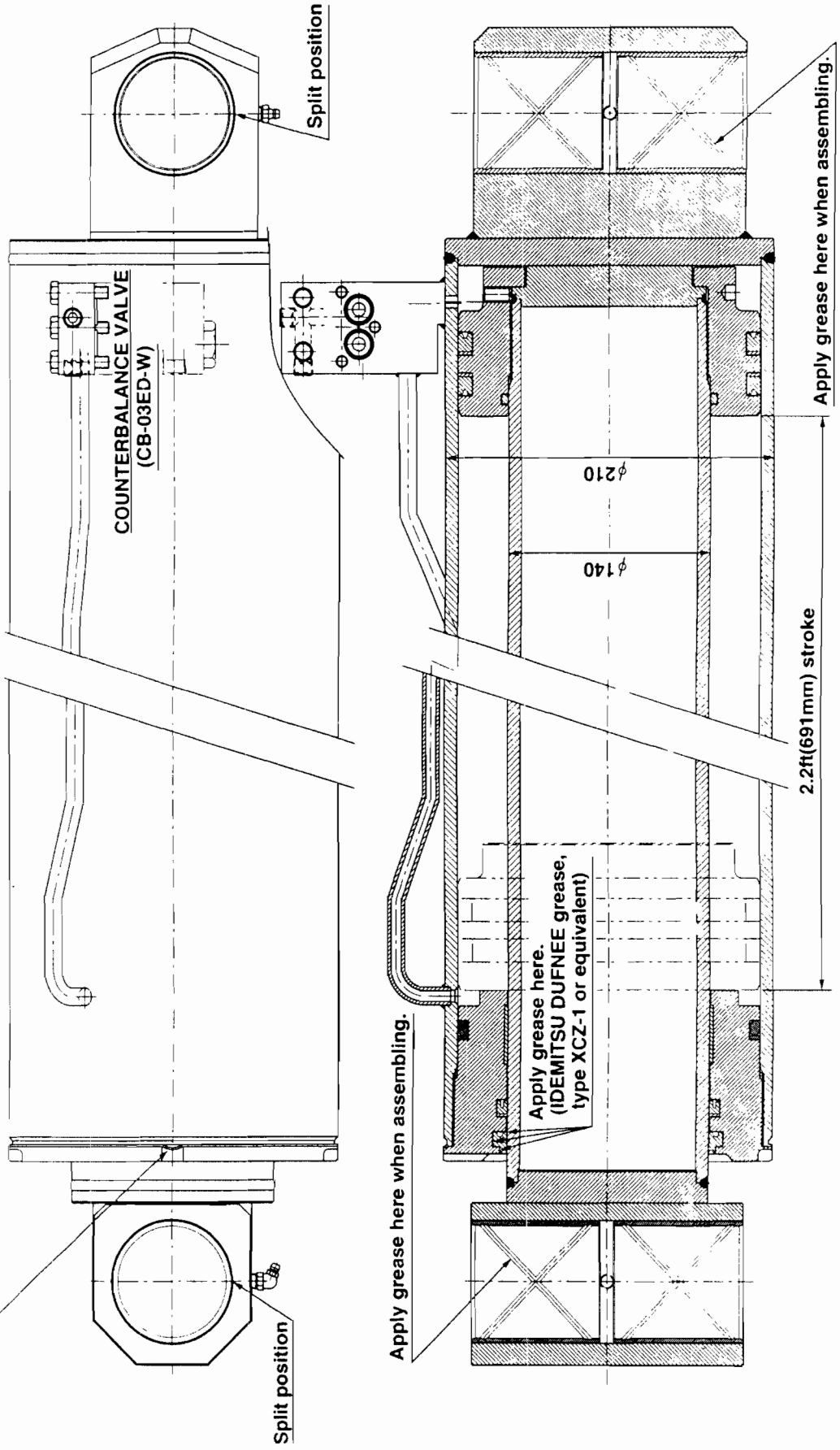


1) Construction



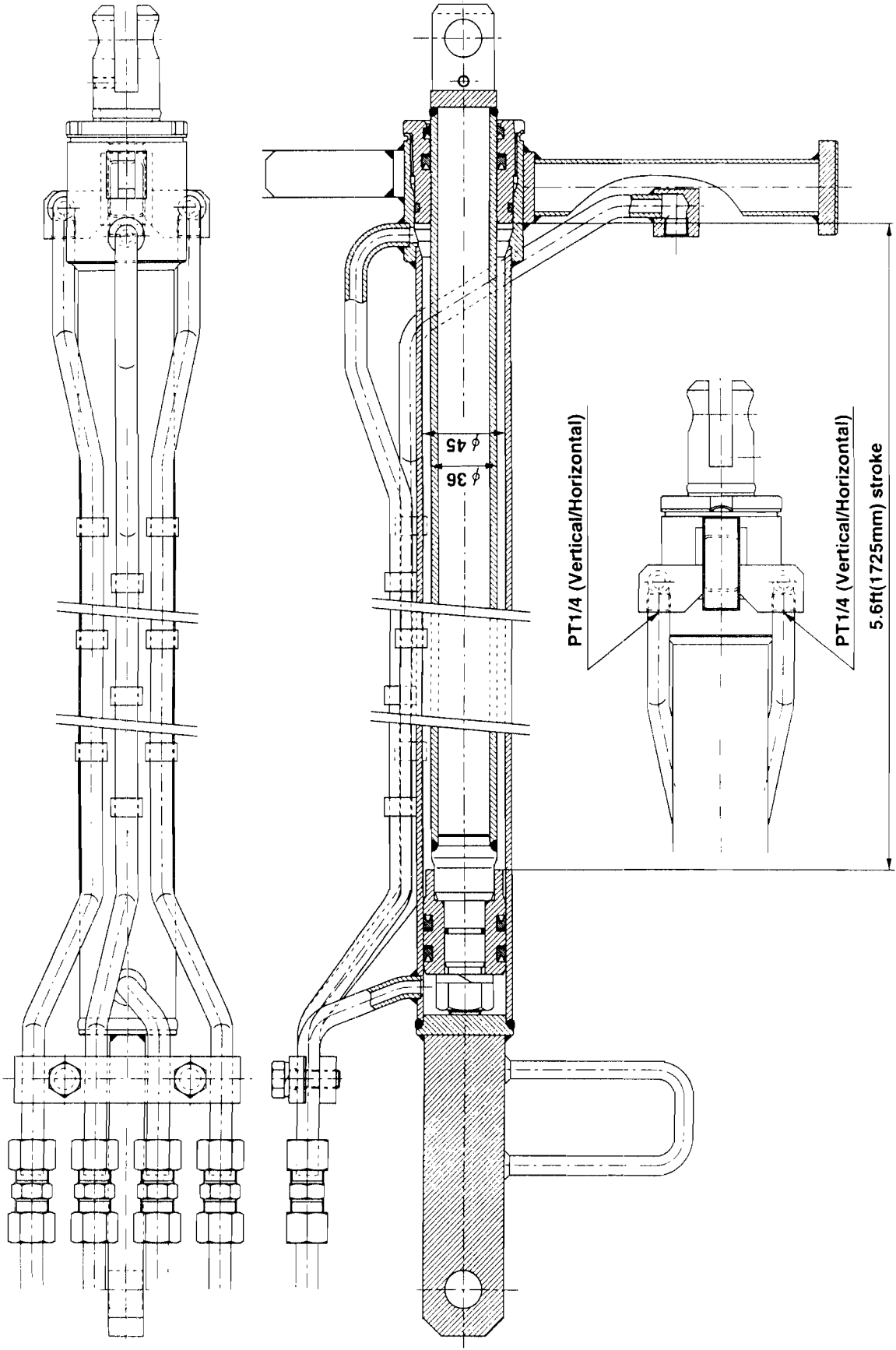
S7. DERRICKING CYLINDER

Bend it toward gland side after gland has been tightened (1 place).
 To prevent water from entering screw thread, apply liquid gasket
 (Tree Bond #1101, solventless type: aliphatic acid degenerated
 phenol family resin) here (2 places)

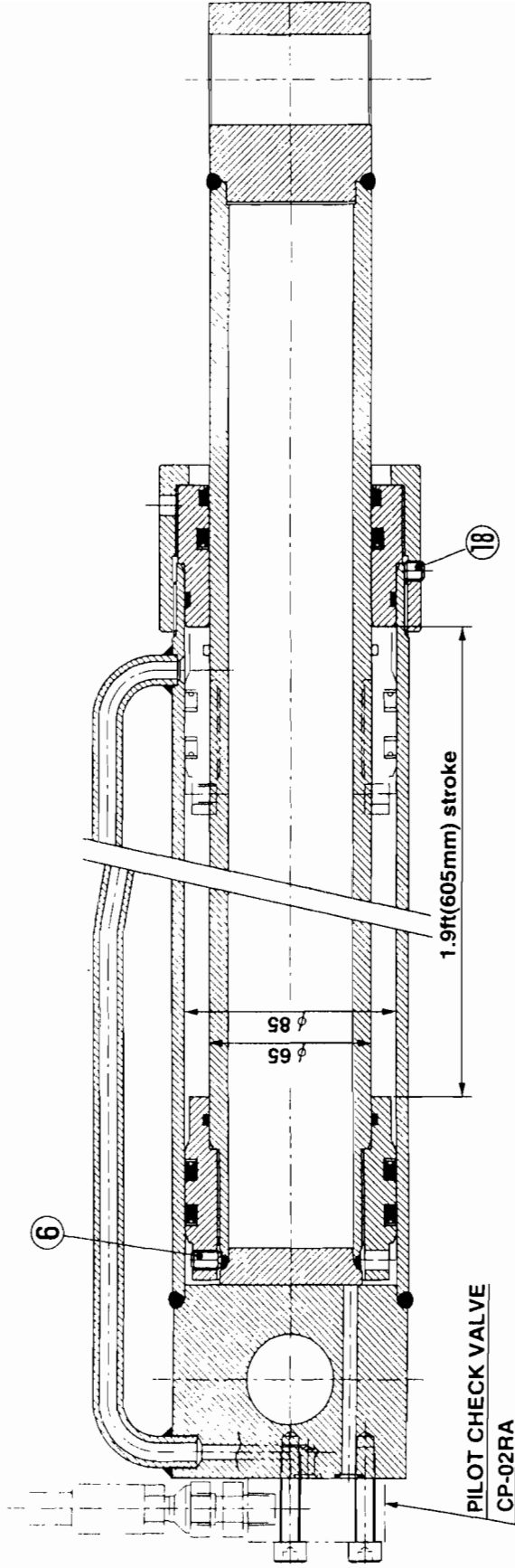


§8. OUTRIGGER CYLINDER

1) Horizontally extending cylinder



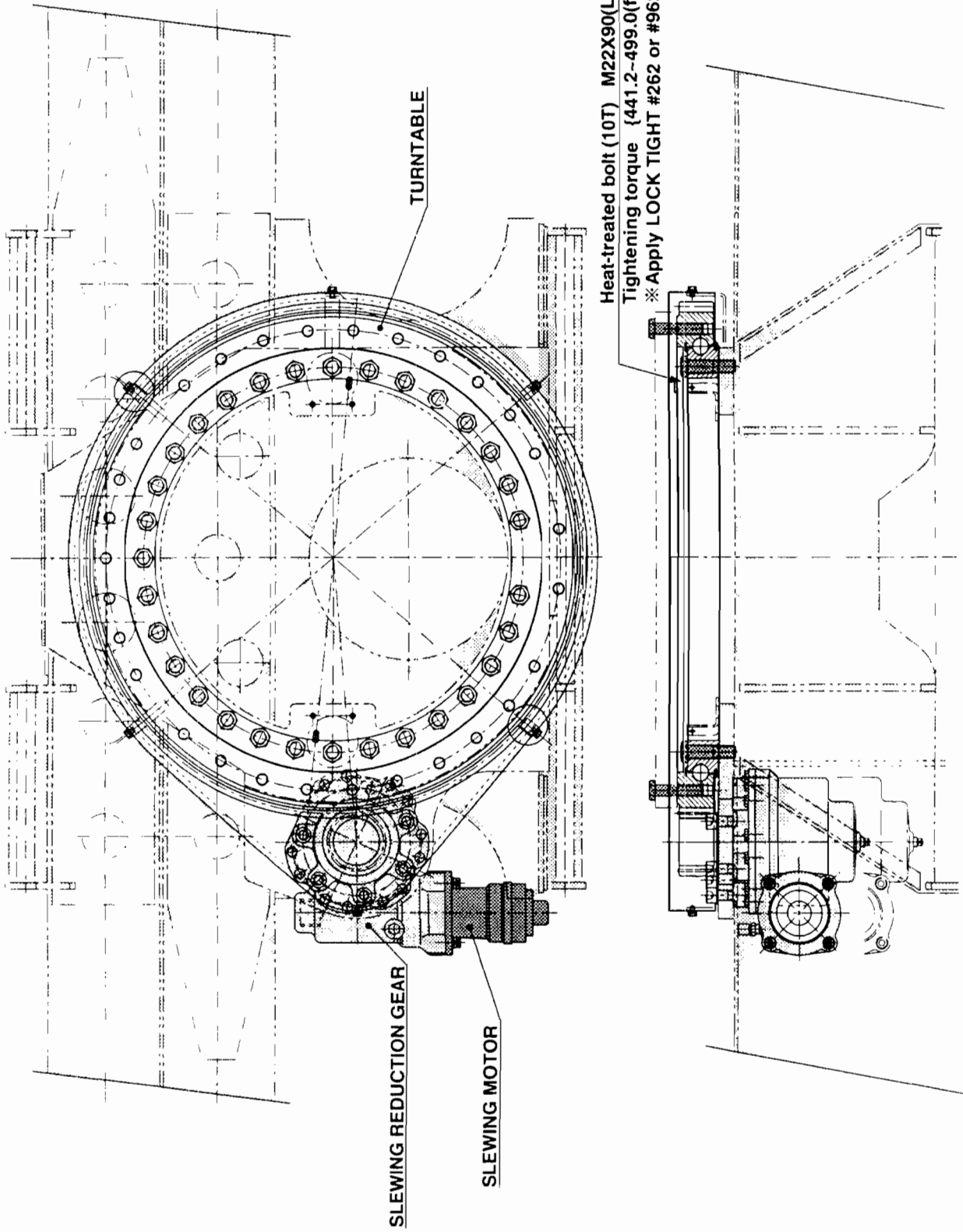
2) Vertical outrigger cylinder



(Note)

1. Apply LOCK TIGHT #2701 before tightening the hexagon socket head screws of sort number ⑥ and ⑱.
(Use #7649, curing accelerating agent primer for LOCK TIGHT.)
2. Punch 2 places around the hexagon socket head screw of sort number ⑥ after it has been tightened. (Punch by using LOCK TIGHT together)

§9. SLEWING DEVICE



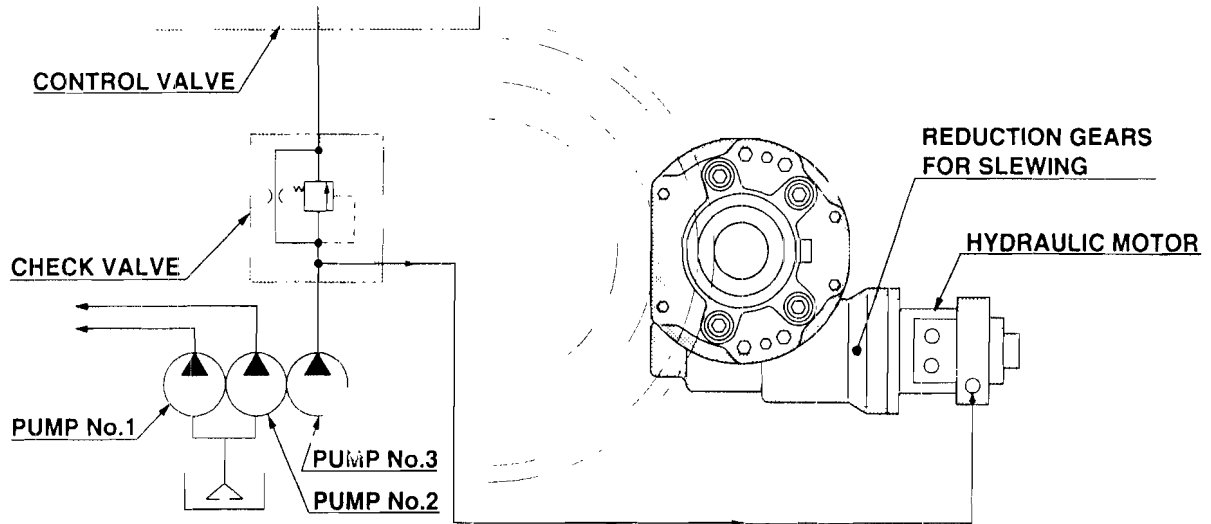
1) Slewing lock mechanism

① Built-in hydraulic motor for slewing lock

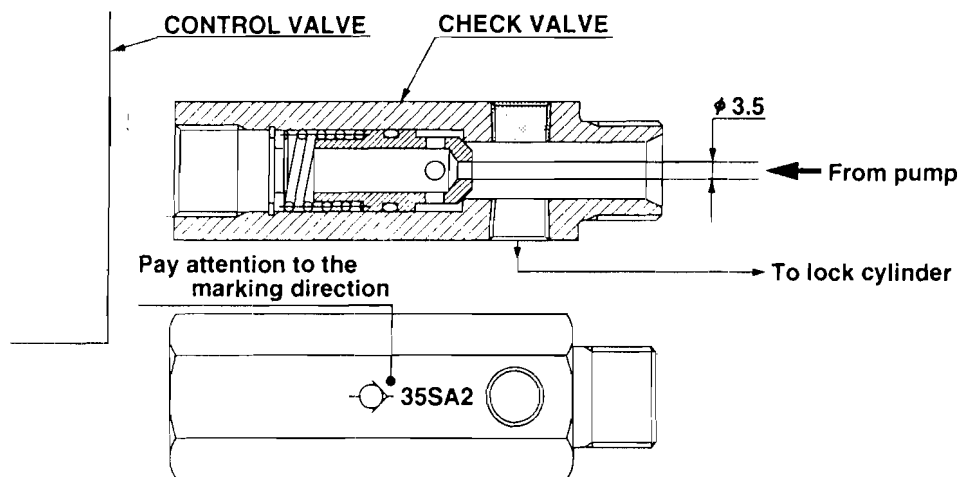
When PTO is engaged, hydraulic motor starts to produce back pressure by the check valve mounted between the pump No.3 and the control valve.

This releases the lock mechanism being built in the hydraulic motor automatically.

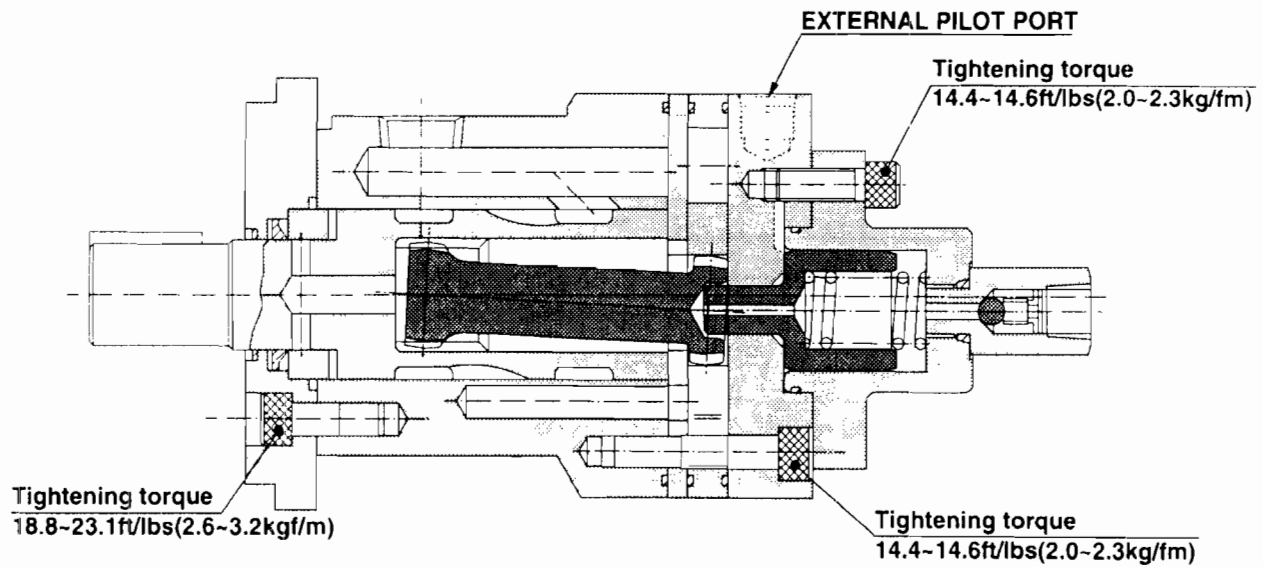
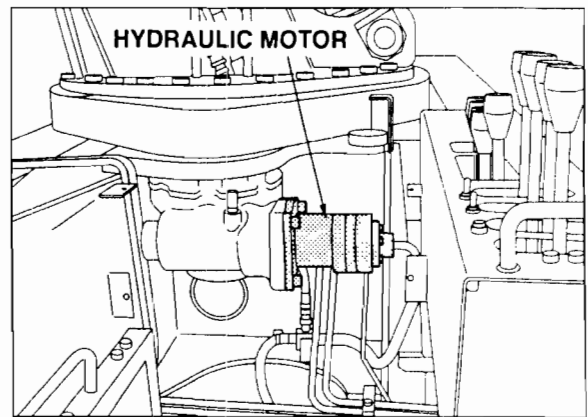
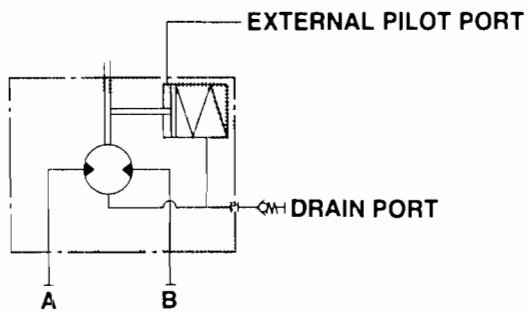
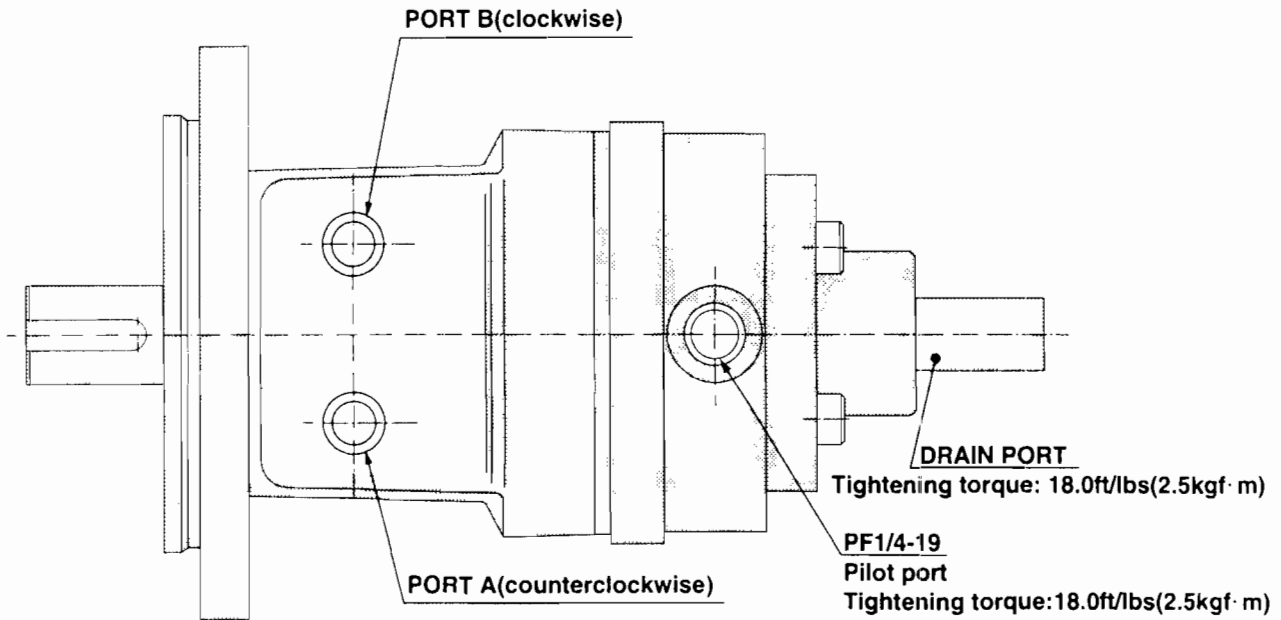
When PTO is disengaged on the other hand, slewing is to be locked automatically by the spring built in the hydraulic motor.



② Location of check valve and its construction

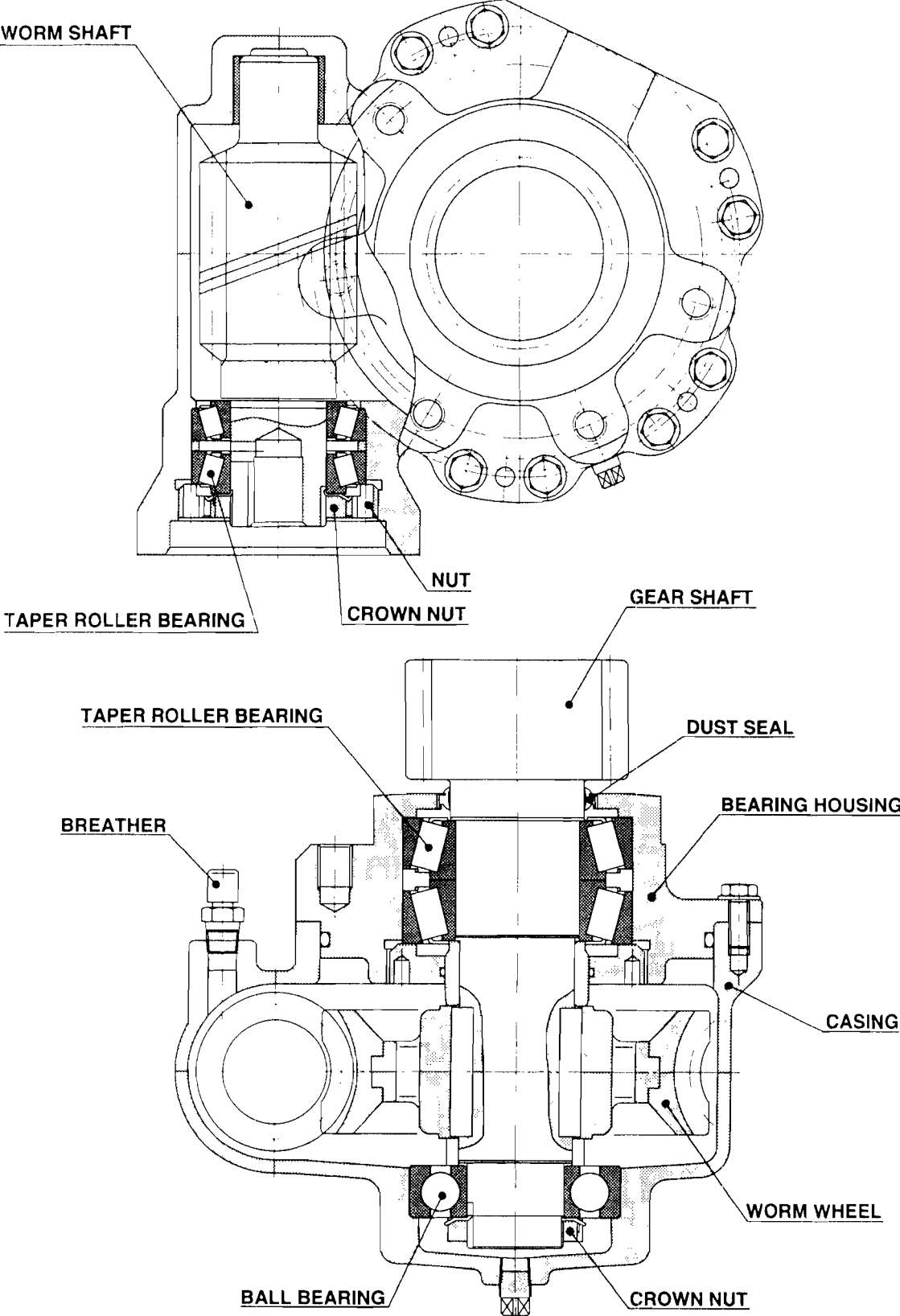


2) Construction of hydraulic motor for slewing lock mechanism



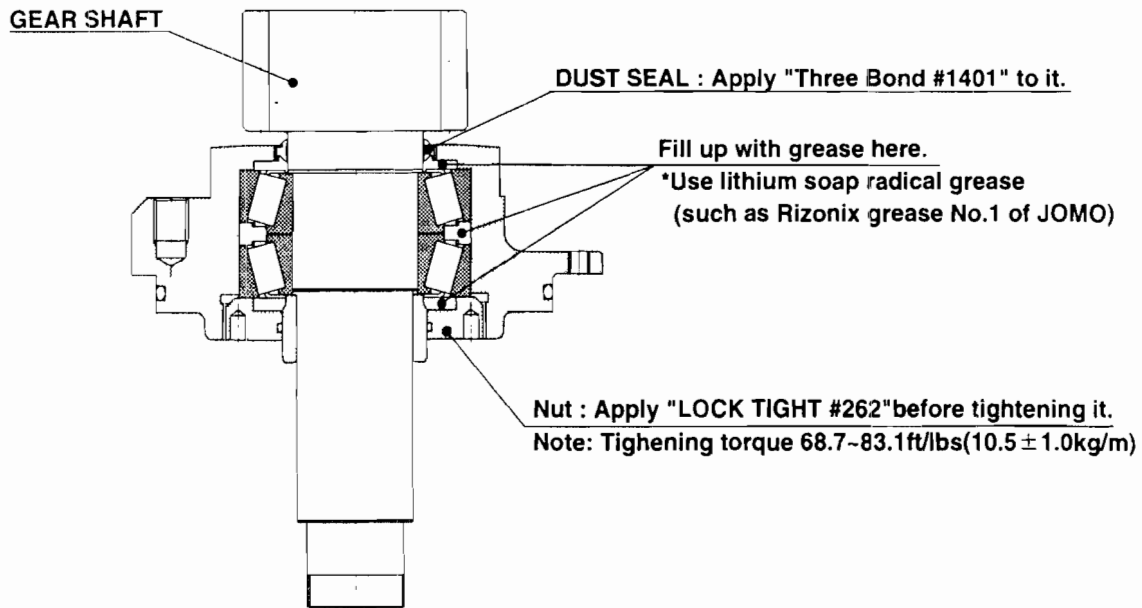
§ 10. REDUCTION GEARS FOR SLEWING

1) Construction

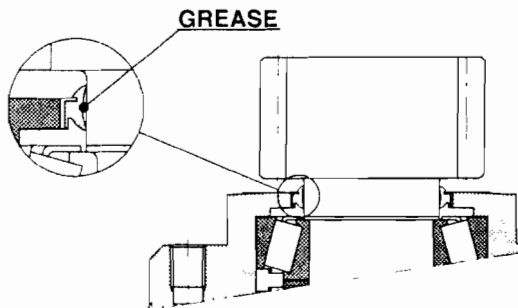


2) Caution to be taken when re-assembling slewing reduction gear

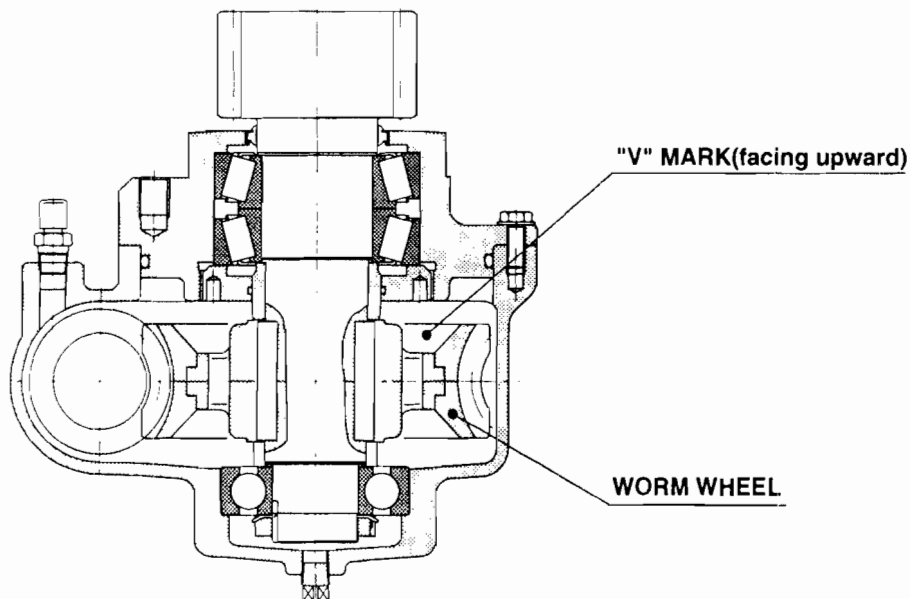
① Places to be applied.



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

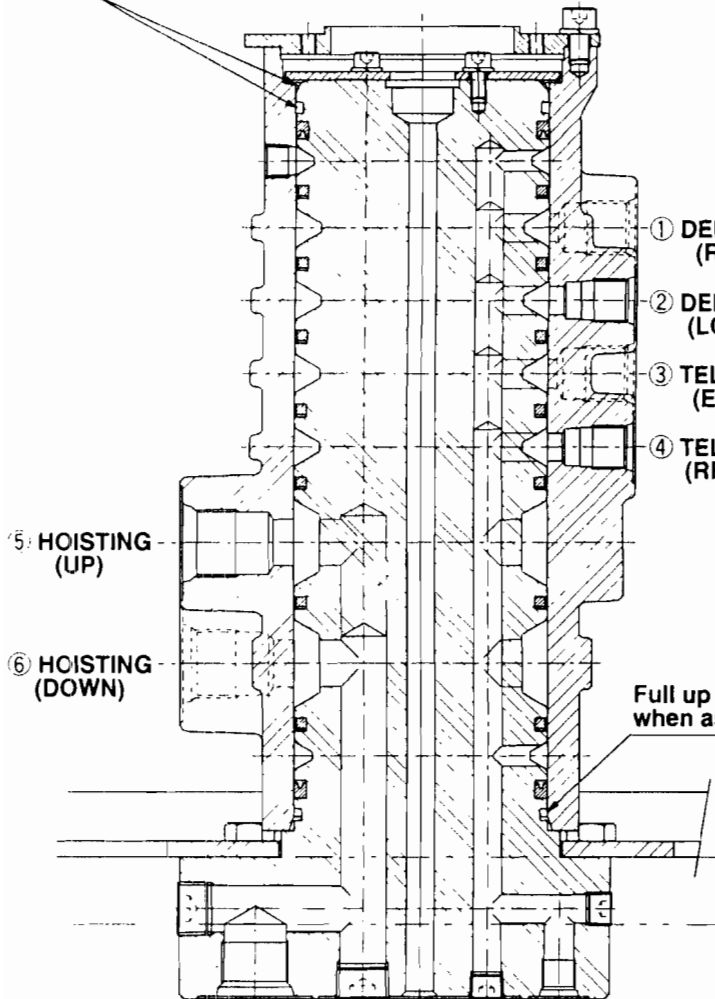


③ Assemble the worm wheel with the mark "V" directed upward.



§ 11. SWIVEL JOINT

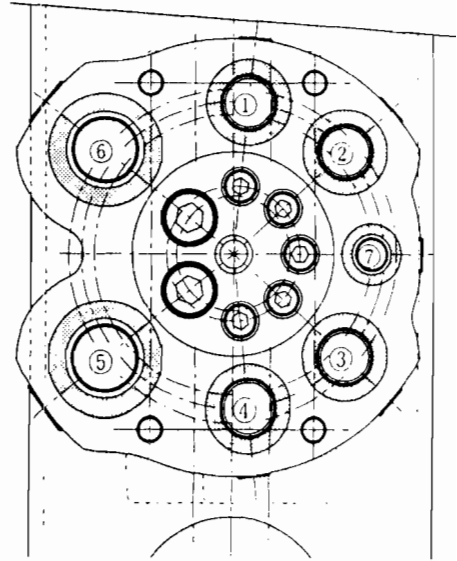
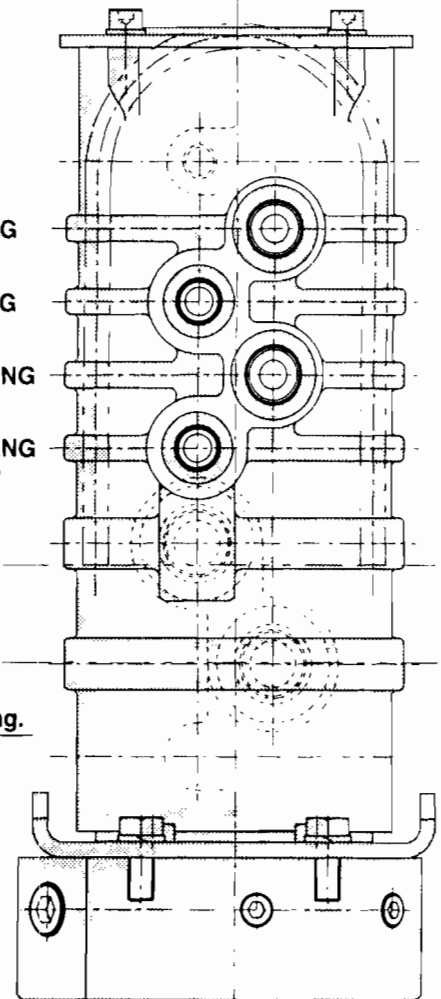
Full up grease (chassis grease)
when assembling.



- ① DERRICKING (RAISE)
- ② DERRICKING (LOWER)
- ③ TELESOPING (EXTEND)
- ④ TELESOPING (RETRACT)

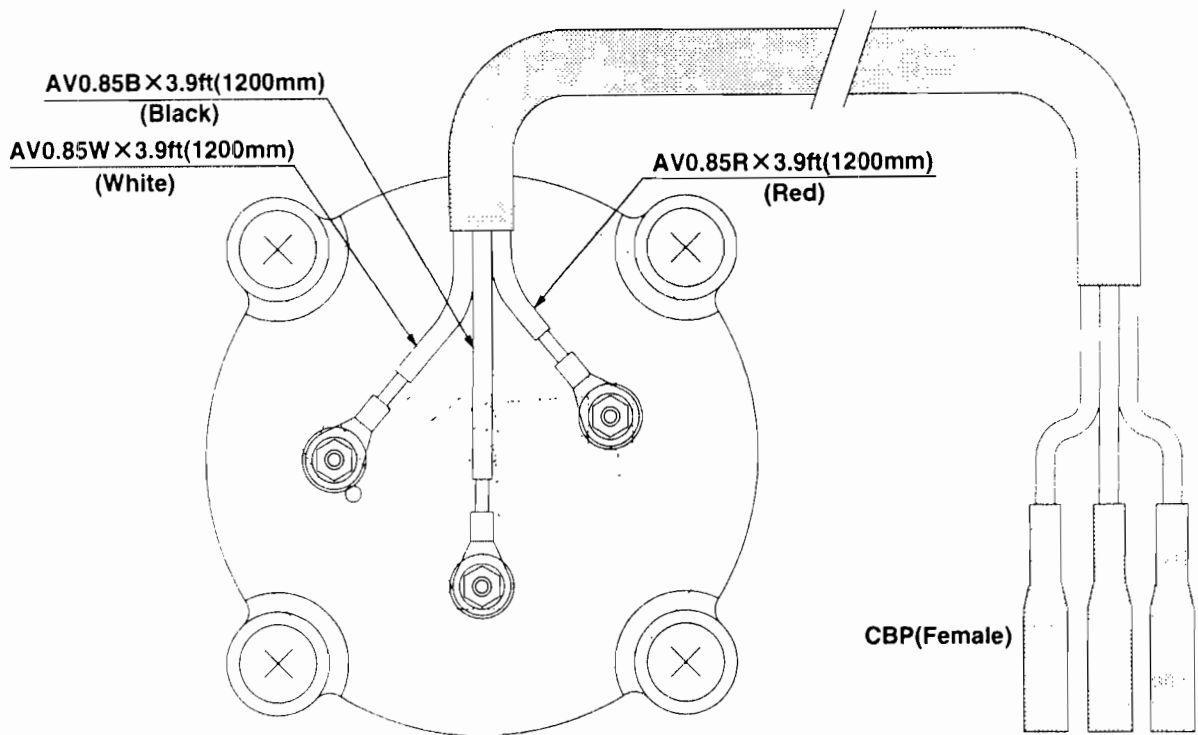
- ⑤ HOISTING (UP)
- ⑥ HOISTING (DOWN)

Full up grease
when assembling.

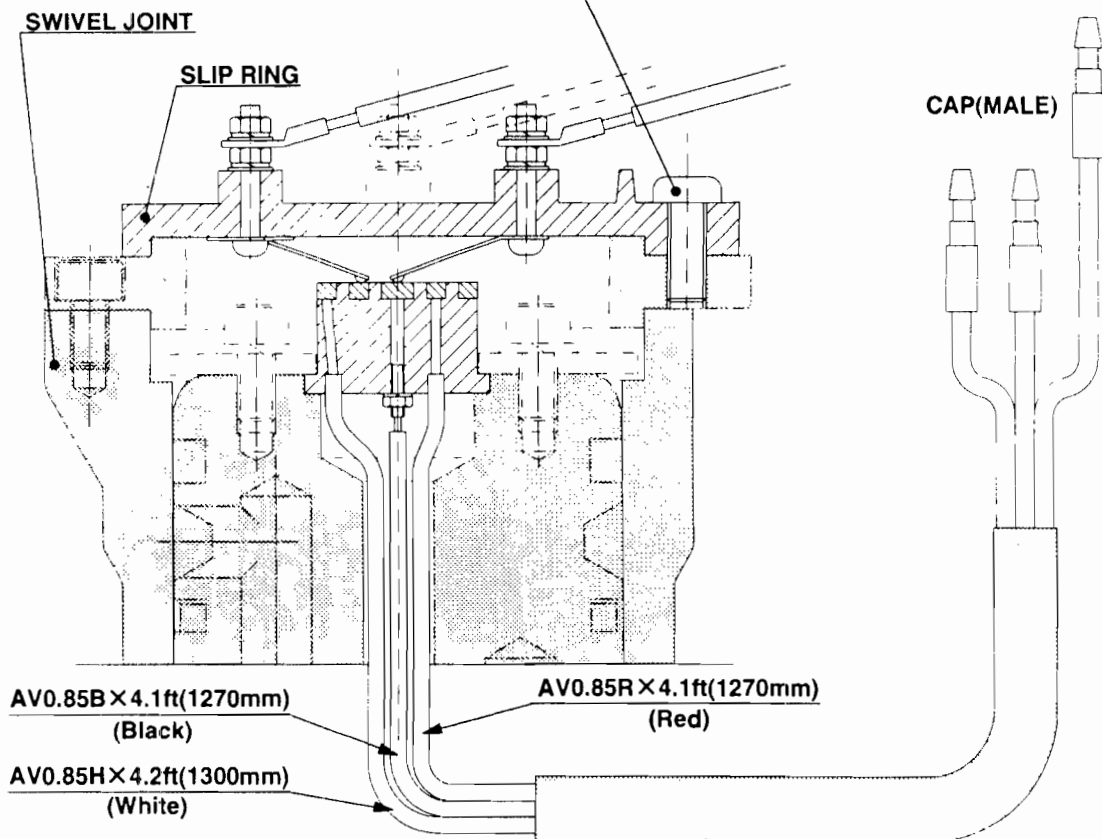


§ 12. SLIP RING

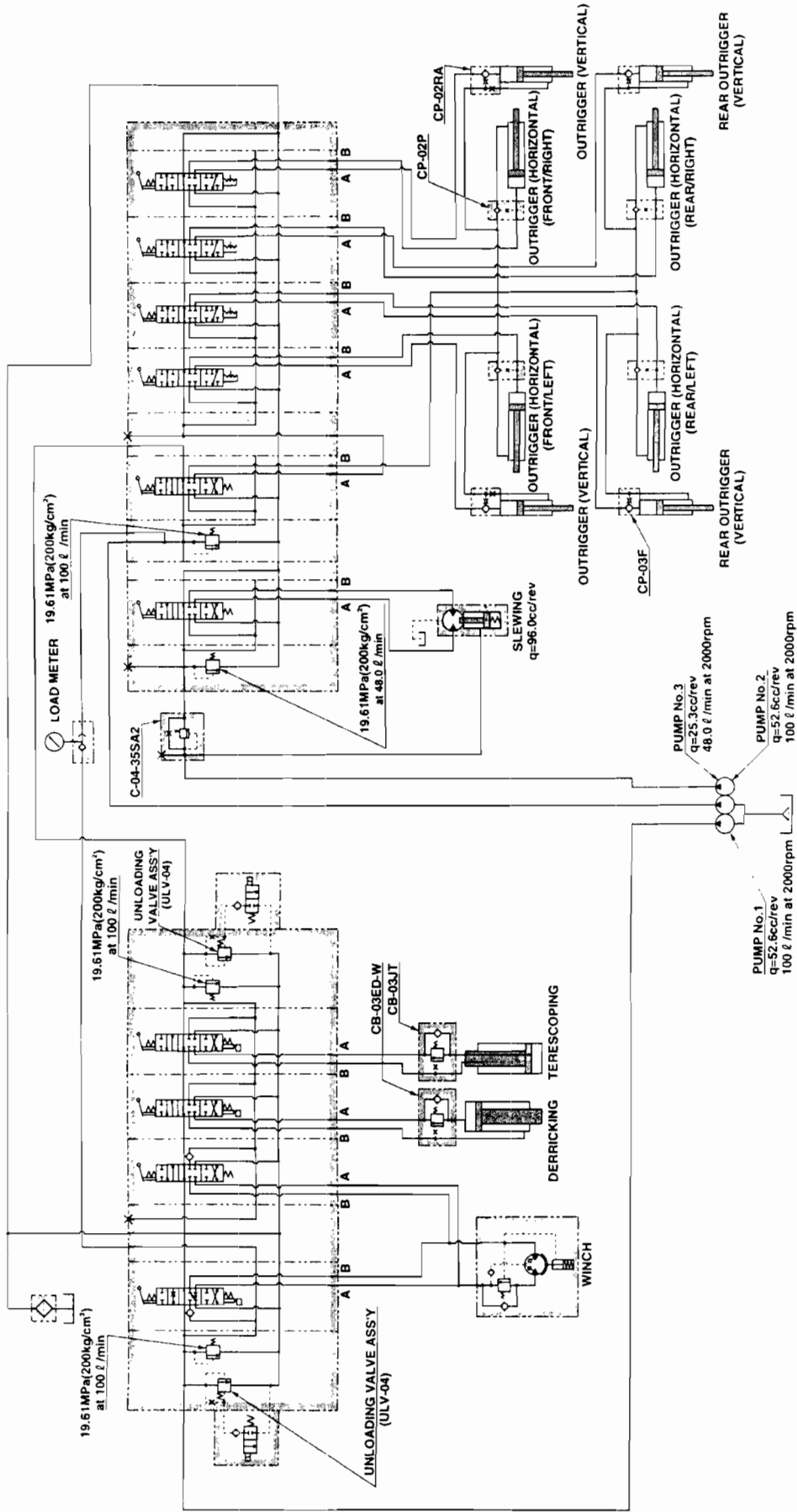
1) Construction of slip ring and where it is mounted



Apply "LOCK TIGHT #242" before tightening the phillips pan head screw.

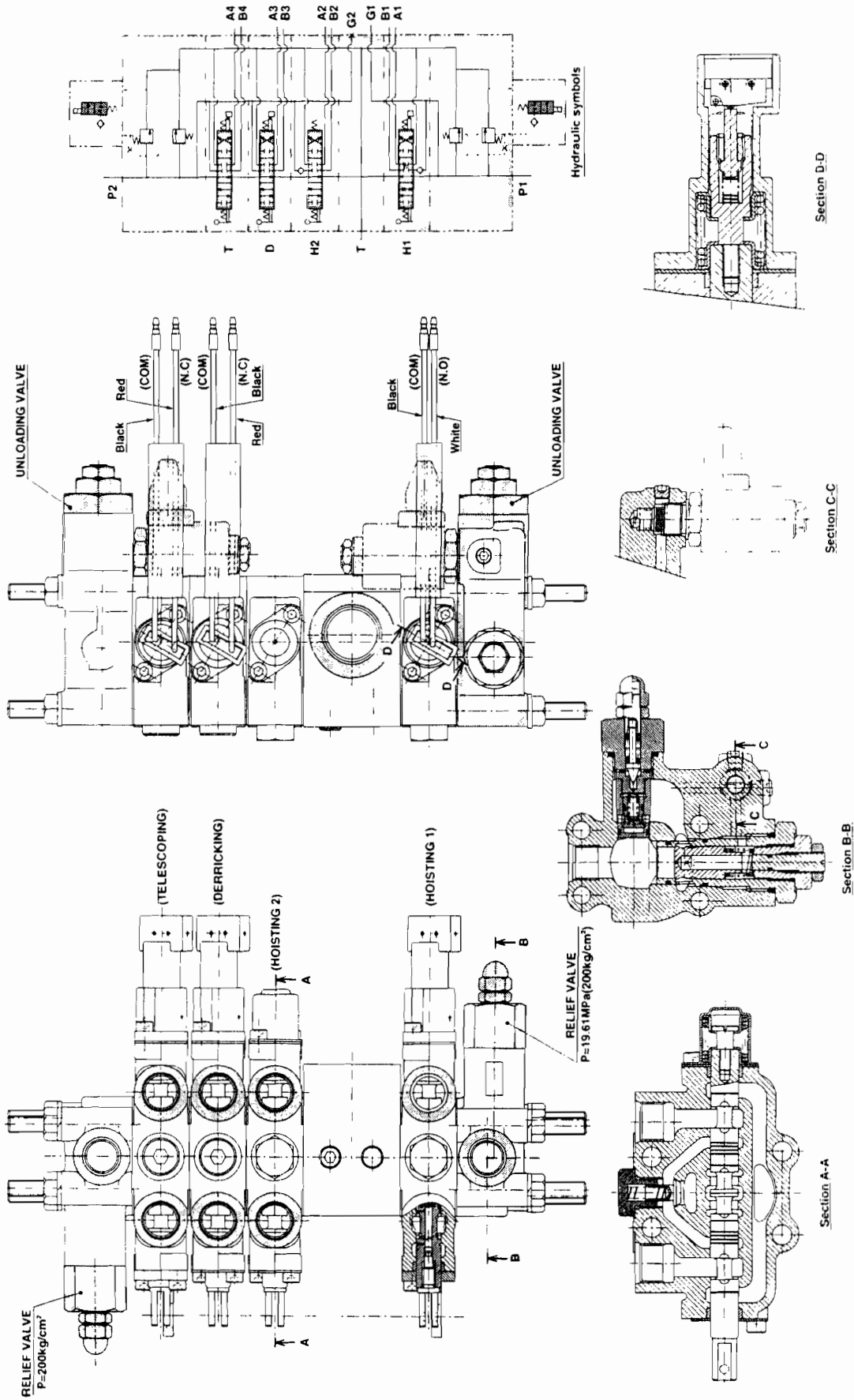


S 13. HYDRAULIC CIRCUIT DIAGRAM

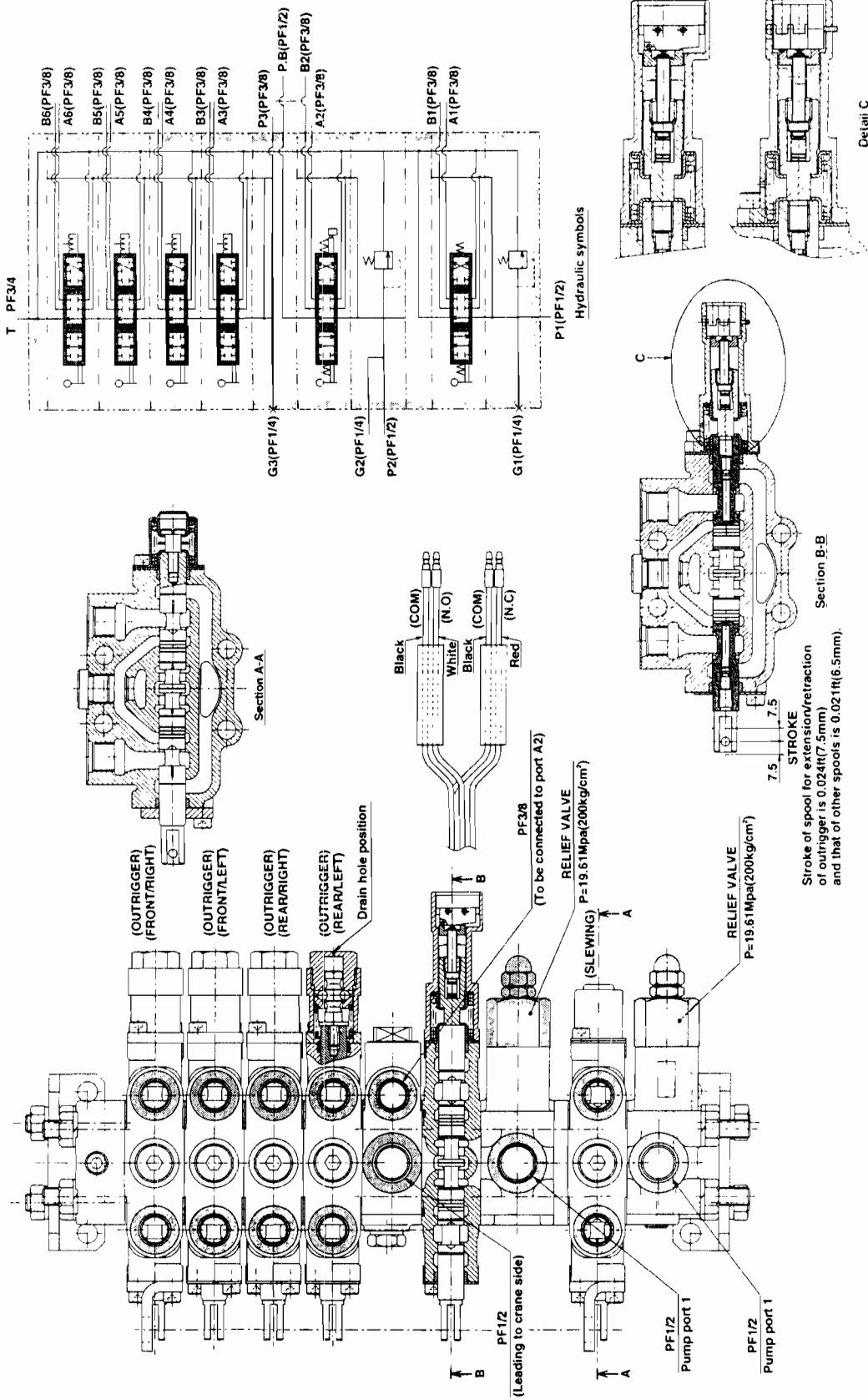


S 14. CONTROL VALVES

1) For hoisting, telescoping, and derricking



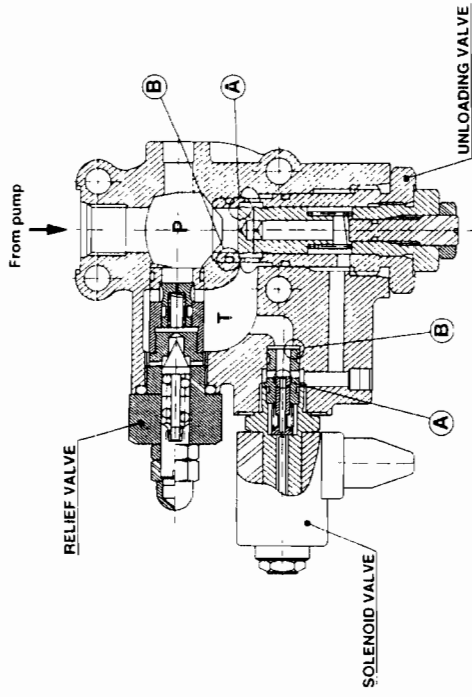
2) For controlling slewing and outrigger



§ 15. TROUBLES AND MEASURES TO BE TAKEN

1) Crane will not be operated at all

* In case where pump and relief valve operate normally



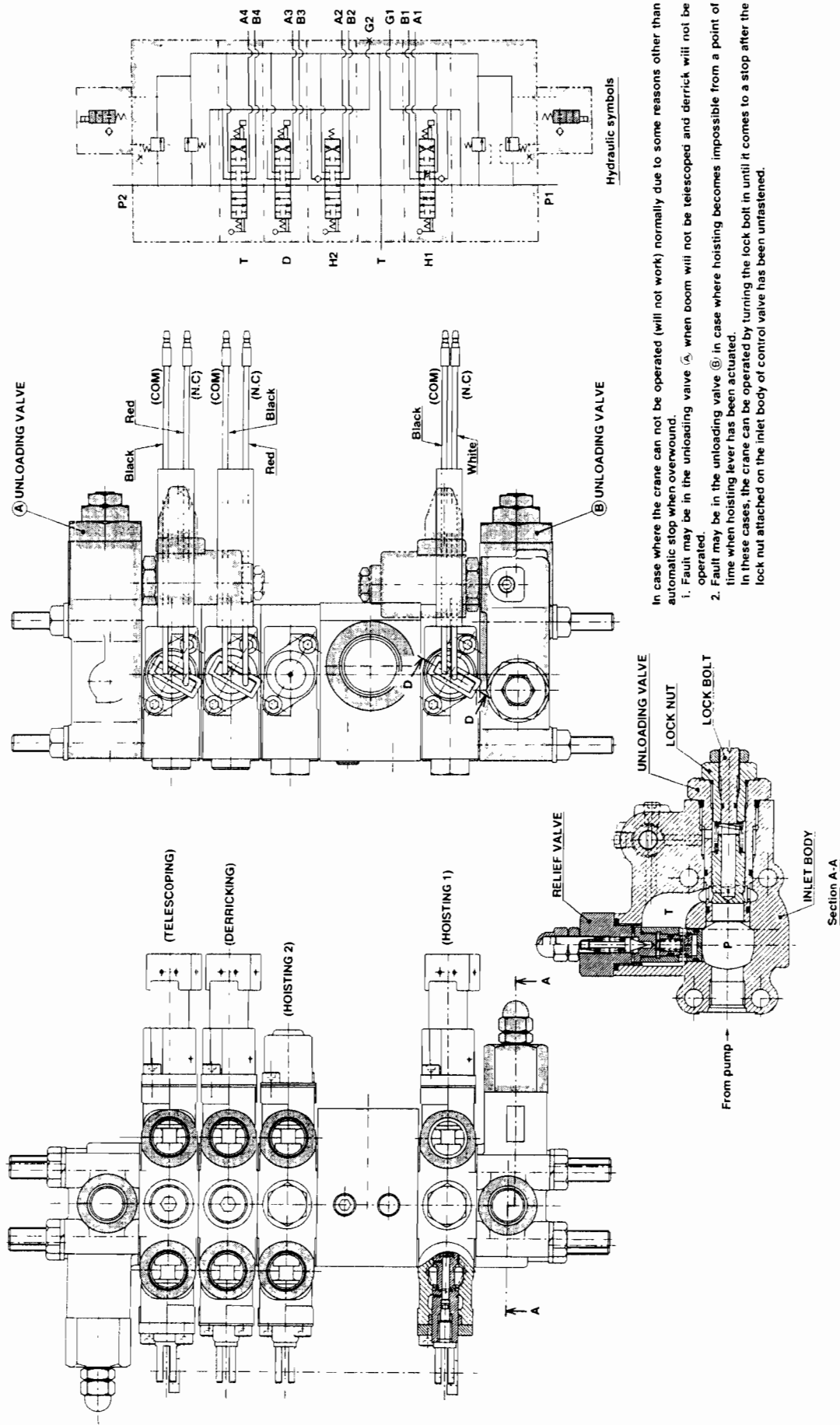
(1) Fault in solenoid valve

- Solenoid valve remains to be open because foreign substances have been caught in the spool illustrated in section (A) of the valve.
- O-ring in section (B) of solenoid valve is broken (AS568-012).

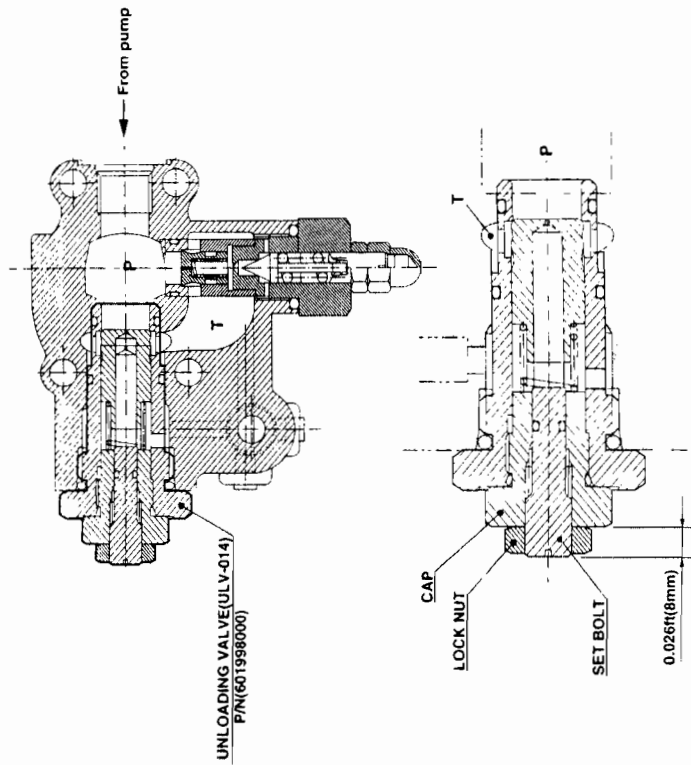
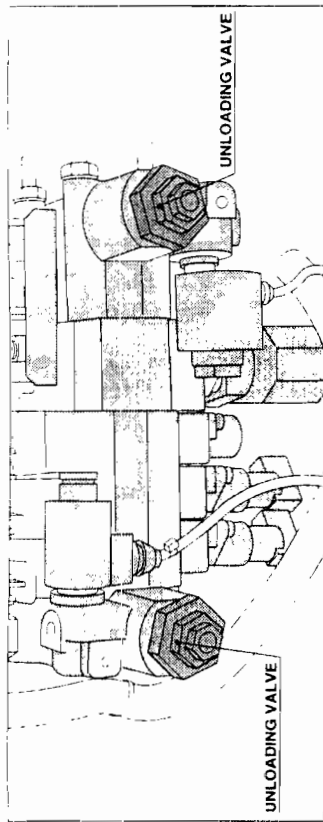
(2) Fault in unloading valve

- Unloading valve remains to be open because foreign substances have been caught in the check, illustrated in section (A) of the valve.
- O-ring in section (C) of unloading valve is broken (P21 Hs90).

2) How to operate when in an emergency

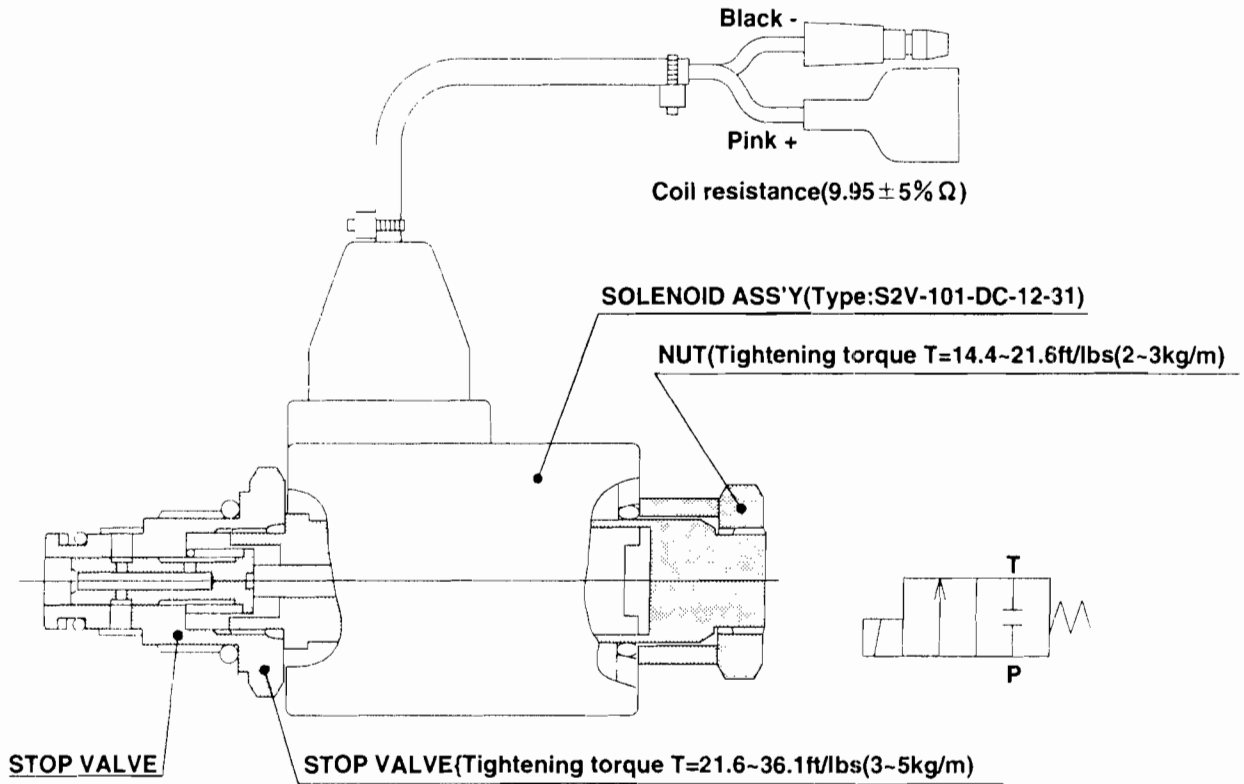


3) Adjusting procedures for unloading valve

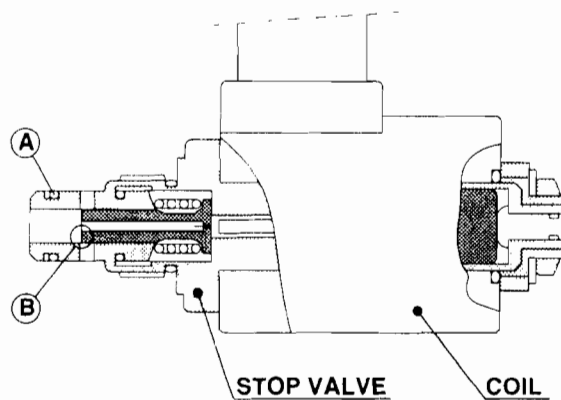


*Tighten the set bolt until it allows 8mm from the cap end then lock the bolt with a lock nut.

4) Solenoid valve of unloading mechanism



※ Where to check the stop valve



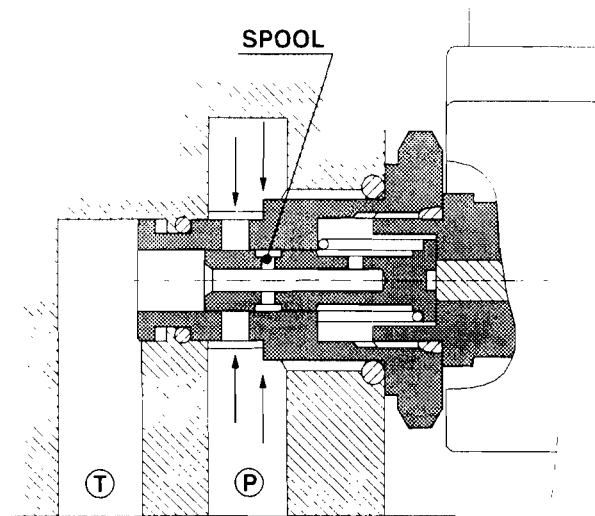
※ Check to see if;

- Check if O-ring (AS568-012) in section (A) has not been broken.
- Check if no foreign substances have been stuck in the top of spool on the port (B).

(How it works)

① When in normal crane work

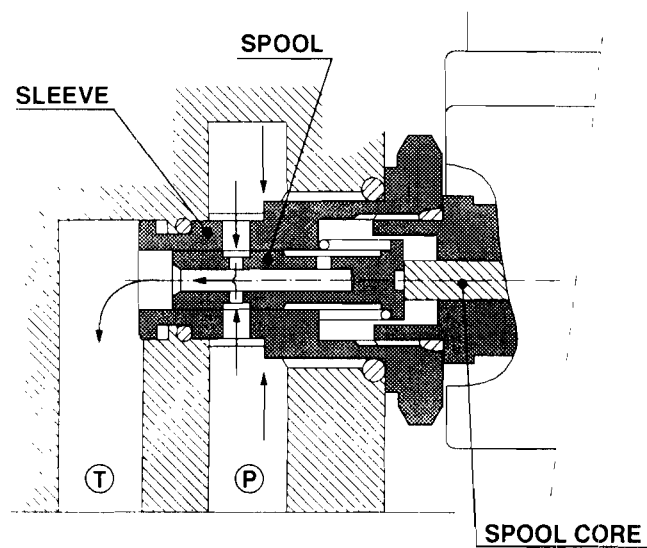
Oil flowing from the port P is blocked by the spool as illustrated so that it can not flow into the tank port.



② When in automatic stop

When in an automatic stop, iron core of the solenoid allows the spool to shift to the left to link holes between the sleeve and the spool.

As a result, oil from the port P flows into the tank port as illustrated.

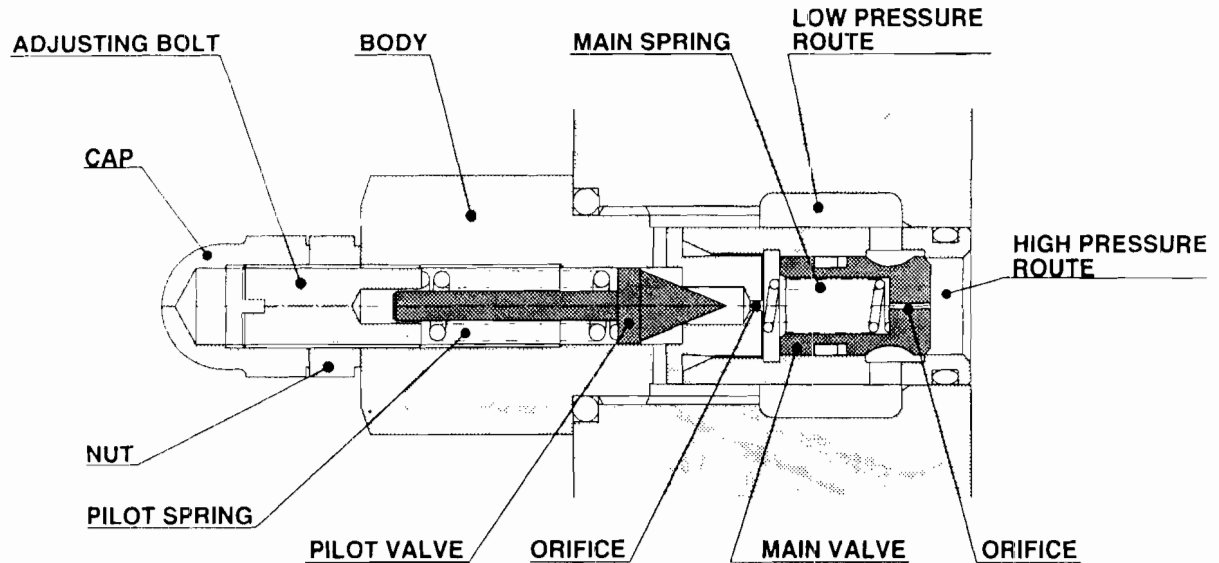


§ 16. VALVES

1) Main relief valve (RT15C) — STD specification

Main relief valve functions to prevent oil pressure in the hydraulic circuit from going beyond the specified.

(1) Construction of Relief Valve

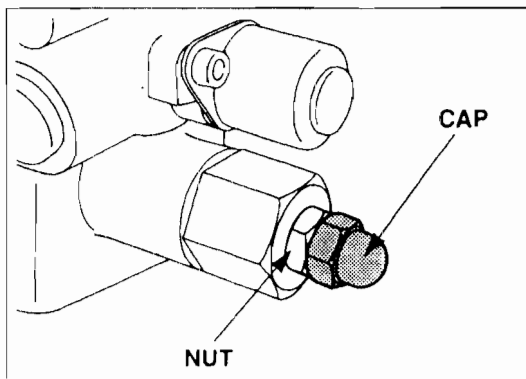


(2) How to Adjust Relief Valve

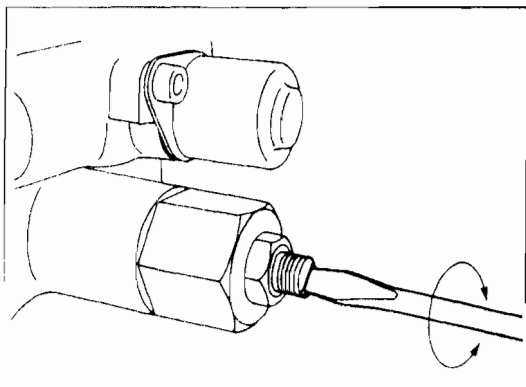
Oil pressure is to be set by how far the adjustment bolt has been screwed in.

Remove the cap and unfasten the nut to adjust the oil pressure.

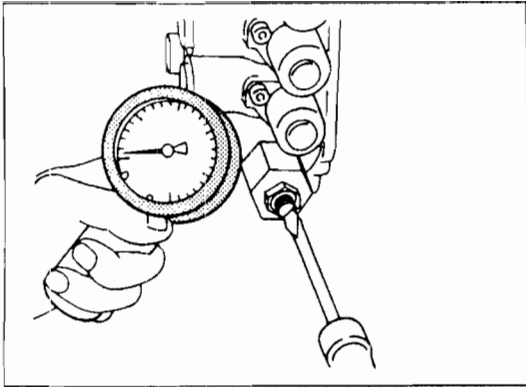
Turning the bolt clockwise with a screw driver fitting into the slot in the bolt end increases the oil pressure and turning it counterclockwise decreases the pressure.



① Remove the cap to loosen the nut.



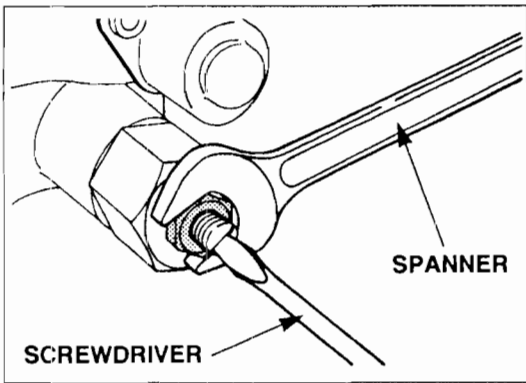
② Turning the bolt clockwise with a screwdriver increases the pressure and turning it counterclockwise decreases the pressure.



- ③ Set the pressure while monitoring pressure gauge with any one of the cylinders (for outrigger, telescoping, or derrick) retracted

Relief pressure to be set2500 psi

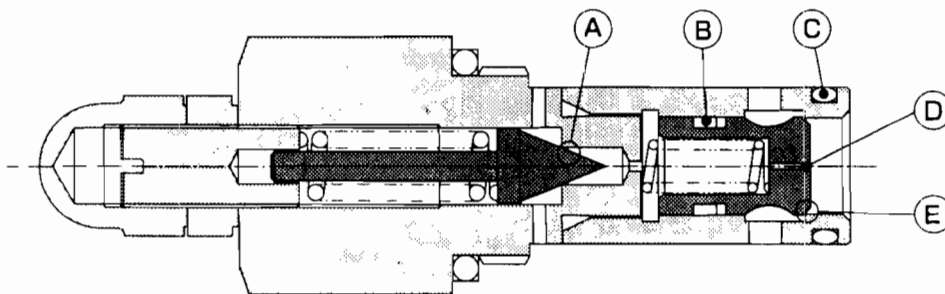
***Do not set the pressure with the engine idling or running at high speed, but set the pressure with the engine running the pump at the rated speed.**



- ④ Lock the nut (M10) with a spanner while fixing the slot in the bolt end with a screwdriver as the adjustment bolt may be loose when tightening the nut and the cap.

(3) Where in relief valve are to be checked

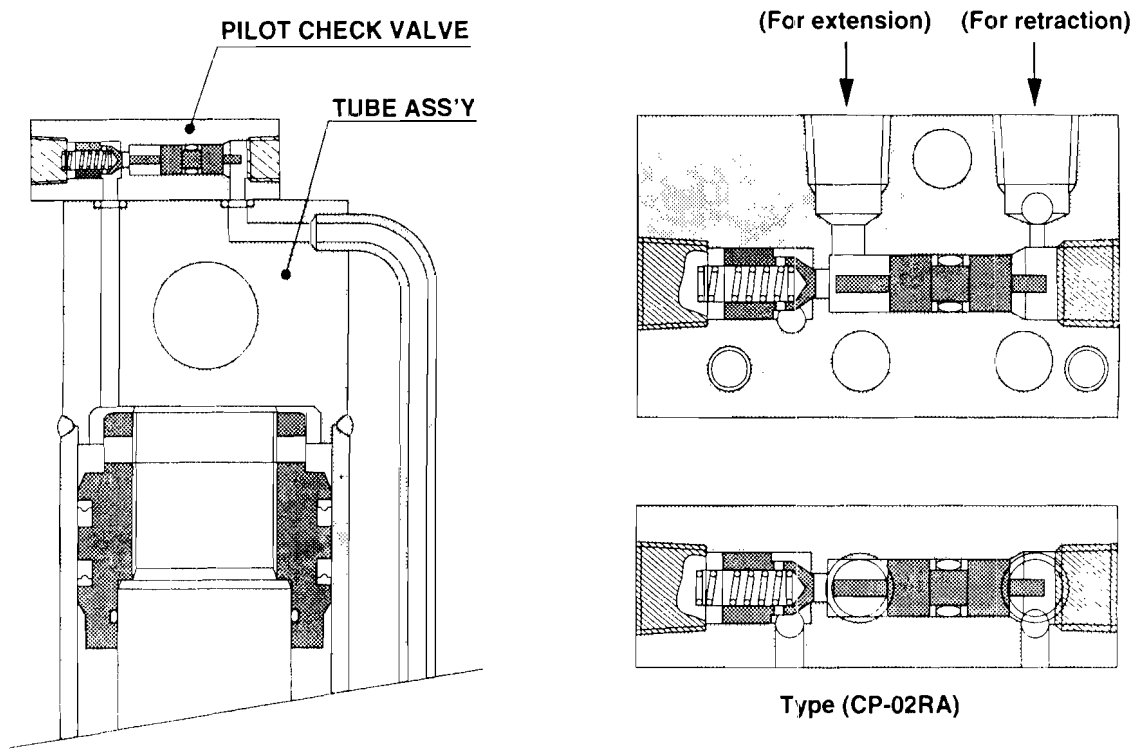
When pressure fails to rise, check the relief valve as illustrated below.



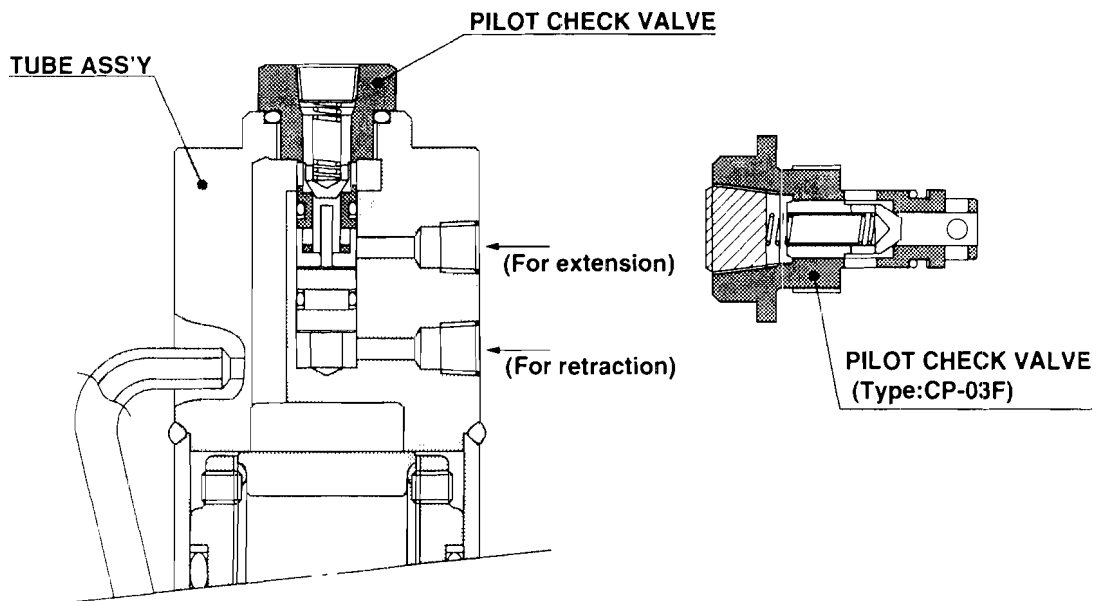
1. Foreign substances being stuck in section (A) and valve seat surface.
2. O-ring (B) for damage ARP568-012 Hs70 (P/N: 731473012)
3. O-ring (C) for damage P15 Hs90 (P/N: 731491015)
4. Foreign substances being stuck in drilled hole of section (D).
5. Foreign substances being stuck in section (E) and valve seat surface.

Note : If anything has not been found wrong with the above, suspect the hydraulic pump.

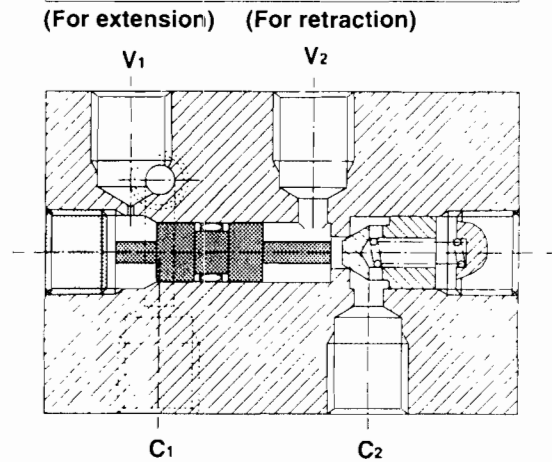
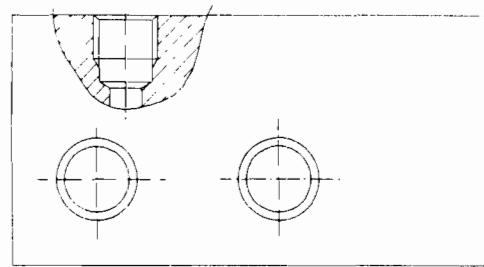
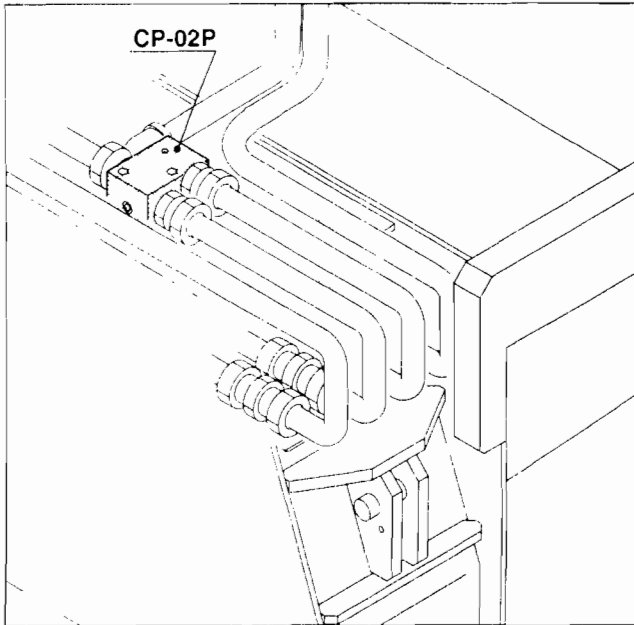
2) Outrigger cylinder (Construction of pilot check valve)



3) Rear-outrigger cylinder (Construction of pilot check valve)

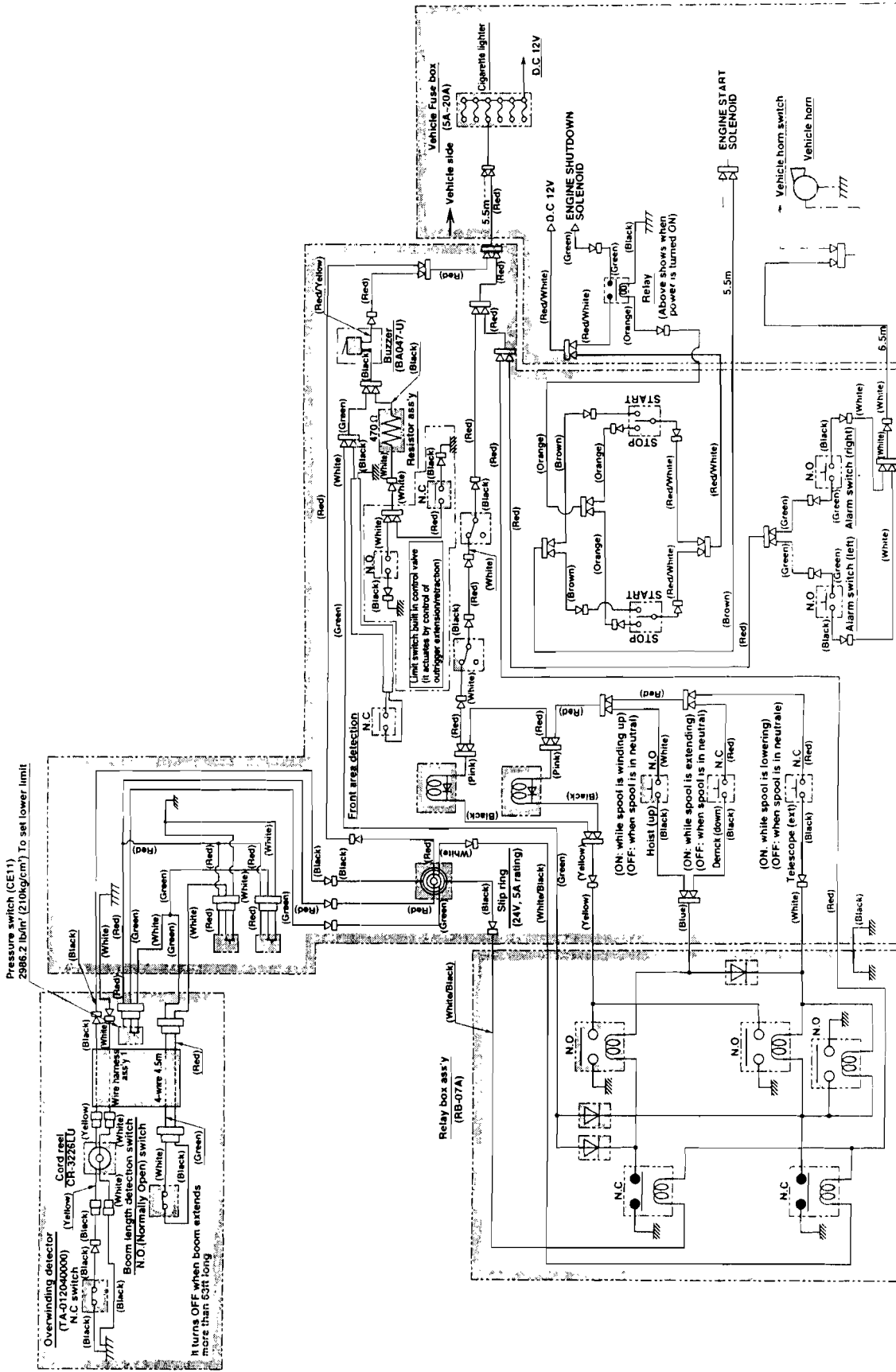


4) Horizontally extending cylinder (Construction of check valve)

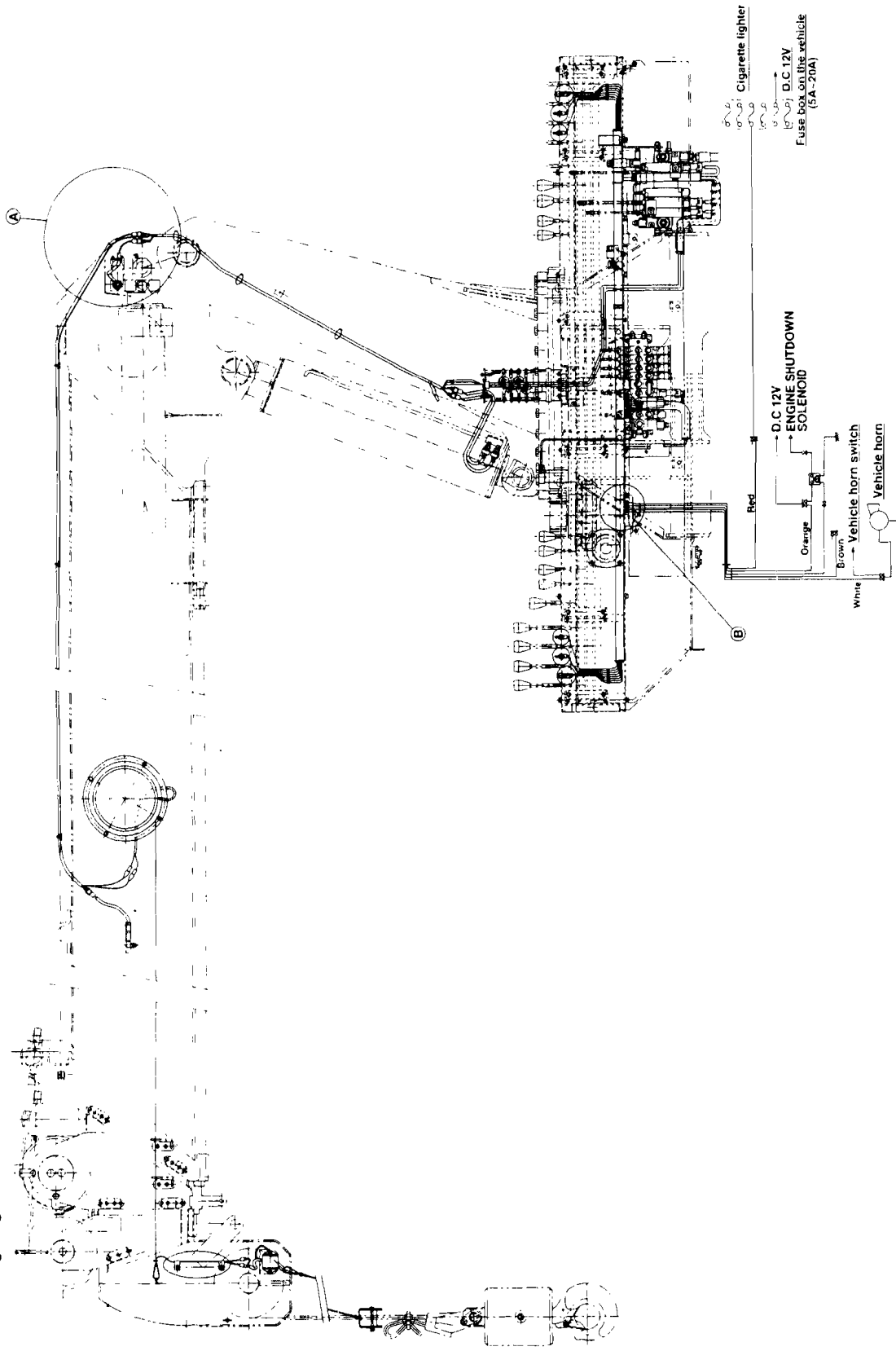


Type (CP-02P)

S17. ELECTRIC CIRCUIT DIAGRAM



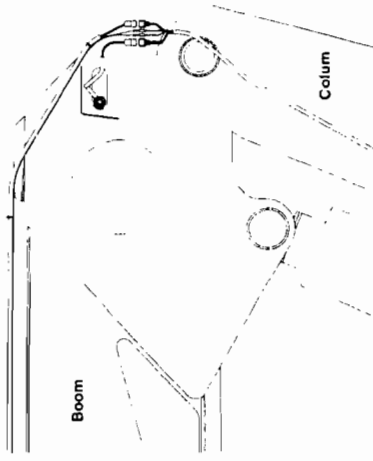
1) Electric wiring diagram



2) Electric wiring

(1) Wiring boom and column (Part A)

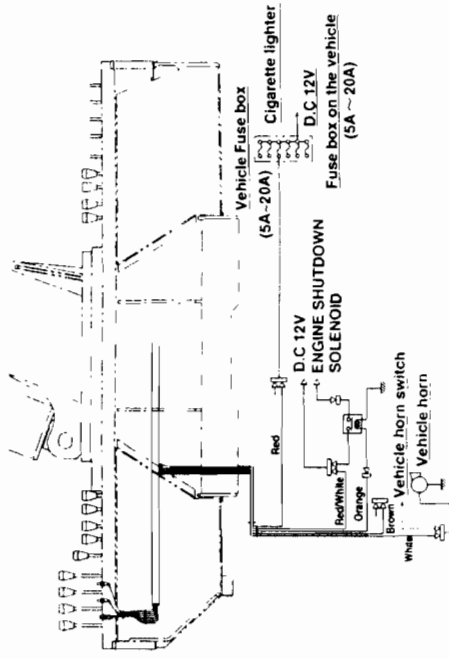
4(four) wiring connectors are provided for the boom and the column respectively.
Connect each connector as illustrated in the figure shown below.



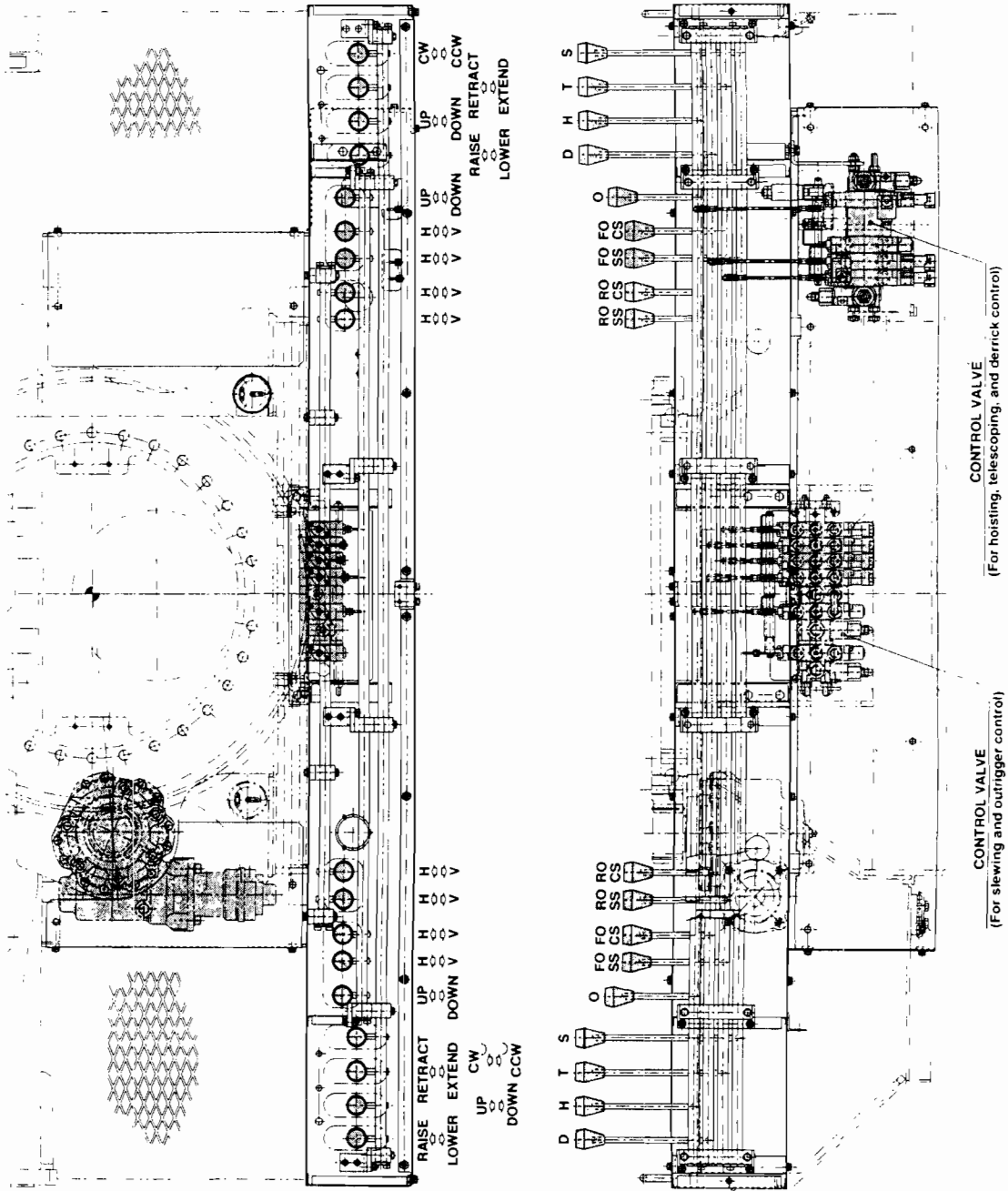
(2) Wiring base and chassis (Part B)

Connect 5(five) lead wires coming from the crane body to the chassis side by referring to the following illustration.

- 1) Connect the white conductor to horn switch on chassis.
- 2) Connect the brown conductor to engine start solenoid on chassis.
- 3) Connect the orange and red-white conductors to relay for engine shut down solenoid.
- 4) Connect the red conductor to power cable of chassis via a 10-A fuse.

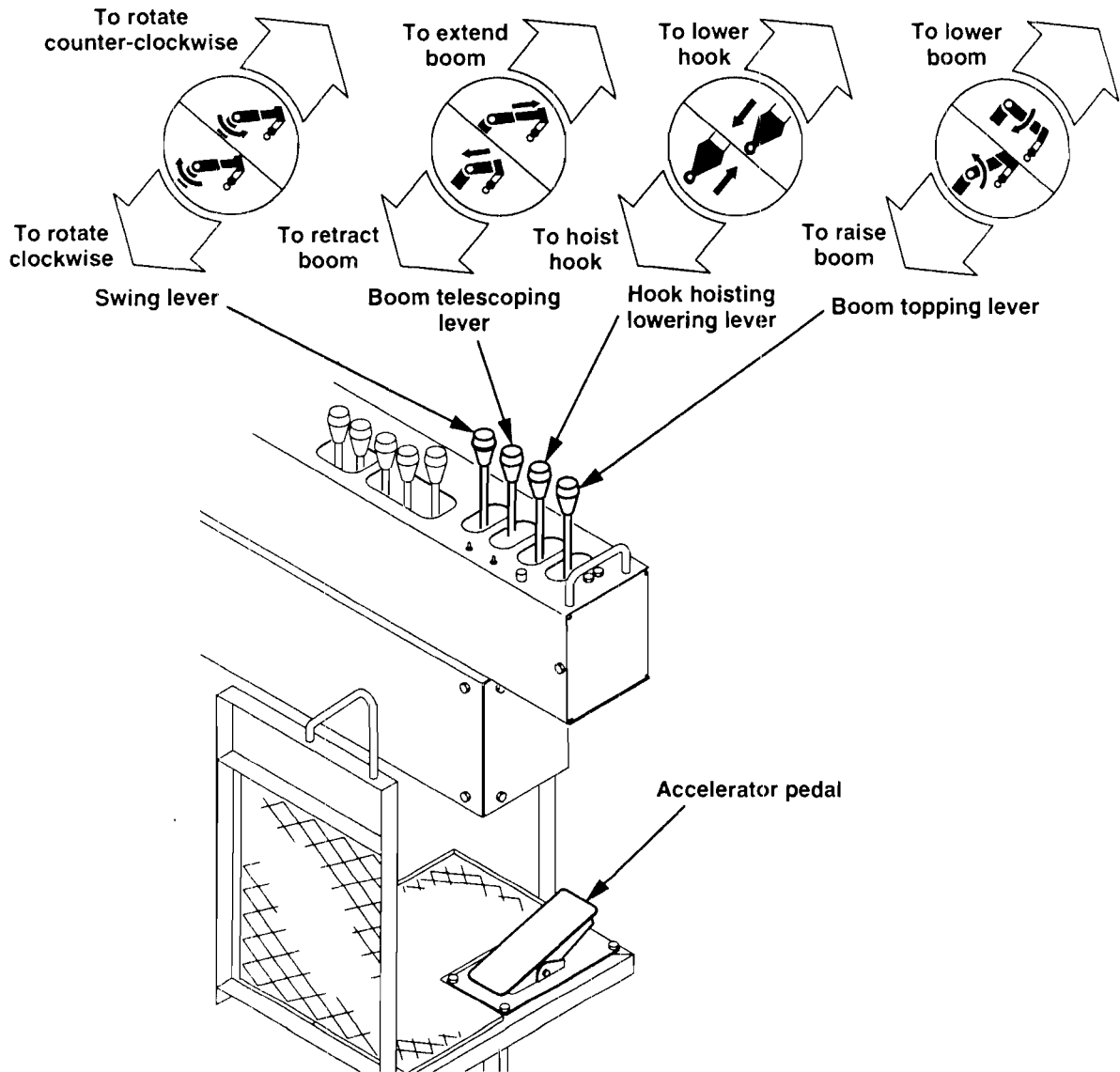


S18. CONTROL



1) Crane controls

With the dual operator control station the UNIC CRANE can be operated on either side of the unit. The controls on the base are : boom raise, hoist, telescope and boom swing, engine accelerator and outrigger system. All controls and direction of actuation for desired movement are identified by the information placard mounted on control knobs.



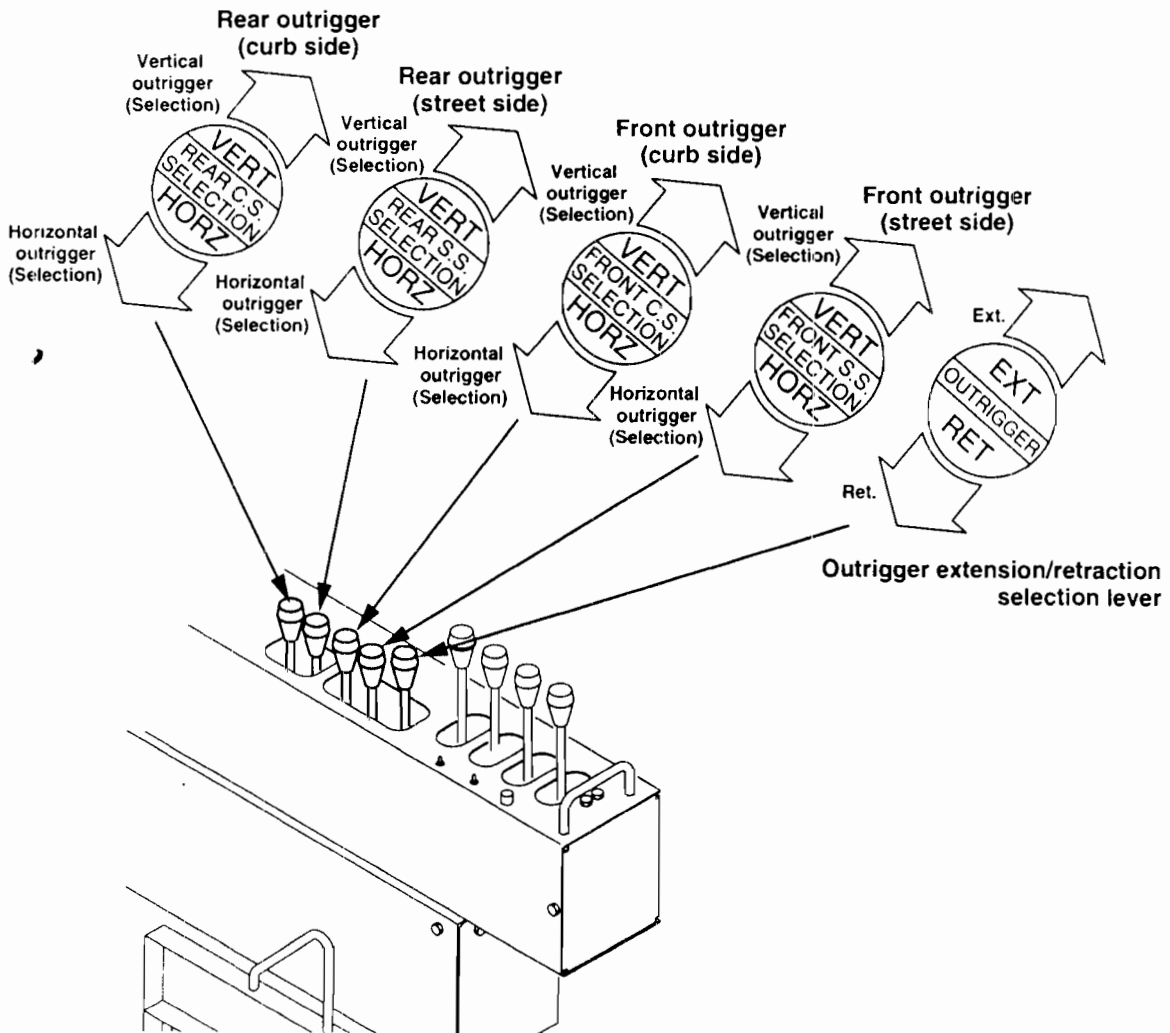
- Boom** : To raise boom, move lever to **pull**;
To lower boom, move lever to **push**.
- Hoist** : To hoist hook, move lever to **pull**;
To lower hook, move lever to **push**.
- Extension** : To extend boom, move lever to **push**;
To retract boom, move lever to **pull**.
- Swing** : To rotate boom clockwise, move lever to **pull**;
To rotate boom counter-clockwise, move lever to **push**.
- Accelerator** : Foot operated with factory adjusted stop for maximum pump speed of 2000r.p.m.

Note : Controls must be used together to achieve combinations of movements.

For instance, the boom extension and loadline (hoist) must be used together to maintain clearance between boom tip and hook block.

2) Outrigger controls

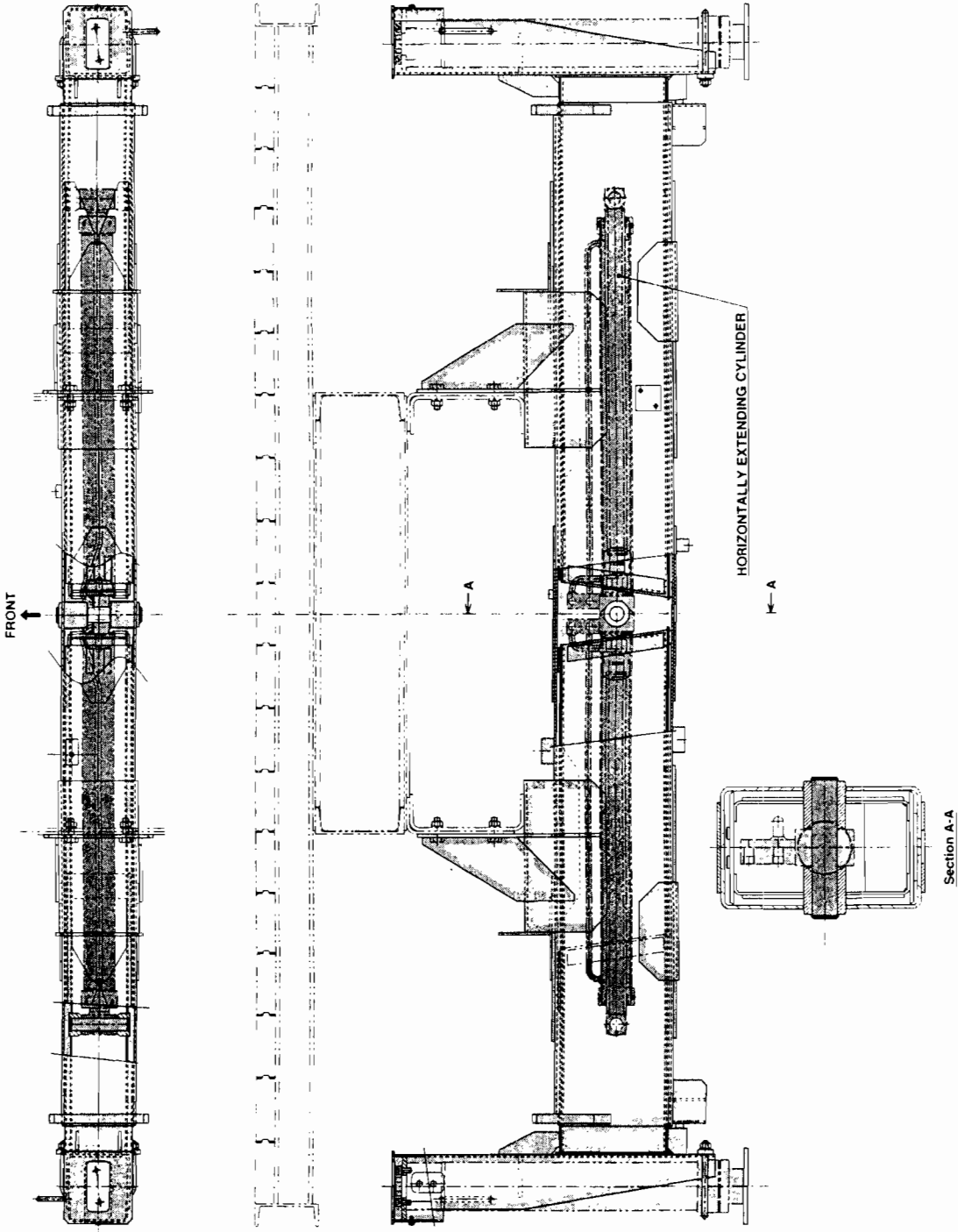
1. Stand clear of outriggers to avoid crushing injury.
2. Do not operate outriggers without determining clearance from obstructions or personnel.
3. Never lower or raise any outrigger unless you or the signal person assisting you can see the outrigger shoe and the ground where the outrigger will make contact and can confirm the area is clear of all personnel.
4. Failure to follow this procedure may result in a serious crushing injury to workmen, property damage, or crane instability.



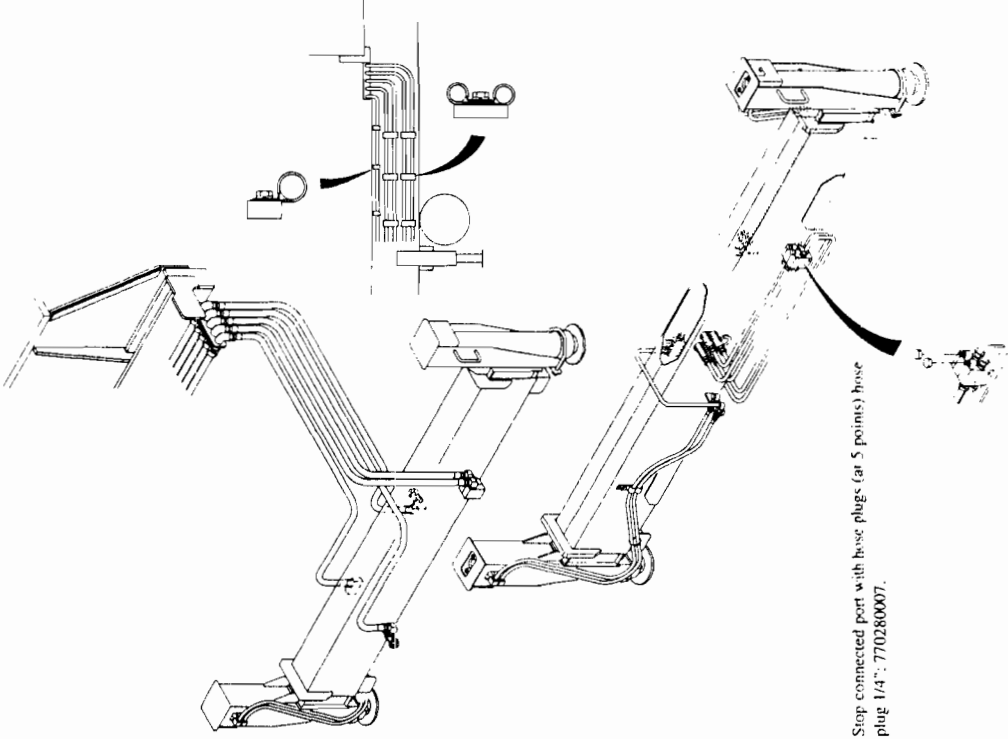
Outriggers : To extend outrigger cylinder, move lever to **push**;
To retract outrigger cylinder, move lever to **pull**.

Selection : To select vertical front/rear outrigger cylinder, move lever to **push**;
To select horizontal front/rear outrigger cylinder, move lever to **pull**.

519. REAR OUTRIGGER



1) Connecting the high-pressure hose for rear outrigger

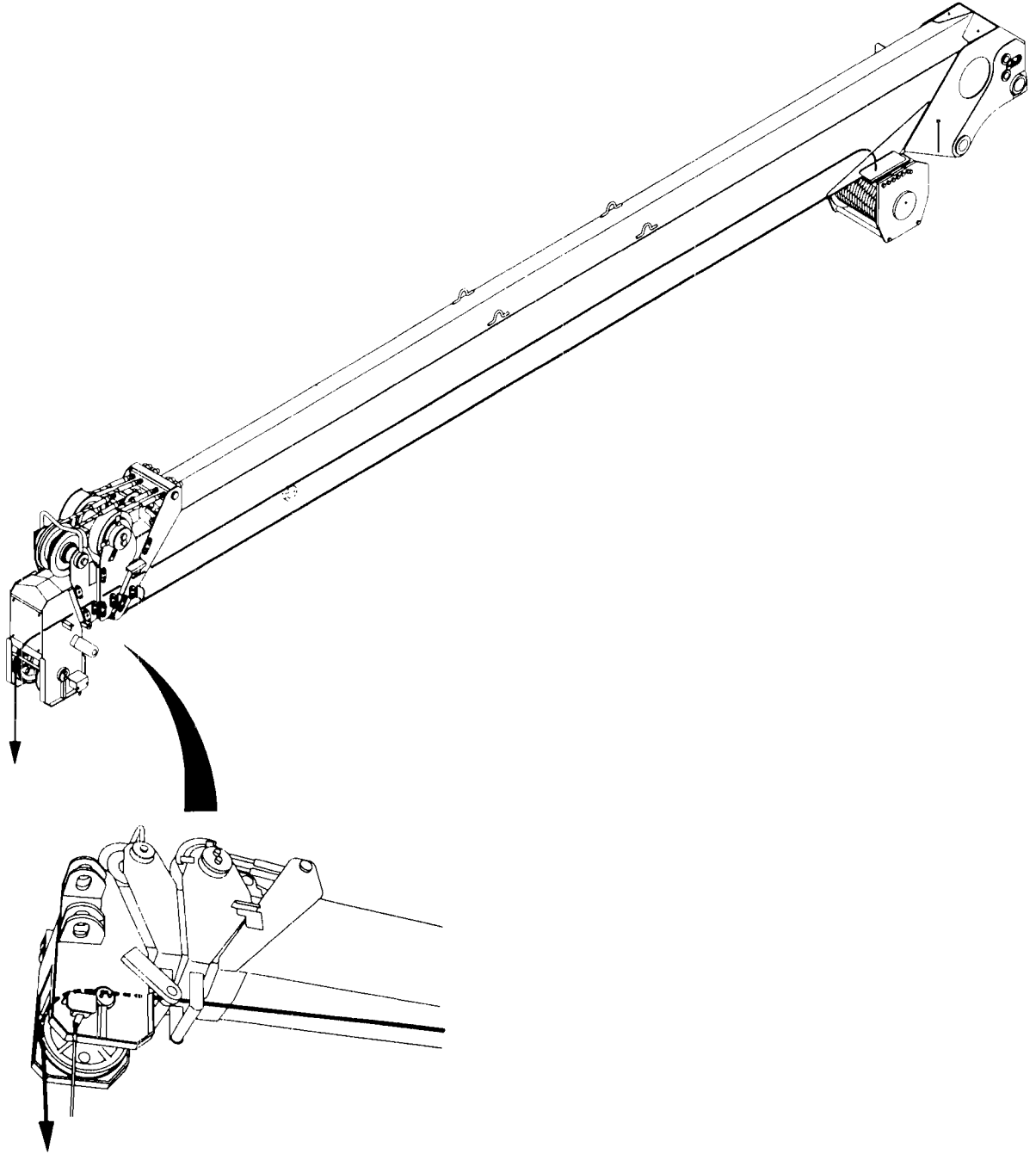


(1) Stop connected port with hose plugs (or 5 points) hose plug 1/4\"/>

§ 20. MOUNTING THE HOOK

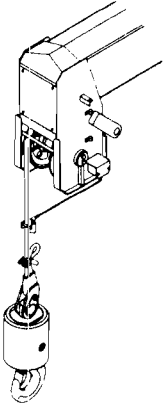
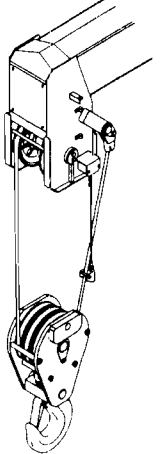
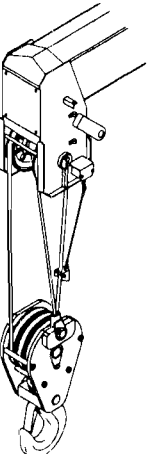
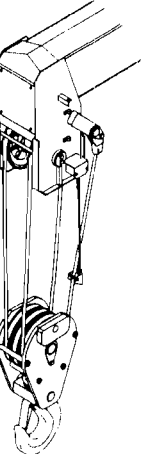
(1) Pull out wire slowly from drum.

Pass wire rope under the boom, and turn it around the right sheave of boom tip as view from the base.

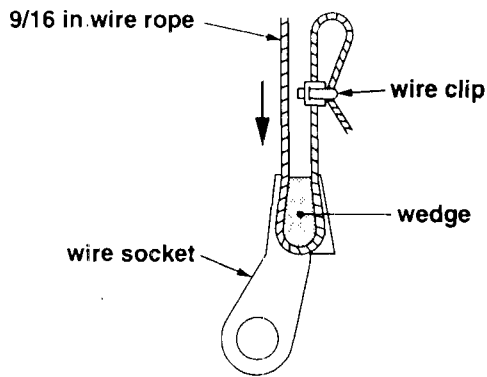


(2) Pass wire through wire socket in the direction shown in the figure.

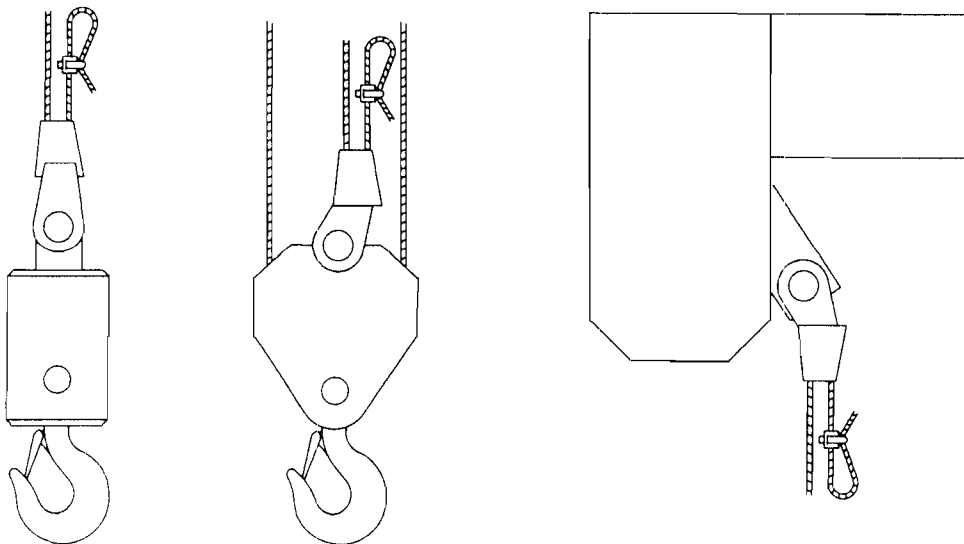
Note: Pay also attention to the position of weight ass'y.

1 PART LINE	2 PART LINE	3 PART LINE	4 PART LINE
 <p data-bbox="181 772 370 802">LOADS UP TO</p>	 <p data-bbox="500 823 678 852">LOADS UP TO</p>	 <p data-bbox="815 823 993 852">LOADS UP TO</p>	 <p data-bbox="1117 823 1295 852">LOADS UP TO</p>

(3) Pass wire through wire socket in the direction shown in the figure.



(4) Fit the wire socket either to the hook or to the boom tip.



§ 21. MAINTENANCE SECTION

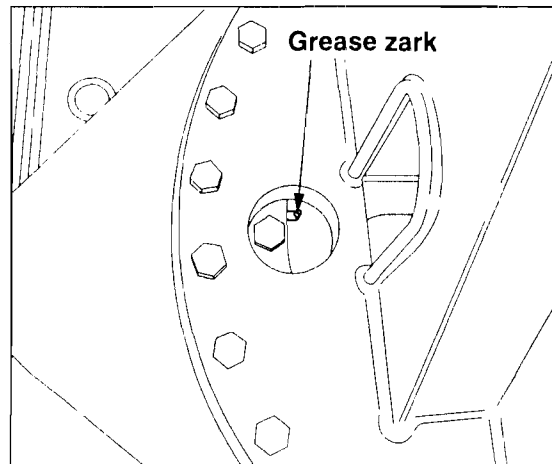
1) Periodic maintenance / Monthly

(1) Lubricate swing bearing

Use chassis grease.

Be sure to fill grease into the bearing from the grease zark.

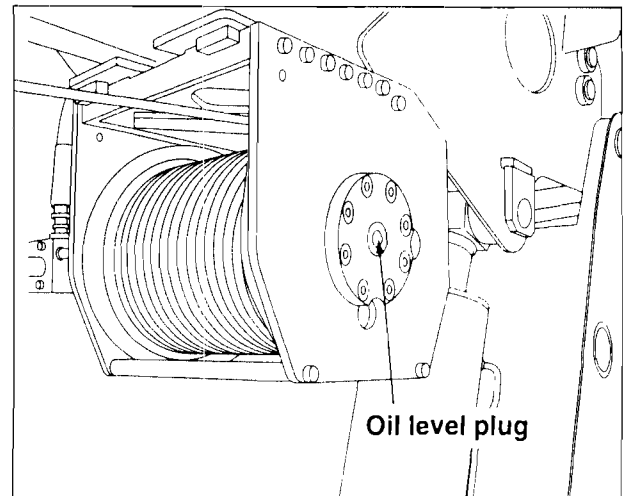
Do not move the crane while it is being lubricated.



(2) Check gear oil level

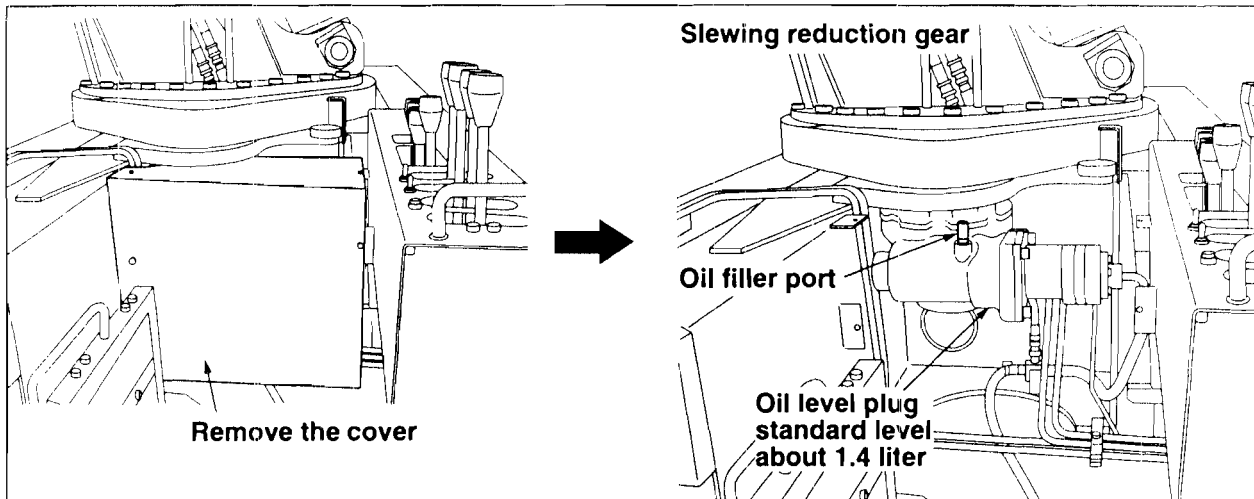
WINCH SYSTEM

1. Remove the oil level plug.
2. Fill oil up to the standard level.
3. Install the oil level plug.



SWING SYSTEM

1. Remove the vent plug for filler port.
2. Remove the oil level plug.
3. Fill oil up to the standard level.
4. Install the oil level plug and the vent plug.



2) Periodic maintenance / Annual

(1) Change hydraulic oil

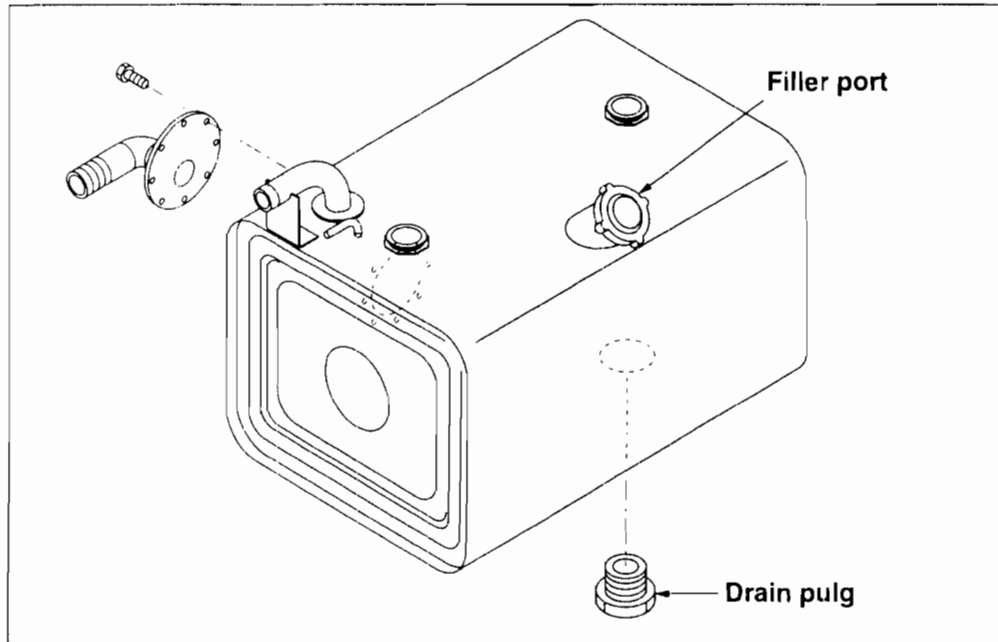


CAUTION

Hot oil and components can cause injury.

Do not allow hot oil or components to contact skin.

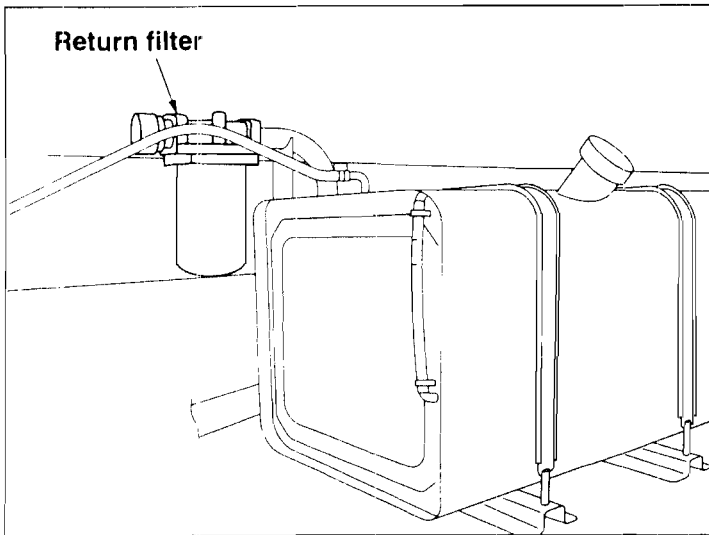
Drain the oil only when engine is stopped and the oil is cool.



- 1 Prepare a sufficient container.
The amount required for a change is about 190 Lit.(50.2 gal.)
2. Remove the hydraulic oil reservoir filler cap.
3. Remove the drain plug and drain the hydraulic oil.
4. Remove the four bolts to remove the cover.
Take the suction strainer out of the tank.
5. Clean the suction strainer in a non-flammable solvent.
Replace the strainer, if it is damaged.
6. Flush the tank with non-flammable solvent.
- 7 Install suction strainer and install the drain plug.
8. After supplying oil, tighten the cap securely by hand.

(2) Change return filter

★ The return filter should be changed after 3 months of initial operation, and once a year thereafter.



1. Turn the return filter counter-clockwise to remove and discard the element. If the filter is hard to loosen, use the filter wrench.
2. Clean the filter base. Lubricate oil to the packing for new filter and then screw in and tighten with all your strength.

(3). Start-up check

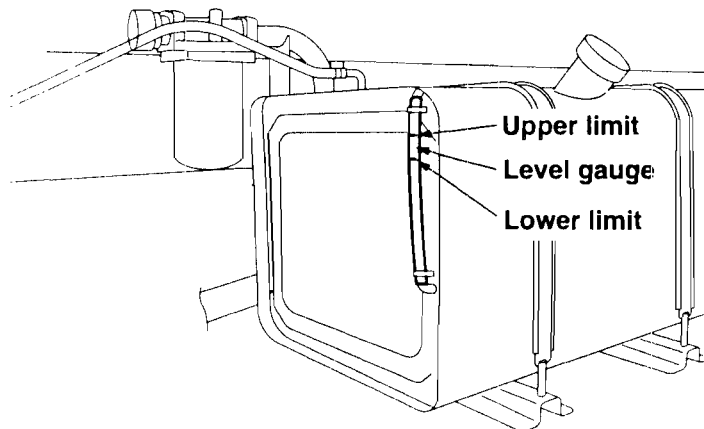
1. Hydraulic oil tank level check

Check that hydraulic oil level is between the marks indicating upper and lower limits on the oil level gauge which is attached on the side of the oil tank.

Conditions of checking:

- Return the crane to its original position to set the vehicle in a state ready for running.
- Insert level gauge until cap contacts oil filler, pull out level gauge, and check oil level.

Check oil level on the oil level gauge attached on the side of oil tank.



(4) Change gear oil

for winch gear box and swing gear box

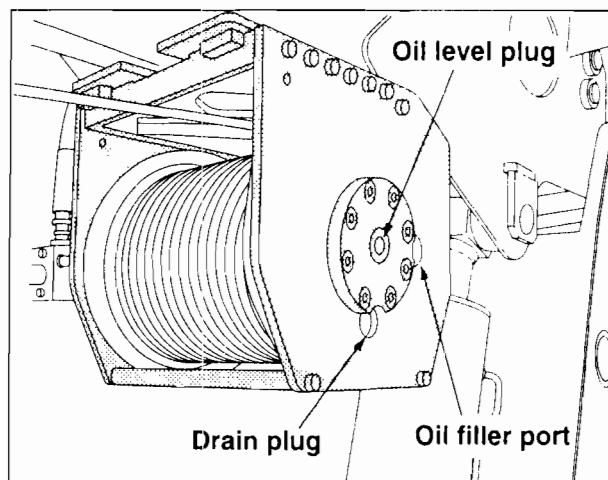
★ The gear oil should be changed after 6 months of initial operation, and once a year thereafter.

Hot oil and components can cause injury.

Do not allow hot oil or components to contact skin.

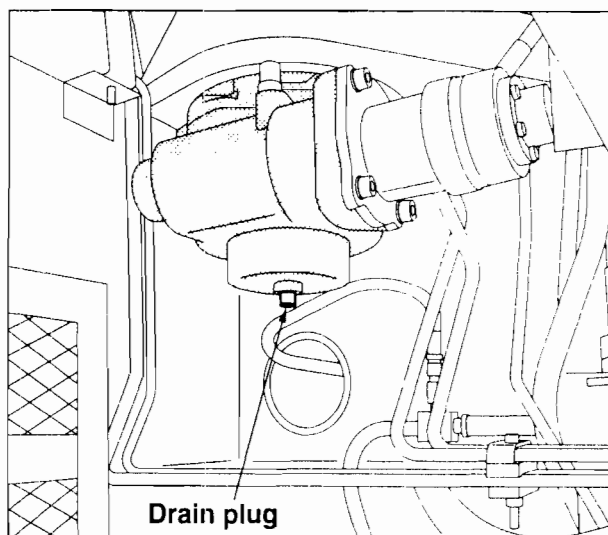
WINCH SYSTEM

1. Remove the oil level plug.
2. Remove the drain plug and drain oil.
Install the drain plug
3. Remove the oil level plug and the oil filler plug.
4. Fill new oil up to the standard level.
5. Install the oil level plug and the filler plug.



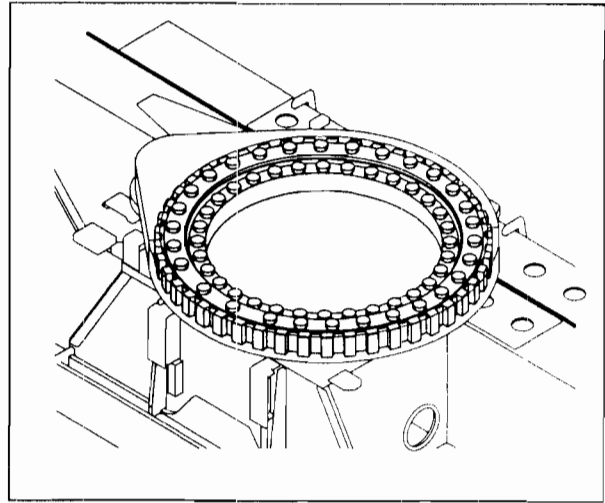
SWING SYSTEM

1. Remove the drain plug and drain oil.
Install the drain plug
2. Remove the vent plug for filler port.
3. Remove the oil level plug.
4. Fill new oil up to the standard level.
5. Install the oil level plug and the vent plug.



(5) Checking swing bearing mounting bolts

When the device of this machine gives out unusual noise during operation or traveling, or when a gap is produced on the mounting surface, contact our authorized service shop for repairing.



3) Periodic maintenance/Replacement of expendable parts

Replace the following parts periodically in order that the strength and quality of the original machine may be maintained.

When you replace the above parts, contact UNIC CORPORATION or the authorized dealer.

Replacement parts	Replacement intervals
Boom wear pads	every 3 years
Packings, O-rings and Dust-seals for telescoping cylinder, topping cylinder, and outrigger cylinder.	every 3 years

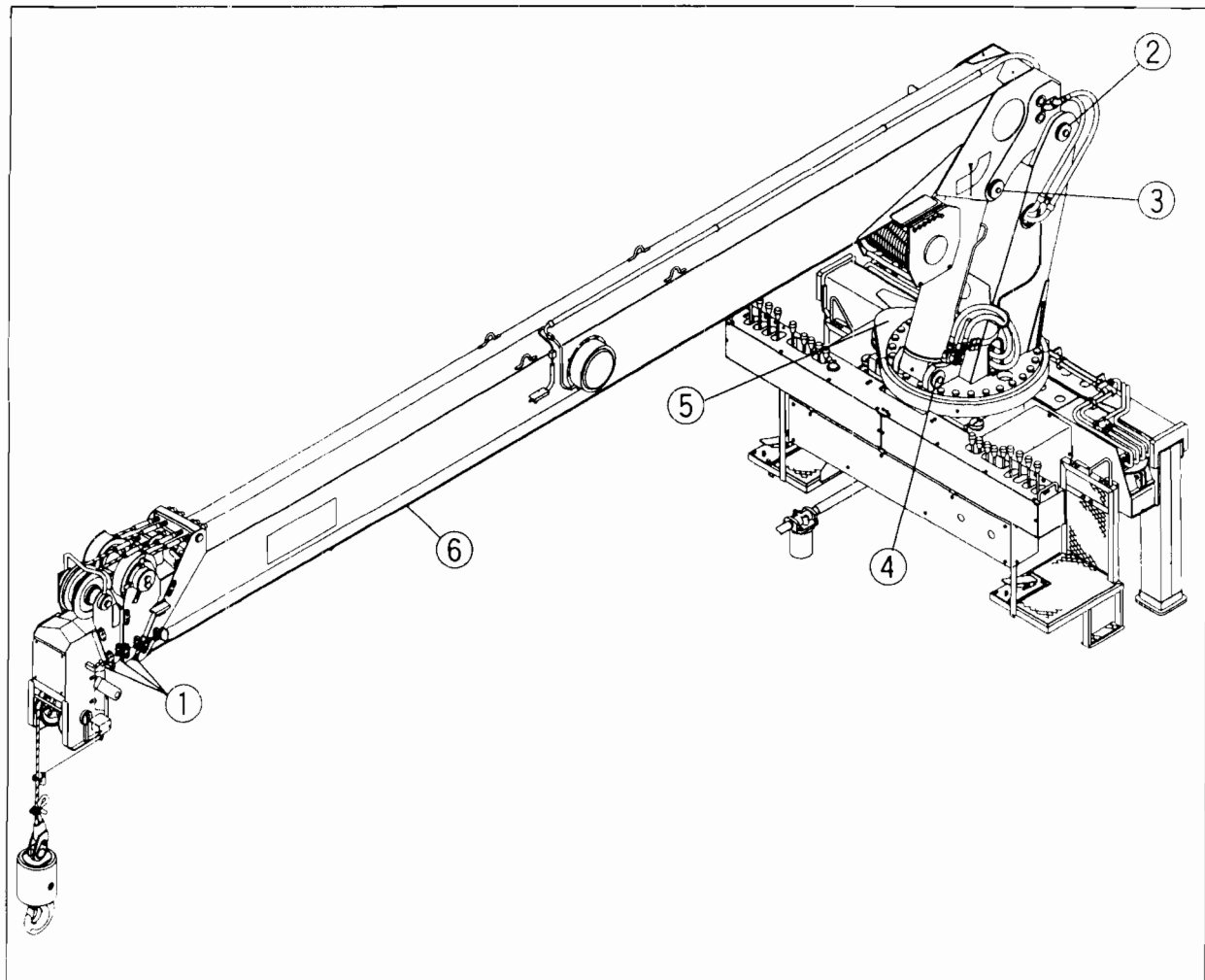
4) Periodic maintenance / Weekly

LUBRICATE THE FITTINGS

Thoroughly clean grease nipples before lubrication.

When supplying grease into a bushing, be sure to pump the grease gun until old grease is forced out of the bushing.

	Applications	Lubricant	Procedure
①	Boom slide plate [undersides of inner boom]	Molybdenum grease	Brush
②	Boom foot pin	Chassis grease	Grease gun
③	Topping cylinder upper support pin	Chassis grease	Grease gun
④	Topping cylinder lower support pin	Chassis grease	Grease gun
⑤	Rotation gear teeth	Chassis grease	Brush
⑥	Wire rope	Rope grease	Spray



§ 24. OTHERS

1) Recommended grease

(1) Chassis grease

Use NLGI No. 1 grade.

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

(1) Molybdenum grease

Use NLGI No. 2 grade.

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

2) Recommended gear oil

(a) SWING SYSTEM

Use API Service GL-4 gear oils.

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

(b) WINCH SYSTEM

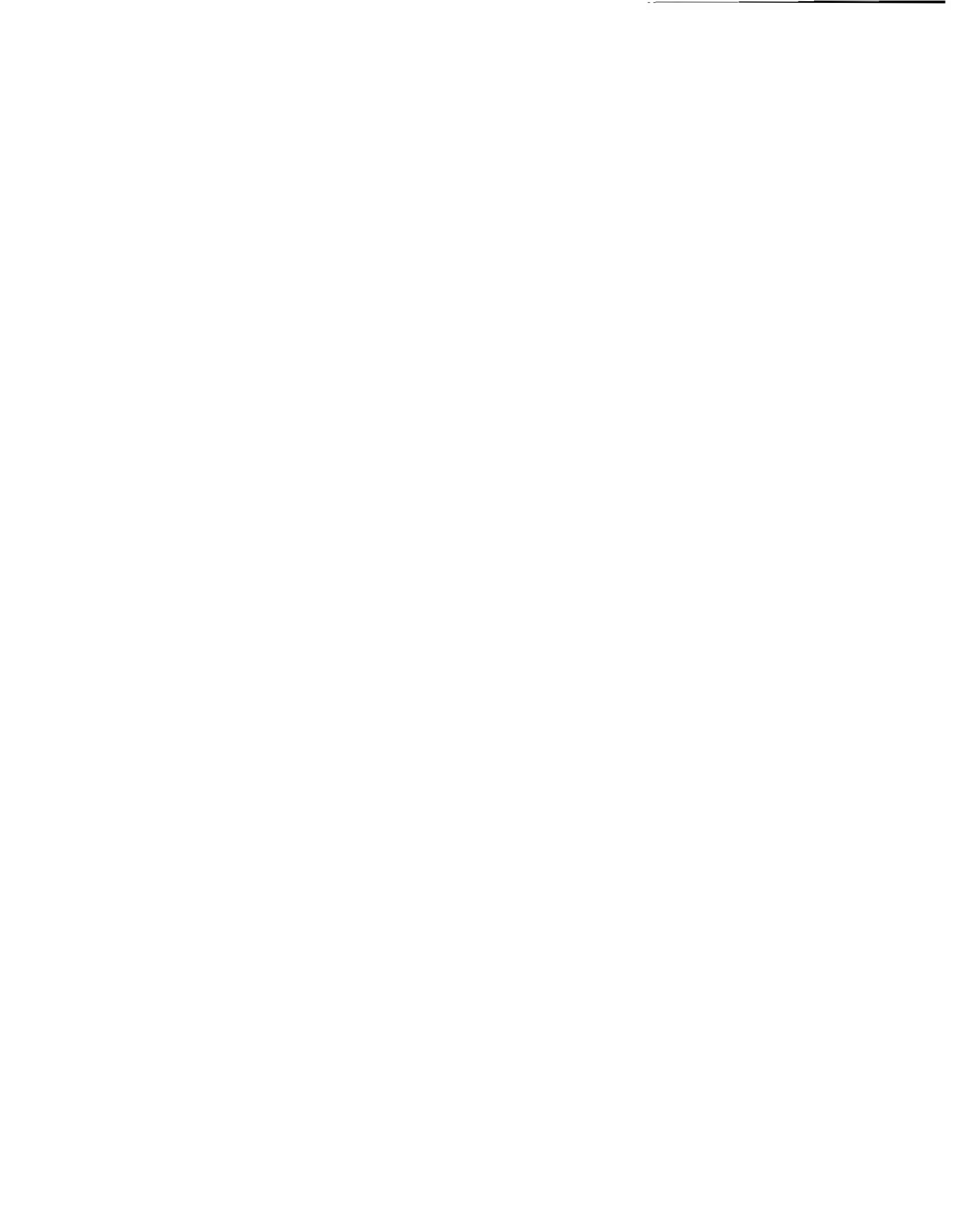
Use API GL-2/3 gear oil or equivalent.

Petroleum Maker	Brand
TEXACO	MEROPA 150

3) Recommended hydraulic oil

Use industrial-type hydraulic oil;
ISO VG 46 for most temperatures.
ISO VG 32 extremely low temperatures.

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



FURUKAWA UNIC CORPORATION

HEAD OFFICE : Center Bldg., 3-12, Higashishinagawa 2-chome,
Shinagawa-ku, Tokyo 140, JAPAN