

# EPS14

## SERVICE MANUAL

< SM-EPS142016002-EN >



BYD FORKLIFT



**This manual is used for authorized personnel to service BYD forklifts**

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# MAINTENANCE INTERVAL

This chapter explains the maintenance interval.

# DAILY MAINTENANCE

## Integral and Items

The period is accumulated in days or hours of operation whichever comes first. For example, if the forklifts works less than 8 hours per day, conduct the following inspection and checks on a daily basis. If daily working hours exceed 8 hours, conduct the following inspection and checks every 8 hours.

inspection checklist:

No.	Item	1 Day	1 Week
		8 Hours	40 Hours
1	Exterior	Inspection	
2	Wheel	Clean and Tighten	Clean and Tighten
3	Mast	Inspection	
4	Hydraulic	Inspection	
5	Display	Inspection	
6	Warning Equipments	Inspection	
7	Braking	Inspection	Inspection
8	Travel, Steering and Control	Inspection	
9	Electric	Inspection	
10	Clean	Clean	
11	Other Anomalies	Inspection	

### Caution

These inspections should be conducted before operating the forklift.

### Note

Before conducting the daily inspection, recheck for any fault and error found earlier.

## Content Description

### 1. Exterior

- (1) Check the truck body for damage and deformation.
- (2) Check if there is any leakage.
- (3) Check the condition of the nameplate and decals.
- (4) Check if any parts loose or fall off.

### Note

If any leakage occurs, confirm the location of the oil leakage and contact the after sale service.

### 2. Wheel

- (1) Check on a daily basis if the wheel nuts are secured or loose. Fasten them if they are loose.
- (2) Take out debris embedded in the tire.
- (3) If the tires are unevenly worn, or the tires are found damaged, or the rims are bent, then replace the tires.

### 3. Mast

- (1) Check the cylinders, oil pipes, and hoses for any oil leakage.
- (2) Check the mast for deformation and damage. Check if the bolts are securely fastened.

### 4. Hydraulic

Check the hydraulic oil level in the oil tank.

### 5. Display

- (1) Check if the battery voltage and status of charger displayed are correct.
- (2) Check if any error or fault indicator appears.

### 6. Warning Equipments

- (1) Press horn button to see if it works.

(2) Check if other warning equipments work properly.

### 7. Braking Performance

Brake the truck when driving it to checking it's performance.

### 8. Travel, Steering and Control Checking

(1) Check for the operation of the tiller and abnormal sounds by rotating the tiller forward or backward and turning the tiller right or left.

(2) Check for the operation of buttons.

(3) Check if any fasteners loose or fall off.

### 9. Electric Checking

(1) Check if there any parts loose in the circuit and tighten them if necessary. Check if there are anything abnormal of connectors (for example, burn marks).

(2) Check if the fuses of the controller are normal, replace them if necessary.

(3) Check if there are any burn marks on the connecting bars, replace them if necessary.

(4) Inspecting fuses and relays and replace them if necessary.

### Warning

Disconnect the battery before checking the electric system.

### 10. Clean

Clean the truck.

### 11. Other Anomalies

Check if there are anything abnormal.

## REGULAR MAINTENANCE

### Integral and Items

The period is accumulated in months or hours of operation whichever comes first. For example, if the truck works less than 250 hours in 6 weeks, conduct the following inspection and checks every 6 weeks, otherwise conduct the following inspection and checks every 250 hours.

Category	Item	6 (Weeks)	3	6	12	Months
		250	500	1000	2000	Hours
Chassis	Gear Oil Level Checking	First Check		Inspection		
Mast	Lift Chain Adjustment	Adjust				
	Lift Chain Lubrication	Lubricate				
	Mast Cleaning	Clean				
	Mast Clearance Adjustment	Adjust				
Hydraulic	Hydraulic Oil Replacement					Replace
	Oil Filter with Breather Filter					Replace
Electric	Electric Checking	Inspection				
Others	Critical Fasteners Torque Checking	Inspection				

#### Note

If the working environment is harsh, the maintenance interval should be reduced, and advice from aftersales personnel should be sought.

### Category, Amount And Type of Supplementary Material

Item	Category	Amount	Type
Gear Oil Level Checking	Gear Oil	1.05 L	SAE 80W-90
Lift Chain Lubrication	Machine Oil	As Needed	20# (Winter), 40# (Other Seasons)
Hydraulic Oil Replacement	Hydraulic Oil	9 L	ISO VG46 ( $\leq 46^{\circ}\text{C}$ ), ISO VG68 ( $\leq 68^{\circ}\text{C}$ )

#### Note

The given quantities are maximum values and take the actual quantities as the standard.

### Content Description

#### 1. Chassis

Check the gear oil level, add it if necessary.

#### 2. Mast

- (1) Check the tension the lift chains, adjust them if necessary.
- (2) Lubricate the lift chains.
- (3) Clean the lift chains.

#### 3. Hydraulic

- (1) Replace the hydraulic oil periodically.
- (2) Replace the oil filler with breather filler periodically.

#### 4. Electric

- (1) Check the circuit of the truck.
- (2) Check fuses and relays.

Check the controller.

#### 5. Others

Check the torque on the critical fastener.

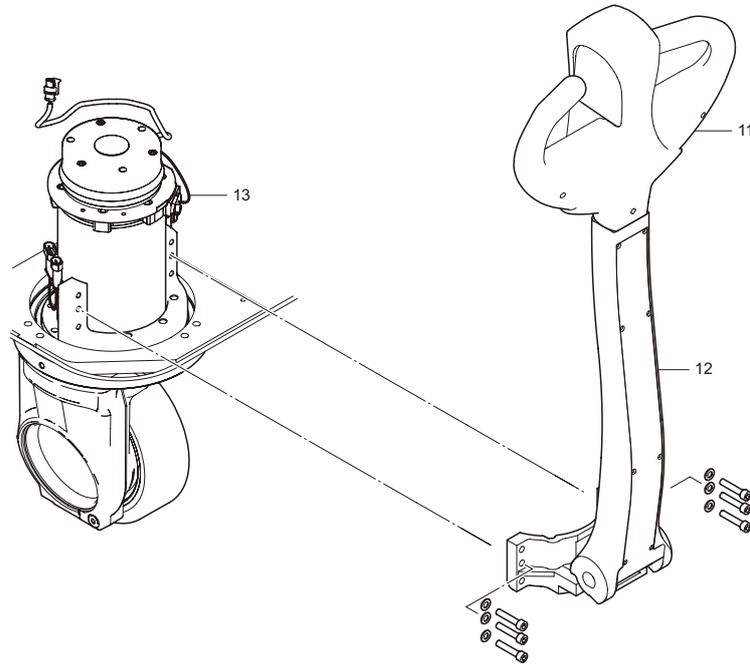
# CHASSIS MAINTENANCE

This chapter explains how to maintain the chassis of the truck.

## TILLER HEAD AND TILLER ARM

### Description

The tiller head is fixed on the tiller arm, which is connected to the drive axle and motor assembly to steer the truck.

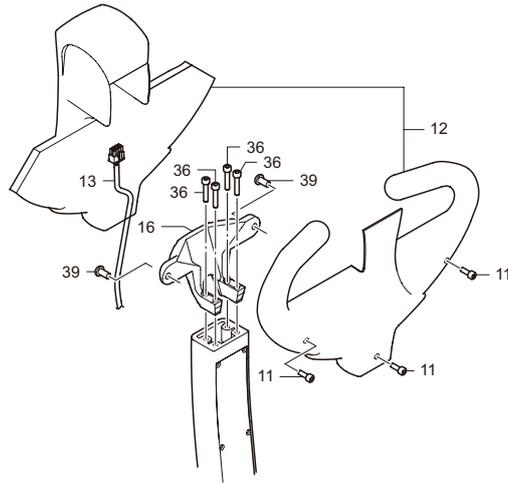


Code	Name	QTY	Information	Code	Name	QTY	Information
11	Tiller Head	1		13	Drive Axle And Motor Assembly		
12	Tiller Arm	1					

### Tiller Head Removal and Installation

#### 1. Removal

- (1) Remove the mounting screws to disassembly the tiller head.
- (2) Remove the mounting screws of the tiller and the mounting bracket, and then remove the tiller head.



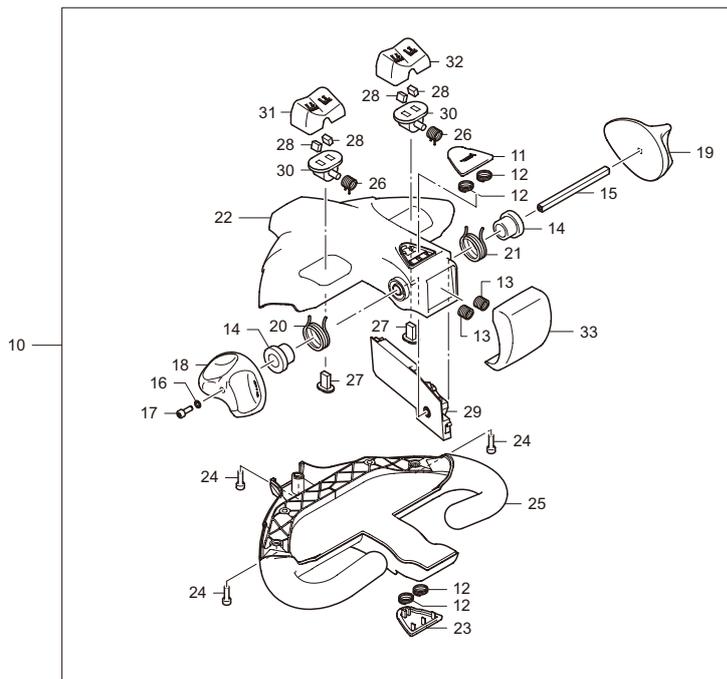
Code	Name	QTY	Information	Code	Name	QTY	Information
11	Screw M6×10	3		16	Tiller Head Mounting Bracket	1	
12	Tiller Head	1		36	Screw M6×30	4	
13	Dataline	1		39	Screw M8×15	2	

2. Installation

Follow the removal steps in reverse to install the tiller head.

Tiller Head Overhaul

Use the picture of the explosive view as the guide to overhaul the tiller head.



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Tiller	1		22	Upper Part	1	
11	Horn Cover	1		23	Low Speed Switch Cover	1	

12	Spring For Horn And Low Speed Switch	4		24	Screw M6×10	3	
13	Emergency Reverse Switch Spring	2		25	Lower Part	1	
14	Bearing	2		26	Hinge Spring	2	
15	Shaft	1		27	Sensor Rocker Lever	2	
16	Washer	2		28	Magnet	4	
17	Screw M3×16	2		29	Pcb	1	
18	Butterfly Switch (Lh)	1		30	Magnet Holder	2	
19	Butterfly Switch (Rh)	1		31	Rocker Lever (Lh)	1	
20	Hinge Spring (Lh)	1		32	Rocker Lever (Rh)	1	
21	Hinge Spring (Rh)	1		33	Emergency Reverse Switch Cover	1	

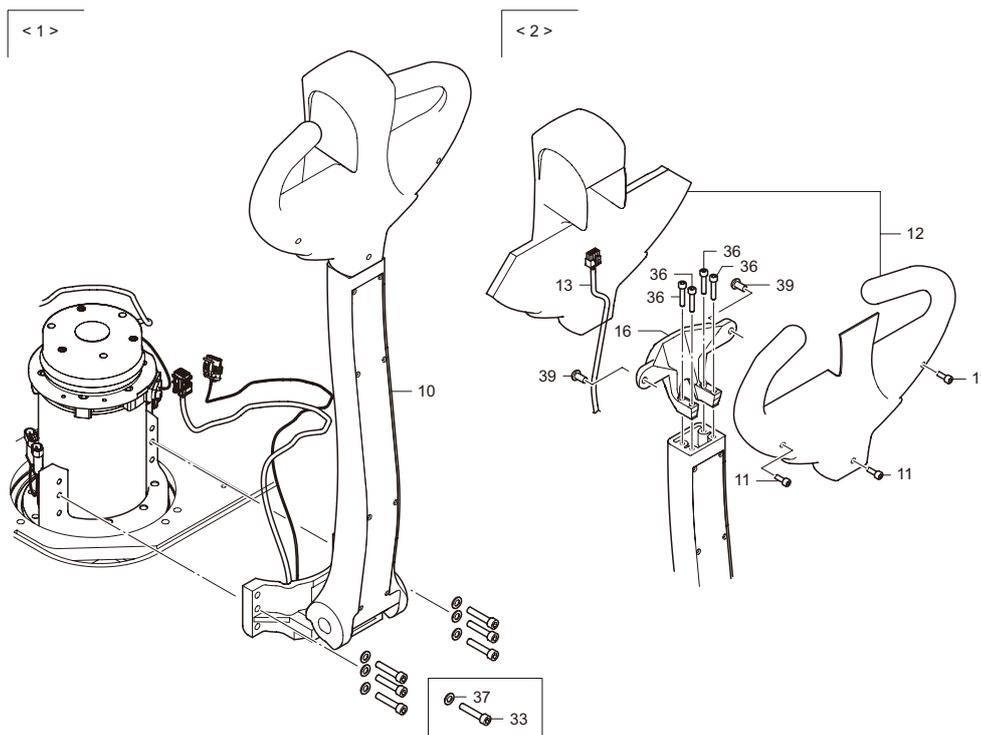
**Caution**

Antistatic gloves are needed when the PCB is being removed or installed.

**Tiller Arm Removal and Installation**

**1. Removal**

- (1) Remove the mounting screws of the tiller head and arm assembly, disconnect the dataline, and then remove the the tiller head and arm assembly.
- (2) Remove the tiller head.



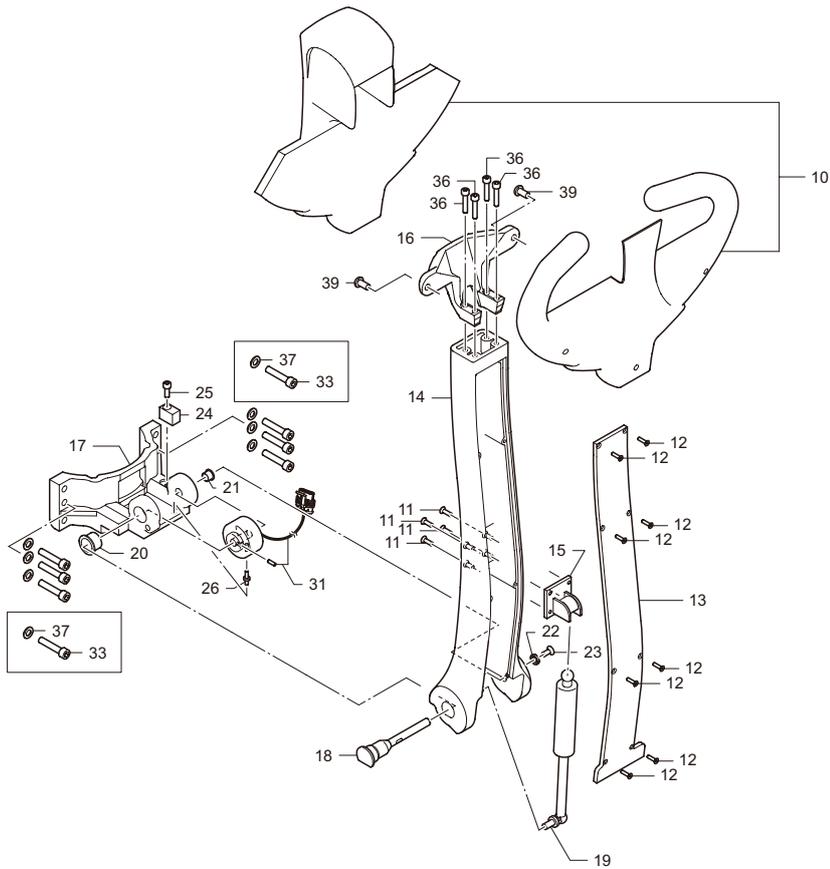
Code	Name	QTY	Information	Code	Name	QTY	Information
10	Tiller Head And Arm Assembly	1		33	Screw M8×45	6	
11	Screw M6×10	3		36	Screw M6×30	4	
12	Tiller Head	1		37	Washer M8	6	
13	Dataline	1		39	Screw M8×15	2	
16	Tiller Head Mounting Bracket	1					

**2. Installation**

Follow the removal steps in reverse to install the tiller arm.

## Tiller Arm Overhaul

Use the picture of the explosive view as the guide to overhaul the tiller arm.

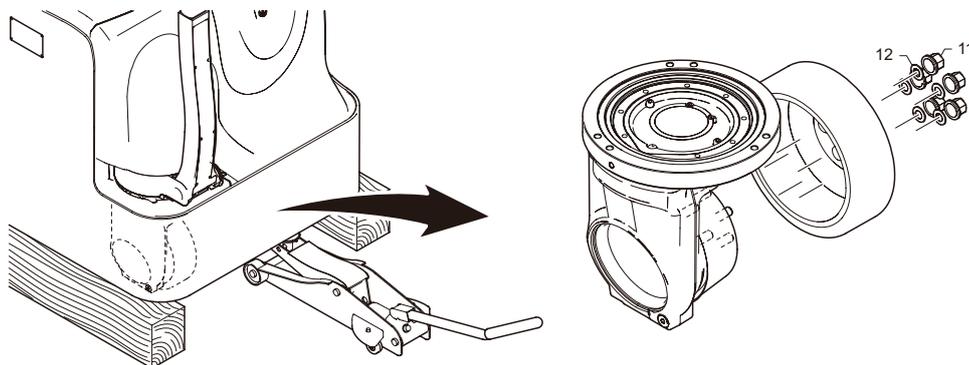


Code	Name	QTY	Information	Code	Name	QTY	Information
10	Tiller Head	1		21	Bushing	1	
11	Screw M5×16	4		22	Washer	1	
12	Screw M4×16	8		23	Screw M6×16	1	
13	Cover	1		24	Rubber Cushion	1	
14	Tiller Arm	1		25	Screw M6×16	1	
15	Retainer Support	1		26	Retainer Shaft	1	
16	Tiller Head Mounting Bracket	1		31	Angle Sensor	1	
17	Connecting Block	1		33	Screw M8×45	6	
18	Mounting Shaft	1		36	Screw M6×30	4	
19	Gas Spring 1200N	1		37	Washer M8	6	
20	Bushing	1		39	Screw M8×15	2	

## DRIVE AXLE AND WHEEL

### Drive Wheel Replacement

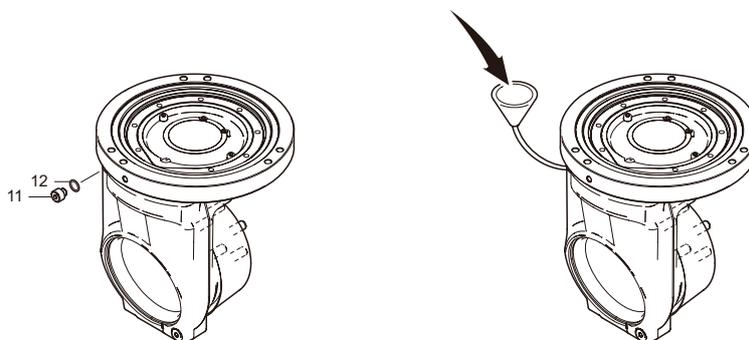
Use the floor jack to raise the truck, and then place the hardwood block under it. Loosen the nuts to replace the wheel.



Code	Name	QTY	Information
11	Hexagon Nut	5	90 N-m
12	Spherical Spring Washer	5	

### Gear Oil Level Checking

- (1) Clean the surrounding areas around the oil filler plug, and then unscrew it with the seal.
- (2) Check the oil level. The correct oil level and the correct oil quantity is achieved when the oil level is at the lower edge of the oil filler plug. Add gear oil if necessary.
- (3) After checking, screw in the oil filler plug with the sealing ring.



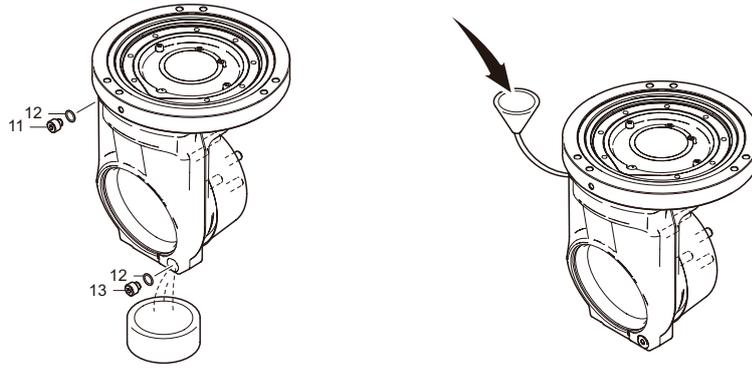
Code	Name	QTY	Information
11	Oil Filler Plug	1	30 N-m
12	Seal	1	

#### Caution

- (2) When filling the oil, care about the condition around to prevent dust and water entering the gear box.
- (3) The correct oil level and the correct oil quantity is achieved when the oil level is at the lower edge of the oil filler plug

### Gear Oil Replacement

- (1) Clean the surrounding areas around the oil filler plug and the oil drain plug, and place a suitable vessel under the oil.
- (2) Unscrew the oil filler plug and the oil drain plug with sealing rings.
- (3) After draining, screw in the oil drain plug with the new sealing ring.
- (4) Add gear oil until the oil level is at the lower edge of the oil filler plug. Screw in the oil filler plug with the sealing ring.



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Oil Filler Plug	1	30 N-m	13	Oil Drain Plug	1	30 N-m
12	Seal	2					

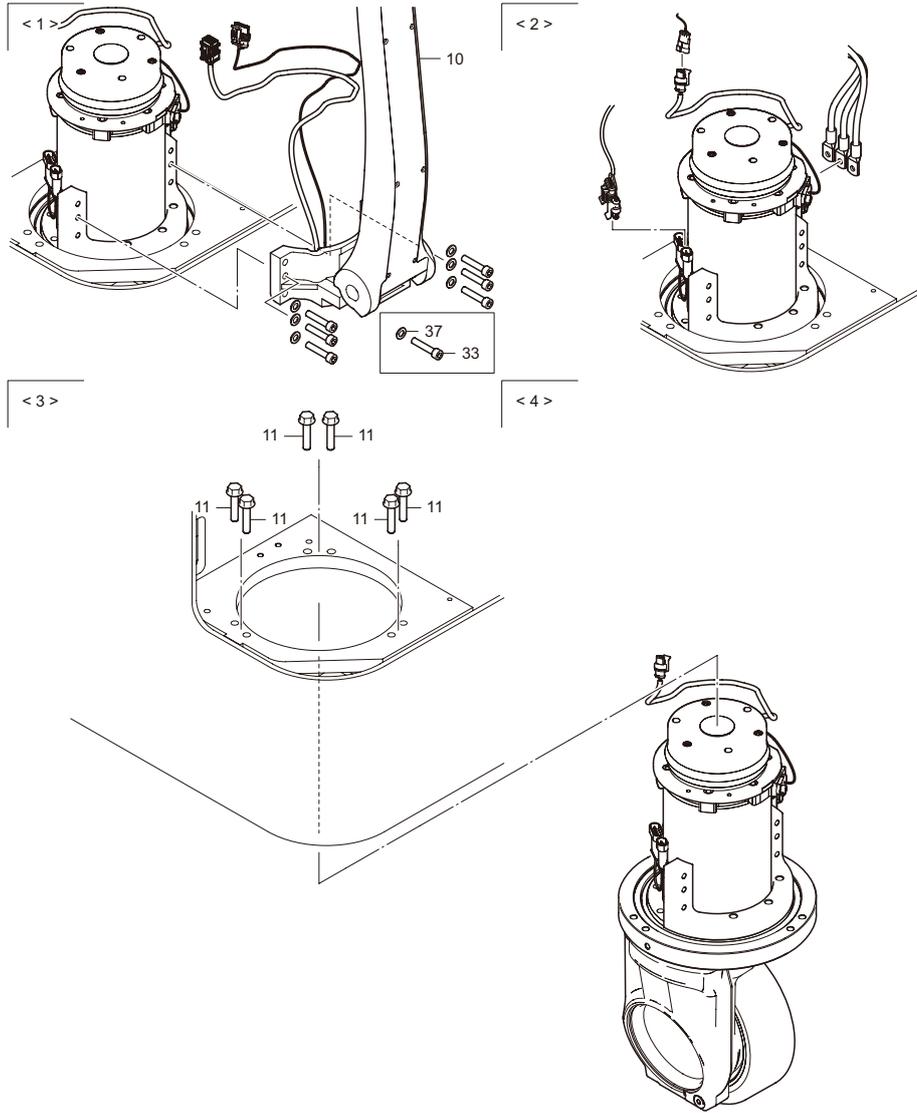
**Caution**

- (2) Oil drain time of approximate 5 minutes must not be exceeded.
- (3) When filling the oil, care about the condition around to prevent dust and water entering the gear box.
- (4) When disposing the waste oil, keep children away and do not pour it into the sewer or onto the ground.
- (5) The correct oil level and the correct oil quantity is achieved when the oil level is at the lower edge of the oil filler plug

**Drive Axle and Motor Assembly Removal and Installation**

1. Removal

- (1) Before removal, remove the cover.
- (2) Remove the tiller head and arm assembly.
- (3) Disconnect cables(high and low voltage cables).
- (4) Remove the fasteners of the drive axle and motor assembly, hoist the truck frame, and then separate them.
- (5) Put the drive axle and motor assembly on the flat floor or sturdy pallets.



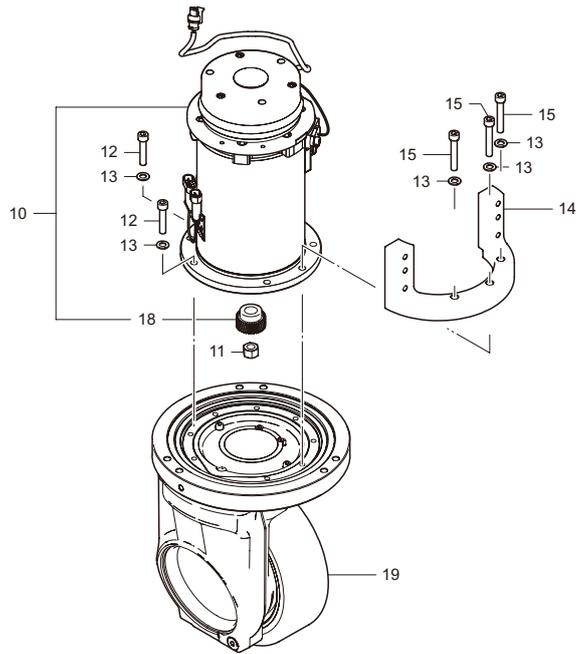
Code	Name	QTY	Information	Code	Name	QTY	Information
10	Tiller Head And Arm Assembly	1		33	Screw M8×45	6	
11	Hexagon Flange Bolt M10×45	6		37	Washer M8	6	

2. Installation

Slowly set the drive axle and motor assembly down on the flat floor or sturdy pallets.

Drive Axle and Motor Separation

Remove the mounting bolts to remove the motor.



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Drive Motor	1		14	Mounting Block	1	
11	Nut M12	1		15	Hexagon Screw M8×50	3	
12	Screw M8×25	2		18	Pinion	1	
13	Washer M8	5					

### Drive Axle and Motor Installation

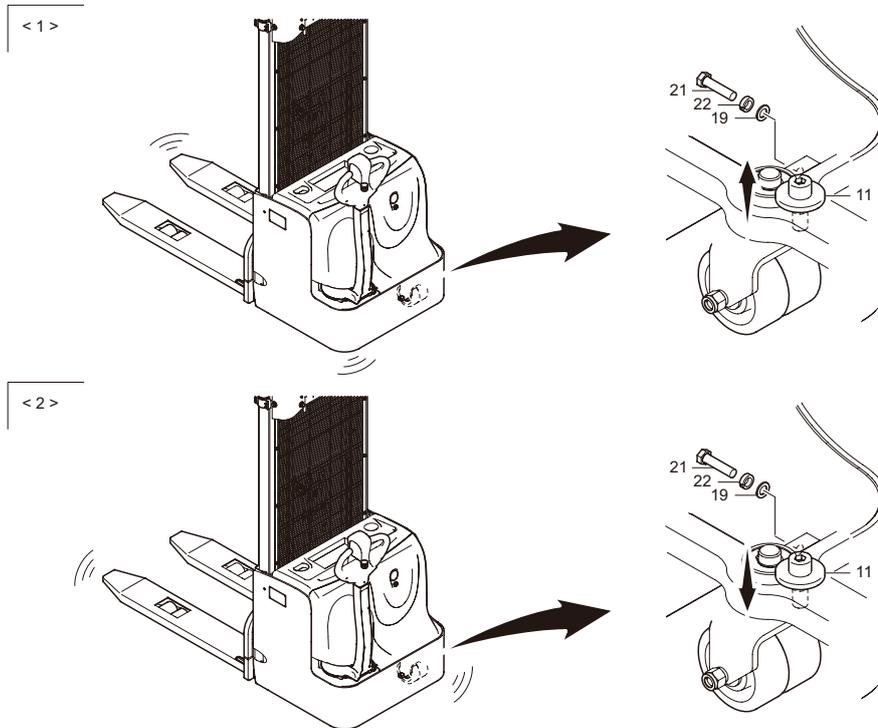
Follow the separation steps in reverse to install the motor on the drive axle.

# BALANCE MECHANISM AND CASTOR WHEELS

## Balance Inspection and Adjustment

If the abnormal shaking occurs, the truck balance is needed to adjusted. Remove the back cover, and then use the retainer to adjust the balance. Before adjustment, place the truck on the sturdy and level ground, and then loosen the mounting bolt of the castor wheel assembly.

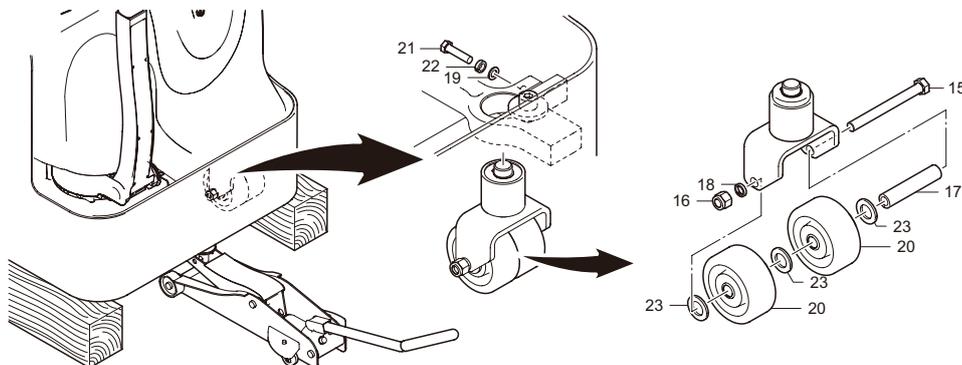
- (1) When the front right side or the rear left side of the truck shakes, turn the retainer upward.
- (2) When the front left side or the rear right side of the truck shakes, turn the retainer downward.



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Retainer	1		21	Bolt M12×45	1	
19	Washer M12	1		22	Spring Washer	1	

## Castor Wheel Replacement

- (1) Use the floor jack to raise the truck, and then place the hardwood block under it. Loosen the bolt to take out the wheel assembly.
- (2) Loosen the nut and bolt to replace the wheel.



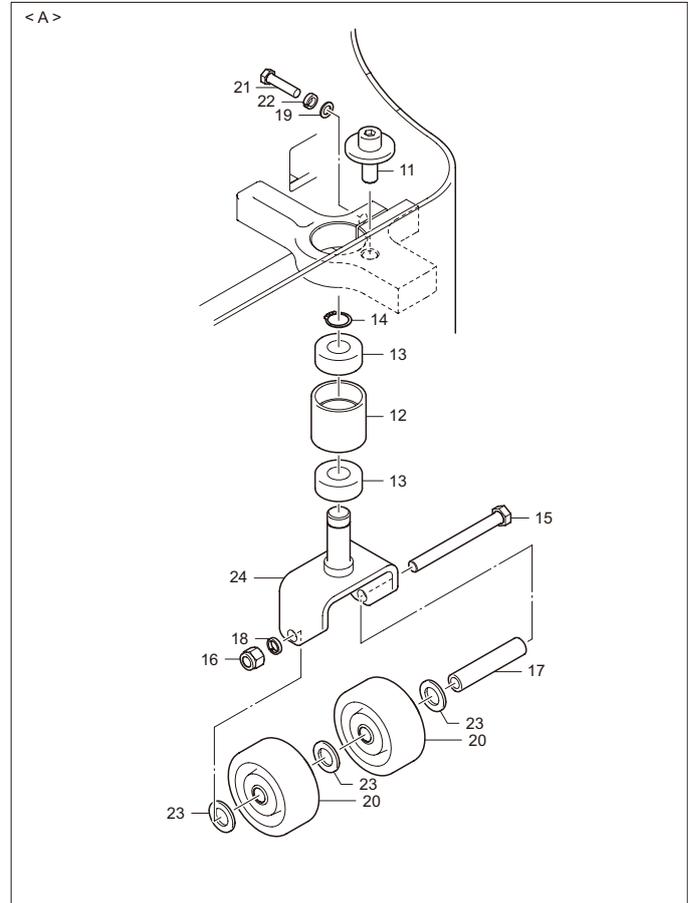
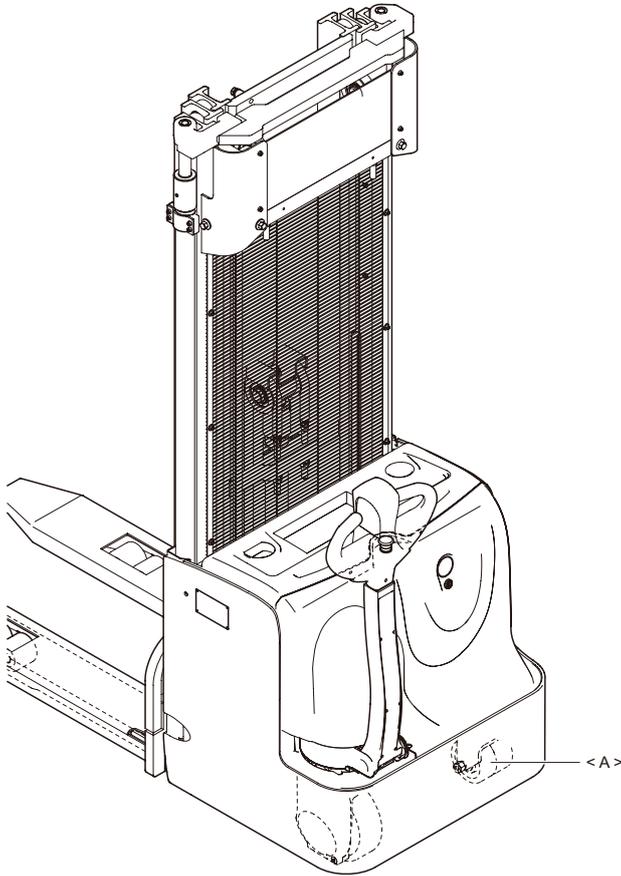
Code	Name	QTY	Information	Code	Name	QTY	Information
15	Bolt M16×160	1		20	Castor Wheel	2	
16	Nut M16	1	110 N·m	21	Bolt M12×45	1	90 N·m

## CHASSIS MAINTENANCE

17	Bushing	1		22	Spring Washer	1	
18	Spring Washer M16	1		23	Wahser	3	
19	Washer M12	1					

### Balance Mechanism Overhaul

Use the picture of the explosive view as the guide to overhaul the balance mechanism.

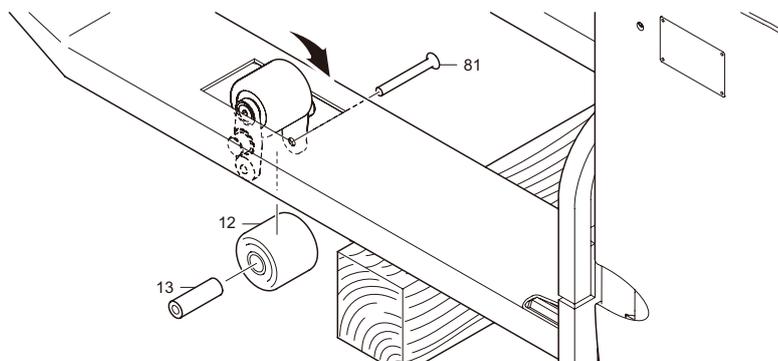


Code	Name	QTY	Information	Code	Name	QTY	Information
11	Retainer	1		18	Spring Washer M16	1	
12	Mounting Tube	1		19	Washer M12	1	
13	Bearing	2		20	Castor Wheel	2	
14	Circlip	1		21	Hexagon Bolt M12×45	1	
15	Bolt M16×160	1		22	Spring Washer	1	
16	Nut M16	1		23	Wahser	3	
17	Bushing	1		24	Support	1	

## LOAD WHEEL

### Load Wheel Replacement

1. Use the hoist equipment to raise the forks until the fork load wheel assembly can be rotated by 90 degrees, and then place the hardwood block under the forks.
2. Loosen the screw to replace one wheel, and then rotate the fork load wheel assembly by 180 degrees to replace the other wheel.
3. Use the same method to replace wheels on the other side.



Code	Name	QTY	Information	Code	Name	QTY	Information
12	Load Wheel	4		81	Screw	4	90 N-m
13	Bushing	4					

#### Caution

4. All fork load wheels should be replaced as a set.
5. After replacement, the truck balance should be adjusted.

# MAST MAINTENANCE

This chapter explains how to maintain the mast of the truck.

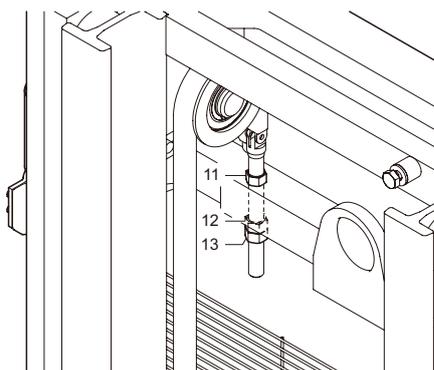
## CHAIN

### 2-Stage Standard Mast Lift Chain Adjustment

The 2-stage standard mast has the main lift chain that is needed to be adjusted.

Fork-to-ground clearance adjustment:

- (1) Lower the mast fully.
- (2) Loosen the upper nut (that some masts have) and the lower nut.
- (3) Screw the middle nut to adjust the chain until it meet the requirement.
- (4) Tighten the upper and lower nuts.



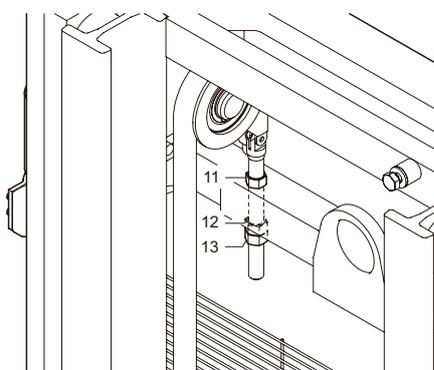
Code	Name	QTY	Information	Code	Name	QTY	Information
11	Nut (Upper)	1	110 N-m	13	Nut (Lower)	1	110 N-m
12	Nut (Middle)	1	110 N-m				

### 3-Stage Free Lift Mast (3 Cylinders) Chain Adjustment

The 3-stage free list mast (3 cylinders) has a main lift chain set and a free lift chain set that are needed to be adjusted.

1. Inner mast bottom height adjustment:

- (1) Lower the mast fully.
- (2) Loosen the upper nut (that some masts have) and the lower nut.
- (3) Screw the middle nut to adjust the chain until it meet the requirement.
- (4) Tighten the upper and lower nuts.



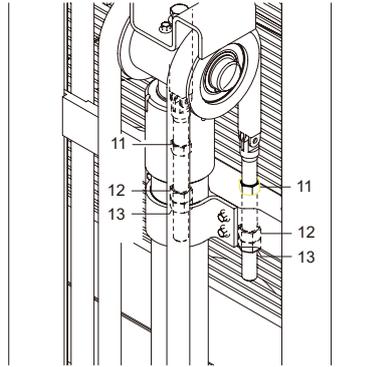
Code	Name	QTY	Information	Code	Name	QTY	Information
11	Nut (Upper)	1	110 N-m	13	Nut (Lower)	1	110 N-m
12	Nut (Middle)	1	110 N-m				

2. Fork-to-ground clearance adjustment:

- (1) Lower the mast fully.

# MAST MAINTENANCE

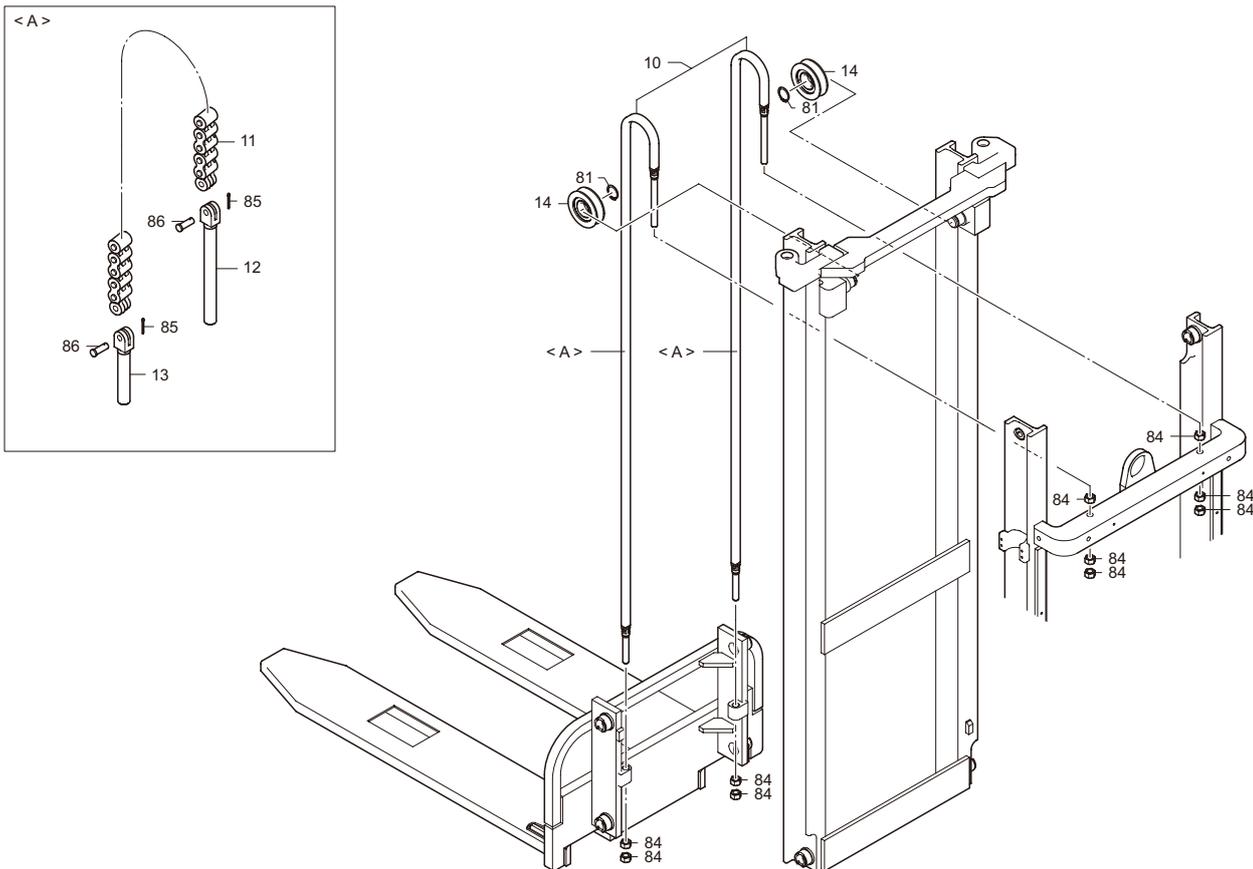
- (2) Loosen the upper nut (that some masts have) and the lower nut.
- (3) Screw the middle nut to adjust the chain until it meet the requirement.
- (4) Tighten the upper and lower nuts.



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Nut (Upper)	1	110 N-m	13	Nut (Lower)	1	110 N-m
12	Nut (Middle)	1	110 N-m				

## 2-Stage Standard Mast Chain Replacement

### 1. Explosive View



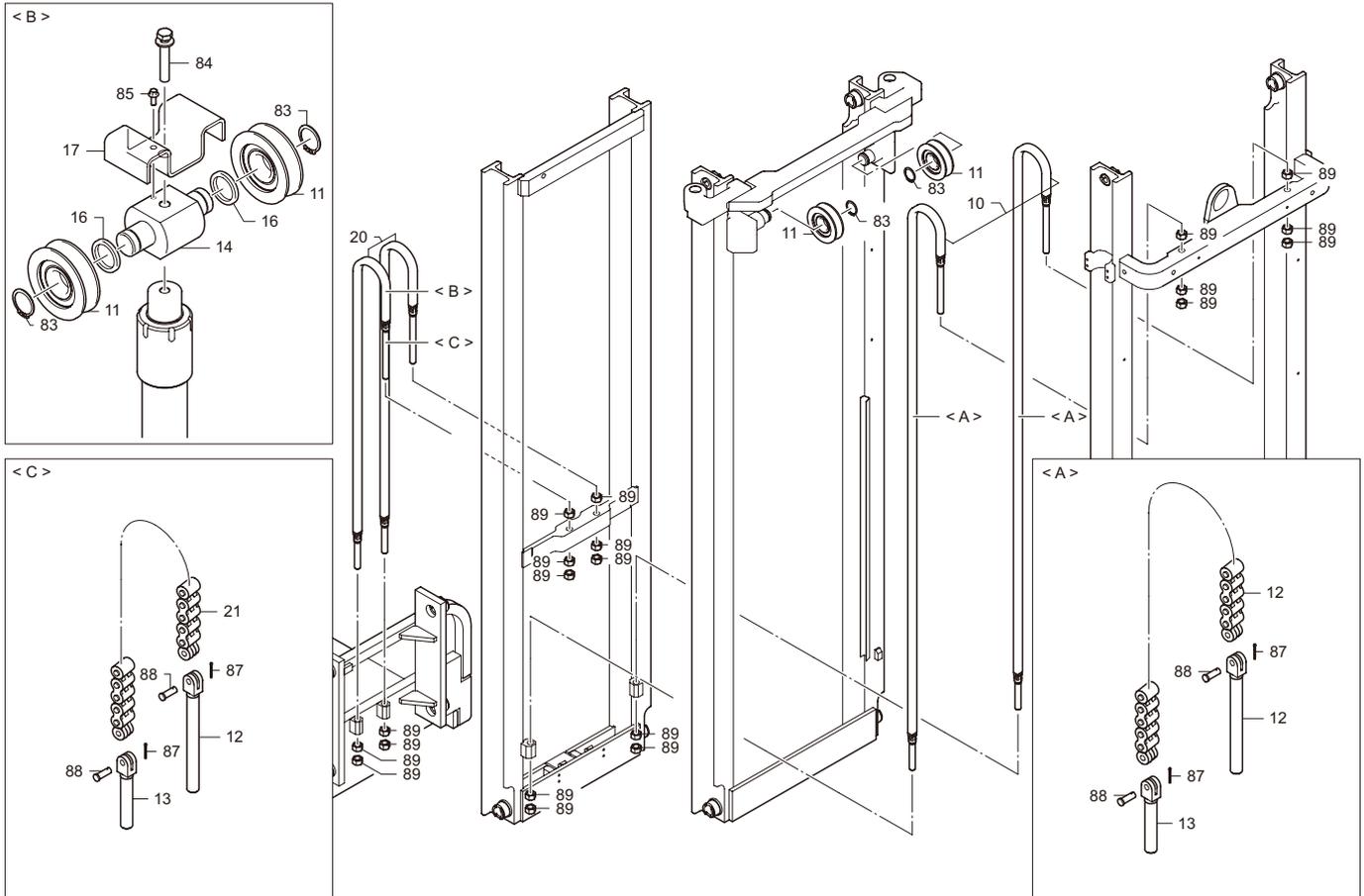
Code	Name	QTY	Information	Code	Name	QTY	Information
10	Free Lift Chain Set	1		81	Circlip	2	
11	Chain	2		84	Nut M16	10	
12	Long Anchor	2		85	Split Pin	4	
13	Short Anchor	2		86	Pin	4	
14	Chain Sheave	2					

2. Main Lift Chain Replacement Procedure

- (1) Lower the mast fully.
- (2) Use a reliable hoisting strap to hang the upper beam of the carriage, and secure the strap with a safety hook. Slowly lift the hook to make chains slack, and then block it.
- (3) Remove the split pin and the pin on the outer mast side and pull the chain off from the sheave.
- (4) Remove the split pin and the pin on the other side.
- (5) Follow the steps in reverse to replace chains as a set, and adjust the chain after replacement.

3-Stage Free Lift Mast (4 Cylinders) Chain Replacement

1. Explosive View



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Free Lift Chain Set	1		21	Chain	2	
11	Chain Sheave	4		83	Circlip	4	
12	Chain	2		84	Bolt Assy M12×70	1	
14	Chain Sheave Head	1		85	Hexagon Flange Bolt M6×16	1	
16	Washer	2		87	Split Pin	8	
17	Protection	1		88	Pin	8	
20	Free Lift Chain Set	1		89	Nut M16	20	

2. Main Lift Chain Replacement

- (1) Lower the mast fully.
- (2) Use a reliable hoisting strap to hang the upper beam of the inner mast, and secure the strap with a safety hook. Slowly lift the hook to make chains slack, and then block it.
- (3) Remove the split pin and the pin on the outer mast side and pull the chain off from the sheave.
- (4) Remove the split pin and the pin on the other side.
- (5) Follow the steps in reverse to replace chains as a set, and adjust the chain after replacement.

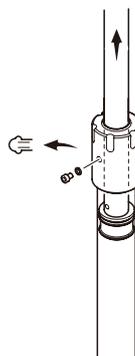
**3. Free Lift Chain Replacement**

- (1) Lower the mast fully.
- (2) Use a reliable hoisting strap to hang the upper beam of the carriage, and secure the strap with a safety hook. Slowly lift the hook to make chains slack, and then block it.
- (3) Move attachment hoses away from chains.
- (4) Remove the split pin and the pin on the outer mast side and pull the chain off from the sheave.
- (5) Remove the split pin and the pin on the other side.
- (6) Follow the steps in reverse to replace chains as a set, move attachment hoses back, adjust the chain after replacement.

## LIFT CYLINDER

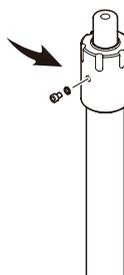
### Lift Cylinder Air-Exhausting

- (1) Lower the mast fully.
- (2) Remove the screw and washer on the top side of the cylinder.
- (3) Fully lift the main lift cylinder (or free lift cylinder) to exhaust the air in the cylinder.
- (4) Install the washer and the screw, and then tighten the screw.



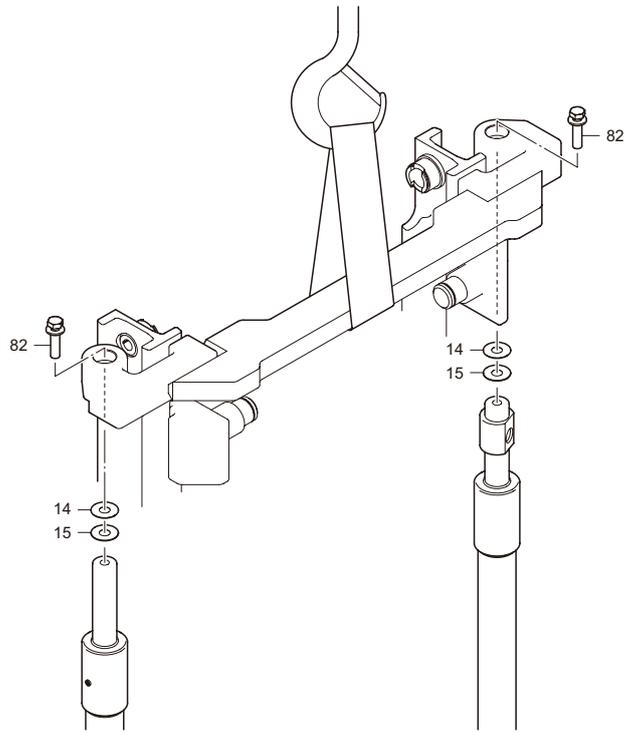
### Cylinder Rod Lubrication

- (1) Lower the mast fully.
- (2) Remove the screw and washer on the top side of the cylinder.
- (3) Add some hydraulic oil into the cylinder tube through the upper hole to lubricate the cylinder rod.
- (4) After lubrication, exhaust the air in the lift cylinder, and then fasten the screw.



### Lift Cylinder Shimming

- (1) Lift the mast to find the cylinder rod top of the shorter stroke.
- (2) Lower the mast fully.
- (3) Use a reliable hoisting strap to hang the upper beam of the inner mast (2-stage mast) or the middle mast (3-stage mast), and secure the strap with a safety hook.
- (4) Remove the piston rod bolt.
- (5) Slowly lift the hoisting strap to expose both cylinder rod tops.
- (6) Insert several shims over the cylinder rod top of the shorter stroke to achieve equal stroke length.
- (7) Slowly lower the inner (or middle) mast back onto the rod tops, and then screw and tighten cylinder rod bolt.

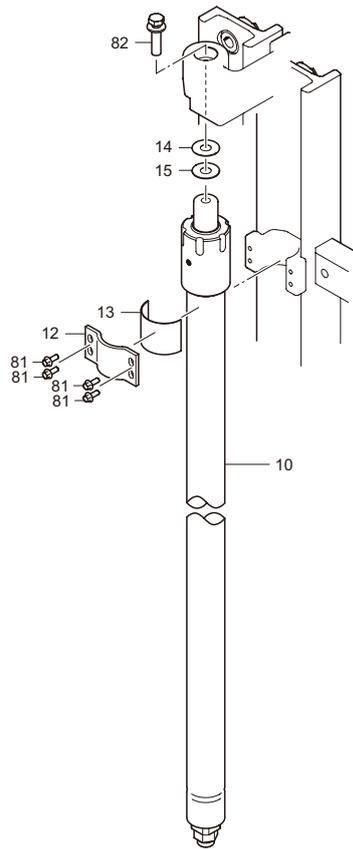


Code	Name	QTY	Information	Code	Name	QTY	Information
14	Shim 0.5Mm	2		82	Bolt M12×50	2	
15	Shim 1.0Mm	2					

## Main Lift Cylinder Removal and Installation

### 1. Removal

- (1) Lower the mast fully.
- (2) Use a reliable hoisting strap to hang the upper beam of the inner mast (2-stage mast) or the middle mast (3-stage mast), and secure the strap with a safety hook.
- (3) Remove bolts, clamps, supports from cylinders.
- (4) Slowly lift the hoisting strap to release cylinders, and then remove all shims and note down quantities and location.
- (5) Disconnect fittings and hoses from the bottom of cylinders.
- (6) Remove cylinders.



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Lift Cylinder	2		15	Shim 1.0Mm	2	
12	Support	2		81	Hexagon Flange Bolt M6×16	8	
13	Cushion Rubber	2		82	Bolt M12×50	2	
14	Shim 0.5Mm	2					

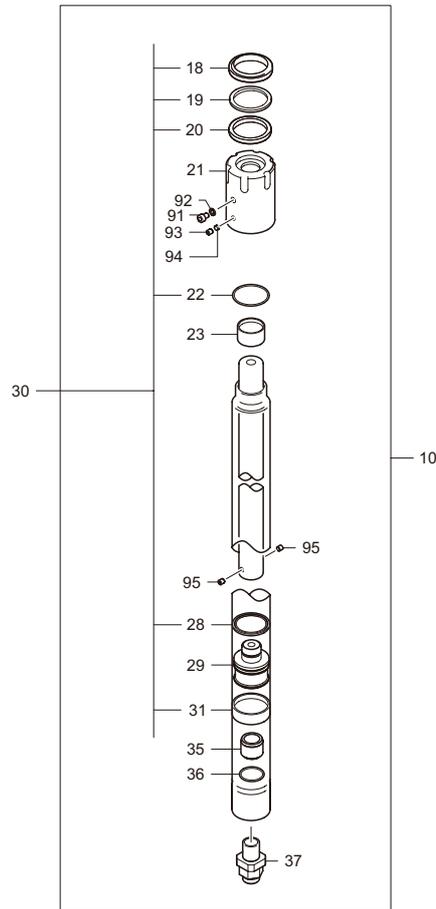
2. Installation

Follow the removal steps in reverse to install main lift cylinders.

Main Lift Cylinder Overhaul

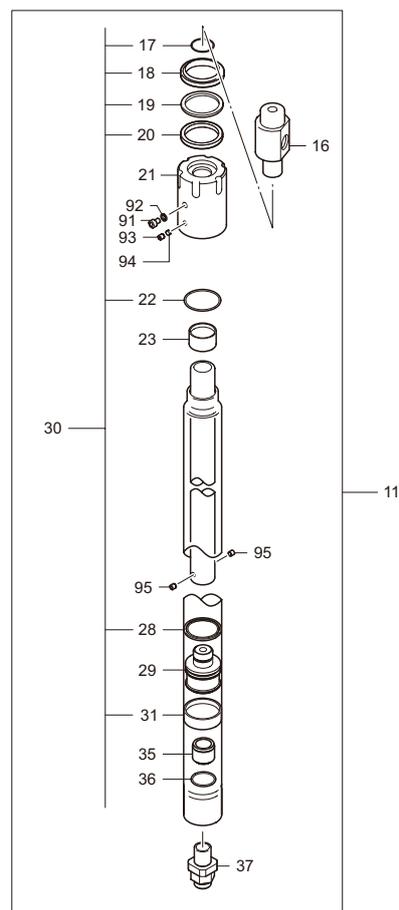
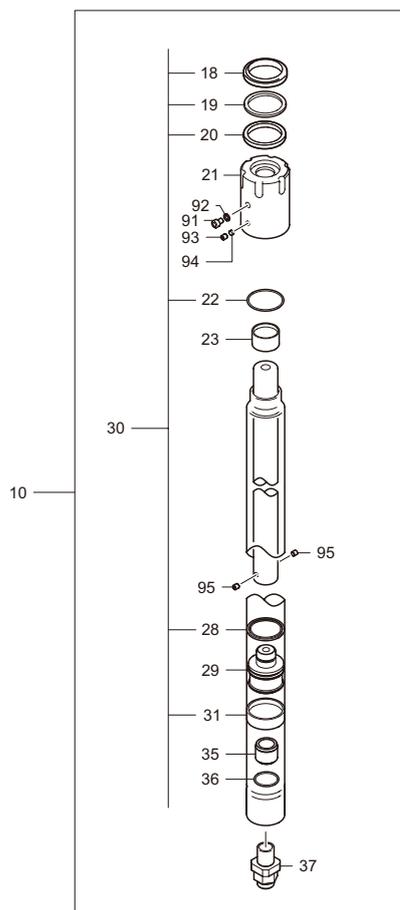
1. Explosive View

(1) 2-stage Mast Main Cylinder Explosive View



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Lift Cylinder	2		31	Back-Up Ring	2	
18	Dust Wiper	2		35	Bushing	2	
19	Retainer Ring	2		36	Steel Retainer Ring	2	
20	Seal	2		37	Safety Valve	2	
21	Gland	2		91	Screw M6×16	1	
22	O-Ring	2		92	Washer	1	
23	Steel-Backed Bearing	2		93	Screw M6×6	1	
28	Glyd Ring	2		94	Rubber	1	
29	Piston	2		95	Screw M4×6	4	
30	Seal Kit	2					

(2) 3-stage Mast Main Cylinder Explosive View



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Left Main Lift Cylinder	1		30	Seal Kit	2	
11	Right Main Lift Cylinder	1		31	Back-Up Ring	2	
16	Connecting Shaft	1		35	Bushing	2	
18	Dust Wiper	2		36	Steel Retainer Ring	2	
19	Retainer Ring	2		37	Safety Valve	2	
20	Seal	2		91	Screw M6×16	1	
21	Gland	2		92	Washer	1	
22	O-Ring	2		93	Screw M6×6	1	
23	Steel-Backed Bearing	2		94	Rubber	1	
28	Glyd Ring	2		95	Screw M4×6	4	
29	Piston	2					

## 2. Main Lift Cylinder Disassembly

- (1) Clean rod tops and gland thoroughly to prevent contamination.
- (2) Remove the gland (with O-rings and seals), and then carefully take the rod and piston (with O-rings and seals) out of the
- (3) cylinder tube and place them in a clean area.
- (4) Remove the valve on the cylinder bottom side, and then cover the cylinder to prevent contamination.
- (5) Remove all O-rings and seals from the gland and the piston.
- (6) Remove the snap ring from the piston bore to release the check valve.

## 3. Parts Inspection

- (1) Clean all parts completely in a suitable solvent. Dry all parts with a soft clean cloth.
- (2) Inspect dust wipers, o-rings, seals, bushings, back-up rings of the gland or the rod and piston. And inspect all O-rings and seals grooves for nicks, burrs, and scratches that can damage components during reinstallation.
- (3) Inspect the cylinder tube and bore for cracks, pining, scoring, or other irregularities that may require replacement of the cylinder.

(4) Inspect the valve in the piston.

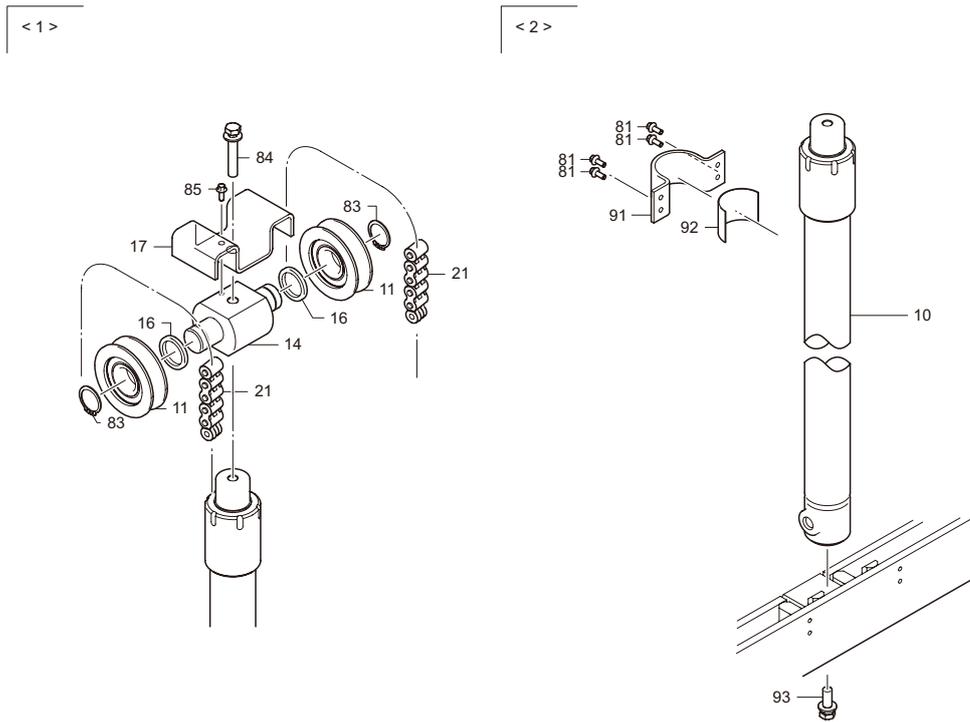
**4. Cylinder Reassembly**

- (1) Coat all o-rings, seals, bushings, back-up rings, the rod and piston, valves, and the inner wall of the gland and the cylinder tube in clean hydraulic oil before reassembly.
- (2) Replace the dust wipers, o-rings, seals, of the gland and piston as a set.
- (3) Carefully insert the rod and piston into the cylinder without damaging cylinder tube threads and inner wall.
- (4) Lubricate cylinder threads and carefully screw gland onto the cylinder fully without damaging o-rings and seals.
- (5) Check and ensure the piston slides freely, and then tighten the gland.
- (6) Install the valve on the cylinder bottom side.

**Free Lift Cylinder Removal and Installation**

**1. Removal**

- (1) Lower the mast fully.
- (2) Use a reliable hoisting strap to hang the upper beam of the inner mast (2-stage mast) or the middle mast(3-stage mast), and secure the strap with a safety hook.
- (3) Remove screw and the protection on the free lift chain.
- (4) Slowly lift the hoisting strap to release the chain, and then move it away from the sheave.
- (5) Loosen bolts to remove the support and sheaves.
- (6) Loosen the cylinder rod bolt to release the cylinder.



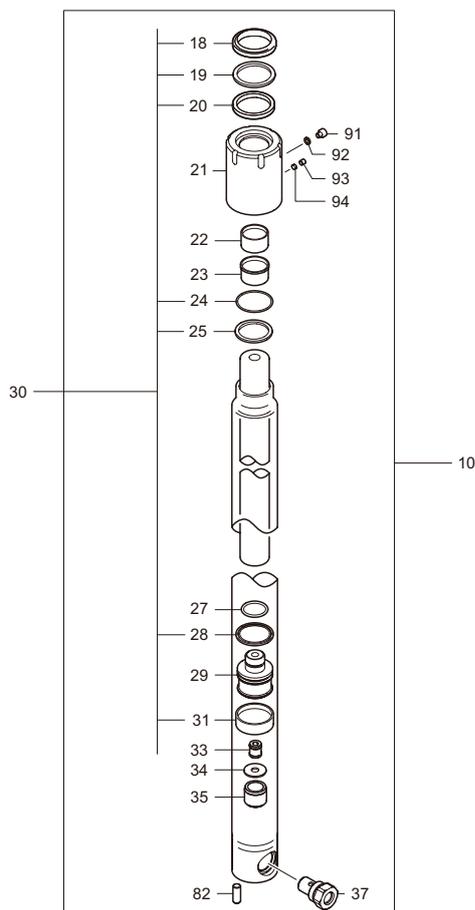
Code	Name	QTY	Information	Code	Name	QTY	Information
10	Free Lift Cylinder	1		92	Cushion Rubber	1	
81	Hexagon Flange Bolt M6×16	4		93	Bolt Assy M12×35	1	
91	Support	1					

**2. Installation**

Follow the removal steps in reverse to install main lift cylinders.

**Free Lift Cylinder Overhaul**

**1. Explosive View**



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Free Lift Cylinder	1		30	Free Lift Cylinder Seal Kit	1	
18	Dust Wiper	1		31	Back-Up Ring	1	
19	Retainer Ring	1		33	Check Valve	1	
20	Seal	1		34	Washer	1	
21	Gland	1		35	Bushing	1	
22	Steel-Backed Bearing	1		37	Safety Valve	1	
23	Bushing	1		82	Pin	1	
24	O-Ring	1		91	Screw M6×16	1	
25	Retainer Ring	1		92	Washer	1	
27	Steel Retainer Ring	1		93	Screw M6×6	1	
28	Glyd Ring	1		94	Rubber	1	
29	Piston	1					

## 2. Disassembly

- (1) Clean rod tops and gland thoroughly to prevent contamination.
- (2) Remove the gland (with O-rings and seals), and then carefully take the rod and piston (with O-rings and seals) out of the
- (3) cylinder tube and place them in a clean area.
- (4) Remove the valve on the cylinder bottom side, and then cover the cylinder to prevent contamination.
- (5) Remove all O-rings and seals from the gland and the piston.
- (6) Remove the snap ring from the piston bore to release the check valve.

## 3. Parts Inspection

- (1) Clean all parts completely in a suitable solvent. Dry all parts with a soft clean cloth.
- (2) Inspect dust wipers, o-rings, seals, bushings, back-up rings of the gland or the rod and piston. And inspect all O-rings and seals grooves for nicks, burrs, and scratches that can damage components during reinstallation.

- (3) Inspect the cylinder tube and bore for cracks, pining, scoring, or other irregularities that may require replacement of the cylinder.
- (4) Inspect the valve in the piston.

#### 4. Cylinder Reassembly

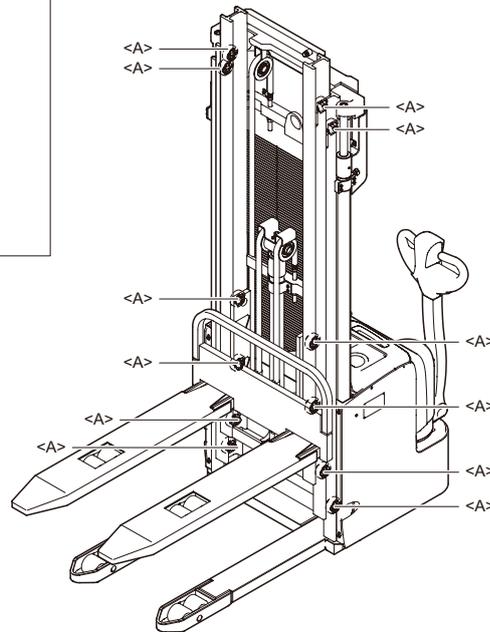
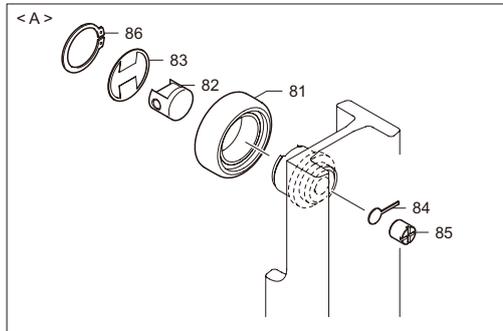
- (1) Coat all o-rings, seals, bushings, back-up rings, the rod and piston, valves, and the inner wall of the gland and the cylinder tube in clean hydraulic oil before reassembly.
- (2) Replace the dust wipers, o-rings, seals, of the gland and piston as a set.
- (3) Carefully insert the rod and piston into the cylinder without damaging cylinder tube threads and inner wall.
- (4) Lubricate cylinder threads and carefully screw gland onto the cylinder fully without damaging o-rings and seals.
- (5) Check and ensure the piston slides freely, and then tighten the gland.
- (6) Install the valve on the cylinder bottom side.

# MAST AND CARRIAGE

## Mast and Carriage Roller Description

### 1. General Description

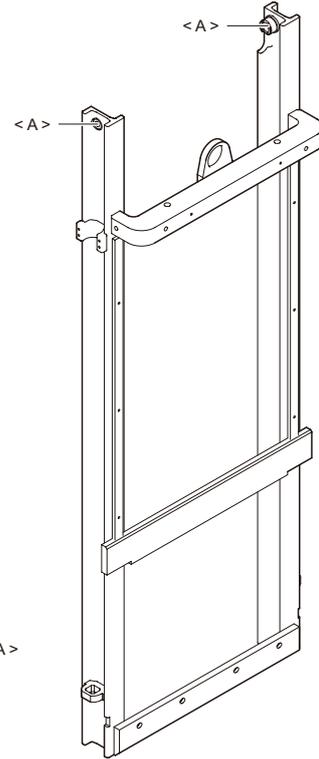
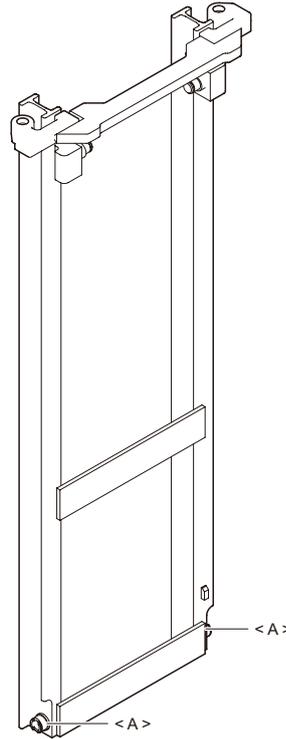
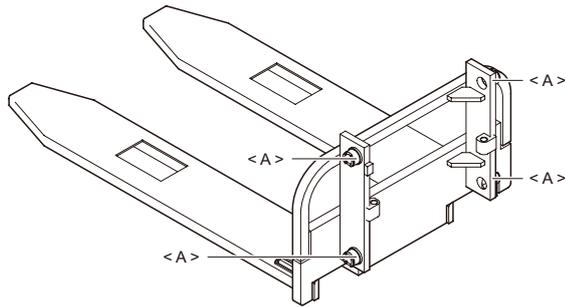
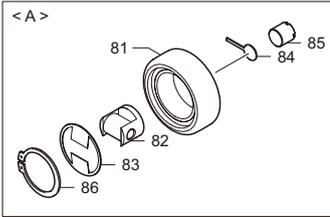
A circlip locks the mast roller, bearing, and the dust protection that are installed on the mast or the carriage stub. The bearing is used to adjust the clearance of the mast and carriage by the adjusting screw, which is installed on the other side of the



Code	Name	QTY	Information	Code	Name	QTY	Information
81	Mast Roller	12		84	Secure Pin	12	
82	Bearing	12		85	Adjust Screw	12	
83	Dust Protection	12		86	Circlip	12	

### 2. 2-Stage Mast And Carriage Roller Description

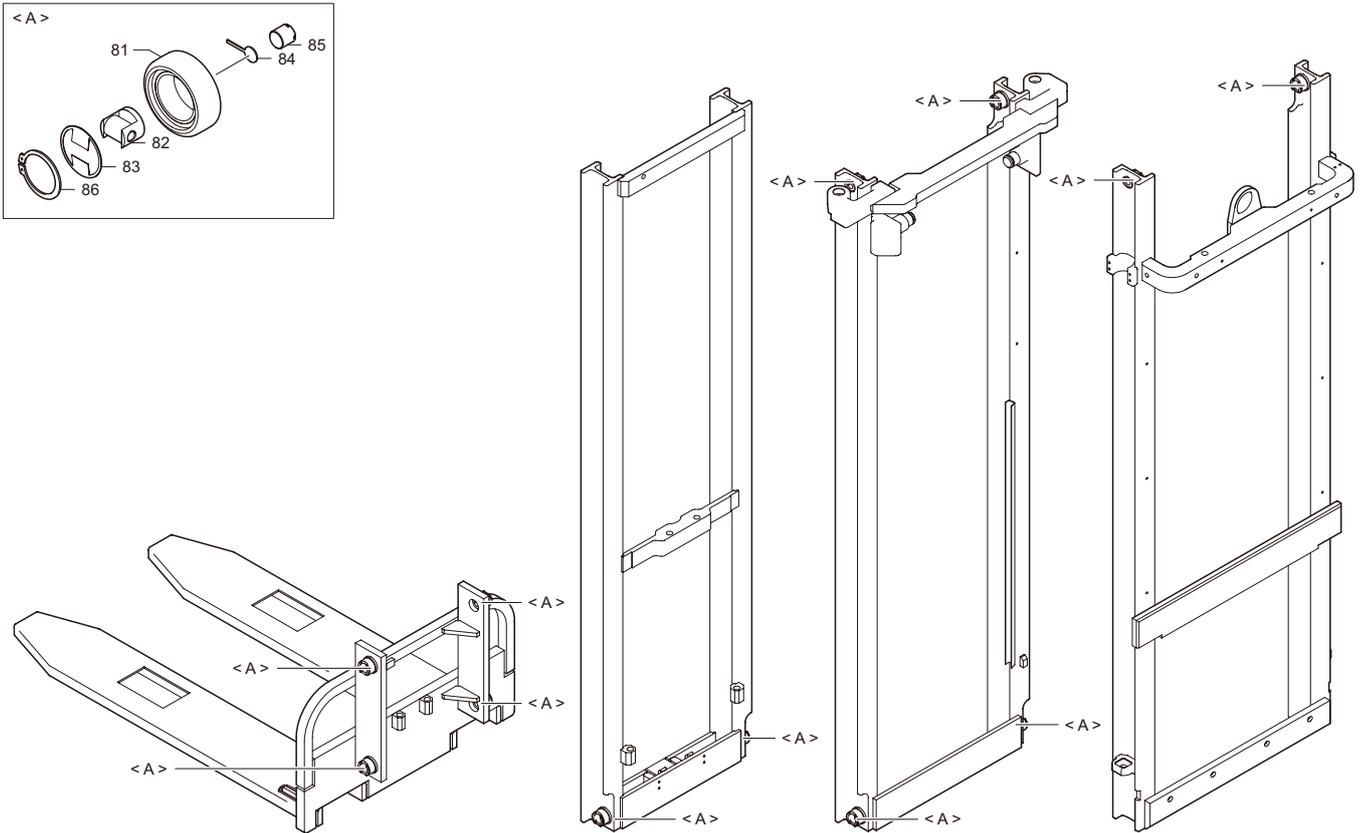
In the 2-stage mast, 2 mast rollers are installed on the top side of the outer mast, 2 mast rollers are installed on the bottom side of the inner mast, and 6 mast rollers are installed on the carriage. Being different from others, the upper 2 mast rollers



Code	Name	QTY	Information	Code	Name	QTY	Information
81	Mast Roller	8		84	Secure Pin	8	
82	Bearing	8		85	Adjust Screw	8	
83	Dust Protection	8		86	Circlip	8	

**3. 3-Stage Mast And Carriage Roller Description**

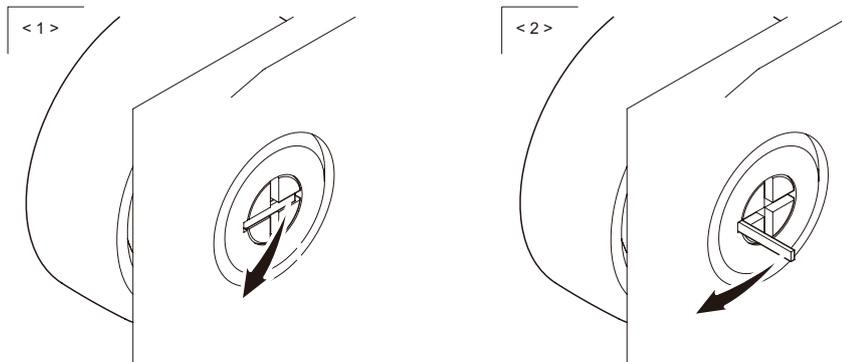
In the 3-stage mast, 2 mast rollers are installed on the top side of the outer mast, 4 mast rollers are installed on both sides of the middle mast, 2 mast rollers are installed on the bottom side of the inner mast, and 6 mast rollers are installed on the



Code	Name	QTY	Information	Code	Name	QTY	Information
81	Mast Roller	12		84	Secure Pin	12	
82	Bearing	12		85	Adjust Screw	12	
83	Dust Protection	12		86	Circlip	12	

### General Carriage and Mast Clearance Adjustment

1. General Carriage and Mast Clearance Adjustment Procedure
  - (1) Lift the mast to expose the position of the adjusting screw.
  - (2) Bend the secure pin to expose the adjusting screw.
  - (3) Use the screw to adjust the clearance.
  - (4) After adjustment, bend the secure pin to secure the adjustment screw.



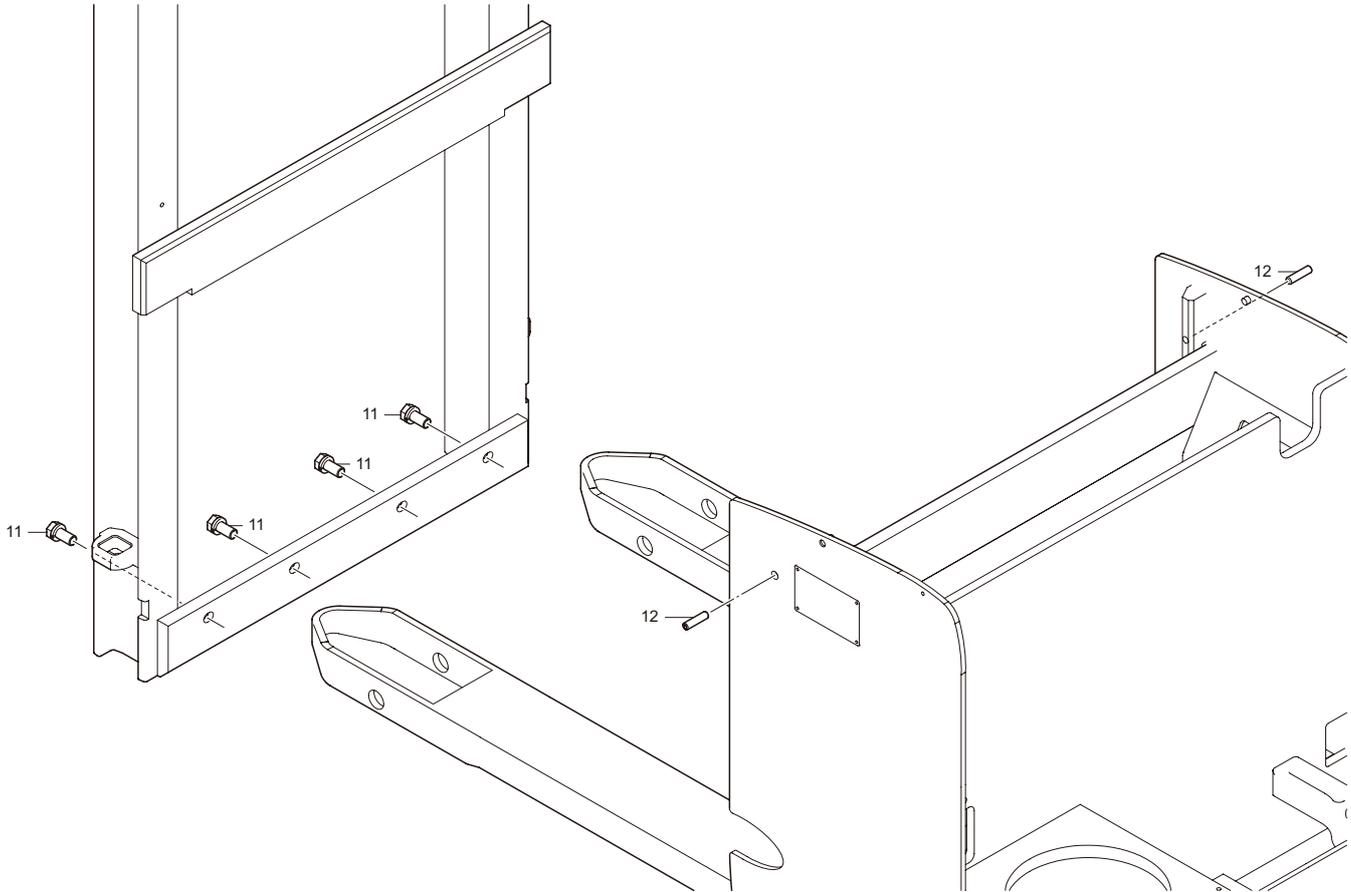
2. Order Of Adjusting 2-Stage Mast and Carriage Clearance
  - (1) Clearance between the outer mast and the inner mast.
  - (2) Clearance between the inner mast and the carriage.
3. Order Of Adjusting 3-Stage Mast and Carriage Clearance

- (1) Clearance between the outer mast and the middle mast.
- (2) Clearance between the middle mast and the inner mast.
- (3) Clearance between the inner mast and the carriage.

## Mast Removal and Installation

### 1. Removal

- (1) Use a reliable hoisting strap to hang the hoisting hole of the mast, and secure the strap with a safety hook.
- (2) Lift the mast to expose the mast mounting bolts, block the mast by the wood, and then remove bolts.
- (3) Lower the mast fully, and then disconnect the fittings and hoses of the main lift cylinders.
- (4) Slowly set the mast down on the flat floor or sturdy pallets.



Code	Name	QTY	Information
11	Bolt Assy M14×35	4	100 N-m
12	Screw M10×40	2	30 N-m

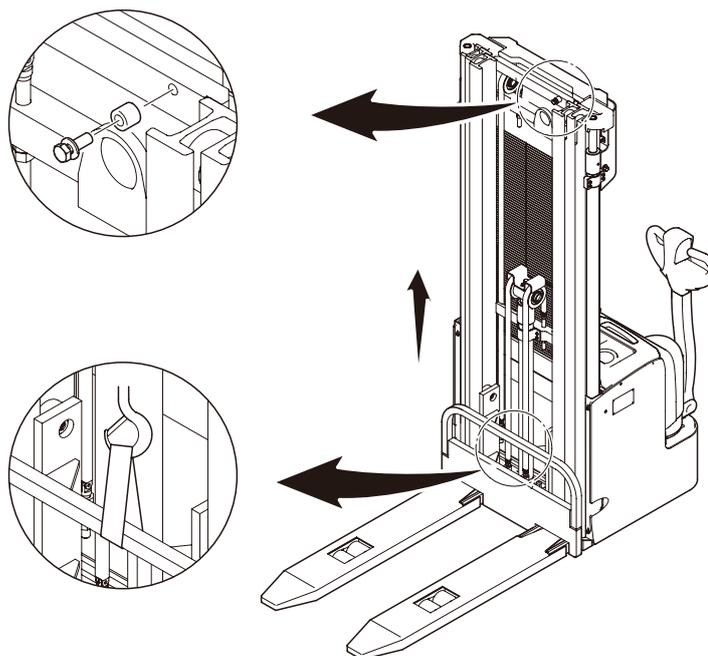
### 2. Installation

Follow the removal steps in reverse to install the mast. After installation, adjust the clearance between the mast and the carriage.

## Carriage Removal and Installation without Removing Mast

### 1. Removal

- (1) Lower the mast fully, and then remove the retainer and the bolt on the top side of the mast.
- (2) Use a reliable hoisting strap to hang the upper beam of the carriage, and secure the strap with a safety hook.
- (3) Remove the chain nuts to separate the carriage and chains.
- (4) Hoist the carriage out of the mast, and then set the carriage down on the flat floor or sturdy pallets.



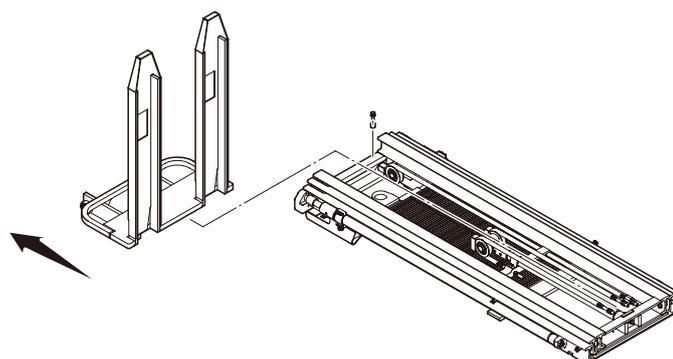
## 2. Installation

Follow the removal steps in reverse to install the carriage. After Installation, adjust the clearance between the mast and the carriage.

## Carriage Removal and Installation after Removing Mast

### 1. Removal

- (1) Remove the mast, and then set it down on the flat floor or sturdy pallets.
- (2) Loosen chain nuts, remove the retainer and the bolt on the top side of the mast.
- (3) Remove the carriage by sliding it out from the bottom of the mast, and then set it down on the flat floor or sturdy pallets.



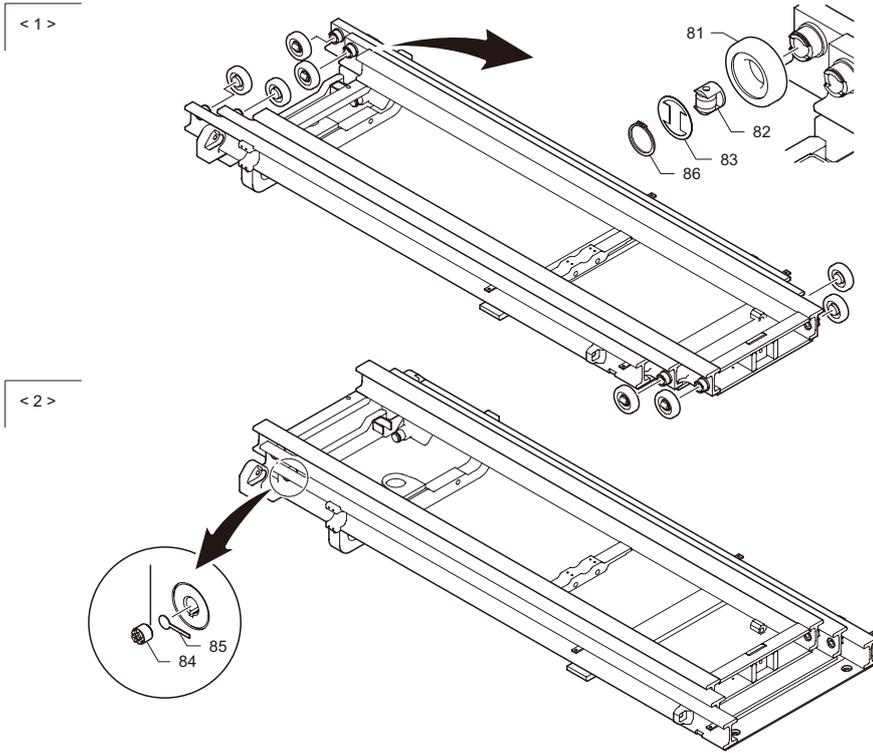
### 2. Installation

Follow the removal steps in reverse to install the carriage. After Installation, adjust the clearance between the mast and the carriage.

## Mast and Carriage Roller Replacement

### 1. Mast Roller Replacement

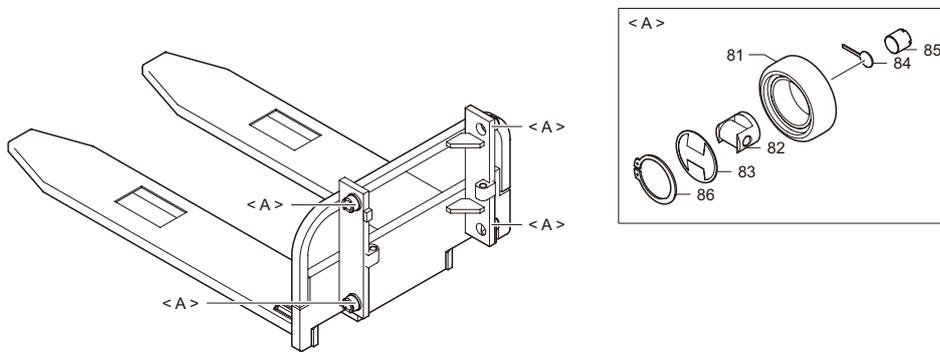
- (1) Before mast roller replacement, remove the mast, slowly set the mast down on the flat floor or sturdy pallets, and then remove the carriage and cylinders away from the mast.
- (2) Slide the mast in the direction of bottom side of the mast, and then replace mast rollers.
- (3) Slide the mast in the direction of top side of the mast, and then check the adjusting screws and secure pins, replace them if necessary.
- (4) After replacement, adjust the clearance of the mast.



Code	Name	QTY	Information	Code	Name	QTY	Information
81	Mast Roller	8		84	Secure Pin	8	
82	Bearing	8		85	Adjust Screw	8	
83	Dust Protection	8		86	Circlip	8	

2. Carriage Roller Replacement

Check the adjusting screws and secure pins, replace them if necessary after the carriage being removed.



Code	Name	QTY	Information	Code	Name	QTY	Information
81	Mast Roller	4		84	Secure Pin	4	
82	Bearing	4		85	Adjust Screw	4	
83	Dust Protection	4		86	Circlip	4	

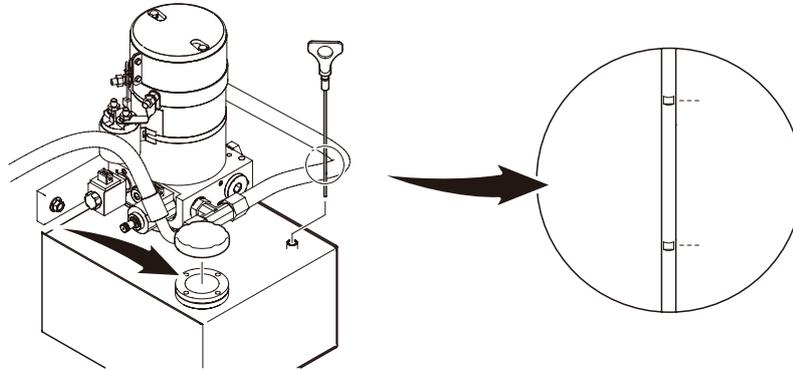
# HYDRAULIC MAINTENANCE

This chapter explains how to maintain the truck hydraulic system.

# HYDRAULIC OIL

## Hydraulic Oil Level Checking

- (1) Pull out the oil dipstick, use the clean cloth to wipe the oil on it, and then insert it back.
- (2) Pull out the oil dipstick again, and then see if the oil level is between two marks.
- (3) If the oil level is under the lower mark, take off the oil filter cap and refill the oil.

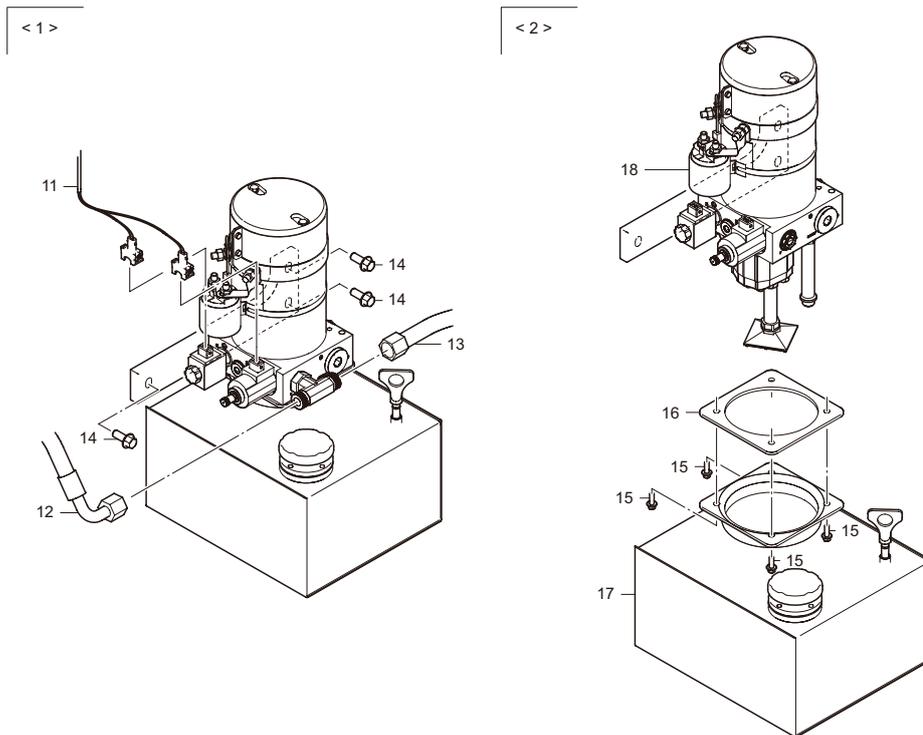


### Caution

- (2) When refilling the oil, care about the condition around to prevent dust and water entering the oil tank.
- (3) Do not mix different types of hydraulic oil.
- (4) When disposing the waste oil, keep children away and do not pour it into the sewer or onto the ground.
- (5) Unauthorized hydraulic oil may damage the hydraulic system, and use only authorized hydraulic oil. If you need to switch to other types of hydraulic oils, contact with the after sale service people.

## Hydraulic Oil Replacement

- (1) Disconnect the electric line and the pressure hose from the hydraulic unit, and remove it after loosening the bolts.
- (2) Remove the hydraulic unit, drain the oil in the oil tank, and then refill the oil.



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Signal Line	1		15	Hexagon Flange Bolt M6×16	4	

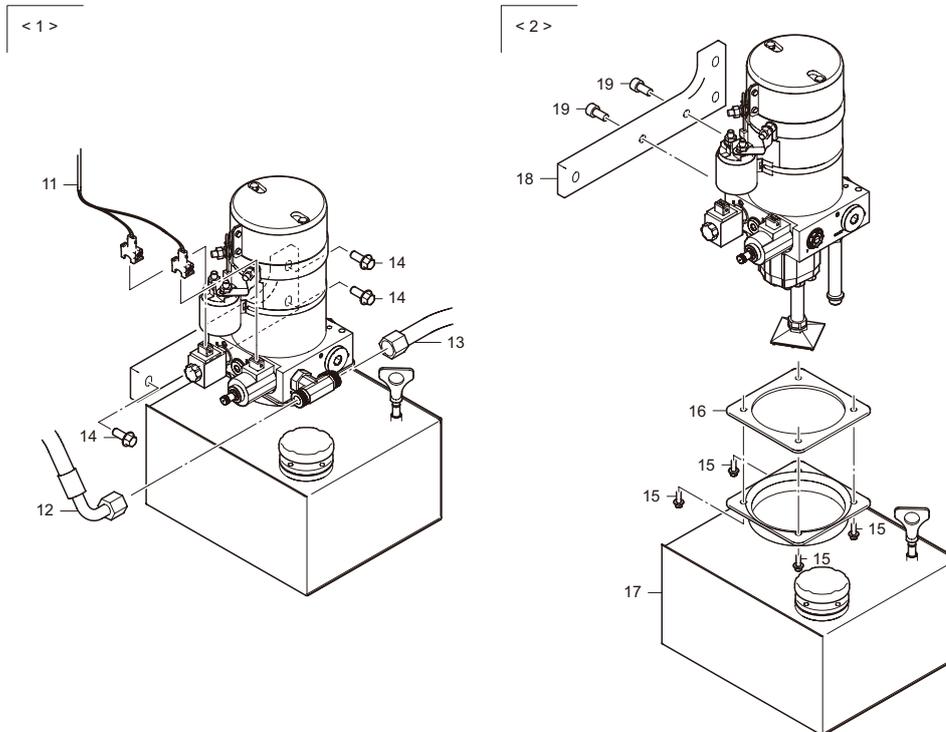
12	Hose	1		16	Rubber Seal	1	
13	Hose	1		17	Oil Tank	1	
14	Hexagon Bolt M10×25	3		18	Hydraulic Unit	1	

# HYDRAULIC UNIT

## Hydraulic Unit Removal and Installation

### 1. Removal

- (1) Disconnect the electric line and the pressure hose from the hydraulic unit, and remove it after loosening the bolts.
- (2) Remove fasteners to separate the hydraulic from the oil tank, and then remove the hydraulic unit mounting plate it&apos;s bolts.



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Signal Line	1		16	Rubber Seal	1	
12	Hose	1		17	Oil Tank	1	
13	Hose	1		18	Mounting Bracket	1	
14	Hexagon Bolt M10×25	3		19	Screw M10×20	2	
15	Hexagon Flange Bolt M6×16	4					

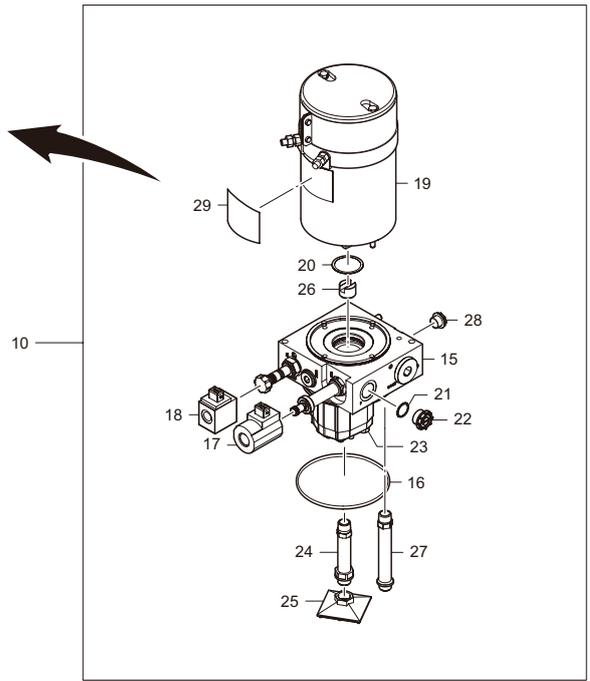
### 2. Installation

Follow the removal steps in reverse to install the hydraulic unit.

## Hydraulic Unit Overhaul (R930053808 Type)

Use the picture of the explosive view as the guide to overhaul the hydraulic unit.

	XXXXXX
XXXXXX	XXXXXX
XXXXXX	XXXXXX
R930053808	XXXXXX
XXXXXX	



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Hydraulic Unit (R Type)	1		22	Plastic Protection Plug	1	
15	Hydraulic Unit Valve	1		23	Pump + Screws M8×85	1	
16	O-Ring	1		24	Suction Pipe	1	
17	Proportional Valve Coil	1		25	Suction Filter	1	
18	Coil	1		26	Coupling	1	
19	Pump Motor	1		27	Pipe	1	
20	Seal	1		28	Plastic Protection Plug	1	
21	Rubber Washer	1		29	Nameplate	1	

# ELECTRIC MAINTENANCE

This chapter explains how to maintain the Electric of the truck.

## ELECTRIC CHECKING

### Warning

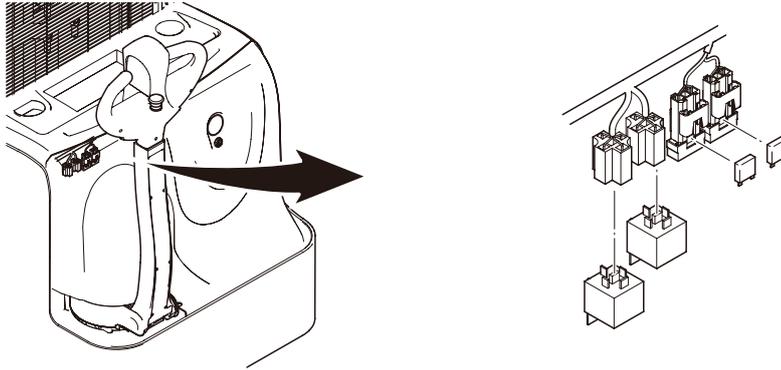
Disconnect the battery before checking the electric system.

### Circuit Inspection

- (1) Check if there any parts loose in the circuit and tighten them if necessary.
- (2) Check if there are anything abnormal of connectors (for example, burn marks).
- (3) Check if there any plugs and sockets loose and latch them tightly again if necessary.

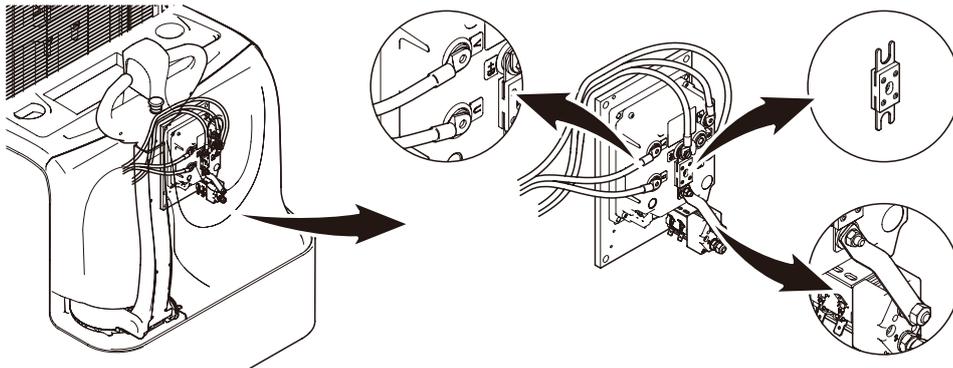
### Fuses and Relays Inspection

Inspecting fuses and relays and replace them if necessary.



### Main Controller Inspection

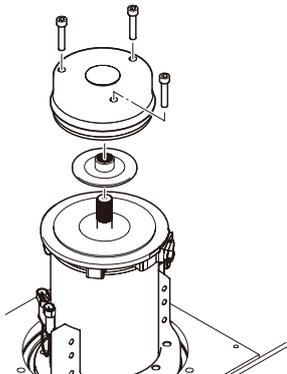
- (1) Inspecting fuses and relays and replace them if necessary.
- (2) Check if the fuses of the controller are normal, replace them if necessary.
- (3) Check if there are any burn marks on the connecting bars, replace them if necessary.



## DRIVE MOTOR

### Drive Motor Electromagnetic Brake Replacement

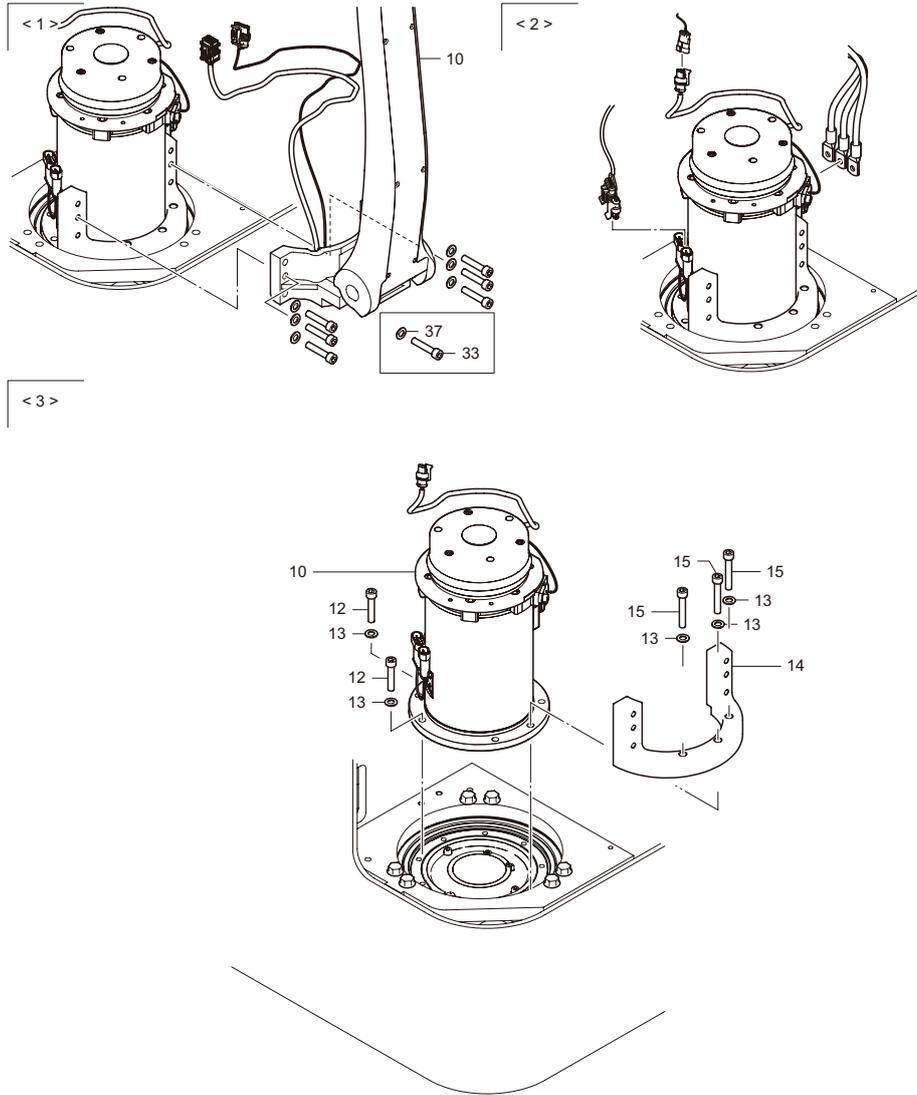
Loosen screws and remove the brake, and then move the electromagnetic brake.



### Drive Motor Removal and Installation

#### 1. Removal

- (1) Before removal, remove the cover.
- (2) Remove the tiller head and arm assembly.
- (3) Disconnect cables(high and low voltage cables).
- (4) Remove screws and then remove the drive motor.



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Drive Motor	1		15	Hexagon Screw M8×50	3	
12	Screw M8×25	2		33	Screw M8×45	6	
13	Washer M8	5		37	Washer M8	6	
14	Mounting Block	1					

2. Installation

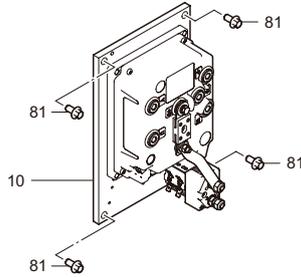
Follow the removal steps in reverse to install the drive motor.

# MAIN CONTROLLER

## Main Controller Removal and Installation

### 1. Removal

Remove bolts and then remove the main controller.



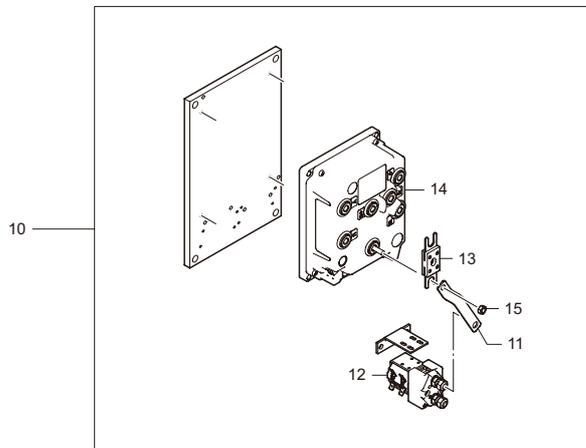
Code	Name	QTY	Information
10	Controller Panel Assy	1	
81	Hexagon Flange Bolt M8×20	4	

### 2. Installation

Follow the removal steps in reverse to install the main controller.

## Main Controller Overhaul

Use the picture of the explosive view as the guide to overhaul the main controller.



Code	Name	QTY	Information	Code	Name	QTY	Information
10	Controller Panel Assy	1		14	Controller	1	
11	Connection Bar	1		15	Nut M6	1	
12	Main Contactor	1		81	Hexagon Flange Bolt M8×20	4	
13	Fuse 300A	1					

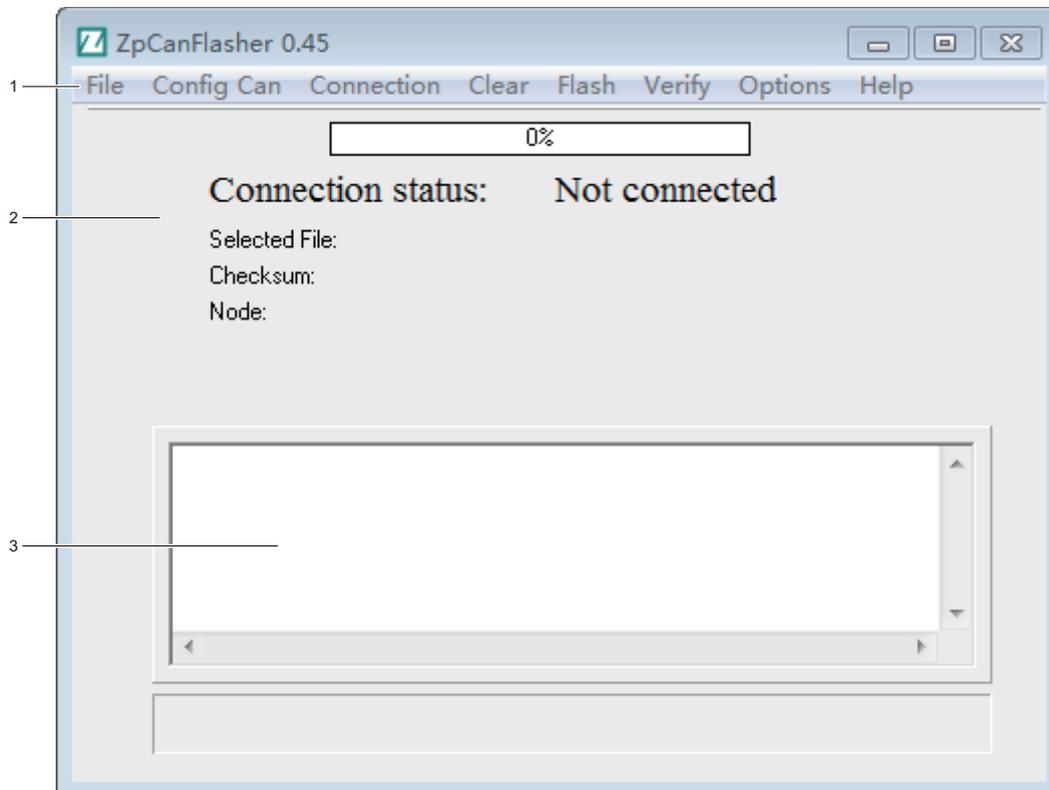
# MAIN CONTROLLER PROGRAM DOWNLOADING

## Program Downloading Description

1. Software Name

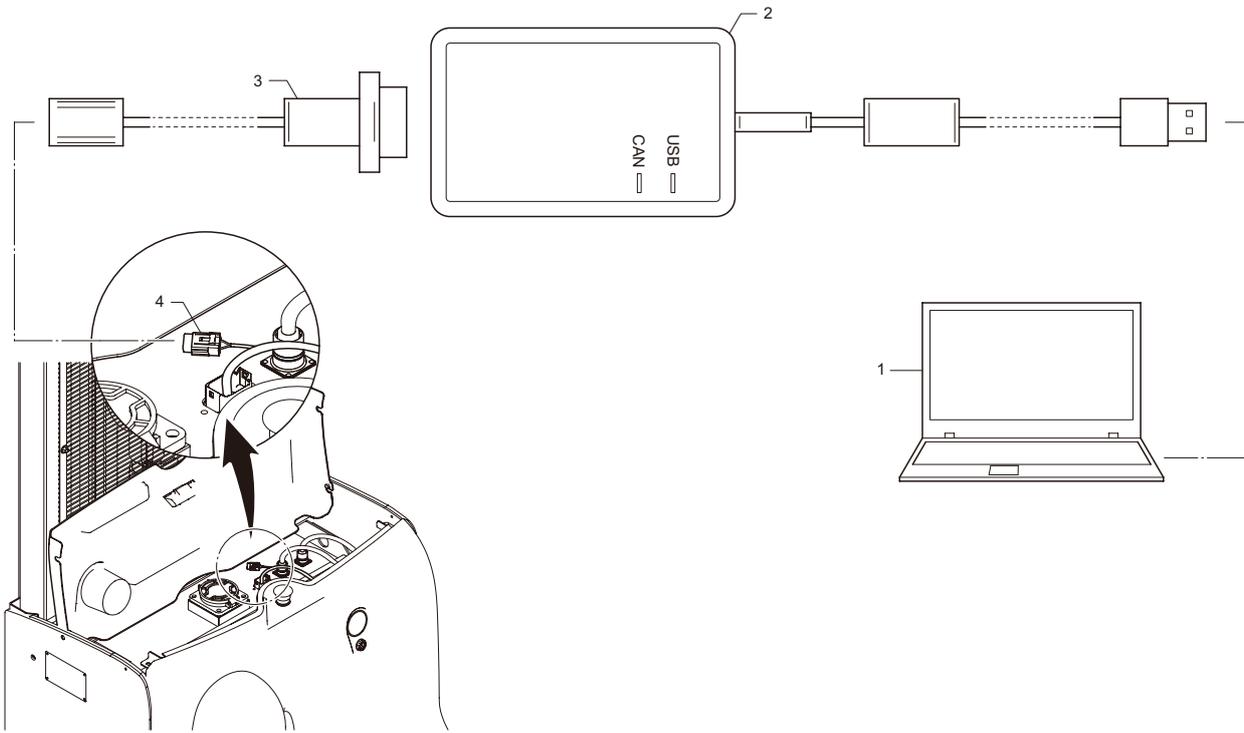
The name of the program downloading software is "ZpCanFlasher".

2. Software Interface



Code	Name	Code	Name
1	Menu Bar	3	Information Textbox
2	Status Area		

3. Connecting the computer to the truck



Code	Name	Code	Name
1	Computer	3	Dataline From Can Box To Diagnostic Interface
2	Can Box With The Dataline	4	Interface

### Program Downloading Procedure

- (1) Use the dataline to connect the computer to the truck.
- (2) Run the software "ZpCanFlasher", click "File" in the menu bar, choose "Load ConfigFlash" to load the file named "adx\_zp002(2560).cfi".
- (3) Click "Config Can" in the menu bar, show the window named "Select Device", choose "Ixxat", confirm, show the "Configuration Can" and set values according to the picture, and then choose "USE IXXAT CONFIGURATION".
- (4) Click "File" in the menu bar, choose "Load File" to load the file named "adxt2b\_2bd008.H86".
- (5) Turn on the truck to run the main controller. Click "Connection" in the menu bar and choose "start" and wait for "CONNECTED" being shown.
- (6) Click "Clear" in the menu bar, the status textbox shows "Cleared", which means that the previous program download in the main controller has been deleted, and then click "Flash" in the menu bar to download the program.
- (7) After downloading, click "Connection" in the menu bar, choose "Stop" to disconnect the communication, and then turn off the truck.

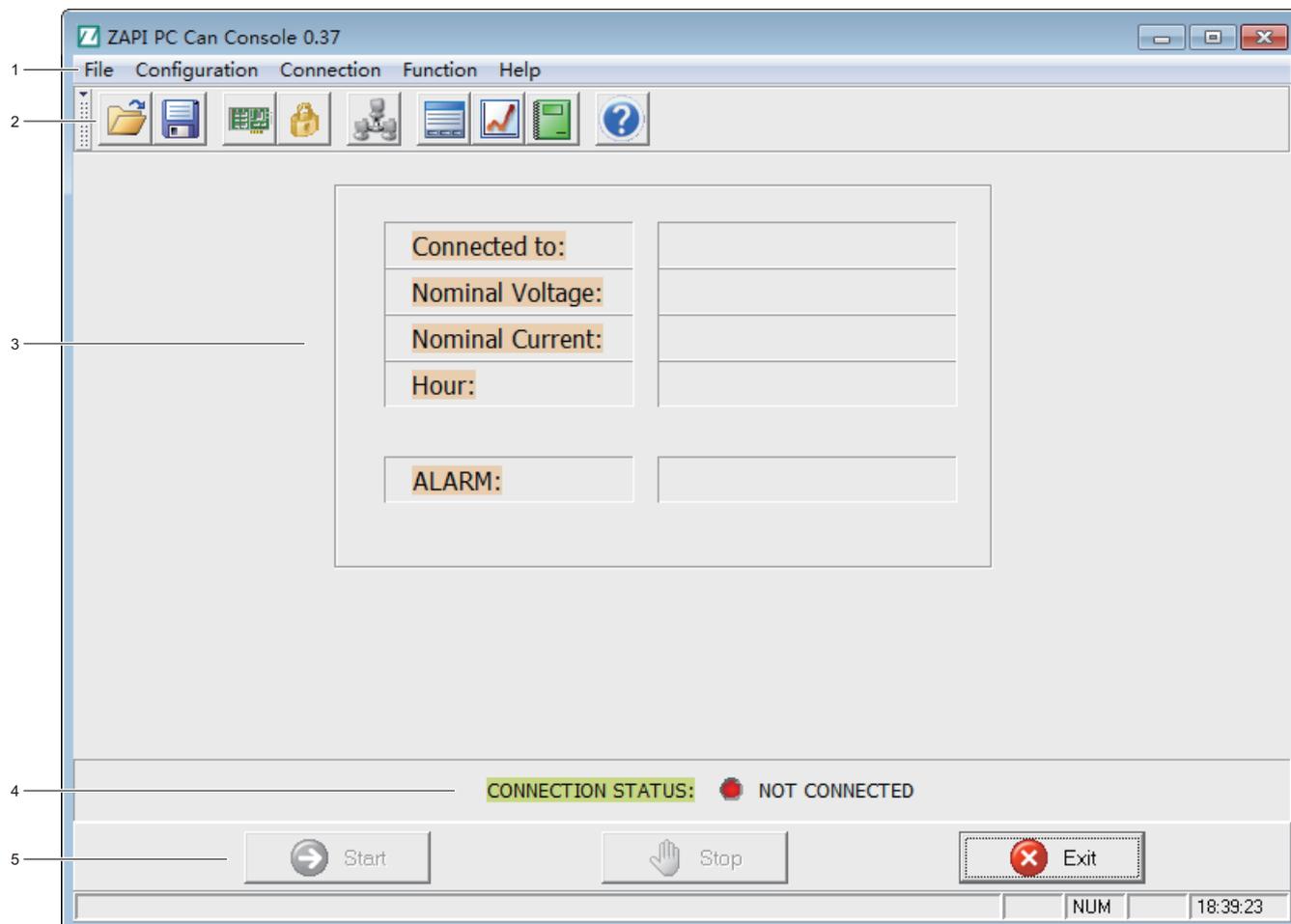
## PARAMETER ADJUSTMENT

### Parameter Adjustment Description

#### 1. Software Name

The name of the parameter adjustment software is "ZpCanFlasher".

#### 2. Software Interface



Code	Name	Code	Name
1	Menu Bar	4	Connection Status Area
2	Shortcut Icon Bar	5	Function Buttons
3	Status Area		

#### 3. Connecting the computer to the truck

The connection method is the same as the program downloading.

### Tiller Arm Angle Parameter Adjustment

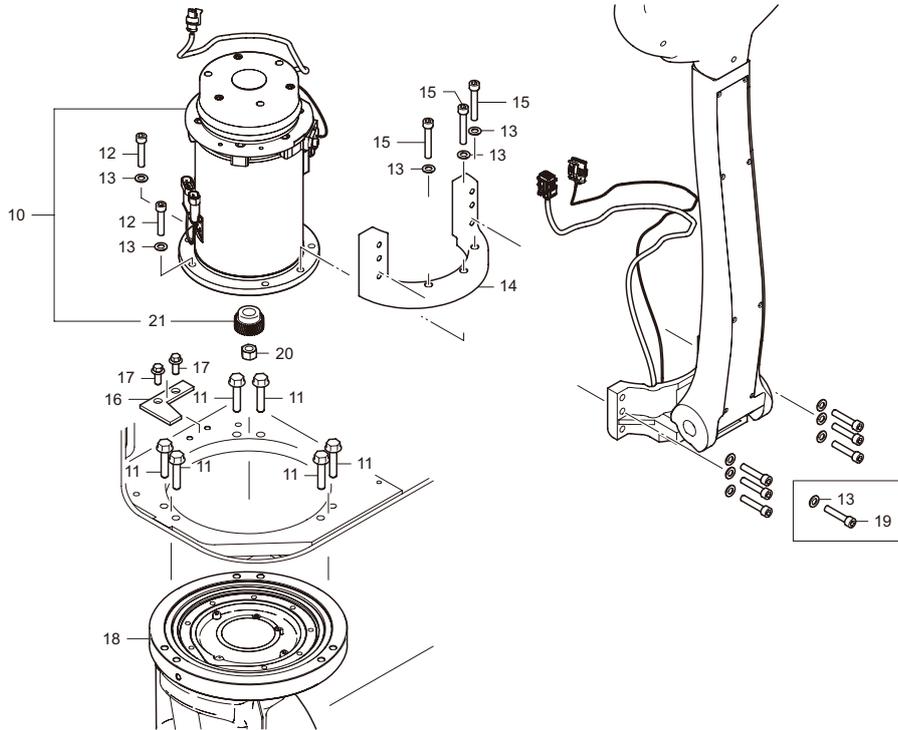
- (1) Run the software, click "Function" in the menu bar, choose "Tester", choose "TILLER POT" on the left and the corresponding parameter value will be shown on the right.
- (2) Set the tiller arm in the vertical position, and the rotate it downward for 10 ° and record the value, which represents the value of "MIN TILLER POT".
- (3) Rotate the tiller arm to the height of the user's pelvis and record the value, which represents the value of "MID TILLER POT".
- (4) Set the tiller arm in the horizontal position, and the rotate it upward for 0~5 ° and record the value, which represents the value of "MAX TILLER POT".
- (5) Click "Function" in the menu bar, choose "Parameter", choose "ADJUSTMENT", find "MIN TILLER POT", "MAX TILLER POT" and "MIN TILLER POT", and write recorded values.

(6) Click "Store" button to save parameters, and then exit the software.

# OTHERS

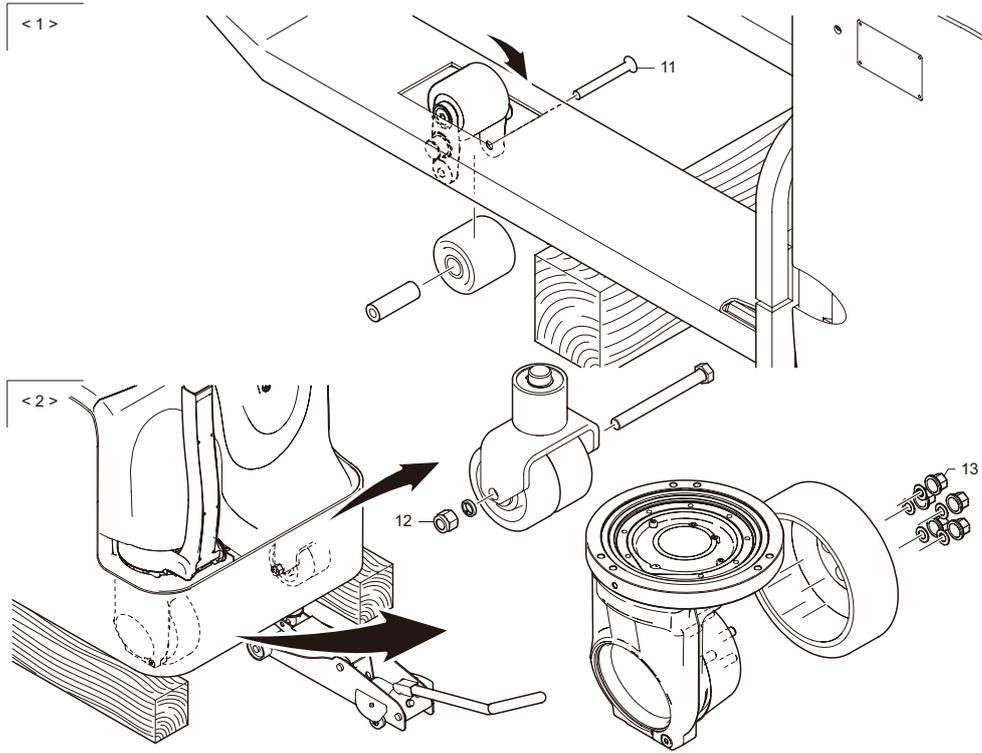
## Critical Fasteners Torque Checking

### 1. Drive Axle and Drive Motor Fasteners Torque Checking



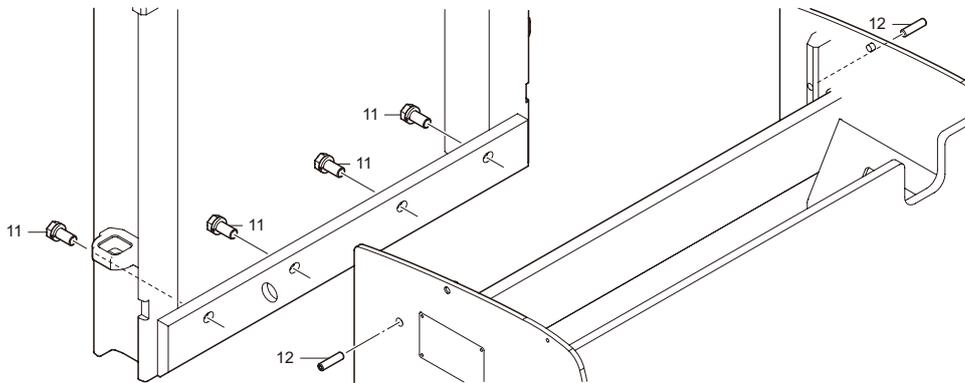
Code	Name	QTY	Information	Code	Name	QTY	Information
11	Hexagon Flange Bolt M10×45	6	70 N-m + Thread Sealant	17	Hexagon Flange Bolt M8×20	2	25 N-m + Thread Sealant
12	Screw M8×25	5	30 N-m + Thread Sealant	18	Drive Axle	1	
13	Washer	12		19	Screw M8×45	6	30 N-m
15	Hexagon Screw M8×50	3	30 N-m + Thread Sealant	20	Nut M12	1	Tighten + Thread Sealant
16	steering RETAINER PLATE	1		21	pinion	1	

### 2. Wheel Fasteners Torque Checking



Code	Name	QTY	Information	Code	Name	QTY	Information
11	Load Wheel Screw	4	90 N-m	13	Drive Axle Nut	1	90 N-m
12	Castor Wheel Nut	2	110 N-m				

3. Mast Fasteners Torque Checking



Code	Name	QTY	Information
11	Bolt Assy M14×35	4	100 N-m
12	Screw M10×40	2	30 N-m



## OTHER INFORMATION

### Contact Information

**Importer:** BYD Europe B.V.

**Address:** s-Gravelandseweg 256, 3125 BK Schiedam, Netherlands

**Tel:**+31-10-2070888 **Fax:**+31-10-2070880

**Importer:** BYD Motors Inc.

**Address:** 1800 South Figueroa Street, Los Angeles, CA, 90015

**Tel:** 213-748-3980 **Fax:** 213-748-3945

**E-mail:** FORKLIFTSERVICE@BYD.COM

**Importer:** BYD do Brasil

**Address:** Av. Antonio Boscato, 230 Terminal Intermodal de Cargas – TIC, CEP 13069-119 CAMPINAS - SP

**Tel:** +55193514-2551

**E-mail:** FORKLIFTSERVICE@BYD.COM

**Importer:** BYD Japan company Limited

**Address:** The fifth Yasuda Bldg.5F,2-20-3 Tsuya-cho, Kanagawa-ku, Yokohama-shi,Kanagawa-ken,221-0835,Janpan

**Tel:** 045-290-6550; 045-290-6616 **Fax:** 81-(0)45-319-1506

**Importer:** BYD Auto Industry Company Limited

**Address:** No.3009, BYD Road, Pingshan, Shenzhen, 518118, P.R.China

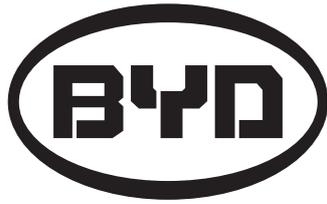
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**Manufacturer:** BYD (SHAOGUAN) CO.,LTD.

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