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M22

MANUALLY PROPELLED, SEMI-ELECTRIC LIFT TRUCK

Used from Serial Number 326100281

Operation

Maintenance

Repair Parts List

Big Lift LLC
www.bigjoeforklifts.com

MANUAL NO. BL-M22EP-0119 - 01-11-2019

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WARNING

Do not operate this truck unless you have been authorized and trained to do so, and have read all warnings and instructions in Operator's Manual and on this truck.

Do not operate this truck until you have checked its condition. Give special attention to wheels, battery, lift system (including forks or attachments, chains, and cables), brake, steering mechanism, guards and safety devices.

Operate truck only from designated operating position. Never place any part of your body into the mast structure or between the mast and the truck. Do not carry passengers. Keep feet clear of truck and wear foot protection.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down at cross aisles and wherever vision is obstructed.

Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery surfaces that could cause truck to slide or overturn. Use special care when traveling without load as the risk of overturn may be greater.

Travel with lifting mechanism as low as possible. Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load trailing.

Use special care when operating on ramps travel slowly, and do not angle or turn. Travel with load downhill.

Do not overload truck. Check nameplate for capacity and load center information.

When using forks, space forks as far apart as load will permit. Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against load backrest.

Do not handle unstable or loosely stacked loads. Use special care when handling long, high or wide loads, to avoid losing the load, striking bystanders, or tipping the truck.

Do not handle loads which are higher than the load backrest unless load is secured so that no part of it could fall backward.

Elevate forks or other lifting mechanism only to pick up or stack a load. Watch out for obstructions, especially overhead.

Do not allow anyone to stand or pass under load or lifting mechanism.

When leaving truck, neutralize travel control, fully lower lifting mechanism and set brake. When leaving truck unattended, also shut off power.

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TABLE OF CONTENTS

Section		Page
DESCRIPTION		1-1
1-1	INTRODUCTION	1-1
1-2	GENERAL DESCRIPTION	1-1
1-3	SAFETY FEATURES	1-1
OPERATION		2-1
2-1	GENERAL	2-1
2-2	OPERATING PRECAUTIONS	2-1
2-3	BEFORE OPERATION	2-1
2-4	INSTRUMENTS AND CONTROLS	2-3
2-4.1	INSTRUMENT PANEL	2-3
2-4.2	FOOT ACTUATED FLOOR LOCK	2-3
2-4.3	OPERATOR HANDLE	2-3
2-5	TRANSPORT	2-3
2-5.1	MOVING, POSITIONING, STOPPING	2-3
2-5.2	TURNING	2-4
2-6	OPERATING THE LIFT	2-4
2-7	LOADING AND UNLOADING	2-4
2-8	PARKING	2-4
PLANNED MAINTENANCE		3-1
3-1	GENERAL	3-1
3-2	MONTHLY AND QUARTERLY CHECKS	3-1
3-3	BATTERY CARE	3-1
3-3.1	GENERAL	3-1
3-3.2	SAFETY RULES	3-2
3-3.3	BATTERY CARE AND CHARGING	3-2
3-4	CHARGING BATTERIES	3-2
3-4.1	BATTERY CHARGER INDICATORS	3-2
3-4.2	CHARGING	3-2
3-5	LUBRICATION	3-2
3-6	LIFT CHAIN MAINTENANCE	3-2
TROUBLESHOOTING		4-1
4-1	GENERAL	4-1
LIFT SYSTEM SERVICING		5-1
5-1	GENERAL	5-1
5-2	LIFT CHAIN WEAR INSPECTION	5-1
5-3	LIFT CHAINS ADJUSTMENT	5-1
5-4	LIFT CHAINS REPLACEMENT	5-1
5-5	LIFT FORKS	5-3
5-5.1	REMOVAL	5-3
5-5.2	INSTALLATION	5-3
5-6	LIFT CARRIAGE	5-3
5-7	LIFT CYLINDER (SINGLE STAGE)	5-4
5-7.1	REMOVAL	5-4
5-7.2	INSTALLATION	5-4
5-8	LIFT CYLINDER (TELESCOPIC)	5-5
5-8.1	REMOVAL	5-5
5-8.2	INSTALLATION	5-5
HYDRAULIC SYSTEM SERVICING		6-1
6-1	HYDRAULIC PUMP ASSEMBLY	6-1
6-1.1	REMOVAL	6-1
6-1.2	INSTALLATION	6-1
6-2	LIFT CYLINDER	6-2
ELECTRICAL SYSTEM SERVICING		7-1
7-1	HYDRAULIC PUMP MOTOR	7-1
7-2	BATTERY CHARGER	7-1
FRAME AND RELATED PARTS SERVICING		8-1
8-1	GENERAL	8-1
8-2	LOAD WHEEL REPLACEMENT	8-1
8-3	CASTER WHEEL REPLACEMENT	8-1
8-4	FOOT ACTUATED FLOOR LOCK	8-1
ILLUSTRATED PARTS BREAKDOWN		9-1

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NOTES

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SECTION 1
DESCRIPTION

1-1. INTRODUCTION.

This publication describes the 12 volt M22 lift truck distributed by Big Lift LLC. Included are operating instructions, planned maintenance instructions, lubrication procedures, corrective maintenance procedures and a complete parts list with part location illustrations.

Users shall comply with all requirements indicated in applicable OSHA standards and current edition of A.N.S.I. B56.1 Part II. By following these requirements and the recommendations contained in this manual, you will receive many years of dependable service from your M22 lift truck.

1-2. GENERAL DESCRIPTION.

The manually-propelled M22 truck, Figure 1-2, lifts and transports payloads up to 2200 pounds on adjustable forks.

The handle is used to control the lift truck. The control handle is used to propel and steer the lift truck. Lift and Lower are controlled by a lever located near the operator.

The model number will be found on the name plate (Figure 1-1) along with the serial number, lifting capacity, and load center. Figure 1-2 shows the locations of the truck's main components and controls.

1-3. SAFETY FEATURES.

The M22 is designed and engineered to provide maximum safety for operator and payload. Some of the safety features incorporated into the design are:

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Figure 1-1 Name Plate

- Foot actuated floor lock.
- Positive steer tracking caster.
- Lift control automatically returns to "OFF" when released.
- High visibility color scheme of truck provides visual alert of truck's presence.
- Battery Discharge Indicator (BDI).
- Key switch.

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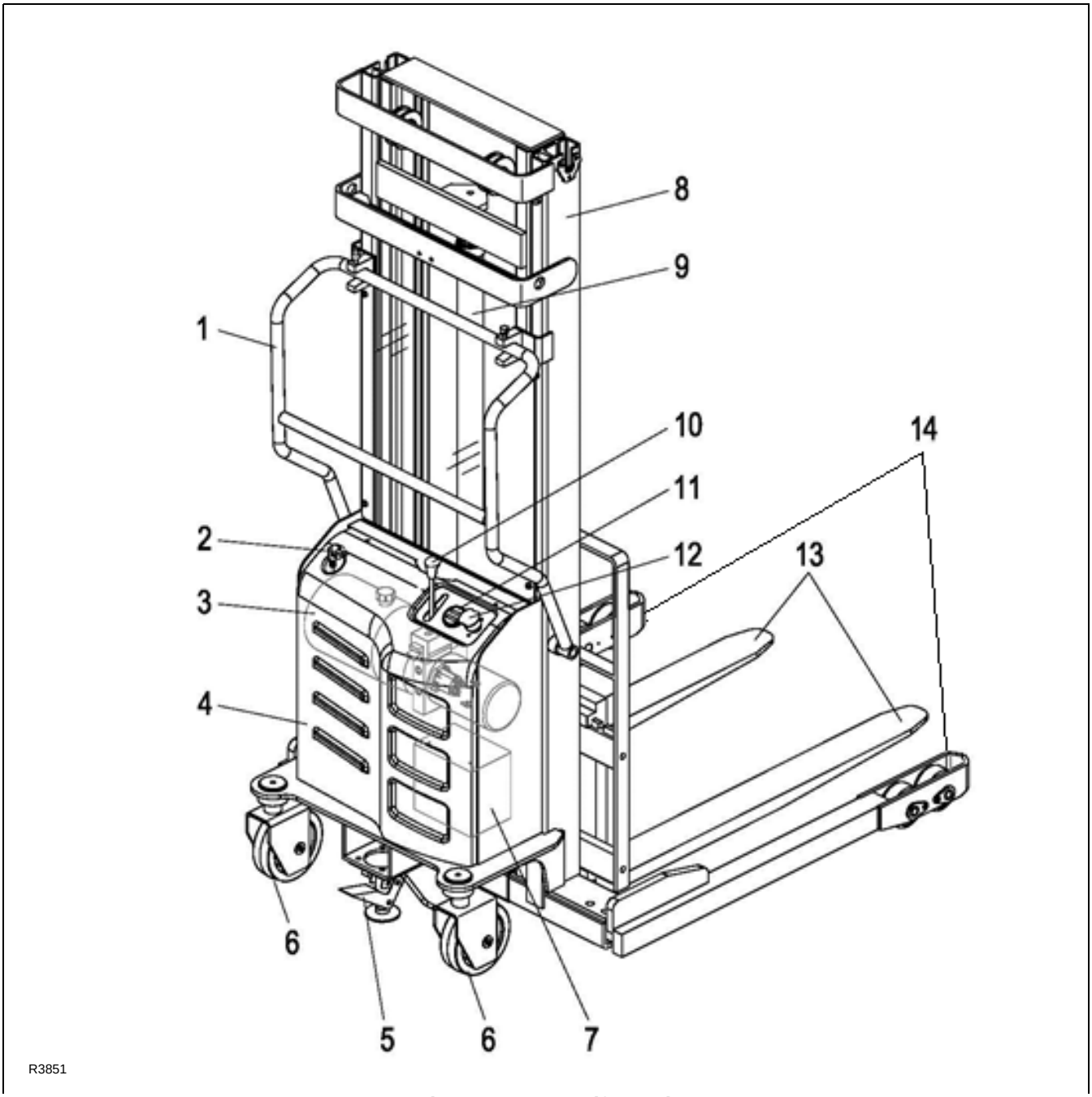

Figure 1-2. M22 Lift Truck

Pos. #	Description	Pos. #	Description
1	Handle	8	Frame / Mast
2	Battery Charger Cord	9	Lift Cylinder
3	Pump and Motor Assembly	10	Lift / Lower Lever
4	Cover	11	Battery Discharge Indicator (BDI)
5	Foot Actuated Floor Lock	12	Emergency Stop Switch
6	Casters	13	Adjustable Forks
7	Battery	14	Adjustable Straddle Legs

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SECTION 2
OPERATION

2-1. GENERAL.

The following paragraphs describe the controls and various procedures involved in proper operation of the lift truck.

2-2. OPERATING PRECAUTIONS.

WARNING: Improper operation of the lift truck may result in operator injury, or load and/or lift truck damage. Observe the following precautions when operating the M22 lift truck.

The following safety precautions must be adhered to at all times.

1. Turn off the key switch and remove the key when leaving the lift truck.
2. Leave the load in the full down position for overnight storage.
3. Engage the floor lock before leaving the lift truck.
4. Center the load as far as possible toward the backrest. Never lift a load on the fork tips or on one fork blade.
5. Do not attempt to lift a load heavier than the rated capacity of the truck. Check that the center of gravity of the load is not beyond the load center listed on the name plate (Figure 1-1). See Figure 2-1 for an explanation of load center.
6. Check for obstructions before raising or lowering a load.
7. Lower the load before traveling. If it is necessary to move the load while raised, travel cautiously and use extra care when turning.

2-3. BEFORE OPERATION.

Table 2-1 covers important inspection points on the M22 lift truck which should be checked prior to operation. Depending on use some trucks may require additional checks.

Figure 2-2 shows a sample format for an Operator Checklist, which can be modified as necessary to fit your operation.

WARNING: Periodic maintenance of this truck by a QUALIFIED SERVICE TECHNICIAN is required.

CAUTION: A QUALIFIED SERVICE TECHNICIAN should check the truck monthly for proper lubrication, proper fluid levels, brake maintenance, motor maintenance and other areas specified in the SECTION 3.

WARNING: If the truck is found to be unsafe and in need of repair, or contributes to an unsafe condition, report it immediately to the designated authority. Do not operate it until it has been restored to a safe operating condition. Do not make any unauthorized repairs or adjustments. All service must be performed by a qualified service technician.

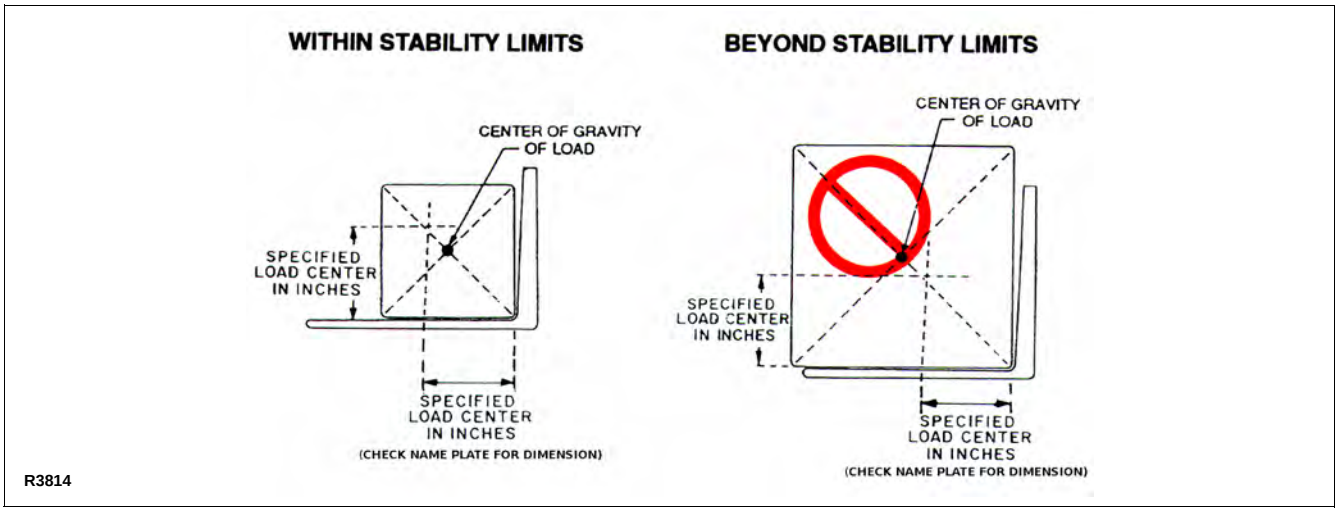

Figure 2-1 Load Center

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Table 2-1 Operator Checks

ITEM	PROCEDURE
Hydraulic System	Check for signs of fluid leakage.
Forks	Check for cracks and damage and that they are properly secured.
Chains, cables and hoses	Check that they are in place, properly secured and not damaged.
Guards	Check that safety guards are in place, properly secured and not damaged.
Safety signs	Check that warning labels, nameplates, etc., are in good condition and legible.
Wheels	Check wheels for cracks or damage. Move the truck to check load wheel and casters for freedom of rotation.
Lift and Lower	Check operation of lift and lower to their maximum positions.
Floor Lock	Check that the floor lock holds the truck stationary.
Lift Motor	Check for grinding or laboring sounds.

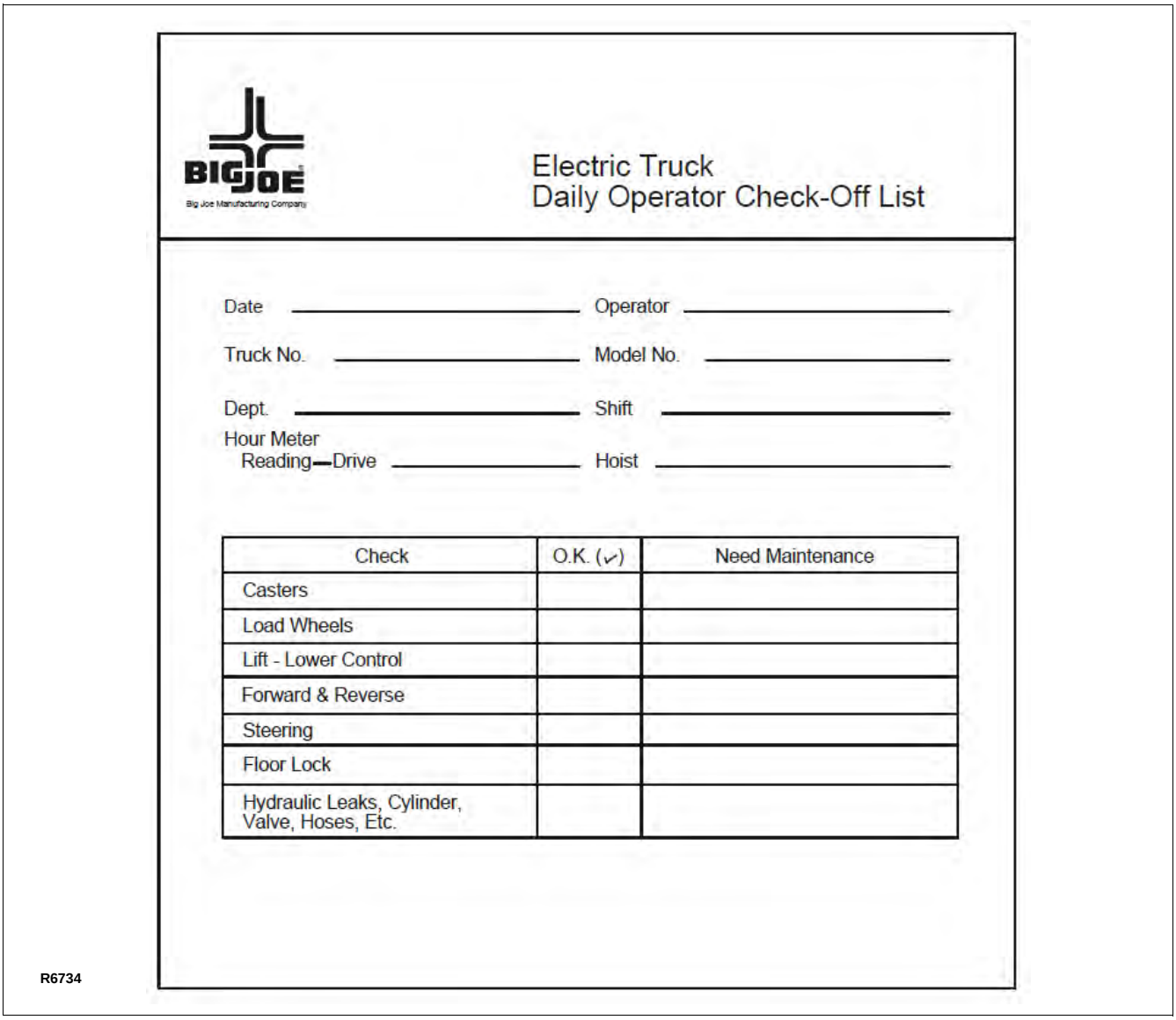

Figure 2-2 Sample of Operator Check List

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2-4. INSTRUMENTS AND CONTROLS.

2-4.1. Instrument Panel

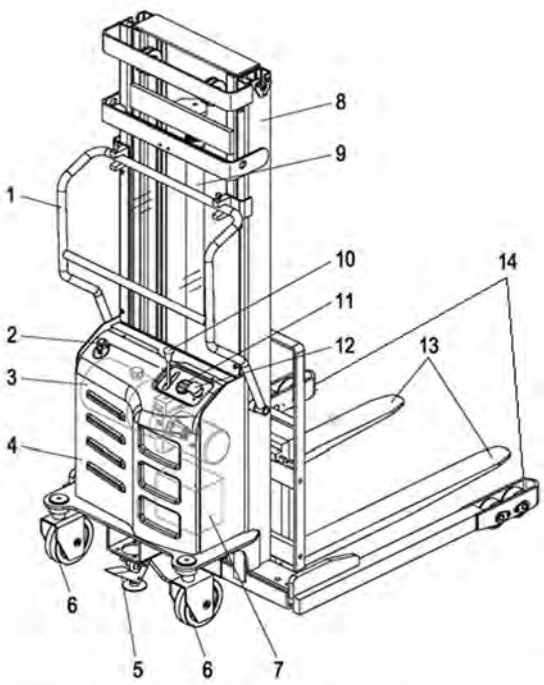
The instrument panel contains the lift/lower control lever, battery discharge indicator (BDI) and the emergency stop switch.

2-4.2. Foot Actuated Floor Lock

The foot actuated floor lock is used to hold the truck stationary.

2-4.3. Operator Handle

The operator handle located on the mast is used to propel and steer the lift truck.



Pos. #§	Description§	Pos. #§	Description§
1§	Handle§	8§	Frame§
2§	Battery Charger Cord§	9§	Lift Cylinder§
3§	Pump and Motor Assembly§	10§	Lift / Lower Lever§
4§	Cover§	11§	Battery Discharge Indicator (BDI)§
5§	Foot Actuated Floor Lock§	12§	Emergency Stop Switch§
6§	Casters§	13§	Adjustable Forks§
7§	Battery§	14§	Adjustable Straddle Legs§

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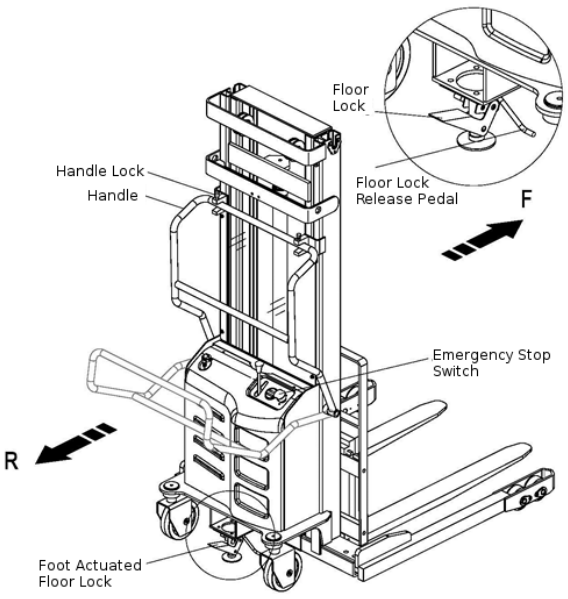

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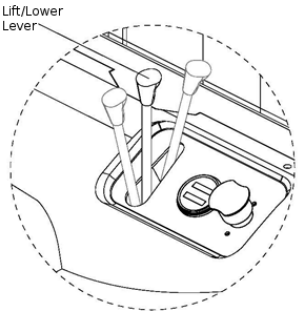

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Figure 2-3. M22 Lift Truck

2-5. TRANSPORT.

2-5.1. Moving, Positioning and Stopping

1. Check that the load is in the down position before traveling.
2. Release the floor lock by pressing the Floor Lock Release Pedal.
3. Apply pressure to the operator handle to move the truck forward. Lower the operator handle so that you are further away from the truck and move the truck in reverse.
4. To stop the lift truck, hand pressure against the operator handle is usually adequate.
5. After the lift truck has stopped, always engage the floor lock before lifting or lowering and when parking.

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2-5.2. Turning

1. Release the floor lock.

NOTE: Turning and maneuvering the lift truck is made easier if the truck is in motion.

2. Begin rolling the truck and simultaneously apply side pressure to the handle to cause the caster wheels to swivel.

2-6. OPERATING THE LIFT.

WARNING: Check the space above the load on the forks to ensure that the load will not strike any obstruction while being raised and make sure that it's not heavier than the trucks capacity.

1. Turn on the truck.
2. To raise the forks, pull the lift control back and hold until the forks reach the desired height. The forks will raise at a fixed speed. Return the lift control to the neutral position.
3. To lower the forks, push the lift control forward and hold until the forks reach the desired level. The lowering speed can be controlled by the lever. Return the lift control to the neutral position.

2-7. LOADING AND UNLOADING.

1. Move the truck to the location where the load is to be picked up.
2. Adjust the forks to the maximum practical width to support the load.
3. Raise the forks to the desired height for entry under the load.
4. Move the lift truck into position so that the forks are centered under the load.
5. Move the lift truck forward to place the load as far back as possible toward the lift carriage. Raise the forks to lift the load.

CAUTION: To avoid spilling the load, move slowly and use extra caution when turning.

6. Reverse the truck from the loading position.
7. When the load is clear of its rack, lower the load, leaving enough floor clearance to maneuver the truck.
8. Push or pull the truck carefully to the area where the load is to be placed.
9. Align the lift truck with its new position.
10. Raise the forks to the desired height and slowly move the lift truck into position for off-loading.

CAUTION: The load must rest squarely on its rack when it is lowered into position.

11. When the load is in position, lower the forks until the pallet rest on its rack and the forks are free.
12. Slowly move the lift truck in reverse checking that the forks do not catch on the pallet or rack.
13. Lower the forks when they are clear from the rack.
14. Proceed to move the next load.

2-8. PARKING.

When finished with moving loads, lower the forks and move the lift truck to its maintenance or storage area. Engage the floor lock and make sure the operator handle is secured in an upright position. Turn off the truck and charge the battery if required. Refer to battery care instruction in SECTION 3.

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SECTION 3
PLANNED MAINTENANCE

3-1. GENERAL.

Planned maintenance consists of periodic visual and operational checks, parts inspection, lubrication, and scheduled maintenance designed to prevent or discover malfunctions and defective parts. The operator performs the checks in SECTION 2, and refers any required servicing to a qualified service Technician who performs the scheduled maintenance and any required servicing.

3-2. MONTHLY AND QUARTERLY CHECKS.

Table 3-1 is a monthly and quarterly inspection and service chart based on normal usage of equipment eight hours per day, five days per week. If the lift truck is used in excess of forty hours per week, the frequency of inspection and service should be increased accordingly. These procedures must be performed by a qualified service technician or your Big Lift LLC Service Representative.

3-3. BATTERY CARE.

3-3.1. General

The care and maintenance of the battery is very important to obtain efficient truck operation and maximum battery life.

Leakage voltage from battery terminals to battery case can cause misleading trouble symptoms with the truck's electrical system. Since components of the truck's electrical system are insulated from truck frame, leakage voltage will not normally affect truck operation unless a short circuit or breakdown of circuit wire insulation to truck frame occurs.

A voltage check from battery connector terminal to battery case should indicate near zero volts. Typically, however, the sum of the voltages at both terminals will equal battery volts. This leakage voltage will discharge the battery. As battery cleanliness deteriorates, the usable charge of the battery decreases due to this self discharge.

Although a leakage voltage reading of zero volts may not be possible, a cleaner battery will have more usable charge for truck operation and not affect operation of electronic devices on the unit.

Table 3-1Monthly and Quarterly Inspection and Service Chart

VISUAL CHECKS	
INTERVAL	**INSPECTION OR SERVICE**
Daily	Check battery condition. Check cables for good contact with terminal posts.
Daily	Observe performance of truck. Check any improper operation.
Weekly	Check floor lock.
Monthly	Inspect hoses and fittings for leaks.
Monthly	Check wiring for loose connections and damaged insulation.
Monthly	Check load wheels for wear.
Monthly	Check caster wheels for wear.
Monthly	Check lift chain tension, lubrication & operation (see paragraph 3-6.)
Quarterly	Check lift cylinder for leakage.
Semi-annually	Inspect for chain wear (See SECTION 8)

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3-3.2. Safety Rules

- Do not lay metallic or conductive objects on battery. Arcing will result.
- Do not touch non-insulated parts of DC output connector or battery terminals to avoid possible electrical shock.
- Do not charge a frozen battery.

3-3.3. Battery Care and Charging

1. Charge the battery only in areas designated for that use.
2. Battery terminals should be checked and cleaned of corrosion regularly. Good battery terminal contact is essential not only for operation, but also for proper charging of the battery.
3. The charging requirements will vary depending on the use of the truck.
4. Make certain battery used meets weight and size requirements of truck. NEVER operate truck with an undersized battery.

3-4. CHARGING BATTERIES

3-4.1. Battery Charger Indicators

The battery charger is fully automatic.

The LED indicator on the dashboard indicate battery charging status. Red indicates charging in progress. Yellow indicates charging error, for example charger not plugged in correctly. Green indicates that the battery is fully charged.

3-4.2. Charging

Charging requirements will vary depending on depth of discharge and temperature. Follow safety rules when placing a battery on charge.

Proceed as follows:

1. Park truck at charging station with carriage lowered and the truck turned off.
2. Check the condition of the AC cord and battery cables. If there are any cuts in the cable, any exposed wires, loose plugs or connectors, DO NOT attempt to charge the batteries. Contact appropriate personnel for repairs to be made.
3. Connect the charger AC cord to the appropriate power supply.
4. The Red light indicates that power is connected.
5. When the battery is fully charged the green indicator will come on.
6. Unplug the power cord when finished charging.

3-5. LUBRICATION.

Refer to Table 3-2 for the recommended types of grease and oil. Table 3-3 in conjunction with Figure 3-1 identifies the items requiring lubrication.

3-6. LIFT CHAIN MAINTENANCE.

Fully raise and lower lift carriage while observing chains as they move over chain sheaves. Ensure chain is aligned and tracking properly and all links are pivoting freely. With lift carriage fully lowered, spray or brush on a film of SAE 30 or 40 engine oil.

Table 3-2 Recommended Lubricants (See Table 3-3 for Application)

No. 1	Grease—Lithium base, general purpose.
No. 2	Hydraulic oil-Heavy duty with a viscosity of 150 SUS foam suppressing agent and rust and oxidation inhibitors Hydraulic oil-Heavy duty with a viscosity of 100 SUS foam suppressing agent and rust and oxidation inhibitors (Note)
No. 3	SAE 30 or 40 Engine lubricating oil

NOTE: USED ON COLD CONDITIONED TRUCKS

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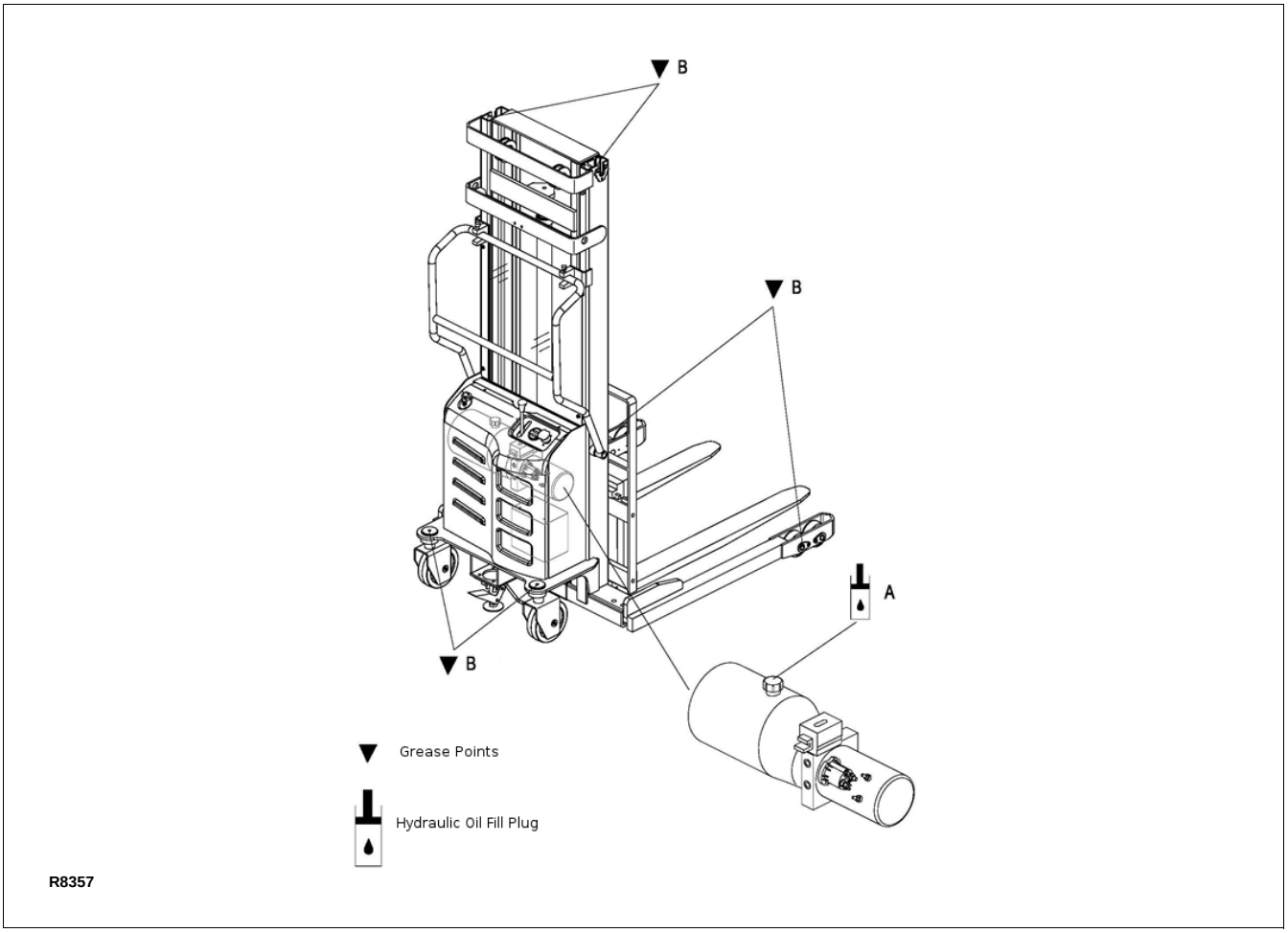

Figure 3-1 Lubrication Diagram

Table 3-3 Lubrication Chart

FIG 3-2 INDEX NO.	LOCATION	METHOD OF APPLICATION	TYPE (Table 3-3)	APPLICATION OF LUBRICANT
1	Lift Carriage	Brush	No. 1	Light coating where forks slide
2	Mast	Brush	No. 1	Full length of channel where rollers operate.
3	Lift Chain	Brush or Spray	No. 3	See Paragraph 3-6.
4	Hydraulic Reservoir Capacity-1 quarts	Can	No. 2	With lift carriage fully lowered, fill reservoir with hydraulic oil to 1 inch below opening

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SECTION 4
TROUBLESHOOTING

4-1. GENERAL

This section gives fixes for some common problems that may arise while operating the lift truck. Table 4-1 lists these malfunctions, their causes, probable and corrective action that will resolve the problem.

Table 4-1 Troubleshooting Chart

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Oil sprays or flows from the top of lift cylinder.	Worn or Defective packing in lift cylinder.	Reseal lift cylinder by installing new packing, seal, and wiper ring.
Oil splashes out of vent cap when lowering forks.	Oil level too high	Drain, then refill reservoir leaving 1 inch air space when forks are in lowest position.
Squealing sound when lifting.	a. Oil level low.	Check and add oil as necessary.
	b. Dry mast channels.	Apply grease.
	c. Defective mast or carriage bearings.	Replace bearing.
Forks do not lift to top.	Oil level low.	Add oil.
Oil leaks at hydraulic pump	Defective pump.	Replace pump assembly.
Lift control does not return to neutral.	a. Foreign particles.	Clean system.
	b. Defective pump.	Replace pump assembly
Weak, slow or uneven action of hydraulic system.	a. Defective pump	Replace pump assembly
	b. Defective lift cylinder	Repair or replace.
	c. Load exceeds capacity.	See data plate.
Forks do not lift, motor does not run	a. Battery Over discharged.	Check. Recharge if required.
	b. Defective wiring.	Check and repair as required.
	c. Defective motor.	Replace pump assembly.
Forks do not lift, motor runs.	Defect in hydraulic system	Check hydraulic oil level. Check oil lines to lift cylinder and repair as required.
Forks creep down with or without load.	a. Oil bypassing in pump or control valve.	Replace pump assembly.
	b. Worn lift cylinder packing	Replace worn parts.
	c. Leak in hydraulic system.	Check for leaky hose or fittings in hydraulic system
Truck moves when floor lock is engaged.	Defective floor lock.	Replace

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SECTION 5
LIFT SYSTEM SERVICING

5-1. GENERAL

This section covers maintenance and repair procedures for the lift system. The lift system consists of:

Inner mast assembly

Lift carriage

Lift forks

Lift chain

The lift cylinder is considered part of the hydraulic system and is covered in SECTION 6.

5-2. LIFT CHAIN WEAR INSPECTION.

Both lift chains should be replaced when either chain is worn enough to increase it's length by 3% or more. To make this determination proceed as follows.

Using a section of chain that sees the most frequent operation over the chain sheaves, isolate a vertical portion under tension from the weight of carriage and forks.

Measure the distance between pin centers on 20 vertical links. If the section measures 12.88" or more, the chain should be replaced.

New chain anchor pins should be installed when chains are replaced. Never replace a partial section of chain and never repair a damaged chain. Refer to paragraph 5-4. when installing new chain.

5-3. LIFT CHAINS ADJUSTMENT.

1. Lower the carriage fully, then disconnect battery.

CAUTION: At least 3 full threads must be present below bottom hex nut after completion of adjustment.

2. Loosen the top jam nuts on the adjusting bolts.

WARNING: Before attempting any adjustment, make certain power is disconnected.

3. Take up slack in both chains by turning the bottom nuts on adjusting bolts. Try to get equal tension on both chains.
4. Align adjusting bolts so that they are parallel to the mast.
5. Tighten the jam nuts while maintaining alignment of the adjusting bolts.

5-4. LIFT CHAINS REPLACEMENT.

1. Place a solid support on the floor under the vertical members nearest the center of the lift carriage.
2. Lower the carriage until it is supported by the support and the chains are slack, then disconnect battery.

WARNING: Before attempting any adjustment, make certain power is disconnected.

3. Remove cotter pin and clevis pin that secure chain to the lift carriage.
4. Remove cotter pin and clevis pin that secure chain to adjusting bolt.
5. Remove the chain from sheave.
6. Position new chain in place on sheave.
7. Connect chain to adjusting bolt with clevis pin and cotter pin.
8. Connect the opposite end of chain to the lift carriage with clevis pin and cotter pin.
9. Replace the remaining chain is the same manner.
10. Adjust chains according to paragraph 5-3.

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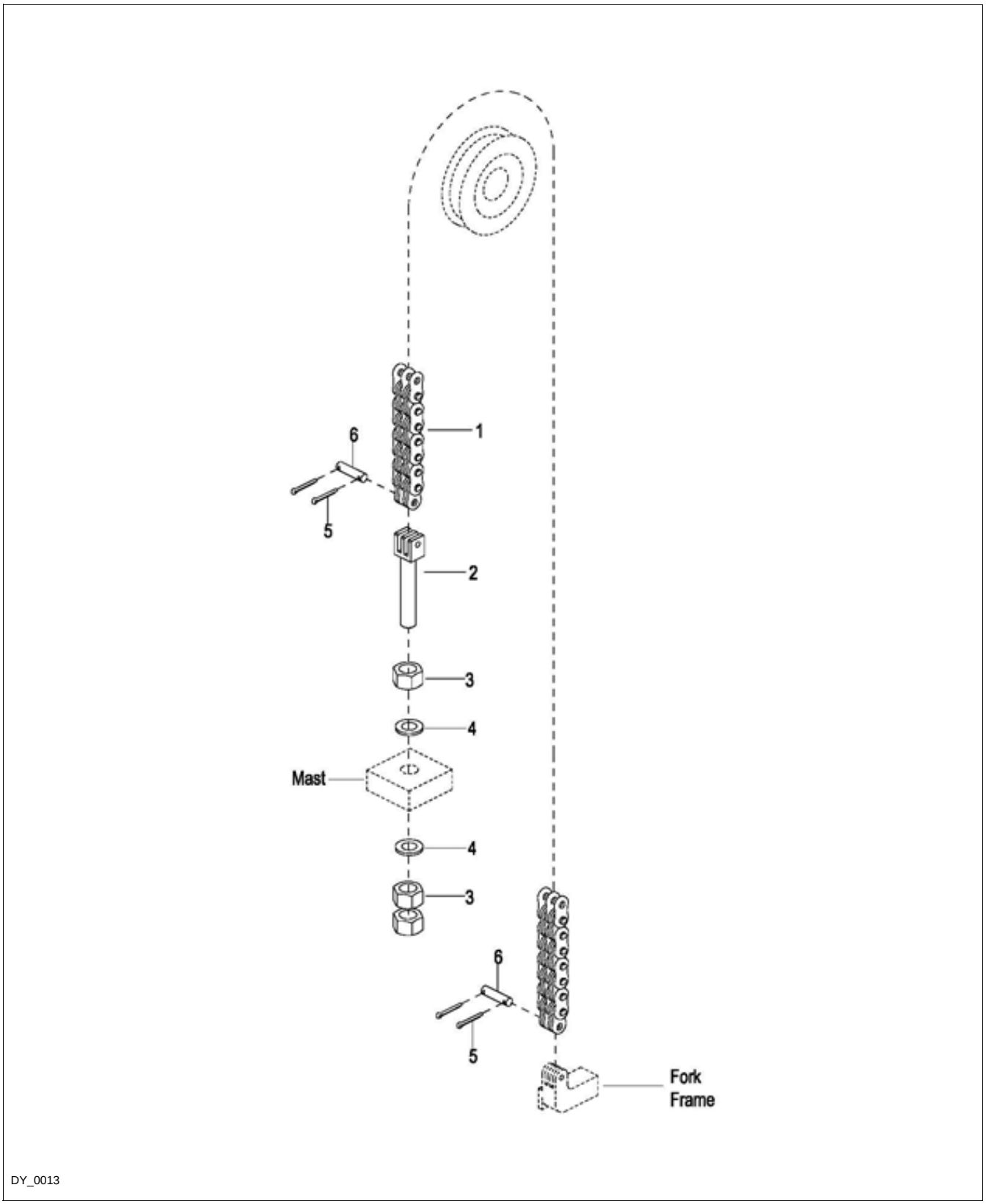

Figure 5-1. Lift Chain

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5-5. FORKS.

Check the forks periodically for cracks and other damage.

5-5.1. Removal

CAUTION: The forks are very heavy and we do not recommend doing this by yourself.

1. Pull up the fork pin and slide the fork to the open slot in the bottom and center of the fork carriage.
2. Once in the center in front of the slot tilt the fork up and while supporting the fork, lift the fork off the carriage.
3. Repeat step 1 and 2 with the second fork.

5-5.2. Installation

CAUTION: The forks are very heavy and we do not recommend doing this by yourself.

1. Lift the fork and position the fork at the open slot in the bottom and center of the fork carriage.
2. Pull up the fork pin and slide the fork to the desired position and then let go of the fork pin.
3. Repeat step 1 and 2 with the second fork.

5-6. LIFT CARRIAGE.

1. Completely lower the carriage until the chains are slack, then disconnect battery.
2. Remove the lift chains as described in paragraph 5-4.
3. Using a suitable lifting device attached to the lift carriage, slowly raise the carriage out of the mast.
4. Remove snap ring and then remove the roller.
5. Repeat step 4 for all rollers on the carriage.
6. Install the lift carriage in the reverse order of removal.

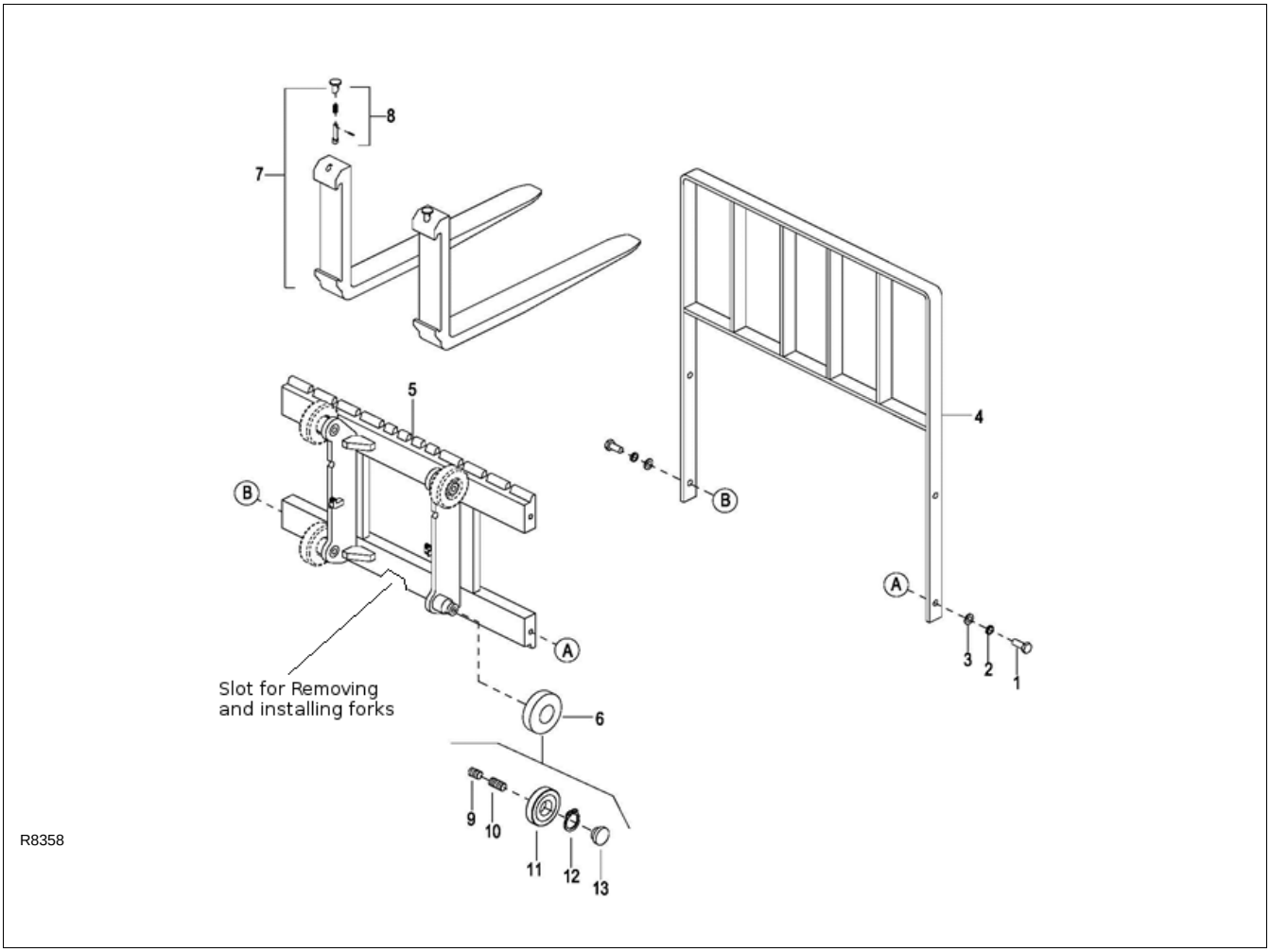

Figure 5-2 lift Carriage

5-7. LIFT CYLINDER (SINGLE STAGE).

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5-7.1. Removal

1. Chock all wheels and engage the floor lock.
2. Raise the forks approximately three feet from the floor and position blocks or other strong supports under the lift carriage. Keep supports in place during the entire procedure.
3. Lower the carriage onto the supports. Check that the supports are supporting the carriage.

WARNING: Before attempting any repair, make certain power is disconnected by disconnecting the battery.

WARNING: Before disconnecting any hydraulic lines, check that the system is not under pressure.

4. Remove return hose from the top of cylinder.
5. Loosen pressure hose at the bottom of lift cylinder and manually push the ram down as far as possible. The chain will become slack and need not be removed.
6. Disconnect pressure hose from the bottom cylinder.
7. Remove connector and packing washer from cylinder.
8. Lift chain from sheave and set it aside.
9. Lift ram head from cylinder.
10. Remove screws, lock washers, flat washers that secure the lift cylinder bracket to the frame and remove the cylinder.

5-7.2. Installation

1. Position the lift cylinder on the mast and secure with screws, flat washers, lock washers.
2. Position ram head on the lift cylinder.
3. Position lift chain on sheave.
4. Install connector and packing washer on cylinder.
5. Connect pressure hose to the bottom of cylinder.
6. Connect return hose to the top of cylinder.
7. Fill the hydraulic reservoir. Use hydraulic oil listed in Table 3-2.
8. Reconnect the battery and turn on the truck.
9. Operate the lift and lower to refill the cylinder and lines with hydraulic oil.
10. Check level of hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
11. Adjust the lift chains according to paragraph 5-3.

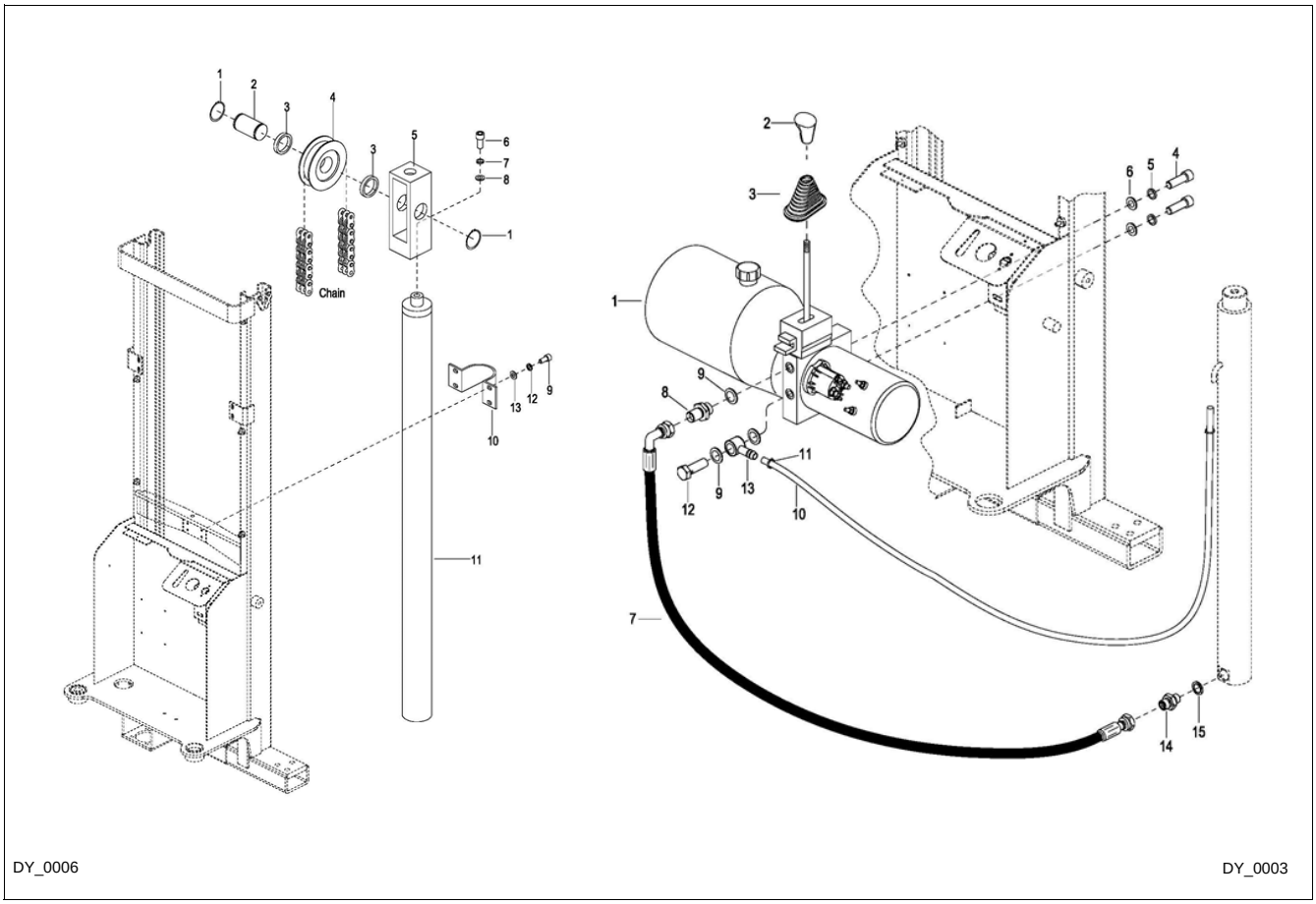

Figure 5-3 Lift Cylinder and Hydraulic System (Single Stage Mast)

5-8. LIFT CYLINDER (TELESCOPIC).

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5-8.1. Removal

1. Chock all wheels and engage the floor lock.
2. Raise the forks approximately three feet from the floor and position blocks or other strong supports under the inner mast. Keep supports in place during the entire procedure.
3. Lower the inner mast onto the supports. Check that the supports are supporting the mast.

WARNING: Before attempting any repair, make certain power is disconnected by disconnecting the battery.

4. Remove bolt, lock washer and flat washer, securing the lift cylinder to inner mast.

WARNING: Before disconnecting any hydraulic lines, check that the system is not under pressure.

5. Remove return hose from the top of cylinder.
6. Loosen pressure hose at the bottom of lift cylinder and manually push the ram down as far as possible. The chains will become slack and need not be removed.
7. Disconnect pressure hose from the bottom cylinder.
8. Remove connector and packing washer from cylinder.
9. Remove bolt, lock washer and flat washer, securing the lift cylinder to the frame.
10. Remove the cylinder.

5-8.2. Installation

1. Position the lift cylinder on the outer mast.
2. Using a suitable lifting device, support the inner mast and remove the supports.
3. Slowly lower the inner mast while lining up the lift cylinder with the inner mast cross member.
4. Secure the top of the cylinder with screw, lock washer and flat washer.
5. Install connector and packing washer on cylinder .
6. Connect pressure hose to the bottom of cylinder .
7. Connect return hose to the top of cylinder.
8. Fill the hydraulic reservoir. Use hydraulic oil listed in Table 3-2.
9. Reconnect the battery and turn on the truck.
10. Operate the lift and lower to refill the cylinder and lines with hydraulic oil.
11. Check level of hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
12. Adjust the lift chains according to paragraph 5-3.

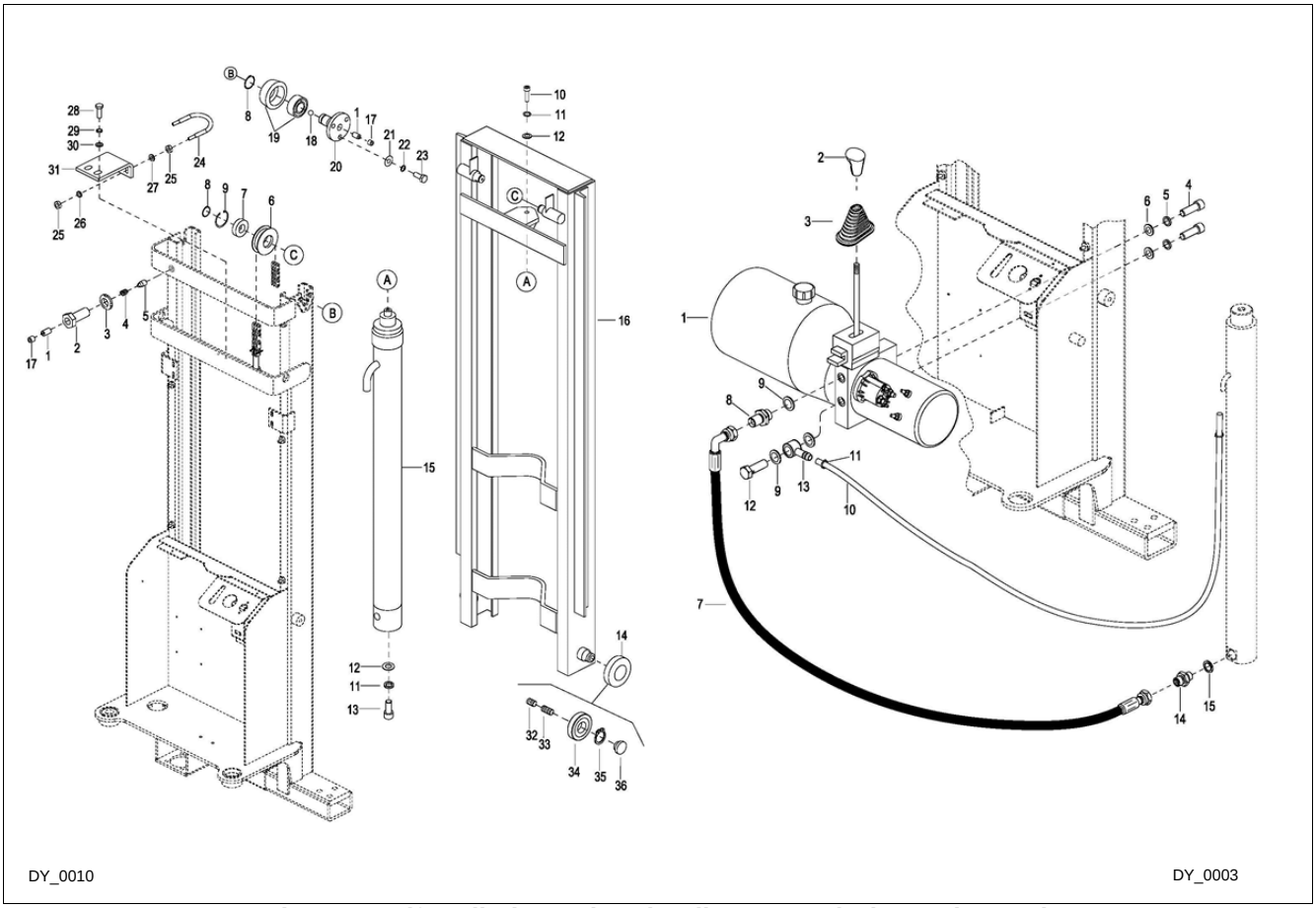

Figure 5-4Lift Cylinder and Hydraulic System (Telescopic Mast)

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NOTES

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6-1. HYDRAULIC PUMP ASSEMBLY.

6-1.1. Removal

WARNING: Before disconnecting any hydraulic line, make sure the forks are lowered completely and the system is not under pressure.

1. Disconnect battery.
2. Fully lower the lift carriage.
3. Turn the two screws on cover and remove the cover.
4. Free the rubber boot for the control lever and push it down into the compartment.

WARNING: Before disconnecting any hydraulic lines, check that the system is not under pressure.

5. Disconnect pressure hose and return hose from fittings on pump assembly.
6. Remove fittings and washers from pump assembly.
7. Label, then disconnect cables and wires from pump assembly.
8. Remove two bolts, lock washers and flat washers. Lower pump assembly out of the truck.

6-1.2. Installation

1. While supporting the pump assembly (install screws, lock washers and flat washers.
2. Reconnect fittings and washers from pump assembly.
3. Reconnect pressure hose and return hose from fittings on pump assembly.
4. Fill the hydraulic reservoir. Use hydraulic oil listed in Table 3-2.
5. Reconnect cables and wires to pump assembly.
6. Reconnect the battery and turn on the truck.
7. Operate the lift and lower to refill the cylinder and lines with hydraulic oil.
8. Check level of hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
9. Install cover (2) and secure with the two thumb screws.

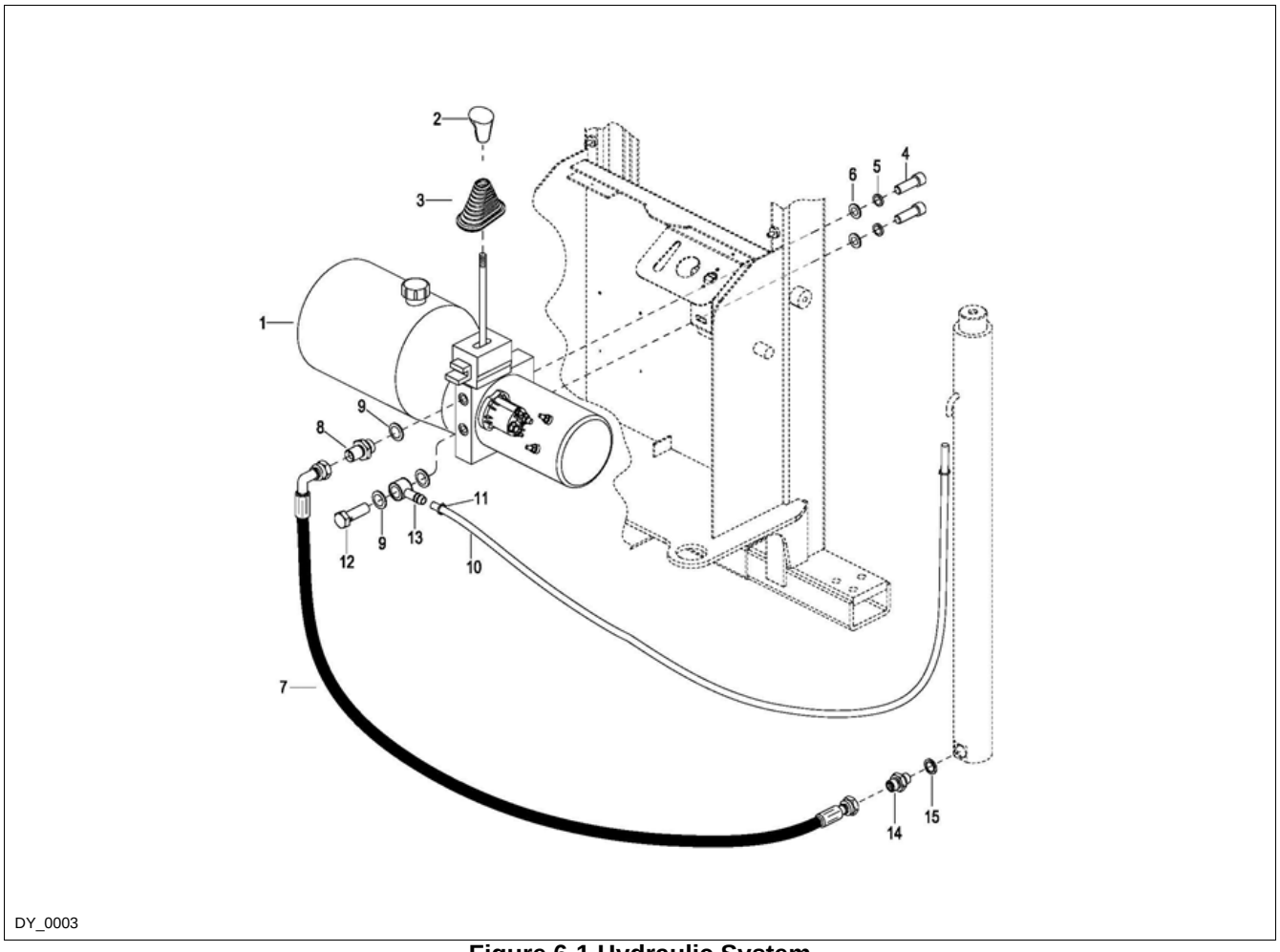

Figure 6-1 Hydraulic System

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6-2. LIFT CYLINDER.

NOTE: Removal procedures are covered in SECTION 5.

CAUTION: Use the proper tube pipe clamp vise in the following steps to prevent damage to the lift cylinder.

1. Secure the lift cylinder in the vise and remove gland nut.
2. Remove dust seal and O-ring from gland nut.
3. Pull piston rod out of cylinder body.
4. Remove guide bushing from piston rod.
5. Remove the lift cylinder from the vise.

CAUTION: Use a vise clamp with non-marring jaws to prevent damaging the piston rod (6).

6. Remove snap ring and piston.
7. Remove seal ring and support ring from piston.
8. Install seal ring and support ring on piston.
9. Install piston and snap ring on piston rod.
10. Remove piston rod from the vise.

CAUTION: Use the proper tube pipe clamp vise in the following steps to prevent damage to the lift cylinder.

11. Secure cylinder body in the vise.
12. Install piston rod in body.
13. Install guide bushing in body.
14. Install dust seal and O-ring on gland nut.
15. Install gland nut on body.
16. Remove lift cylinder from vise.

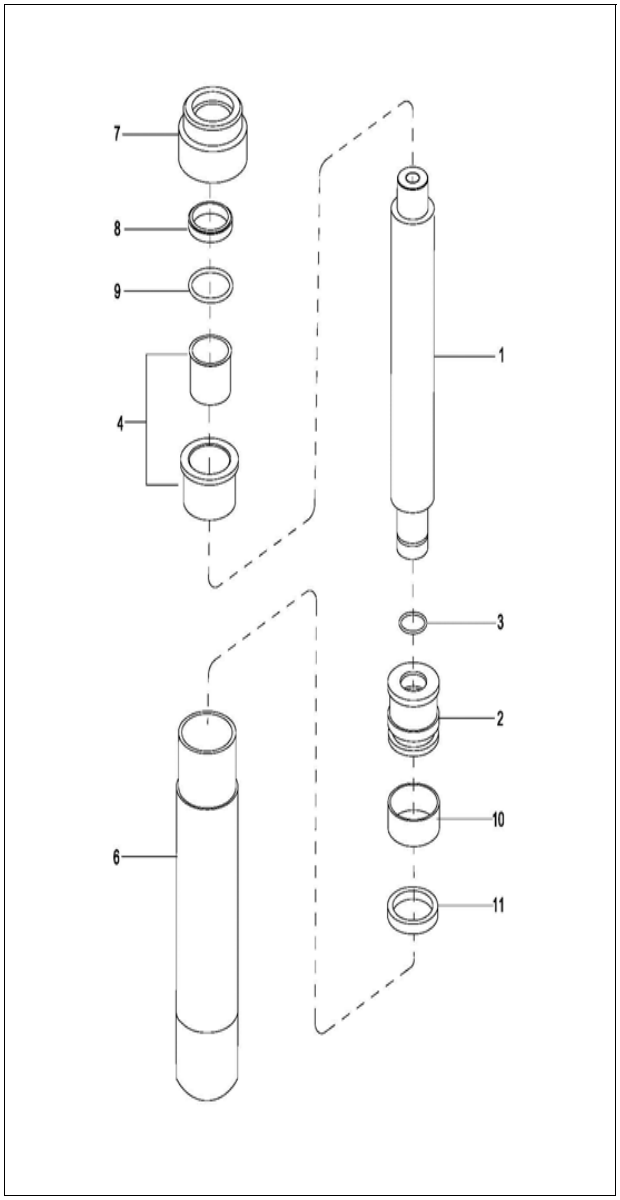

Figure 6-2 Lift Cylinder

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SECTION 7
ELECTRICAL SYSTEM SERVICING

7-1. HYDRAULIC PUMP MOTOR.

The hydraulic pump motor is part of the hydraulic pump assembly. Refer to SECTION 6 for removal and disassembly.

7-2. BATTERY CHARGER.

Your M22 lift truck is supplied with a built in battery charger which makes it a complete, self-contained unit. If the battery charger should ever fail to operate, Refer to Figure 9-12.

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NOTES

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SECTION 8
FRAME AND RELATED PARTS SERVICING

8-1. GENERAL.

This section covers load wheels, casters and floor lock replacement.

8-2. LOAD WHEEL REPLACEMENT.

1. Fully lower the carriage.
1. Chock both caster wheels and the load wheel that is not being replaced. Engage the floor brake.
2. Raise the front of the lift truck with a suitable jack. Place strong supports under the straddle leg just in back of the wheel housing so that the load wheel being replaced is approximately one inch above the floor.
3. Remove screws that secures the load wheel shaft.
4. Remove washer, load wheel shaft and load wheel.
5. Remove bearings from load wheel.
6. Install a new load wheel in the reverse order of removal.

8-3. CASTER WHEEL REPLACEMENT.

1. Fully lower the carriage.
2. Chock the load wheels.
3. Raise the rear of the lift truck with a suitable jack or another lift truck. Place strong supports approximately six inches in front of the caster to be replaced.
4. Lower the lift truck so that the body of the truck is resting on the supports. Remove the jack.
5. Check that the caster wheel is not touching the floor and is free to turn.
6. Remove screws and thrust washers.
7. Remove axle and caster wheel.
8. Remove bearings from caster wheel.
9. Install a new caster wheel in the reverse order of removal.

8-4. FOOT ACTUATED FLOOR LOCK .

1. Release the floor lock.
2. Remove bolts, lock washers, flat washers and nuts.
3. Slide floor lock assembly out from under the truck frame.
4. Install the new brake in the reverse order of removal.

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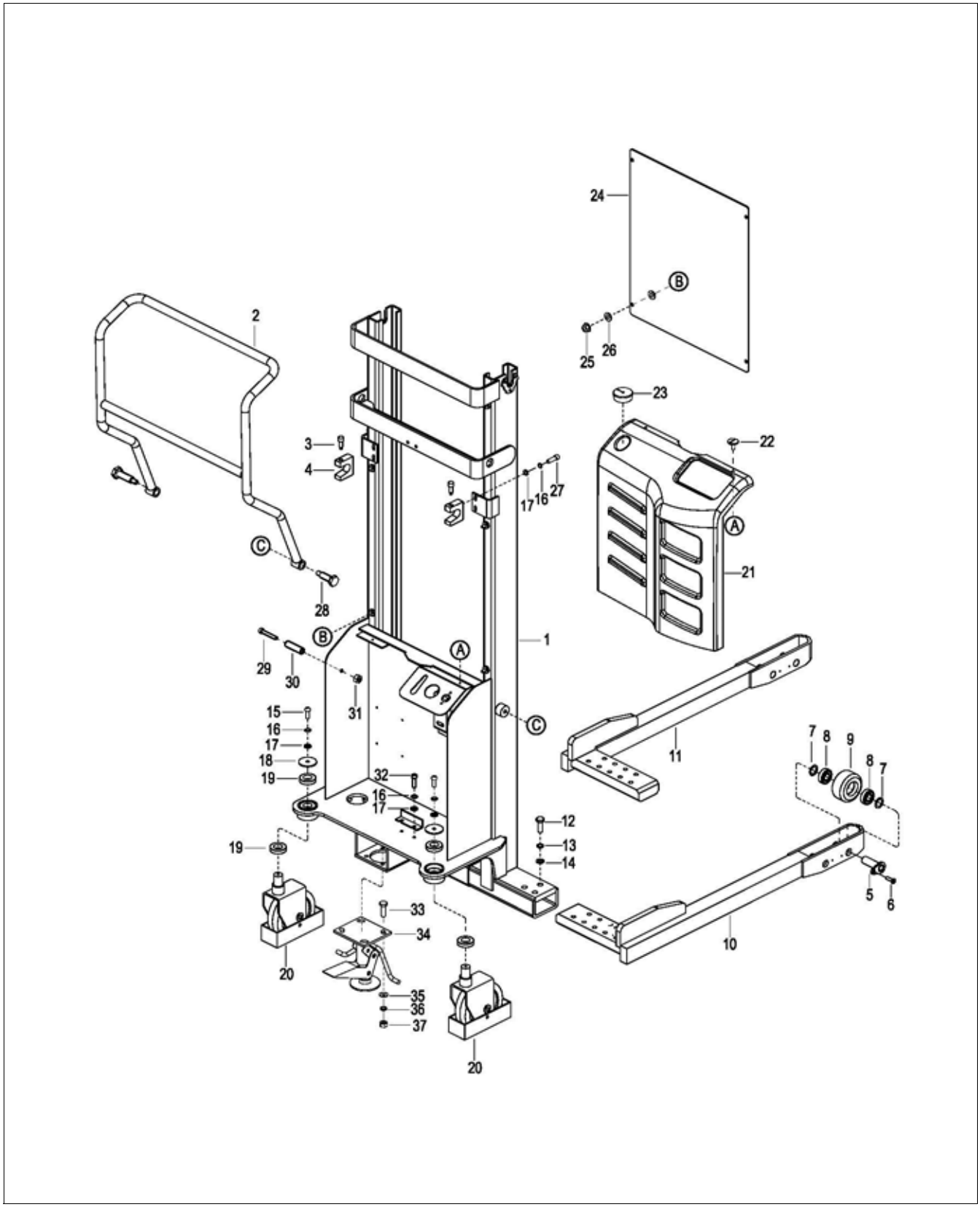

Figure 8-1 Frame

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SECTION 9
ILLUSTRATED PARTS BREAKDOWN

Following is an illustrated parts breakdown of assemblies and parts associated with the M22 Lift Truck starting from Serial Number 326100281.

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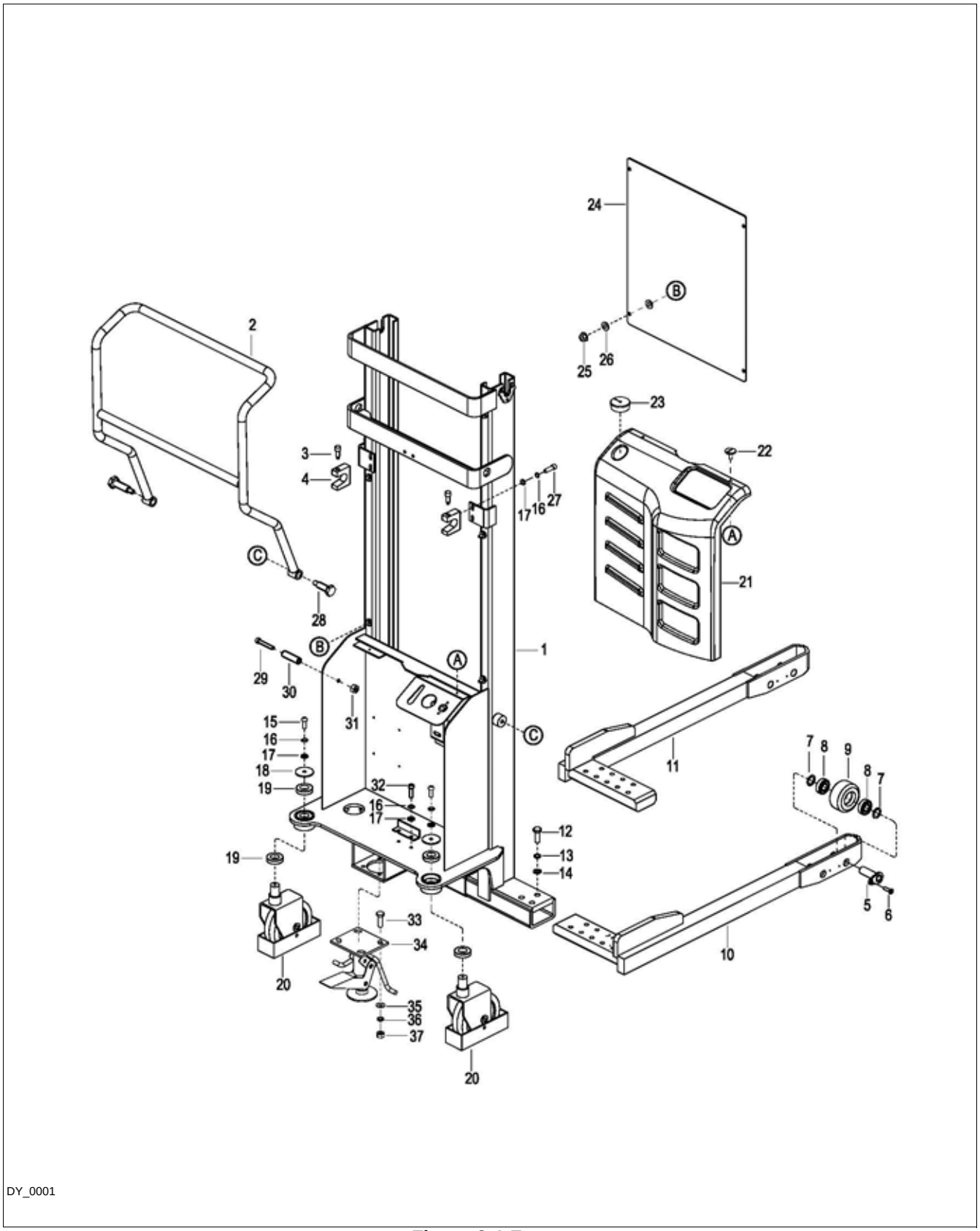

Figure 9-1 Frame

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FRAME

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2010-110000-1A	FRAME	1	For Telescopic Mast
1a	2010-110000-2A	FRAME	1	For Single stage Mast
2	2010-150000-10	HAND RAIL	1	
3	2010-100008-10	SCREW	2	
4	2010-100002-1A	FIXED BLOCK	2	
5	2010-141000-10	SHAFT	4	
6	0000-000090-00	SCREW M6×12	4	
7	2125-101003-00	WASHER	8	
8	0000-000424-00	BEARING	8	
9	2010-140001-10	LOAD WHEEL	4	
10	2010-130000-10	STRADDLE LEG R	1	
11	2010-120000-10	STRADDLE LEG L	1	
12	0000-000771-00	BOLT M16×40	6	
13	0000-000191-00	LOCK WASHER Ø16	6	
14	0000-000541-00	FLAT WASHER Ø16	6	
15	0000-000851-01	SCREW M8×12	2	
16	0000-000159-00	LOCK WASHER Ø8	8	
17	0000-000176-00	FLAT WASHER Ø8	8	
18	2010-100001-00	PLATE	2	
19	0000-001436-00	BEARING	4	
20	2010-130000-00	CASTER ASSEMBLY	2	
21	2010-160001-00	COVER	1	
22	1120-150004-00	SCREW M6×25	2	
23	1115-120002-00	CHARGER CAP	1	
24	2108-110004-60	WIND SHIELD	1	For Single stage Mast
24a	2010-100001-1A-03	WIND SHIELD	1	For Telescopic Mast 96”
24b	2010-100001-1A-02	WIND SHIELD	1	For Telescopic Mast 116”
25	0000-001176-00	NUT M8	4	
26	2214-150002-00	WASHER	8	
27	0000-000321-01	SCREW M8X20	4	
28	2010-100004-10	BOLT	2	
29	0000-001726-00	SCREW M8X80	1	
30	2010-100005-10	HAND RAIL STOP	1	
31	0000-000740-00	NUT M8	1	
32	0000-000109-00	SCREW M8X16	2	
33	0000-000251-00	BOLT M10×25	4	
34	2010-170000-00	FOOT ACTUATED FLOOR LOCK	1	
35	0000-000007-00	FLAT WASHER Ø10	4	
36	0000-000063-00	LOCK WASHER Ø10	4	
37	0000-000553-00	NUT M10	4	

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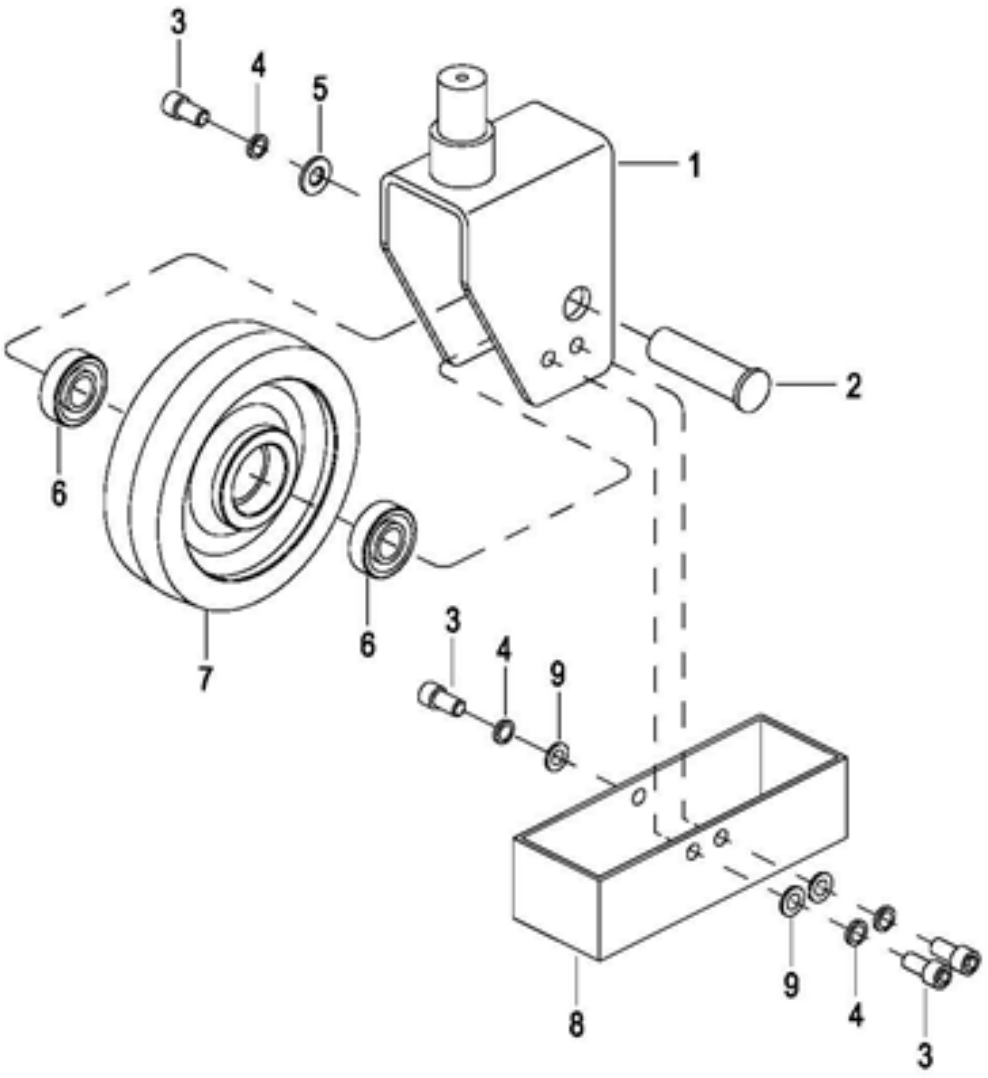

Figure 9-2 Caster Assembly

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CASTER ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2010-130000-00	CASTER ASSEMBLY	1	There are two Caster Assemblies on the truck.
1	2010-131000-00	WHEEL BRACKET	1	
2	2010-120001-00	SHAFT	1	
3	0000-000077-00	SCREW M6×12	4	
4	0000-000056-00	LOCK WASHER Ø6	4	
5	0000-000437-00	FLAT WASHER Ø6	1	
6	0000-000019-00	BEARING	2	
7	2010-120003-00	NYLON WHEEL	1	
8	2010-122000-00	PLATE	1	
9	0000-000380-00	FLAT WASHER Ø6	3	

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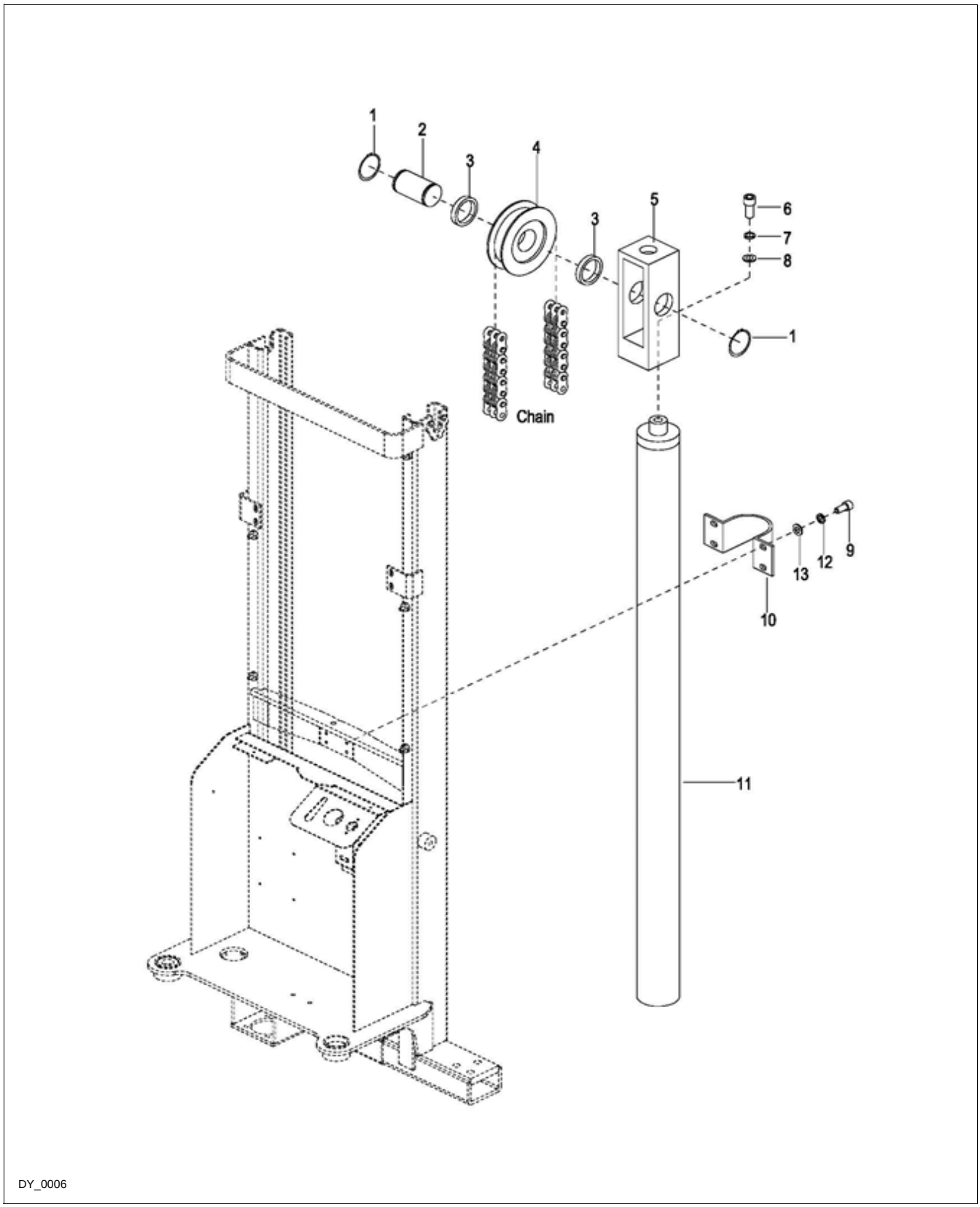

Figure 9-3 Elevation System - Single Stage

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ELEVATION SYSTEM - SINGLE STAGE

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000756-00	RETAINER RING Ø40	2	
2	2108-600001-00	SHAFT	1	
3	2108-600003-00	WASHER	2	
4	2108-600002-00	CHAIN ROLLER	1	
5	2108-620000-00	CHAIN BRACKET	1	
6	0000-000374-00	SCREW M12×30	1	
7	0000-000060-00	LOCK WASHER Ø12	1	
8	0000-000373-00	FLAT WASHER Ø12	1	
9	0000-000321-00	SCREW M8×20	4	
10	2111-600001-20	CYLINDER BRACKET	1	
11	2108-410000-60	LIFT CYLINDER	1	Lift Height 62” (1575mm)
12	0000-000159-00	LOCK WASHER Ø8	4	
13	0000-000176-00	FLAT WASHER Ø8	4	

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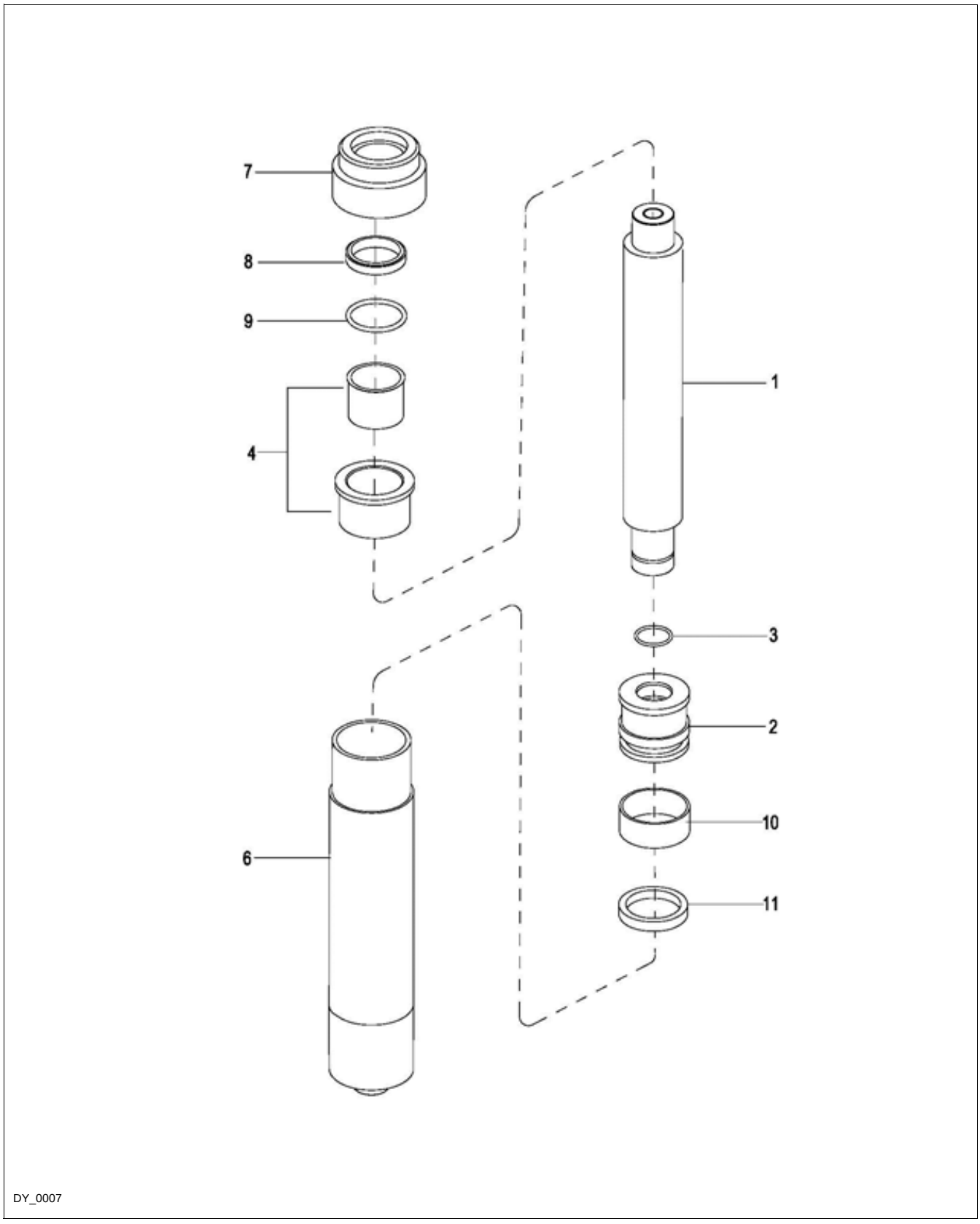

Figure 9-4 Lift Cylinder - Single Stage

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LIFT CYLINDER - SINGLE STAGE

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2108-410000-60	LIFT CYLINDER	1	Lift Height 62” (1575mm)
KIT	2110-2BG	SEAL KIT FOR CYLINDER	1	Includes Pos. # 8, 9, 11
1	2125-410001-00	PISTON ROD	1	
2	2125-410002-00	PISTON	1	
3	2125-410003-00	COLLAR	1	
4	2125-410006-00	BUSHING	1	
6	2108-411000-60	CYLINDER	1	
7	2125-410004-0A	CAP	1	
8	0000-000084-00	RING WIPER 35×43×5-6.5	1	
9	0000-000370-00	O-RING 40×3.1	1	
10	2125-410005-00	RING BACK UP 50×20×2.5	1	
11	0000-000512-00	ROD PACKING 40×50×6	1	

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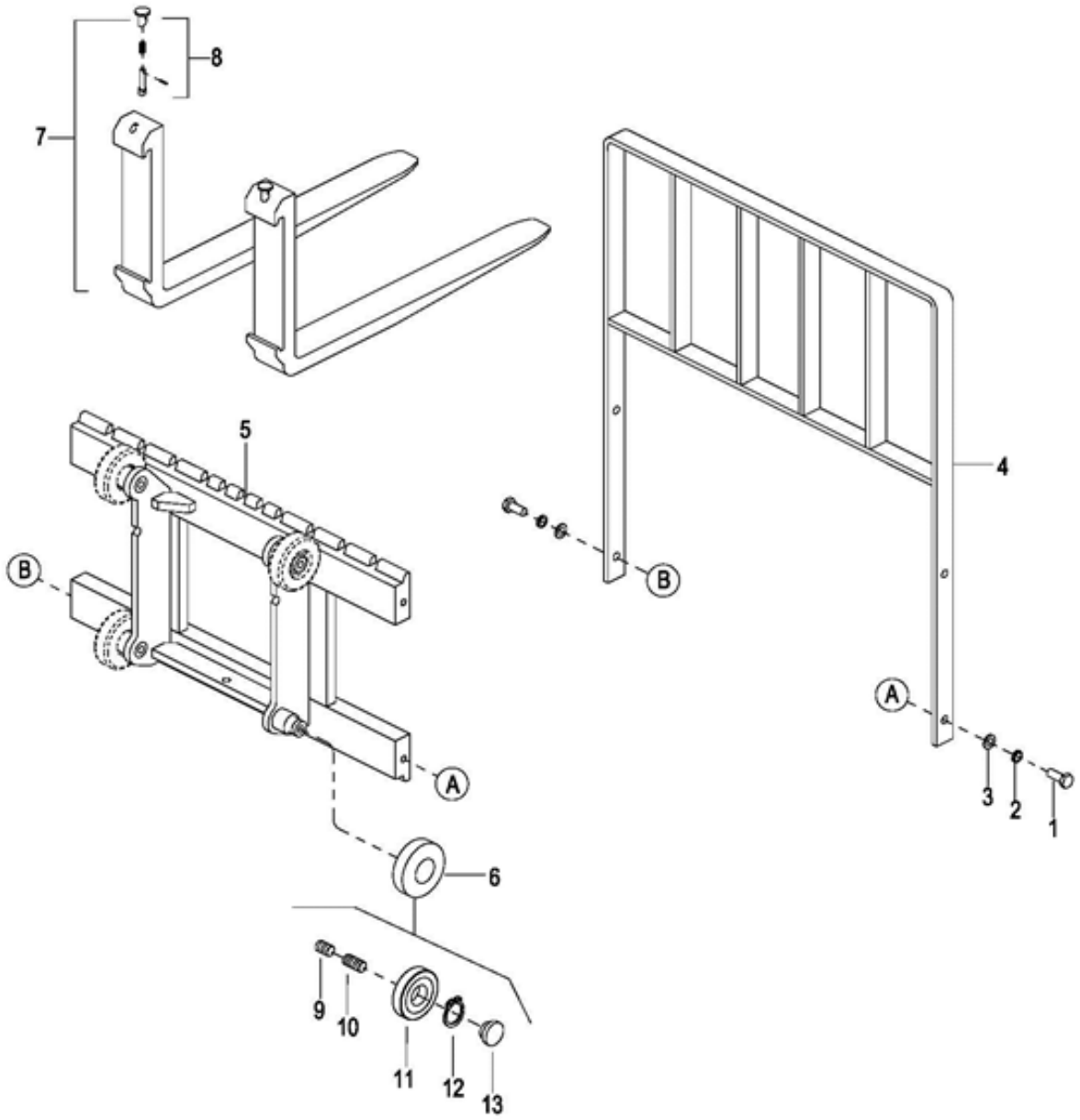

Figure 9-5 Fork Carriage - Single Stage

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FORK CARRIAGE - SINGLE STAGE

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000284-00	BOLT M12×30	4	
2	0000-000060-00	LOCK WASHER Ø12	4	
3	0000-000373-00	FLAT WASHER Ø12	4	
4	2125-632000-00	BLOCKING SHELF	1	
5	2010-631000-20	FORK FRAME	1	
6	2108-632000-70	ROLLER ASSEMBLY	4	Incl. Pos. # 9-13
7	2108-630001-10	FORK	2	
8	2125-630001-10	FORK PIN KIT	2	
9	0000-001525-00	SCREW M12×10	4	
10	0000-000761-00	SCREW M12×20	4	
11	2108-650000-60	ROLLER	4	
12	0000-000434-00	SNAP RING Ø30	4	
13	2108-600012-60	CAP	4	

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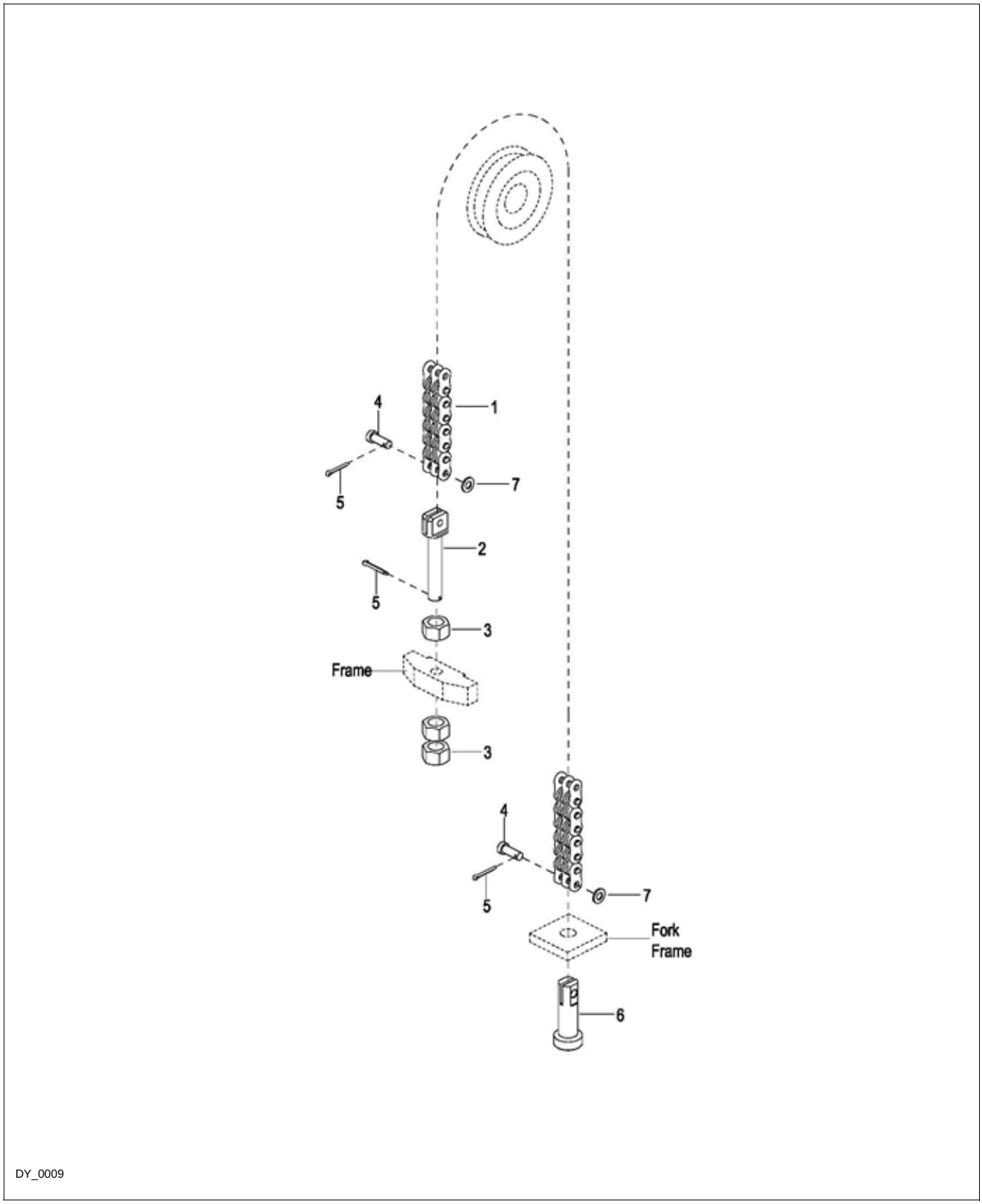

Figure 9-6 Mast Chain Assembly - Single Stage

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MAST CHAIN ASSEMBLY - SINGLE STAGE

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2108-640004-00	CHAIN	1	Lift Height 62” (1575mm)
2	2108-640001-00	BOLT	1	
3	0000-000237-00	NUT M16×1.5	3	
4	2108-640002-00	PIN SHAFT	2	
5	0000-000188-00	PIN Ø3.2×20	3	
6	2108-640003-00	CHAIN ANCHOR	1	
7	0000-000176-00	FLAT WASHER Ø8	2	

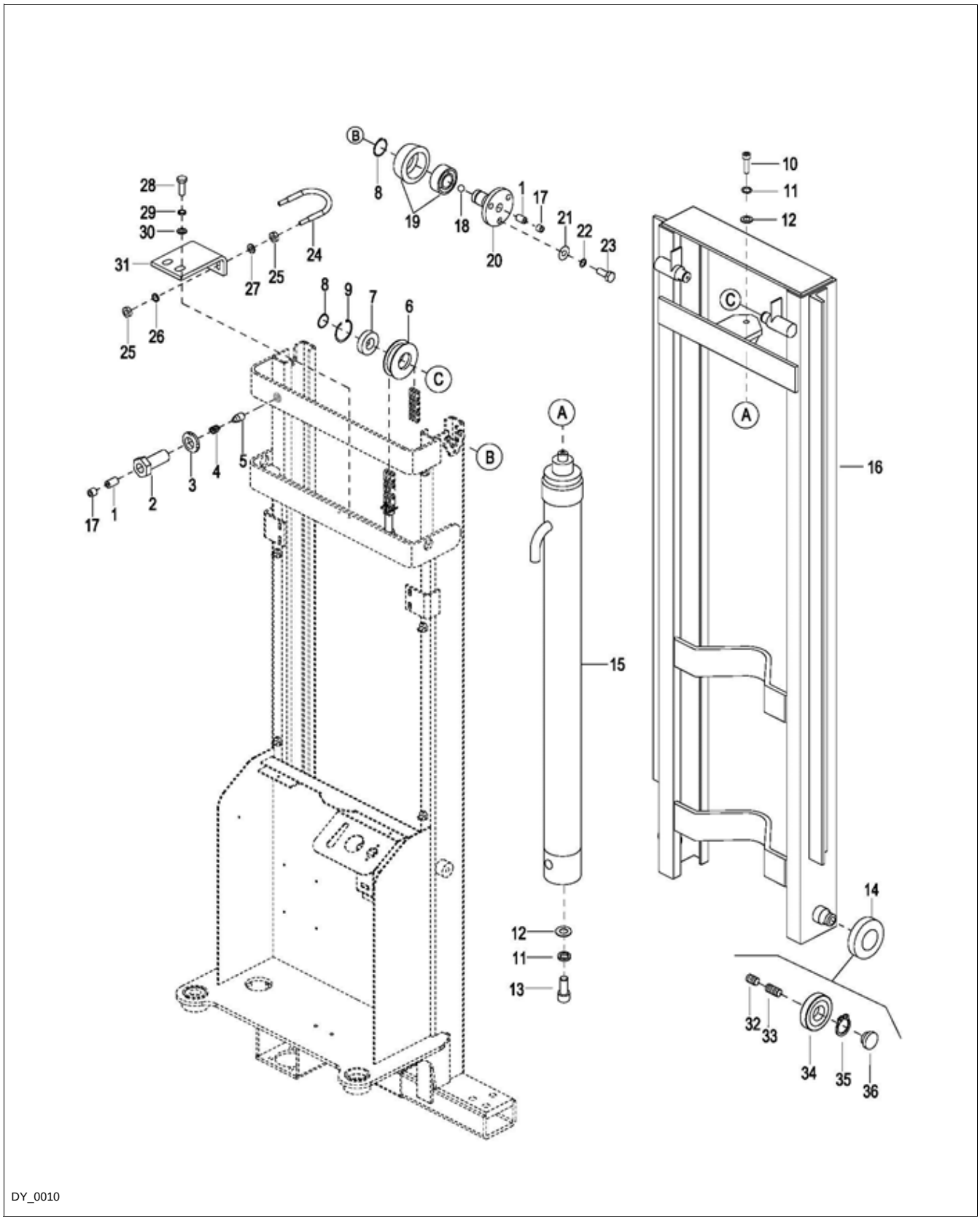

Figure 9-7 Elevation System - Telescopic

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ELEVATION SYSTEM - TELESCOPIC

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000761-00	SCREW M12×20	4	
2	2108-600002-60	BOLT	2	
3	0000-000757-00	NUT M20X1.5	2	
4	2108-600003-60	SPRING	2	
5	2108-600004-60	POSITIONING ROD	2	
6	2108-600005-60	CHAIN ROLLER Ø84 / Ø52X33	2	
7	0000-000100-00	BEARING	2	
8	0000-000294-00	RETAINER RING Ø25	4	
9	0000-000758-00	ELASTIC COLLAR Φ52	2	
10	0000-000374-00	SCREW M12×30	1	
11	0000-000060-00	LOCK WASHER Ø12	2	
12	0000-000373-00	FLAT WASHER Ø12	2	
13	0000-000075-00	SCREW M12×30	1	
14	2108-632000-70	ROLLER ASSEMBLY	2	Incl. Pos. # 32-36
15	2108-410000-60-04	LIFT CYLINDER	1	Lift Height 96” (2440mm)
15a	2108-410000-60-02	LIFT CYLINDER	1	Lift Height 116” (2945mm)
16	2010-620000-00	INNER MAST	1	
17	0000-001525-00	SCREW M12×10	4	
18	0000-000777-00	STEEL BALL 12.0000 G100 B	2	
19	2108-600008-60	ROLLER SHELL Ø72X30	2	
19a	0000-000759-00	BEARING	2	
20	2108-600009-60	BEARING BLOCK	2	
21	0000-000007-00	FLAT WASHER Ø10	6	
22	0000-000063-00	LOCK WASHER Ø10	6	
23	0000-000760-00	BOLT M10×30	6	
24	2108-600011-60	CYLINDER HOLDER	1	
25	0000-000166-00	NUT M6	4	
26	0000-000056-00	LOCK WASHER Ø6	2	
27	0000-000380-00	FLAT WASHER Ø6	2	
28	0000-000109-00	SCREW M8×16	2	
29	0000-000159-00	LOCK WASHER Ø8	2	
30	0000-000176-00	FLAT WASHER Ø8	2	
31	2316-600002-0B	BRACKET	1	
32	0000-001525-00	SCREW M12×10	2	
33	0000-000761-00	SCREW M12×20	2	
34	2108-650000-60	ROLLER	2	
35	0000-000434-00	SNAP RING Ø30	2	
36	2108-600012-60	CAP	2	

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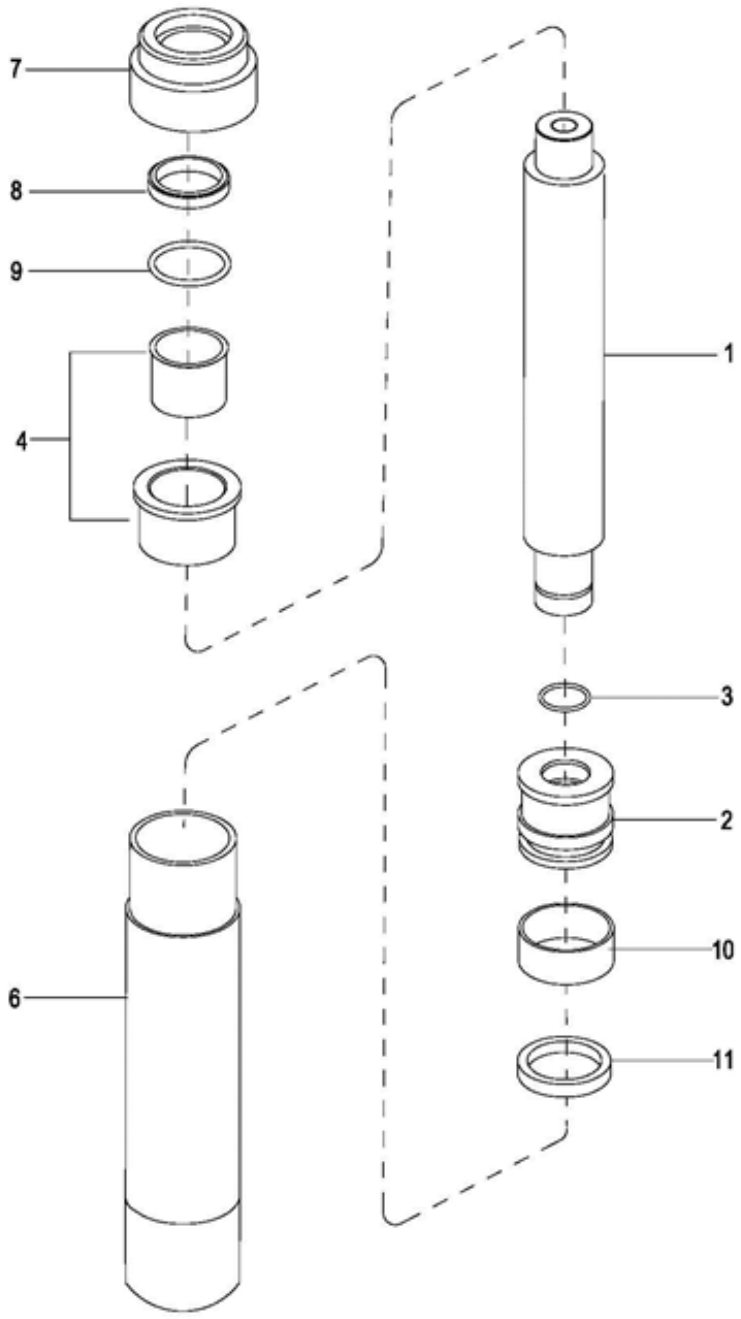

Figure 9-8 Lift Cylinder - Telescopic

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LIFT CYLINDER - TELESCOPIC

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2108-410000-60-04	LIFT CYLINDER	1	Lift Height 96” (2440mm)
--	2108-410000-60-02	LIFT CYLINDER	1	Lift Height 116” (2945mm)
KIT	2110-2BG	SEAL KIT FOR CYLINDER	1	Includes Pos. # 8, 9, 11
1	2125-410001-00-01	PISTON ROD	1	Lift Height 96” (2440mm)
1a	2125-410001-00-03	PISTON ROD	1	Lift Height 116” (2945mm)
2	2125-410002-00	PISTON	1	
3	2125-410003-00	COLLAR	1	
4	2125-410006-00	BUSHING	1	
6	2108-411000-60-04	CYLINDER	1	Lift Height 96” (2440mm)
6	2108-411000-60-02	CYLINDER	1	Lift Height 116” (2945mm)
7	2125-410004-0A	CAP	1	
8	0000-000084-00	RING WIPER 35×43×5-6.5	1	
9	0000-000370-00	O-RING 40×3.1	1	
10	2125-410005-00	RING BACK UP 50×20×2.5	1	
11	0000-000512-00	ROD PACKING 40×50×6	1	

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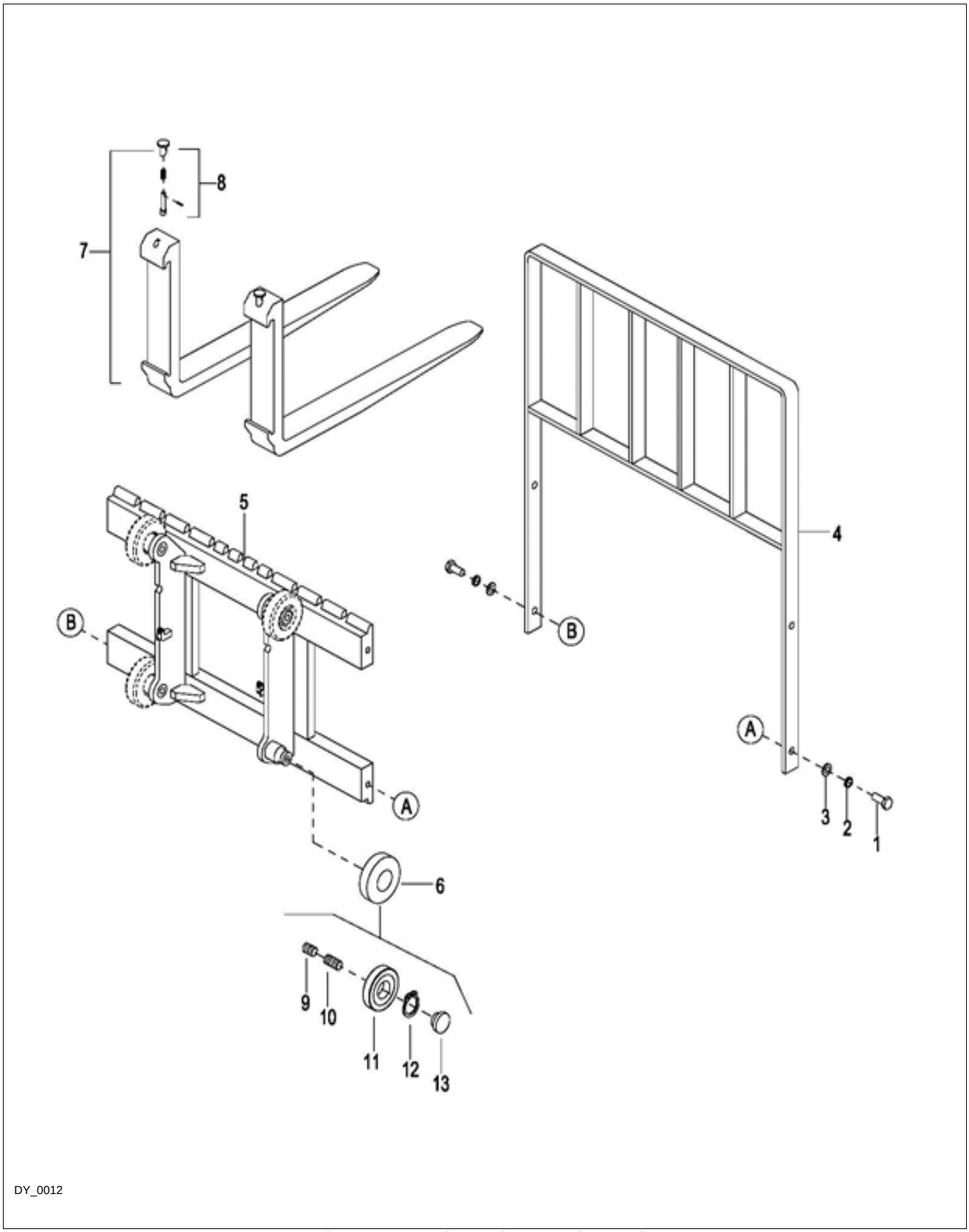

Figure 9-9 Fork Carriage - Telescopic

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FORK CARRIAGE - TELESCOPIC

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000284-00	BOLT M12×30	4	
2	0000-000060-00	LOCK WASHER Ø12	4	
3	0000-000373-00	FLAT WASHER Ø12	4	
4	2125-632000-00	LOAD BACKREST	1	
5	2111-631000-10	FORK FRAME	1	
6	2108-632000-70	ROLLER ASSEMBLY	4	Incl. Pos. # 9-13
7	2108-630001-10	FORK	2	
8	2125-630001-10	FORK PIN KIT	2	
9	0000-001525-00	SCREW M12×10	4	
10	0000-000761-00	SCREW M12×20	4	
11	2108-650000-60	ROLLER	4	
12	0000-000434-00	SNAP RING Ø30	4	
13	2108-600012-60	CAP	4	

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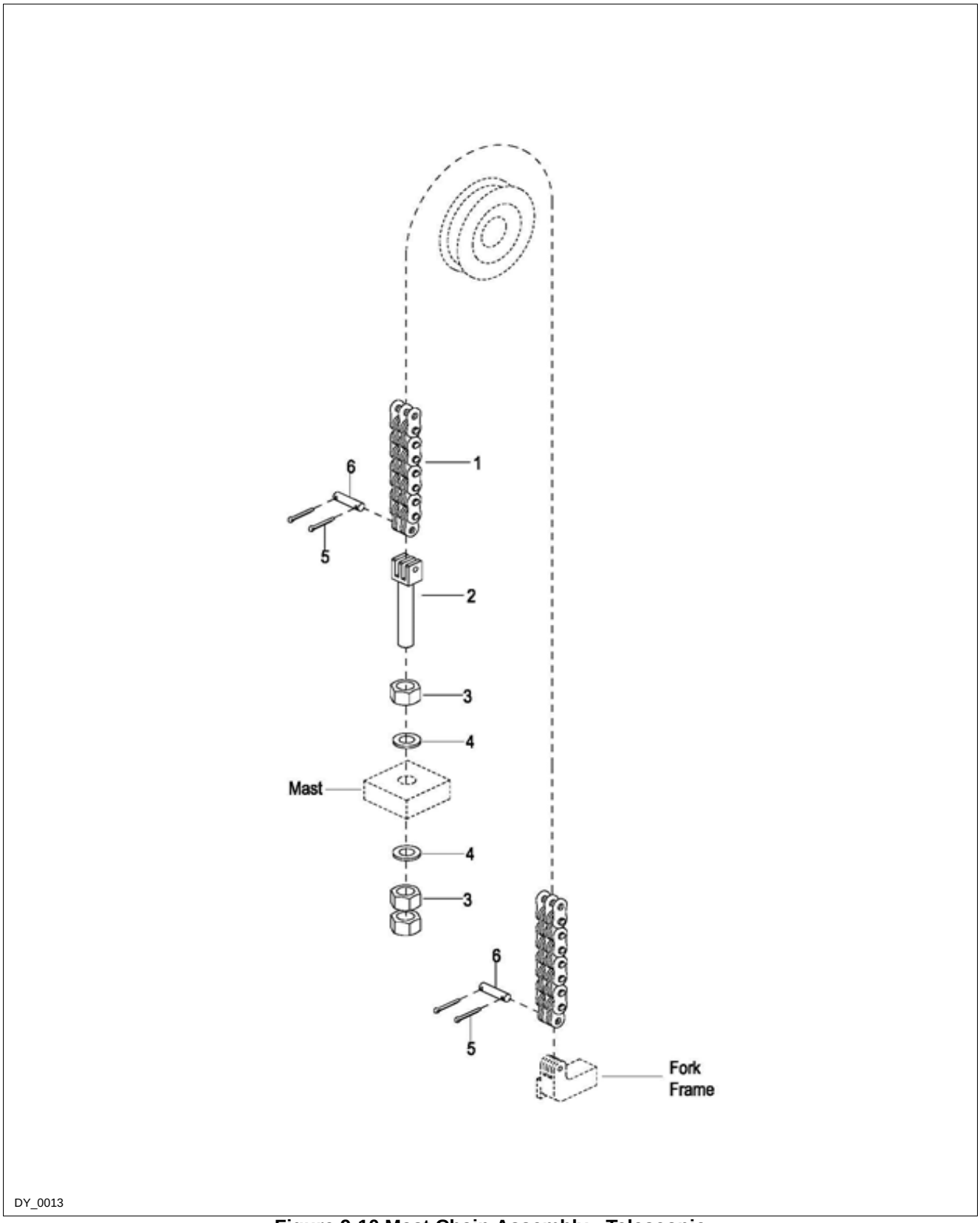

Figure 9-10 Mast Chain Assembly - Telescopic

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MAST CHAIN ASSEMBLY - TELESCOPIC

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2108-640001-60-04	CHAIN	2	Lift Height 96” (2440mm)
1a	2108-640001-60-02	CHAIN	2	Lift Height 116” (2945mm)
2	2108-640002-60	BOLT	2	
3	0000-000237-00	NUT M16×1.5	6	
4	0000-000220-00	WASHER Ø16	4	
5	0000-000188-00	PIN Ø3.2×20	8	
6	0000-000779-00	PIN Ø6×30	4	

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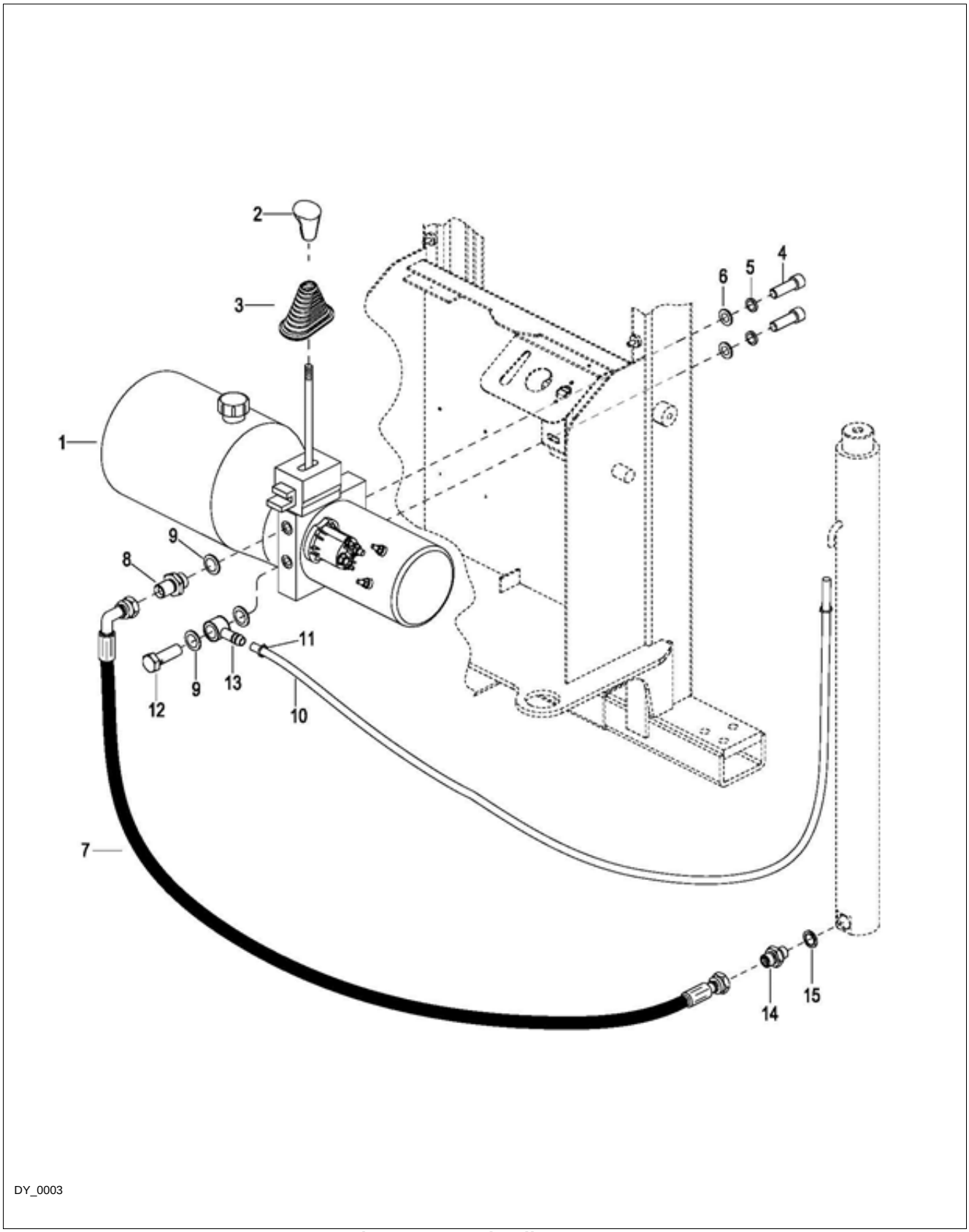

Figure 9-11 Hydraulic System

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HYDRAULIC SYSTEM

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2010-450000-00	HYDRAULIC PUMP ASSEMBLY	1	
2	3218-330006-00	LIFT KNOB	1	
3	2010-100009-10	HANDLE SHEATH	1	
4	0000-000109-00	SCREW M8×16	2	
5	0000-000159-00	LOCK WASHER Ø8	2	
6	0000-000176-00	FLAT WASHER Ø8	2	
7	2010-432000-00	OIL PIPE	1	
8	2702-381600-00	CONNECTOR G3/8-M16×1.5	1	
9	0000-000634-00	WASHER Ø18	3	
10	2108-400002-00	OIL RETURN PIPE	1	
11	0000-000472-00	CLIP	2	
12	2402-383700-00	BOLT G3/8×37	1	
13	2713-381301-00	CONNECTOR G3/8-13	1	
14	2701-161600-00	CONNECTOR M16×1.5-M16×1.5	1	
15	0000-000069-00	PACKING WASHER Ø16	1	

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Figure 9-12 HYDRAULIC PUMP & MOTOR ASSEMBLY

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HYDRAULIC PUMP & MOTOR ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2010-450001-00	SAFE VALVE	1	
2	2010-450002-00	SWITCH	1	
3	2010-450003-00	MOTOR	1	
4	2010-450004-00	COUPLING	1	
5	2010-450005-00	O-RING	1	
6	2010-451001-00	SWITCH	1	
7	2010-451002-00	STAND	1	
8	2010-451003-00	MANUAL VALVE	1	
9	2010-451004-00	BALANCE VALVE	1	
10	2010-450006-00	PLUG	1	
11	2010-450007-00	CHECK VALVE	1	
12	2010-450008-00	SEALING PAD	1	
13	2010-450009-00	PUMP FRAME	1	
14	2010-450010-00	O-RING 109X5.3	1	
15	2010-450011-00	PUMP	1	
16	2010-450012-00	PIPE	1	
17	2010-450013-00	OIL FILTER	1	
18	2010-450014-00	SCREW M8X80	2	
19	2010-450015-00	TANK TOP	1	
20	2010-450016-00	TANK	1	
21	2010-450017-00	BLOT M5X8	1	
22	2010-450018-00	MAGNET	1	
23	0000-000159-00	LOCKWASHER Ø8	2	
24	0000-000176-00	FLATWASHER Ø8	2	
25	2010-450019-00	PIPE	1	
26	0000-000044-00	SEALING PAD Ø14	1	
27	2010-450020-00	PLUG	1	
28	2010-450021-00	SEALING PAD	1	
29	2010-450022-00	CONNECTOR	1	

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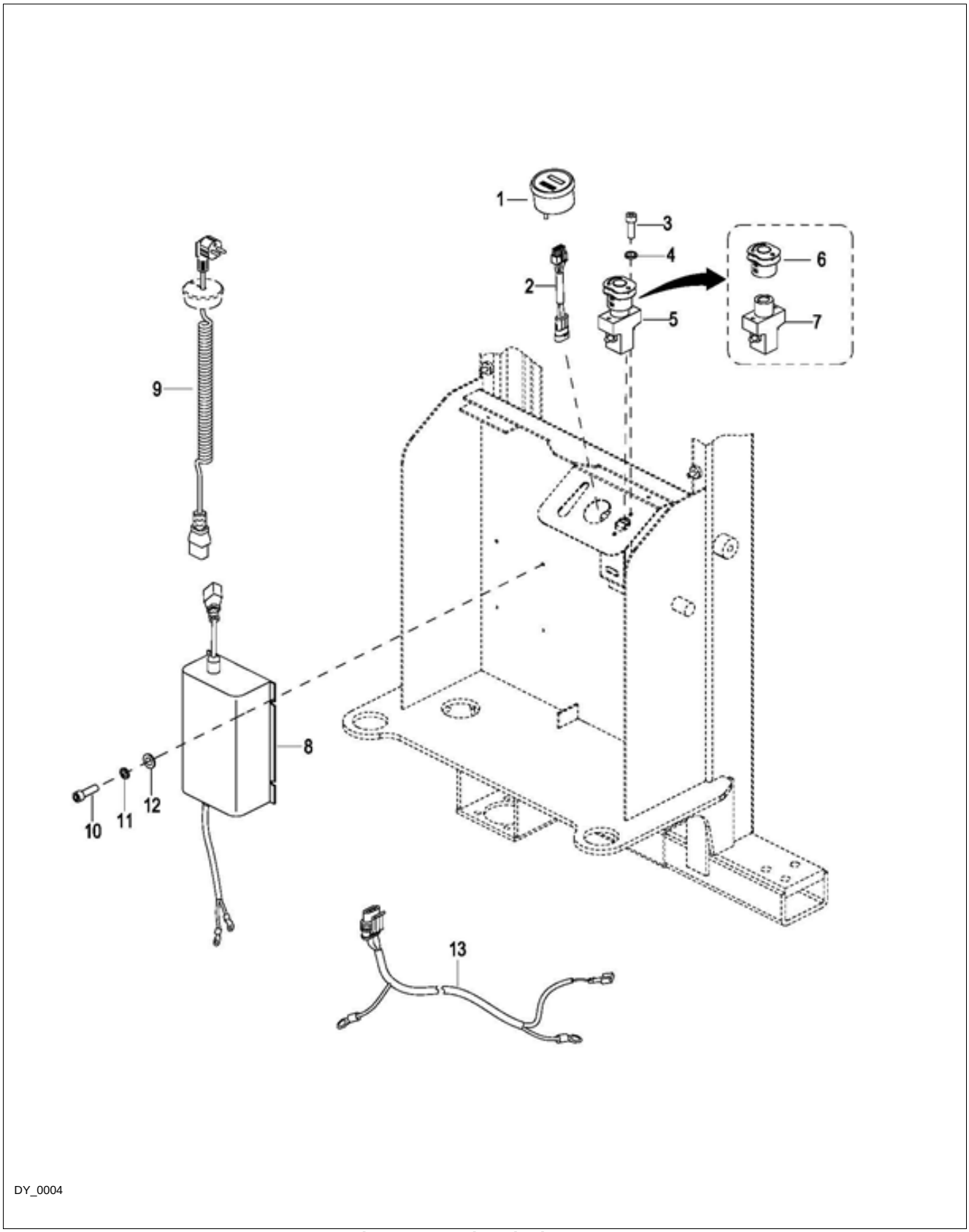

Figure 9-13 Electrical System

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ELECTRICAL SYSTEM

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2010-500002-00	INDICATOR ,WITH HOUR METER	1	
2	1220-520007-0D	METER WIRE HARNESS	1	
3	0000-000004-00	SCREW M5×12	2	
4	0000-000206-00	LOCK WASHER Ø5	2	
5	1114-540000-00	EMERGENCY STOP SWITCH	1	
6	1114-540001-00	SWITCH BUTTON	1	
7	1114-540002-00	EMERGENCY STOP SWITCH SEAT	1	
8	2010-520000-00	CHARGER ASSEMBLY,15A/12V	1	
9	1115-500006-10	CHARGER CABLE	1	
10	0000-000055-00	SCREW M6×16	4	
11	0000-000056-00	LOCK WASHER Ø6	4	
12	0000-000380-00	FLAT WASHER Ø6	4	
13	2010-520001-00	MAIN WIRING HARNESS	1	

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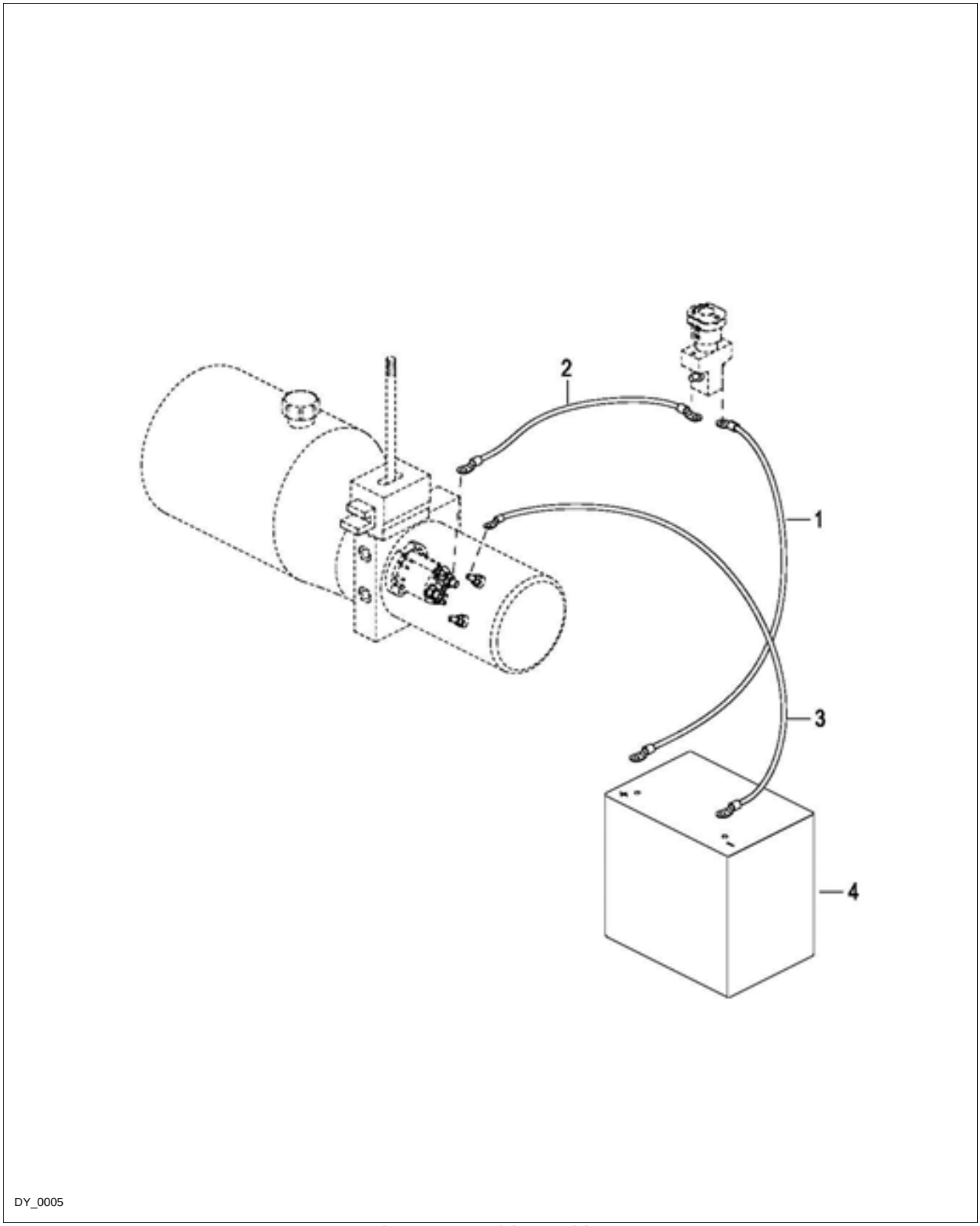

Figure 9-14 Wiring Cables

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WIRING CABLES

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2010-530001-00	POSITIVE CABLE	1	
2	2010-530002-00	P+ CABLE	1	
3	2010-530003-00	NEGATIVE CABLE	1	
4	1118-560007-00	BATTERY	1	100Ah

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