

PDSR 30

POWER DRIVE REACH LIFT TRUCK

**Operation
Maintenance
Repair Parts List**

WARNING

Do not operate this truck unless you have been trained and authorized 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 tires, horn, lights, battery, controller, lift system (including forks or attachments, chains, cables and limit switches), brakes, steering mechanism, guard and safety device.

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.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn 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 or lifting mechanism trailing.

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

Do not overload truck. Check capacity plate for load weight 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 or load backrest extension unless load is secured so that no part of it could fall backward.

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

Do not lift personnel except on a securely attached specially designed work platform. **Use extreme care when lifting personnel.** Make sure mast is vertical, place truck controls in neutral and apply brakes. Lift and lower smoothly. Remain in operating position or immediate vicinity as long as personnel are on the work platform. Never transport personnel on forks or work platform.

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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SECTION 1 DESCRIPTION

1-1. INTRODUCTION.

.This publication describes the 24 volt 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 PDSR lift truck

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 trucks main components and controls.

1-2. GENERAL DESCRIPTION.

The self-propelled truck, (Figure 1-2), lifts and transports payloads up to 3000 pounds on rigid forks.

4 feet without changing the overall lift height. Then the mast will start to rise. However, if the truck has an optional load backrest, the backrest will raise above the mast before the end of the full free lift.

The forward and reverse motion is controlled by either of two controller levers mounted on the control head. Stopping and turning is controlled by the steering arm. Lift and Lower is controlled by pushbuttons on the control head. The battery powered lift truck is quiet and without exhaust fumes.

The reversible AC motor propels the lift truck in forward or reverse direction throughout the available speed range. The PDSR lift truck can be driven with

forks raised or lowered; however, the speed is restricted when the platform is raised above a preset limit.

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.

MODEL NO.		SERIAL NO.	
MAX CAP LB/KG	LOAD CTR IN/MM	LIFT HGT IN/MM	
ALT CAP LB/KG	LOAD CTR IN/MM	LIFT HGT IN/MM	
TRUCK WT LESS BATTERY LB/KG		BATTERY MIN WT LB/KG	
TRUCK WT WITH BATTERY LB/KG		BATTERY MAX WT LB/KG	
TRUCK TYPE <input style="width: 50px;" type="text"/>	BATTERY TYPE <input style="width: 50px;" type="text"/>	CERTIFIED <input style="width: 50px;" type="text"/>	VOLTAGE <input style="width: 50px;" type="text"/>
COMPLIES WITH THE APPLICABLE REQUIREMENTS OF ANSI B56.1 AND OSHA STANDARDS BIG LIFT LLC WISCONSIN DELLS, WISCONSIN 53965			
			

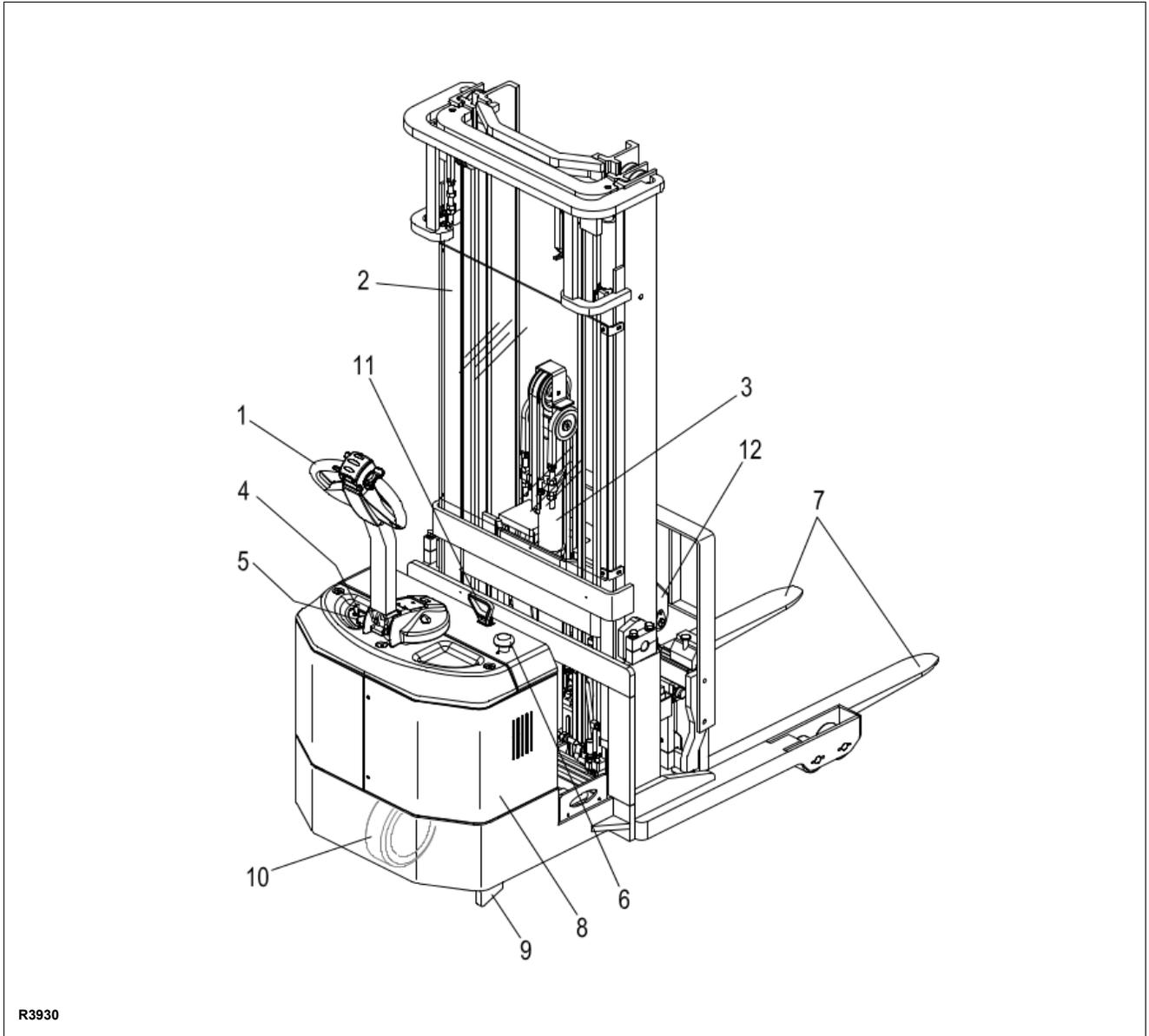
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Figure 1-1 Name Plate

1-3. SAFETY FEATURES.

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

- Dead-man brake to apply the brake and cut off drive power when the steering arm is released.
- Belly-button switch to reverse truck should the operator accidentally pin himself against a wall or obstruction when backing up in slow speed.
- High speed limit switch to restrict speed when lift carriage is raised above the preset limit.
- All control functions automatically return to "OFF" when released.
- Externally accessible battery disconnect within operator's reach.
- Separately fused control circuits and power circuits.
- Readily accessible horn button.
- Lift carriage backrest to help stabilize the load.
- Handle to provide a firm hand hold for operator.
- Flow control valve regulates maximum lowering speed within prescribed limits.
- Relief valve maintains hydraulic pressure within prescribed limits.
- High visibility color scheme of truck provides visual alert of truck's presence.
- Battery Indicator.
- Stabilizers.



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Figure 1-2 PDSR Lift Truck

Pos.	Component	Pos.	Component
1	CONTROL HANDLE	7	FORKS
2	WINDSHIELD	8	COVER
3	LIFT CYLINDER	9	STABILIZERS
4	KEY SWITCH	10	DRIVE WHEEL
5	BATTERY INDICATOR	11	BATTERY PLUG
6	EMERGENCY DISCONNECT	12	REACH ASSEMBLY

NOTES

SECTION 2 OPERATION

2-1. GENERAL.

This section gives detailed operating instructions for the lift truck. The instructions are divided into the various phases of operations, such as operating lift, driving, and stopping. Routine precautions are included for safe operation

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 lift truck.



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

- Do not operate this truck unless you have been trained and authorized to do so.
- All warnings and instructions must be read and understood before using the equipment.
- Equipment must not be altered in any way.
- Equipment must be inspected by a qualified person on a regular basis.
- Do not exceed the rated capacity. Overloading may result in damage to the hydraulic system and structural components.
- Be certain that the lifting mechanism is operating smoothly throughout its entire height, both empty and loaded.
- Be sure that mast is vertical - do not operate on a side slope.
- Be sure the truck has a firm and level footing.
- Avoid overhead wires and obstructions.
- Check for obstructions when raising or lowering the lift carriage.
- Do not handle unstable or loosely stacked loads. Use special care when handling long, high, or wide loads to avoid tipping, loss of load, or striking bystanders.
- Center and carry the load as far back as possible toward the lift carriage back rest. The center-of-gravity of the load must not exceed the load center listed on the nameplate. See Figure 2-1 for load center limitations.
- Pick up loads on both forks. Do not pick up on only one fork.
- When traveling, always lower the load as far as possible.
- When stacking pallets in racks and it is necessary to move the load in a raised position, use caution. Operate truck smoothly.
- Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever vision is obstructed.
- Operate truck only from designated operation position. Never place any part of your body between the mast uprights. Do not carry passengers.
- 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, turn off key switch, remove key and disengage the emergency stop switch.

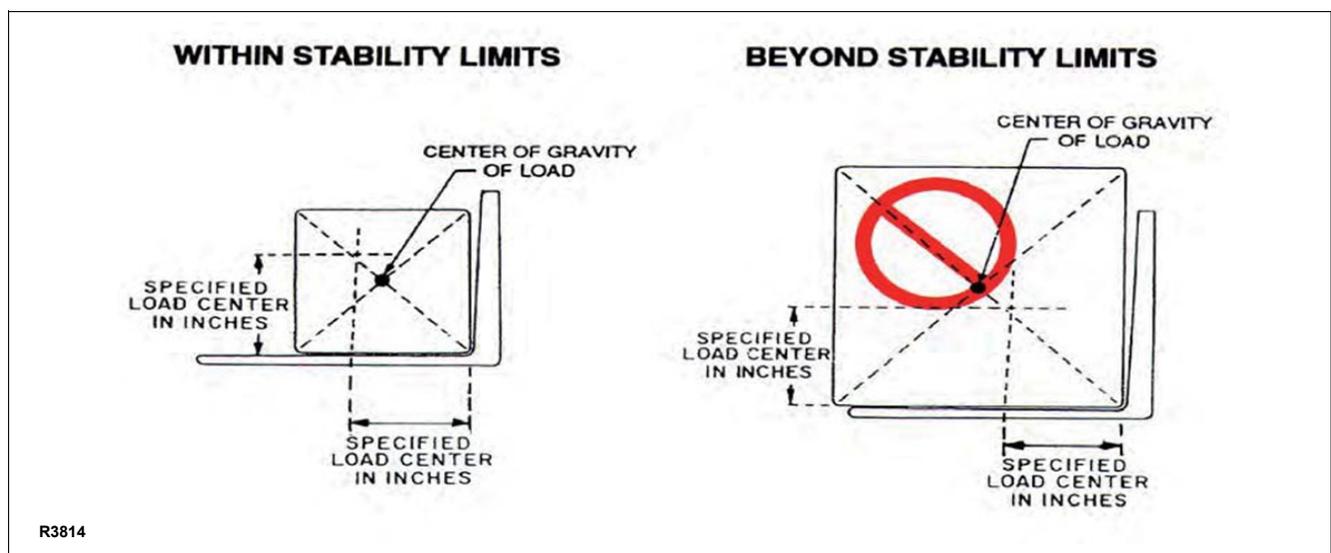


Figure 2-1 Load Center

2-3. BEFORE OPERATION

Table 2-1 covers important inspection points on the PDSR 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 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 maintenance technician.



Table 2-1 Operator Checks

ITEM	PROCEDURE
Transmission and hydraulic systems.	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, secured correctly, functioning properly and free of binding or damage.
Guards and load backrest	Check that safety guards are in place, properly secured and not damaged.
Safety signs	Check that warning labels, nameplate, etc., are in good condition and legible
Horn	Check that horn sounds when operated
Steering	Check for binding or looseness in steering arm when steering.
Travel controls	Check that speed controls on control head operate in all speed ranges in forward and reverse and that belly button switch functions.

ITEM	PROCEDURE
Wheels	Check drive wheel for cracks or damage. Move truck to check load for freedom of rotation.
Hydraulic controls	Check operation of lift and lower to their maximum positions.
Brakes	Check that brakes actuate when steering arm is raised to upright position, and when lowered to horizontal position.
Deadman/ Parking brake	Check that steering arm raises to upright position when released and brake applies.
Emergency Stop Switch	Check that emergency stop switch can be disengaged and reengaged.
Battery charge	Check the battery indicator.
High speed limit switch	Allow for enough space to operate truck in high speed. Elevate forks approximately two feet, then test drive truck to check if high speed is cut out



Electric Truck Daily Operator Check-Off List

Date _____ Operator _____
Truck No. _____ Model No. _____
Dept. _____ Shift _____
Hour Meter _____
Reading-Drive _____ Hoist _____

Check	O.K.(√)	Need maintenance
Tires		
Load Wheels		
Horn		
Lift-Lower Controls		
Attachment Operation		
Forward & Reverse Controls		
Steering		
Brakes		
Hydraulic Leaks,cylinders, Valves, Hoses, Etc.		

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Figure 2-2 Sample of Operator Check List

2-4. GENERAL CONTROL OPERATION.

The speed control (See [Figure 2-3](#)) located on each side of the control head provides fingertip control for driving the truck. Rotate the control in the direction you want to travel. The farther you rotate the control from the neutral position, the faster the truck will travel.

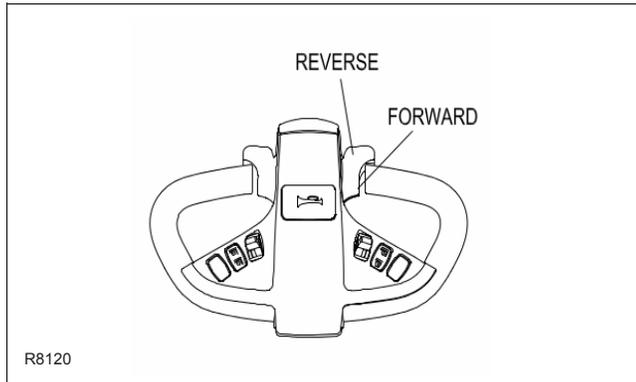


Figure 2-3 Forward / Reverse Control

The pushbutton switches (See [Figure 2-4](#)), located on the front of the control head activate the lift-lower controls and the horn.

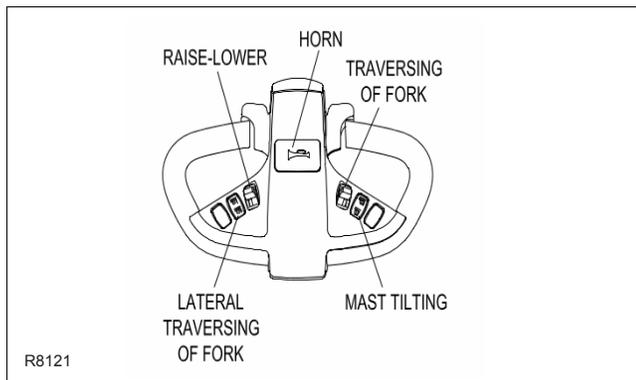


Figure 2-4 Pushbutton Switches

2-5. DRIVING AND STOPPING PROCEDURES

1. Connect the battery and turn on the key switch. Grasp the grips of the steering head so that the speed control can be comfortably operated by either thumb.
2. Lower the steering arm to a comfortable position above horizontal to disengage the brake and to energize the electrical circuits. If the truck is not moved, the electrical circuits will time out and will deenergize. See.

3. To move forward (with load in back), slowly press the speed control forward. See [Figure 2-3](#). Press the forward speed control farther to increase speed.
4. To slow down or stop, release the speed control and lower or raise the steering arm to the horizontal or vertical position. In those positions, the brake engages, slowing or stopping the truck.
5. Procedures for movement in reverse are the same as in the forward direction except slowly press the speed control backward.

2-5.1. Stopping

The stopping distance of the truck depends on the ground conditions. The driver must take this into account when operating the truck.

The driver must be looking ahead when traveling. If there is no hazard, brake moderately to avoid moving the load.

There are four different ways to stop the truck:

1. **Plugging:** This electrical braking function consists of rotating the speed control lever in the opposite direction of travel and then releasing it when the truck stops. Plugging is a convenient way to slow down the truck during normal operation. If the control is not released, the truck will accelerate in the opposite direction.
2. **Steering arm (See [Figure 2-5](#)):** The brake is fully applied by lowering or raising the steering arm. (See [Figure 2-5](#)) All traction control power is shut off when the brake is engaged. When the steering arm is in the upright position, the brake acts as a parking brake. Deadman braking occurs when the handle is released and spring action raises steering arm to the upright position.
3. **Emergency braking:** Press the emergency brake switch, all electrical functions are cut out and the truck automatically brakes.
4. **Regenerative braking:** If the speed control lever is released, the truck automatically brakes regeneratively. When the speed is below 5 MPH, the brake applies.

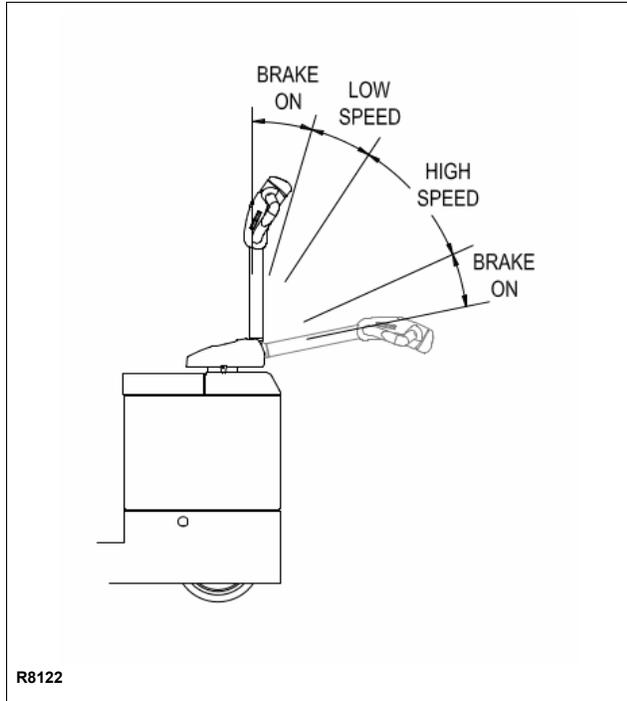


Figure 2-5 Brake Actuation

2-6. BELLY-BUTTON SWITCH

The belly-button switch (Figure 2-6) minimizes the possibility of the driver being pinned by the steering arm while driving the lift truck in slow speed. If the switch presses against the operator while the lift truck is being driven toward the operator, the switch changes the direction of the lift truck.

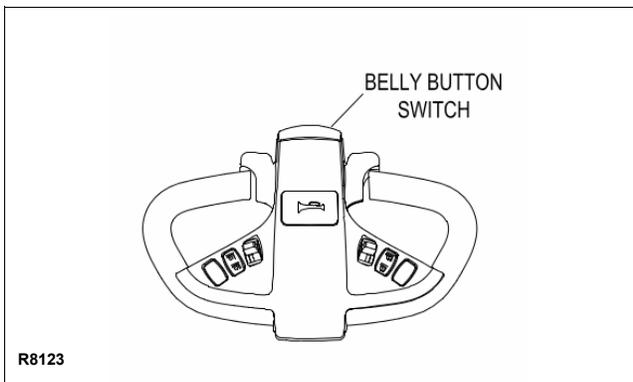


Figure 2-6 Belly Button Switch

2-7. STEERING ARM GAS SPRING

The steering arm gas spring automatically raises the steering arm to the upright position when the steering arm is released. If the steering arm does not return fully, the steering arm gas spring requires replacement. Return truck to maintenance for repair.

2-8. LIFT AND LOWER CONTROLS

Lift/Lower Control buttons are located on the steering control head. (Figure 2-4)

To lift forks, push in either LIFT button and hold until forks reach desired height. To lower forks, push in either LOWER button and hold until forks descend to desired height.

2-9. LOADING AND UNLOADING

1. Move truck to location where load is to be picked up.
2. Move the truck into position so forks are within pallet or skid, and the load is centered over the forks and as far back as possible.
3. Raise forks to lift load.
4. Drive to area where load is to be placed.
5. Move truck to align load with its new position.
6. Lower the load until it rests squarely in place and the forks are free.
7. Slowly move the truck out from under the load.

2-10. PARKING

When finished with moving loads, return the truck to its maintenance or storage area. Turn off the key switch and disconnect the battery. Charge battery as necessary. Refer to battery care instructions, SECTION 3.

NOTES

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 maintenance 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 EP Service Representative.

3-3. BATTERY CARE

3-3.1. General

The PDSR may be equipped with maintenance free or industrial wet cell batteries.

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

CAUTION: Gases produced by a battery can be explosive. Do not smoke, use an open flame, create an arc or sparks in the vicinity of the battery. Ventilate an enclosed area well when charging.



CAUTION: Batteries contain sulfuric acid which may cause severe burns. Avoid contact with eyes, skin or clothing. In case of contact, flush immediately and thoroughly with clean water. Obtain medical attention when eyes are affected. A baking soda solution (one pound to one gallon of water) applied to spilled acid until bubbling stops, neutralizes the acid for safe handling and disposal.



Leakage voltage from battery terminals to battery case can cause misleading trouble symptoms with the truck electrical system. Since components of the truck 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 3-1 Monthly and Quarterly Inspection and Service Chart

VISUAL CHECKS	
INTERVAL	INSPECTION OR SERVICE
Monthly	Check electrical brake for proper operation.
Monthly	Check load wheels for wear. A poly load wheel must be replaced if worn to within 1/16 inch of hub. Check for separation from hub.
Monthly	Check drive wheel for wear. A poly drive wheel must be replaced if worn to within 3/4 inch of hub. Check for separation from hub.
Monthly	Inspect wiring for loose connections and damaged insulation.
Monthly	Inspect contractors for proper operation.
Monthly	Check deadman brake switch for proper operation.
Monthly	Check lift chain tension, lubrication & operation (see paragraph 3-6.)
Quarterly	Check lift cylinder for leakage.
Quarterly	Check for excessive jerking of steering arm when stopping or starting.
Semi-annually	Inspect for chain wear (See SECTION 8)

3-3.2. Safety Rules

- Wear protective clothing, such as rubber apron, gloves, boots and goggles when performing any maintenance on batteries. Do not allow electrolyte to come in contact with eyes, skin, clothing or floor. If electrolyte comes in contact with eyes, flush immediately and thoroughly with clean water. Obtain medical attention immediately. Should electrolyte be spilled on skin, rinse promptly with clean water and wash with soap. A baking soda solution (one pound to one gallon of water) will neutralize acid spilled on clothing, floor or any other surface. Apply solution until bubbling stops and rinse with clean water.
- If truck is equipped with wet cell batteries, keep vent plugs firmly in place at all times except when adding water or taking hydrometer readings. Do not allow dirt, cleaning solution or other foreign material to enter cells. Impurities in electrolyte has a neutralizing effect reducing available charge.
- Do not bring any type of flame, spark, etc., near the battery. Gas formed while the battery is charging, is highly explosive. This gas remains in cell long after charging has stopped.
- 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.
- De-energize all AC and DC power connections before servicing battery.
- Do not charge a frozen battery.
- Do not use charger if it has been dropped or otherwise damaged.

3-3.3. Battery Care and Charging

CAUTION: Never smoke or bring open flame near the battery. Gas formed during charging is highly explosive and can cause serious injury.



1. Charge the battery only in areas designated for that use.
2. Make certain the charger being used matches the voltage and amperage of the truck battery.

3. Before disconnecting or connecting batteries to a charger, make sure the charger is "OFF". If an attempt is made to do this while the charger is "ON", serious injury to you, the battery and the charger could result.
4. Before connecting the battery cable to the trucks receptacle, make sure the key switch is off. The battery cable must be fully connected before the truck is used. If the plug is not making good contact, heat will weld the two parts of the battery connector together, making it difficult to remove and necessary to replace.
5. 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.
6. The charging requirements will vary depending on the use of the truck. The battery should be given as equalizing charge on a weekly basis. This charge should normally be an additional three hours at the finish rate.
7. Make certain battery used meets weight and size requirements of truck. NEVER operate truck with an undersized battery.

3-3.4. Battery Cleaning

Always keep vent plugs tightly in place when cleaning battery. When properly watered and charged, the battery will remain clean and dry. All that is necessary is to brush or blow off any dust or dirt that may accumulate on them. However, if electrolyte is spilled or overflows from a cell, it should be neutralized with a solution of baking soda and water, brushing the soda solution beneath the connectors and removing grime from the covers. Then rinse the battery with cool water from a low pressure supply to remove the soda and loosen dirt. If batteries stay wet consistently, they may be either overcharged or over filled. This condition should be investigated and corrected.

3-4. CHARGING BATTERIES

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 turn the key switch 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. Disconnect the batteries from the truck and connect the batteries to the charger. Make sure connectors are mated properly.
4. Connect the charger to the appropriate power supply.
5. Follow the instructions for the charger being used.

3-5. LUBRICATION

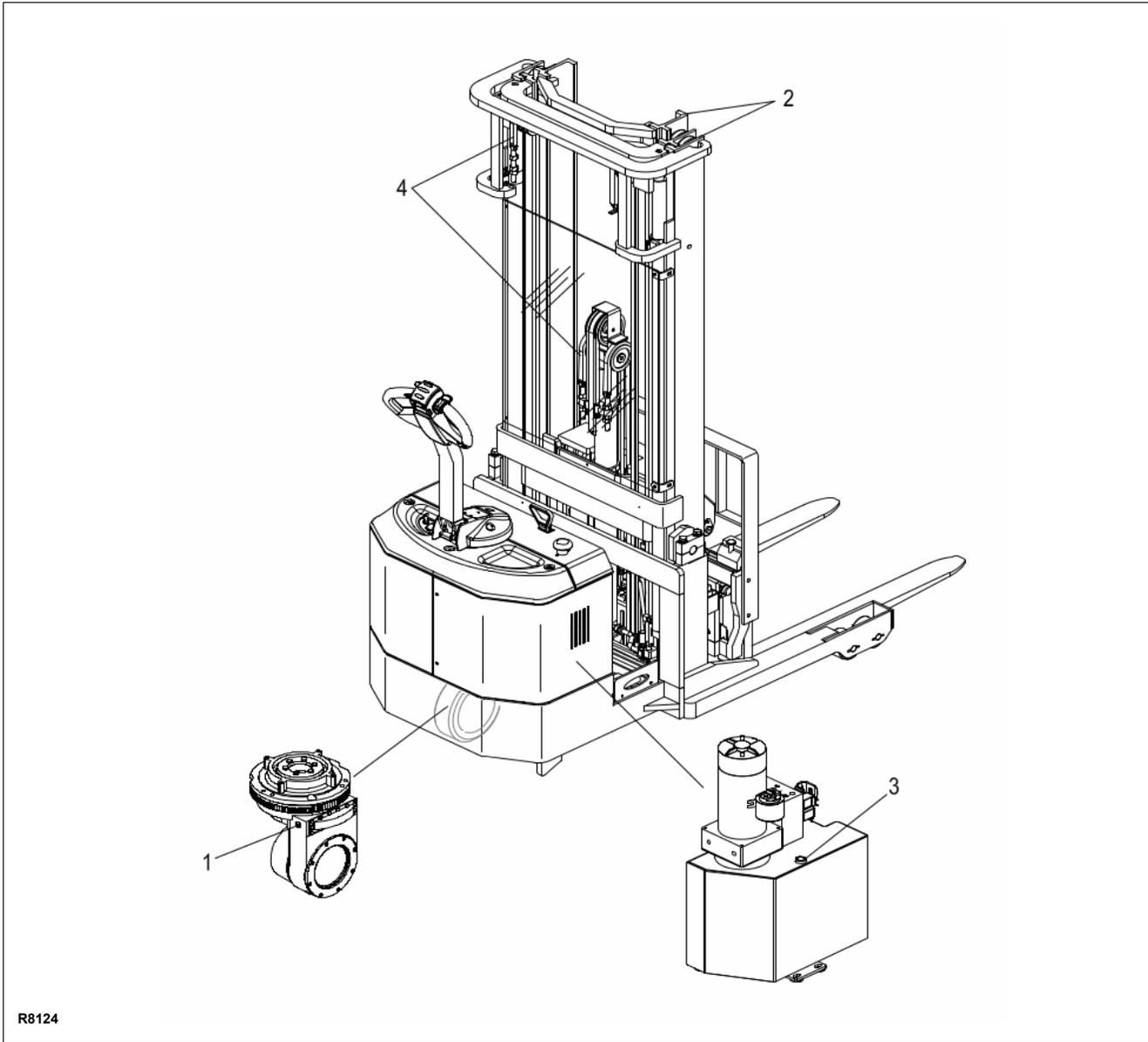
Refer to [Table 3-2](#) for the recommended types of grease and oil. [Table 3-3](#) in conjunction with [Figure 3-1](#) identifies the items requiring lubrication.

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	Transmission oil- 85W-90 Transmission oil-10W-30 (NOTE)
No. 2	Grease-Lithium base, general purpose.
No. 3	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. 4	SAE 30 or 40 Engine lubricating oil.
NOTE: USED ON COLD CONDITIONED TRUCKS	



R8124

Figure 3-1 Lubrication Diagram

Table 3-3 Lubrication Chart

Pos.	Location	Method of Application	TYPE (Table3-2)	APPLICATION OF LUBRICANT
1	Transmission Capacity - 1.75 Liters	Can	No. 1	Fill to level plug opening.
2	Inner & Outer Mast	Brush	No.2	Full length of channel where rollers operate.
3	Hydraulic Reservoir: Capacity - 13.78 Liters (L.H. 2600mm) Capacity - 14.91 Liters (L.H. 3200mm) Capacity - 16.86 Liters (L.H.4000mm)	Can	No. 3	With lift carriage fully lowered, fill reservoir with hydraulic oil to 1 inch below opening.
4	Lift Chain	Brush or Spray	No. 4	See Paragraph 3-6

SECTION 4 TROUBLESHOOTING

4-1. GENERAL

Use [Table 4-1](#). as a guide to determine possible causes of trouble. The table is divided into five main categories: Truck and Hydraulic System Will Not

Operate:

Truck Does Not Operate Forward or Reverse: Trouble With Braking: Trouble With Lifting Or Lowering, and Miscellaneous malfunctions.

Table 4-1. Troubleshooting Chart

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
TRUCK AND HYDRAULIC SYSTEM WILL NOT OPERATE		
Truck will not travel not will lift system operate.	a. Fuse blown.	Check fuse and replace if necessary.
	b. Fuse blown.	Check fuse and replace if necessary.
	c. Battery dead or disconnected.	Check battery connections and check battery voltage.
	d. Key switch defective	Bypass key switch to determine if it is malfunctioning.
	e. Emergency brake switch defective.	Bypass the switch to determine if it is malfunctioning.
	f. Defective wiring.	Check for open circuit. Repair as required
TRUCK DOES NOT OPERATE FORWARD OR REVERSE		
Truck does not travel forward or reverse. All other functions operate normally.	a. Check all wiring. A loose connection may be the cause of malfunction.	Tighten all loose connections before further troubleshooting.
	b. Defective deadman switch.	Check and replace switch if defective.
	c. Defective main controller.	Check for proper operation and replace if necessary.
	d. Defective potentiometer in control head.	Check and replace potentiometer if defective.
Truck travels forward but not in reverse.	Defective potentiometer in control head.	Check and replace potentiometer if defective.
Truck travels reverse but not in forward.	Defective potentiometer in control head.	Check and replace potentiometer if defective.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Truck travels forward and in reverse at lower speeds; will not travel at high speed.	Defective potentiometer in control head.	Check and replace potentiometer if defective.
TROUBLE WITH BRAKING		
Truck does not slow with brake, or brake does not engage.	a. Defective deadman switch.	Check deadman switch for continuity. If none found when the control arm is in the brake position, replace switch.
	b. Defective electric brake.	Adjust or replace brake.
Brake will not release.	a. Defective electric brake.	Replace.
	b. Brake temperature above 281° F	Allow to cool and check air gap.
	c. Open brake circuitry or wiring.	Make voltage checks.
Brake drags.	Defective electric brake	Replace.
Brake grabs.	a. Incorrect stopping distance adjustment	Adjust.
	b. Defective electric brake.	Replace.
Abnormal noise and chatter when brake is applied.	Defective electric brake	Replace.
TROUBLE WITH LIFTING OR LOWERING		
Oil sprays or flows from the top of the lift cylinder.	Defective packing in lift cylinder.	Repair lift cylinder.
Squealing sounds when lifting forks.	a. Oil level too low.	Identify oil leak and fill reservoir.
	b. Lift linkage binding.	Apply grease.
Forks do not lift to top.	a. Oil level too low.	Add oil to reservoir.
	b. Load larger than capacity.	Refer to I.D.plate for capacity.
Weak, slow or uneven action of hydraulic system.	a. Defective pump or relief valve	Check pressure. Adjust as necessary.
	b. Worn lift cylinder.	Replace cylinder.
	c. Load larger than capacity.	Refer to I.D.platefor capacity.
	d. Defective lift motor solenoid.	Replace solenoid on pump motor.
	e. Battery charge low.	Charge battery.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Forks do not lift, pump motor does not run.	a. Battery is dead or disconnected.	Check and recharge if required.
	b. Defective wiring.	Check and repair as required.
	c. Defect in electrical system for operating pump motor.	Check lift switch in control head as well as the solenoid.
TROUBLE WITH LIFTING OR LOWERING - Continued		
Forks do not lift, motor runs.	Defect in hydraulic system.	Check the oil level in the reservoir and the oil lines to the lift cylinder, and repair as required. If normal, check the hydraulic pump, and relief valve. Repair, or adjust.
Forks lift, but will not go down.	Defect in hydraulic system	Check lowering control switch in control head and lowering solenoid on valve assembly. Replace as required
Load will not hold.	a. Oil bypassing internally in control valve.	Replace valve assembly.
	b. Worn lift cylinder or packing.	Repack cylinder.
Forks does not lift to top. Pump motor runs	a. Oil level too low.	Add oil to reservoir.
	b. Load larger than capacity.	Refer to nameplate on side of mast for maximum load capacity.
	c. Incorrect stopping distance adjustment.	Change batteries.
Forks creep downward under load when in a raised position.	Leak in hydraulic system, lift cylinder or lowering valve.	Check for leaking fitting in hydraulic line and repair as required. Repack lift cylinder or replace valve assembly .
MISCELLANEOUS		
Steering arm does not return to the upright position.	a. Weak return spring.	Replace spring.
	b. Binding.	Check and free the binding item. Verify that the cable has not been damaged. Repair or replace as needed.
Truck moves forward when arm is pulled down.	a. Belly-button switch defective.	Check for short, and repair or replace as necessary.
	b. Short in control head.	Check wiring and repair as required. Check wiring and repair as required.
Steering arm jerks excessively starting or stopping the truck.	Drive wheel worn.	Replace drive wheel if worn to within 3/4 inch of hub.
Drive motor is jerky.	Motor internally damaged or worn.	Replace motor.

4-2. CONTROLLER TROUBLESHOOTING

4-2.1 Zapi Handset (Optional)

A Zapi Handset is available that is designed specifically for use with the Zapi controller. It serves multiple functions of reading diagnostic data, testing truck operation, setting options, adjustments and parameter changes of the controller. The Zapi Handset is available through your Big Lift LLC dealer. If you require dealer location information, contact Big Lift LLC.

4-2.2 Fault Detection

4-2.2.1 General

The controller provides diagnostics information to assist technicians in troubleshooting problems. When a fault is detected, an alarm is recorded in the logbook. It has a FIFO (First Input First Output) structure that means the oldest alarm is lost when the database is full and a new alarm occurs. The logbook is composed of alarms with the following information:

- The alarm code.
- The number of times that each alarm occurs consecutively.
- The Hour Meter reading (value) when the latest event of every alarm occurred.
- The invert temperature when the latest event of every alarm occurred.

This function permits a deeper diagnosis of problems as the recent history can be revisited.

4-2.2.2 Logbook Access

To view the alarm logbook proceed as follows:

1. Connect the Zapi Handset, refer to paragraph 4-2.1
2. Press the ROLL down button and the ENTER button at the same time to enter the MAIN MENU.
3. Press the ROLL down button or the ROLL up button to find the ALARMS display.
4. Press the ENTER button to view the alarms.
5. Press the OUT button to exit the alarms.

NOTE: Refer to bigjoesupport.com for the Zapi supplement containing detailed information of alarm codes. There are two versions shown. The PDS uses the Standard version which lists the error by: Alarm Name, Repetitions, Temperature and Hour Meter reading.

4-2.3 Testing Truck Operation

The Zapi Handset can be used to test certain truck operations as follows:

1. Connect the Zapi Handset, refer to paragraph 4-2.1
2. Press the ROLL down button and the ENTER button at the same time to enter the MAIN MENU.
3. Press the ROLL down button or the ROLL up button to find the TESTER display.
4. Press the ENTER button to view the tests.
5. To verify various switch functions, locate the switch on the display and then operate that function to verify operation.
6. Press the OUT button to exit the tests.

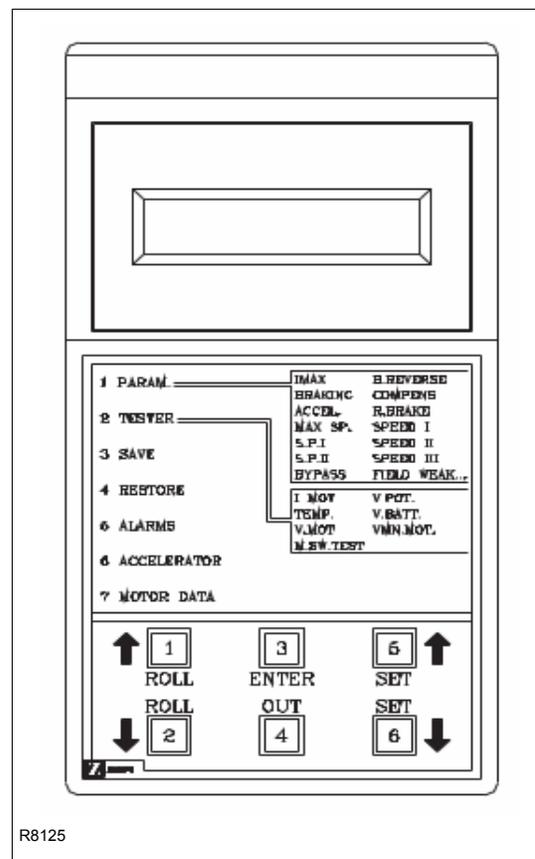


Figure 4-1 Hand Held Programmer

4-2.4 Settings and Adjustments

4-2.4.1 Set Options

To set options proceed as follows and refer to

Table 4-2:

1. Connect the Zapi Handset, refer to paragraph 4-2.1.
2. Press the ROLL up button and the SET up button (5) at the same time to enter the CONFIG MENU.
3. Press the ROLL down button or the ROLL up button to find the SET OPTIONS display.
4. Press the ENTER button to view the options.
5. Press the ROLL down or the ROLL up button to find the option to be changed.
6. Press the SET up button or the SET down button (6) until the desired value setting is reached. The option is now set at the desired value.
7. Press the OUT button to exit the options.

Table 4-2 Traction Controller

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
99	SLIP PROFILE	This is an error on the choice of the parameters of the slip profile.	So ask for the assistance of a Zapi technicians when this alarm
80	FORW+BACK	This alarm occurs when both the travel (Fwd and Rev) are active at the same time.	Check the wiring of the Fwd and Rev travel demand inputs (use the readings in the TESTER to facilitate the troubleshooting). Check the micro switches for failures. A failure in the logic is possible too. So, when you have verified the travel demand switches and wiring are correct, it is necessary to replace the controller.
79	INCORRECT START	This is a warning for an incorrect starting sequence.	The possible reasons for this alarm are (use the readings in the TESTER to facilitate the troubleshooting): • A travel demand was active at key-on. • Presence man sensor was active at key-on. Check the wiring. Check the micro-switches. It could also be an error sequence made by the operator. A failure in the logic is possible too; so when all of the above are checked and nothing was found, replace the controller.
78	VACC NOT OK	The test is made at key-on and after 20 sec that both the travel demands have been turned off. This alarm occurs if the ACCELERATOR reading in the TESTER menu is 1.0V higher than PROGRAM VACC min acquisition when the accelerator is released.	Check the mechanical calibration and the functionality of the potentiometer.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
62	TH. PROTECTION	This alarm occurs when the temperature of the base plate is higher than 85°C. Then the maximum current decreases proportionally with the temperature increases from 85°C to 105°C. At 105°C the Current is limited to 0 Amps.	Improve the air cooling of the controller. If the alarm is signaled when the controller is cold, the possible reasons are a thermal sensor failure or a failure in the logic card. In this case, it is necessary to replace the controller.
65	BATTERY LOW	This occurs when the battery charge is calculated being less than or equal to 10% of the full charge and the BATTERY CHECK setting is other than 0 (refer to SET OPTION menu).	Charge the battery. If charging does not help, using a voltmeter, measure the battery voltage and compare the reading with the value in the BATTERY VOLTAGE parameter. If they are different, adjust the value of the ADJUST BATTERY function.
71	EEPROM KO	This is due to a HW or SW defect of the non-volatile embedded memory supporting the controller parameters. This alarm does not inhibit the machine operations, but the truck will work with the default values.	Try to execute a CLEAR EEPROM operation (refer to CONSOLE manual). Switch the key off and on to check the result. If the alarm occurs permanently, it is necessary to replace the controller. If the alarm disappears, the previously stored parameters will have been replaced by the default parameters. with the temperature increases from 85°C to 105°C.
65	MOTOR TEMPERATURE	This warning occurs when the temperature sensor is opened (If digital) or has overtaken the threshold of 150°C (if analog).	Check the thermal sensor inside the motor (use the MOTOR TEMPERATURE reading in the TESTER menu); check the sensor ohmic value and sensor wiring. If the sensor is OK, improve the air cooling of the motor. If the warning is present when the motor is cool, then the problem is inside the controller.
61	THERMIC SENSOR KO	The output of the controller thermal sensor is out of range.	This type of fault is not related to external components; replace the controller.
	CHECK UP NEEDED	This is just a warning to call for the time programmed maintenance.	It is just enough to turn the CHECK UP DONE option to level ON after the maintenance is executed.
	DATA ACQUISITION	Acquisition of the current gains.	The alarm ends when the acquisition is done.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
86	PEDAL WIRE KO	The SW continuously checks for the connection of the two supply ends of the potentiometer in the accelerator. The test consists of reading the voltage drop on a sense diode, connected between NPOT (CNA#30) and GND and cascaded with the potentiometer: if the potentiometer gets disconnected on PPOT (NNA#25) or NPOT, no current flows in the sense diode and the voltage on the NPOT connection collapses down. When the NPOT voltage is less than 0.3V this alarm occurs. This alarm also occurs when the NPOT voltage is higher than 2Vdc (to detect the condition of a broken sense diode).	Check the Voltage on NPOT and the potentiometer connections.
51	TILLER OPEN	Warning: When the tiller is released, after a fixed period of time of standby (30 seconds) the main contactor open.	At the next travel request, the warning will disappear.
92	CURRENT GAIN	The Maximum current gain parameter are at the default values, which means the maximum current adjustment procedure has not been carried out yet.	Ask the assistance of a Zapi technician to do the correct adjustment procedure of the current gain parameters.
68	WAITING FOR NODE	The controller receives from the CAN the message that another controller in the net is in fault condition; as a consequence the ACOE controller itself cannot enter an operative status, but has to WAIT for the other controller coming out from the fault status.	
76	VALVE COIL SHORTED	This alarm occurs when there is a short circuit on an on/off valve coil.	<ul style="list-style-type: none"> • If the fault is present at start up, it is very likely that the hw over current protection circuit is damaged, it is necessary to replace the controller. • If the fault is present when the controller drives the outputs, the problem is located in the harness and in the coils.
74	EV1 DRIVER SHORTED	Electro valve EV1 driver is shorted.	Check if there is a short or a low impedance between the negative of one of these coils and -BAT. Otherwise the driver circuit is damaged and the controller must be replaced.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
74	EV2 DRIVER SHORTED	Electro valve EV2 driver is shorted	Check if there is a short or a low impedance between the negative of this coil and -BAT. This warning also occurs if the external load is not present and the parameter EV2 in the "Set Options" menu is set "PRESENT", in this case the warning disappears setting the EV2 parameter "ADBSSENT". Otherwise the driver circuit is damaged and the controller must be replaced.
74	EV3 DRIVER SHORTED	Electro valve EV3 driver is shorted	Check if there is a short or a low impedance between the negative of this coil and -BAT. This warning also occurs if the external load is not present and the parameter EV3 in the "Set Options" menu is set "PRESENT", in this case the warning disappears setting the EV3 parameter "ADBSSENT". Otherwise the driver circuit is damaged and the controller must be replaced.
56	PUMP I NO ZERO	In standby condition (pump motor not driven), the feedback coming from the current sensor in the pump chopper gives a value out of a permitted range.	This type of fault is not related to external components; replace the controller.
52	PUMP I=0 EVER	This test is carried out when the pump motor is running, and it verifies that the current feedback sensor is not constantly stuck to 0.	<ul style="list-style-type: none"> • Check the motor connection, that there is continuity. If the motor connection is opened, the current cannot flow, so the test fails and the error code is displayed. • If everything is ok for what it concerns the motor, the problem could be in the current sensor or in the related circuit.
75	CONT. DRV. EV1	The EV1 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
75	CONT. DRV. EV2	The EV2 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
75	CONT. DRV. EV3	The EV3 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
89	PUMP VACC NOT OK	The minimum of the lift potentiometer is not correctly set.	It is suggested to repeat a "PROGRAM VACC" procedure
67	SENS. MOT. TEMP. KO	<ul style="list-style-type: none"> • The motor temperature sensor is not correctly connected to A22. • The motor temperature sensor is damaged. 	<ul style="list-style-type: none"> • Check the correct connection of the motor temperature sensor. • If the current sensor is correctly connected, replace it. • If the problem persist, replace the controller.
85	VACC OUT RANGE	The voltage on CNC#4 is outside of the parameters' range.	Please re-acquire the VACC parameters with a PROGRAM VACC procedure.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
11	STALL ROTOR	The traction rotor is stuck or the encoder signal is not correctly received by the controller.	Please check if the sign of FREQUENCY and ENCODER on the tester menu are the same and different than zero during a traction request.
48	EVP DRIVER OPEN	The EVP driver is damaged or the EVP coil impedance is too low.	Please check the EVP coil impedance. If the EVP impedance is OK, the problem is inside the controller.
49	MANY PUMP REQS	More than one pump functions were requested at the same time	Just one pump function at a time can be requested. Please reset all the requests and try again.
79	PUMP INC START	This is a warning for a pump incorrect starting sequence.	The possible reasons for this alarm are: <ul style="list-style-type: none"> • Pump request active at key-on. • Pump request active without man presence. Check the wirings. Check the micro-switches. It could also be an error sequence made by the operator. A failure logic is possible too. When all of the above conditions were checked and nothing was found, replace the controller.
90	PUMP VACC RANGE	The voltage on CNC#9 is outside of the parameters range.	If the EVP TYPE parameter is set to ANALOG, please acquire again the values of MIN LOWER and MAX LOWER. If the controller is in Combiacx configuration and the PROPORTION. LIFT parameter is set to ON, please acquire again also the values of MIN LIFT and MAX LIFT.
13	PARAM RESTORE	This warning appears when the controller restored the default values.	If a CLEAR EEPROM was made before the last key on-recycle, this warning just means that the EEPROM was correctly cleared. A travel demand or a pump request cancel the alarm. If this alarm appears at key on without any CLEAR EEPROM request by the operator, there could be a problem inside the controller.

Table 4-3 Steering Controller

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
6	SERIAL ERR #1	Main uC and slave uC communicate via a local serial interface. This alarm occurs when the slave uC does not receive the communication from the main uC through this serial interface.	It is necessary to replace the controller.
13	EEPROM KO	It occurs if a test to write and read one location in EEPROM fails. The SW expects to read the written value. It also occurs when the hour meter gives different values between the three redundant locations in which it is recorded. It also occurs when the busy bit of the EEPROM does not rise within 12 msec.	It is necessary to replace the controller.
16	LOGIC FAILURE #4	This alarm occurs in the rest state if the output of the voltage amplifier of the phase Vw-Vv have a drift larger than ± 0.25 V	It is necessary to replace the controller.
17	LOGIC FAILURE #3	This alarm occurs in the rest state if the output of the voltage amplifier of the phase Vu-Vw have a drift larger than ± 0.25 V.	It is necessary to replace the controller.
18	LOGIC FAILURE #2	This alarm occurs when the real voltage between phases W and V of the motor is different from the desired voltage.	It is necessary to replace the controller.
19	LOGIC FAILURE #1	This alarm occurs when the real voltage between phases W and U of the motor is different from the desired voltage.	It is necessary to replace the controller.
32	VMN NOT OK	This alarm occurs in the initial rest state after key-on if the inputs of motor voltage amplifiers are not in the window from 2.2 to 2.8 Vdc.	It is necessary to replace the controller.
48	MAIN CONT. OPEN	This alarm occurs only when the setting CAN BUS is PRESENT. Then the EPS-AC0 waits for a via CAN information that the traction controller has closed the main contactor. If this information lacks more than about 1.5 secs, this alarm occurs.	Find, on the traction controller, the reason for keeping the main contactor open.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
53	STBY I HIGH	This alarm occurs two ways: 1) In the initial rest state after key-on, if the outputs of the current amplifiers are not comprised in the window 2.2 to 2.8 Vdc. 2) After the initial diagnosis this alarm occurs when the outputs of the current amplifiers at rest have a drift larger than $\pm 0.15V$.	It is necessary to replace the controller.
61	HIGH TEMPERATURE	This alarm occurs if the temperature of the controller base plate overtakes 75 degrees.	Improve the cooling of the controller; otherwise it is necessary to replace the controller.
65	MOTOR TEMPERATURE	This alarm occurs only when DIA MOTOR TEMP is on and the thermal sensor inside the motor measures a temperature higher than 150 degrees. It also occurs when trying to acquire the motor resistance with a temperature in the motor higher than 150 degree (still with DIAG MOTOR TEMP to ON).	Check that the thermal sensor in the motor is working correctly. If it is, improve the cooling of the motor.
70	HIGH CURRENT	This alarm occurs if the circuit to limit via hardware the current in the motor is either always active at key-on or repeatedly active when the motor is turning.	Check the motor is suited to work with the EPS-DC0 (not oversized). Otherwise it is necessary to replace the controller.
71	POWER FAILURE #3	This alarm occurs when the current in the phase V of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase V of the motor. Otherwise it is necessary to replace the controller.
72	POWER FAILURE #2	This alarm occurs when the current in the phase U of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase U of the motor. Otherwise it is necessary to replace the controller.
73	POWER FAILURE #1	This alarm occurs when the current in the phase W of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase W of the motor. Otherwise it is necessary to replace the controller.
83	BAD ENCODER SIGN	It occurs in applications with toggle switches when the applied frequency (FREQUENCY) and motor speed (ENC SPEED) have opposite sign.	Swap in between two encoder channels (CNB#7 with CNB#8).

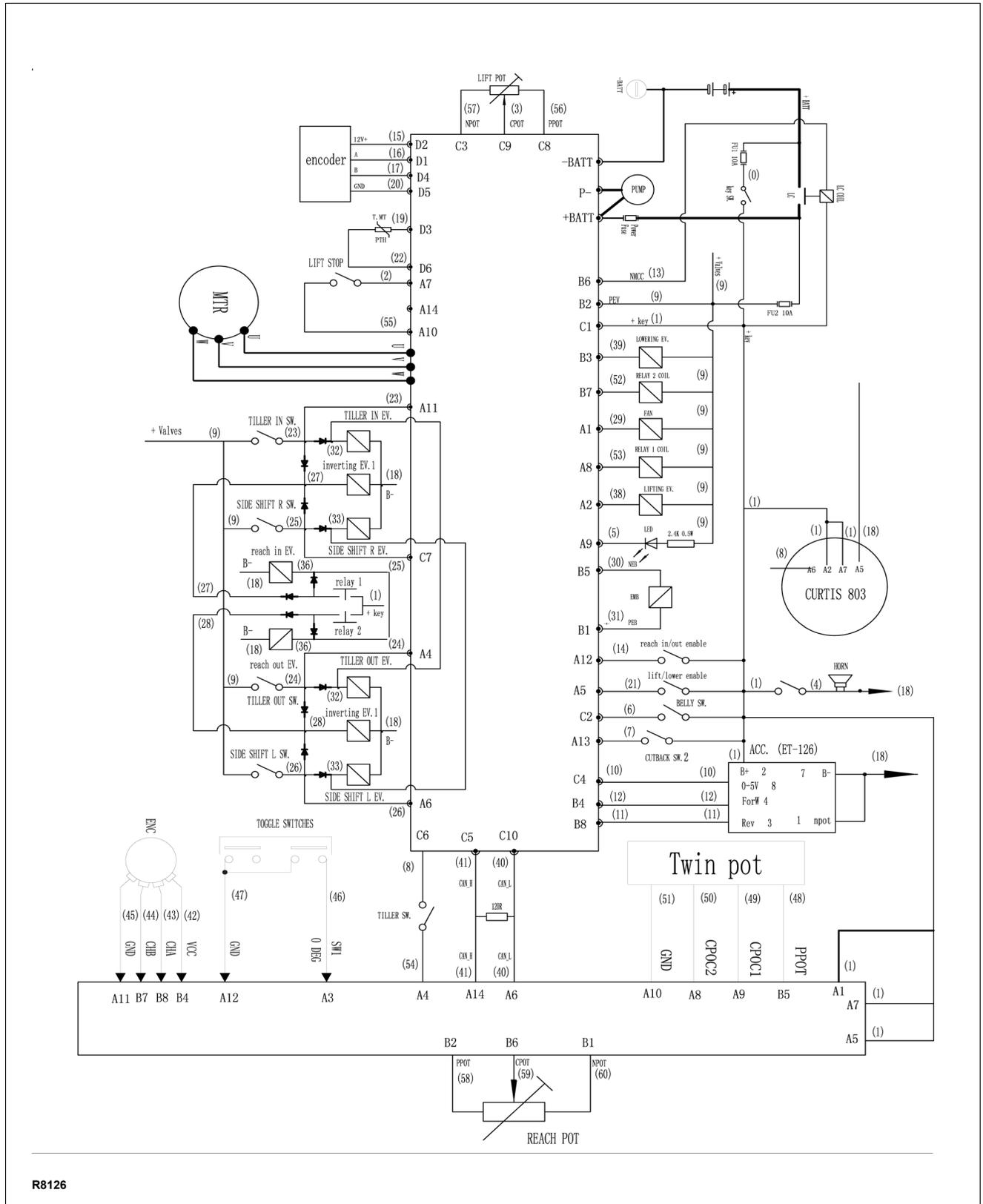
Error Message		Possible Cause	Fault Elimination
Code	Error Text		
84	STEER SENSOR KO	This alarm occurs if the command potentiometer (CPOC1 on CNA#9 or CPOC2 on CNA#8) changes with a jerk larger than MAX SP SLOPE. This alarm is used to catch a discontinuity in the voltages of the command potentiometer.	Change the steer pot.
85	STEER HAZARD	This is just a warning to inform that the steering controller is limiting the angle in the steering direction. No speed reduction occurs on the traction.	
218	CLOCK PAL NOT OK	The main uC sends an analog signal towards the slave uC to reset the slave uC on demand. When the slave uC detects the analog signal external to a window from 2.2 to 2.8 and not in the range to generate the reset on demand, the slave uC raises this alarm.	It is necessary to replace the controller.
99	INPUT ERROR #1	It occurs when the voltage on CNA#4 (NK1: Lower Potential Terminal of the Safety Contacts) is higher than 12 V before to turn the safety contacts closed.	When the safety contacts are open, the voltage on CNA#4 is expected to be close to 0 Vdc and this is independent from whether the safety contacts are connected to a plus battery or to a minus battery. In the first case (safety contacts connected to a plus battery), when the safety contacts are open, CNA#4 is connected to a minus battery through a load. Only a harness mistake may connect NK1 to a higher than 12 voltage.
212	MICRO SLAVE #8	It occurs when the encoder counting of the main uC is not matched with the encoder counting the slave uC.	It is necessary to replace the controller.
219	STEPPER MOTOR MISM	This alarm occurs if the frequency and the amplitude of the voltages from the stepper motor lines are mismatched in between. In normal condition when the amplitude of the stepper motor lines increases, the frequency of the stepper motor lines must increase too.	It is necessary to replace the controller.
220	MOTOR LOCKED	This alarm occurs if the current in the steering motor stays close to the maximum current longer than 1 sec.	Search for a mechanical problem locking the motor. To help in the fault finding, set DEBUG OUTPUT to level 11.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
221	MICRO SLAVE #4	It occurs in one or the following conditions: (Open loop application only) If the slave uC detects the stator voltage phase rotates in the opposite direction respect to the sign of the stepper motor speed. (Closed loop application only) If the slave uC detects the stator voltage phase rotates in the opposite direction respect to the commanded position.	It is necessary to replace the controller.
222	FB POT LOCKED	In application with a feedback potentiometer, this alarm occurs if the feedback potentiometer (CPOT on CNB#6) does not change (or changes in the opposite direction) its value even if commanded to change. In application with toggle switches with ENCODER CONTROL to off, this alarm occurs if the feedback encoder counting does not change its value even if commanded to change.	In application with the feedback potentiometer, verify potentiometer is not mechanically loosened. Check there is not a mechanical block of the steered wheel. Be sure the wiper has not reached its own electrical limit because of too much angle of the steered wheel. Besides, this alarm may occur at the installation when the motor rotates in the wrong direction turning away from the desired direction.
223	JERKING FB POT	This alarm occurs if the feedback potentiometer (CPOT on CNB#6) changes with a jerk larger than 0.3V in 16 msec. This alarm is used to catch a discontinuity in the voltages of the feedback potentiometer.	Change the feedback potentiometer.
225	CURRENT GAIN	This alarm occurs when the parameter to compensate for the gain of the current amplifiers (ADJUSTMENT #03 and ADJUSTMENT #04) have the default values.	It is necessary to send the controller to Zapi to perform, the maximum current regulation.
226	NO SYNC	Every 16msec, inside the code cycle, the main uC rises and then lowers an input for the slave uC (SYNC). When the slave uC detects no edge for more than 100 msec on this input, this alarm occurs. This is just a watch dog function: when the main uC does not execute the code cycle it does not update the SYNC signal and the slave uC cuts off the steer and traction.	It is necessary to replace the controller.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
227	SLAVE COM. ERROR	Main uC and Slave uC communicate via a local serial interface. This alarm occurs when the main uC does not receive the communication from the slave uC through this serial interface.	It is necessary to replace the controller.
237	WAITING DATA	This warning occurs only if CAN BUS is PRESENT. At key-on the EPS-AC0 asks the traction controller to send a list of parameters via CAN BUS. From the request until the parameter are correctly received, this warning occurs. The steer is not activated yet, and the safety relays remain open when this warning is present.	
228	POSITION ERROR	This alarm occurs for a error in the redundant test of the feed- back sensors.	Check the potentiometer connected to CNB#6 is working correctly. If toggle switches are connected to CNA#2 and CNA#3, verify they are working correctly and the setting AUX FUNCTION 11 is correct. Verify that sensor bearing in the motor (encoder) has not slipped (the sensor bearing has two rings: one is connected to the rotor shaft; the other is connected to the motor frame. Check these two rings are securely connected to their structure without slippage.
238	EPS NOT ALIGNED	This is a real alarm that cuts off the traction. It occurs at the initial alignment if the straight ahead condition is not matched within 6 sec. Throughout the 6 sec delay, steering is not activated, the safety relays are open and the traction is stopped.	
239	WAITING FOR TRAC	At key-on the EPS-AC0 needs an assent from the traction controller to close the safety contacts and to turn on the operational mode. Until this happens, this warning occurs. The steer is not activated and the safety relays remain open when this warning is present.	
241	ENCODER ERROR	It occurs when ENCODER CONTROL is set ON and the real frequency does not pursuit the commanded frequency.	This condition is several times due to either, a mismatching between the Encoder resolution used in the SW and the real encoder resolution, or a wrong connection between the two encoder channels. In this latest case, exchange the connections.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
242	Q LINE SENSOR KO	This alarm occurs when the mean voltage of the Quadrature line of the stepper motor (connection CNA#8) is not null: the voltage on every stepper motor line is a sine wave with null mean voltage.	Check the continuity of the stepper motor connections. In particular the resistance between CNA#8 and the negative battery (with the stepper motor at rest) is expected to be very low (close to 30 ohms).
243	D LINE SENSOR KO	This alarm occurs when the mean voltage of the Direct line of the stepper motor (connection CNA#9) is not null: the voltage on every stepper motor line is a sine wave with null mean voltage	Check the continuity of the stepper motor connections. In particular the resistance between CNA#9 and the negative battery (with the stepper motor at rest) is expected to be very low (close to 30 ohms).
244	GAIN EEPROM KO	The parameters to compensate for the gain of the current amplifiers (ADJUSTMENT #03 and ADJUSTMENT #04 are recorded in a not volatile memory (eeprom) with a redundant handling. In fact every adjustment is recorded in three eeprom locations. If the values in these three location are different, this alarm occurs.	It is necessary to send the controller to Zapi to execute the maximum current regulation.
245	DATA ACQUISITION	This alarm occurs when acquiring the motor resistance or when adjusting the parameters to compensate for the gain of the current amplifiers (maximum current factory adjusted).	Recycle the key.
246	MICRO SLAVE KO	In stepper motor application, this alarm occurs if the main uC is detecting a direction of the stepper motor not matched with the one that the slave uC is detecting. In closed loop application, this alarm occurs if the main uC is detecting a direction of the steering error not matched with the one that the slave uC is detecting. Furthermore, this alarm occurs if the main uC is detecting no steering limitation meanwhile the slave uC is detecting a steering limitation.	It is necessary to replace the controller.
247	CAN BUS KO	This alarm occurs only when the setting CAN BUS is PRESENT. Then the EPS-AC0 must receive the event messages from the traction controller. If these messages lack more than about 1 sec, this alarm occurs.	Check the CAN Bus communication system and analyse the frames from the traction controller to the steer controllers.

Error Message		Possible Cause	Fault Elimination
Code	Error Text		
248	S.P OUT OF RANGE	This alarm occurs for a fault on the command potentiometer (CPOC2 on CNA#8). When a single command pot is chosen, the alarm occurs if the wiper (CPOC1) exits the range from 0.8 Vdc to 4.2 Vdc. When the twin pot is chosen, the alarm occurs if the sum of the two wiper voltages (CPOC1 + CPOC2) exists the range from 4.5 Vdc to 5.5 Vdc.	Check the connections of the potentiometer. This alarm occurs when one connection of the command potentiometer is broken.
249	F.B OUT OF RANGE	This alarm occurs for a fault on the feedback potentiometer (CPOT on CNB#6). This alarm occurs in CPOT exits the range from 0.3 Vdc to 4.7 Vdc.	Check the connections of the feedback potentiometer. This alarm occurs when one connection of the feedback potentiometer is broken.
250	MICRO SLAVE	It occurs when the information on the status bus between the main uC and the slave uC is frozen to the OFF value (the slave uC does not update the status bus configuration).	It is necessary to replace the controller.
251	KM OPEN	This alarm occurs if the slave uC detects the safety contact, of the main uC, open when expected being closed.	It is necessary to replace the controller.
252	KS OPEN	This alarm occurs if the slave uC detects the safety contact, of the main uC, open when expected being closed.	It is necessary to replace the controller.
253	KM CLOSED	This alarm occurs at key-on if the slave uC detects the safety contact, of the main uC, closed prior to being commanded.	This alarm occurs if the connection CNA#5 (K1) is around a voltage of 12 Vdc when switching on the key. In fact, when the safety contacts are open, K1 is expected to be plus battery voltage (not 12 V). Search for a harness problem or replace the controller.
254	KS CLOSED	This alarm occurs if the main uC detects the safety contact, of the slave uC, closed prior to being commanded.	This alarm occurs if the connection CNA#4 (NK1) is around a voltage of 12 Vdc when switching on the key. In fact, when the safety contacts are open, NK1 is expected to be a minus battery voltage (not 12 V). Search for a harness problem or replace the controller.



R8126

Figure 4-2 Wiring Diagram

NOTES

SECTION 5 OPERATING CONTROL SYSTEM

5-1. CONTROL HEAD

5-1.1 Cap Assembly Removal

1. Engage the emergency stop switch and turn off key switch.
2. Remove four screws, lift up cap and disconnect harness from harness.

5-1.2 Cap Assembly Installation

1. Hold up cap in place and connect harness to harness.
2. Position up cap on control head and secure with four screws.
3. Disengage the emergency stop switch and turn on key switch.

5-1.3 Control Head Removal

1. Remove the up cap as described in paragraph 5-1.1.
2. Disconnect harness from potentiometer and switch.
3. Remove three screws, three lock washers and three flat washers.

WARNING: When removing the control head in the following steps, be sure to hold it in place until the control harness is disconnected.



4. Remove the control head and handle.

5-1.4 Control Head Installation

1. Hold control head and handle in place and install three screws, three washers and three flat washers.
2. Reconnect harness to potentiometer and switch .
3. Install the cap assembly as described in paragraph 5-1.2.

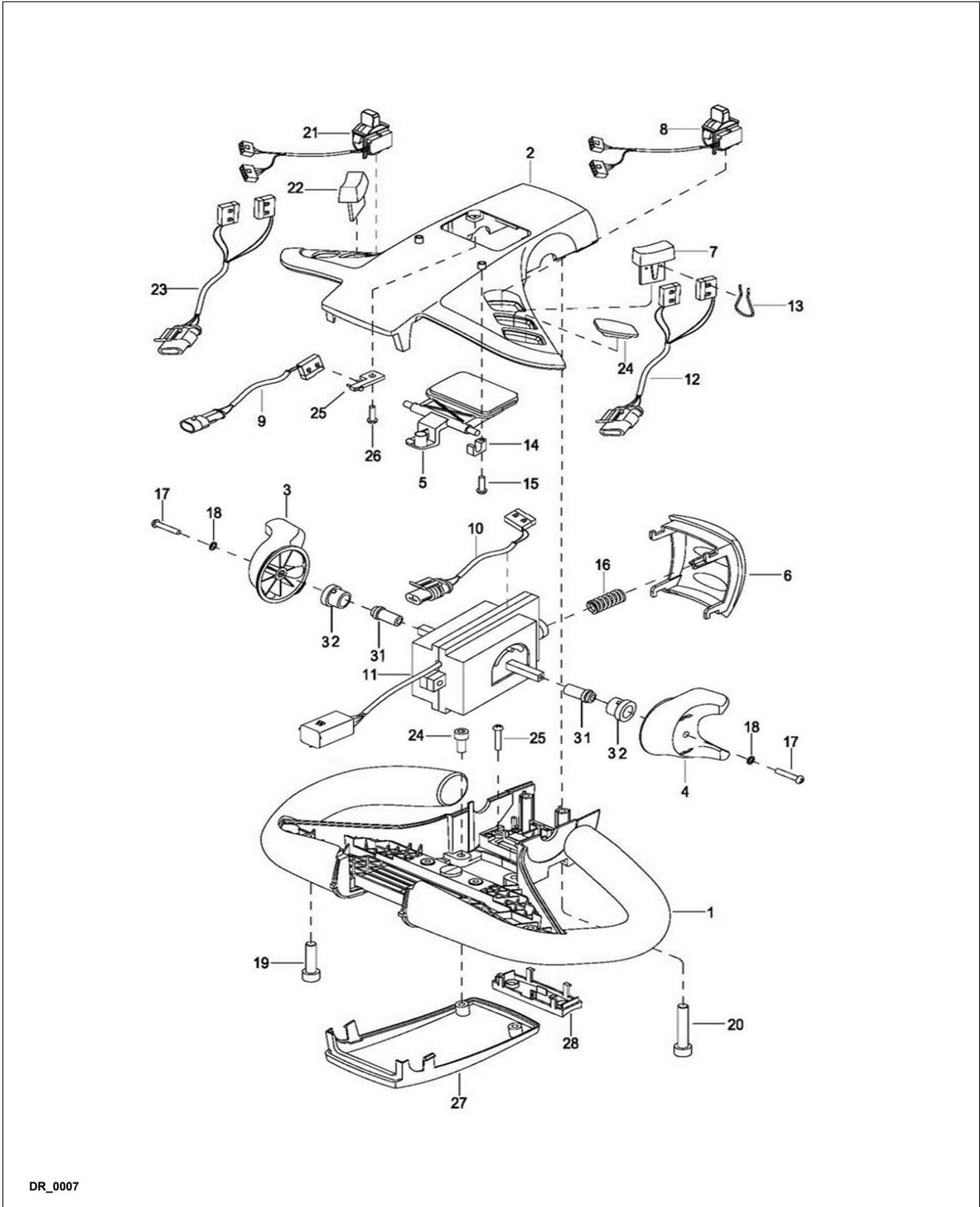
5-1.5 Potentiometer Replacement

1. Remove the cap assembly as described in paragraph 5-1.1.
2. Disconnect harness from potentiometer.
3. Remove screw, washer and control knob from potentiometer.

4. Remove screw, washer and control knob from other side of potentiometer.
5. Remove potentiometer from cover.
6. Position new potentiometer in cover.
7. Install control knob on potentiometer and secure with screw, and washer.
8. Install control knob on the other side of potentiometer and secure with screw and washer.
9. Connect harness to potentiometer.
10. Install the up cap as described in paragraph 5-1.2.

5-1.6 Belly-Button Switch Replacement

1. Remove the up cap as described in paragraph 5-1.1.
2. Disconnect harness from reversing switch wiring.
3. Remove reversing switch from potentiometer.
4. Position the new reversing switch in potentiometer.
5. Reconnect harness to reversing switch wiring.
6. Install the up cap as described in paragraph 5-1.2.



DR_0007

Figure 5-1 Control Head Assembly

5-1.7 Horn Switch Replacement

1. Remove the up cap as described in paragraph 5-1.1.
2. Remove two screws, brackets and spring.
3. Remove the screw, bracket and horn wiring from the up cap.
4. Position the new horn wiring on the up cap and secure with screw and bracket.
5. Position horn switch in the up cap and secure with two screws and brackets.
6. Install the up cap as described in paragraph 5-1.2.

5-1.8 Lift and Lower Switch Replacement

1. Remove the up cap as described in paragraph 5-1.1.
2. Disconnect harness from switch.
3. Remove switch from cap.
4. Position the new switch and Connect harness to switch.
5. Install the up cap as described in paragraph 5-1.2.

NOTE: Other switches replaced like this.

5-2. COMPARTMENT COVERS

5-2.1 Removal

1. Engage the emergency stop switch and turn off key switch.
2. Open covers.
3. Remove three screws and middle cover.
4. Remove three screws and upper cover.
5. Remove two screws and two washers.

5-2.2 Installation

1. Install upper cover and secure with three screws.
2. Install middle cover and secure with three screws.
3. Close covers.
4. Install two screws and two washers.
5. Disengage the emergency stop switch and turn on key switch.

5-3. STEERING ARM

5-3.1 Return Spring Replacement

The steering arm gas return spring is replaced while the steering arm is in the upright position.

1. Engage the emergency stop switch and turn off key switch.
2. Secure the steering arm in the upright position.
3. Remove screw and free the gas return spring from bracket.
4. Pull downward on the gas return spring to free it from its seat inside steering arm.
5. Position the new gas return spring inside the steering arm being sure it fully engages its seat.
6. Position the opposite end of the gas return spring on bracket and install screw.
7. Disengage the emergency stop switch and turn on key switch

5-3.2 Steering Arm Removal

1. Engage the emergency stop switch and turn off key switch.
2. Remove the return spring as described in paragraph 5-3.1.
3. Disconnect harness from main harness.
4. Attach a hoist to steering arm.
5. Remove shaft and the steering arm.

5-3.3 Steering Arm Installation

1. Position steering arm in bracket and secure with shaft and screw.
2. Install the return spring as described in paragraph 5-2.1.
3. Reconnect harness to main harness.

Disengage the emergency stop switch and turn on key switch.

SECTION 6 BRAKE SERVICING

6-1. BRAKES

The brake system consists of a drive motor mounted brake. This brake is spring applied and electrically released.

6-1.1. Measurement

The "air gap" is the distance between the magnet body and the rotor plate with the brake applied. As the brake pads and rotor wear normally, the air gap will increase and should be replaced when it measures more than 0.25mm.

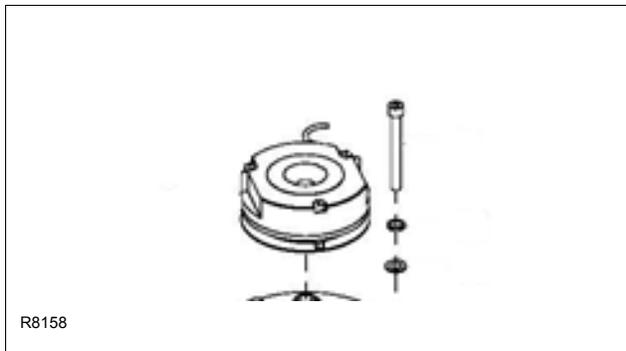


Figure 6-1 Brake Assembly

6-1.2. Stopping Distance Adjustment

The stopping distance of the truck should not require adjustment. However, this distance should be checked with each planned maintenance.

Using an unloaded truck, run truck to its top speed on an even dry concrete surface. Move control handle into the lower braking position. Measure length of braking path from the actuation point of the brakes until the truck has stopped. The actual length of the braking path should be between approximately

1.5 - 2.5 ft (0.5-0.7 m) if more than that replace the brake.

6-1.3. TBrake Assembly Replacement

1. Block load wheels.
2. Remove the compartment covers as described in paragraph 5-2.
3. Disconnect electric brake from harness.
4. Remove the three mounting screws (Figure 6-1) and the brake.
5. Place the new brake into position and secure with the three mounting screws.
6. Finally tighten the three mounting screws to 52 inlb (6 Nm).
7. Reconnect electric brake from harness.
8. Remove load wheel blocks and check operation.
9. Install the compartment covers as described in paragraph 5-2.

NOTES

SECTION 7 DRIVING SYSTEM

7-1. DRIVE WHEEL

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2.
3. Loosen but do not remove the five bolts.
4. Jack up the truck so the drive wheel is off the ground; then securely block the truck to prevent movement.
5. Remove five bolts, five washers, and drive wheel from transmission.
6. Install new drive wheel in reverse order of removal.
7. Install the compartment covers as described in paragraph 5-2.
8. Disengage the emergency stop switch and turn on key switch.

7-2. TRANSMISSION

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2.
3. Remove the brake as described in paragraph 6-1.1.
4. Disconnect harness from drive motor.
5. Remove four screws, four lock washers, flat washers, and motor from transmission.
6. Disconnect position switch from harness.
7. Remove position switch from the frame.
8. Support the transmission and remove the six screws, six lock washers and six flat washers.
9. Slowly lower the transmission out the bottom of the frame.
10. Install new transmission by reversing the steps above.

7-3. STEERING MOTOR

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2.
3. Disconnect encoder from harness.

4. Remove three screws and encoder from the steering motor.
5. Disconnect harness from steering motor.
6. Remove screw, lock washer, washer and gear from steering motor.
7. Remove four screws and lift steering motor from the frame.
8. Install new steering motor by reversing the steps above.

7-4. Load Wheel

7-4.1. Removal

1. Raise forks.
2. Engage the emergency stop switch and turn off key switch.
3. Block the drive wheel to prevent the truck from rolling.
4. Jack up the forks to raise the load wheels off the floor. Securely block the forks in the raised position by positioning supports under both fork tips.
5. Remove screw and retaining ring securing shaft.

NOTE: When shaft is removed, load wheel will drop free.

6. Remove shaft, load wheel and washers.
7. Remove bearings from load wheel.

NOTE: Inspect the load wheel assembly. If the load wheel is worn within 1/8" of the metal sleeve, or is cracked or damaged, replace the entire load wheel and bearing assembly. We recommend that both load wheel assemblies be replaced at the same time. This ensures level and safe operation of the lift truck.

7-4.2. Repair

1. Remove bearings from wheels.
2. Inspect bearings and replace if necessary.
3. Reassemble bearings in wheels.
4. Jack up the truck to raise the load wheels off the floor. Securely block the forks in the raised position by positioning supports under both fork tips.

7-4.3. Load Wheel Installation

NOTE: Adjustable straddle shown, fixed straddle similar.

1. Install bearings in load wheel.
2. Position load wheel in the straddle.
3. Install shaft and secure with screws and retaining ring.
4. Remove blocking from under the truck.
5. Lower the forks.
6. Disengage the emergency stop switch and turn on key switch.

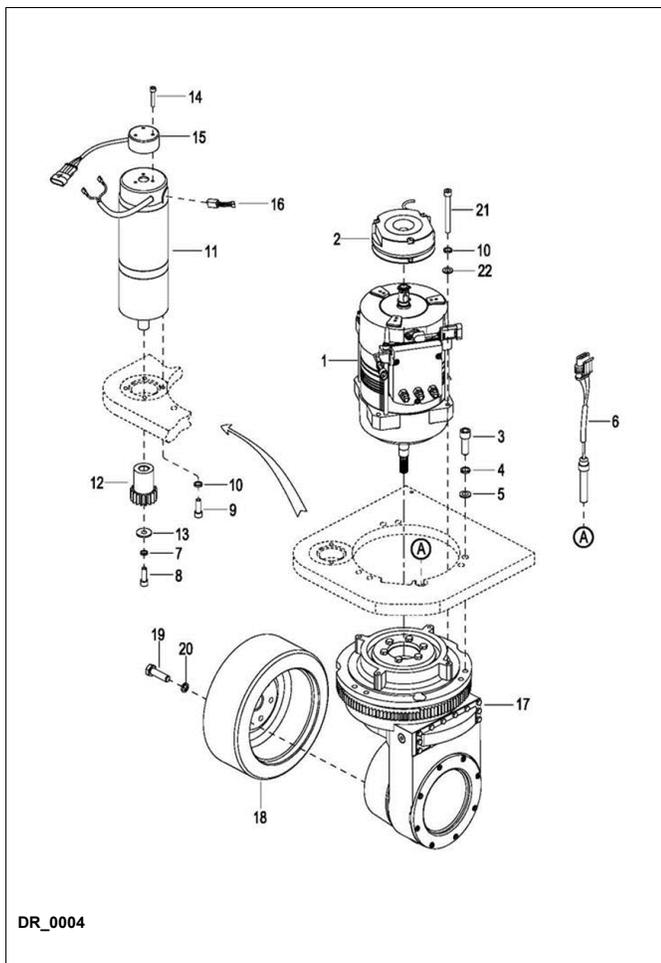


Figure 7-1 Transmission, Motor, Brake Mounting

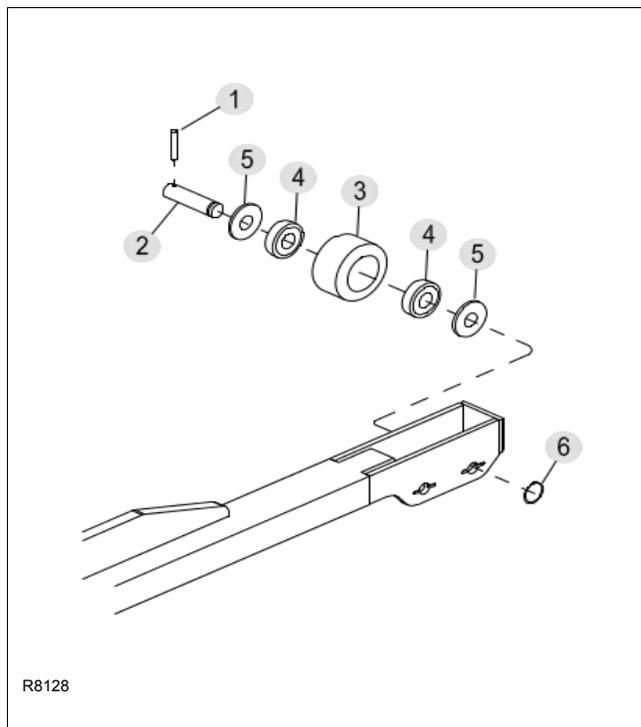


Figure 7-2 Load Wheel

SECTION 8 ELEVATION SYSTEM SERVICING

8-1. GENERAL

The elevation system includes the outer mast, inner mast, lift linkage, lift chains, lift cylinder and ram head.

8-2. LIFT CHAIN LENGTH ADJUSTMENT

NOTE: The Telescopic trucks have two lift chains that are adjusted at the cross member of the outer mast. TRIMAST trucks have four lift chains. The free lift chains are adjusted at the free lift cylinder close to the cross member of the inner mast. The secondary lift chains are adjusted at the top of the outer mast.

1. Fully lower the lift carriage.
2. Engage the emergency stop switch and turn off key switch.

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



3. Loosen both upper jam nuts to allow for adjustment of middle jam nuts.
4. Break both lower jam nuts free from the middle jam nuts.
5. Take up slack in both lift chains with middle jam nuts. Strive for equal tension on both chains.
6. Align anchor so the clevis pins is parallel to the masts.

CAUTION: At least 3 full threads must be present below lower nut after adjustment.



7. Tighten jam nuts securely while maintaining alignment of clevis pins.
8. Disengage the emergency stop switch and turn on key switch.
9. Test chain by operating carriage. If slack is still apparent, repeat above procedure.

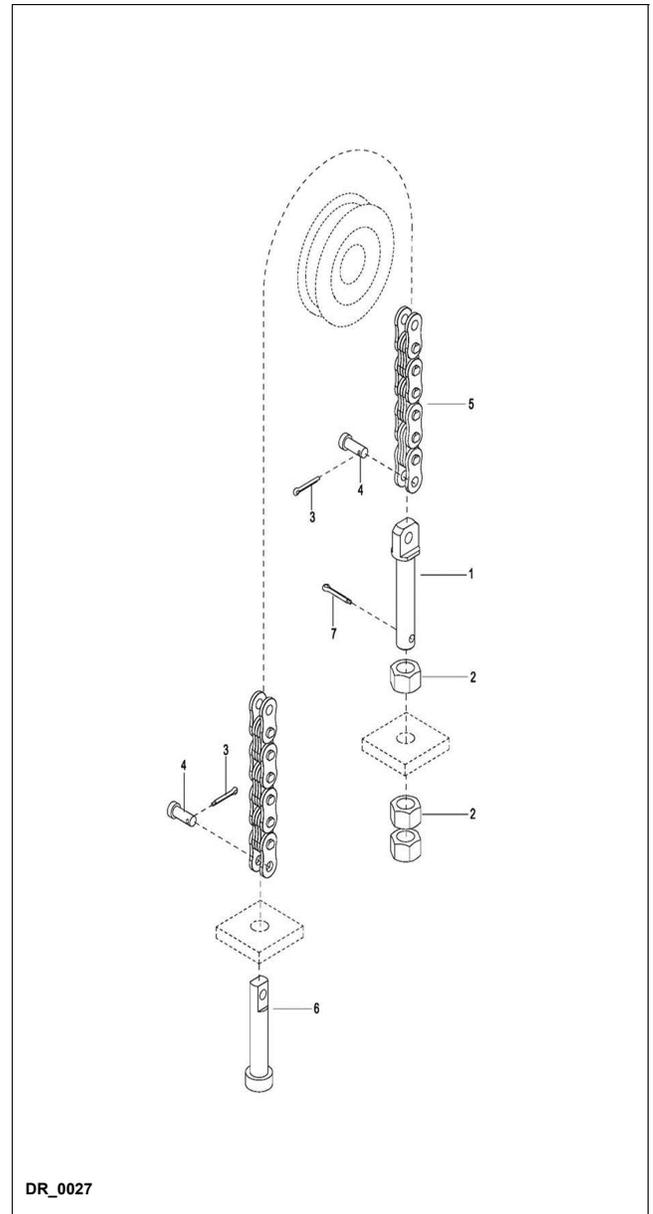


Figure 8-1 Chain Assembly

8-3. LIFT CHAIN WEAR INSPECTION

Both lift chains should be replaced when either chain is worn enough to increase its 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, clevis pins and cotter pins should be installed when chains are replaced. Never replace a partial section of chain and never repair chain. Refer to paragraph 8-4. when installing new chain.

8-4. LIFT CHAIN REPLACEMENT

8-4.1. Telescopic

1. With the lift truck wheels securely blocked, raise the forks approximately three feet from floor and position blocks or strong supports under inner mast.
2. Lower inner mast onto the support. Check that arrangement is secure before proceeding.

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



3. Engage the emergency stop switch and turn off key switch.
4. Remove cotter pin and clevis pin connecting chain to chain anchor at the lift carriage.
5. Remove cotter pin and clevis pin connecting chain to chain anchor at the outer mast.
6. Remove chain from sheave.
7. Position new chain on sheave.
8. Secure new chain to new chain anchor at the outer mast with new clevis pin and new cotter pin.
9. Connect the opposite end of new chain to new chain anchor at the lift carriage with new clevis pin and new cotter pin.
10. Adjust the chains according to paragraph 8-2.
11. Disengage the emergency stop switch (and turn on key switch).

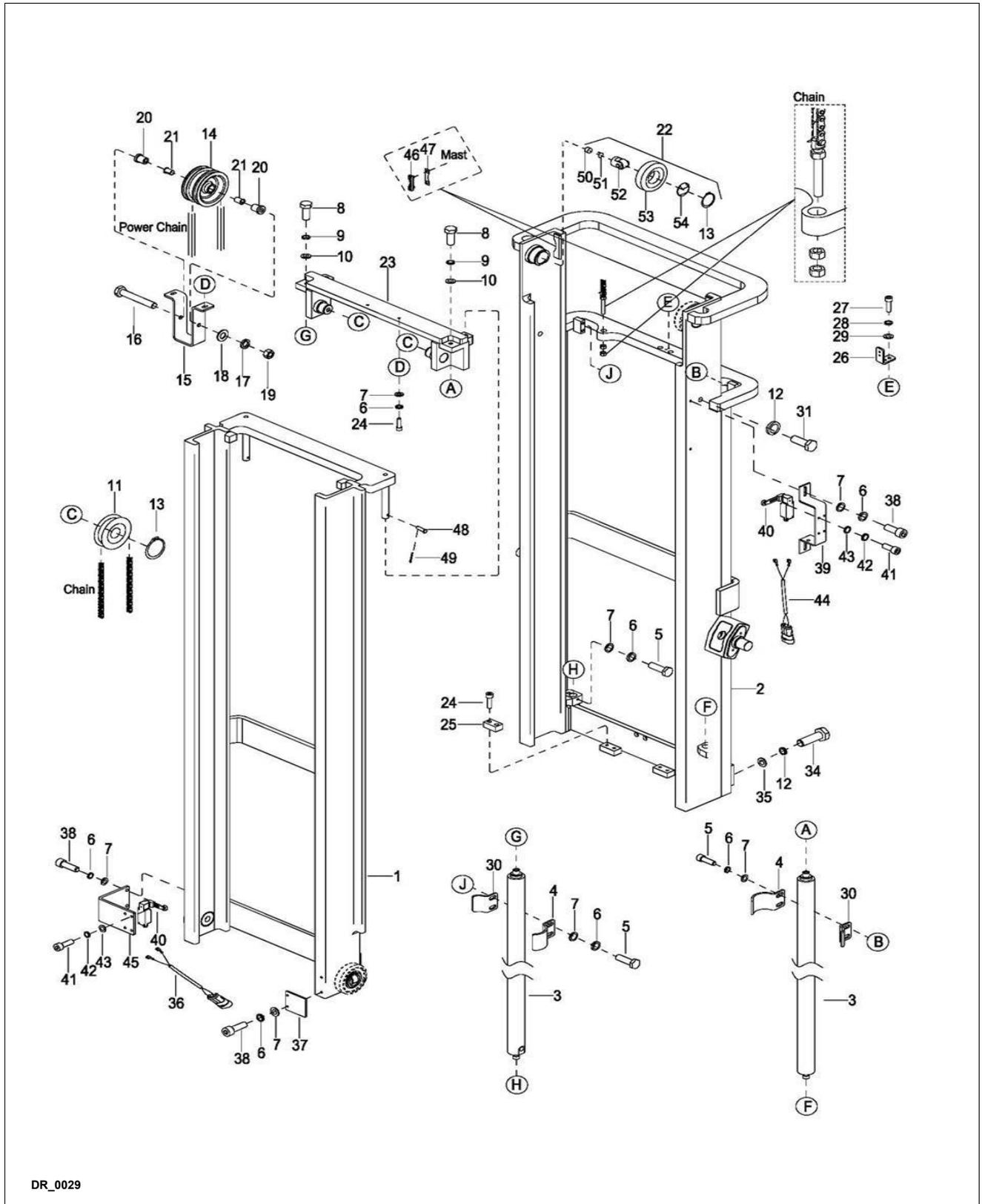


Figure 8-2 Telescopic Mast Assembly

8-4.2. TRIMAST Free Lift Chain

1. With the lift truck wheels securely blocked, raise the forks approximately three feet from floor and position blocks or strong supports under the lift carriage.
2. Lower inner mast onto the support. Check that arrangement is secure before proceeding.
3. Engage the emergency stop switch and turn off key switch.

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



4. Remove cotter pin and clevis pin connecting chain to chain anchor at the lift carriage.
5. Remove cotter pin and clevis pin connecting chain to chain anchor at free lift cylinder.
6. Remove chain from sheave.
7. Position new chain on sheave.
8. Secure new chain to new chain anchor at the outer mast with new clevis pin and new cotter pin.
9. Connect the opposite end of new chain to new chain anchor at the lift carriage with new clevis pin and new cotter pin.
10. Adjust the chains according to paragraph 8-2.
11. Disengage the emergency stop switch and turn on key switch.

8-4.3. TRIMAST Secondary Lift Chain

1. With the lift truck wheels securely blocked, raise the forks approximately three feet from floor and position blocks or strong supports under masts.
2. Lower inner mast onto the support. Check that arrangement is secure before proceeding.
3. Engage the emergency stop switch (and turn off key switch).

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



4. Remove cotter pin and clevis pin connecting chain to chain anchor at the inner mast.
5. Remove cotter pin and clevis pin connecting chain to chain anchor at the outer mast.
6. Remove chain from sheave.
7. Position new chain on sheave.
8. Secure new chain to new chain anchor at the outer mast with new clevis pin and new cotter pin.
9. Connect the opposite end of new chain to new chain anchor at the inner mast with new clevis pin and new cotter pin.
10. Adjust the chains according to paragraph 8-2.
11. Disengage the emergency stop switch and turn on key switch.

8-5. LIFT CYLINDERS

NOTE: Removal and repair of lift cylinders are covered in [SECTION 9](#).

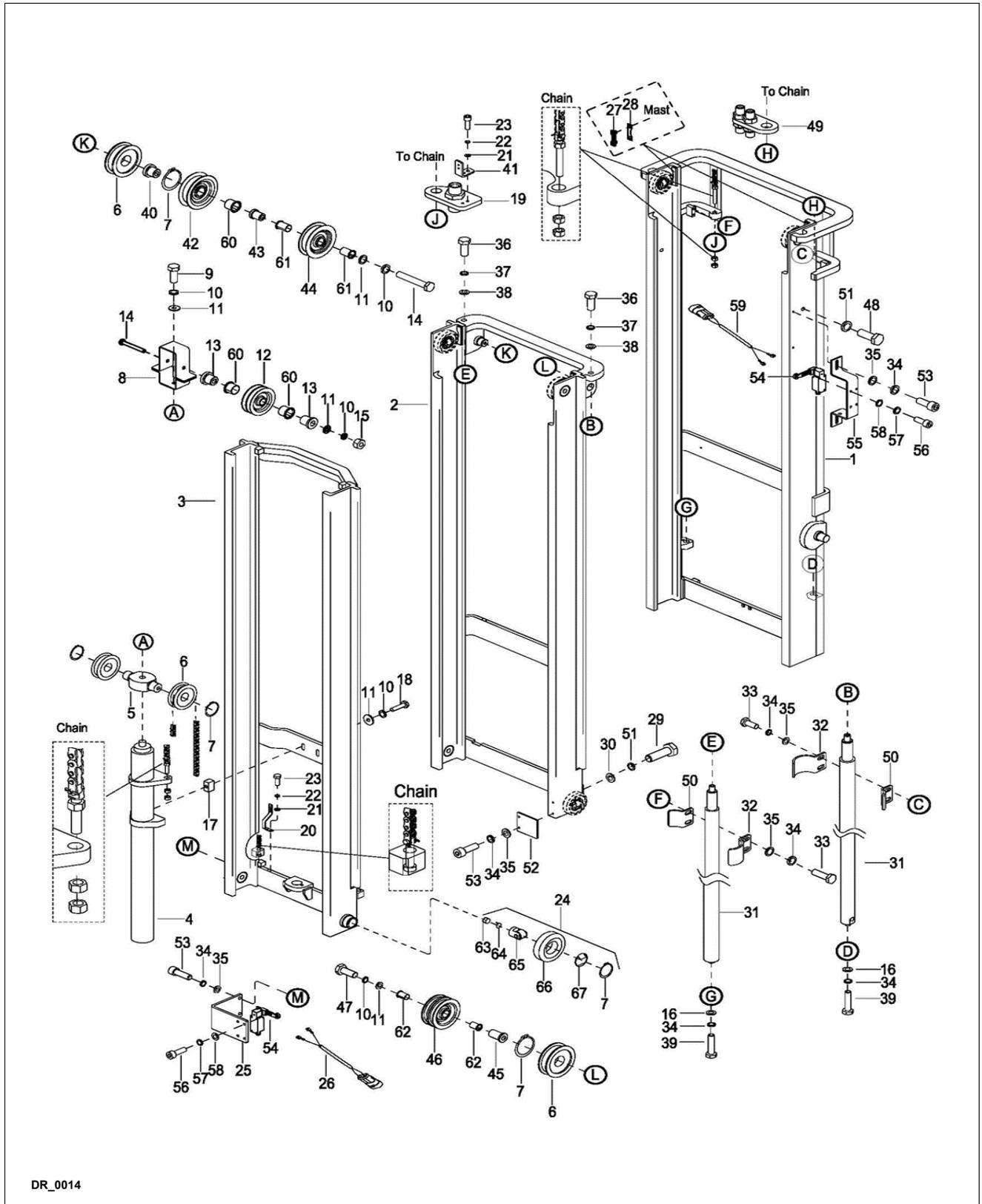


Figure 8-3 Trimast Assembly

NOTES

SECTION 9 HYDRAULIC SYSTEM SERVICING

9-1. LINES AND FITTINGS

WARNING: When forks are raised, pressure exists in the hydraulic system lines and fittings. To ensure release of pressure, forks must be fully lowered and the batteries disconnected before performing any maintenance on the hydraulic system.



NOTE: Leaking hydraulic fittings may be remedied by simply tightening fittings. If this does not remedy the leak, the fittings or line must be replaced.

1. Lower forks fully.
2. Engage the emergency stop switch and turn off key switch.
3. Remove the compartment covers as described in paragraph 5-2..

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



4. **Telescopic Trucks:** Refer to [Figure 9-1](#) or [Figure 9-1.1](#) and re- move leaking line or fitting and replace it with a new line or fitting.

TRIMAST Trucks: Refer to [Figure 9-2](#) or [Figure 9-2 .1](#) and re- move leaking line or fitting and replace it with a new line or fitting.

5. Check level of hydraulic oil. With lift carriage fully lowered, fill reservoir with hydraulic oil to 1 inch below opening. Use hydraulic oil listed in [Table 3-2](#).
6. Disengage the emergency stop switch and turn on key switch.
7. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
8. Check level of hydraulic oil. Hydraulic oil must be 1 inch below opening. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
9. Install the compartment covers as described in paragraph 5-2.

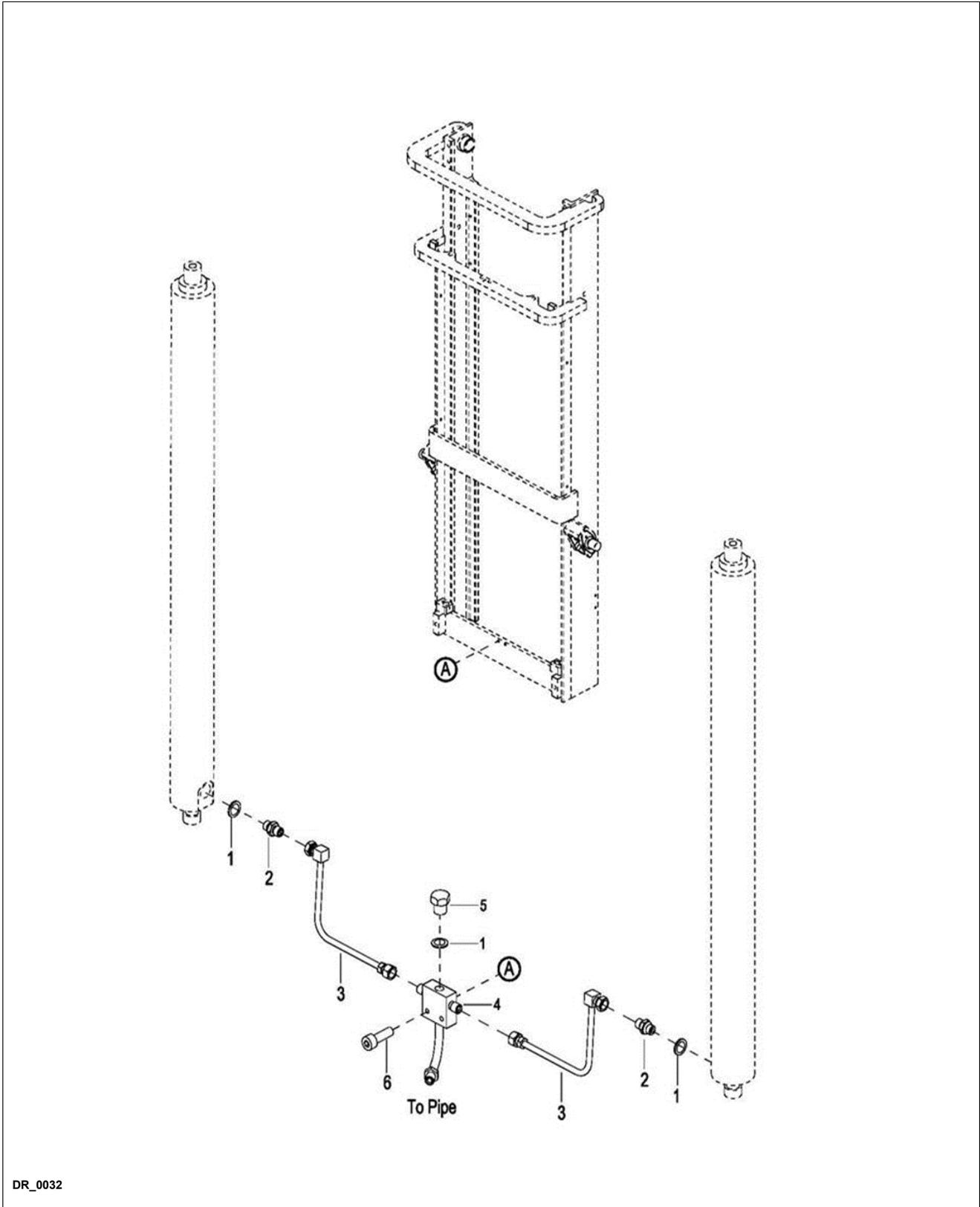
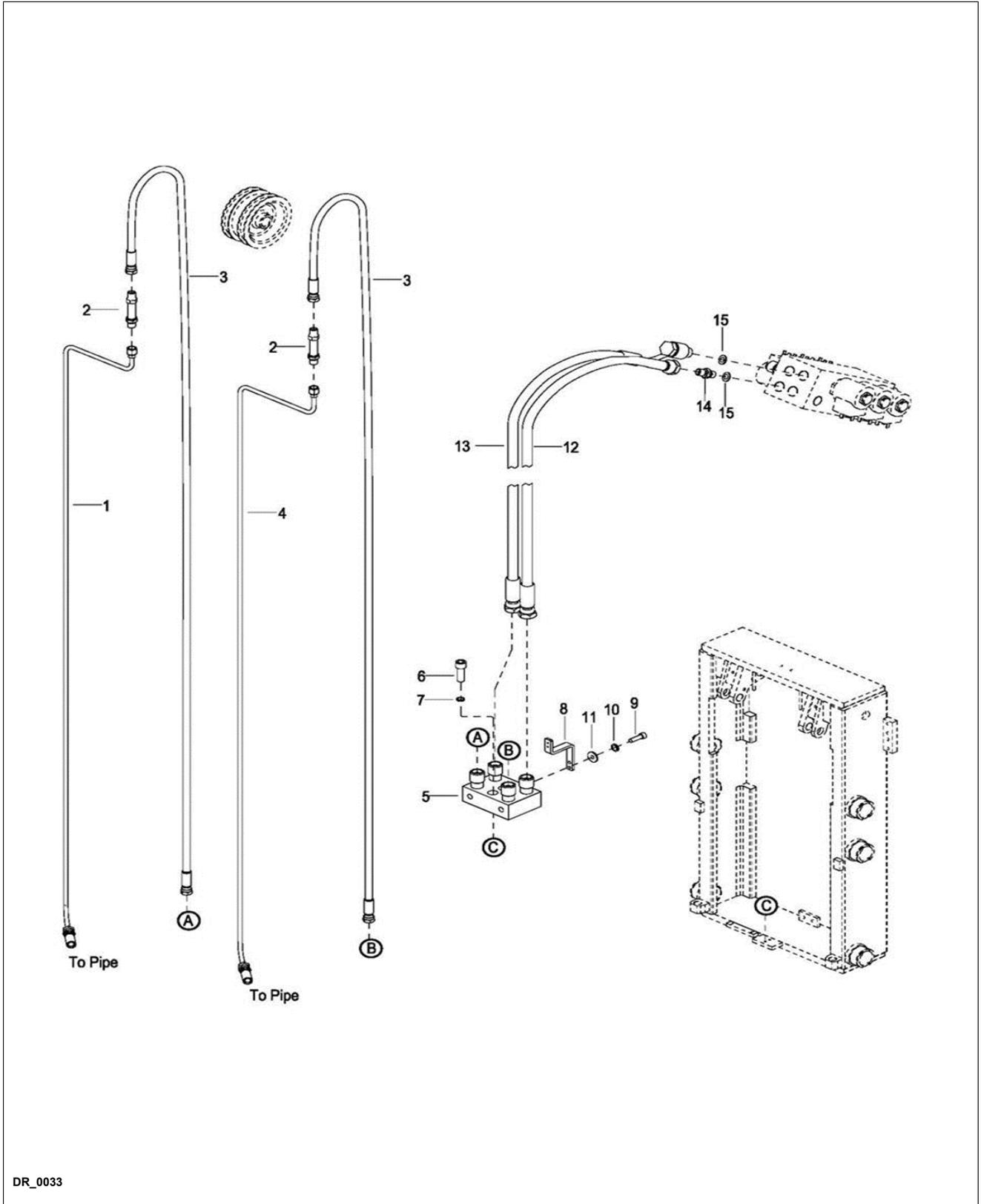
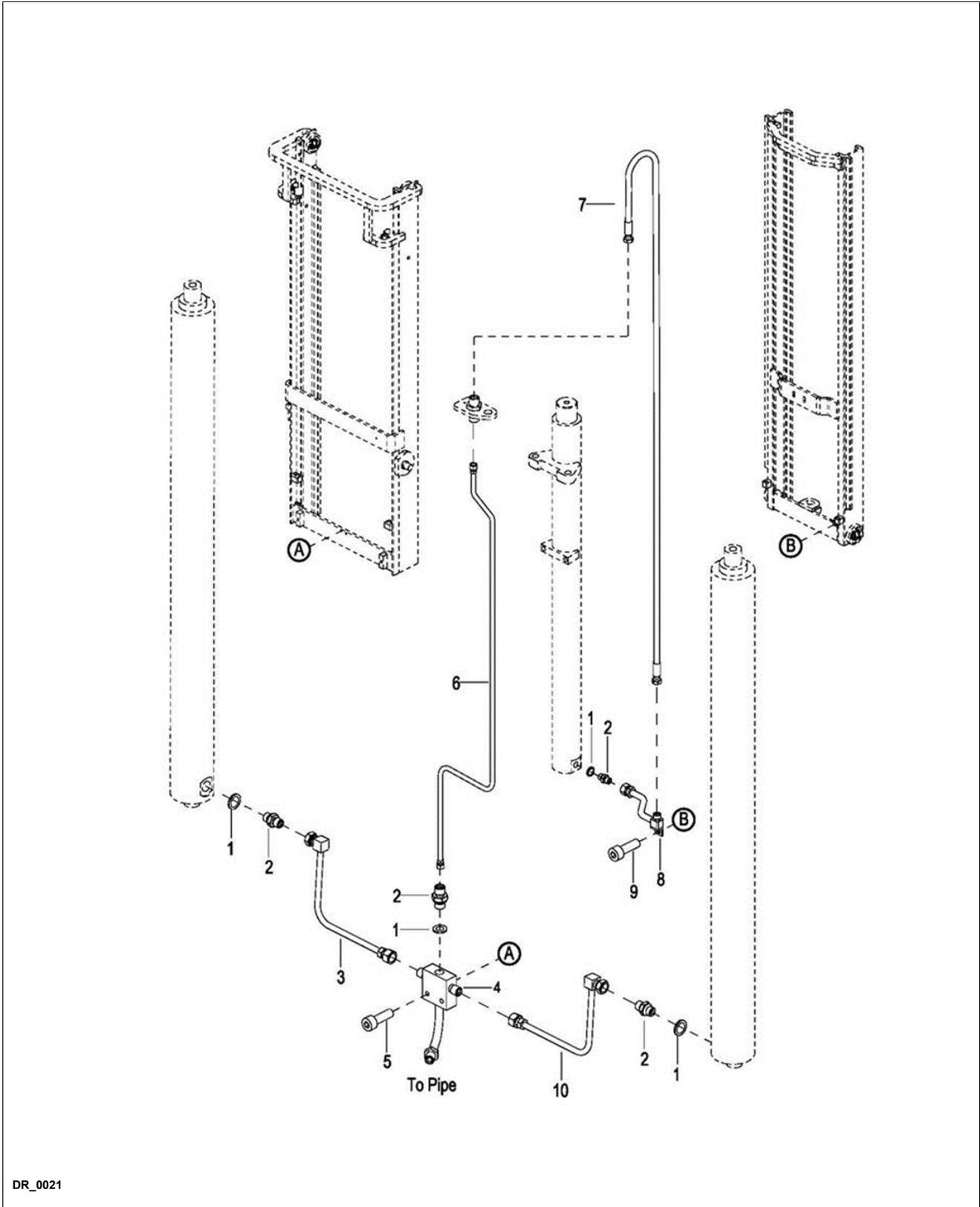


Figure 9-1 Hydraulic Lines for Telescopic Lift Cylinder



DR_0033

Figure 9-1.1 Hydraulic Lines for Telescopic Mast



DR_0021

Figure 9-2 Hydraulic Lines for Trimast Lift Cylinder

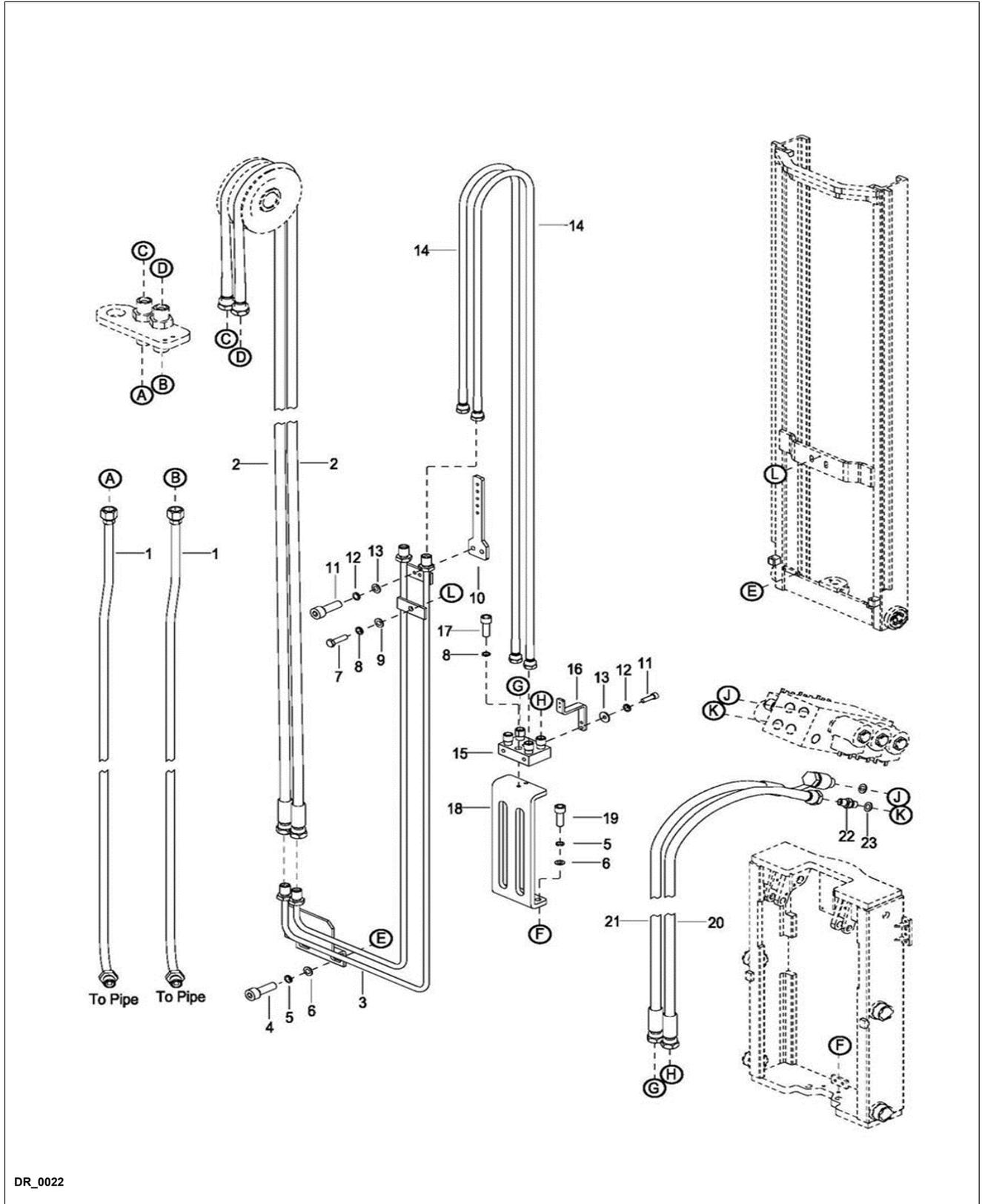


Figure 9-2 .1 Hydraulic Lines for Trimast

9-2. HYDRAULIC PUMP, MOTOR AND RESERVOIR

The hydraulic pump/motor assembly can be disassembled and repaired. However, a defective pump, valve or motor requires replacement of that component.

WARNING: When forks are raised, pressure exists in the hydraulic system lines and fittings. To ensure release of pressure, forks must be fully lowered and the batteries disconnected before performing any maintenance on the hydraulic system.



9-2.1. Removal

1. Lower forks fully.
2. Engage the emergency stop switch and turn off key switch.
3. Remove the compartment covers as described in paragraph 5-2..

NOTE: The reservoir and hose will be filled with hydraulic oil. Place a container under the pump assembly to catch any hydraulic oil.

4. Tag and disconnect electrical leads from motor and solenoid. Refer to [Figure 10-3](#) and [Figure 10-4](#).
5. Disconnect hoses from pump/motor assembly.
6. While supporting the pump/motor assembly, remove four screws and four lock washers.
7. Remove the pump/motor assembly.

9-2.2. Disassembly and Reassembly

1. Remove the hydraulic pump/motor assembly as described in paragraph 9-2.1..
2. Refer to [Figure 9-3](#) for disassembly and reassembly.

9-2.3. Installation

1. While supporting the pump/motor assembly, secure with four screws and four lock washers.
2. Reconnect hoses to pump/motor assembly.
3. Connect electrical leads to motor and solenoid. Refer to [Figure 10-3](#) and [Figure 10-4](#)...
4. Fill the hydraulic reservoir. Use hydraulic oil listed in [Table 3-2](#).
5. Disengage the emergency stop switch and turn on key switch.
6. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.

7. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
8. Install the compartment covers as described in paragraph 5-2

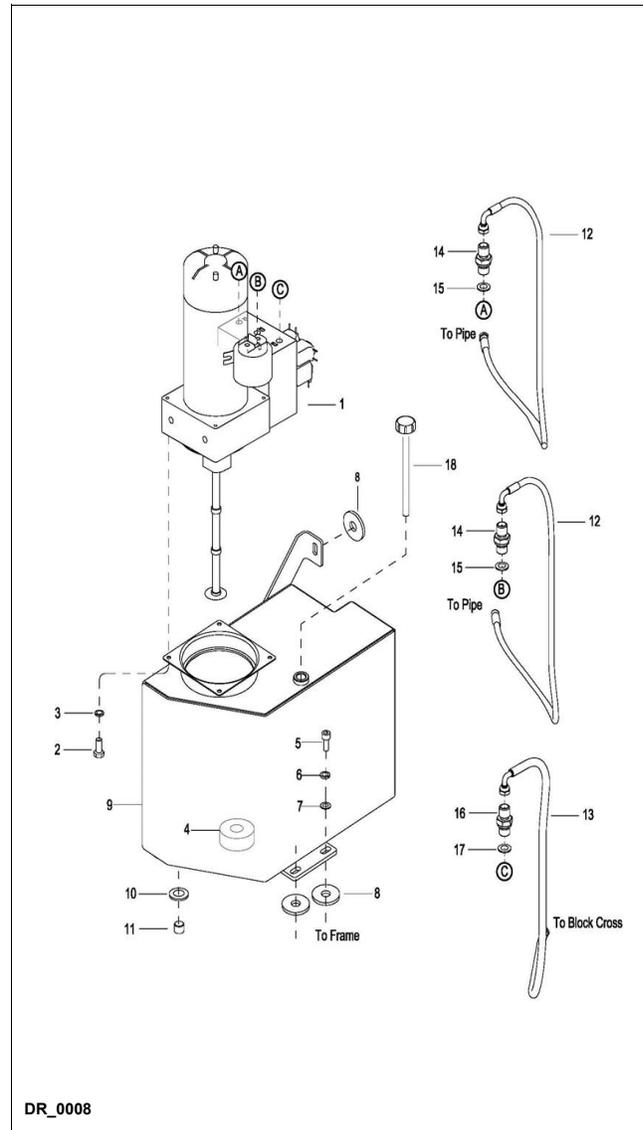


Figure 9-3 Hydraulic System

9-2.4. Lift Cylinder (Telescopic)

9-2.4.1. Removal

1. With the lift truck wheels securely blocked, raise the forks approximately three feet from floor and position blocks or strong supports under inner mast
2. Lower inner mast onto the support. Check that arrangement is secure before proceeding.
3. Engage the emergency stop switch and turn off key switch.

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



4. Remove screw, lock washer and flat washer.
5. Remove screw, lock washer and flat washer.

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



6. Loosen 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 the hose from the bottom of lift cylinder.
8. Lift chains clear of sheaves and lay them aside.

WARNING: Support lift cylinder before performing the following steps to prevent cylinder from falling.



9. Tilt lift cylinder forward from their position in the lift truck.
10. Raise lift cylinder assembly up and out of truck.

9-2.4.2. Repair

CAUTION: To prevent damage, use proper pipe clamp vise. The cylinder will be distorted if the vise is tightened too much.



1. Secure the lift cylinder in a vise, clamping lightly at the base of the cylinder.
2. Remove gland nut.
3. Remove wiper ring from gland nut.
4. Pull out piston rod.

5. Remove guide ring, seal and snap ring from piston rod.

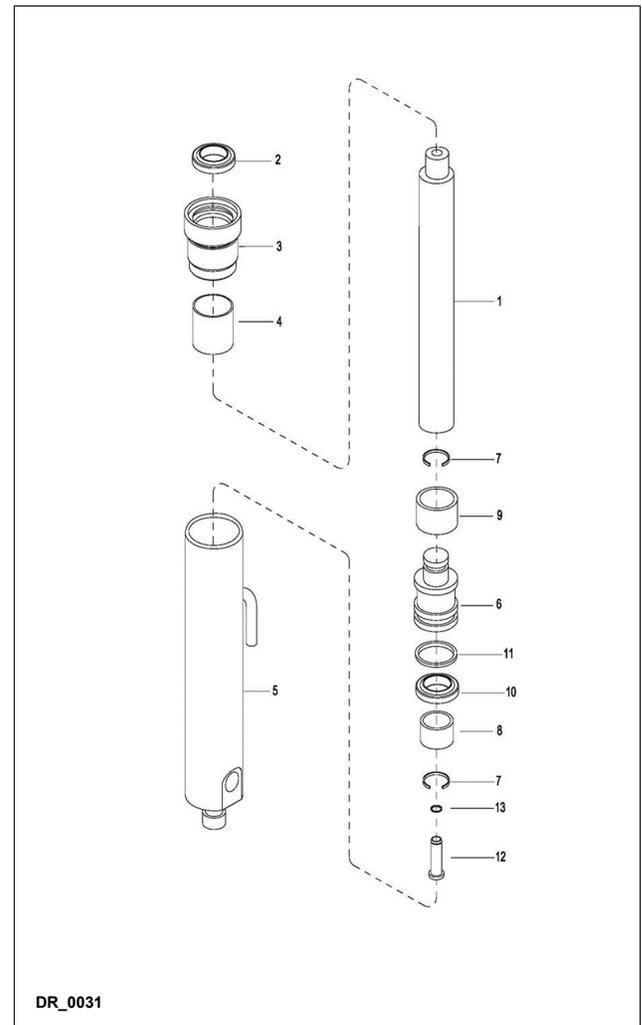


Figure 9-4 Lift Cylinder (Telescopic)

6. Coat all parts with hydraulic oil ([Table 3-2](#)).
7. Install guide ring and new seal and snap ring on piston rod.
8. Insert rod in cylinder tube.
9. Install wiper ring on gland nut.
10. Install gland nut in cylinder tube.

9-2.4.3. Installation

1. Position the cylinder on outer mast.
2. Tilt the cylinder back into position.
3. Lift up the lift chains and position them on sheaves.
4. Using a suitable lifting device, support the inner mast and remove the supports.

5. Slowly lower the inner mast while lining up the lift cylinder with its mounting taps.
6. Secure the top of the cylinder with screw, lock washer (9) and flat washer.

Secure the bottom of the cylinder with screw,

7. lock washer and flat washer.
8. Reconnect the hose to the bottom of lift cylinder.
9. Adjust the chains according to paragraph 8-2..
10. Fill the hydraulic reservoir. Use hydraulic oil listed in Table 3-2.
11. Disengage the emergency stop switch and turn on key switch.
12. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
13. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in Table 3-2.
14. Install the compartment covers as described in paragraph 5-2..

9-2.5. Lift Cylinder (TRIMAST Free Lift)

9-2.5.1. Removal

1. Fully lower the lift carriage.
2. Engage the emergency stop switch and turn off key switch.

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



3. Using another lift truck or suitable jack, raise lift carriage far enough to remove pressure on the free lift cylinder
4. Remove cotter pin and clevis pin connecting chain to chain anchor at free lift cylinder.
5. Remove chains from sheaves.
6. Remove screw lock washer, flat washer, bracket and ram head from cylinder.

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



7. Support cylinder and remove two screws two lock washers and two flat washers.
8. Raise lift cylinder assembly up and out of truck.

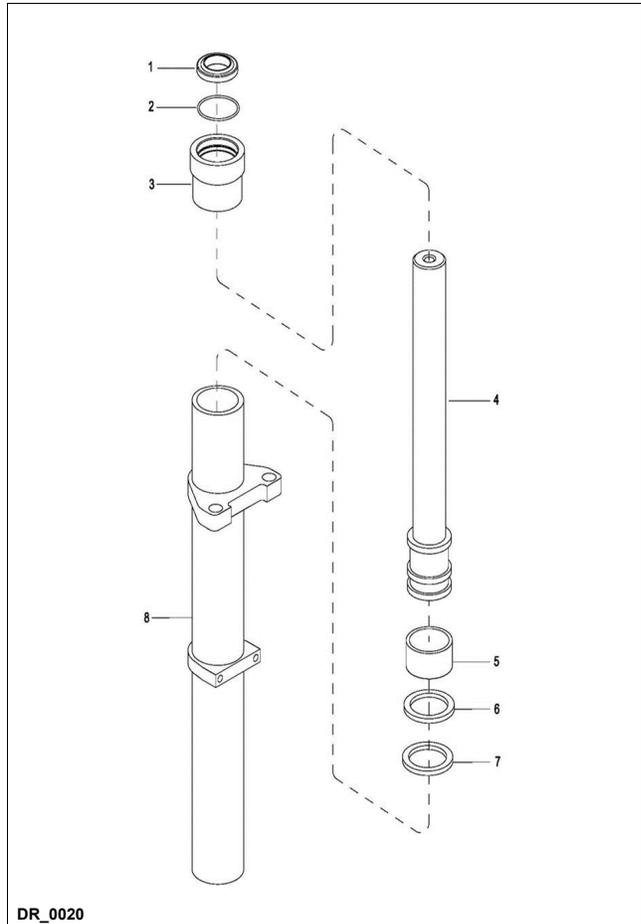


Figure 9-5 Trimast Free Lift Cylinder

9-2.5.2. Repair

CAUTION: To prevent damage, use proper pipe clamp vise. The cylinder will be distorted if the vise is tightened too much



1. Secure the lift cylinder in a vise, clamping lightly at the base of the cylinder.
2. Remove gland nut.
3. Remove wiper and O-ring from gland nut.
4. Pull out piston rod.
5. Remove guide ring, seal and snap ring from piston rod.
6. Coat all parts with hydraulic oil (Table 3-2).
7. Install guide ring and new seal and snap ring on piston rod.
8. Insert rod in cylinder tube.
9. Install wiper and O-ring on gland nut.
10. Install gland nut in cylinder tube.

9-2.5.3. Installation

1. Position cylinder on inner mast and secure with two screws, two lock washers and two flat washers.
2. Reconnect the tube to the bottom of the cylinder.
3. Position ram head on cylinder and secure with bracket, screw, lock washer, and flat washer.
4. Lift up the lift chains and position them on sheaves.
5. Adjust the chains according to paragraph 8-2.
6. Disengage the emergency stop switch and turn on key switch.
7. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
8. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
9. Install the compartment covers as described in paragraph 5-2..

9-2.6. Lift Cylinder (TRIMAST Secondary)

9-2.6.1. Removal

1. Fully lower the lift carriage.
2. Engage the emergency stop switch and turn off key switch.

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

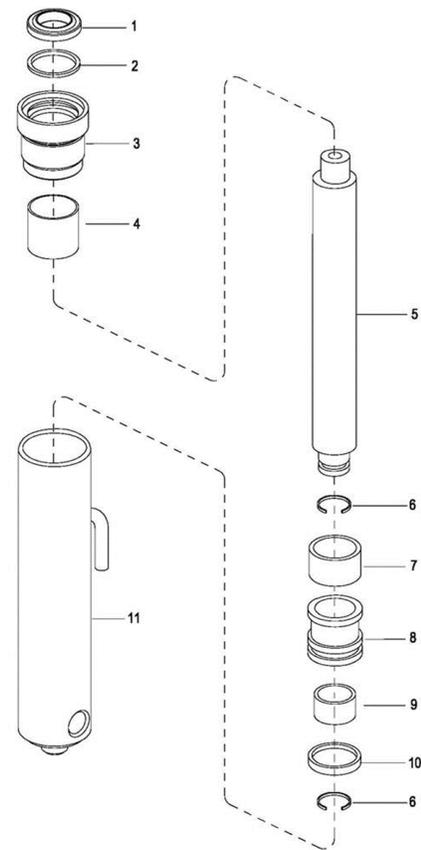


3. Remove screw, lock washer and flat washer securing the top of cylinder to mast.
4. Using another lift truck or suitable jack, raise middle mast far enough to remove pressure on the secondary lift cylinder.

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



5. Support cylinder and remove two bolts, two lock washers, two flat washers, support and clamp.
6. Raise lift cylinder assembly up and out of truck.



DR_0017

Figure 9-6 Trimast Lift Cylinder - Lift Height 157"

9-2.6.2. Repair

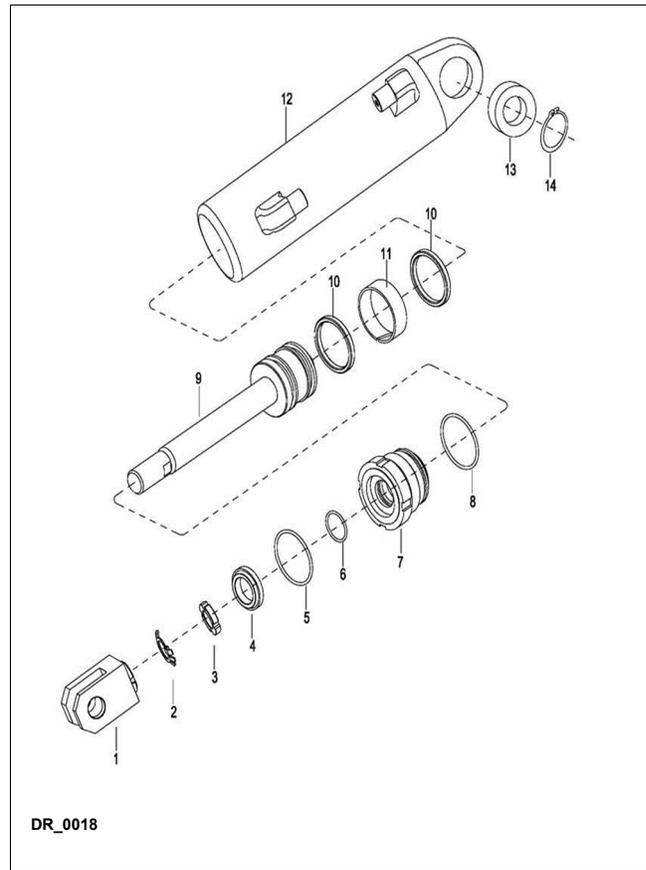
CAUTION: To prevent damage, use proper pipe clamp vise. The cylinder will be distorted if the vise is tightened too much.



1. Secure the lift cylinder in a vise, clamping lightly at the base of the cylinder.
2. Remove gland nut.
3. Remove wiper and O-ring from gland nut.
4. Pull out piston rod.
5. Remove guide ring and seal from piston rod.
6. Coat all parts with hydraulic oil ([Table 3-2](#)).
7. Install guide ring and seal on piston rod.
8. Insert rod in cylinder tube.
9. Install O-ring and wiper on gland nut.
10. Install gland nut in cylinder tube.

9-2.6.3. Installation

1. Using another lift truck or suitable jack, raise middle mast far enough to allow installation of the secondary lift cylinder.
2. Slowly lower mast while aligning cylinder with the top on mast.
3. Secure the top of cylinder with flat washer, lock washer and screw.
4. Install clamp, support, two flat washers, two lock washers and two bolts.
5. Reconnect the tube to the bottom of the lift cylinder.
6. Fill the hydraulic reservoir. Use hydraulic oil listed in [Table 3-2](#).
7. Disengage the emergency stop switch (and turn on key switch).
8. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
9. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
10. Install the compartment covers as described in paragraph 5-2..



9-2.7. Reach Cylinder

9-2.7.1. Removal

1. Fully lower the lift carriage.
2. Engage the emergency stop switch and turn off key switch.

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



CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



3. Disconnect the hose from the reach cylinder.

WARNING: Support reach cylinder before performing the following steps to prevent cylinder from falling.



4. Remove screw, shaft from the scissors base.
5. Remove screw, shaft from the scissors.
6. Remove cylinder and out of truck.

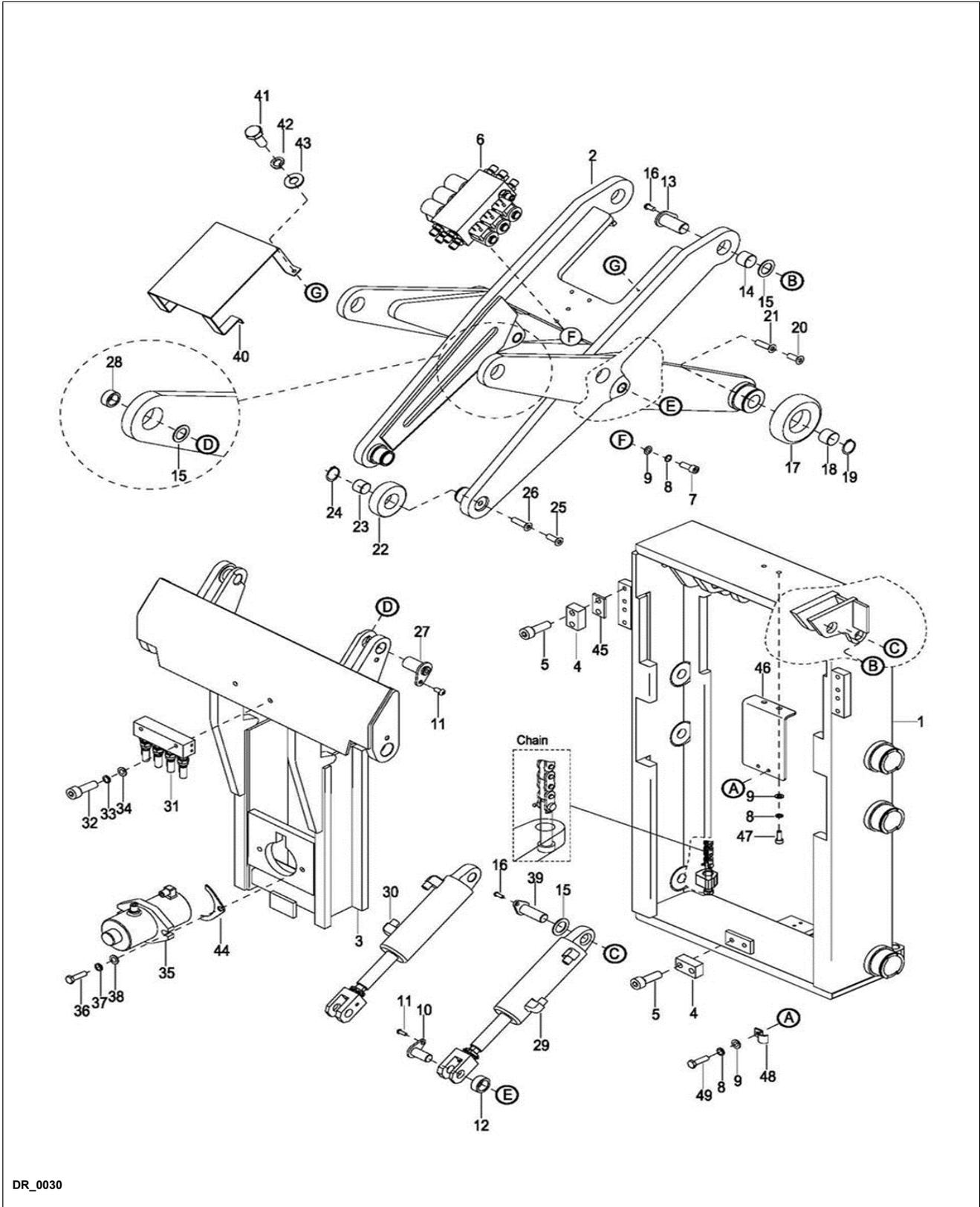
Figure 9-7 Reach Cylinder

9-2.7.2. Repair

CAUTION: To prevent damage, use proper pipe clamp vise. The cylinder will be distorted if the vise is tightened too much.



1. Secure the cylinder in a vise, clamping lightly at the base of the cylinder.
2. Remove connector, lock washer and round nut from piston rod.
3. Remove gland nut.
4. Remove wiper ring, O-ring, seal and O-ring from gland nut.
5. Pull out piston rod.
6. Remove guide ring and seal from piston rod.
7. Coat all parts with hydraulic oil ([Table 3-2](#)).
8. Install guide ring and new seal on piston rod.
9. Insert rod in cylinder tube.
10. Install wiper ring, O-ring, seal and O-ring on gland nut.
11. Install gland nut in cylinder tube.
12. Install connector, lock washer and round nut from piston rod.



DR_0030

Figure 9-9 Telescopic Reach Assembly

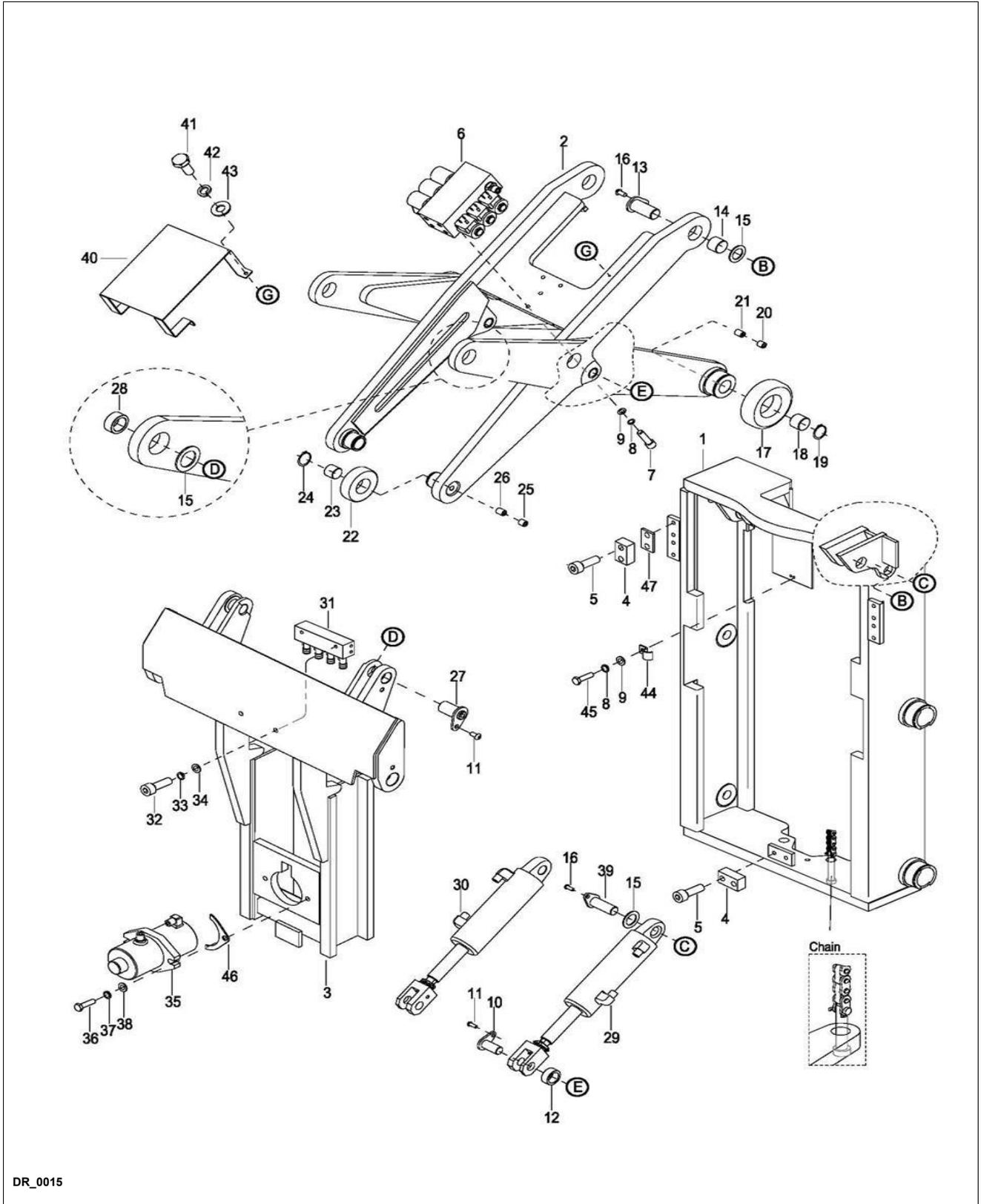


Figure 9-10.1 Trimast Reach Assembly

9-2.7.3. Installation

1. Position the cylinder on scissors base and secure with screw and shaft.
2. Position the cylinder on scissors and secure with screw and shaft.
3. Reconnect the tube to the cylinder.
4. Operate the leading button to refill the cylinder and lines with hydraulic oil.
5. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
6. Install the compartment covers as described in paragraph [5-2](#).

9-2.8. Tilt Cylinder

9-2.8.1. Removal

1. Fully lower the lift carriage.
2. Engage the emergency stop switch and turn off key switch.

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



WARNING: Support shifter side assembly before performing the following steps .



3. Remove screw, shaft from the scissors assembly.

CAUTION: Hydraulic oil can damage parts. Wipe off any oil immediately. Provide a container under the line or fitting before disconnecting.



4. Disconnect the hose from the reach cylinder.

WARNING: Support tilting cylinder before performing the following steps to prevent cylinder from falling.



5. Remove two screws, lock washer and flat washer from the fork weldment.
6. Remove cylinder and out of truck

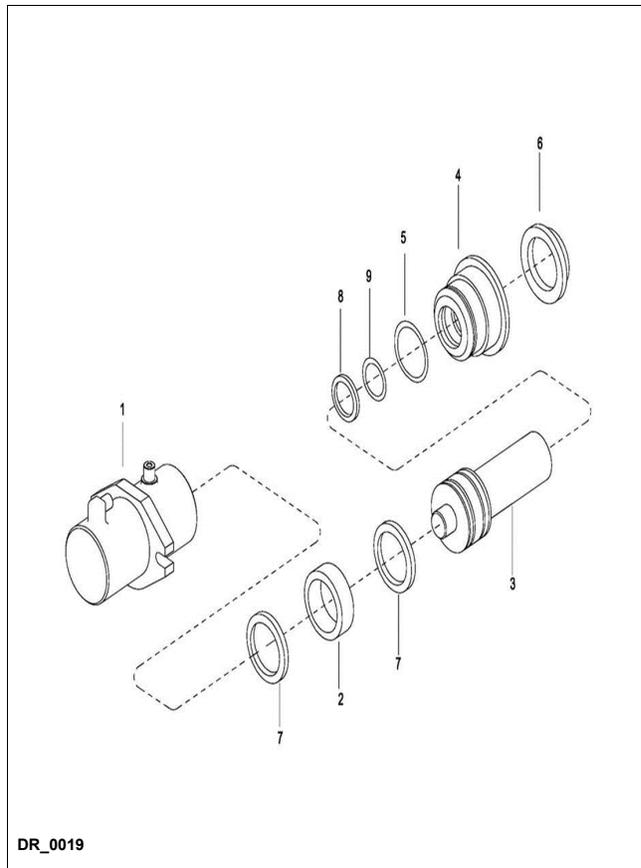


Figure 9-11 Tilt Cylinder

9-2.8.2. Repair

CAUTION: To prevent damage, use proper pipe clamp vise. The cylinder will be distorted if the vise is tightened too much.



1. Secure the cylinder in a vise, clamping lightly at the base of the cylinder.
2. Remove gland nut.
3. Remove wiper ring, O-ring, seal and O-ring from gland nut.
4. Pull out piston rod.
5. Remove guide ring and seals from piston rod.
6. Coat all parts with hydraulic oil ([Table 3-2](#)).
7. Install guide ring and new seals on piston rod.
8. Insert rod in cylinder tube.
9. Install wiper ring, O-ring, seal and O-ring on gland nut.
10. Install gland nut in cylinder tube.

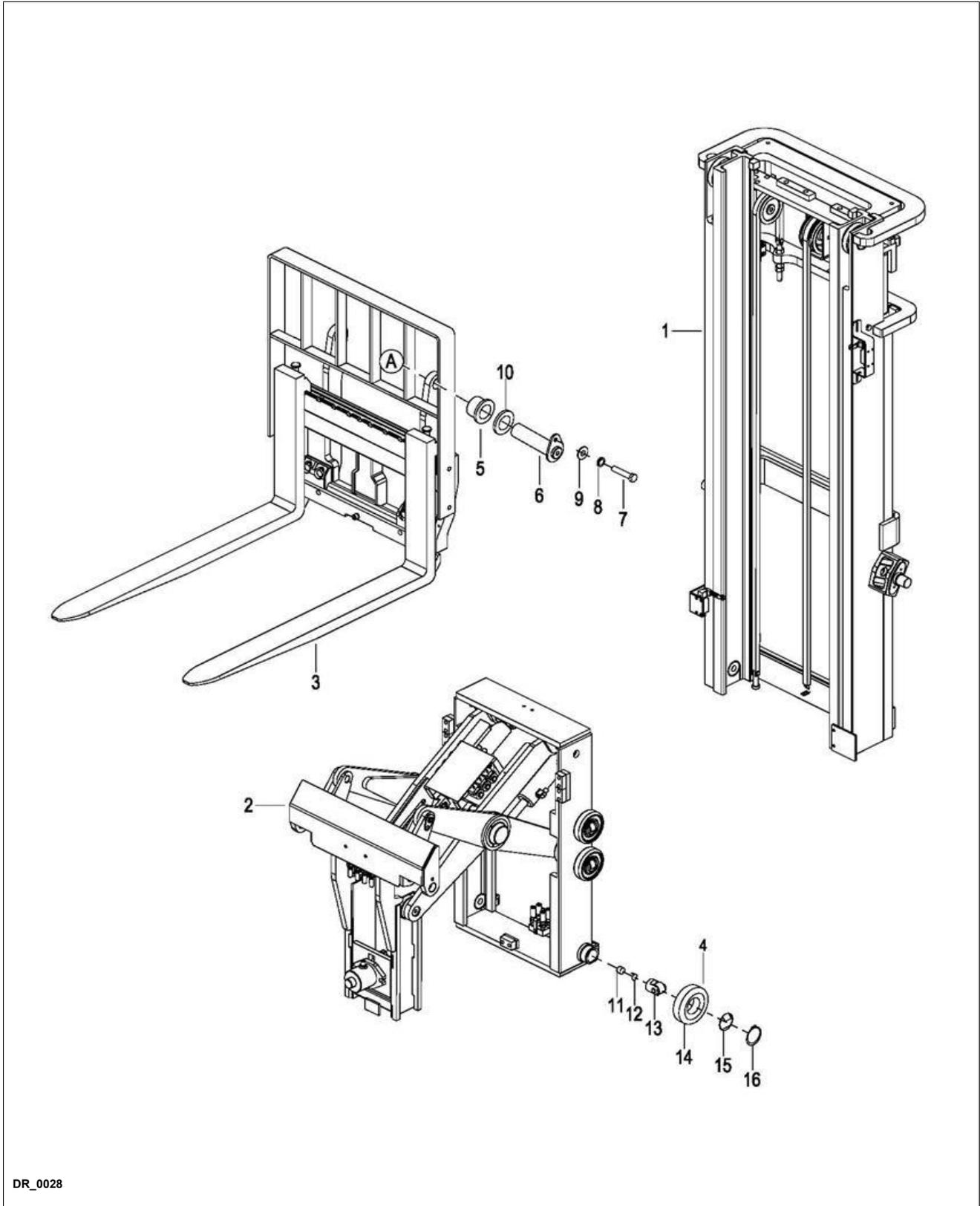


Figure 9-12 Telescopic System

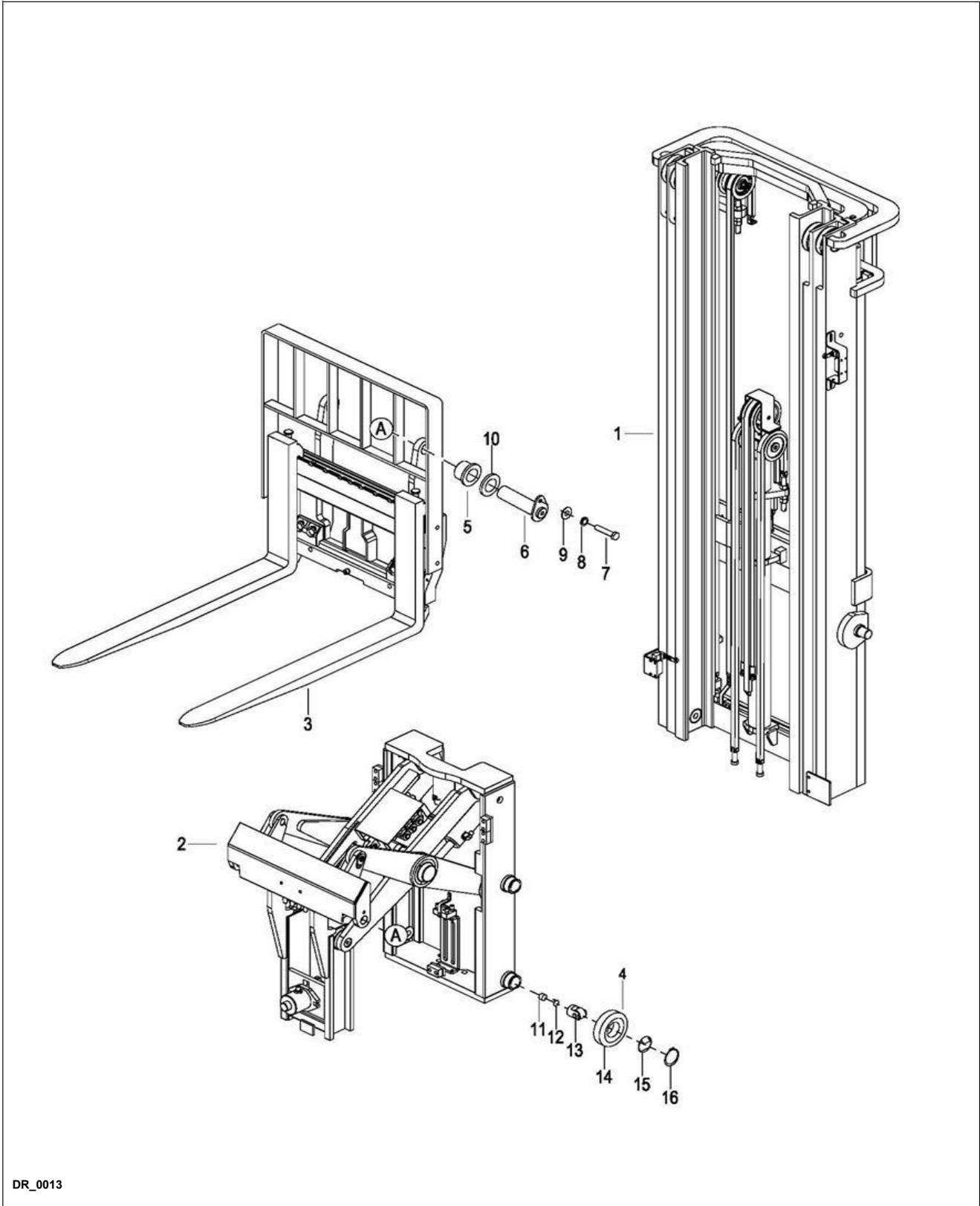


Figure 9-13 Trimast System

9-2.8.3. Installation

1. Position the cylinder on the fork weldment and secure with two screws, lock washer and flat washer.
2. Reconnect the tube to the cylinder.
3. Using a suitable lifting device, support the shifter side assembly.
4. Position the shifter side assembly with two screws and shafts and remove the supports.
5. Operate the tilting button to refill the cylinder and lines with hydraulic oil.
6. Check level of hydraulic oil. If required, add hydraulic oil to bring to proper level. Use hydraulic oil listed in [Table 3-2](#).
7. Install the compartment covers as described in paragraph [5-2](#).

NOTES

SECTION 10 ELECTRICAL COMPONENTS

10-1. ELECTRICAL CONTROL PANEL

10-1.1. Maintenance

NOTE: Erratic operation of the truck may be caused by defective controller components. Before removing the electrical panel, perform troubleshooting procedures per Section 4-2.4, to determine corrective action to be taken.

There are no user-serviceable parts inside the controller. No attempt should be made to open the controller. Opening the controller may damage it and will void the warranty.

The controller is programmed at the factory specifically for the truck model on which it is equipped. It is important to replace the controller with the correct preprogrammed unit to assure proper performance settings intended for that particular truck. See Figure 4-1 for the preprogrammed controller number.

It is recommended that the controller exterior be cleaned periodically, and if a hand held programmer is available, this periodic cleaning provides a good opportunity to check the controller's diagnostic history file. It is also recommended that the controller's fault detection circuitry be checked whenever the vehicle is serviced.

10-1.2. Cleaning

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2..
3. Remove any dirt or corrosion from the bus bar area. The controller should be wiped clean with a moist rag. Allow it to dry before reconnecting the battery.
4. Make sure the connections to the buss bars are tight. Use two well insulated wrenches for this task in order to avoid steering the buss bars.

10-1.3. Panel Removal

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2..

3. Tag and disconnect all electrical cables which connect to the control panel.
4. Remove four screws, four lock washers, four flat washers and control panel.

10-1.4. Panel Disassembly

Refer to Figure 10-2 for location and identity of the major replacement components mounted on the panel and remove defective parts.

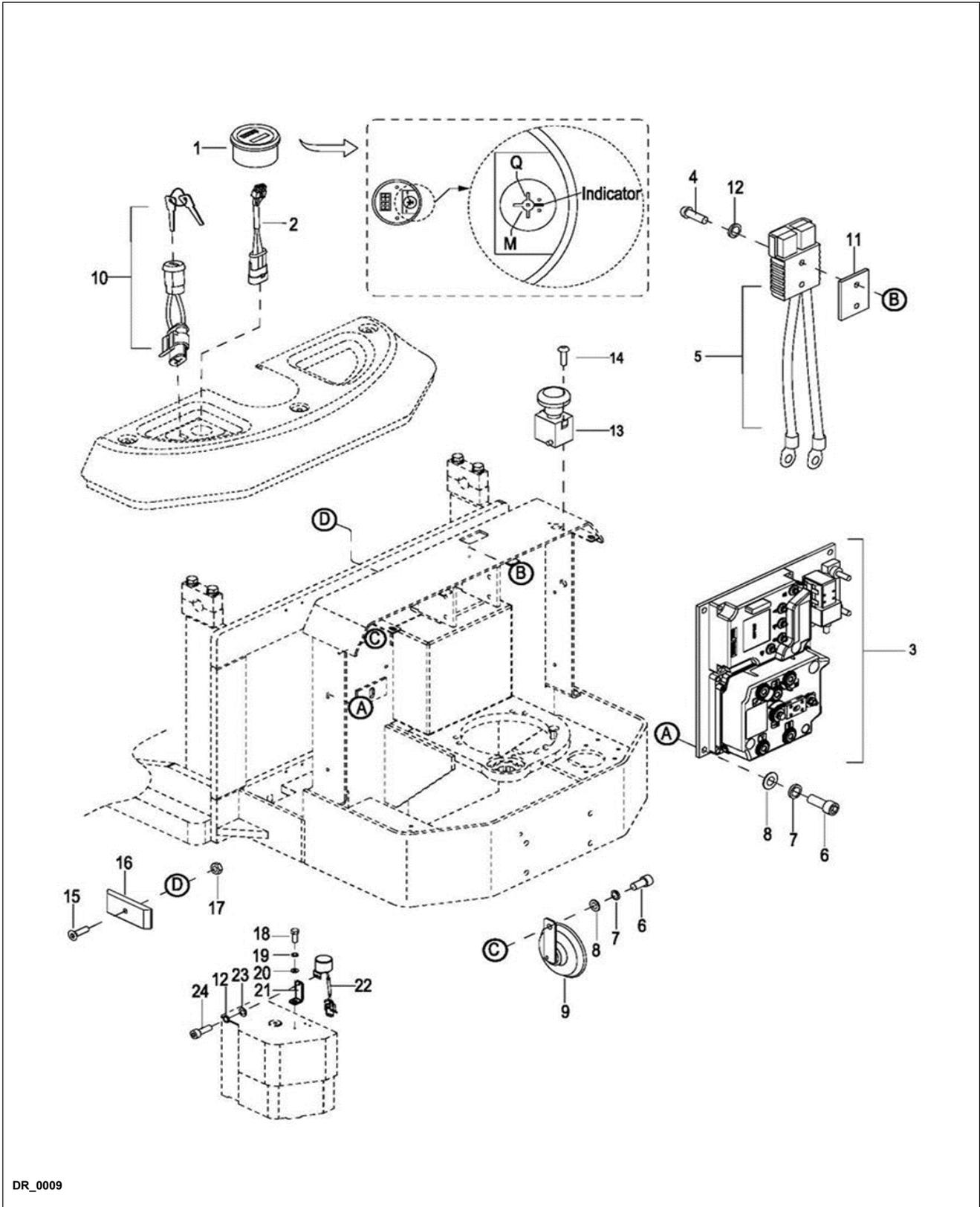
NOTE: Contactor (2or17) is not repairable and must be replaced if defective.

10-1.5. Panel Installation

1. Install the control panel and secure with four screws, four lock washers and four flat washers.
2. Connect all electrical cables to the control panel as noted during removal.
3. Install the compartment covers as described in paragraph 5-2..
4. Disengage the emergency stop switch and turn on key switch.

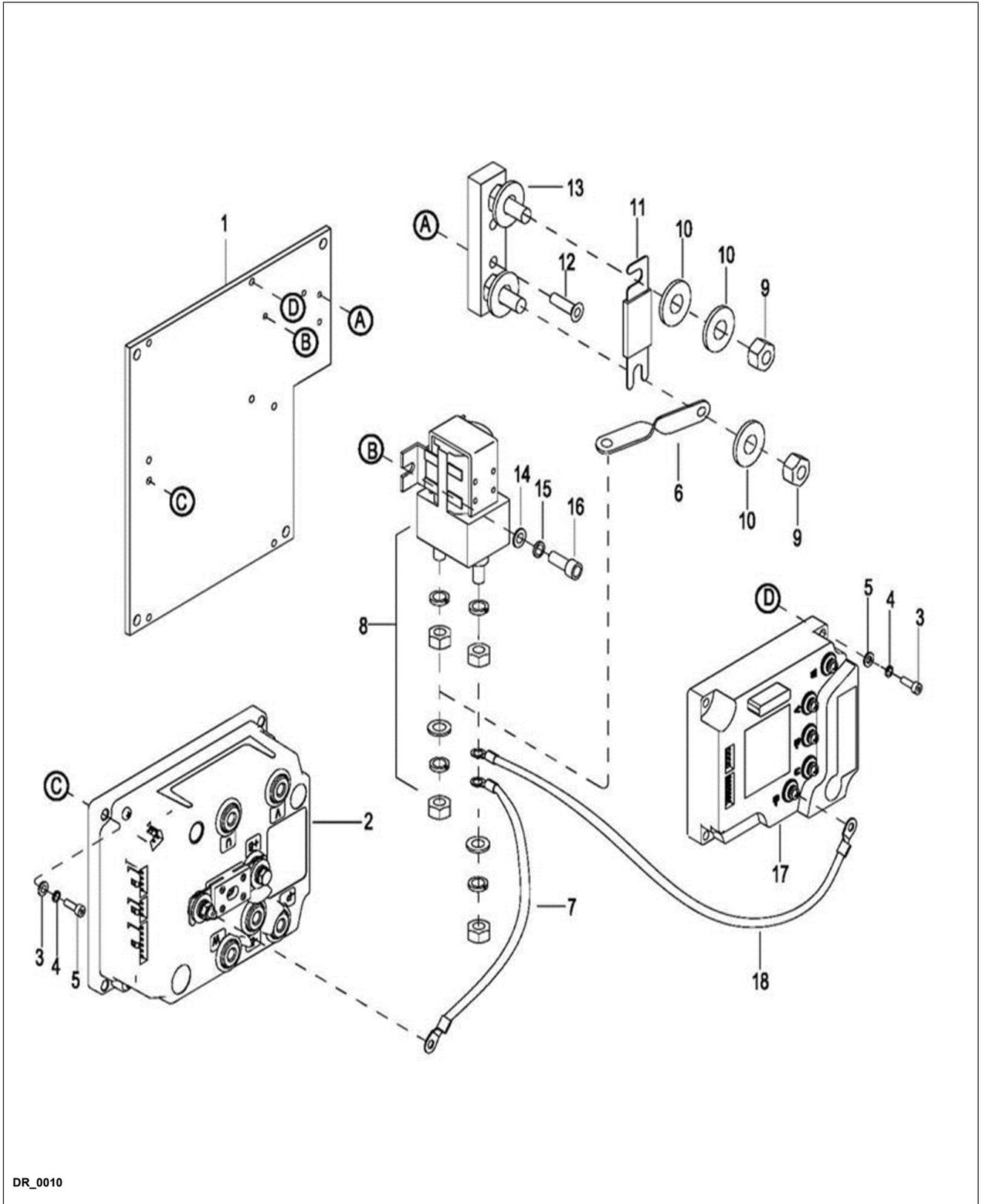
10-2. HORN REPLACEMENT

1. Engage the emergency stop switch and turn off key switch.
2. Remove the compartment covers as described in paragraph 5-2..
3. Tag and disconnect all electrical connections from horn.
4. Remove screw, lock washer, flat washer and horn.
5. Install new horn and secure with screw, lock washer, flat washer.
6. Install the compartment covers as described in paragraph 5-2..
7. Disengage the emergency stop switch and turn on key switch.



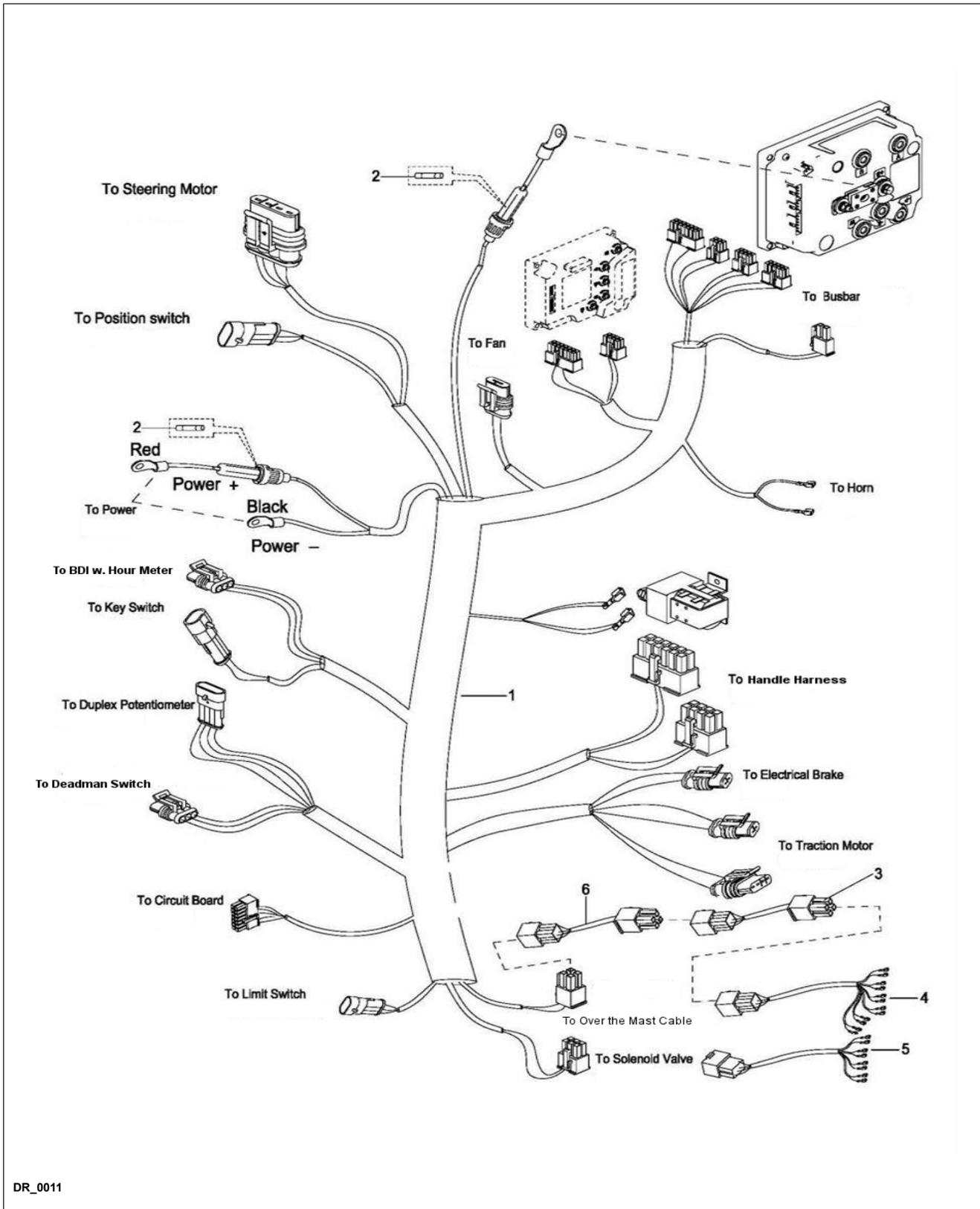
DR_0009

Figure 10-1 Electrical System



DR_0010

Figure 10-2 Control Panel Assembly



DR_0011

Figure 10-3 Wiring Harness

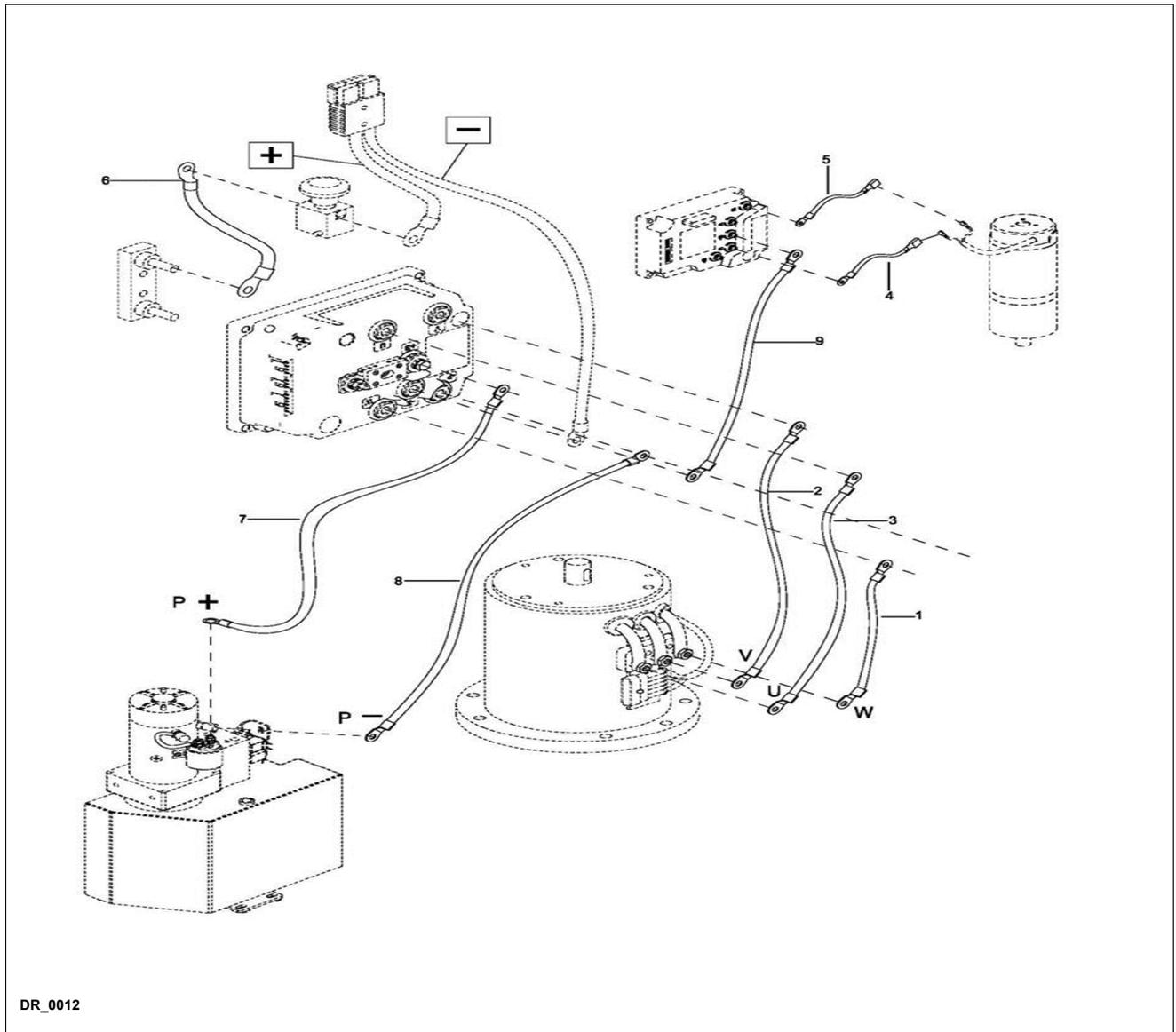


Figure 10-4 Wiring Harness

10-3. PUMP MOTOR

The pump motor is replaceable but not repairable. Refer to paragraph 9-2..

10-4. DRIVE MOTOR

The drive motor exposed surfaces should be cleaned at least once a month to assure proper cooling of motor. Use an air hose to blow dust off of motor surfaces.

The drive motor is replaceable but not repairable. Refer to paragraph 7-2..

10-5. DEADMAN SWITCH

1. Disconnect harness from the deadman switch.
2. Remove the two screws, and switches from bracket.
3. Position the new switches on bracket and secure with the two screws.
4. Reconnect harness to the dead-man switch.

NOTES

SECTION 11 OPTIONAL EQUIPMENT

11-1.LOAD BACKREST

A load backrest is available for addition to the lift truck to allow handling of high loads.

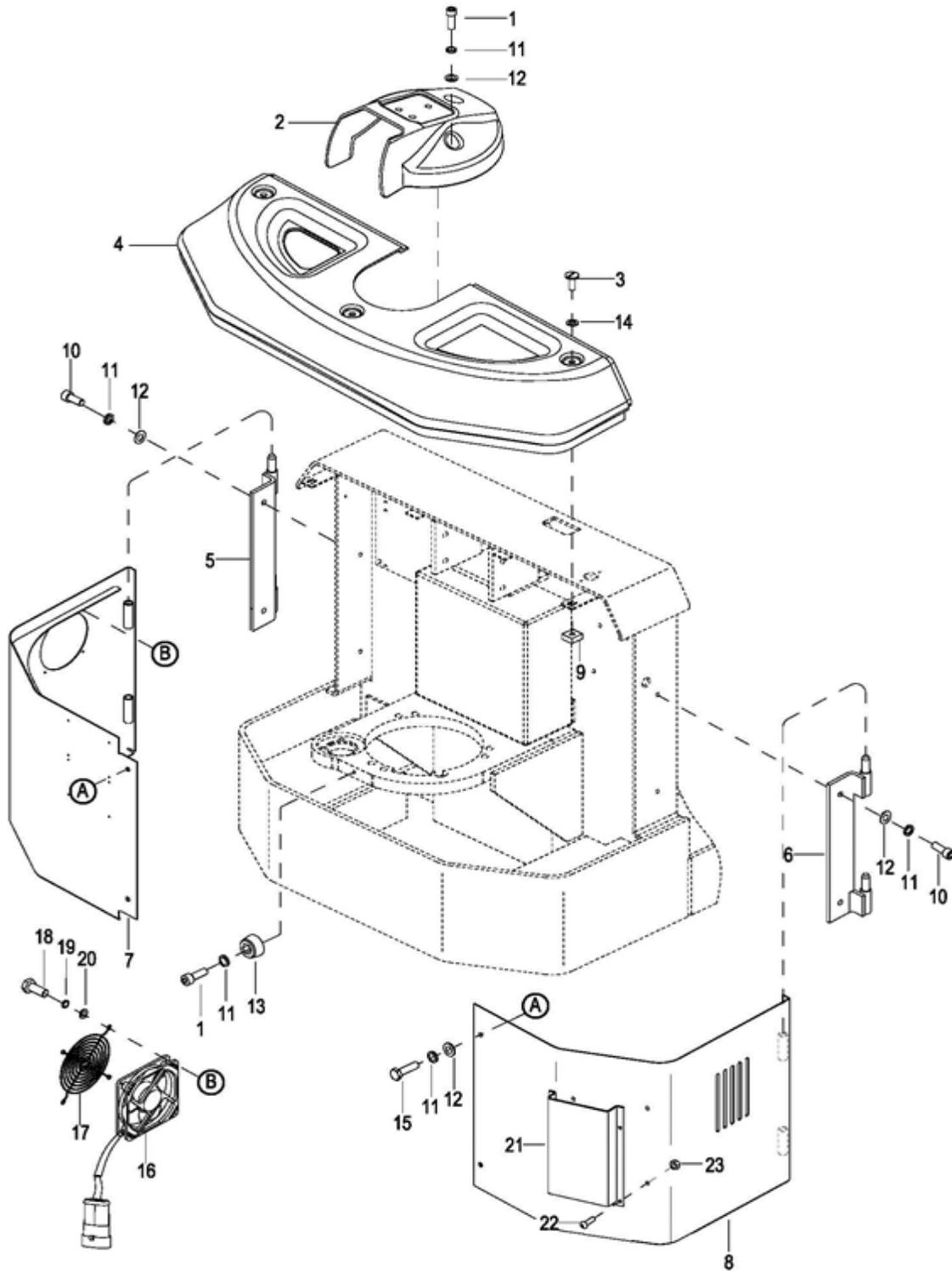
NOTES

SECTION 12 ILLUSTRATED PARTS BREAKDOWN

Following is an illustrated parts breakdown of assemblies and parts associated with the PDSR Lift Truck.

FRAME

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-101000-00	FRAME	1	Used with 34" Straddle ID - Up to serial number 324200105
1a	2415-101000-0B	FRAME	1	Used with 34" Straddle ID - Up from serial number 324200106
1ab	2415-101000-A0	FRAME	1	Used with 42" Straddle ID - Up to serial number 324200105
1c	2415-101000-AB	FRAME	1	Used with 42" Straddle ID - Up from serial number 324200106
1d	2415-101000-B0	FRAME	1	Used on trucks with Lift Height 189" and 42" Straddle ID
2	2415-100001-1A	COUNTER WEIGHT	1	
3	2415-100003-10	HYDRAULIC PIPE BRACKET	1	
4	0000-000432-00	SCREW M16×80	4	
5	0000-000191-00	LOCKWASHER Ø16	4	
6	0000-000220-00	FLATWASHER Ø16	4	
7	0000-000228-00	BOLT M12×25	4	
8	0000-000060-00	LOCKWASHER Ø12	8	
9	0000-000222-00	FLATWASHER Ø12	4	
10	0000-000181-00	BEARING	8	
11	2130-140001-00	LOAD WHEEL	4	
12	2130-140003-00	WASHER	8	T=1
13	2130-140002-0A	SHAFT	4	
14	0000-000654-00	ROLL PIN Ø4×45	4	
15	0000-000294-00	RETAINING RING Ø25	4	
16	0000-000428-00	BOLT M6×30	2	
17	0000-000056-00	LOCKWASHER Ø6	2	
18	0000-000123-00	FLATWASHER Ø6	2	
19	2415-100002-00	STABILIZER BLOCK-L	1	
20	2415-100001-00	STABILIZER BLOCK-R	1	
21	0000-000516-00	SCREW M12×40	4	Used up to serial number 327160893
21a	3020-010001-20	SCREW M12×50	4	Used from serial number 327160894
22	0000-000373-00	FLATWASHER Ø12	4	
23	2112-112002-00	MOUNTING BLOCK	2	
24	2112-112006-00	WASHER	A.R.	As Required

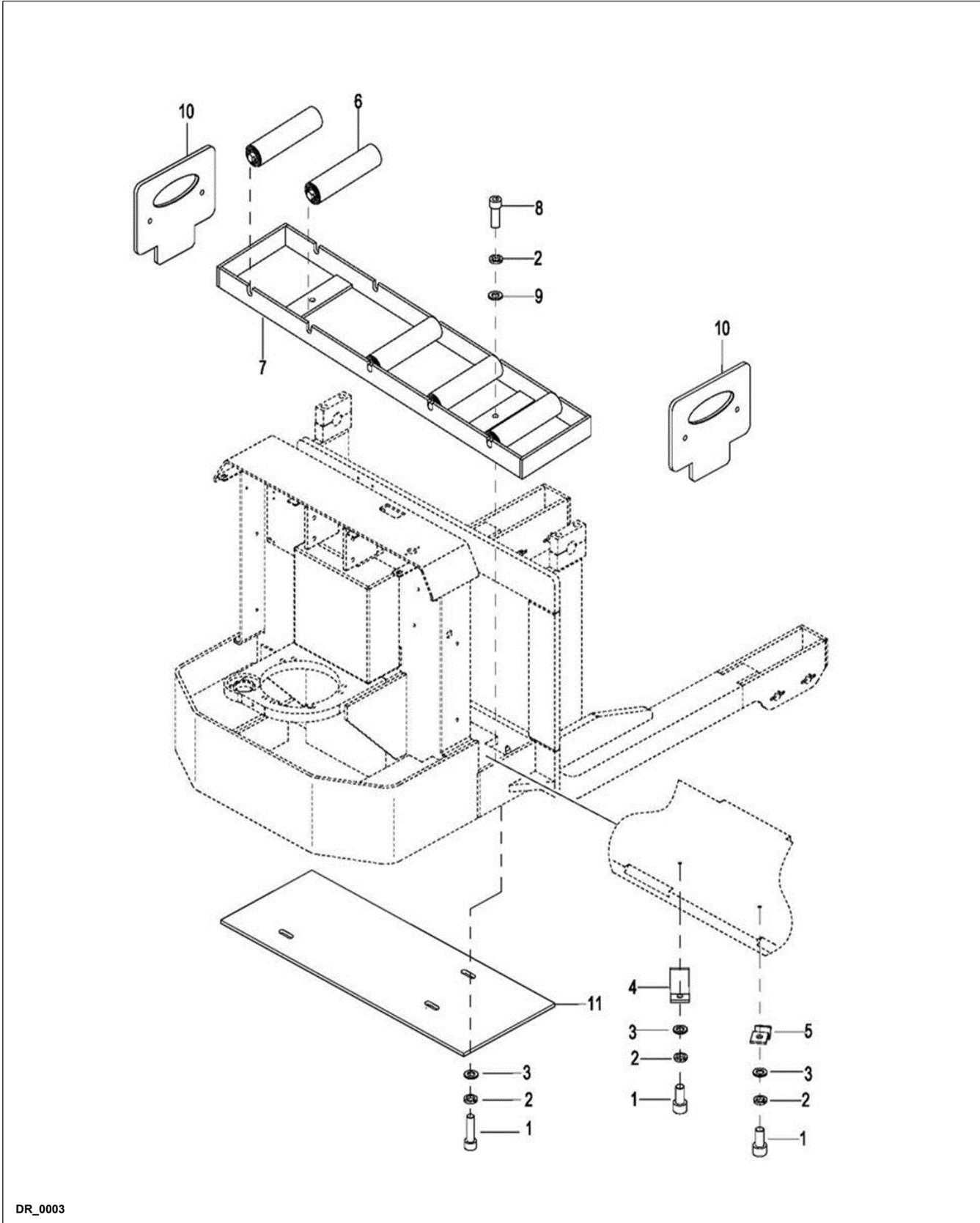


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Figure 12-2 Cover Assembly

COVER ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000433-00	SCREW M8×12	4	
2	2130-190002-00	MIDDLE COVER	1	
3	0000-000649-00	SCREW M8×20	3	
4	2130-190001-00	UPPER COVER	1	
5	2130-172000-00	LEFT HINGE	1	
6	2130-182000-00	RIGHT HINGE	1	
7	2415-100100-1A	COVER L	1	
8	2415-100200-1A	COVER R	1	Used up to serial number 326110025
8a	2415-100200-1B	COVER R	1	Used from serial number 326110026
9	1220-150005-00	CLASP NUT M8	3	
10	0000-000322-00	SCREW M8×25	4	
11	0000-000159-00	LOCKWASHER Ø8	10	
12	0000-000194-00	FLATWASHER Ø8	9	
13	3218-210001-00	SHOCK ABSORBER	1	
14	2214-150002-00	WASHER	3	
15	0000-000649-00	SCREW M8×20	2	
16	1220-520010-0C	FAN	1	
17	1220-500004-00	FAN GUARD	1	
18	0000-000121-00	SCREW M4×35	4	
19	0000-000122-00	LOCKWASHER Ø4	4	
20	0000-000702-00	FLATWASHER Ø4	4	
21	1146-151002-30	MANUAL HOLDER	1	
22	0000-000119-00	SCREW M5×12	4	Used from serial number 326110026
23	0000-000546-00	NUT M5	4	



DR_0003

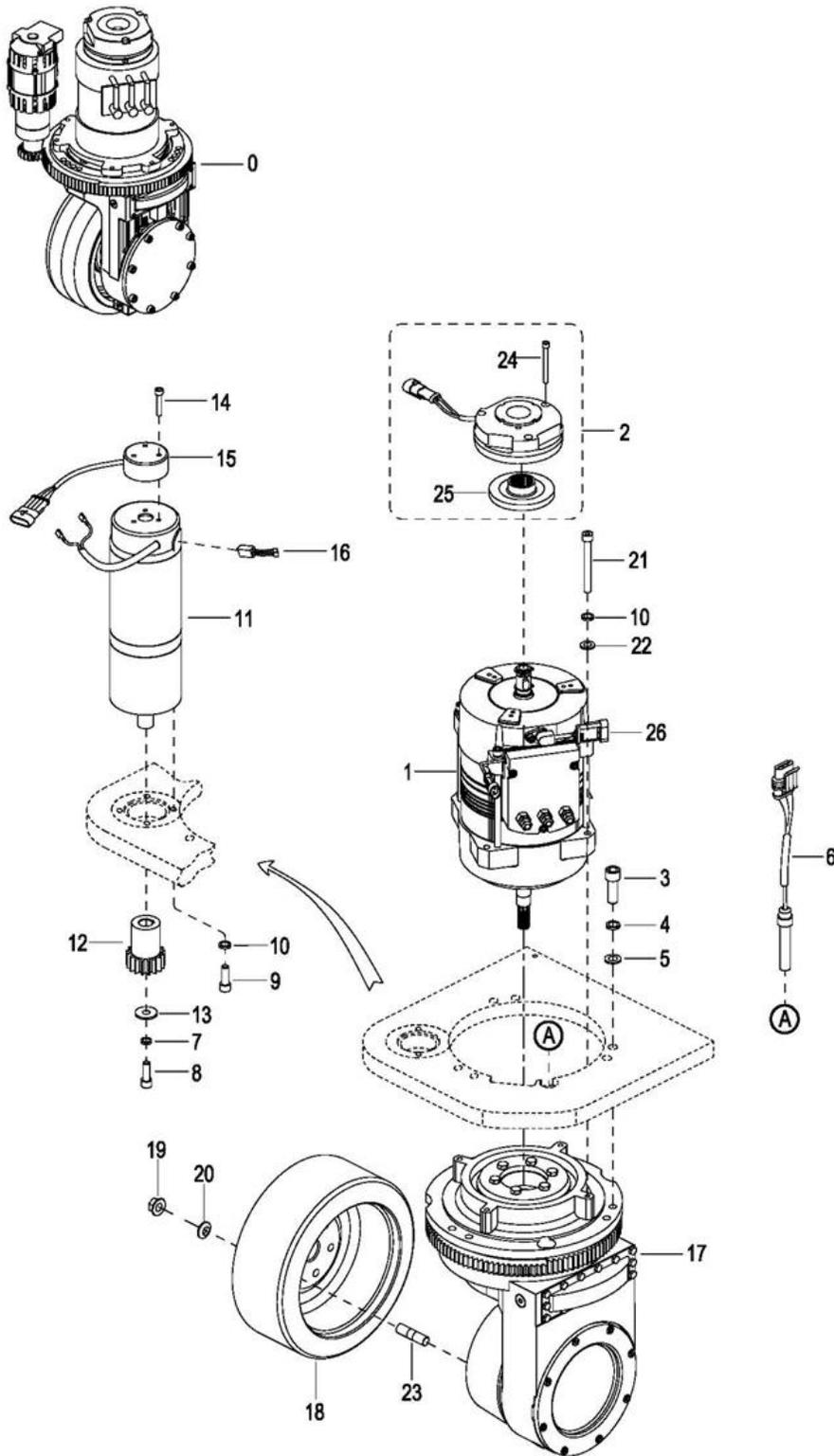
Figure 12-3 Battery Compartment

BATTERY COMPARTMENT

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000109-00	SCREW M8×16	6	
2	0000-000159-00	LOCKWASHER Ø8	8	
3	0000-000176-00	FLATWASHER Ø8	6	
4	2130-400001-40	HOSE CLAMP	1	
5	2112-400002-00	HOSE CLAMP	1	
6	2125-102200-0A	ROLLER	5	Used up to serial number 324200105
6a	2415-112000-00	ROLLER	5	Used from serial number 324200106
6b	2415-112000-B0	ROLLER	5	Used on trucks with Lift Height 189"
7	2130-151000-00	BATTERY ROLLER TRAY	1	Used up to serial number 324200105 - Does NOT include rollers
7a	2415-111000-00	BATTERY ROLLER TRAY	1	Used from serial number 324200106 - Does NOT include rollers
7b	2415-111000-B0	BATTERY ROLLER TRAY	1	Used on trucks with Lift Height 189" - Does NOT include rollers
8	0000-000321-00	SCREW M8×20	2	
9	0000-000194-00	FLATWASHER Ø8	2	
10	2130-160001-10	BAFFLE-PLATE	2	
11	2415-100003-00	PROTECTION PLATE	1	Used from serial number 325150188
11a	2415-100001-B0	PROTECTION PLATE	1	Used on trucks with Lift Height 189"

TRANSMISSION, MOTOR & BRAKE ASSEMBLY - USED UP TO S/N 325130600

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-210000-10	MOTOR 3.3 KW	1	
2	1280-210000-00	BRAKE ASSEMBLY	1	
3	0000-000516-00	SCREW M12×40	6	
4	0000-000060-00	LOCKWASHER Ø12	6	
5	0000-000373-00	FLATWASHER Ø12	6	
6	1280-520009-10	SWITCH WIRE HARNESS II	1	With Sensor
7	0000-000056-00	LOCKWASHER Ø6	1	
8	0000-000386-00	SCREW M6×20	1	
9	0000-000321-00	SCREW M8×20	4	
10	0000-000159-00	LOCKWASHER Ø8	8	
11	1221-240000-0A	STEERING MOTOR	1	
12	1221-200004-00	GEAR	1	
13	1221-200005-00	WASHER	1	
14	0000-000208-00	SCREW M4×25	3	
15	3712-403000-00	ENCODER	1	
16	1221-240001-0A	BRUSH,STEERING MOTOR	4	
17	2415-220000-10	GEAR CASE ASSEMBLY	1	
18	2415-230000-10	DRIVE WHEEL	1	
19	0000-000283-00	BOLT M10×35	6	
20	0000-000063-00	LOCKWASHER Ø10	6	
21	0000-001281-00	SCREW M8×75	4	
22	0000-000176-00	FLATWASHER Ø8	4	



DR_0040

Figure 12-5 Transmission, Motor & Brake Assembly - Used from serial number 325130601

TRANSMISSION, MOTOR & BRAKE ASSEMBLY - USED FROM S/N 325130601

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-210000-10	MOTOR 3.3 KW	1	
2	1280-210000-00	BRAKE ASSEMBLY	1	
3	0000-000516-00	SCREW M12×40	6	
4	0000-000060-00	LOCKWASHER Ø12	6	
5	0000-000373-00	FLATWASHER Ø12	6	
6	1280-520009-10	SWITCH WIRE HARNESS II	1	With Sensor
7	0000-000056-00	LOCKWASHER Ø6	1	
8	0000-000386-00	SCREW M6×20	1	
9	0000-000321-00	SCREW M8×20	4	
10	0000-000159-00	LOCKWASHER Ø8	8	
11	1221-240000-0A	STEERING MOTOR	1	
12	1221-200004-00	GEAR	1	
13	1221-200005-00	WASHER	1	
14	0000-000208-00	SCREW M4×25	3	
15	3712-403000-00	ENCODER	1	
16	1221-240001-0A	BRUSH,STEERING MOTOR	4	
17	2415-220000-1A	GEAR CASE ASSEMBLY	1	Used between serial number 325130601 and 326140301
17a	ZK18-240000-A0-02	GEAR CASE ASSEMBLY	1	Used from serial number 326140302
18	2415-230000-1A	DRIVE WHEEL	1	
19	0000-001131-10	NUT M12×1.5	6	
20	0000-000025-00	LOCKWASHER Ø12	6	
21	0000-001281-00	SCREW M8×75	4	
22	0000-000176-00	FLATWASHER Ø8	4	
23	1120-240014-3A	STUDS	6	
24	0000-001287-10	SCREW M6×70	3	
25	2333-210004-00	BRAKE LINING	1	
26	2415-210001-10	ENCODER	1	

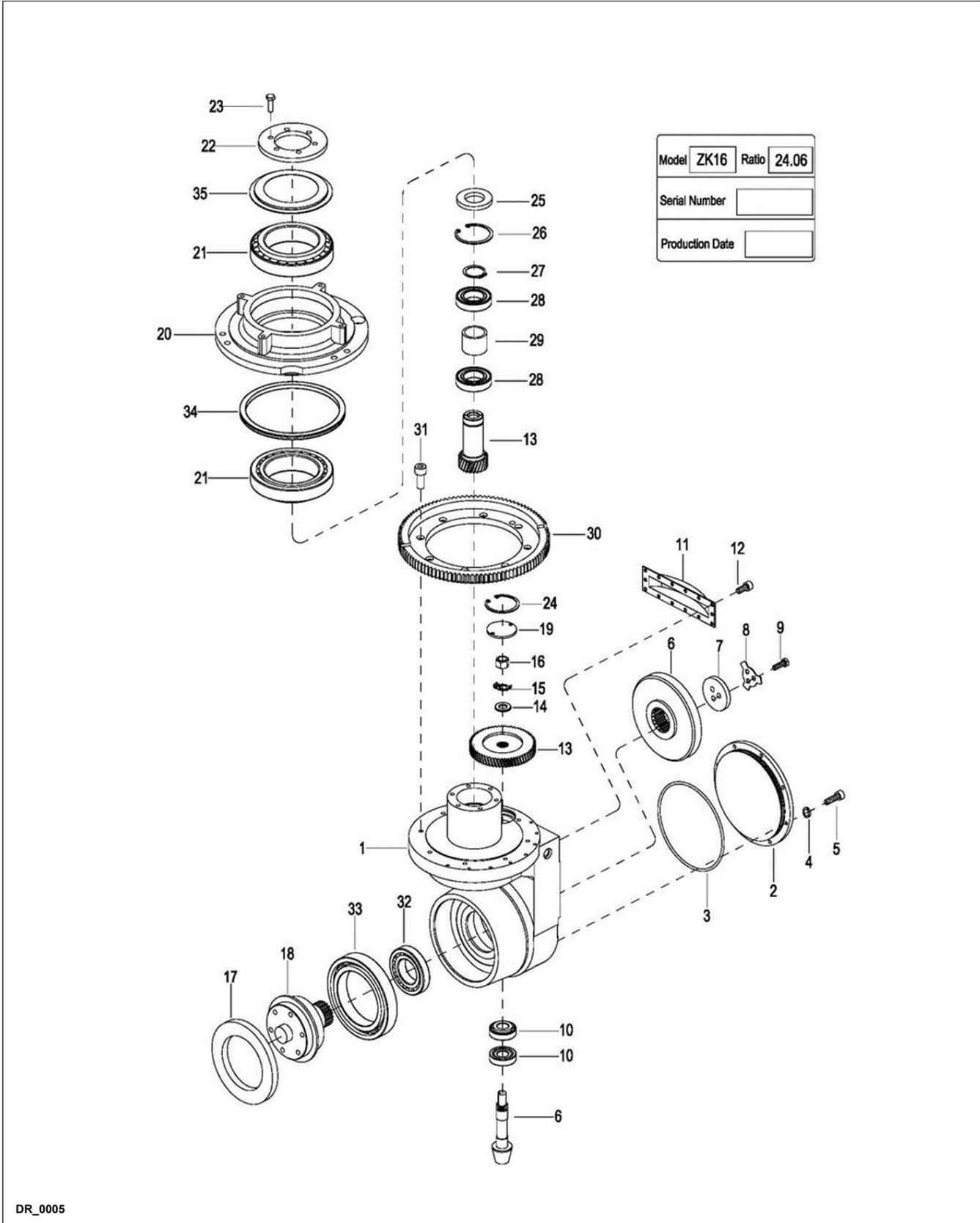


Figure 12-6 Gear Case Assembly - Used up to serial number 326140301

GEAR CASE ASSEMBLY - USED UP TO SERIAL NUMBER 326140301

<https://truckmanualshub.com/>

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2415-220000-10	GEAR CASE ASSEMBLY	1	Used up to serial number 325130600 - Incl. pos. # 1-35
--	2415-220000-1A	GEAR CASE ASSEMBLY	1	Used between serial number 325130601 and 326140301- Incl. pos. # 1-35
1	2415-220001-10	GEAR CASE	1	
2	2415-220002-10	COVER	1	
3	2415-220008-10	O-RING	1	
4	0000-000056-00	LOCKWASHER Ø6	8	
5	0000-000055-00	SCREW M6×16	8	
6	2415-GB10-00	SPIRAL BEVEL GEAR	1	The kit includes 2 gears
7	1120-240007-30	WASHER	1	
8	1120-240008-30	LOCKING PLATE	1	
9	0000-000277-00	BOLT M8×25	3	
10	0000-001054-00	BEARING	2	
11	2415-220009-10	COVER	2	
12	0000-000077-00	SCREW M6×12	14	
13	2415-GB10-10	GEAR	1	The kit includes 2 gears
14	0000-000379-00	FLATWASHER Ø14	1	
15	0000-001055-00	WASHER Ø14	1	
16	0000-001056-00	NUT M14×1.5	1	
17	2415-220014-10	SEAL WASHER TC100×150×13	1	
18	2415-220003-10	DRIVE SHAFT	1	Used up to serial number 325130600
18a	2415-220003-1A	DRIVE SHAFT	1	Used between serial number 325130601 and 326140301
19	2415-220018-10	COVER PLATE	1	
20	2415-220010-10	SEAT	1	
21	0000-001285-10	BEARING	2	
22	2415-220012-10	PLATE	1	
23	0000-000255-00	BOLT M8×20	6	
24	0000-001699-00	SNAP RING ø55	1	
25	2415-220015-10	SEAL WASHER TC35×62×7	1	
26	0000-000762-00	CIRCLIP Ø62	1	
27	0000-000183-00	RETAINER RING Ø35	1	
28	0000-001282-10	BEARING	2	
29	2415-220011-10	SLEEVE	1	
30	2415-220013-10	GEAR	1	
31	0000-000321-00	SCREW M8×20	8	
32	0000-001286-10	BEARING	1	
33	0000-001283-10	BEARING	1	
34	2415-220016-10	DUST RING	1	
35	2415-220017-10	DUST COVER	1	

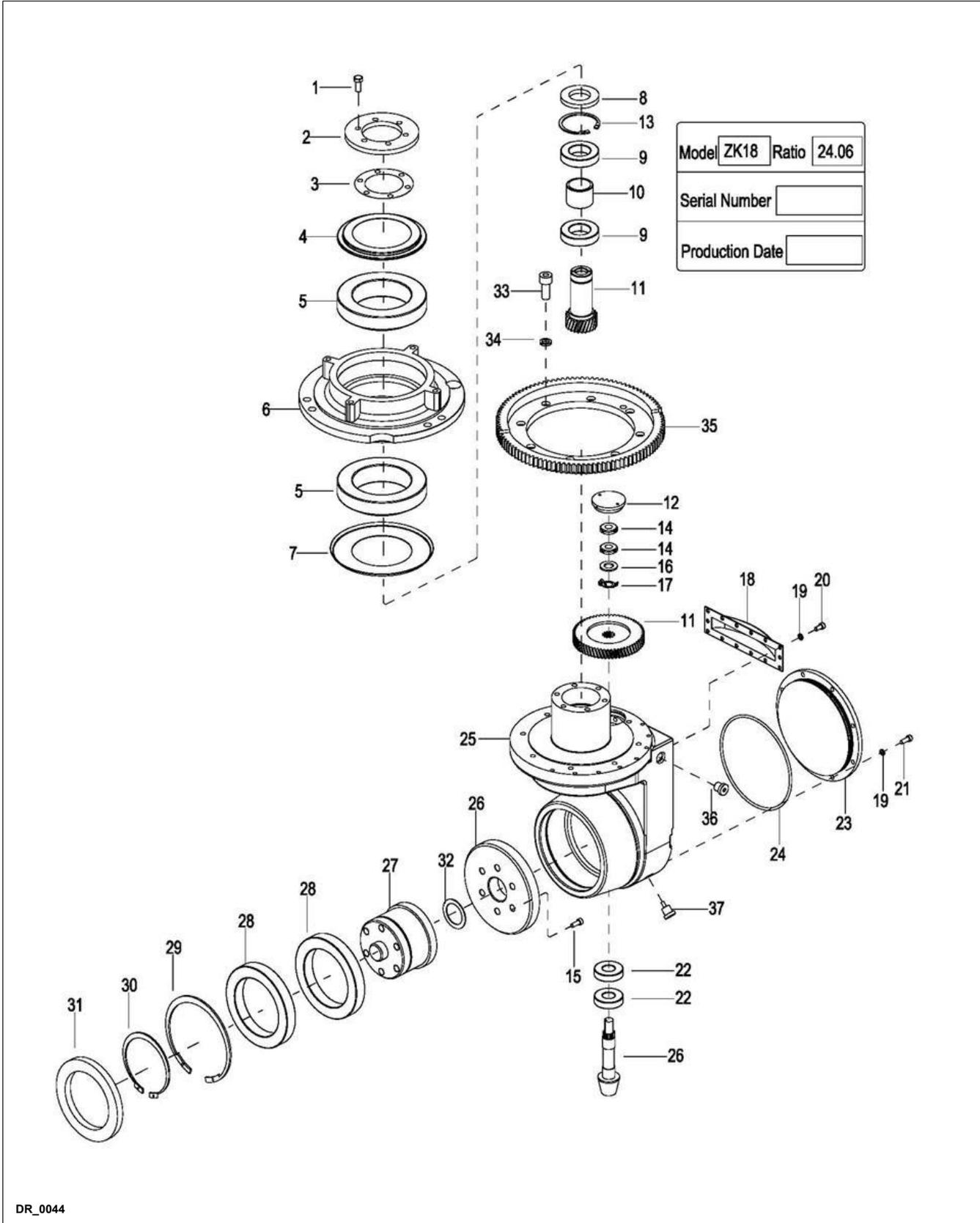


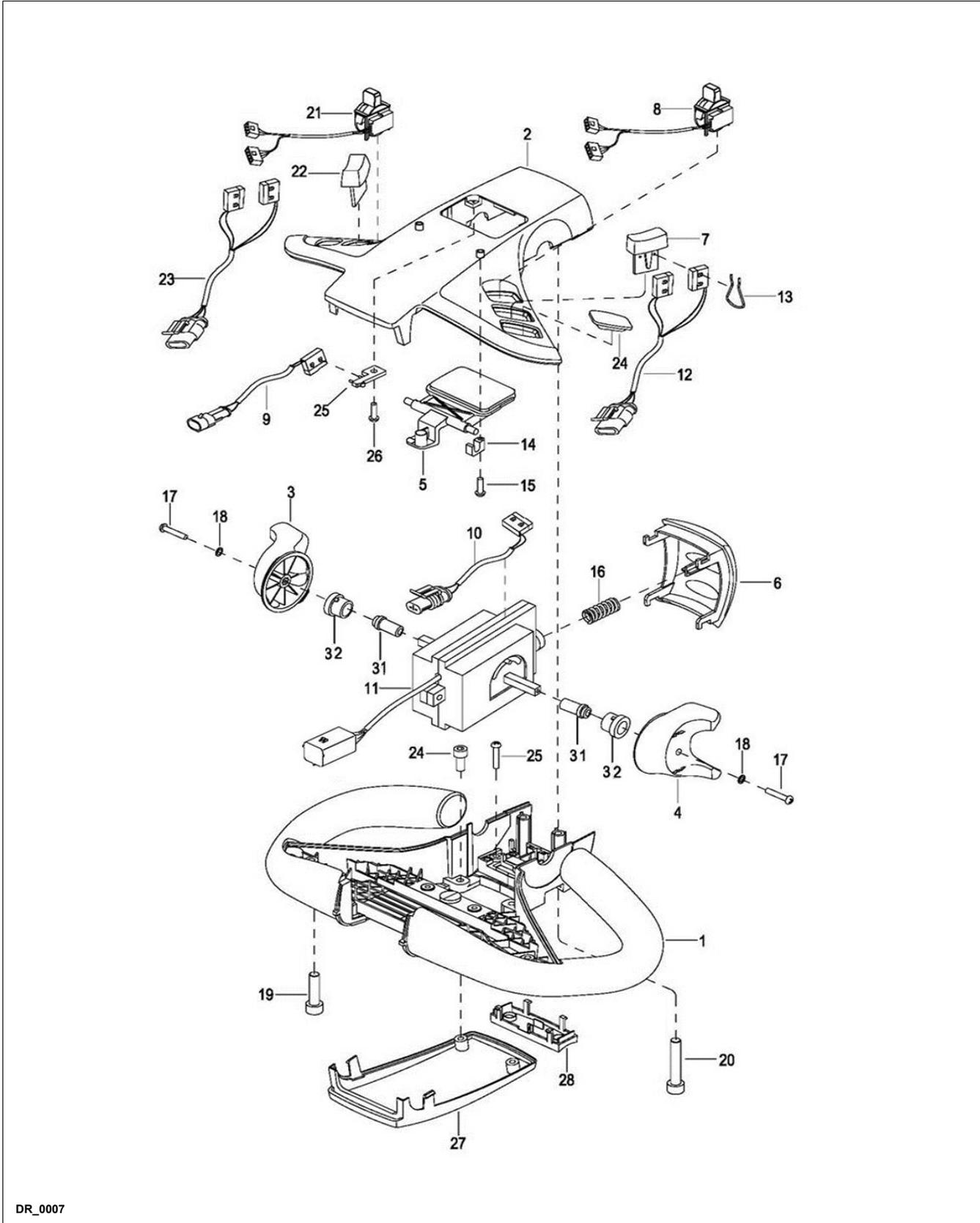
Figure 12-7 Gear Case Assembly - Used from serial number 326140302

GEAR CASE ASSEMBLY - USED FROM SERIAL NUMBER 326140302

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Pos.	Part Number	Description	Qty. Reqd.	Notes
--	ZK18-240000-A0-02	GEAR CASE ASSEMBLY	1	Incl. pos. # 1-37
1	0000-000911-00	BOLT M8×20	6	
2	ZK18-240011-00	PLATE	1	
3	ZK18-240017-00	WASHER	A.R.	As Required
4	ZK18-240009-00	DUST COVER	1	
5	0000-001285-10	BEARING	2	
6	ZK18-240004-00	SEAT	1	
7	ZK18-240012-00	PLATE	1	
8	3060-030000-13	SEAL WASHER TC35*62*7	1	
9	0000-001445-00	BEARING	2	
10	ZK18-240010-00	SLEEVE	1	
11	ZK18-GBA0-00	GEAR KIT (Z1/Z2=28/94)	1	This kit includes 2 gears (Pos.# 11)
12	ZK18-240006-00	COVER PLATE	1	
13	0000-000762-00	ELASTIC COLLAR Ø62	1	
14	0000-001056-00	NUT M14×1.5	2	
15	0000-000070-00	SCREW M10×25	6	
16	0000-000379-00	FLATWASHER Ø14	1	
17	0000-001055-00	WASHER Ø14	1	
18	ZK18-240008-00	COVER	1	
19	0000-000056-00	LOCKWASHER Ø6	22	
20	0000-000077-00	SCREW M6×12	14	
21	0000-000055-00	SCREW M6×16	8	
22	0000-001054-00	BEARING	2	
23	ZK18-240005-00	COVER	1	
24	3060-020000-28	O-RING 155×4	1	
25	ZK18-240003-00	GEAR CASE	1	
26	ZK18-GB00-10	GEAR KIT (Z1/Z2=6/43)	1	This kit includes 2 gears (Pos.# 26)
27	ZK18-240007-00	OUTPUT SHAFT	1	
28	3090-010000-26	BEARING	2	
29	3050-020000-18	ELASTIC COLLAR Ø140	1	
30	3050-010000-19	RETAINER RING Ø100	1	
31	3060-030000-14	SEAL WASHER TC140*100*12	1	
32	ZK12-240011-00	WASHER	A.R.	As Required
33	0000-000321-00	SCREW M8×20	8	
34	0000-000159-00	LOCKWASHER Ø8	8	
35	ZK18-240015-00	GEAR	1	
36	ZK12-240017-00	PLUG M14*1.5	1	
37	ZK12-240016-00	PLUG M14*1.5	1	

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-340000-2A	CONTROL POD ASSEMBLY	1	
2	2333-330000-10	CONTROL HANDLE	1	
3	0000-000010-00	SCREW M5×6	1	
4	0000-000490-00	HARNESS CLAMP	1	
5	0000-000011-00	BEARING	2	
6	2130-350000-00	GAS SPRING	1	
7	0000-000322-00	SCREW M8×25	5	
8	0000-000114-00	NUT M52×1.5	1	
9	0000-000143-00	CHECK WASHER Ø52×1.5	1	
10	0000-000030-00	SCREW M10×16	1	
11	0000-000429-00	SCREW M5×8	1	
12	1120-300003-00	SHAFT	1	
13	1120-300006-00	SPACER	1	
14	0000-000028-00	SCREW M4×10	2	
15	0000-000122-00	LOCKWASHER Ø4	2	
16	0000-000377-00	SCREW M2×20	2	
17	2333-300001-10	TURNING BRACKET	1	
18	2322-300002-00	SLEEVE	1	
19	0000-000142-00	BEARING	2	
20	0000-000159-00	LOCKWASHER Ø8	16	
21	0000-000433-00	SCREW M8×12	1	
22	2322-310000-00	BRACKET	1	
23	0000-000283-00	BOLT M10×35	4	
24	0000-000007-00	FLATWASHER Ø10	4	
25	0000-000063-00	LOCKWASHER Ø10	5	
26	0000-000553-00	NUT M10	4	
27	2322-300001-0A	STEERING SHAFT	1	
28	0000-000882-00	C TYPE KEY 8×7×14	1	
29	1280-370000-10	DAMPING STEERING BOX	1	
30	0000-000176-00	FLATWASHER Ø8	11	
31	0000-000321-00	SCREW M8×20	5	
32	1221-300006-00	TURNTABLE	1	
33	0000-000109-00	SCREW M8×16	2	
34	1221-300003-00	ROCKER POTENTIOMETER	1	
35	1221-300002-00	MOUNTING PLATE	1	
36	1221-520007-0A	POTENTIOMETER	1	
37	0000-000702-00	FLATWASHER Ø4	2	
38	0000-000121-00	SCREW M4×35	2	
39	2130-520004-00	WIRE HARNESS BELLY SWITCH	1	
40	2415-520002-20	WIRE HARNESS	1	
41	1220-560001-00	INCHING SWITCH I	2	
42	1221-300004-00	PLATE	1	
43	2333-320000-10	CONTROL POD BRACKET	1	
44	0000-000055-00	SCREW M6×16	2	
45	0000-000056-00	LOCK WASHER Ø6	2	

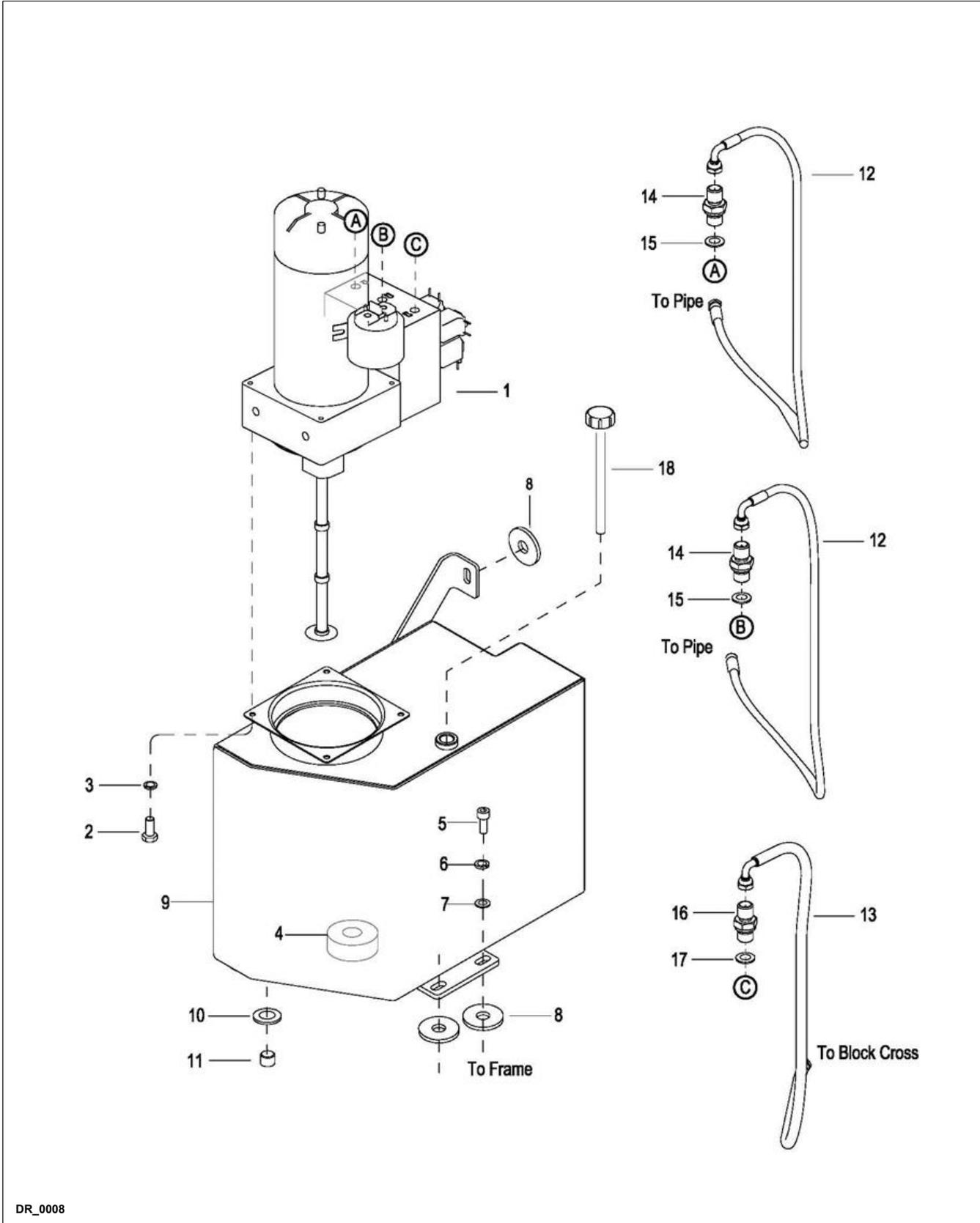


DR_0007

Figure 12-9 Control Head Assembly

CONTROL HEAD ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2333-340001-00	COVER	1	
2	2333-340002-00	CAP	1	
3	2333-340003-00	CONTROL KNOB R	1	
4	2333-340004-00	CONTROL KNOB L	1	
5	2333-340005-00	HORN BUTTON	1	
6	2333-340006-00	BELLY BUTTON COVER	1	
7	2333-340007-00	TILT SWITCH	1	
8	2415-340003-00	FORWARD & REVERSE SWITCH	1	
9	2333-520005-10	HORN WIRE HARNESS	1	
10	2333-520004-10	REVERSING SWITCH WIRE	1	
11	2333-520003-10	ACCELERATOR ASSEMBLY	1	
12	2415-340004-00	TILT SWITCH WIRE	1	
13	2333-340017-00	CLAMP	4	
14	2333-340009-00	MOUNTING SEAT	2	
15	2333-340012-00	SCREW ST2.9×9.5	2	
16	2333-340010-00	SPRING	1	
17	0000-000037-00	SCREW M3×12	2	
18	0000-000038-00	LOCK WASHER Ø3	2	
19	2333-340013-00	SCREW M5×30	2	
20	2333-340014-00	SCREW M5×55	2	
21	2333-340008-00	LIFT & LOWERING SWITCH	1	
22	2333-340016-00	SIDE SHIFT SWITCH	1	
23	2415-340008-00	SIDE SHIFT SWITCH WIRE	1	
24	2333-340020-00	COVER	2	
25	2333-340018-00	BRACKET	1	
26	2333-340019-00	SCREW M3×10	1	
27	2333-340022-00	SEALING PLATE	1	
28	2333-340023-00	BUTTON	1	
29	2333-340024-00	SCREW M5×12	2	
30	2333-340025-00	SCREW ST2.9×20	2	
31	2333-340026-00	BUSHING	2	
32	2333-340027-00	BUSHING	2	

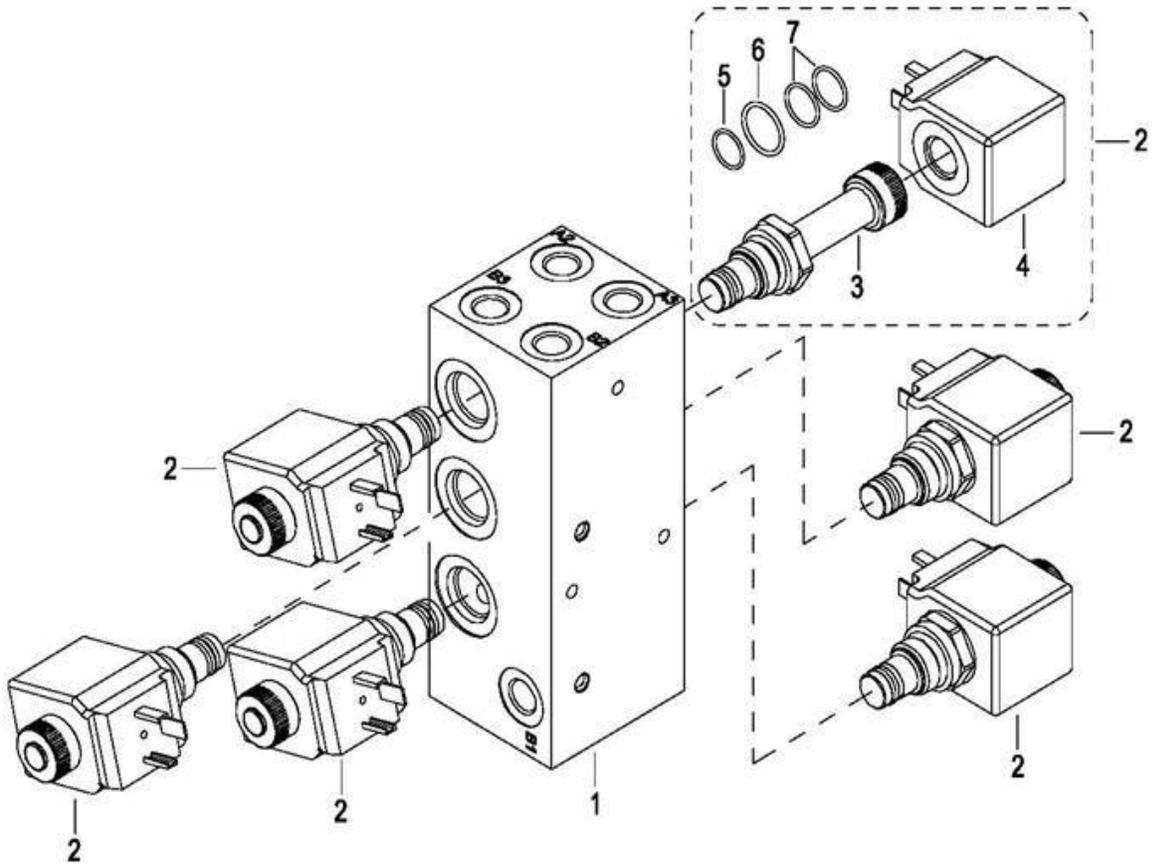


DR_0008

Figure 12-10 Hydraulic System

HYDRAULIC SYSTEM

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-450000-10	PUMP & MOTOR ASSEMBLY	1	
2	0000-000620-00	BOLT M 6×16	4	
3	0000-000056-00	LOCKWASHER Ø6	4	
4	2125-420001-00	MAGNET	1	
5	0000-000109-00	SCREW M8×16	5	
6	0000-000159-00	LOCKWASHER Ø8	5	
7	0000-000176-00	FLATWASHER Ø8	5	
8	2112-410004-00	WASHER	3	
9	2415-411000-10	TANK	1	
10	0000-000510-00	WASHER Ø20	1	
11	0000-000635-00	PLUG M18×1.5	1	
12	2415-438000-10	OIL PIPE, SIDE SHIFT	2	
13	2415-439000-10	OIL PIPE, LIFT	1	
14	2702-141400-00	CONNECTOR G1/4-M14X1.5	2	
15	0000-000044-00	WASHER Ø14	2	
16	2702-141600-00	CONNECTOR G1/4-M16X1.5	1	
17	0000-000069-00	WASHER Ø16	1	
18	2130-423000-00	FILTER	1	Used up to serial number 327150483
18a	2415-412000-10	FILTER	1	Used from serial number 327150484

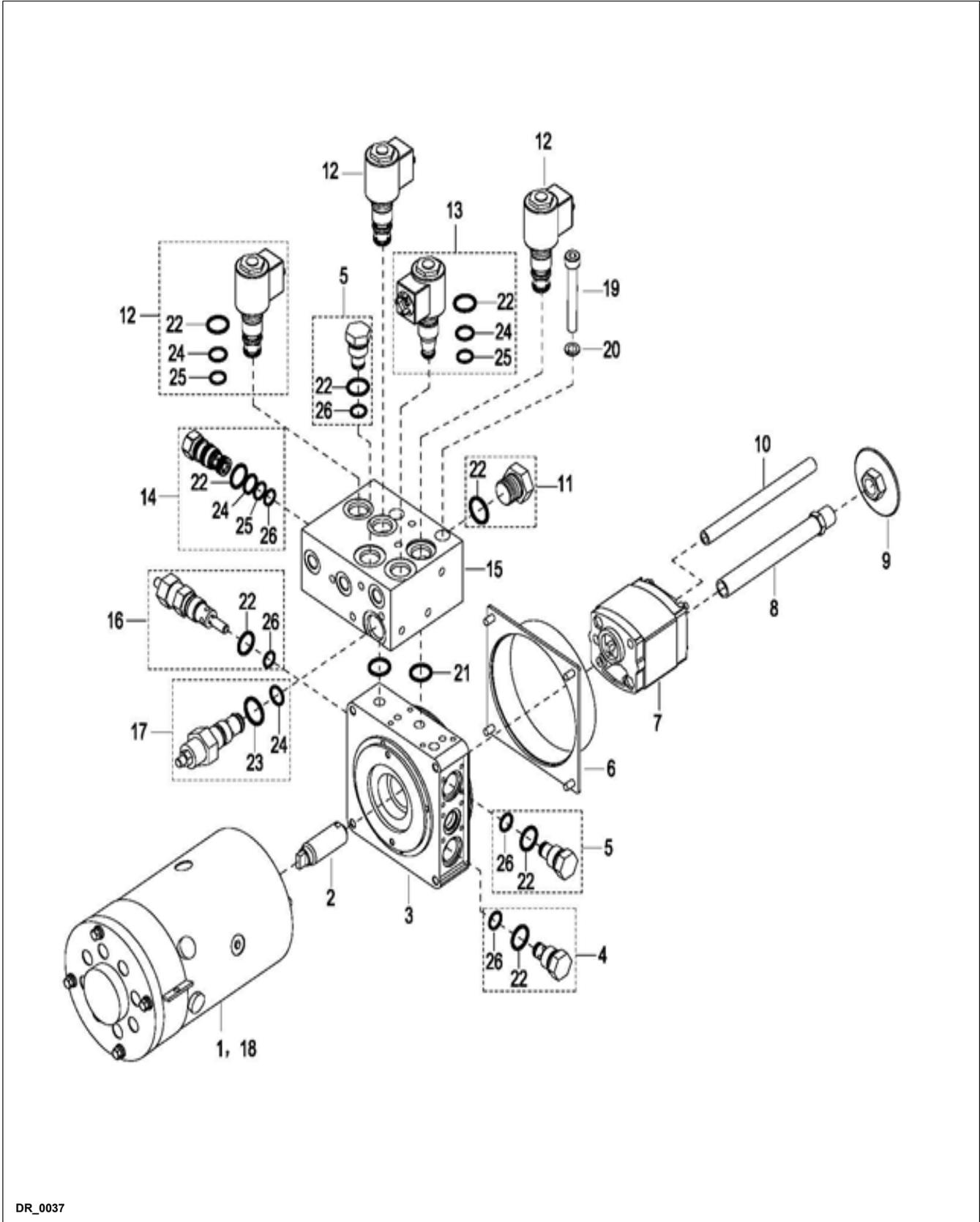


DR_0045

Figure 12-11 Triple Solenoid Valve

TRIPLE SOLENOID VALVE

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-441100-30		1	
2	2415-441200-30		6	Pos. #3-7
3	2415-441201-30		1	
4	2415-441202-30		1	
5	2415-441203-30		1	
6	2415-441204-30		1	
7	2415-441205-30		2	

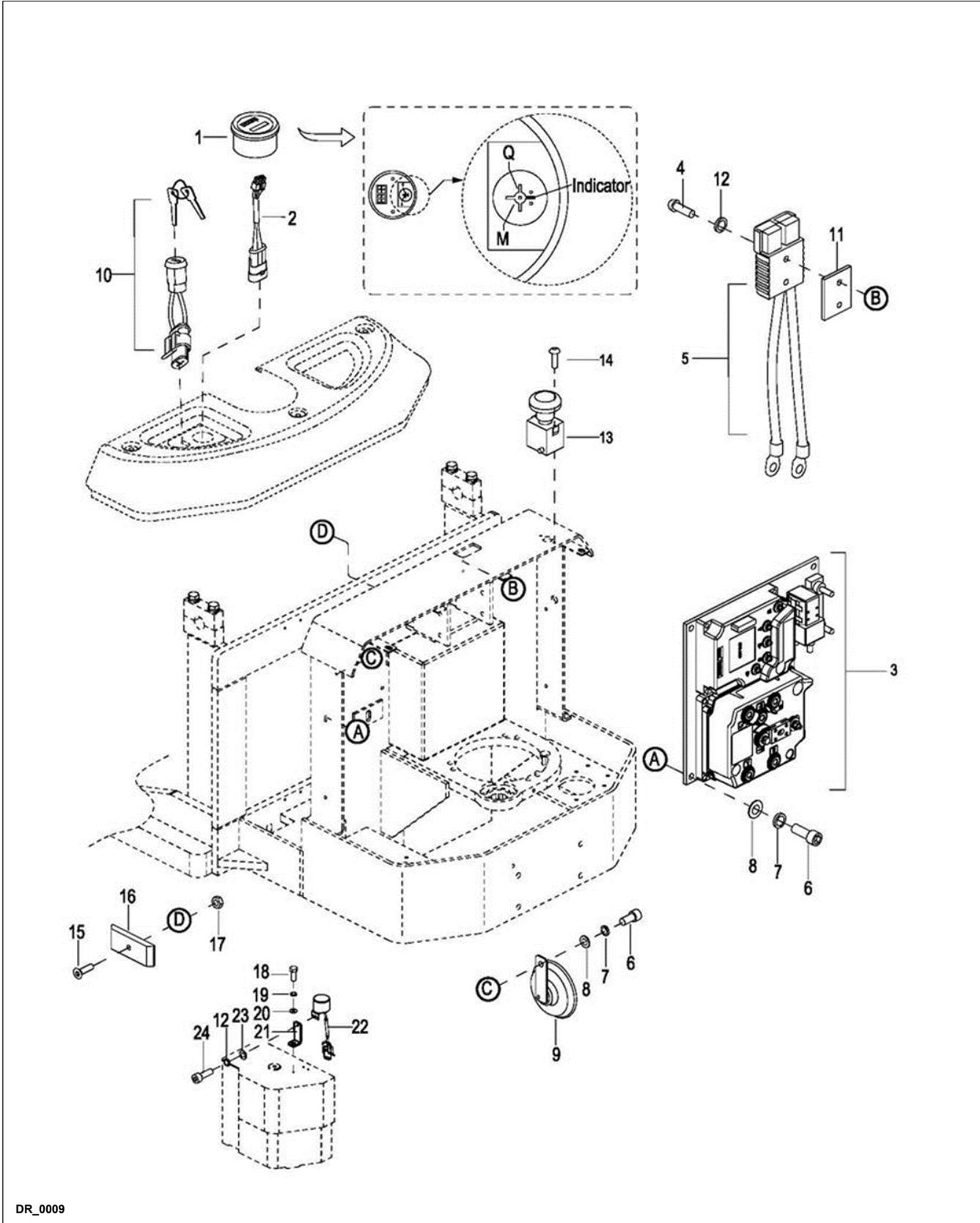


DR_0037

Figure 12-12 Pump and Motor Assembly

PUMP AND MOTOR ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-450001-10	MOTOR	1	
2	2415-450002-10	COUPLING	1	
3	2415-450003-10	ADAPTER	1	
4	2415-450004-10	CHECK VALVE	1	
5	2415-450005-10	PLUG	2	
6	2415-450006-10	FLANGE	1	
7	2415-450007-10	PUMP	1	
8	2415-450008-10	OIL SUCTION PIPE	3	
9	2415-450009-10	FILTER	1	
10	2415-450010-10	RETURN OIL PIPE	1	
11	2415-450011-10	PLUG	1	
12	2415-450012-10	SOLENOID VALVE	3	
13	2415-450013-10	PROPORTIONAL SOLENOID VALVE	1	
14	2415-450014-10	HYDRAULIC LOCK	1	
15	2415-450015-10	ADAPTER	1	
16	2415-450016-10	RELIEF VALVE	1	
17	2415-450017-10	PROPORTIONAL COMPENSATING VALVE	1	
18	2415-450018-10	MOTOR BRUSH	1	
19	0000-000110-00	SCREW M8×65	2	
20	0000-000159-00	LOCKWASHER Ø8	2	
21	2415-450019-10	O-RING, 19×2.4	2	
22	2415-450020-10	O-RING, 16.36×2.21	1	
23	2415-450021-10	O-RING, 24×2.4	1	
24	2415-450022-10	O-RING, 12.5×1.8	1	
25	2415-450023-10	O-RING, 11.2×1.8	1	
26	2415-450024-10	O-RING, 9.5×1.8	1	
27	2415-451000-10	SEAL KIT	1	The kit includes: Pos. 21 (2 PCS), Pos. 22 (10 PCS), Pos. 23 (1 PCS), Pos. 24 (6 PCS), Pos. 25 (5 PCS), Pos. 26 (5 PCS).

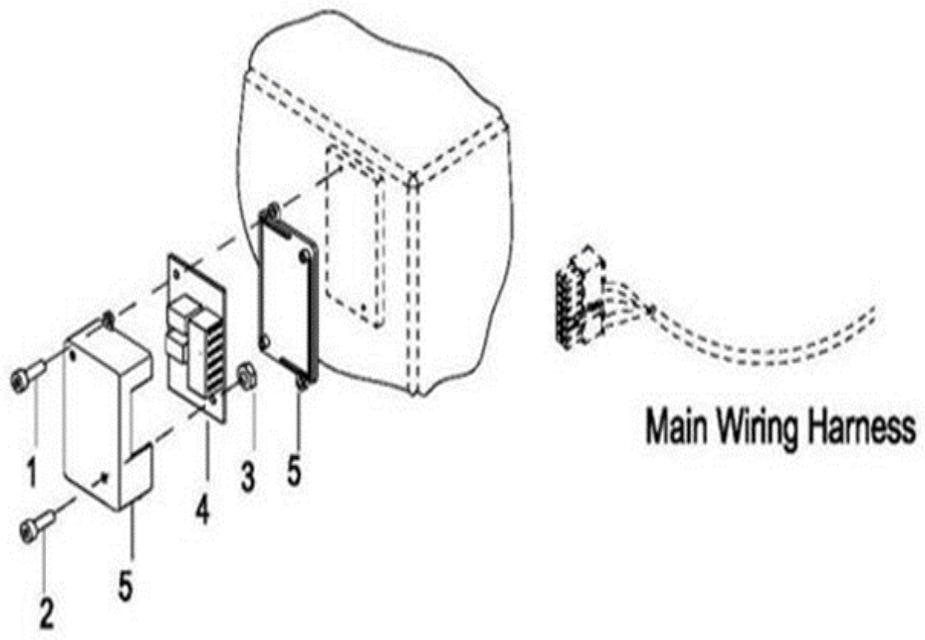


DR_0009

Figure 12-13 Electrical System

ELECTRICAL SYSTEM

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1115-510006-2B-01	BDI WITH HOUR METER	1	With Hour meter dial set to: M = Industrial Battery,
1a	1115-510006-2B-02	BDI WITH HOUR METER	1	With Hour meter dial set to: Q = Maint.Free Battery
2	1220-520007-0D	BDI WRING HARNESS 3 PIN	1	
3	--	CONTROL PANEL ASSEMBLY	1	See Control Panel Assembly Section
4	0000-000498-00	SCREW M6×30	2	
5	1120-500009-10	BATTERY CONNECTOR ASSEMBLY	1	
6	0000-000433-00	SCREW M8×12	4	
7	0000-000159-00	LOCKWASHER Ø8	4	
8	0000-000105-00	FLATWASHER Ø8	4	
9	1120-500003-00	HORN	1	
10	1220-520002-1C	KEY SWITCH ASSEMBLY	1	
11	1120-112008-00	PLATE	1	
12	0000-000056-00	LOCKWASHER Ø6	5	
13	1220-500001-00	EMERGENCY DISCONNECT	1	
14	0000-000119-00	SCREW M5×12	2	
15	0000-000738-00	SCREW M8×30	1	
16	2322-560001-20	BAFFLE BLOCK	1	
17	0000-000550-00	NUT M8	1	
18	0000-001678-00	BOLT M12×15	1	Optional Equipment (used for Travel Alarm) (Pos. 18-24)
19	0000-000060-00	LOCKWASHER Ø12	1	
20	0000-000373-00	FLATWASHER Ø12	1	
21	2415-100002-B0	INSTALLATION PLATE	1	
22	3712-405000-00	ALARM BUZZER	1	
23	0000-000380-00	FLATWASHER Ø6	1	
24	0000-000055-00	SCREW M6×16	1	

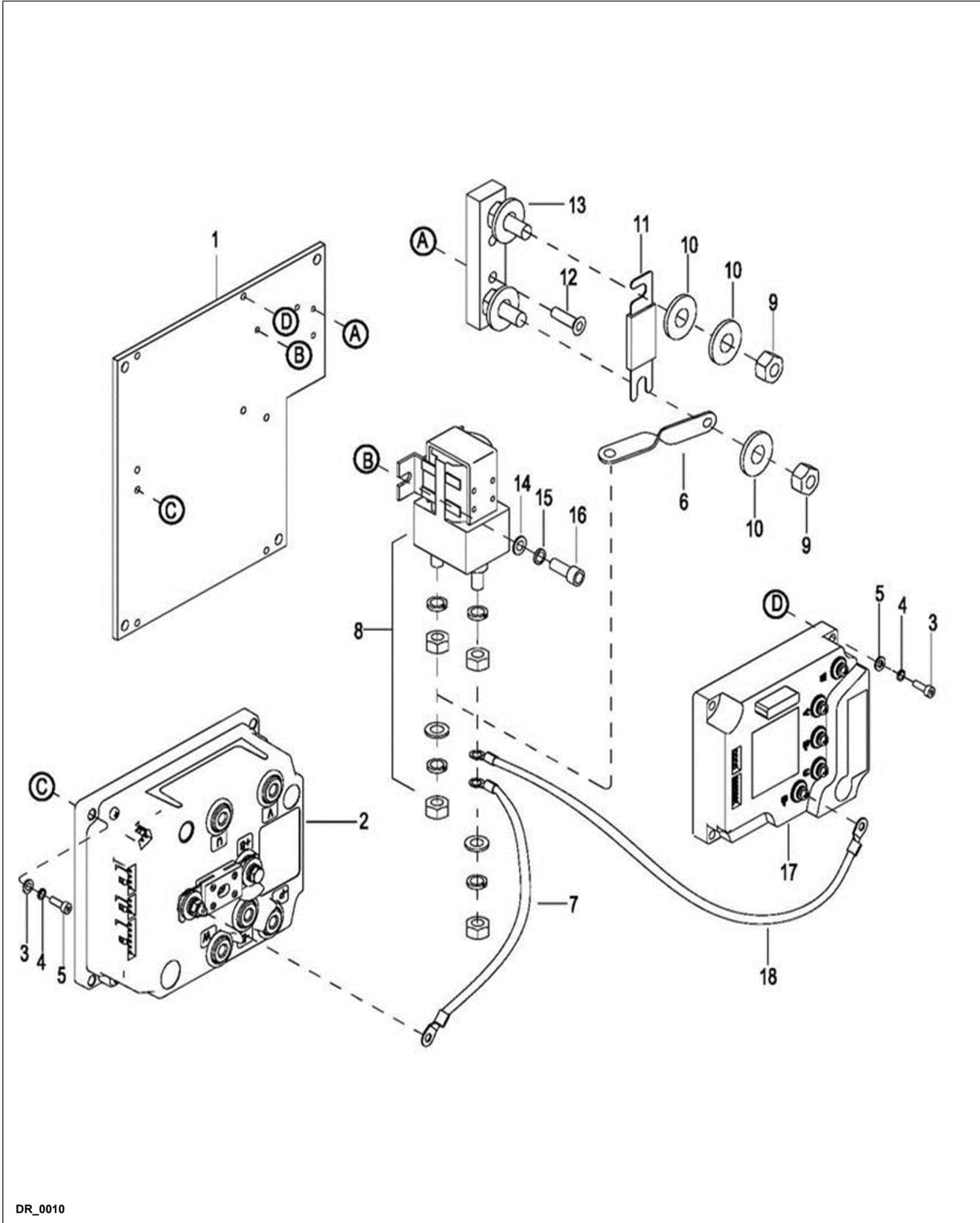


DR_0039

Figure 12-14 Proportional Valve Circuit Board

PROPORTIONAL VALVE CIRCUIT BOARD

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-001024-00	SCREW M3X10	2	Used from Serial Number 325150188
2	0000-001138-00	SCREW	2	Used from Serial Number 325150188
3	0000-000924-00	NUT M3	2	Used from Serial Number 325150188
4	2415-520004-20	CIRCUIT BOARD	1	Prior to Serial Number 325150188 - it was mounted without the box by the Drive motor.
5	2415-100300-10	CIRCUIT BOARD BOX	1	Used from Serial Number 325150188

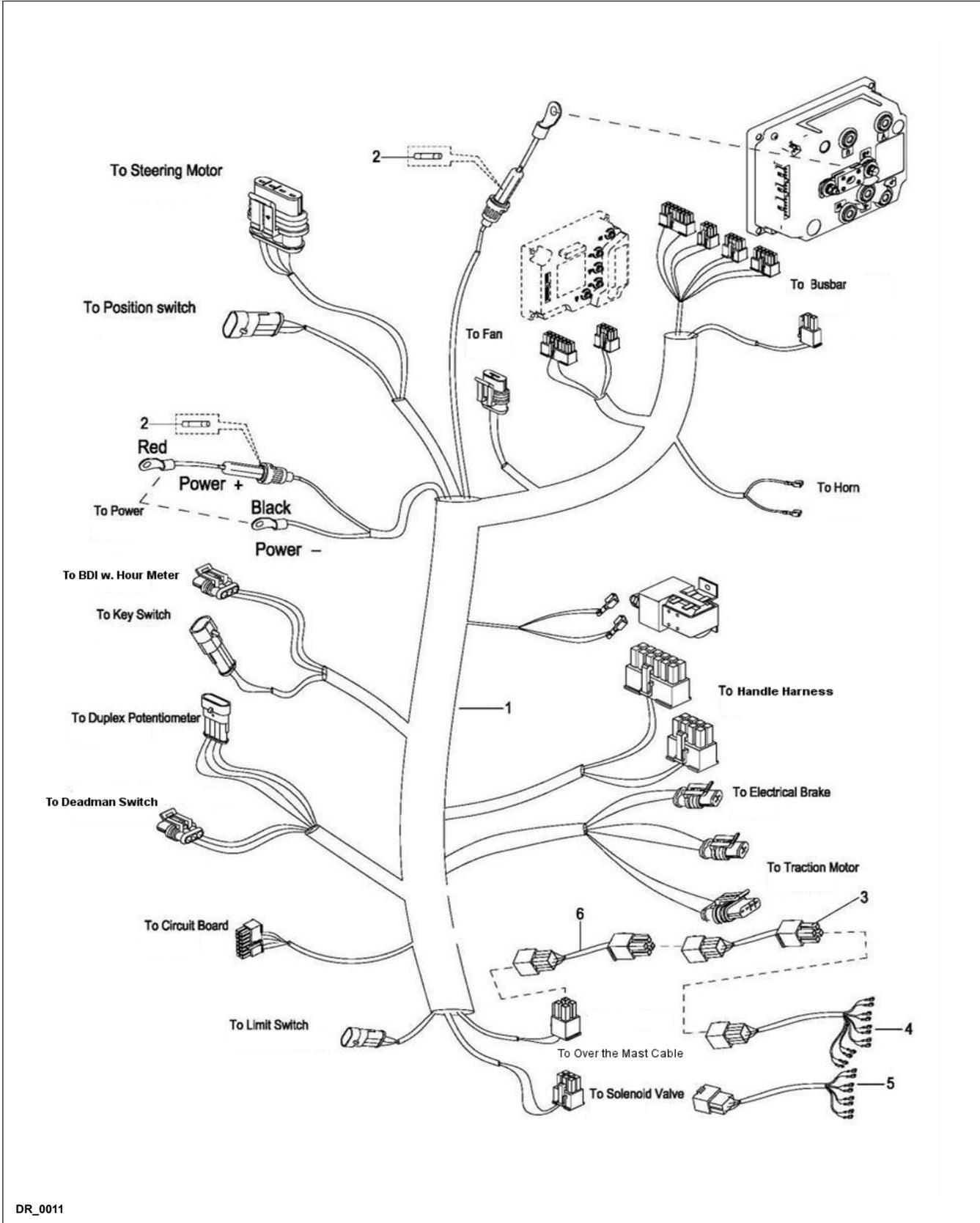


DR_0010

Figure 12-15 Control Panel Assembly

CONTROL PANEL ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-510001-20	CONTROL PANEL	1	
2	2110-500007-00-70	CONTROLLER	1	
3	0000-000380-00	FLATWASHER Ø6	8	
4	0000-000056-00	LOCKWASHER Ø6	8	
5	0000-000015-00	SCREW M6×10	8	
6	1120-530006-00	COPPER CONDUCTOR	1	
7	2415-530012-2A	CONTROLLER +	1	
8	1120-500005-10	CONTACTOR	1	
9	0000-000196-00	NUT M8	2	
10	0000-000210-00	FLATWASHER Ø8	3	
11	1120-540002-00	FUSE 200A	1	
12	0000-000074-00	SCREW M6×20	2	
13	1120-540001-00	STAND	1	
14	0000-000128-00	FLATWASHER Ø5	2	
15	0000-000206-00	LOCKWASHER Ø5	2	
16	0000-000031-00	SCREW M5×8	2	
17	1280-560002-10-70	CONTROLLER	1	
18	2415-530008-20	STEERING CONTROLLER +	1	

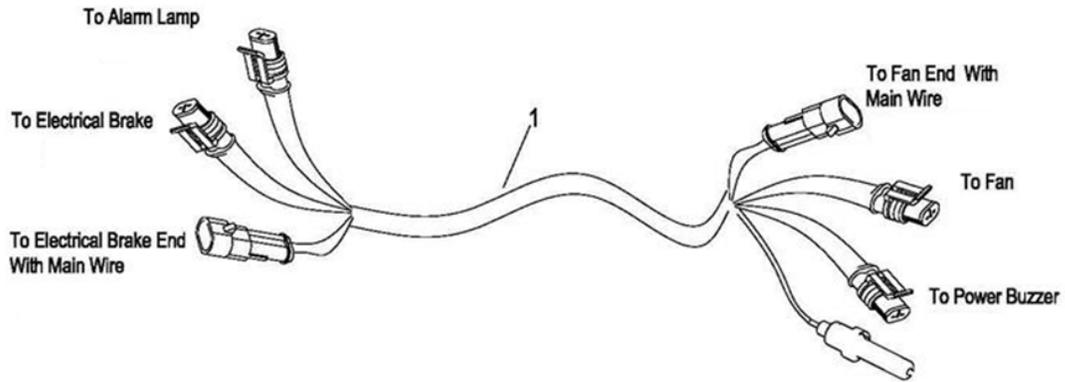


DR_0011

Figure 12-16 Wiring Harness

WIRING HARNESS

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-520001-2E	MAIN WIRING HARNESS	1	
2	1120-500010-00	FUSE 10A	2	
3	2415-520009-20-01	MASTER WIRING HARNESS	1	Used from Serial Number 325150405 - for Lift Height 106"
3a	2415-520009-20-03	MASTER WIRING HARNESS	1	Used from Serial Number 325150405 - for Lift Height 126"
3b	2415-520009-20-08	MASTER WIRING HARNESS	1	Used from Serial Number 325150405 - for Lift Height 157"
3c	2415-520009-20-10	MASTER WIRING HARNESS	1	Used from Serial Number 325150405 - for Lift Height 189"
4	2415-520005-00-01	POWER CHAIN WIRING HARNESS	1	Used up to Serial Number 325150404 for Lift Height 102"
4a	2415-520005-0A-03	POWER CHAIN WIRING HARNESS	1	Used up to Serial Number 325150404 for Lift Height 106"
4b	2415-520005-00-02	POWER CHAIN WIRING HARNESS	1	Used up to Serial Number 325150404 for Lift Height 126"
4c	2415-520005-2A-07	POWER CHAIN WIRING HARNESS	1	Used up to Serial Number 325150404 for Lift Height 157"
4d	2415-520005-2A-09	POWER CHAIN WIRING HARNESS	1	Used up to Serial Number 325150404 for Lift Height 189"
4e	2415-520008-20	POWER CHAIN WIRING HARNESS	1	Used from Serial Number 325150405
5	2415-520003-2A	SOLENOID VALVE WIRING HARNESS	1	
6	2415-520010-20	WIRING HARNESS	1	Used from Serial Number 325150405

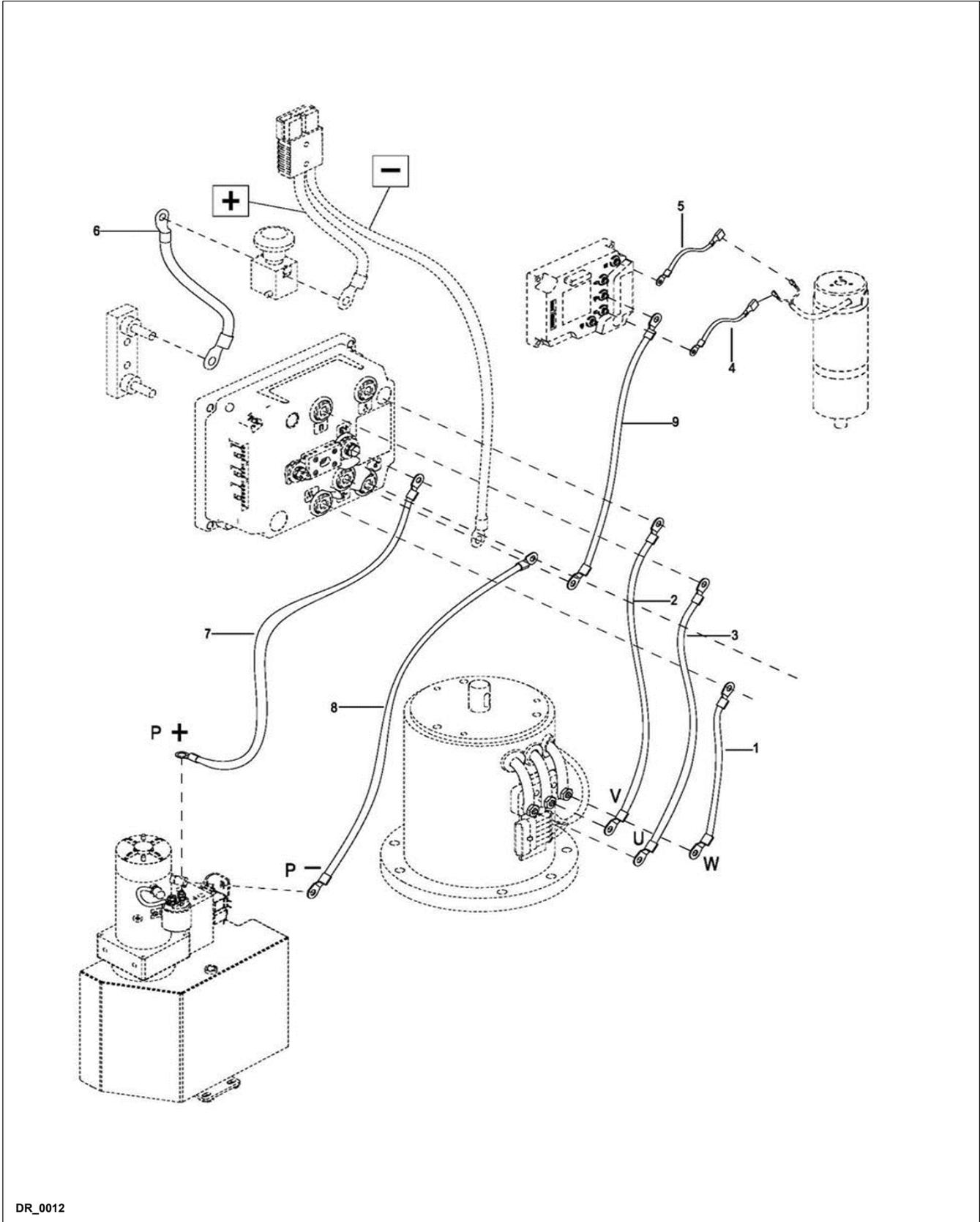


DR_0041

Figure 12-17 Travel Alarm Wiring Harness

TRAVEL ALARM WIRING HARNESS

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-521002-B0	TRAVEL ALRM WIRING HARNESS	1	Travel Alarm is Optional

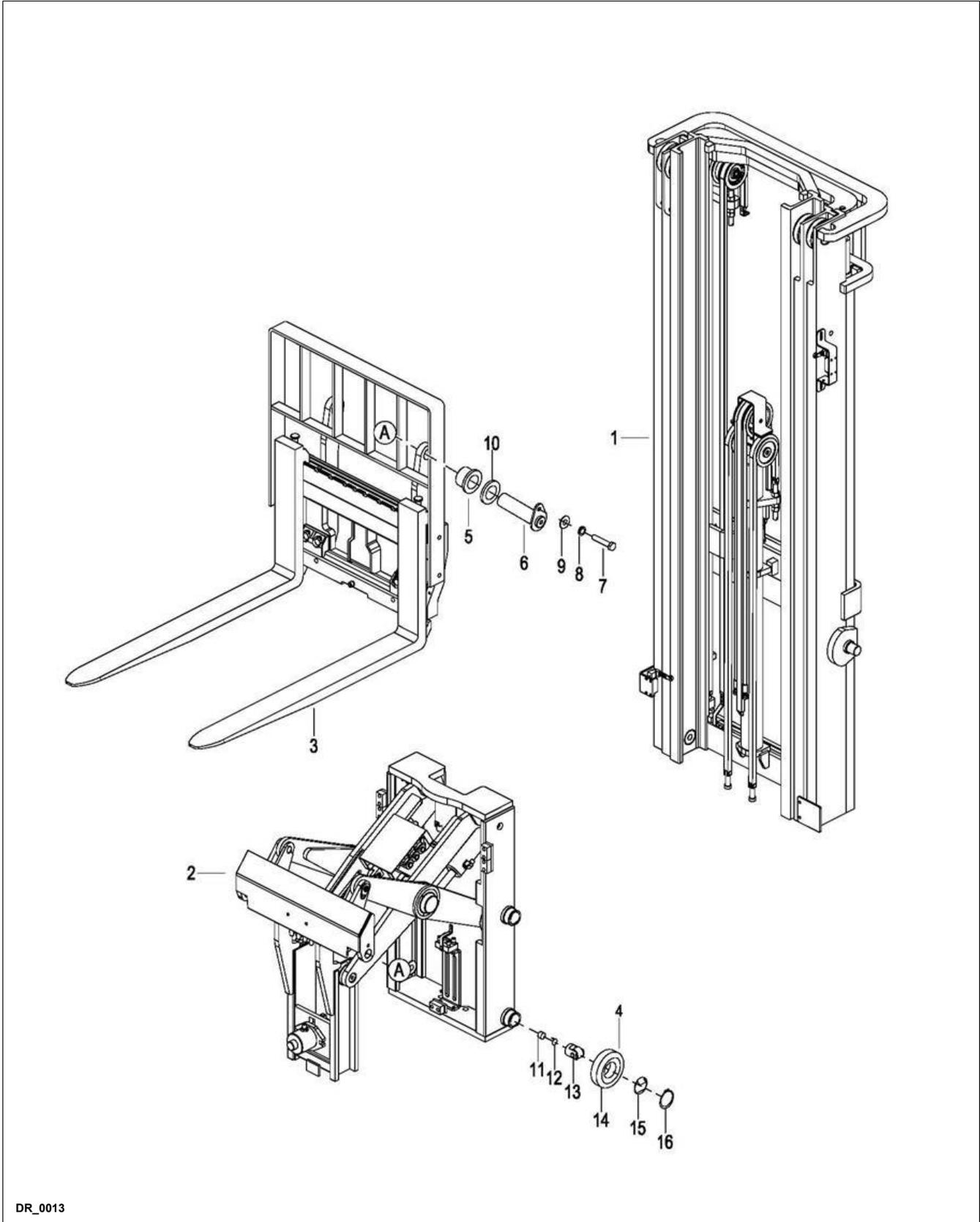


DR_0012

Figure 12-18 Cable Assembly

CABLE ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-530003-2A	MOTOR LINE W	1	
2	2415-530002-2A	MOTOR LINE V	1	
3	2415-530001-2A	MOTOR LINE U	1	
4	2415-530006-2A	STEERING MOTOR LINE U	1	
5	2415-530007-20	STEERING MOTOR LINE W	1	
6	2415-530013-2A	EMERGENGY STOP LINE	1	
7	2415-530004-00	PUMP POWER LINE +	1	
8	2415-530005-00	PUMP POWER LINE -	1	
9	2415-530009-20	CONTROLLER - TO CONTROLLER - LINE	1	

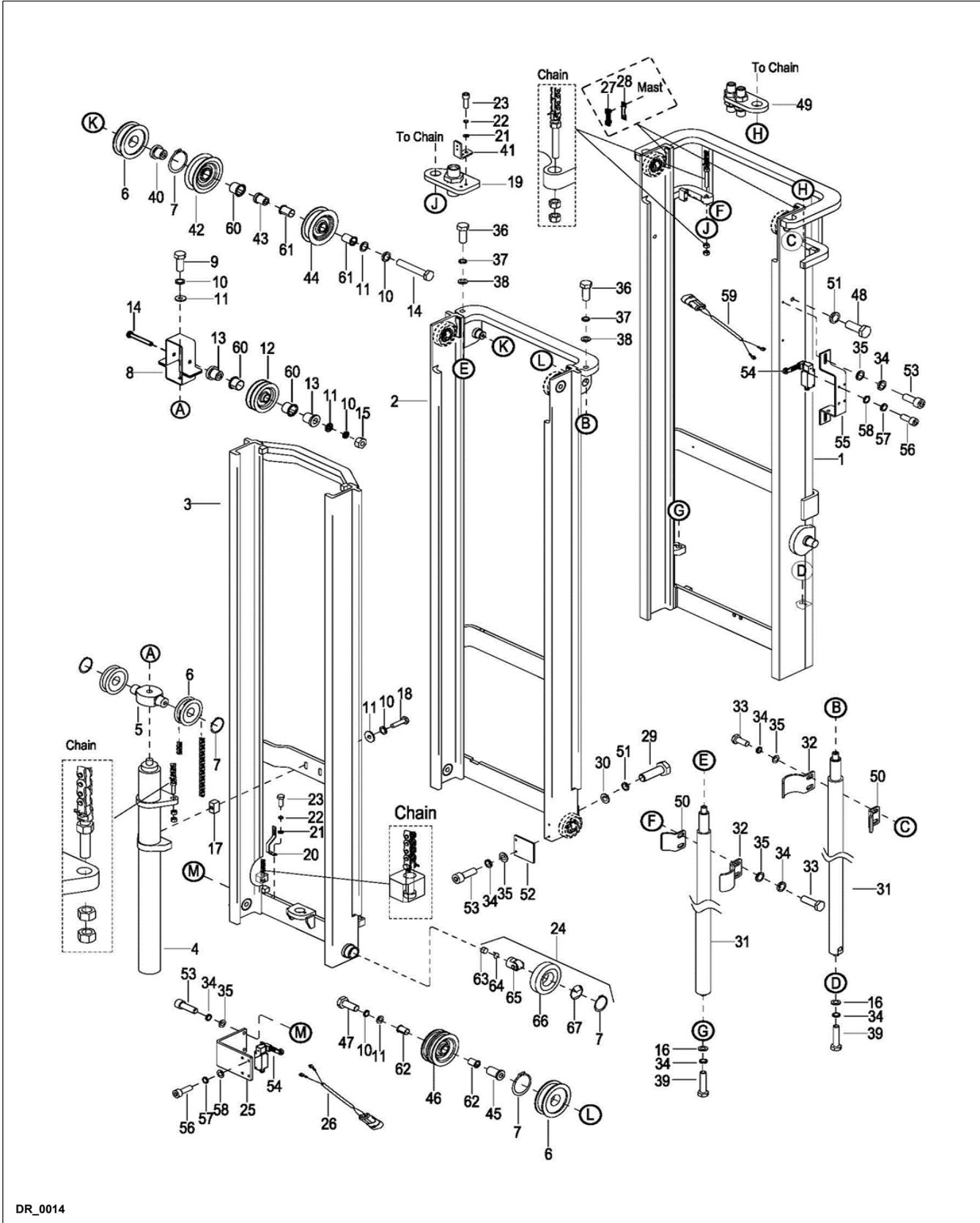


DR_0013

Figure 12-19 Trimast System Assemblies

TRIMAST SYSTEM ASSEMBLIES

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	--	TRIMAST LIFTING SYSTEM	1	See Trimast Assembly Section
2	--	TRIMAST REACH ASSEMBLY	1	See Trimast Reach Assembly Section
3	--	SIDE SHIFTER ASSEMBLY	1	See Side Shift Assembly Section
4	2415-612000-10	ROLLER ASSEMBLY	4	
5	2415-640004-10	SELF-LUBRICATING BEARING	2	
6	2415-640400-10	SHAFT	2	
7	0000-000277-00	BOLT M8X25	2	
8	0000-000159-00	LOCKWASHER Ø8	2	
9	0000-000176-00	FLATWASHER Ø8	2	
10	2415-640012-10-01	WASHER	A.R.	As Required - 2mm
10a	2415-640012-10-02	WASHER	A.R.	As Required - 3mm
11	2415-612001-10	SCREW	4	
12	2415-612002-10	SNAP RING	4	
13	2415-612003-10	ASSISTANT ROLLER	4	
14	2415-612004-10	MAIN ROLLER ASSEMBLY	4	
15	2415-612005-10	DUST SNAP	4	
16	0000-000183-00	RETAINER RING Ø35	4	



DR_0014

Figure 12-20 Trimast Assembly

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-611000-1F-02	OUTER MAST	1	Used for Lift Height 157"
1a	2415-611000-1F-05	OUTER MAST	1	Used for Lift Height 189"
1b	2415-611000-B0	OUTER MAST	1	Used for Lift Height 189" - When Option Travel Alarm
2	2415-621000-1D-02	MIDDLE MAST	1	Used for Lift Height 157"
2a	2415-621000-1D-05	MIDDLE MAST	1	Used for Lift Height 189"
3	2415-631000-1D-02	INNER MAST	1	Used for Lift Height 157"
3a	2415-631000-1D-05	INNER MAST	1	Used for Lift Height 189"
4	2130-420000-30-01	FREE LIFT CYLINDER	1	Used for Lift Height 157"
4a	2130-420000-30-03	FREE LIFT CYLINDER	1	Used for Lift Height 189"
5	2415-600004-10	ROLLER BRACKET	1	
6	2214-600001-00	CHAIN ROLLER	4	
7	0000-000183-00	RETAINER RING Ø35	12	
8	2415-600500-10	MIDDLE CYLINDER BRACKET	1	
9	0000-000593-00	BOLT M12×40	1	
10	0000-000060-00	LOCKWASHER Ø12	6	
11	0000-000222-00	FLATWASHER Ø12	8	
12	2415-600005-1A	MIDDLE HOSE PULLEY	1	
13	2415-600006-1A	BUSHING	2	
14	0000-001413-00	BOLT M12×100	2	
15	0000-000165-00	NUT M12	1	
16	0000-000210-00	FLATWASHER Ø8	2	
17	2415-600013-10	MIDDLE CYLINDER BLOCK	2	
18	0000-001416-00	BOLT M12X60	2	
19	2415-421000-10	LIFTING WELDMENT	1	
20	2415-600001-10	DRAG CHAIN LOWER TIE PLATE	1	
21	0000-000089-00	FLATWASHER Ø4	4	
22	0000-000122-00	LOCKWASHER Ø4	4	
23	0000-000028-00	SCREW M4×10	4	
24	2415-612000-10	ROLLER ASSEMBLY	8	
25	2415-600017-1A	SENSOR BRACKET	1	
26	2415-520006-20	SPEED CUT OFF SWITCH WIRING	1	
27	3120-600001-00	GUIDE PLATE	2	
28	58A04-30T01	WASHER	A.R.	As Required
29	0000-001210-00	BOLT M16X55	2	Used up to serial number 327100496
29a	0000-001210-00	BOLT M16X55	4	Used from serial number 327100497
30	0000-000190-00	FLATWASHER Ø16	2	
31	2415-650000-10-05	LIFT CYLINDER	2	Used for Lift Height 157"
31a	2415-650000-10-07	LIFT CYLINDER	2	Used for Lift Height 189"
32	2415-600007-10	CYLINDER BRACKET	2	
33	0000-000277-00	BOLT M8X25	4	
34	0000-000159-00	LOCKWASHER Ø8	12	
35	0000-000176-00	FLATWASHER Ø8	10	

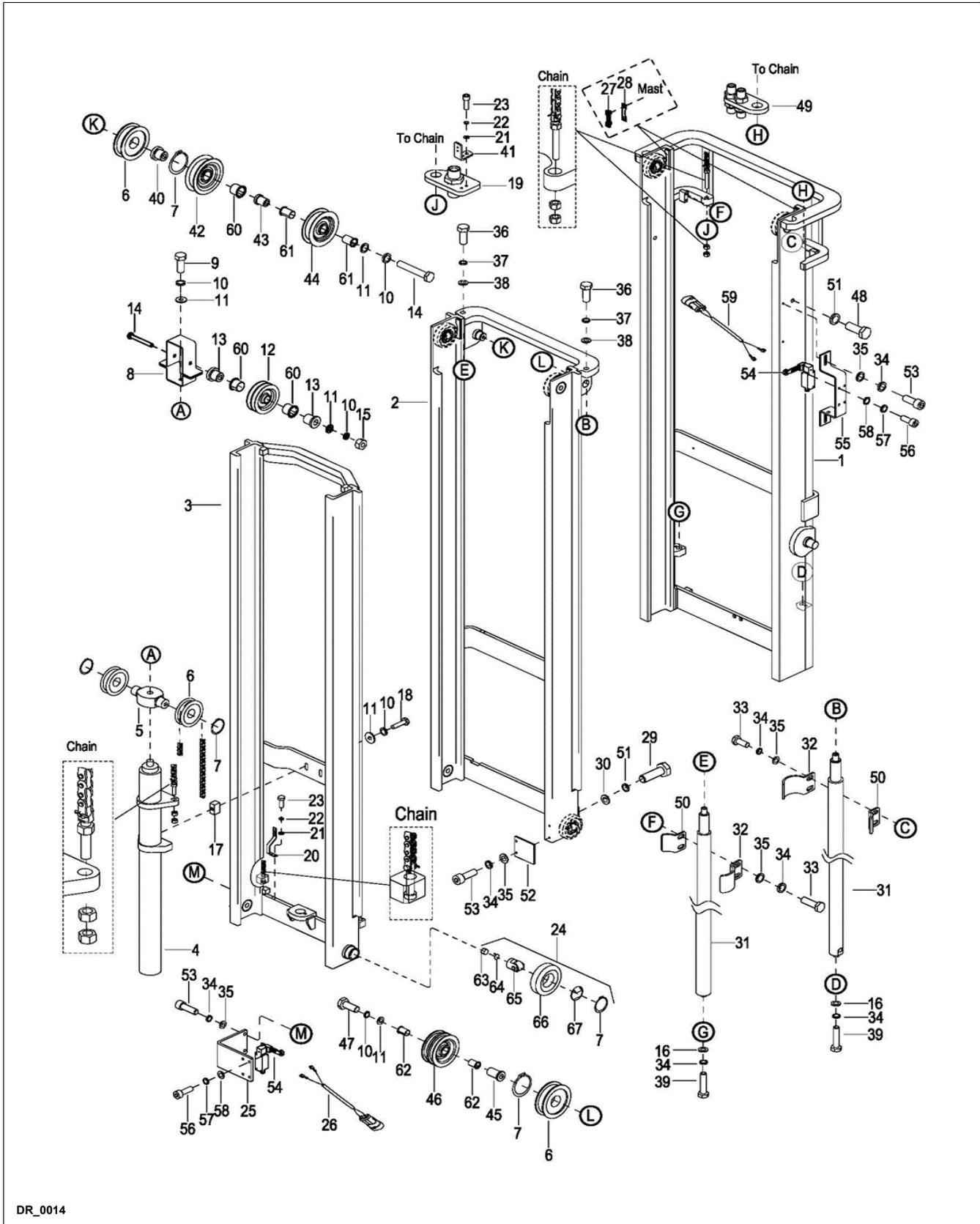
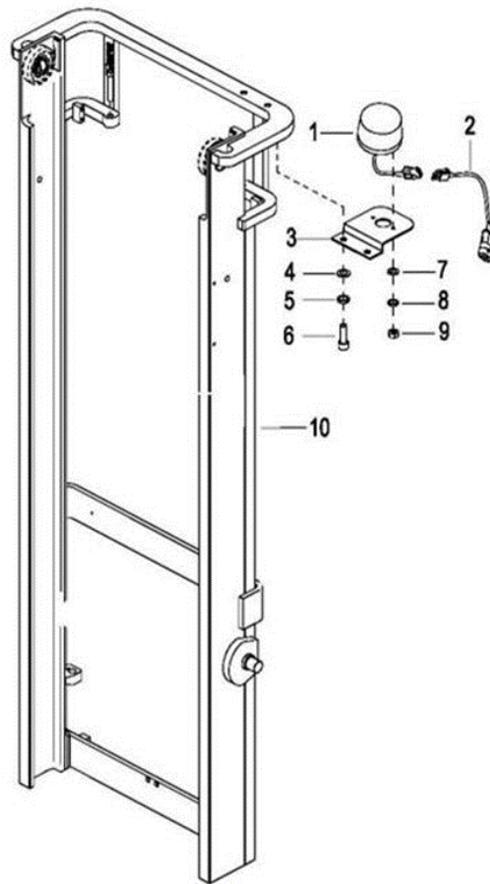


Figure 12-20 Trimast Assembly - Continued

TRIMAST ASSEMBLY - CONTINUED

Pos.	Part Number	Description	Qty. Reqd.	Notes
36	0000-001415-00	BOLT M10X30	2	
37	0000-000063-00	LOCKWASHER Ø10	2	
38	0000-000175-00	FLATWASHER Ø10	2	
39	0000-001412-00	BOLT M8X40	2	
40	2415-600019-00	BUSHING	1	
41	2415-600008-10	DRAG CHAIN UPPER TIE PLATE	1	
42	2415-600018-00	ROLLER	1	
43	2415-600009-1A	BUSHING	1	
44	2415-600010-1A	CHAIN ROLLER	1	
45	2415-600012-1A	BUSHING	1	
46	2415-600011-1A	DUAL PULLEY	1	
47	0000-001414-00	BOLT M12×80	1	
48	0000-000996-00	BOLT M16X45	2	
49	2415-420100-10	WELDMENT	1	
50	2415-600015-10	CYLINDER BRACKET	2	
51	0000-000191-00	LOCKWASHER Ø16	4	
52	2415-600016-1A	LIMIT SWITCH PLATE	1	
53	0000-000118-00	SCREW M8X10	6	
54	2125-500003-00	PROXIMITY SWITCH	2	
55	2415-600018-10	SENSOR BRACKET	1	
56	0000-000117-00	SCREW M5X10	6	
57	0000-000206-00	LOCKWASHER Ø5	6	
58	0000-000390-00	FLATWASHER Ø5	6	
59	2415-520007-2B-08	LIFT LIMIT PROXIMITY SWITCH WIRING	1	Used for Lift Height 157"
59a	2415-520007-2B-10	LIFT LIMIT PROXIMITY SWITCH WIRING	1	Used for Lift Height 189"
60	2415-600022-00	BEARING	3	
61	3316-500004-10	BEARING	2	
62	2415-600020-00	BEARING	2	
63	2415-612001-10	SCREW	8	
64	2415-612002-10	SNAP RING	8	
65	2415-612003-10	SHAFT ROLLER	8	
66	2415-612004-10	MAIN ROLLER	8	
67	2415-612005-10	DUST SNAP	8	

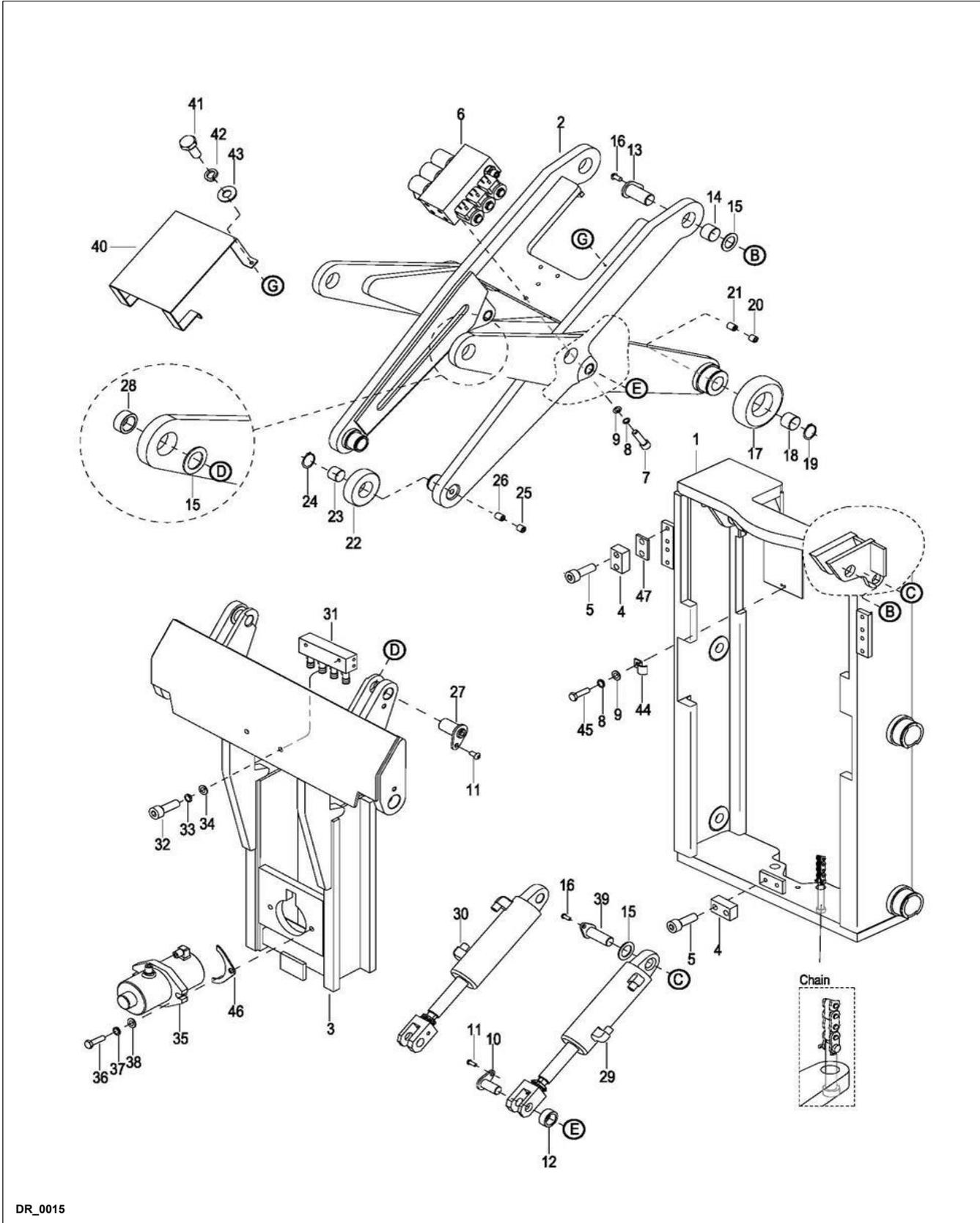


DR_0042

Figure 12-21 Option for Trimast 189"

OPTION FOR TRIMAST 189”

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	CK10-520015-10	WARNING LIGHT	1	Option, for the travel alarm.
2	2415-521001-B0	WARNING LIGHT WIRING	1	Option, for the travel alarm.
3	2333-500001-50	BRACKET	1	Option, for the travel alarm.
4	0000-000176-00	FLAT WASHER Ø8	6	
5	0000-000159-00	LOCK WASHER Ø8	6	
6	0000-000109-00	SCREW M8×16	6	
7	0000-000702-00	FLAT WASHER Ø4	2	
8	0000-000122-00	LOCK WASHER Ø4	2	
9	0000-000139-00	NUT M4	2	
10	2415-611000-B0	EXTERNAL MAST	1	189” (4800mm), for the travel alarm



DR_0015

Figure 12-22 Trimast Reach Assembly

TRIMAST REACH ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-641100-1B	SCISSORS BASE	1	
2	--	SCISSORS	1	See Scissor Section
3	2415-644000-1C	FORK WELDMENT	1	
4	2125-600005-00	BUFFER BLOCK	5	
5	0000-000321-00	SCREW M8X20	5	
6	2415-441000-30	TRIPLE SOLENOID VALVE	1	
7	0000-000006-00	SCREW M6X30	3	
8	0000-000056-00	LOCKWASHER Ø6	5	
9	0000-000123-00	FLATWASHER Ø6	5	
10	2415-640600-10	SHORT PIN WELDING	2	
11	0000-000126-00	SCREW M6X16	4	
12	2415-640006-10	BEARING	2	
13	2415-640200-10	LONG PIN WELDING	2	
14	2415-640001-10	BEARING	2	
15	2415-640002-10	WASHER	6	
16	0000-000700-00	SCREW M8X16	4	
17	2415-642201-10	EXTERNAL SCISSORS MAIN ROLLER	2	
18	2415-642202-10	SLIDER	2	
19	2415-642203-10	RETAINER RING Ø55	3	
20	2415-642204-10	SCREW M10X1X12	2	
21	2415-642205-10	SCREW M10X1X16	2	
22	2415-643201-10	INTERNAL SCISSORS MAIN ROLLER	2	
23	2415-643202-10	SLIDER	2	
24	2415-643203-10	RETAINER RING Ø34	2	
25	2415-643204-10	SCREW M10X1X14	2	
26	2415-643205-10	SCREW M10X1X16	2	
27	2415-640300-10	SHORT PIN WELDING	2	
28	2415-640003-10	BEARING	2	
29	2415-647000-10	REACH CYLINDER LEFT	1	
30	2415-648000-10	REACH CYLINDER RIGHT	1	
31	2415-420200-10	EIGHT-WAY VALVE	1	
32	0000-000109-00	SCREW M8×16	2	
33	0000-000159-00	LOCKWASHER Ø8	2	
34	0000-000105-00	FLATWASHER Ø8	2	
35	2415-646000-10	TILT CYLINDER	1	
36	0000-000283-00	BOLT M10X35	2	
37	0000-000063-00	LOCKWASHER Ø10	2	
38	0000-000007-00	FLATWASHER Ø10	2	
39	2415-640500-10	LONG PIN WELDING	2	

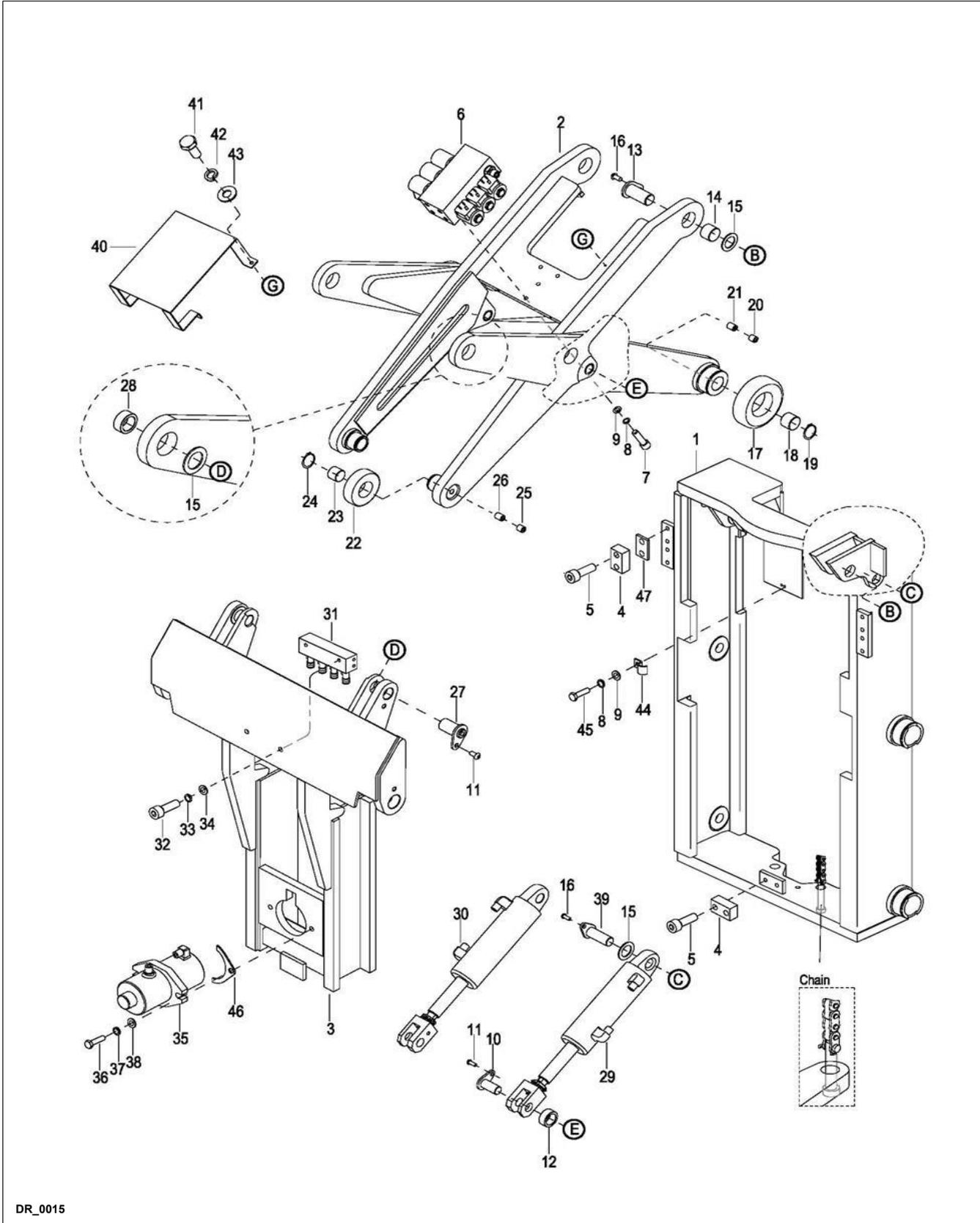
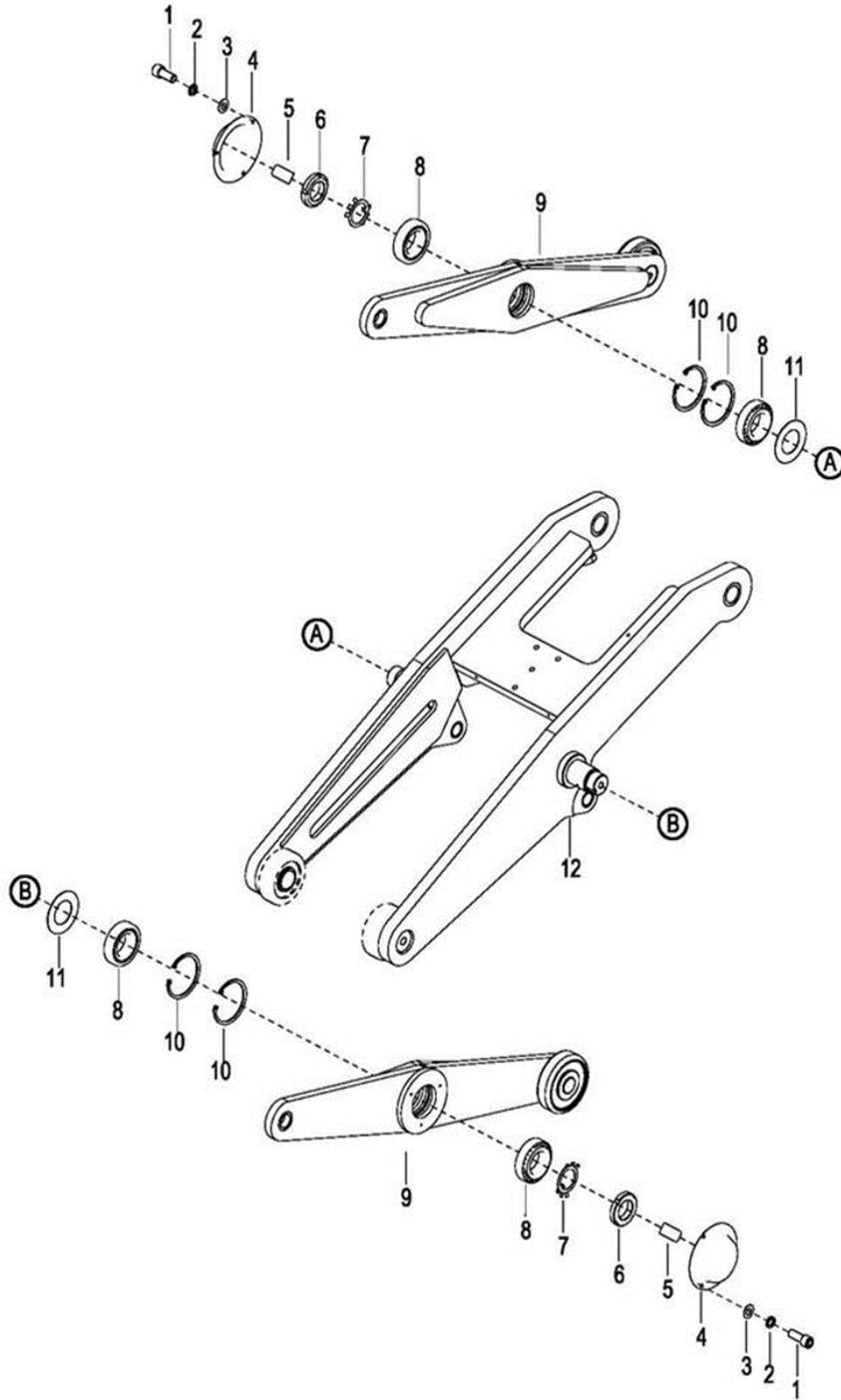


Figure 12-22 Trimast Reach Assembly - Continued

TRIMAST REACH ASSEMBLY - CONTINUED

Pos.	Part Number	Description	Qty. Reqd.	Notes
40	2415-600014-10	COVER	1	
41	0000-000028-00	BOLT M4X10	3	
42	0000-000122-00	LOCKWASHER Ø4	3	
43	0000-000089-00	FLATWASHER Ø4	3	
44	3316-610001-10	FIXED BLOCK	2	
45	0000-000988-00	BOLT M6X30	2	
46	2415-640010-1A	WASHER	2	
47	2415-640011-10	WASHER	4	

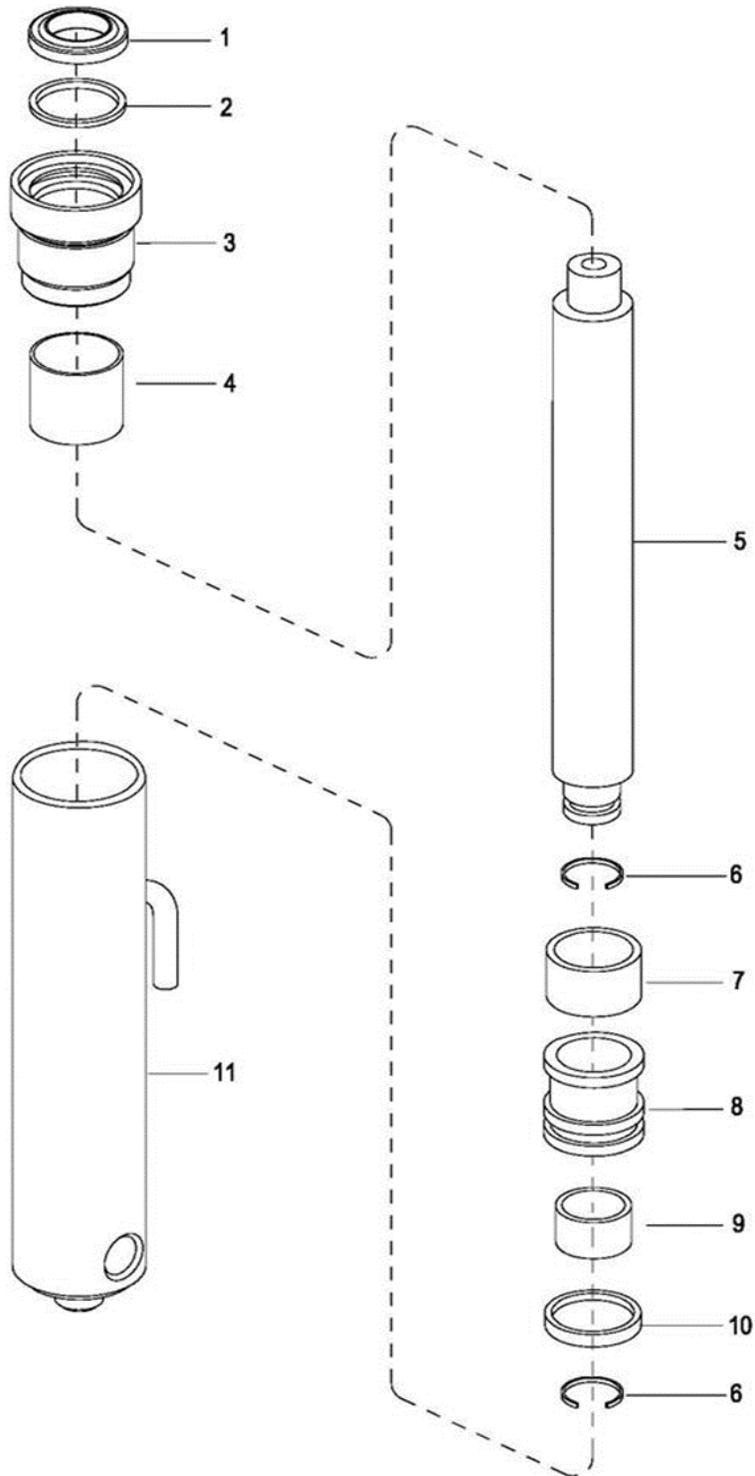


DR_0016

Figure 12-23 Telescopic and Trimast Scissor Assembly

TELESCOPIC AND TRIMAST SCISSOR ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000088-00	SCREW M4X8	8	
2	0000-000122-00	LOCKWASHER Ø4	8	
3	0000-000702-00	FLATWASHER Ø4	8	
4	2415-640008-10	DUST CAP	2	
5	0000-000012-00	OIL BOTTLE Ø8	2	
6	0000-001048-00	ROUND NUT M30X1.5	2	
7	0000-001049-00	LOCKWASHER M30	2	
8	0000-001407-00	BEARING	4	
9	2415-642100-10	EXTERNAL SCISSORS	2	
10	0000-000762-00	CIRCLIP OF HOLE Ø62	4	
11	2415-640007-10	INNER DUSTPROOF PLATE	2	
12	2415-643100-1A	INTERNAL SCISSORS	1	

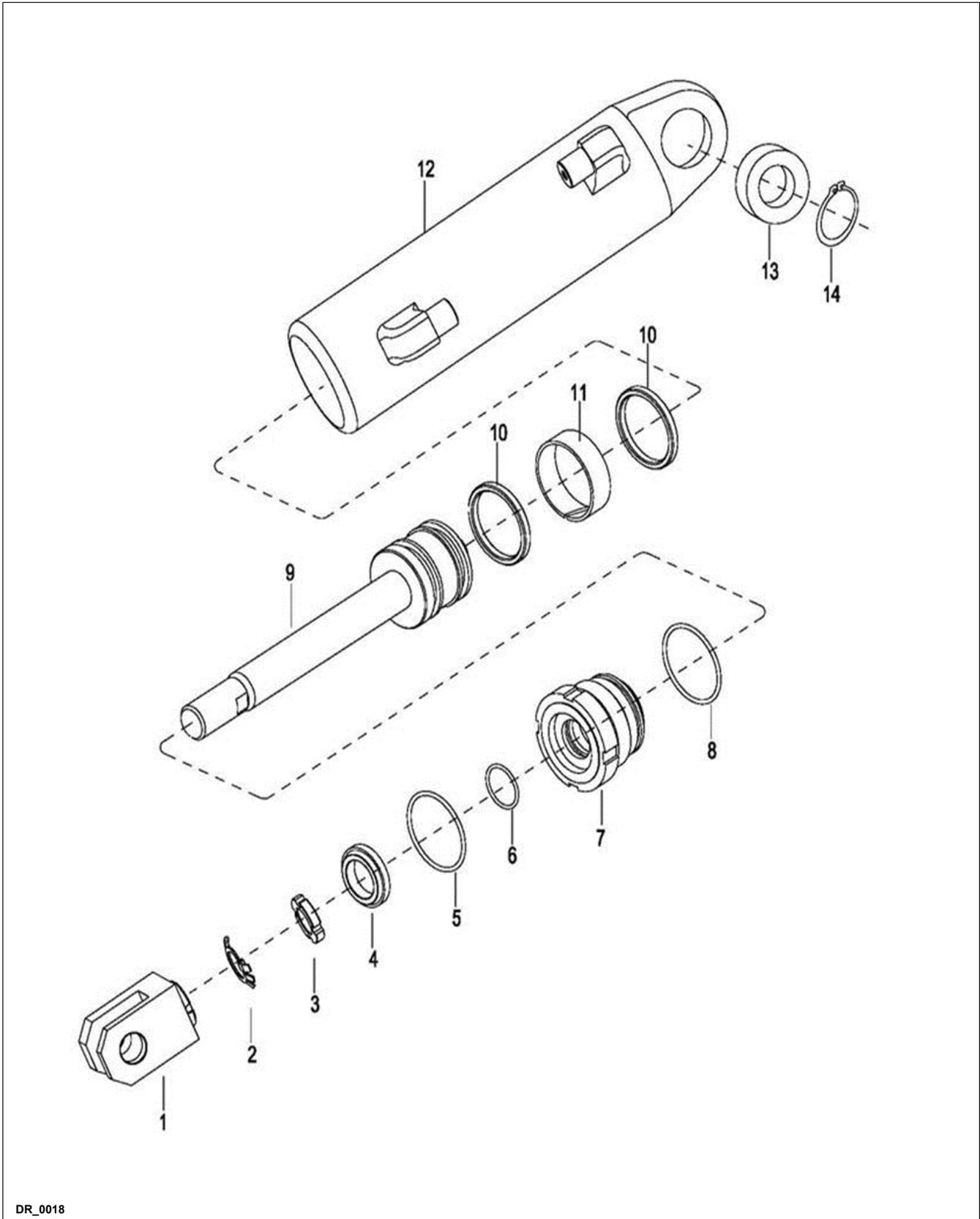


DR_0017

Figure 12-24 Trimast Lift Cylinder

TRIMAST LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2415-650000-10-05	LIFT CYLINDER	1	Used for lift height 157"
--	2415-650000-10-07	LIFT CYLINDER	1	Used for lift height 189"
KIT	2415-2BG	SEAL KIT FOR LIFTING CYLINDER	1	Includes pos. # 1, 2 & 9
1	0000-000084-00	RING WIPER 35×43×5-6.5	1	
2	0000-000370-00	O-RING 40×3.1	1	
3	1220-420001-0B	CAP	1	
4	1220-420004-00	BEARING 39*35*24	1	
5	2415-680001-10-05	PISTON ROD	1	Used for Lift Height 157"
5a	2415-680001-10-07	PISTON ROD	1	Used for Lift Height 189"
6	2125-410003-00	COLLAR	2	
7	2415-650001-10	RING BACK UP 40*35*15	1	
8	2415-680002-10	PISTON	1	
9	0000-000132-00	ROD PACKING 30×40×6	1	
10	2125-410005-3A	CUSHION COLLAR	1	
11	2415-681000-10-05	CYLINDER TUBE	1	Used for Lift Height 157"
11a	2415-681000-10-07	CYLINDER TUBE	1	Used for Lift Height 189"



DR_0018

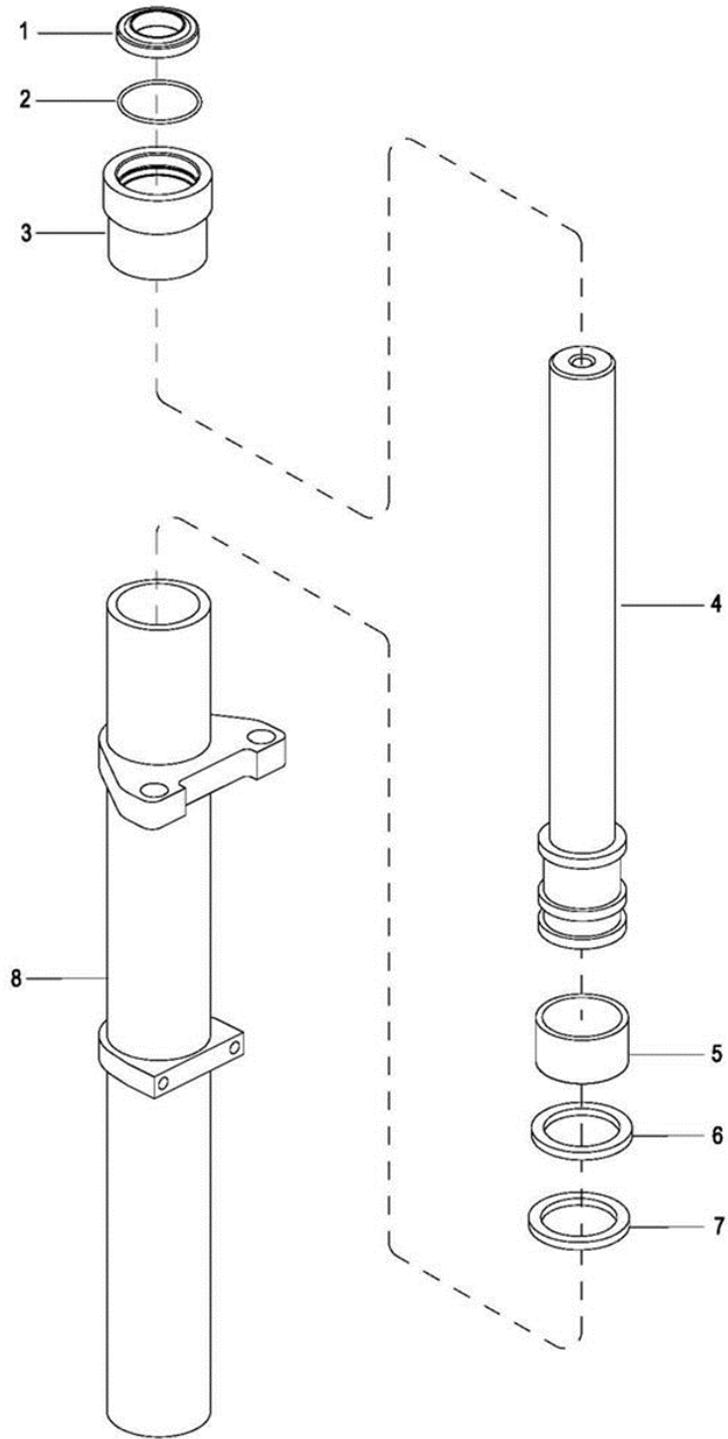
Figure 12-25 Reach Cylinder

REACH CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2415-647000-10	REACH CYLINDER LEFT	1	
--	2415-648000-10	REACH CYLINDER RIGHT	1	
KIT	2415-QYG	SEAL KIT FOR REACH CYLINDER	1	One Seal Kit per cylinder Includes Pos. # 4,5,6,8 & 10
1	2415-640005-10	CONNECTOR	1	
2	2415-647003-10	LOCK WASHER M18	1	
3	2415-647004-10	SMALL ROUND NUT M18X1.5	1	
4	0000-000137-00	SEAL 25X33X4.8	1	
5	2415-647005-10	O-RING 55X2.4	1	
6	2415-647006-10	SEAL 25X33X5	1	
7	2415-647001-10	GUIDE SLEEVE	1	
8	2415-647007-10	O-RING 50X3.1	1	
9	2415-647200-10	PISTON ROD	1	
10	0000-001089-00	SEAL 50X60X6	2	
11	2415-647002-10	RETAINING RING 60X55X10	1	
12	2415-647100-10	LEFT REACH CYLINDER TUBE	1	
12	2415-648100-10	RIGHT REACH CYLINDER TUBE	1	
13	2415-647008-10	STEEL-BACKED BEARING 20X35X12X16	1	
14	2415-647009-10	INTERNAL CIRCLIP 35	1	

TILT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2415-646000-10	TILT CYLINDER	1	
KIT	2415-QXG	SEAL KIT FOR TILT CYLINDER	1	Includes Pos. # 5,6,7,8 & 9
1	2415-646100-10	CYLINDER BODY	1	
2	2415-646001-10	RETAINING RING 10X2.5	1	
3	2415-646200-10	PISTON ROD	1	
4	2415-646002-10	GUIDE SLEEVE	1	
5	0000-000966-00	O-RING 63X3.1	1	
6	0000-000980-00	SEAL 32	1	
7	0000-000699-00	SEAL 53X63X6	2	
8	0000-000972-00	SEAL 40X32X5	1	
9	0000-000971-00	O-RING 37X3.1	1	

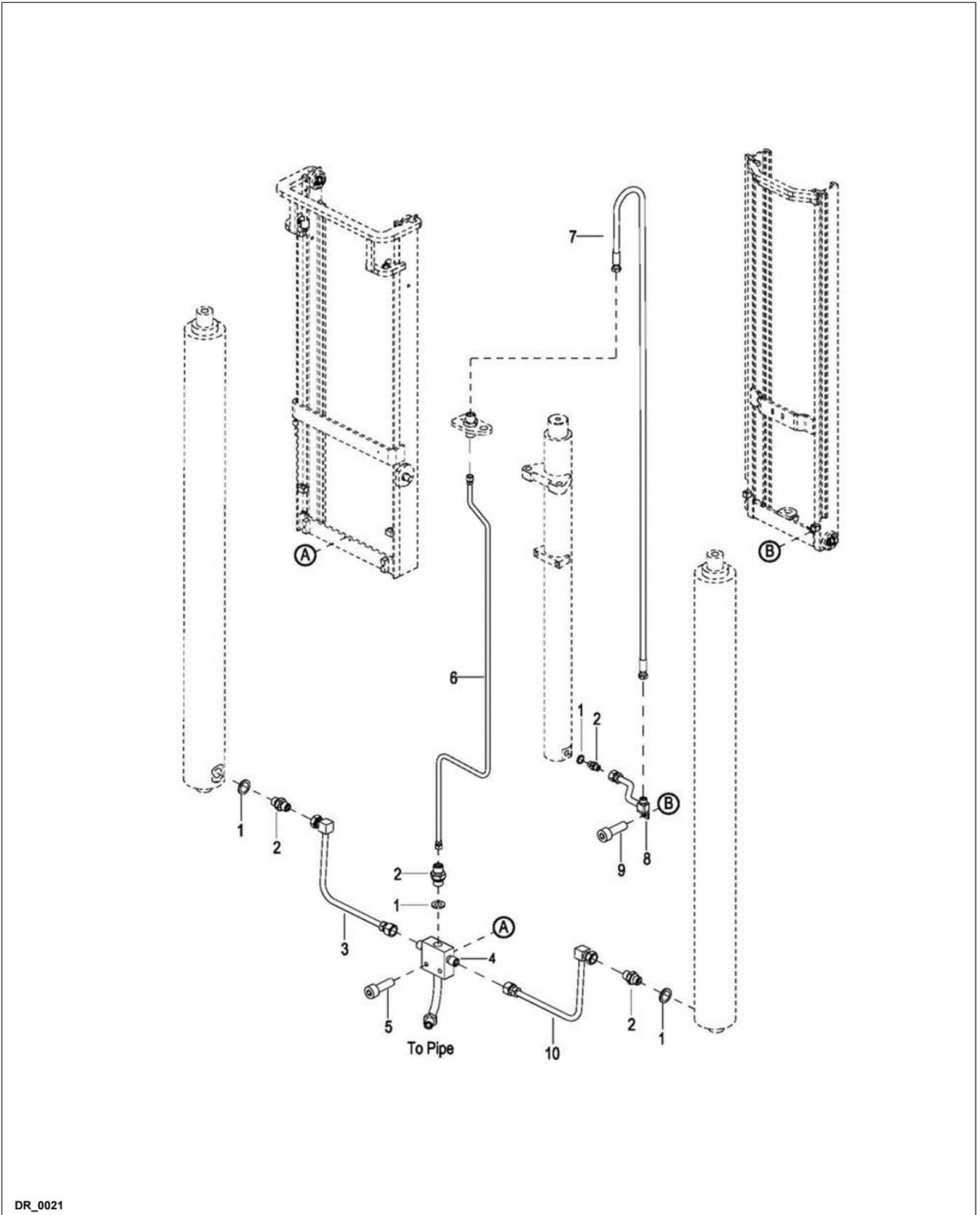


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Figure 12-27 Trimast Free Lift Cylinder

TRIMAST FREE LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2130-420000-30-01	FREE LIFT CYLINDER	1	Used for Lift Height 157"
--	2130-420000-30-03	FREE LIFT CYLINDER	1	Used for Lift Height 189"
KIT	2130-3ZG	SEAL KIT	1	Includes Pos. # 1,2 & 7
1	0000-000045-00	RING WIPER 55×63×5-6.5	1	
2	0000-000690-00	O-RING 60×3.1	1	
3	2130-420002-30	CAP	1	
4	2130-420001-30-01	PISTON ROD	1	Used for Lift Height 157"
4a	2130-420001-30-03	PISTON ROD	1	Used for Lift Height 189"
5	2130-420003-30	RING BACK UP 70×65×20	1	
6	0000-000698-00	SNAP RING 53×63×2	1	
7	0000-000699-00	COLLAR 53×63×6	1	
8	2130-421000-30-01	CYLINDER TUBE	1	Used for Lift Height 157"
8a	2130-421000-30-03	CYLINDER TUBE	1	Used for Lift Height 189"

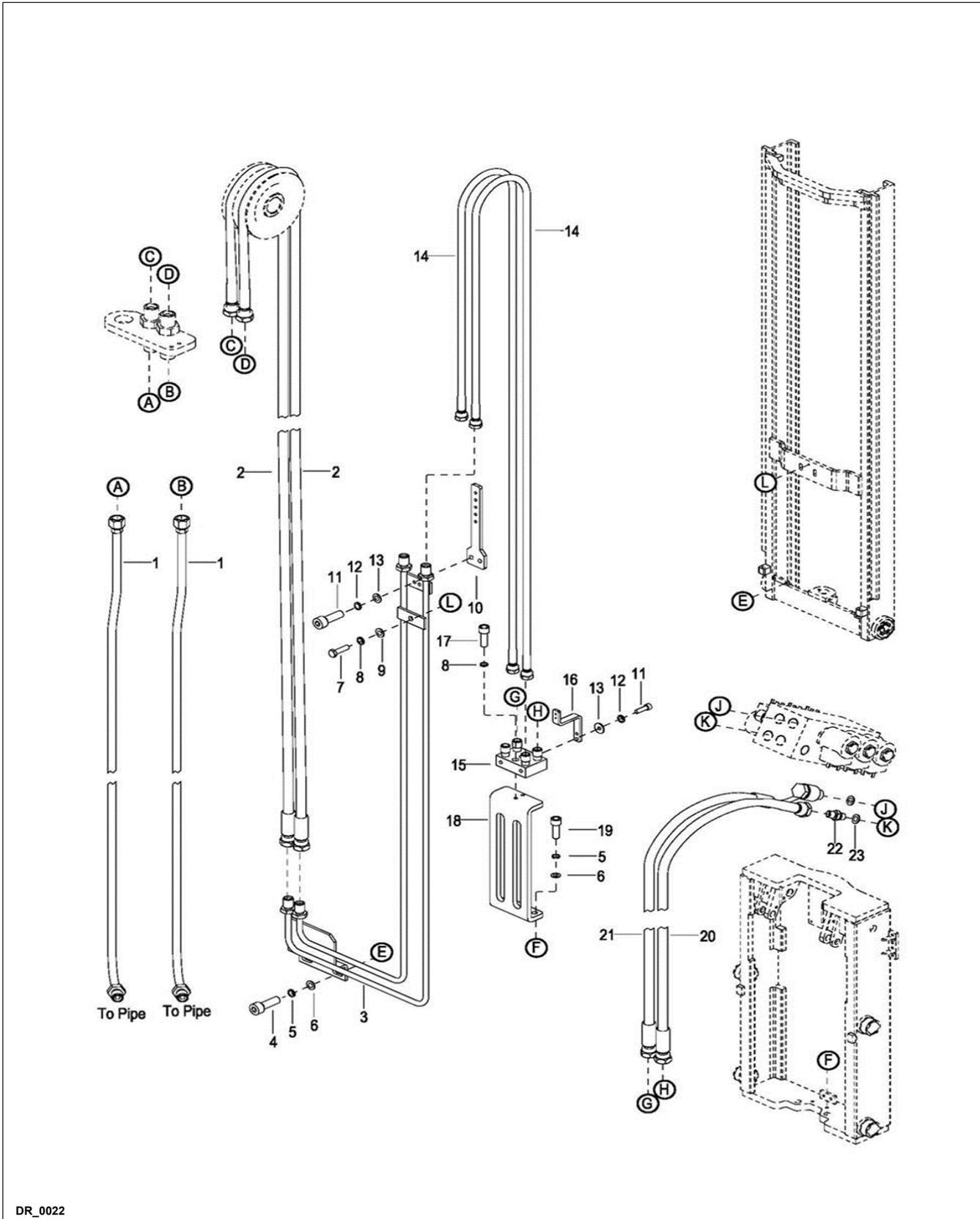


DR_0021

Figure 12-28 Hydraulic Lines for Trimast Lift Cylinder

HYDRAULIC LINES FOR TRIMAST LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000069-00	WASHER Ø16	4	
2	2701-161600-00	CONNECTOR M16×1.5-M16×1.5	4	
3	2415-420300-10	HYDRAULIC LINEASSEMBLY LEFT	1	
4	2415-426000-10	BLOCK CROSS	1	
5	0000-000151-00	SCREW M8×25	2	
6	2415-422000-1A-01	HYDRAULIC LINE	1	Used for Lift Height 157"
6a	2415-422000-1A-03	HYDRAULIC LINE	1	Used for Lift Height 189"
7	2415-430400-1A-01	HOSE	1	Used for Lift Height 157"
7a	2415-430400-1A-03	HOSE	1	Used for Lift Height 189"
8	2415-423000-10	HYDRAULIC LINE	1	
9	0000-000321-00	SCREW M8×20	1	
10	2415-420400-10	HYDRAULIC LINEASSEMBLY RIGHT	1	

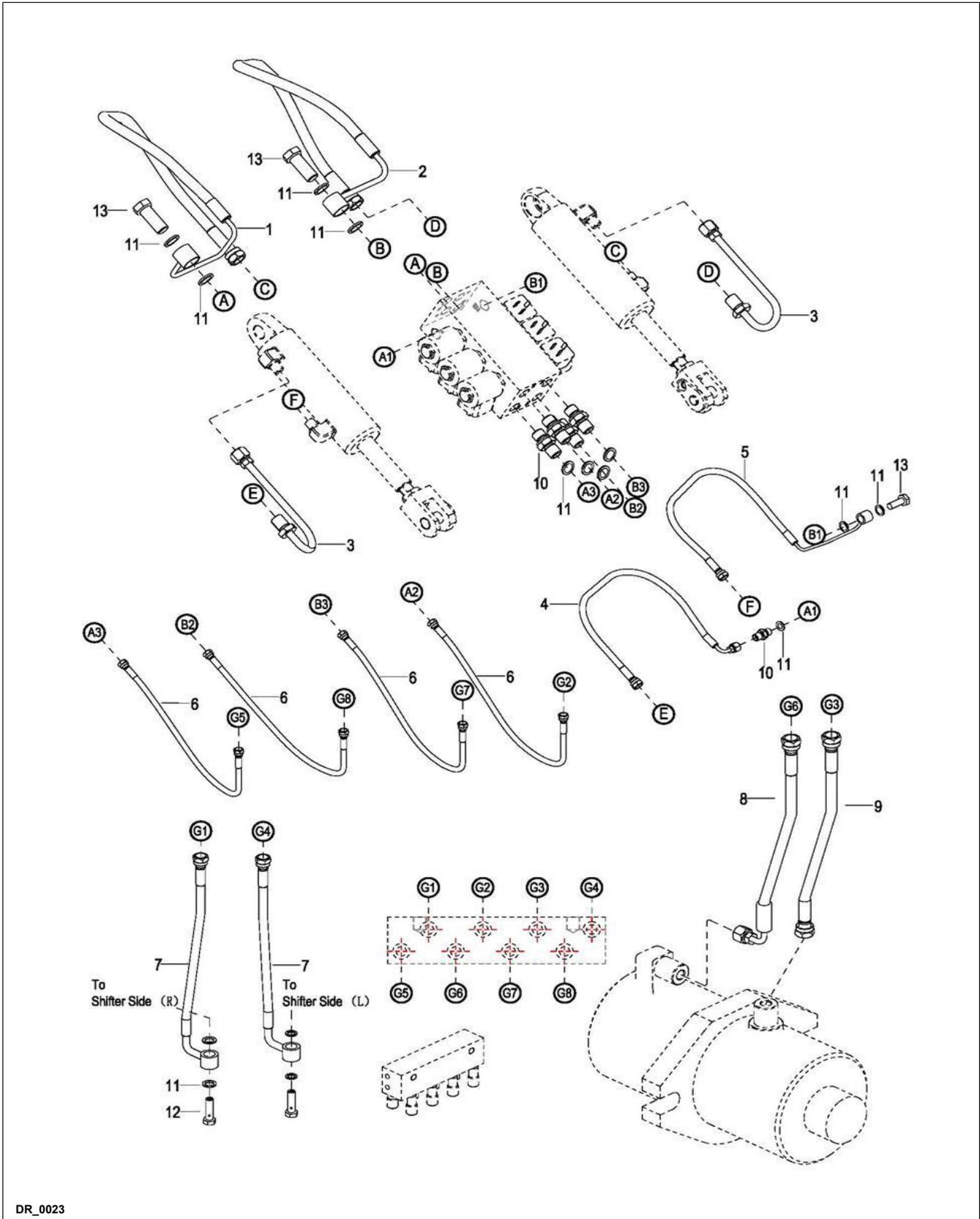


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Figure 12-29 Hydraulic Lines for Trimast

HYDRAULIC LINES FOR TRIMAST

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-427000-10-01	HYDRAULIC LINE ASSEMBLY	2	Used up to serial number 325200481 - for Lift Height 157"
1a	2415-427000-1B-01	HYDRAULIC LINE ASSEMBLY	2	Used from serial number 325200482 - for Lift Height 157"
1b	2415-427000-10-03	HYDRAULIC LINE ASSEMBLY	2	Used up to serial number 325200481 - for Lift Height 189"
1bc	2415-427000-1B-03	HYDRAULIC LINE ASSEMBLY	2	Used from serial number 325200482 - for Lift Height 189"
2	2415-430500-1A-01	OIL PIPE	2	Used for Lift Height 157"
2a	2415-430500-1A-03	OIL PIPE	2	Used for Lift Height 189"
3	2415-428000-10-02	HYDRAULIC LINE ASSEMBLY	1	Used up to serial number 325200481 - for Lift Height 157"
3a	2415-428000-1B-02	HYDRAULIC LINE ASSEMBLY	1	Used from serial number 325200482 - for Lift Height 157"
3b	2415-428000-10-04	HYDRAULIC LINE ASSEMBLY	1	Used up to serial number 325200481 - for Lift Height 189"
3c	2415-428000-1B-04	HYDRAULIC LINE ASSEMBLY	1	Used from serial number 325200482 - for Lift Height 189"
4	0000-000109-00	SCREW M8X16	2	
5	0000-000159-00	LOCKWASHER Φ 8	2	
6	0000-000176-00	FLATWASHER Φ 8	2	
7	0000-000274-00	BOLT M6 \times 25	1	
8	0000-000056-00	LOCKWASHER Φ 6	3	
9	0000-000123-00	FLATWASHER Φ 6	1	
10	2415-600003-1A	BRACKET	1	
11	0000-000028-00	SCREW M4 \times 10	4	
12	0000-000122-00	LOCKWASHER Φ 4	4	
13	0000-000089-00	FLATWASHER Φ 4	4	
14	2415-430600-1A-01	HYDRAULIC LINE	2	Used for Lift Height 157"
14a	2415-430600-1A-03	HYDRAULIC LINE	2	Used for Lift Height 189"
15	2415-429000-10	VALVE BLOCK	1	
16	2415-600002-10	BRACKET	1	
17	0000-000032-00	SCREW M6X20	2	
18	2415-640009-10	MOUNTING PLATE	1	
19	0000-000322-00	SCREW M8X25	2	
20	2415-430300-10	HYDRAULIC LINE B	1	
21	2415-430200-10	HYDRAULIC LINE A	1	
22	2702-141400-00	CONNECTOR G1/4-M14 \times 1.5	1	
23	0000-000044-00	WASHER Φ 14	2	



DR_0023

Figure 12-30 Hydraulic Lines for Reach Assembly (Telescopic and Trimast)

HYDRAULIC LINES FOR REACH ASSEMBLY (TELESCOPIC AND TRIMAST)

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-431000-10	HYDRAULIC LINE FROM A1 TO LEFT CYLINDER	1	
2	2415-433000-10	HYDRAULIC LINE FROM B1 TO LEFT CYLINDER	1	
3	2415-425000-10	TILT CYLINDER HYDRAULIC LINE	2	
4	2415-432000-10	HYDRAULIC LINE FROM A1 TO RIGHT CYLINDER	1	
5	2415-434000-10	HYDRAULIC LINE FROM B1 TO RIGHT CYLINDER	1	
6	2415-431000-30	FLOWLINE A2	4	
7	2415-432000-30	SIDESHIFTER HOSE	2	
8	2415-437000-10	REVERSE HOSE	1	
9	2415-436000-10	FORWARD HOSE	1	
10	2702-141400-00	CONNECTOR G1/4-M14×1.5	5	
11	0000-000044-00	WASHER Ø14	15	
12	2401-143500-00	BOLT M14X35	2	
13	2402-143500-00	BOLT G1/4×35	3	

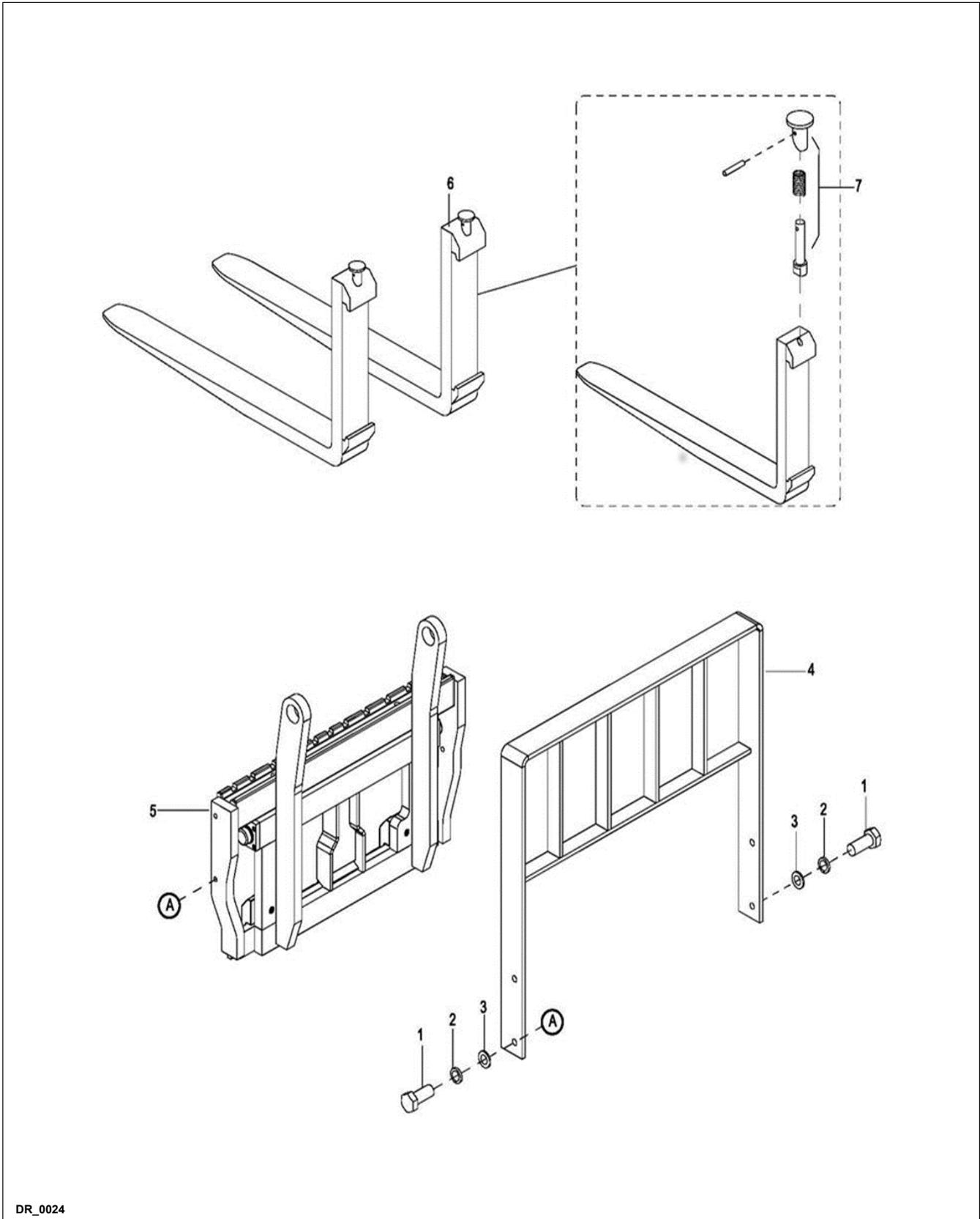
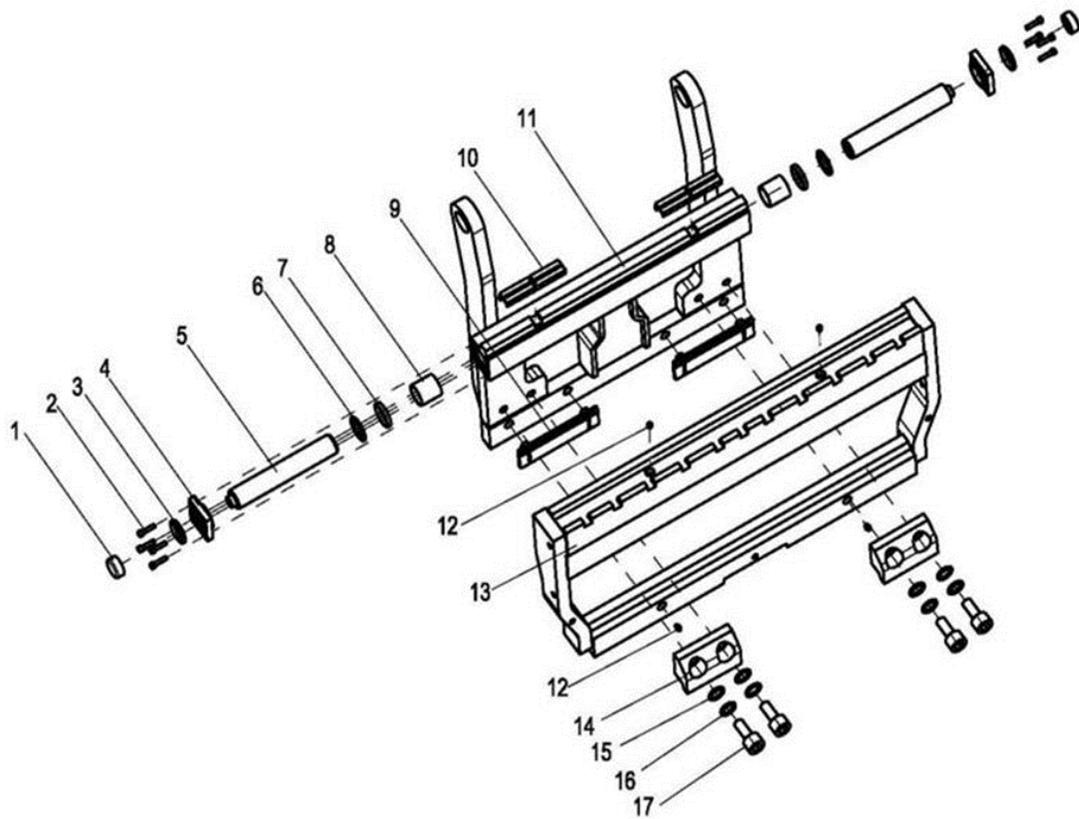


Figure 12-31 Side Shift Assembly

SIDE SHIFT ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000221-00	BOLT M12×30	4	
2	0000-000060-00	LOCKWASHER Ø12	4	
3	0000-000373-00	FLATWASHER Ø12	4	
4	2415-640100-00-01	LOAD BACKREST	1	28" Height
4a	2415-640100-00-02	LOAD BACKREST	1	36" Height
4b	2415-640100-00-03	LOAD BACKREST	1	48" Height
5	2415-645000-00	SIDE SHIFTER	1	
6	3218-800001-10	FORK	2	Fork Length 36"
6a	3218-800001-20	FORK	2	Fork Length 42"
6b	3218-800001-40	FORK	2	Fork Length 48"
7	3218-800002-00	PIN ASSEMBLY	2	

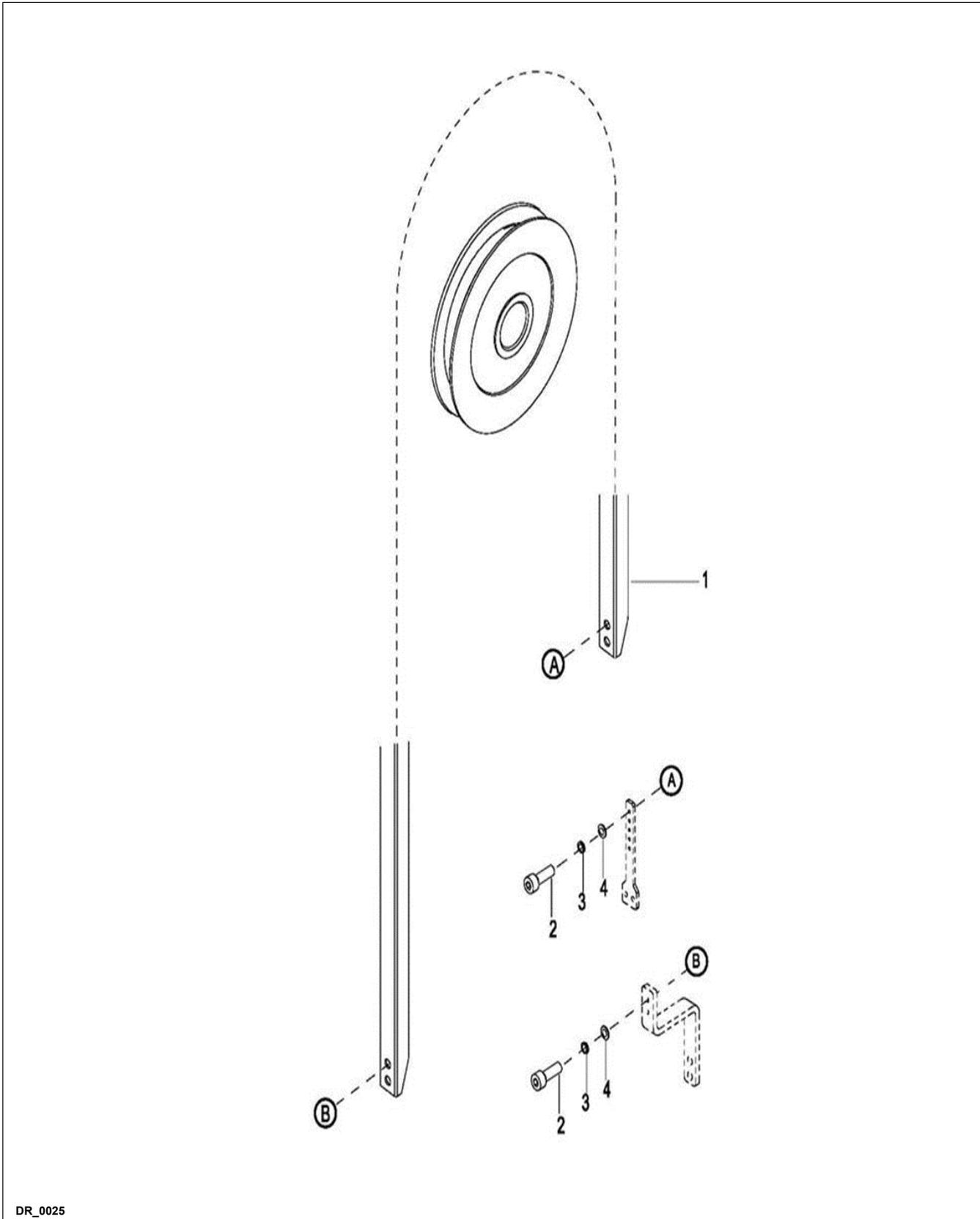


DR_0038

Figure 12-32 Side Shift Breakdown

SIDE SHIFT BREAKDOWN

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-645160-30	BOLT M12×30	2	
2	0000-000032-00	SCREW	8	
3	0000-000082-00	WIPER SEAL	2	
4	2415-645180-30	CYLINDER HEAD	1	
5	2415-645111-00	PISTON ROD	1	
6	0000-001566-00	BAFFEL	2	
7	0000-000085-00	SEAL	2	
8	0000-001567-00	BEARIN	2	
9	2415-645500-00	WEAR PLATE	2	
10	2415-645300-00	WEAR PLATE	2	
11	2415-645100-0A	SIDE SHIFT FRAME (FIXED)	1	
12	0000-000587-00	LUBRICATION FITTING M6	4	
13	2415-645200-00	SIDE SHIFT CARRIAGE (MOVEABLE)	1	
14	2415-645400-30	LOCKING BLOCK	2	
15	0000-000191-00	WASHER	4	
16	0000-000220-00	WASHER	4	
17	0000-001180-00	SCREW M16×1.5×40	4	

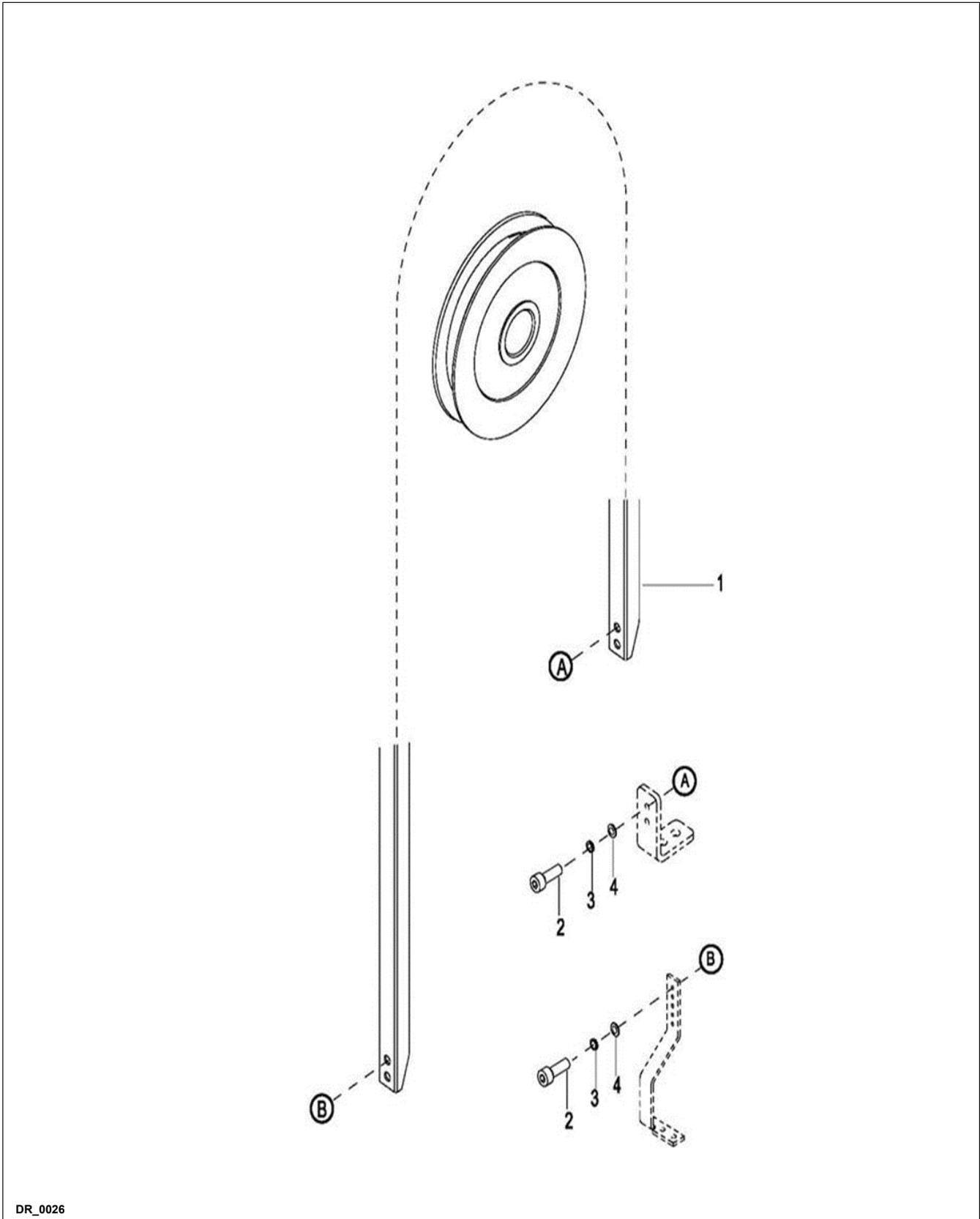


DR_0025

Figure 12-33 Drag Chain Assembly I - Trimast Free Lift Cylinder

DRAG CHAIN ASSEMBLY I - TRIMAST FREE LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-600300-10-01	DRAG CHAIN I	1	Used for 157" Lift Height
1a	2415-600300-10-03	DRAG CHAIN I	1	Used for 189" Lift Height
2	0000-001243-00	SCREW M3X6	4	
3	0000-000995-00	LOCKWASHER Ø3	4	
4	0000-000999-00	FLATWASHER Ø3	4	

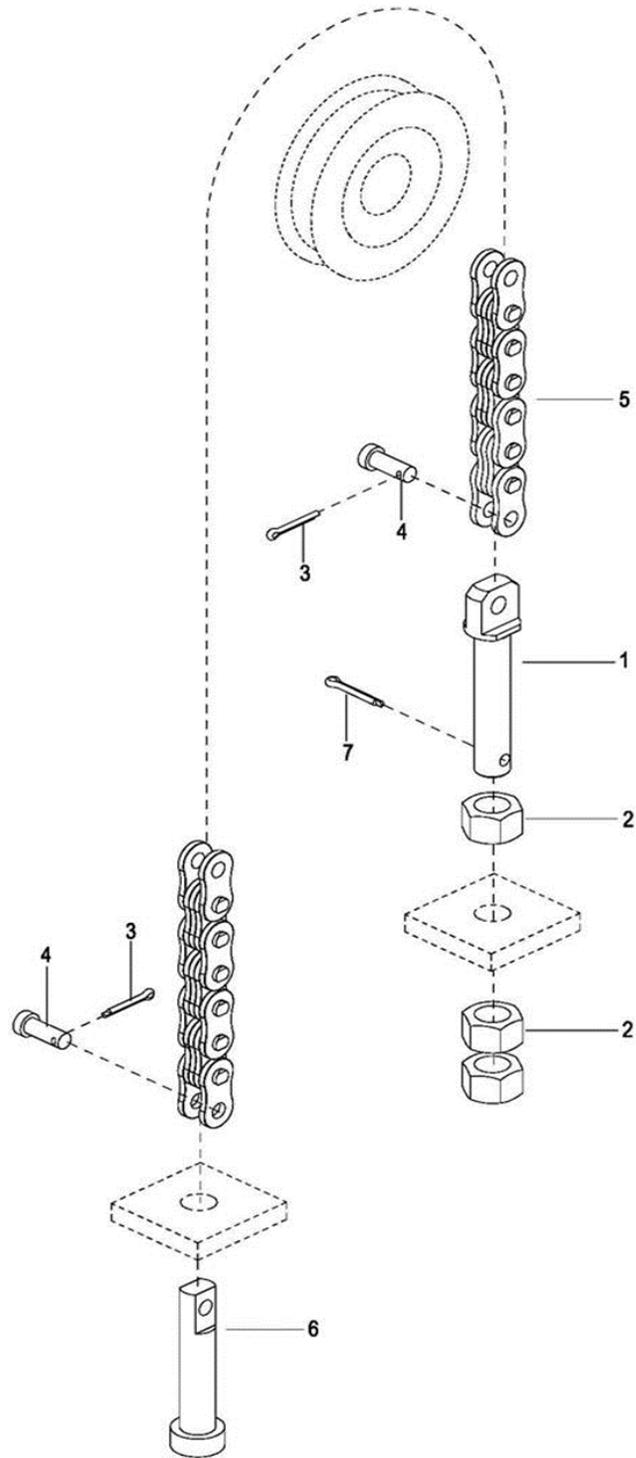


DR_0026

Figure 12-34 Drag Chain Assembly II - Trimast Lift Cylinder

DRAG CHAIN ASSEMBLY II - TRIMAST LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-600400-10-01	DRAG CHAIN II	1	Used for 157" Lift Height
1a	2415-600400-10-03	DRAG CHAIN II	1	Used for 189" Lift Height
2	0000-001243-00	SCREW M3X6	4	
3	0000-000995-00	LOCKWASHER Ø3	4	
4	0000-000999-00	FLATWASHER Ø3	4	

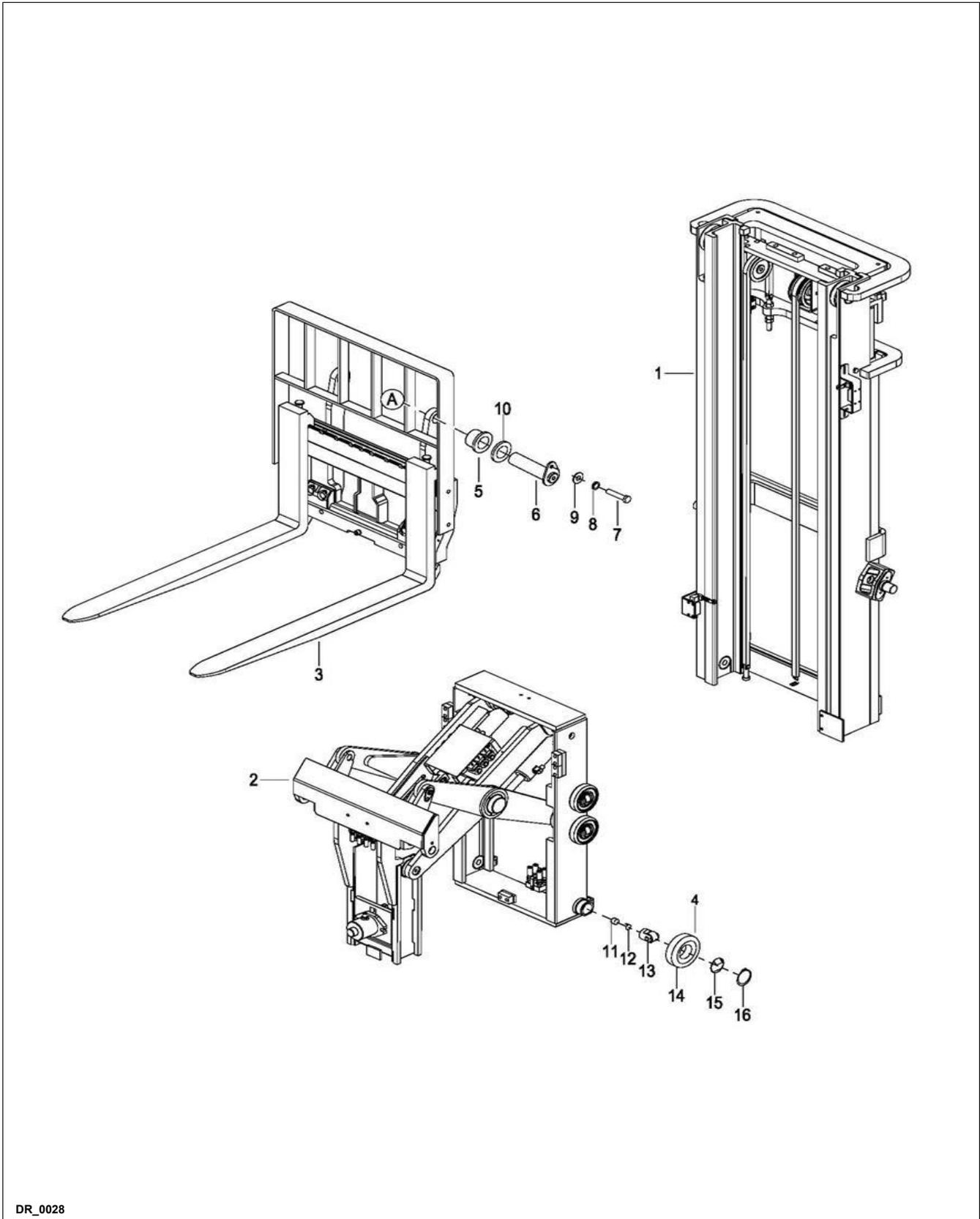


DR_0027

Figure 12-35 Chain Assembly

CHAIN ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2125-640001-00	BOLT	1	
2	0000-000187-00	NUT M16×1.5	3	
3	0000-000188-00	COTTER PIN Ø3.2×20	2	
4	2125-640002-00	PIN	2	
5	2415-600100-00-01	CHAIN ASSEMBLY	1	Used for Lift Height 102"
5a	2415-600100-0A-03	CHAIN ASSEMBLY	1	Used for Lift Height 106"
5b	2415-600100-00-02	CHAIN ASSEMBLY	1	Used for Lift Height 126"
5c	2415-600100-10-01	CHAIN ASSEMBLY I	1	Used for Lift Height 157"
5d	2415-600200-10-01	CHAIN ASSEMBLY II	1	Used for Lift Height 157"
5e	2415-600100-10-03	CHAIN ASSEMBLY I	1	Used for Lift Height 189"
5f	2415-600200-10-03	CHAIN ASSEMBLY II	1	Used for Lift Height 189"
6	2125-640003-00	CHAIN ANCHOR	1	
7	0000-000686-00	COTTER PIN Ø3.2×32	1	

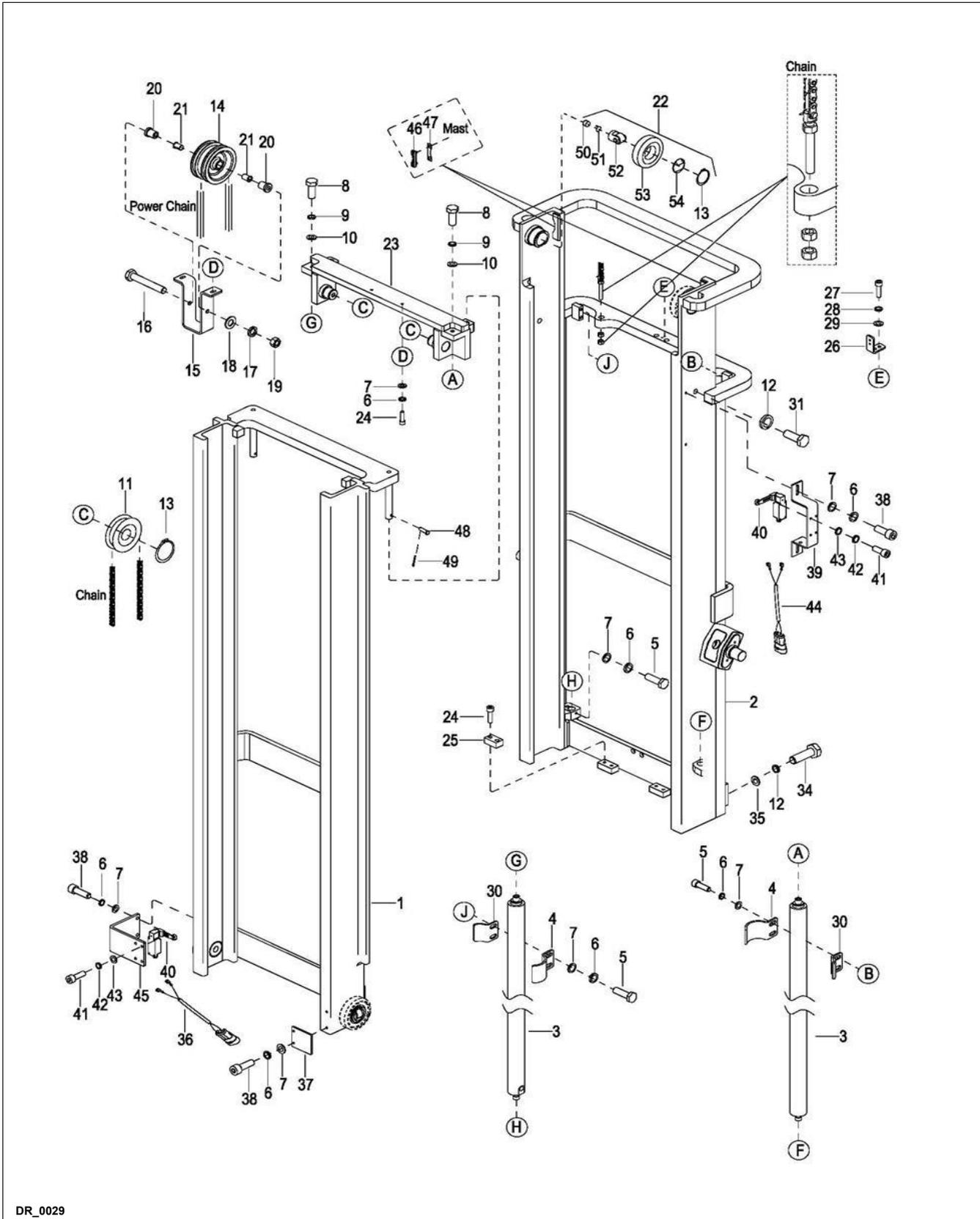


DR_0028

Figure 12-36 Telescopic System Assemblies

TELESCOPIC SYSTEM ASSEMBLIES

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	--	TELESCOPIC MAST LIFTING SYSTEM	1	See Trimast Assembly Section
2	--	TELESCOPIC REACH ASSEMBLY	1	See Telescopic Reach Assembly Section
3	--	SIDE SHIFTER ASSEMBLY	1	See Side Shift Assembly Section
4	2415-612000-10	ROLLER ASSEMBLY	6	
5	2415-640004-10	SELF-LUBRICATING BEARING	2	
6	2415-640400-10	SLIDING PIN	2	
7	0000-000277-00	BOLT M8X25	2	
8	0000-000159-00	LOCKWASHER Ø8	2	
9	0000-000176-00	FLATWASHER Ø8	2	
10	2415-640012-10-01	WASHER	A.R.	As Required - 2mm
10a	2415-640012-10-02	WASHER	A.R.	As Required - 3mm
11	2415-612001-10	Screw	4	
12	2415-612002-10	Snap Ring	4	
13	2415-612003-10	Assistant Roller	4	
14	2415-612004-10	Main Roller Assembly	4	
15	2415-612005-10	Dust Snap	4	
16	0000-000183-00	Retainer Ring Ø35	4	

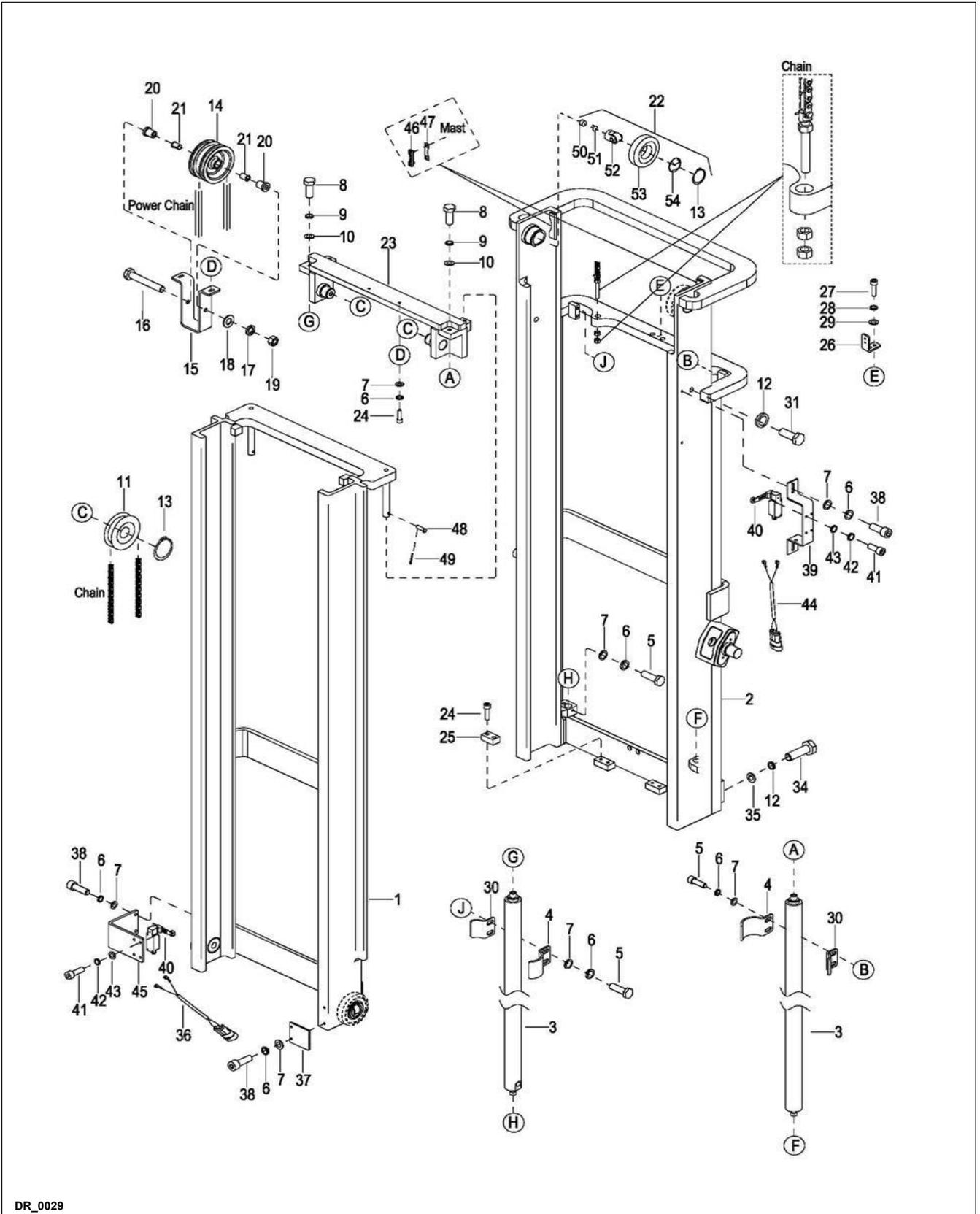


DR_0029

Figure 12-37 Telescopic Mast Assembly

TELESCOPIC MAST ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-621000-00-01	INNER MAST	1	Used for Lift Height 102" - Used up to 01-27-2016
1a	2415-621000-0A-01	INNER MAST	1	Used for Lift Height 102" - Used from 01-28-2016
1b	2415-621000-0A-03	INNER MAST	1	Used for Lift Height 106"
1c	2415-621000-00-02	INNER MAST	1	Used for Lift Height 126" - Used up to 01-27-2016
1d	2415-621000-0A-02	INNER MAST	1	Used for Lift Height 126" - Used from 01-28-2016
2	2415-611000-00-01	OUTER MAST	1	Used for Lift Height 102"
2a	2415-611000-0A-03	OUTER MAST	1	Used for Lift Height 106"
2b	2415-611000-00-02	OUTER MAST	1	Used for Lift Height 126"
3	2415-650000-00-01	LIFT CYLINDER	2	Used for Lift Height 102"
3a	2415-650000-0A-03	LIFT CYLINDER	2	Used for Lift Height 106"
3b	2415-650000-00-02	LIFT CYLINDER	2	Used for Lift Height 126"
4	2415-600007-10	CYLINDER BRACKET	2	
5	0000-000255-00	BOLT M8X20	6	
6	0000-000159-00	LOCKWASHER Ø8	14	
7	0000-000176-00	FLATWASHER Ø8	14	
8	0000-000251-00	BOLT M10X25	2	
9	0000-000063-00	LOCKWASHER Ø10	2	
10	0000-000175-00	FLATWASHER Ø10	2	
11	2214-600001-00	CHAIN ROLLER	2	
12	0000-000191-00	LOCKWASHER Ø16	2	
13	0000-000183-00	RETAINER RING Ø35	8	
14	2415-600005-1A	CHAIN ROLLER	1	
15	2415-600002-00	BRACKET	1	
16	0000-001413-00	BOLT M12X100	1	
17	0000-000060-00	LOCKWASHER Ø12	1	
18	0000-000222-00	FLATWASHER Ø12	1	
19	0000-000165-00	NUT M12	1	
20	2415-600006-1A	BUSHING	1	
21	2415-600022-00	BEARING	1	
22	2415-612000-10	ROLLER ASSEMBLY	4	
23	2415-600300-00	SPROCKET SEAT	1	
24	0000-000255-00	SCREW M8X20	6	
25	2125-600005-00	BUFFER BLOCK	2	
26	2415-600008-10	DRAG CHAIN UPPER BRACKET	1	
27	0000-001024-00	SCREW M3X10	2	
28	0000-000995-00	LOCK WASHER Ø3	2	
29	0000-000999-00	FLAT WASHER Ø3	2	

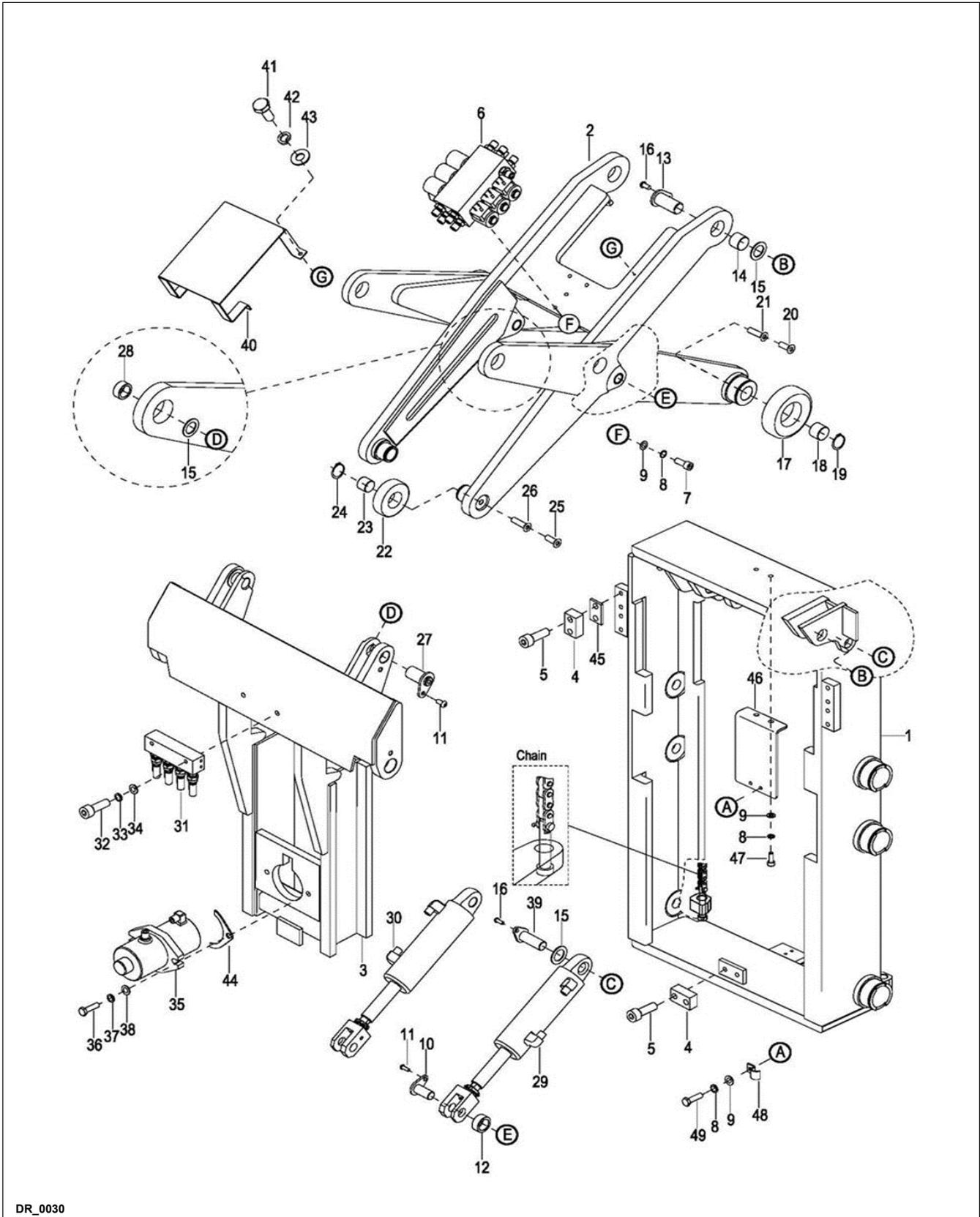


DR_0029

Figure 12-37 Telescopic Mast Assembly - Continued

TELESCOPIC MAST ASSEMBLY - CONTINUED

Pos.	Part Number	Description	Qty. Reqd.	Notes
30	2415-600015-10	CYLINDER BRACKET	2	
31	0000-000771-00	BOLT M16X40	2	
32	0000-001412-00	BOLT M8X40	2	
33	0000-000210-00	FLATWASHER Ø8	2	
34	0000-001210-00	BOLT M16X55	2	Used up to serial number 327100496
34a	0000-001210-00	BOLT M16X55	4	Used from serial number 327100497
35	0000-000190-00	FLATWASHER Ø16	2	
36	2415-520006-20	SPEED LIMIT SWITCH WIRING	1	
37	2415-600016-1A	LIMIT SWITCH PLATE	1	
38	0000-000118-00	SCREW M8X10	6	
39	2415-600018-10	SENSOR BRACKET	1	
40	2125-500003-00	PROXIMITY SWITCH 8108	2	
41	0000-000117-00	SCREW M5X10	6	
42	0000-000206-00	LOCKWASHER Ø5	6	
43	0000-000390-00	FLATWASHER Ø5	6	
44	2415-520007-00-01	LIFT LIMIT PROXIMITY SWITCH WIRING	1	Used for Lift Height 102"
44a	2415-520007-0B-03	LIFT LIMIT PROXIMITY SWITCH WIRING	1	Used for Lift Height 106"
44b	2415-520007-00-02	LIFT LIMIT PROXIMITY SWITCH WIRING	1	Used for Lift Height 126"
45	2415-600002-2A	SENSOR BRACKET	1	
46	3120-600001-00	GUIDE PLATE	4	
47	58A04-30T01	WASHER	A.R.	As Required
48	0000-000952-00	PIN	2	Used from 01-28-2016
49	0000-000188-00	COTTER PIN Ø3.2×20	2	Used from 01-28-2016
50	2415-612001-10	SCREW	4	
51	2415-612002-10	SNAP RING	4	
52	2415-612003-10	SHAFT ROLLER	4	
53	2415-612004-10	MAIN ROLLER	4	
54	2415-612005-10	DUST SNAP	4	



DR_0030

Figure 12-38 Telescopic Reach Assembly

TELESCOPIC REACH ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-641100-00	SCISSORS BASE	1	
2	--	SCISSORS	1	See Scissor Section
3	2415-644000-1C	FORK WELDMENT	1	
4	2125-600005-00	BUFFER BLOCK	5	
5	0000-000321-00	SCREW M8X20	5	
6	2415-441000-30	TRIPLE SOLENOID VALVE	1	
7	0000-000006-00	SCREW M6X30	3	
8	0000-000056-00	LOCKWASHER Ø6	7	
9	0000-000123-00	FLATWASHER Ø6	7	
10	2415-640600-10	SHORT PIN WELDING	2	
11	0000-000126-00	SCREW M6X16	4	
12	2415-640006-10	BEARING	2	
13	2415-640200-10	LONG PIN WELDING	2	
14	2415-640001-10	BEARING	2	
15	2415-640002-10	WASHER	6	
16	0000-000700-00	SCREW M8X16	4	
17	2415-642201-10	EXTERNAL SCISSORS MAIN ROLLER	2	
18	2415-642202-10	SLIDER	2	
19	2415-642203-10	RETAINER RING Ø55	3	
20	2415-642204-10	SCREW M10X1X12	2	
21	2415-642205-10	SCREW M10X1X16	2	
22	2415-643201-10	INTERNAL SCISSORS MAIN ROLLER	2	
23	2415-643202-10	SLIDER	2	
24	2415-643203-10	RETAINER RING Ø34	2	
25	2415-643204-10	SCREW M10X1X14	2	
26	2415-643205-10	SCREW M10X1X16	2	
27	2415-640300-10	SHORT PIN WELDING	2	
28	2415-640003-10	BEARING	2	
29	2415-647000-10	REACH CYLINDER LEFT	1	
30	2415-648000-10	REACH CYLINDER RIGHT	1	
31	2415-420200-10	EIGHT-WAY VALVE	1	
32	0000-000109-00	SCREW M8×16	2	
33	0000-000159-00	LOCKWASHER Ø8	2	
34	0000-000105-00	FLATWASHER Ø8	2	
35	2415-646000-10	TILT CYLINDER	1	
36	0000-000283-00	BOLT M10X35	2	
37	0000-000063-00	LOCKWASHER Ø10	2	
38	0000-000007-00	FLATWASHER Ø10	2	
39	2415-640500-10	LONG PIN WELDING	2	
40	2415-600014-10	COVER	1	

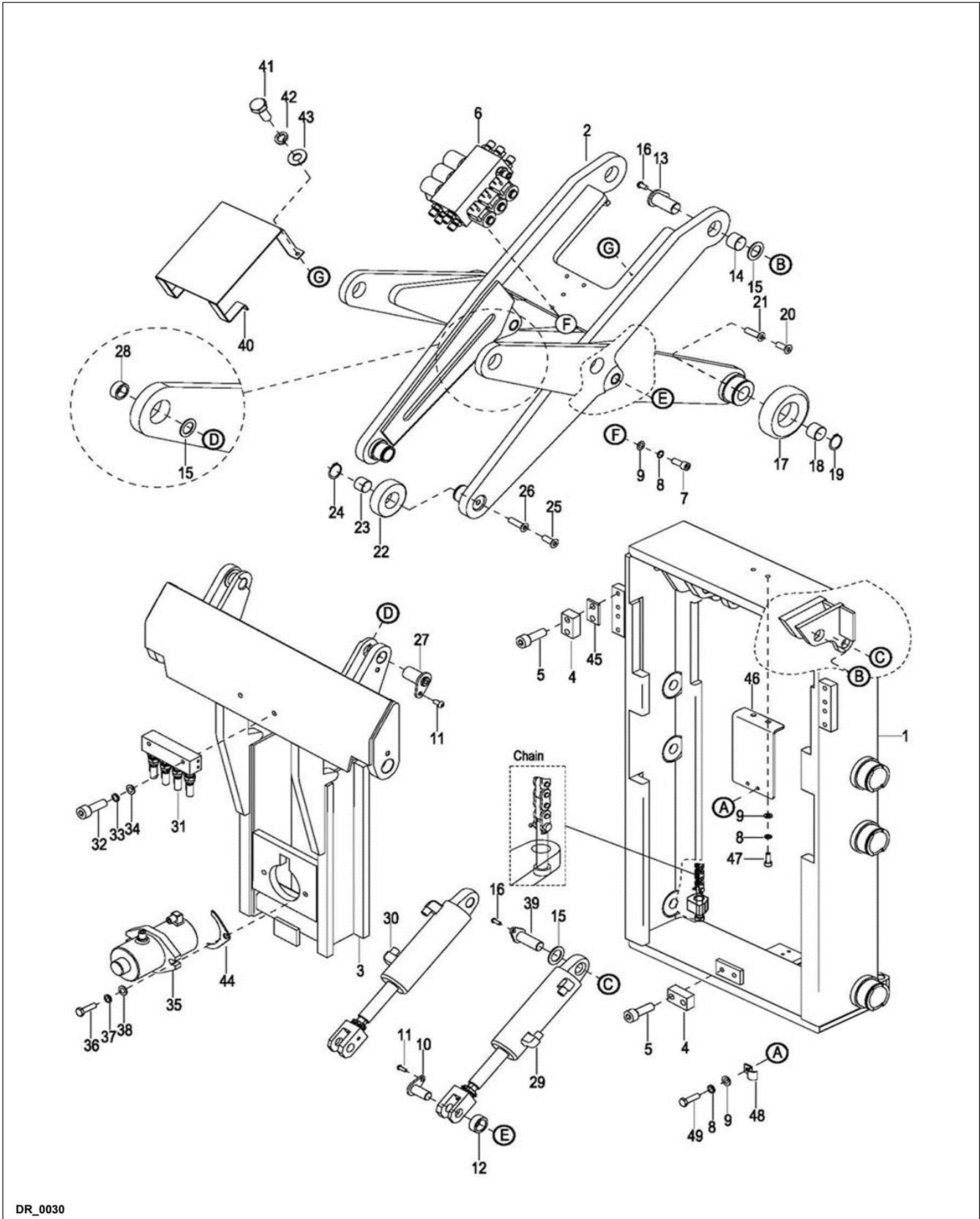
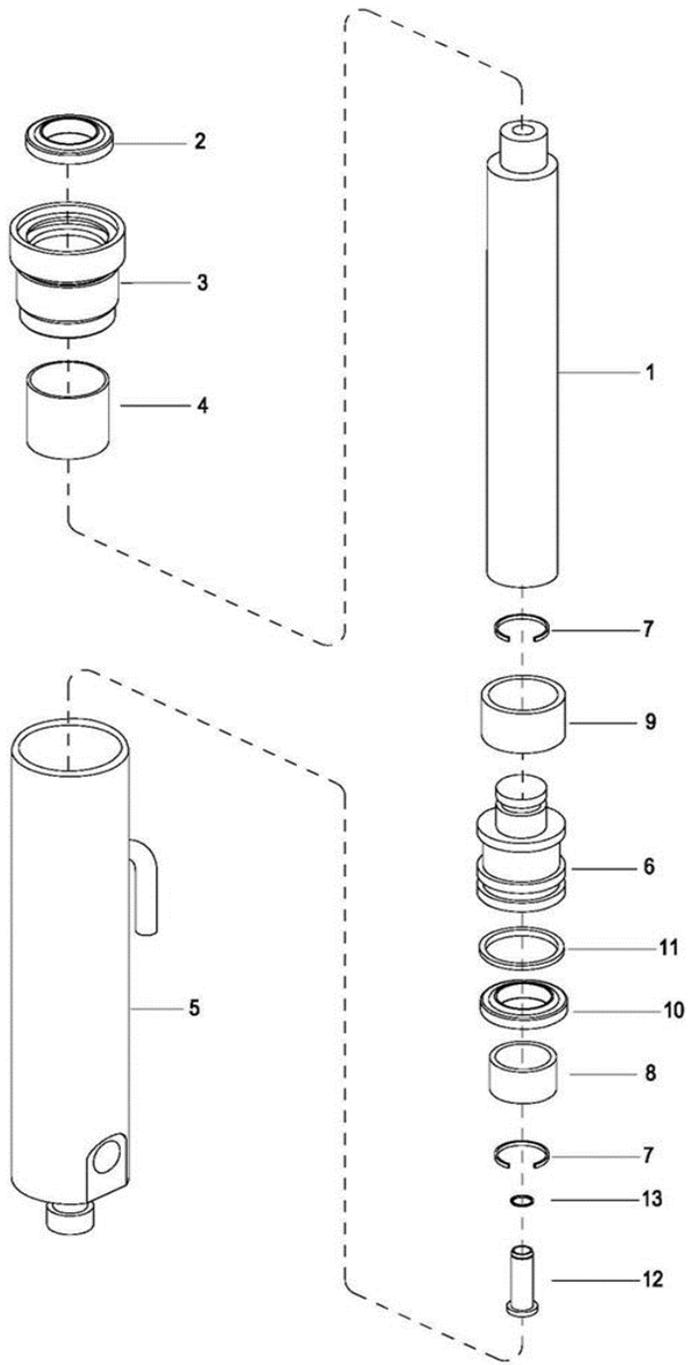


Figure 12-38 Telescopic Reach Assembly - Continued

TELESCOPIC REACH ASSEMBLY - CONTINUED

Pos.	Part Number	Description	Qty. Reqd.	Notes
41	0000-000028-00	BOLT M4X10	3	
42	0000-000122-00	LOCKWASHER Ø4	3	
43	0000-000089-00	FLATWASHER Ø4	3	
44	2415-640010-1A	WASHER	2	
45	2415-640011-10	WASHER	4	
46	2415-640001-00	TUBING BAFFLE	1	Used from serial number 324200106
47	0000-000055-00	SCREW M6X16	2	Used from serial number 324200106
48	3316-610001-10	FIXED BLOCK	2	Used from serial number 324200106
49	0000-000988-00	BOLT M6X30	2	Used from serial number 324200106

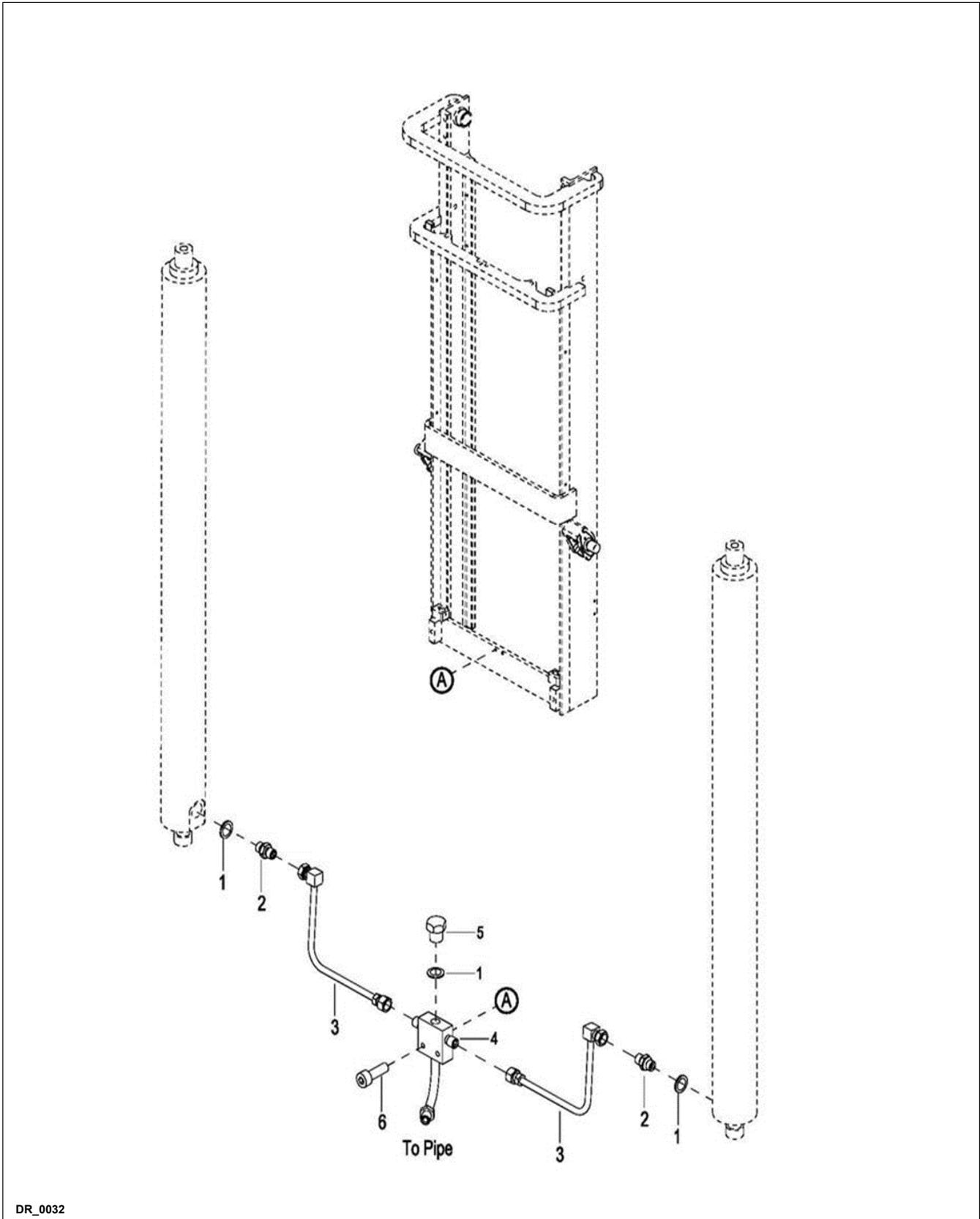


DR_0031

Figure 12-39 Telescopic Lift Cylinder

TELESCOPIC LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
--	2415-650000-00-01	LIFT CYLINDER	1	Used for Lift Height 102"
--	2415-650000-0A-03	LIFT CYLINDER	1	Used for Lift Height 106"
--	2415-650000-00-02	LIFT CYLINDER	1	Used for Lift Height 126"
KIT	2415-2BG-0A	SEAL KIT	1	Includes Pos. # 2 & 10
1	2415-650001-20-01	PISTON ROD	1	Used for Lift Height 102"
1a	2415-650001-20-03	PISTON ROD	1	Used for Lift Height 106"
1b	2415-650001-20-02	PISTON ROD	1	Used for Lift Height 126"
2	0000-000084-00	RING WIPER 35×43×5-6.5	1	
3	2415-650003-10	CAP	1	
4	2415-650002-00	BEARING 39*35*2	1	
5	2415-651000-20-01	CYLINDER TUBE	1	Used for Lift Height 102"
5a	2415-651000-20-03	CYLINDER TUBE	1	Used for Lift Height 102"
5b	2415-651000-20-02	CYLINDER TUBE	1	Used for Lift Height 126"
6	2415-650002-10	PISTON	1	
7	2125-410003-00	COLLAR 26.5X2.2	2	
8	2125-410005-3A	CUSHION COLLAR	1	
9	2415-650001-10	RING BACK UP 40*35*15	1	
10	0000-000132-00	ROD PACKING 30×40×6	1	
11	3315-550006-00	CATCH 40X30X2	1	
12	3525-413004-00	CUSHION COLLAR	1	
13	2130-410003-00	COLLAR 21.5X2.2	1	

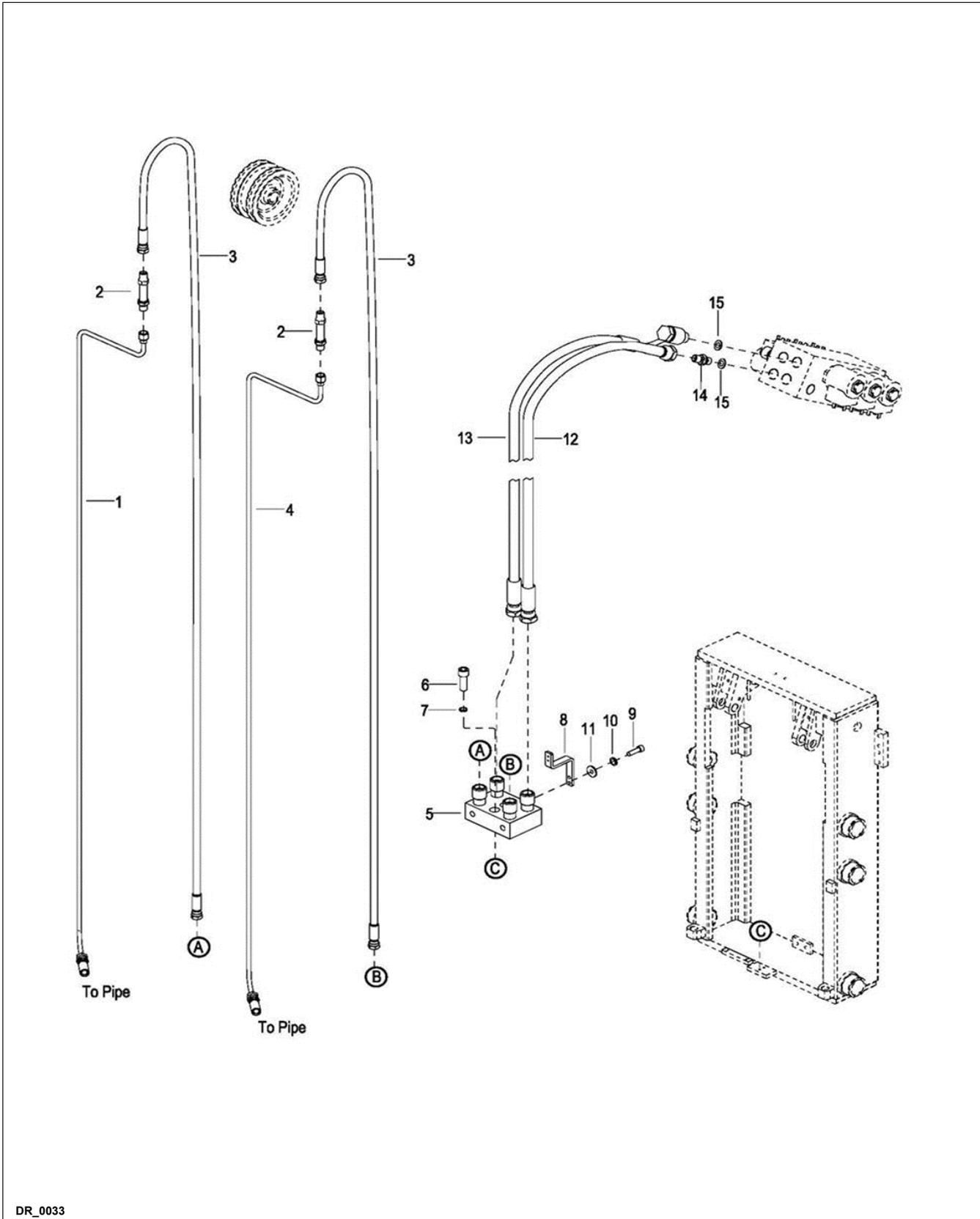


DR_0032

Figure 12-40 Hydraulic Lines for Telescopic Lift Cylinder

HYDRAULIC LINES FOR TELESCOPIC LIFT CYLINDER

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000069-00	WASHER Ø16	3	
2	2701-161600-00	CONNECTOR M16×1.5-M16×1.5	2	
3	2415-423000-00	HYDRAULIC LINE ASSEMBLY	2	
4	2415-426000-10	BLOCK CROSS	1	
5	2401-161300-00	PLUG M16×1.5	1	
6	0000-000169-00	SCREW M8×30	2	



DR_0033

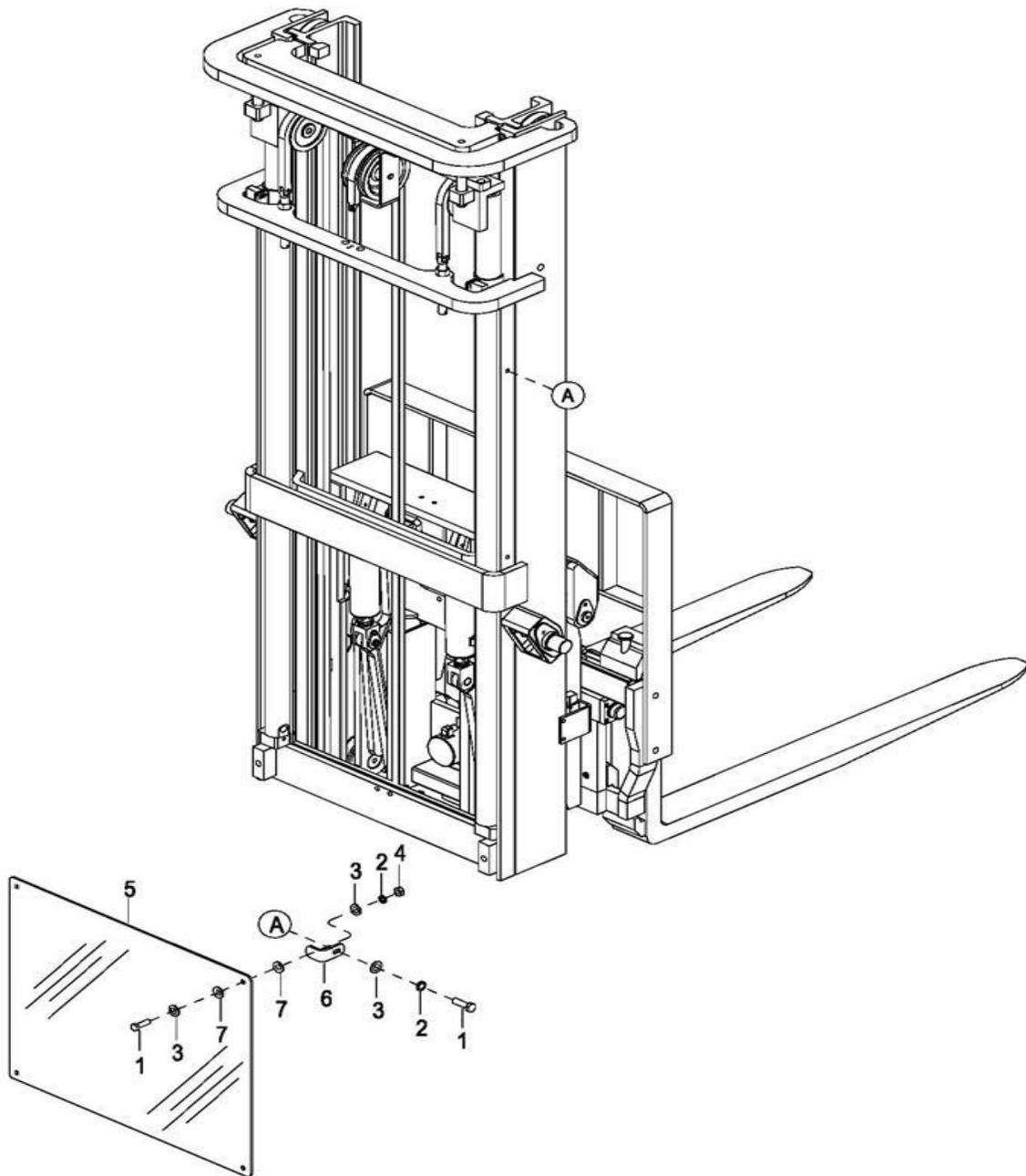
Figure 12-41 Hydraulic Lines for Telescopic Mast

HYDRAULIC LINES FOR TELESCOPIC MAST

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-421000-00-01	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 102"
1a	2415-421000-0A-03	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 106"
1b	2415-421000-00-02	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 126"
2	3316-610300-00	FITTING M14×1.5-M14×1.5	4	
3	2415-424000-00-01	OIL PIPE	2	Used for Lift Height 102"
3a	2415-424000-0A-03	OIL PIPE	2	Used for Lift Height 106"
3b	2415-424000-00-02	OIL PIPE	2	Used for Lift Height 126"
4	2415-422000-00-01	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 102"
4a	2415-422000-0A-03	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 106"
4b	2415-422000-00-02	HYDRAULIC LINE ASSEMBLY	1	Used for Lift Height 126"
5	2415-429000-10	BLOCK CROSS	1	
6	0000-000032-00	SCREW M6X20	2	
7	0000-000056-00	LOCKWASHER Ø6	2	
8	2415-600002-10	BOTTOM FIXED PLATE	1	
9	0000-000028-00	SCREW M4×10	2	
10	0000-000122-00	LOCKWASHER Ø4	2	
11	0000-000089-00	FLATWASHER Ø4	2	
12	2415-426000-00	HYDRAULIC LINE B	1	
13	2415-425000-00	HYDRAULIC LINE A	1	
14	2702-141400-00	CONNECTOR G1/4-M14×1.5	1	
15	0000-000044-00	WASHER Ø14	2	

TELESCOPIC DRAG CHAIN ASSEMBLY

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2415-600200-00-01	DRAG CHAIN	1	Used for Lift Height 102"
1a	2415-600200-0A-03	DRAG CHAIN	1	Used for Lift Height 106"
1b	2415-600200-00-02	DRAG CHAIN	1	Used for Lift Height 126"
2	0000-001243-00	SCREW M3X6	4	
3	0000-000995-00	LOCKWASHER Ø3	4	
4	0000-000999-00	FLATWASHER Ø3	4	



DR_0035

Figure 12-43 Windshield

WINDSHIELD

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000277-00	BOLT M8×16	8	
2	0000-000159-00	LOCKWASHER Ø8	8	
3	0000-000176-00	FLATWASHER Ø8	12	
4	0000-000550-00	NUT M8	4	
5	2415-600007-00-01	WINDSHIELD	1	Used up to serial number 324200107 - Lift Height 102"
5a	2415-600007-0B-02	WINDSHIELD	1	Used up to serial number 325200481- Lift Height 106"
5b	2415-600007-0C-02	WINDSHIELD	1	Used from serial number 325200482- Lift Height 106"
5c	2415-600007-0B-03	WINDSHIELD	1	Used up to serial number 325200481- Lift Height 126"
5d	2415-600007-0C-03	WINDSHIELD	1	Used from serial number 325200482- Lift Height 126"
5e	2415-600007-0B-04	WINDSHIELD	1	Used up to serial number 325200481- Lift Height 157"
5f	2415-600020-1A-01	WINDSHIELD	1	Used from serial number 325200482- Lift Height 157"
5g	2415-600020-1A-04	WINDSHIELD	1	Used for Lift Height 189"
6	2415-600008-00	WINDSHIELD BRACKET	4	Used up to serial number 325200481
6a	2415-600008-0A	WINDSHIELD BRACKET	4	Used from serial number 325200482
7	2214-150002-0A	WASHER	8	



Big Lift LLC