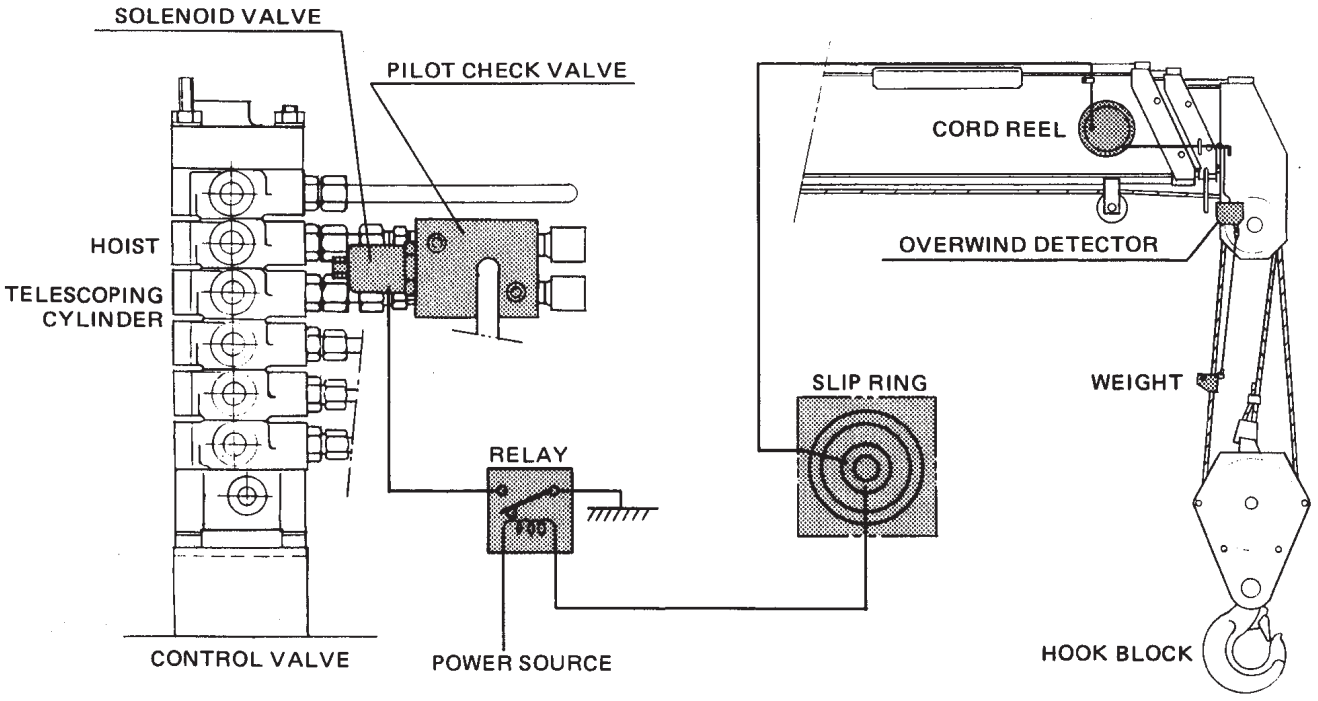
§16. SAFETY DEVICES

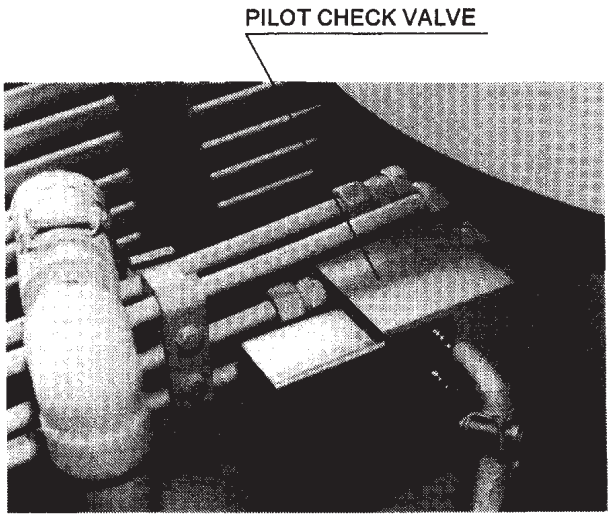
1) Construction of Anti Two Block Device

When the hook pushes the weight up to turn the overwind detector switch off in winding up the hook or extending the booms, the solenoid valve is switched on to operate so that the pilot check valve shuts off the oil flow for winding (return side of motor) and for boom extension to stop the operation.

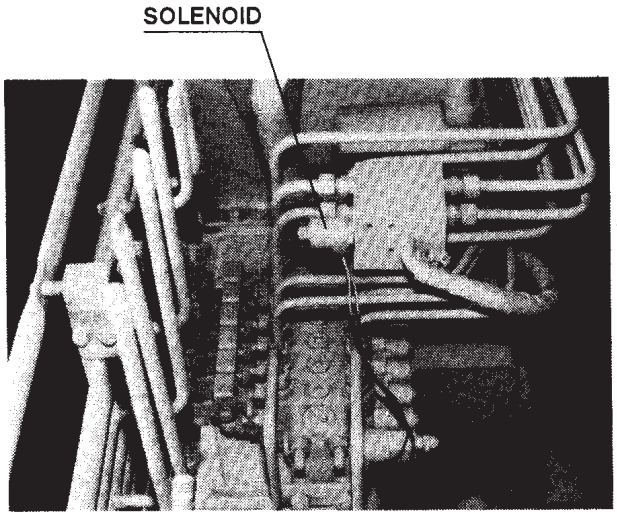
※ However, the hoist can be unwound and the booms can be retracted.



PILOT CHECK VALVE POSITION

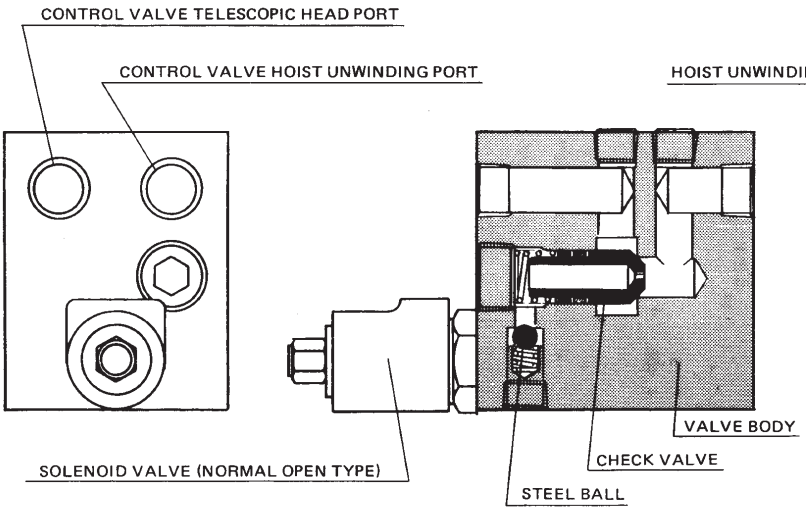


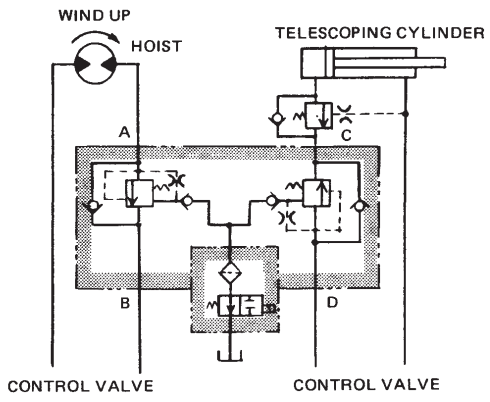
UR500 SERIES



UR330 SERIES

2) Construction of Pilot Check Valve





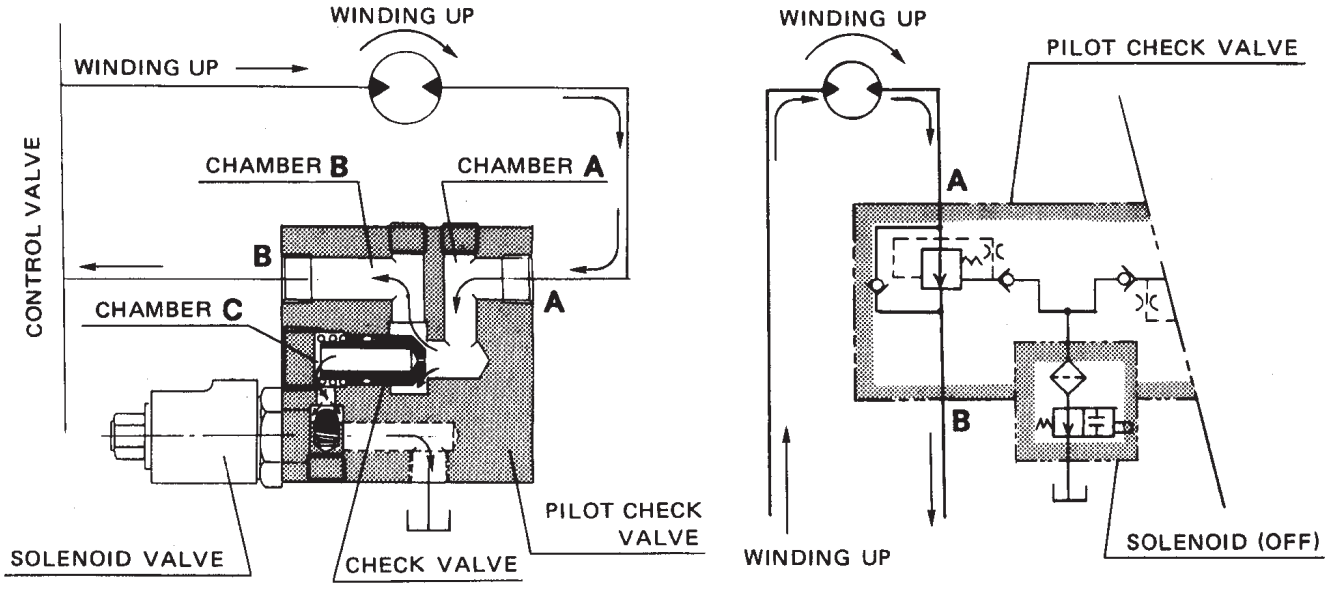
HYDRAULIC CIRCUIT

3) Description of Pilot Check Valve Operation

The pilot check valve is described as to oil flow through it and its check operation in winding/unwinding the hoist and extending/retracting the telescoping cylinders.

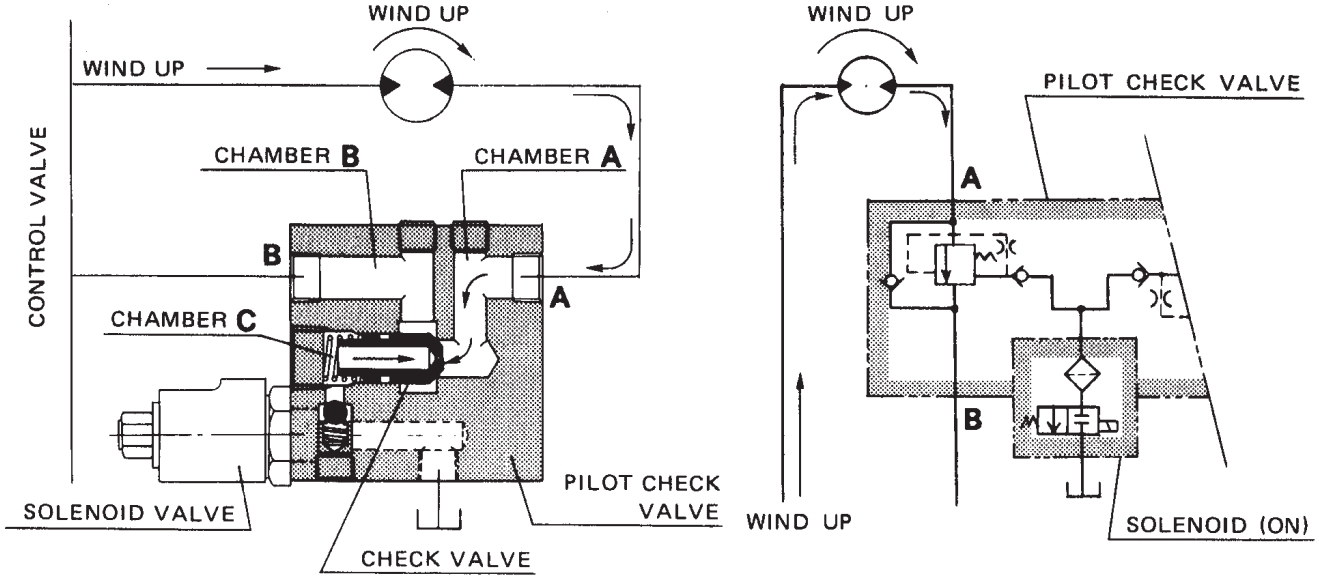
(1) Hoist Winding (In normal operation state, overwind detector is ON and solenoid valve OFF.)

In normal operation, the overwind detector is ON and the pilot check valve's solenoid valve is OFF. The return port is open to the tank port, and the oil in chamber C flows into the tank. Thus, the return oil in chamber A from the motor pushes open the check valve to flow via chamber B and the control valve back into the tank. This causes the motor to drive the hoist to wind.



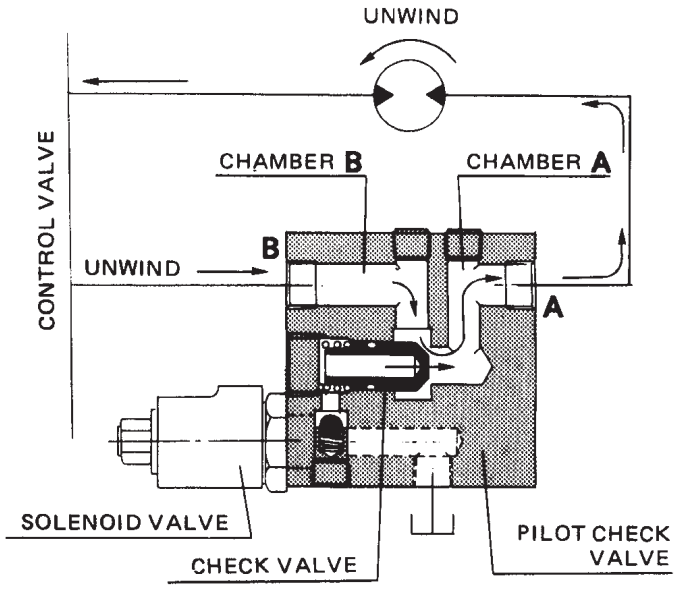
(2) Hoist winding stop (In overwound state, overwind detector is OFF and solenoid valve ON.)

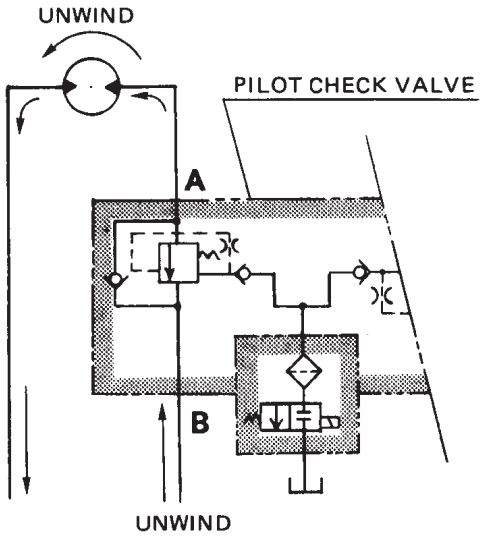
In an overwound state, the overwind detector turns off and the solenoid valve of the pilot check valve turns on. The operation of the solenoid valve closes the tank port so that the return oil in chamber A from the motor enters chamber C through the hole drilled in the check valve. Because the tank port is closed, chamber A and C become the same in pressure, and the check valve is pushed to the right due to the area difference between chambers A and C. Thus, the return oil in chamber A is shut off by the check valve, causing the



(3) Hoist unwinding

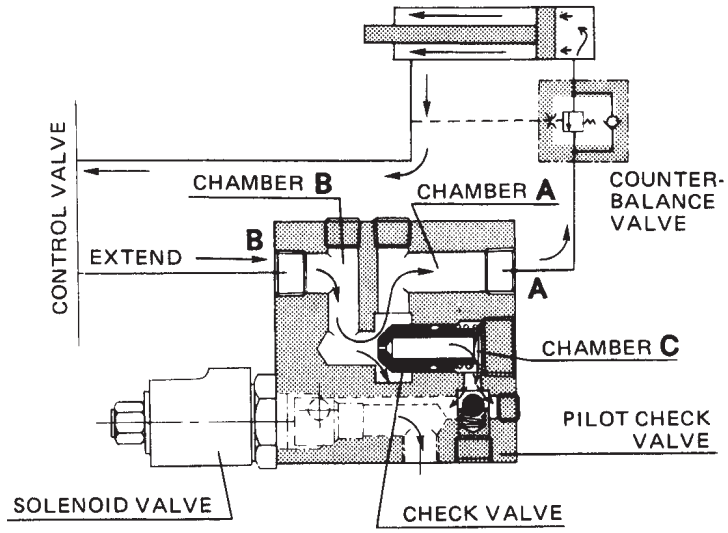
The oil entering chamber B from the control valve moves the check valve to the left to flow into chamber A and the unwinding end of the motor. The return oil from the motor flows via the control valve back into the tank, causing the motor to drive the hoist to unwind.

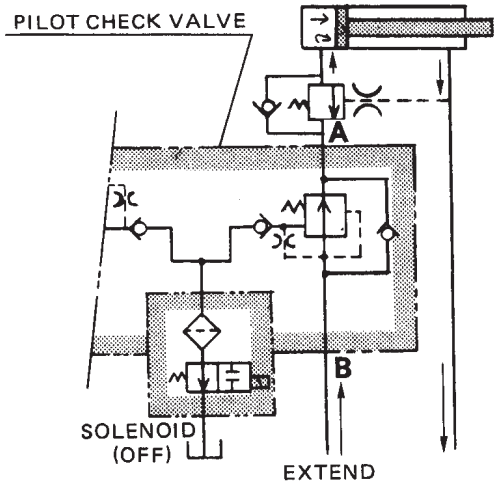




(4) Telescoping cylinder extending operation (In normal operating state, overwind detector is ON and solenoid valve OFF.)

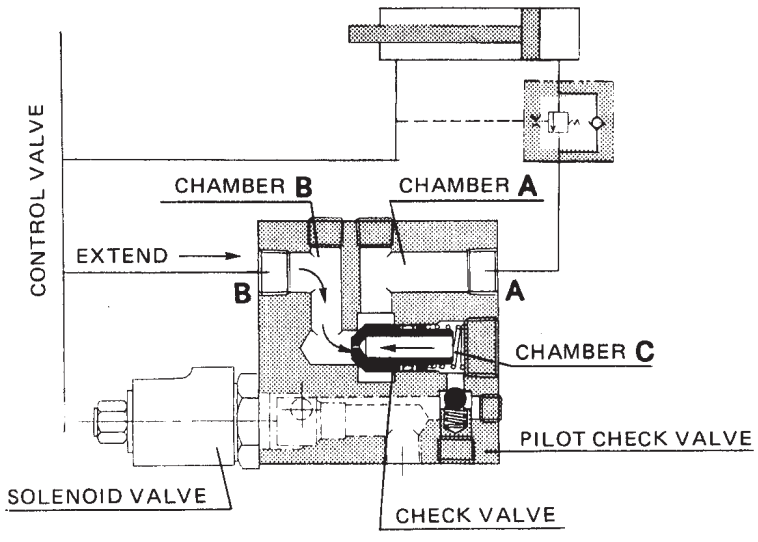
In normal operation, the overwind detector is ON and the solenoid valve of the pilot check valve is OFF. The return port is open to the tank so that the oil in chamber C flows into the tank. Thus, the oil in chamber B from the control valve pushes the check valve open to flow into chamber A, from which it passes through the counterbalance valve into the extending end of the cylinder to extend it.

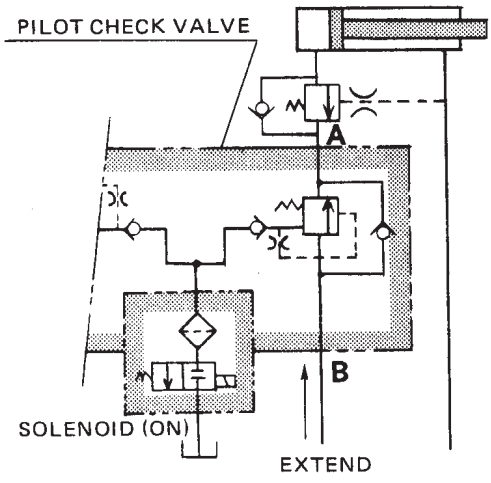




(5) Telescoping cylinder extension stop (In overwound state, overwind detector is OFF and solenoid valve ON.)

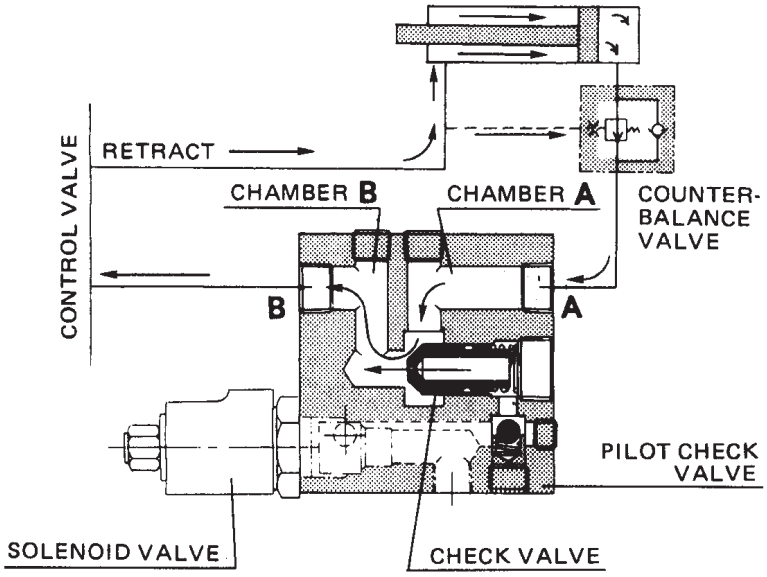
In an overwound state, the overwind detector turns off and the solenoid valve of the pilot check valve turns on. The operation of the solenoid valve closes the tank port so that the oil in chamber B from the control valve enters chamber C through the hole drilled in the check valve. Because the tank port is closed, chambers B and C become the same in pressure, and the check valve is pushed to the left due to the area difference between chambers B and C. Thus, the oil in chamber B is shut off by the check valve, and no longer flows into chamber A. This stops cylinder extending operation.

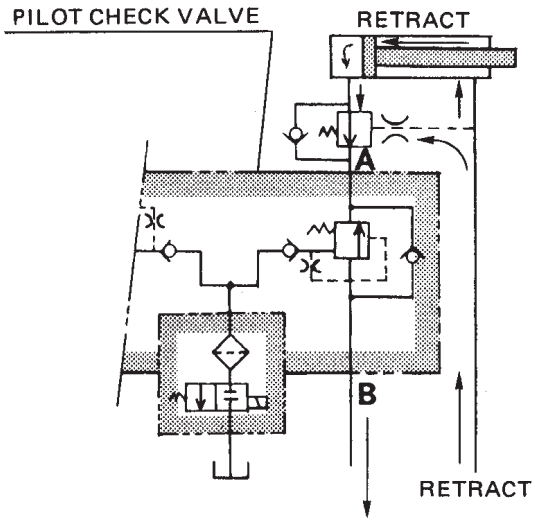




(6) Telescoping cylinder retracting operation

When the oil flows from the control valve into the retraction end of the cylinder, the oil in the cylinder pushing part flows via the counterbalance valve into chamber A of the pilot check valve to move the check valve to the right. Thus, it flows into chamber B and returns to the tank via the control valve to retract the cylinder.





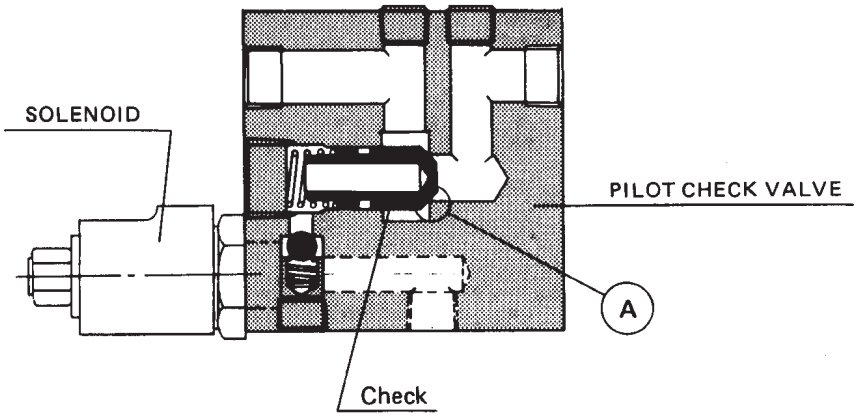
4) Troubleshooting

(1) Neither the hoist winds nor the telescoping cylinder extends in a normal operating state (not in an overwound state).

Suspected cause	Remedy
1. No electric power	Check.
2. Wire is broken somewhere between overwind detector and solenoids, or cable is disconnected from connection terminal.	Check cables and connection terminals.
3. Overwind detector defective	Check and repair or replace.
4. Cord reel defective	Check and repair or replace.
5. Solenoid of pilot check valve defective	Check and repair or replace.
6. Slip ring defective	Check and repair or replace.
7. Relay defective	Check and repair or replace.

(2) Either the hoist winds or the telescoping cylinder extends in an overwound state.Suspected cause:

- Check the pilot check valve for foreign matter that might be caught in part Ⓐ.



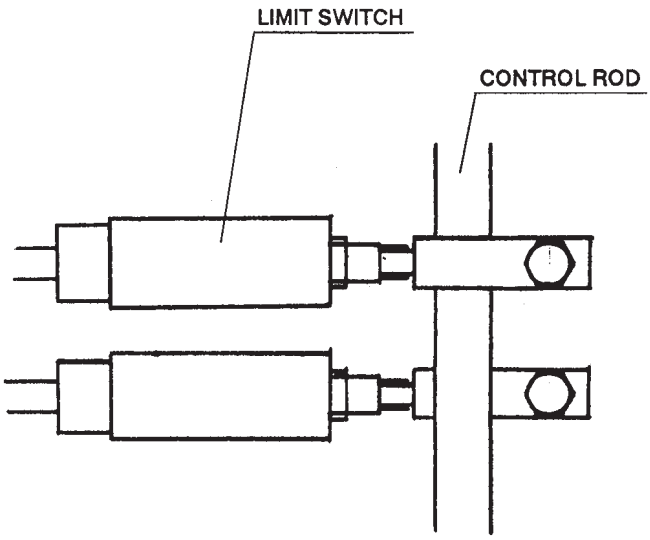
(3) Both the hoist winds and telescoping cylinder extends in an overwound state.

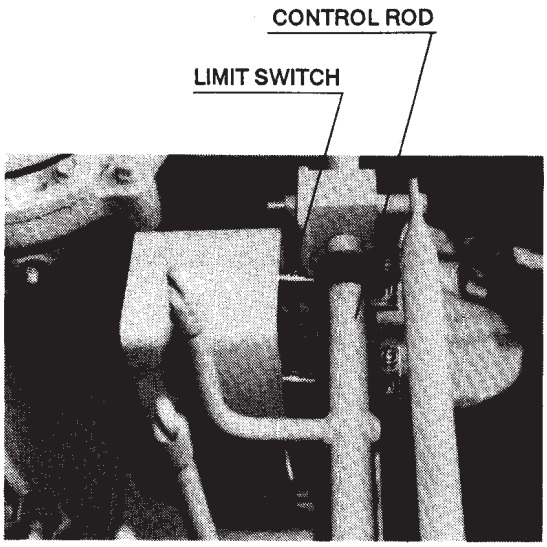
Suspected cause	Remedy
1. No electric power	Check.
2. Wrong wiring of power supply, relay, or solenoid.	Check
3. Overwind detector defective	Check and repair or replace.
4. Relay defective	Check and repair or replace.
5. Solenoid of pilot check valve defective	Check and repair or replace.

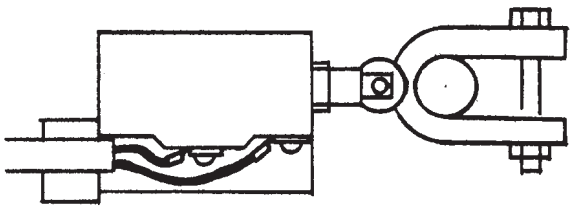
5) Alarm for Outrigger Extension/Retraction

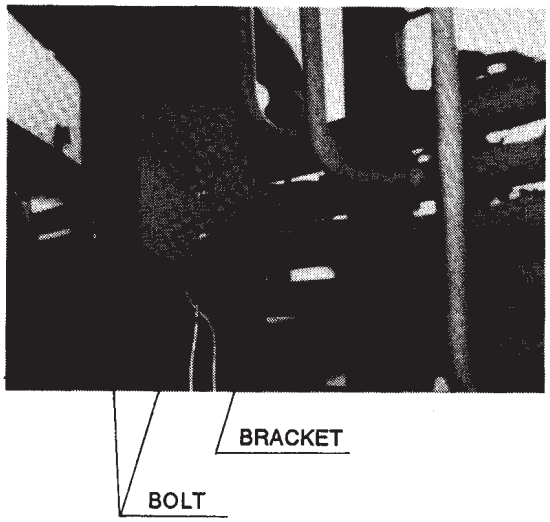
When the outrigger control lever is moved for retraction, the control rods that connect the right and left push the limit switches to sound the alarm.

(1) Construction







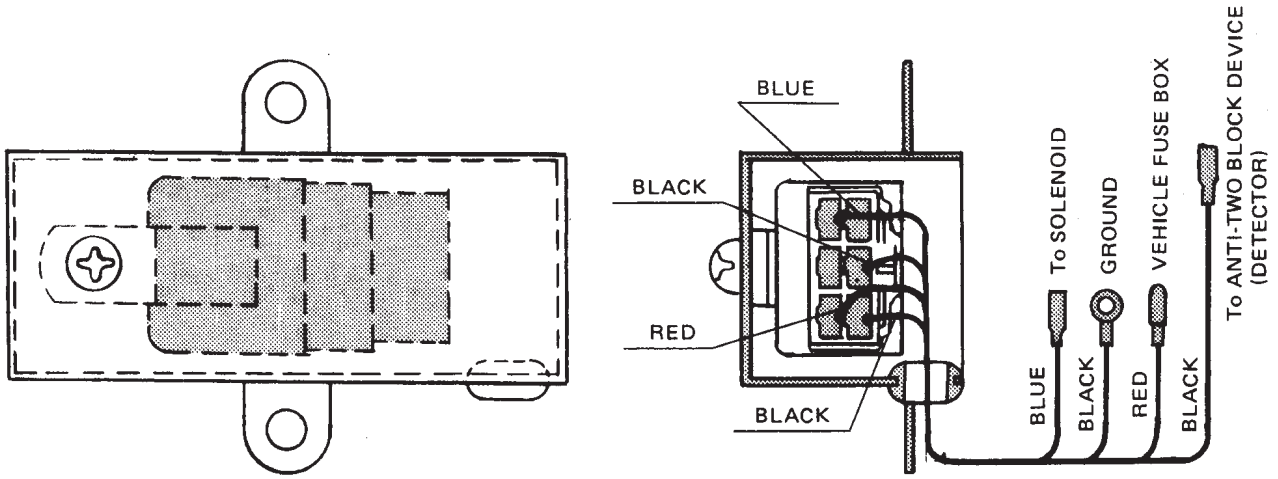


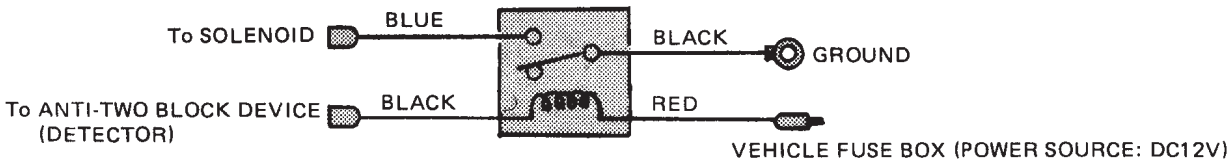
(2) Limit switch mounting and adjusting method

Adjust the limit switch and bracket position so that limit switch (A) turns on when the outrigger cylinders begin to extend or retract in response to outrigger lever movement. After adjustment, tighten the bolts.

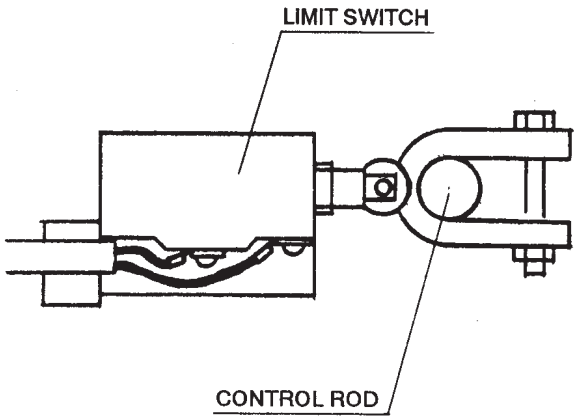
6) Relay and Limit Switches

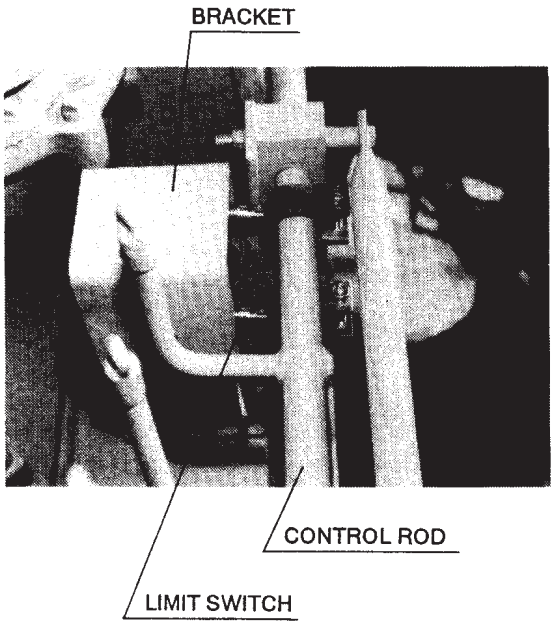
(1) Relay



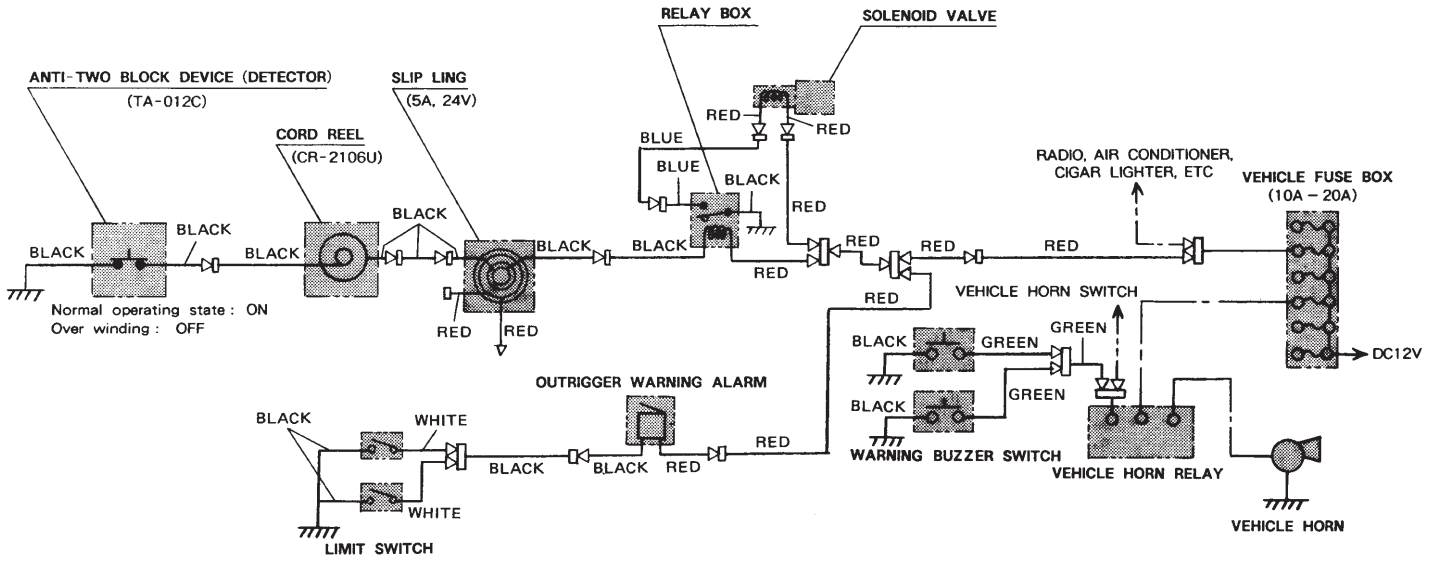


(2) Limit switches

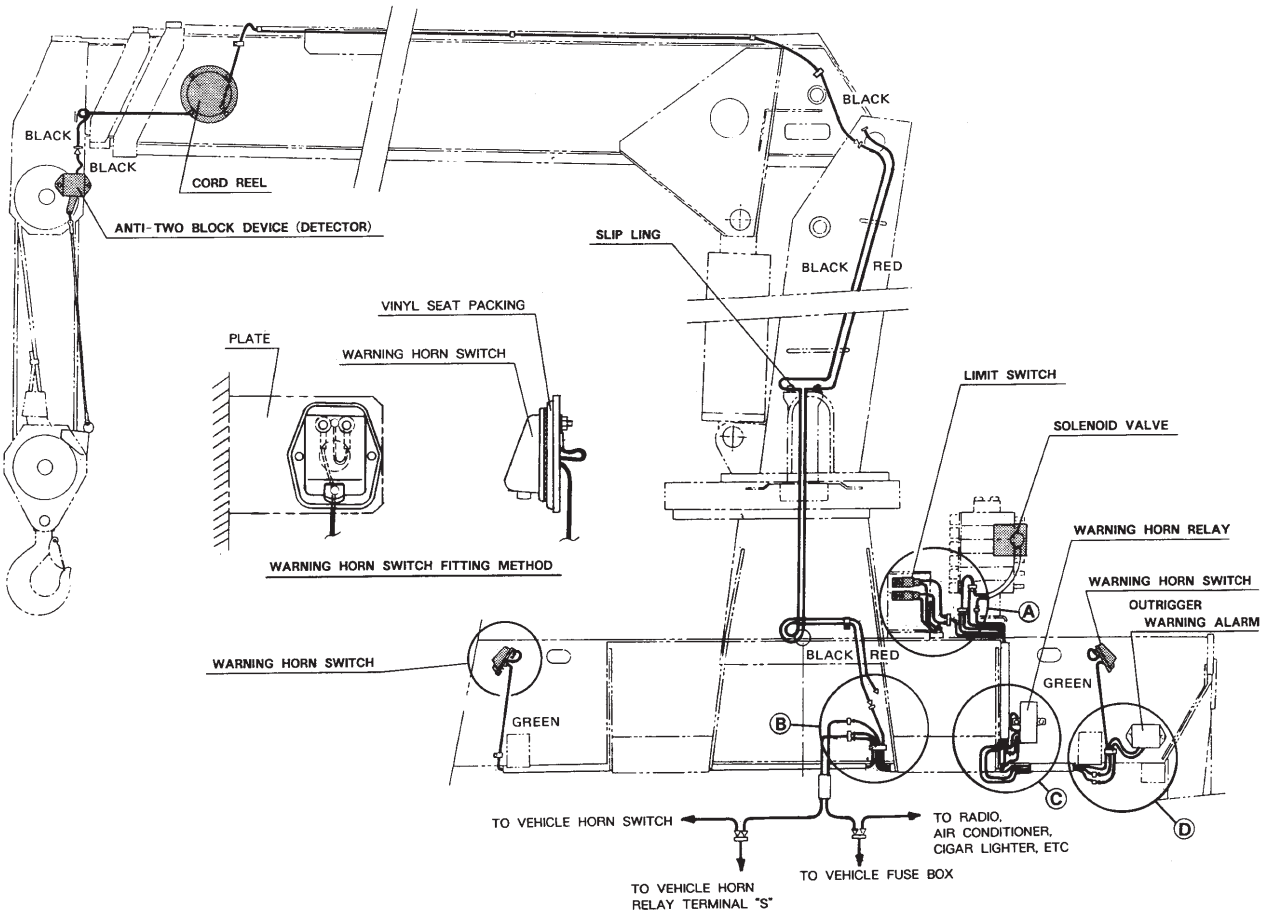




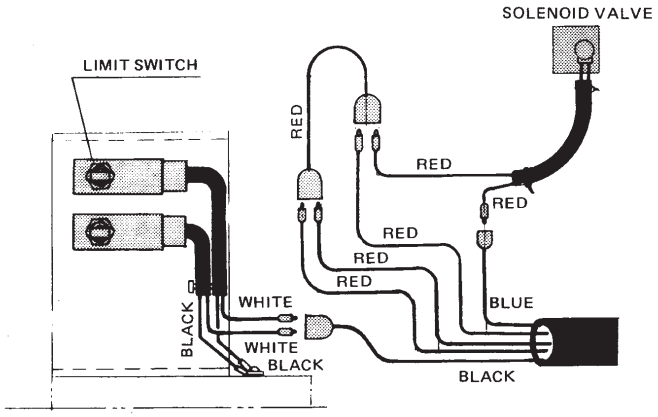
§17. ELECTRIC CIRCUIT DIAGRAM (NORMAL WALKING)



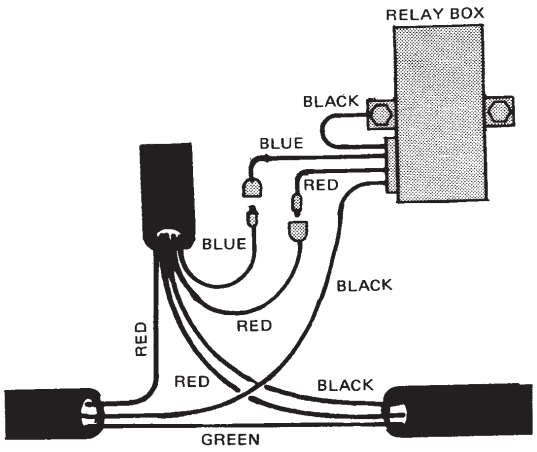
§18. ELECTRIC WIRING DIAGRAM



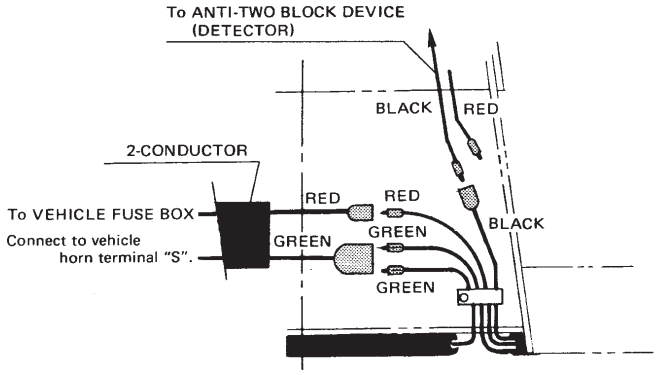
Enlarged View of Wiring in Parts Ⓐ, Ⓑ, Ⓒ, Ⓓ



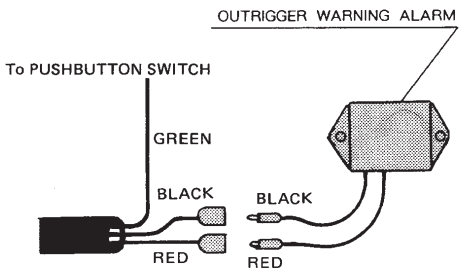
Enlarged View of Wiring in Parts Ⓐ



Enlarged View of Wiring in Parts Ⓒ

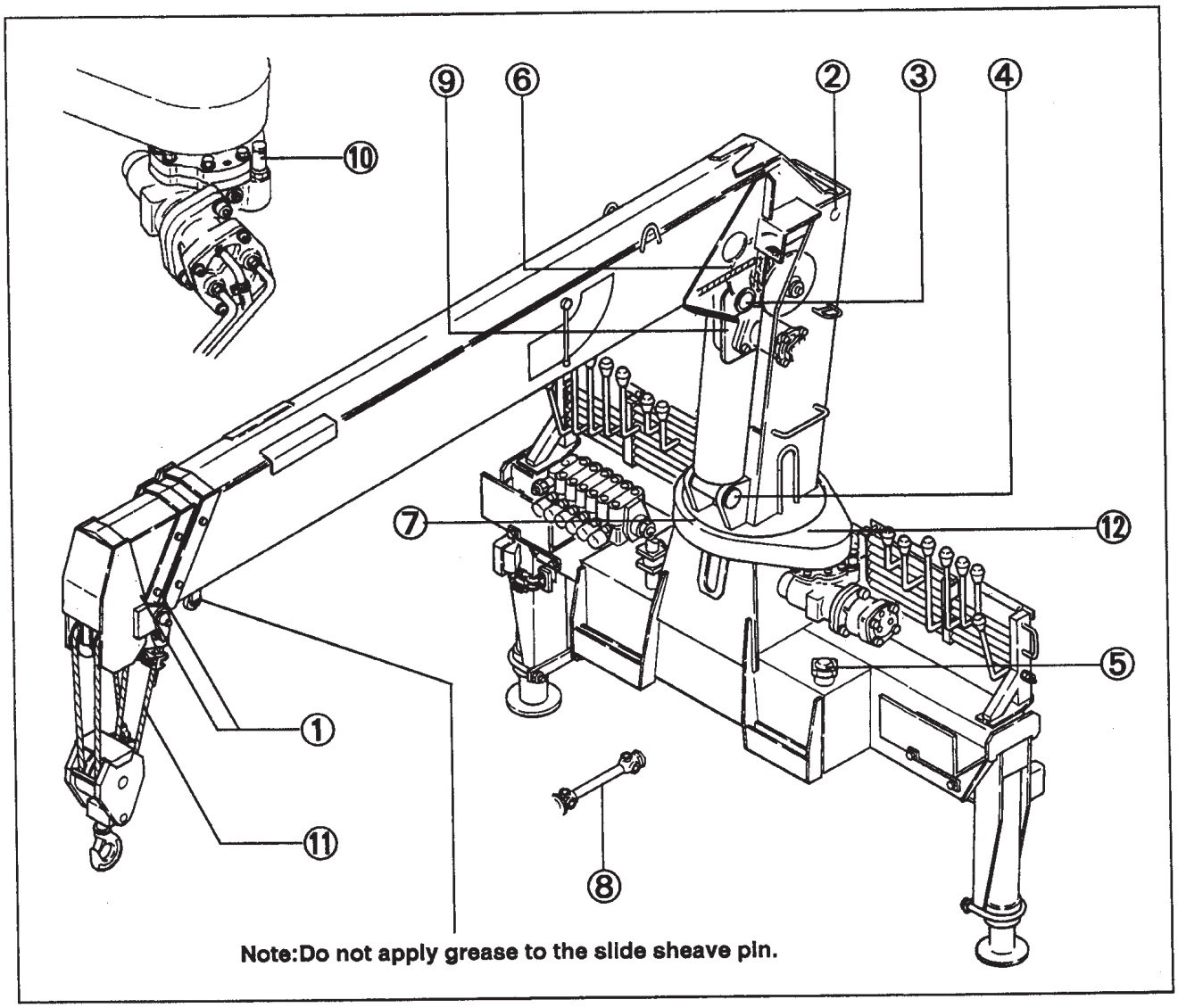


Enlarged View of Wiring in Parts Ⓑ



Enlarged View of Wiring in Parts Ⓓ

§19. LUBRICATION DIAGRAM



Note:Do not apply grease to the slide sheave pin.

Period	Lubrication Point	No. of points	Lubricant	Method
Daily	① Boom slide plates (Boom ②, ③, 3-section boom)	2	Molybdenum grease	Brush
	② Boom foot pin	1	Chassis grease	Grease gun
	③ Derrick cylinder upper support pin	1	Chassis grease	Grease gun
	④ Derrick cylinder lower support pin	1	Chassis grease	Grease gun
	⑤ Oil tank(32-liter)	1	Hydraulic oil (Up to mid point on level)	
Weekly	⑥ Winch drum gear	1	Chassis grease	Grease gun
	⑦ Rotation gear teeth	1	Chassis grease	Brush
	⑧ Propeller shaft	3	Chassis grease	Grease gun
Monthly	⑨ Winch gear box(about 0.9 liter)	1	Gear oil	
	⑩ Swing gear box(about 0.7 liter)	1	Gear oil	
	⑪ Wire rope	1	Chassis grease	Brush
	⑫ Swing bearing	2	Chassis grease	Grease gun