Group 1 Structure and Operation	3-1
Group 2 Inspection and Troubleshooting	3-3
Group 3 Disassembly and Assembly	3-4

GROUP 1 STRUCTURE AND OPERATION

1. STRUCTURE



- 1 Motor case
- 2 Brake assembly
- 3 O-ring
- 4 Dowel pin
- 5 Socket head bolt
- 6 Bracket
- 7 Socket head bolt
- 8 Parking lever
- 9 Key
- 10 Hexagonal bolt
- 11 Nut
- 12 Snap ring

- 13 Center axle assembly
- 14 Differential gear assembly
- 15 Second gear assembly
- 16 First gear assembly
- 17 LH axle housing assembly
- 18 O-ring
- 19 Ring gear
- 20 LH axle shaft
- 21 Wheel hub assembly
- 22 Socket head bolt
- 23 O-ring
- 24 RH axle housing assembly

- 25BX3PS01A
- 25 Parking stopper plate
- 26 Spring washer
- 27 Hexagonal bolt
- 28 RH axle shaft
- 29 Air breather
- 30 Air breather
- 31 Brake port
- 32 Drain A plug
- 33 Drain B plug
- 34 Axle name plate
- 35 Rivet

2. OPERATION



25BX3PS02

The drive axle is a power train system consisted of a service brake and a parking brake, and assembled in the drive wheel of a battery-powered forklift truck.

Drive axle transfers torque of drive motor to drive wheel through the following procedures:

Gear trains of major gear box consist of helical gears (1) to (4). Torque is transferred from drive motor to helical gear (1). Torque is transferred to differential gear through helical gear (4), and further to planetary gears (7) and (8) through axle (9). Planetary gear plays a role of transferring torque to carrier shaft (10) and wheel adapter (11).

Service brake and parking brake (12) are configured on the shaft on one side of differential gear, and work in the wet disk mode.

3. SPECIFICATIONS			
Item	Unit	Specifications	
Max. axle load	kg	9000	
Max. input speed	rpm	4000	
Gear ratio	-	20.5	
Weight (excluding oil)	kg	200	
Oil volume	l	7.0	

3. SPECIFICATIONS

GROUP 2 FAILURE DIAGNOSIS AND CORRECTIVE ACTIONS

Trouble	Cause	Corrective action
1. Noise		
1) High frequency noise	 Misaligned mounting of input gear and drive motor 	 Remove the drive motor. Check tooth face and helical gear of backlash for damage. Check connection, and dimensions of spline. Check input gear and drive motor for cor- rect mounting.
2) Abnormal noise	Incorrect connection of motor	- Check the motor connection.
	· Defective motor bearing	- Check bearings of motor and axle.
3) Internal grinding noise	· Defective wheel bearing	- Check bearing at the shop.
	- Low level of gear oil	
	- Extreme pre-stress of bearing	
	Damage of planetary gear	- Check planetary gear and wheel bearing at the shop.
	- Low level of gear oil	
	- Excessive play of wheel bearing	
2. Oil leak		
1) Air breather valve	· Excessive level of gear oil	- Checking gear oil level
	· Valve trouble	- Checking valve for damage
	\cdot High pressure inside gear box	- Checking inside pressure
2) Drive motor	· O-ring damaged	- Remove drive motor, and check O-ring
	 Housing damaged 	and housing surface for damage.
3) Wheel adaptor and	Damage on oil sealing and adaptor of	- Replace oil seal between drive housing
nousing		and adaptor.
4) Parking lever	O-ring damaged	1. Remove parking lever, and check O-ring
	a nousing damaged	2 Contact the shop or your dealer
2 High temperature		
1) High temperature of	· Excessively high or low level of gear	- Checking gear oil level
drive motor	· oil	- Checking play on wheel shaft
	Excessive load on wheel bearing	- Checking play on brake disk
	• No play on brake disk	- Checking parking brake conditions
	Parking brake being caught	

GROUP 3 DISASSEMBLY AND ASSEMBLY

1. WHEEL ASSEMBLY

1) DISASSEMBLING



(1) Disassemble oil injection port, and three drain plugs from the bottom of axle to drain gear oil.

- (2) Remove socket head bolt (1) from axle housing (6).
- (3) Remove wheel hub assembly (2) from axle housing (6).
- (4) Remove axle shaft (7) from axle assembly.
- * Care should be exercised to protect O-ring from damage after disassembling drain plug.
- $\,\%\,$ Store LH and RH axle shafts respectively.

2) ASSEMBLING

- (1) Mount axle shaft (7) on spline hub.
- * Assemble correct LH or RH axle shaft.



(2) Care shall be exercise to protect O-ring(4) from damage when assembling it on ring gear (5).



(3) Lubricate the surface of O-ring with grease.



(4) Assemble ring gear assembly on axle housing (6).



- (5) Care shall be exercise to protect O-ring (4) from damage when assembling it on ring gear (5).
- (6) Lubricate the surface of O-ring with grease.

- (7) Assemble dowel pin (3) on ring gear (5).

(8) Assemble wheel hub assembly (2) on axle housing (6).





25BX3PS10



3-6

(9) Never forget to coat 10 socket-head bolts (1) with Loctite 277.



(10) Assemble socket head bolt (1) on axle housing (6).

(11) Mark on bolt head and housing for checking correct assembling.





(12) Fasten socket head bolt (1). \cdot Fastening torque : 9 \pm 0.5 kgf \cdot m



2. WHEEL HUB ASSEMBLY

1) DISASSEMBLING



(1) Remove socket head bolt (1) from wheel cap (2).

(2) Remove wheel cap (2), O-ring (3), lock nut (4) and lock plate (5) in order.

(3) Press the top of carrier shaft down to remove carrier cap assembly (13).

(4) Remove final housing (11) from adaptor (6).

(5) Remove stud bolt (7) and oil seal (8) from adaptor (6).

2) ASSEMBLING

(1) Make use of jig and press to assemble stud bolt (7) on adaptor (6).



(2) Apply ThreeBond on the outer surface of oil seal (8).



(3) Make use of jig and press to assemble oil seal (8) on adaptor (6).



(4) Lubricate ring surface inside adaptor(6) with proper amount of grease.



25BX3PS21

- S.
- (5) Make use of jig and press to assemble taper roller bearing (9) on adaptor (6).

(6) Assemble space (10) on adaptor (6).



(7) Make use of jig and press to assemble final housing (11) and taper roller bearing (12) on adaptor (6).

(8) Make use of jig and press to assemble carrier shaft assembly (13) on adaptor (6).



25BX3F

(9) Make use of push-pull gauge to check bearing preload.

 \cdot Set preload : 0.12-0.16 kgf \cdot m



(10) Assemble lubricated O-ring on adaptor (6).



(11) Assemble lock plate on carrier shaft, and then fasten lock nut lubricated with Loctite 277 on carrier shaft. \cdot Fastening torque : 15 \pm 0.5 kgf \cdot m

- (12) Make use of push-pull gauge to check bearing preload.
 - · Set preload : 0.12-0.16 kgf · m

(13) Assemble O-ring (3) lubricated with grease on wheel cap (2).







(14)Lubricate assembled O-ring with grease, and assemble wheel cap (2) on adaptor (6).



(15) Fasten socket head bolt (1) lubricated with Loctite 277 on wheel cap (2).
Fastening torque : 3.3±0.2 kgf · m





3. CARRIER SHAFT ASSEMBLY

1) DISASSEMBLING



1 Carrier shaft 2

3

- Spring pin Planetary gear shaft
- 5 Thrust washer 6 Planetary gear
- 8 Thrust needle roller bearing
- 9 Needle roller bearing
- (1) Strike spring pin (2) in vertical direction with round pin and mallet to remove planetary gear (6).
- (2) Once planetary gear is removed, remove thrust washer (7) and thrust needle roller bearing (8).

2) ASSEMBLING

(1) Make use of jig and press to assemble needle roller bearing (9) on carrier adaptor (1).



(2) Assemble thrust washer and needle valve bearing (7, 8) on grease-lubricated carrier shaft.



(3) Assemble 3 planetary gear assemblies on carrier shaft (1).



(4) Assemble planetary gear shaft (3) on carrier shaft (1) by aligning with hole of the latter.



(5) Assemble 3 spring pins (2) on carrier shaft (1).



(6) Caulk with a tool to prevent spring pin from removal from carrier shaft.



4. RH AXLE HOUSING ASSEMBLY

1) DISASSEMBLING



- (1) Loosen hexagonal bolt (1), and then remove RH axle housing assembly from brake housing.
- (2) Turn RH axle housing assembly up side down, and remove snap ring (8).
- (3) Remove spline hub (9), snap ring (1) and ball bearing (11) from RH axle housing (3).
- (4) Remove snap ring (10) and ball bearing (11) from spline hub (9).

2) ASSEMBLING

- (1) Assemble ball bearing (11) on spline hub (9).
- % Check ball bearing for smooth revolution.



- (2) Make use of snap ring puller to assemble snap ring (10) on spline hub (9).
- 25BX3PS43
- (3) Mark a point on snap ring for checking for proper assembling.

- (4) Assemble spline hub assembly on RH axle housing (3).

(5) Make use of snap ring puller to assemble snap ring (8) on RH axle housing (3).







25BX3PS44

25BX3PS46

(6) Assemble O-ring (5) on RH axle housing (3).



(7) Assemble dowel pin (6) on brake housing (7).

- (8) Assembly RH axle housing assembly on brake housing (7).
 - e housing assembly (7).

(9) Fasten 7 hexagonal bolts (1) and spring washers (2) lubricated each with Loctite 277 on the assembly.
Fastening torque : 14±0.5 kgf · m



5. LH AXLE HOUSING ASSEMBLY

1) DISASSEMBLING



- (1) Loosen socket head bolt (1), and remove LH axle housing (2) from motor case (7).
- (2) Turn LH axle housing upside down, loosen socket head bolt (8), and then remove stopper plate(9) from LH axle housing (2).
- (3) Remove first gear sub assembly (3), second gear sub assembly (4), and differential gear sub assembly (5).
- $\ensuremath{\mathbb{X}}$ Gear parts must keep clean and prevent from damage.

2) ASSEMBLING

- (1) Assemble O-ring (12) on LH axle housing (2).
- $\ensuremath{\overset{\scriptstyle \otimes}{_{\scriptstyle \sim}}}$ Be careful not to damage the O-ring.



- (2) Never forget to lubricate the surface of O-ring (12) with grease.
- * Be careful not to damage the O-ring.



- (3) Assemble gear case (11) on LH axle housing (2).
- * Be careful not to damage the O-ring.

(4) Assemble 2 dowel pins (6, 10) into LH axle housing (2).





- (5) Assemble stopper plate (9) on gear case (11).
- * Spread the Loctite on the bolt thread.



- (6) Fasten 10 socket head bolts (8). \cdot Fastening torque : 6 \pm 0.5 kgf \cdot m
- 25BC9U3
- (7) Mark points on LH axle housing and the heads of socket head bolts for checking to properly installed.

- (8) Assemble first gear sub assembly (3), second gear sub assembly (4) and differential gear sub assembly (5).
- 25BC9U3PS6
- (9) Assemble 2 dowel pins (6) into gear case (11) by using a mallet.





- (10) Apply Three-bond evenly on the sealing surface of gear case (11).
- * Uneven applying may cause oil leak.



- (11)Assemble a bolt guide or a special guide(s) to prevent the Three-bond from coming off.
- * Three-bond spread out



(12)Set the case sub-assembly while being careful about the Three-bond separation.





(13) Apply the Loctite on the threads of the socket head bolts (1).



(13) Fasten 11 socket head bolts (1) to motor case ...

 \cdot Fastening torque : 9 \pm 0.5 kgf \cdot m



6. BRAKE HOUSING ASSEMBLY

1) DISASSEMBLING



25BX3PS76A

- Snap ring 1 Parking lever pushing 6 11 2 Key 7 Brake air breather 12 3 Hexagonal bolt 8 Brake port 13 4 Nut 9 Socket head bolt 14
- 5 Parking lever pulling
 - 10 Socket head bolt
- Parking cable bracket
- Brake assembly
- O-ring
- Dowel pin
- 15 Motor case
- (1) Once snap ring (1) is removed, remove parking lever pulling (5) from parking lever pushing (6).
- (2) Remove brake air breather (7) and port (8) from brake assembly (12).
- (3) Loosen socket head bolt (10), and then remove parking cable bracket (11) from motor case (15).
- (4) Loosen socket head bolt (9), and then remove parking assembly (12) from motor case (15).

(1) Assemble dowel pin (14) on motor case (15) with a mallet.



- (2) Assemble O-ring (13) on brake assembly (12).
- Image: Contract of the second seco
- (3) Lubricate the surface of O-ring with grease.



(4) Mount brake assembly on motor case (15).



- (5) Fasten 2 socket head bolts (10) lubricated with Loctite 277 on parking cable bracket (11) and brake assembly (12).
 - \cdot Fastening torque : 9 \pm 0.5 kgf \cdot m
- (6) Fasten 7 socket head bolts (9) lubricated with Loctite 277 on brake assembly (12) and motor case (15).
 - \cdot Fastening torque : 9 \pm 0.5 kgf \cdot m

- (7) Assemble hexagonal bolt (3) on parking lever pulling (6).
- (8) Assemble nut (3) hexagonal bolt (3) assembled on parking lever pulling (6).



25BX3PS83



(9) Assemble key (2) on parking lever pushing (6).



(10) Assemble parking lever pulling assembly on parking lever pulling (6).



(11)Assemble snap ring (1) on parking lever pushing (6). Mark a point for checking proper assembling.



7. BRAKE ASSEMBLY

1) DISASSEMBLING



- 1 Socket head bolt
- 7 Brake spring spacer8 Brake return spring
- 2 Bearing metal
- 3 Guide pin
- 4 Brake reaction plate
- 5 Friction plate
- 6 Hexagonal bolt
- 9 Brake Piston
- 10 D-ring (large)
- 11 D-ring (small)
- 12 Parking pin

- 13 Brake housing
- 14 Snap ring
- 15 O-ring
- 16 Parking lever
- 17 O-ring
- 18 Parking lever pushing

25BX3PS89A

- (1) Loosen socket-head bolt (1), and then remove bearing metal (2) from brake housing (13).
- (2) Once guide pin (3) is removed, remove brake reaction plate (4) and friction plate (5).
- (3) Once hexagonal bolt (6) is loosened, remove brake piston (9).
- (4) Remove snap ring (14) and O-ring (15) from brake housing (13).
- (5) Remove parking spacer (16) and O-ring (17) from brake housing (13).
- (6) Remove parking lever pushing (18) from brake housing (13).

- (1) Assemble D-rings (10, 11) on brake piston (9). Clean the contact surface of piston clear that is assembled on brake housing.
- Visit
 Visit

 Vi
- (2) Lubricate assembly surface with grease.

(3) Make use of jig and press to assemble brake piston assembly on brake housing (13).

(4) Assemble spring space (7) and return spring (8) on brake piston (9). Assemble 3 hexagonal bolts (6) lubricated with

Loctite 277.







(5) Fasten hexagonal bolts (6) on brake piston (9).

 \cdot Fastening torque : 1.5 \pm 0.2 kgf \cdot m



- (6) Assemble friction plate (5) and brake reaction plate (4) on brake housing (13)
- Never forget to assemble reaction plate only after assembling friction plate.

- (7) Assemble bearing housing on brake housing (13).
 - · Brake play setting : 1.2 mm





(8) Lubricate socket head bolt (1) with Loctite 277.



(9) Fasten socket head bolt (1) on brake housing (13).

 \cdot Fastening torque : 6 \pm 0.5 kgf \cdot m



- (10) Assemble parking pin (12) on brake housing (13).
- EBX3PS99
- (11) Assemble parking lever pushing (18) on brake housing (13).



(12) Assemble 2 O-rings on parking lever pushing (18).



(13)Lubricate the surface of O-ring with grease.



(14) Assemble snap ring (14) on parking lever pushing (18). Mark a point for checking for proper assembling.







(16)Lubricate the surface of O-ring with grease.



- (13)Assemble O-ring (17) on parking space (16), and lubricate it with grease.Mark a point for checking for proper assembling.
- EBX3PS106
- (14) Assemble assembly on brake housing (13).

- (15) Assemble hexagonal bolt on parking lever pulling.
- 25BX3PS107



(16) Assemble key on parking lever pushing (18).



(17) Assemble parking lever pulling assembly on parking lever pulling (18).



(18) Assemble snap ring on parking lever pushing (18). Mark a point for checking for proper assembling.



8. DIFFERENTIAL GEAR ASSEMBLY

1) DISASSEMBLING



- 1 Center axle assembly
- 6 Socket head bolt
- 2 Snap ring Brake hub

Ball bearing

Ball bearing

3

4

5

- 7 Differential gear case
- 8 Dowel pin
- 9 Differential cover gear
- 10 Differential pinion shaft (A)

- 25BX3PS112A
- 11 Differential pinion shaft (B)
- 12 Differential side gear
- 13 Thrust washer
- 14 Differential pinion gear
- 15 Differential pinion washer
- (1) Remove center shaft assembly (1) from differential gear assembly.
- (2) Remove snap ring (2) and brake hub (3) from differential gear case (7).
- (3) Remove ball bearing (4) from differential gear case (7).
- (4) Remove ball bearing (5) from differential cover gear (9).
- (5) Remove socket head bolt (6) and differential gear case (7) from differential cover gear (9).
- (6) Remove differential gear and pinion.

2) ASSEMBLING

(1) Lubricate differential gear case (7) with grease.



(2) Lubricate gear, washer and shaft with grease.



(3) Assemble pinion gear, shaft and washer on differential gear case (7) and differential cover gear (9).

(4) Assemble washer, differential side gear(12) and dowel pin (8) on differential gear case (7) and differential cover gear(9).



(5) Lubricate socket head bolt (6) with Loctite 277.



(6) Assemble 8 socket head bolts (6) on differential gear case (7).



- (7) Fasten 8 socket head bolts (6) on differential gear case (7).
 - \cdot Fastening torque : 6 \pm 0.5 kgf \cdot m

(8) Assemble ball bearing (5) on differential cover gear (9).





25BX3P





(10) Assemble snap ring (2), and then mark a point for checking proper assembling.



9. FIRST AND SECOND GEAR ASSEMBLIES



- Gear shaft
- 5 Key

(1) Disassembling first gear assembly

- ① Remove ball bearing (1) from input gear (3).
- ② Remove ball bearing (2) from input gear (3).

(2) Disassembling second gear assembly

- ① Remove ball bearing (1) from second gear assembly.
- 2 Remove ball bearing (1) from second gear assembly.
- ③ Remove helical gear (2) and key (5) from gear shaft (4).
- ④ Remove helical gear (2) and key (5) from gear shaft (4).

2) ASSEMBLING

- (1) Assembling first gear assembly
 - ① Make use of heating device to assemble bearing on input gear (3).



(2) Assembling second gear assembly

 Once key (5) is assembled on gear shaft (4), assemble helical gears (3, 4).



- ② Make use of heating device to assemble ball bearing (1) on gear shaft (4).
- * Check ball bearing for smooth revolution.



10. CENTER SHAFT ASSEMBLY

1) DISASSEMBLING



25BX3PS128A

- 1 Snap ring
- 2 Brake hub
- 3 Center shaft
- (1) Remove snap ring (1) and brake hub (2) from center shaft (3).

2) ASSEMBLING

(1) Assemble brake hub (2) on center shaft (3).



(2) Assemble snap ring (1) on center shaft(3).

