

OWNER'S MANUAL

EPJ-40 ELECTRIC PALLET TRUCK



WARNING

Do not operate or service this product unless you have read and fully understand the entire contents of this manual. Failure to do so may result in property damage, bodily injury or death.

BLUE GIANT[®]

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WARNING

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

Do not operate this truck until you have checked its condition. Give special attention to wheels, horn, battery, controller, lift system, brakes, steering mechanism, guards and safety devices.

Operate truck only from designated operating position. Do not carry passengers. Keep feet clear of truck and wear foot protection.

Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down 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.

Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load trailing.

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

Do not handle loads which are higher than the chassis unless load is secured so that no part of it could fall backward. Before lifting, be sure load is centered, forks are completely under the chassis backrest.

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 D40 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 D40 lift truck.

1-2. GENERAL DESCRIPTION.

The self-propelled D40 truck, [Figure 1-2](#), lifts and transports payloads up to 4000 pounds on rigid forks.

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 D40 lift truck can be driven with

forks raised or lowered. The lift truck must be protected from the elements.

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.

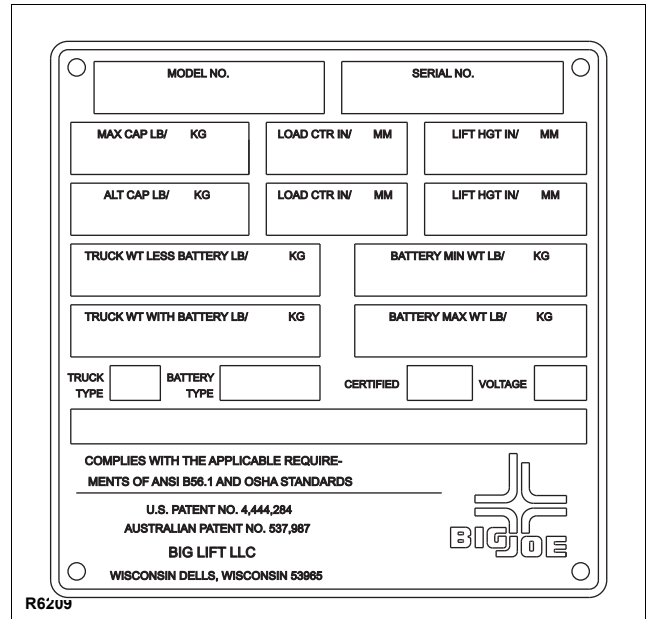


Figure 1-1 Name Plate

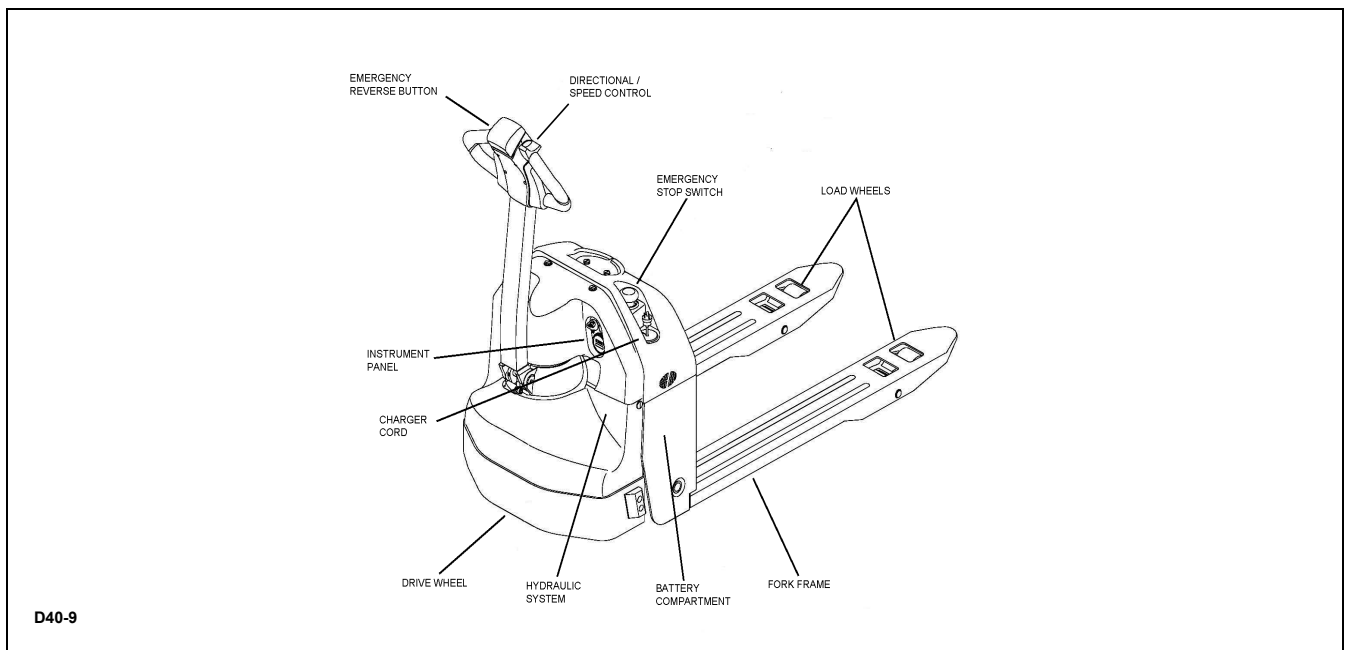


Figure 1-2 . D40 Lift Truck

1-3. SAFETY FEATURES.

The D40 is designed and 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.
- All control functions automatically return to "OFF" when released.
- Emergency Disconnect within operator's reach.
- Readily accessible horn button.
- 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.
- Guard rails adjustable for various pallets.
- Adjustable load backrest.

SECTION 2 OPERATION

2-1. GENERAL.

This section gives detailed operating instructions for the D40 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 D40 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 and have read all warnings and instructions in this manual and on the truck.
- All warnings and instructions must be read and understood before using the equipment.
- Equipment must be inspected by a qualified person on a regular basis.
- Do not operate this truck until you have checked its condition. Give special attention to Wheels, Horn, Batteries, Controller, Lift System, Brakes, Steering Mechanism, Guards and Safety Devices
- Operate truck only from designated operation position. Wear foot protection. Do not carry passengers.
- 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.

- Always look in direction of travel. Keep a clear view, and when load interferes with visibility, travel with load or lifting mechanism trailing.
- Do not overload truck. Check nameplate for load weight and load center information.
- Before lifting, be sure load is centered, forks are completely under load, and load is as far back as possible against the chassis.
- Do not handle loads which are higher than the chassis unless load is secured so that no part of it could fall backward.
- When leaving truck, neutralize travel control. Fully lower lifting mechanism and set brake. When leaving truck unattended, turn off key switch and disconnect switch, and remove key.

2-3. BEFORE OPERATION

[Table 2-1](#) covers important inspection points on the D40 lift truck which should be checked prior to operation. Depending on use, some trucks may require additional checks.

[Figure 2-1](#) 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 operation, 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.
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.
Brake	Check that brake actuates 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.
Battery disconnect	Check that battery can be disconnected and reconnected. Check for connector damage.
Battery charge	Check the battery indicator.



Electric Truck Daily Operator Check-Off List

Date _____ Operator _____

Truck No. _____ Model No. _____

Dept. _____ Shift _____

Hour Meter
Reading—Drive _____ Hoist _____

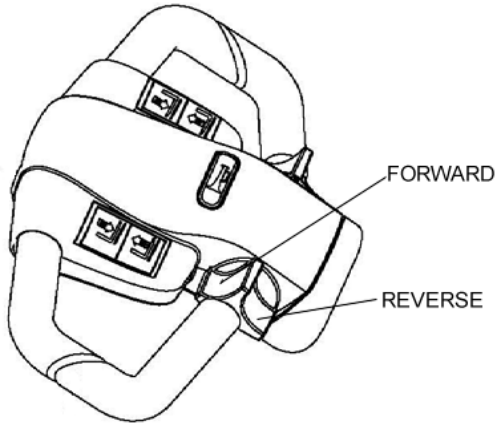
Check	O.K. (✓)	Need Maintenance
Tires		
Load Wheels		
Horn		
Lift—Lower Control		
Attachment Operation		
Forward & Reverse Controls		
Steering		
Brakes		
Hydraulic Leaks, Cylinders, Valves, Hoses, Etc.		

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Figure 2-1 Sample of Operator Check List

2-4. GENERAL CONTROL OPERATION.

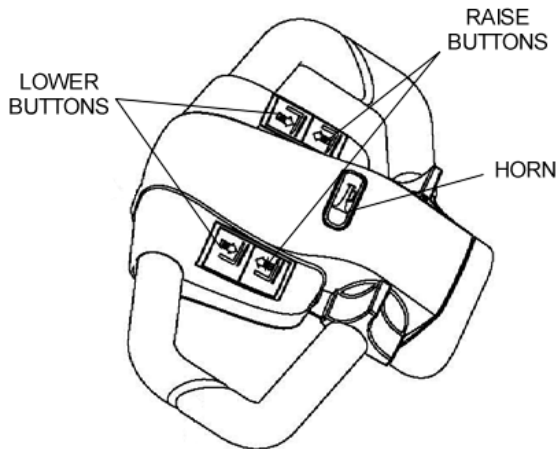
The speed control (See [Figure 2-2](#)) located on each side of the control head provides fingertip control for driving the truck. Rotate the control in the direction you want to travel. The farther you rotate the control from the neutral position, the faster the truck will travel.



R6617

Figure 2-2 Forward/Reverse Control

The pushbutton switches (See [Figure 2-3](#)), located on the front of the control head activate the lift-lower controls and the horn.



R6618

Figure 2-3 Pushbutton Switches

The brake is fully applied by lowering or raising the steering arm. (See [Figure 2-4](#)) 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.

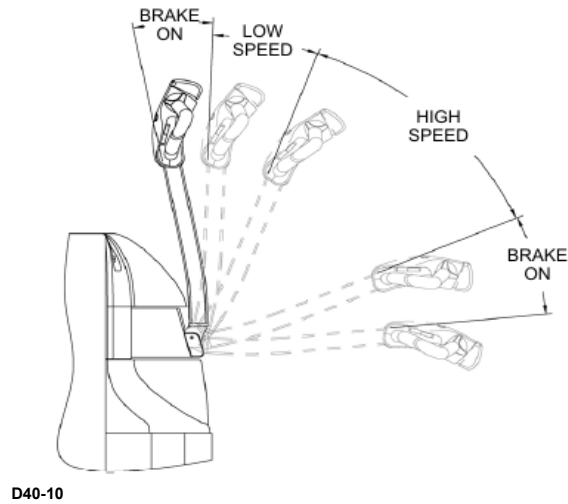


Figure 2-4 Brake Actuation

2-5. DRIVING AND STOPPING PROCEDURES.

1. Turn on the emergency disconnect and 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 [Figure 2-4](#).
3. To move forward (with load in front), slowly press the speed control forward. See [Figure 2-2](#). 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. See [Figure 2-4](#). 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. See [Figure 2-2](#).

2-6. BELLY-BUTTON SWITCH.

The belly-button switch ([Figure 2-5](#)) 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.

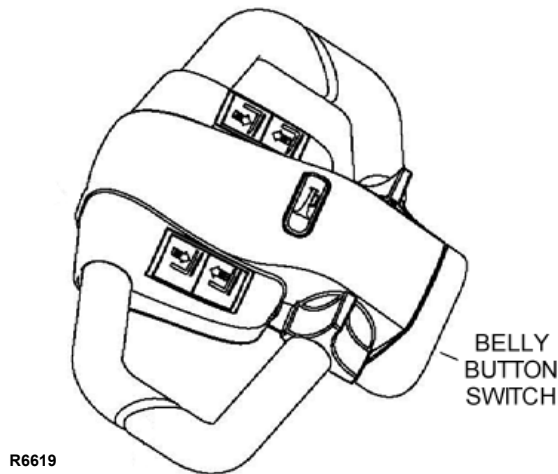


Figure 2-5 Belly-Button Switch

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 2-3)

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. BACKREST.

An adjustable load backrest (Figure 12-9) is incorporated. Backrest (3) is adjustable to 46" forks for standard pallets and 36" for beverage pallets. Handle (4) is used to secure the backrest in the raised position for full use of 46" forks.

2-10.GUIDE RAILS.

Guide rails (17 and 19, Figure 12-9) are adjustable for standard pallets and for beverage pallets. Rails must be swiveled into the lower position before lowering the backrest.

2-11.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.

2-12.PARKING.

When finished with moving loads, return the truck to its maintenance or storage area. Turn off the emergency Disconnect and the key switch. Charge batteries 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 fourty hours per week, the frequency of inspection and service should be increased accordingly. These procedures must be performed by a qualified service technician or your Big Lift LLC Service Representative.

3-3. BATTERY CARE.

3-3.1. General

The D40 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.

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 contactors for proper operation.
Monthly	Check deadman brake switch for proper operation.
Quarterly	Check lift cylinder for leakage.
Quarterly	Check for excessive jerking of steering arm when stopping or starting.

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.

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. Battery terminals should be checked and cleaned of corrosion regularly. Good battery terminal contact is essential not only for operation, but also for proper charging of the battery.
3. The charging requirements will vary depending on the use of the truck. 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.
4. 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.

3-3.5. MAINTENANCE FREE BATTERIES

Some trucks may be equipped with maintenance free batteries. These batteries are completely sealed, will not require any watering and have a full 80% discharge available.

Sealed Maintenance Free batteries contain a pressure release valve and under normal operating conditions do not require any special ventilation.

CAUTION: Do not try to open this battery or remove the pressure release valve.

Only under severe overcharging, such as connected to an improperly sized charger, will any significant amount of gasses be released from the battery. Also, being a valve regulated battery, it never requires watering.

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 forks 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. Pull the charger cord (1, [Figure 3-1](#)) out of the top cover and connect to the appropriate power supply.

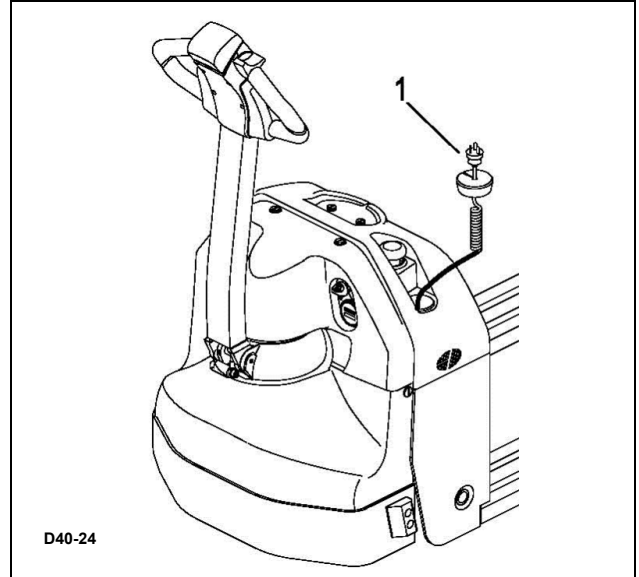



Figure 3-1 Charging Battery

BATTERY HAZARD	
	! DANGER EXPLOSIVE/POISON/CAUSTIC NO SPARKS, FLAMES, SMOKING BATTERY ACID can cause blindness and severe burns SHIELD EYES, AVOID SKIN CONTACT IF SPLASHED flush immediatly with water, get medical help fast. Do not service battery while on charge. Do not connect or disconnect battery from charger while charger is on. Only qualified and experienced personnel should perform maintenance and repair on batteries. Use caution while servicing or removing battery. (Refer to Battery Safety Sheet).

3-5. BATTERIES REPLACEMENT

Access to the batteries requires moving the controller board.

Proceed as follows:

1. Remove two screws (1, [Figure 3-2](#)) and remove cover (2).

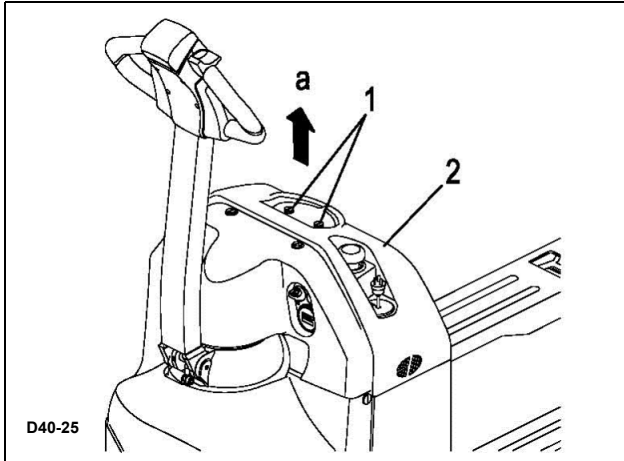


Figure 3-2 Cover Removal

- a. Remove the hose and harness (3, [Figure 3-3](#)) and battery cable (2). Remove four screws (3) and take out the controller board (4).

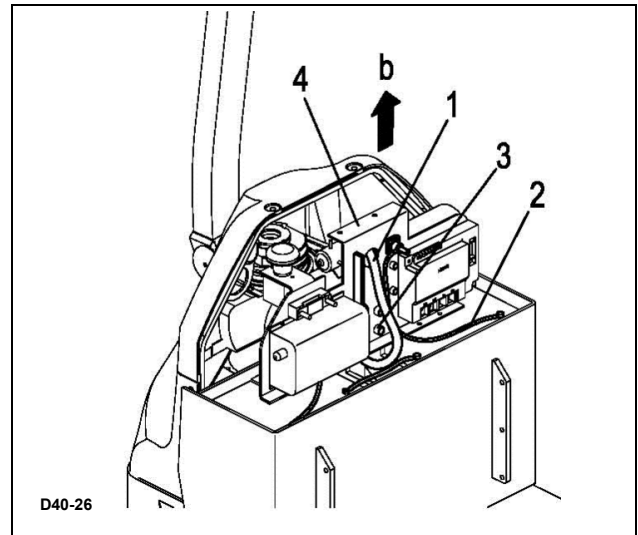


Figure 3-3 Controller Board Removal

- b. Install in the reverse order of remove. Pay attention to battery position and cable connection. Position cables to avoid damage.

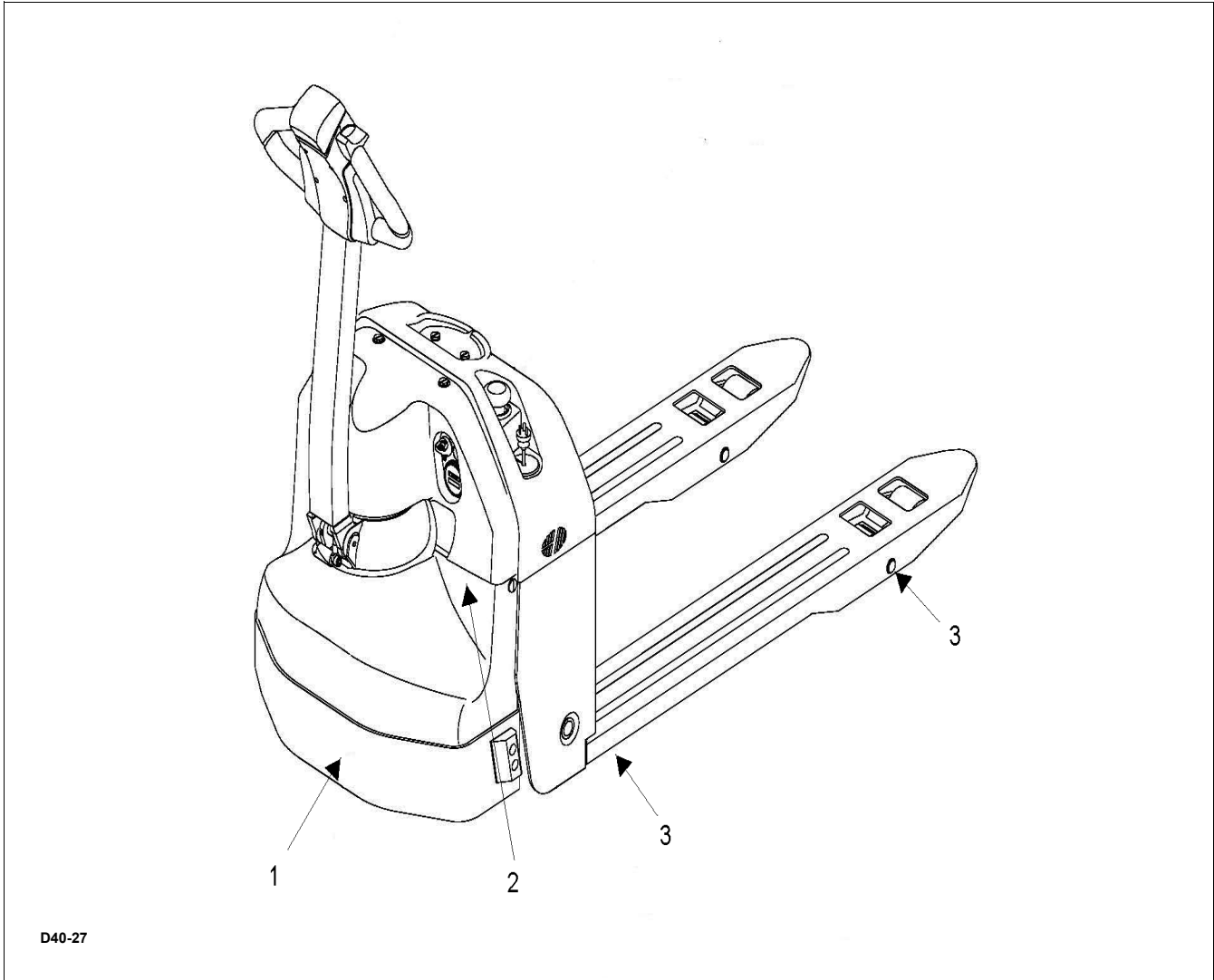
3-6. LUBRICATION.

Refer to [Table 3-2](#) for the recommended types of grease and oil. [Table 3-3](#) in conjunction with [Figure 3-4](#) identifies the items requiring lubrication.

**Table 3-2 Recommended Lubricants
(See [Table 3-3](#) for Application)**

No. 1	Transmission oil—EP SAE 80W-90 Transmission oil—EP SAE 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



D40-27

Figure 3-4 Lubrication Diagram

Table 3-3 Lubrication Chart

FIG 3-2 INDEX NO.	LOCATION	METHOD OF APPLICATION	TYPE (Table 3-3)	APPLICATION OF LUBRICANT
1	Transmission Capacity 2 pints	Can	No. 1	Fill to level plug opening
2	Hydraulic Reservoir Capacity-1 quarts	Can	No. 3	With lift carriage fully lowered, fill reservoir with hydraulic oil to 1 inch below opening
3	Lift Linkage Fittings*	Gun	No. 2	Pressure lubricate.

* Raise lift carriage to gain access to grease fittings.

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 Oper-

ate: 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
<p>TRUCK AND HYDRAULIC SYSTEM WILL NOT OPERATE Truck will not travel nor will lift system operate.</p>	<p>a. Fuse (12, Figure 12-19) blown. b. Battery dead or disconnected. c. Keyswitch (20, Figure 12-20) defective. d. Defective wiring.</p>	<p>Check fuse and replace if necessary. Check battery connections and check battery voltage. Bypass keyswitch to determine if it is malfunctioning. Check for open circuit. Repair as required.</p>
<p>TRUCK DOES NOT OPERATE FORWARD OR REVERSE Truck does not travel forward or reverse. All other functions operate normally.</p> <p>Truck travels forward but not in reverse.</p> <p>Truck travels reverse but not in forward.</p> <p>Truck travels forward and in reverse at lower speeds; will not travel at high speed.</p>	<p>a. Check all wiring. A loose connection may be the cause of malfunction. b. Defective deadman switch (16, Figure 12-1). c. Defective controller (18, Figure 12-19). d. Defective potentiometer (21, Figure 12-2). Defective potentiometer (21, Figure 12-2) in control head. Defective potentiometer (21, Figure 12-2) in control head. Defective potentiometer (21, Figure 12-2) in control head.</p>	<p>Tighten all loose connections before further troubleshooting. Check and replace switch if defective. Check for proper operation and replace if necessary. Check and replace potentiometer if defective. Check and replace potentiometer if defective. Check and replace potentiometer if defective.</p>
<p>TROUBLE WITH BRAKING Truck does not slow with brake, or brake does not engage.</p> <p>Brake will not release.</p>	<p>a. Defective deadman switch (16, Figure 12-1). b. Defective electric brake (2, Figure 12-5). a. Brake temperature above 281° F (140° C). b. Open brake circuitry or wiring.</p>	<p>Check deadman switch for continuity. If none found when the control arm is in the brake position, replace switch. Replace brake. Allow to cool. Make voltage checks.</p>

Table 4-1 Troubleshooting Chart - Continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
<p>TROUBLE WITH BRAKING - Continued</p> <p>Brake drags.</p> <p>Brake grabs.</p> <p>Abnormal noise and chatter when brake is applied.</p>	<p>Defective electric brake (2, Figure 12-5).</p> <p>Defective electric brake (2, Figure 12-5).</p> <p>Defective electric brake (2, Figure 12-5).</p>	<p>Replace.</p> <p>Replace.</p> <p>Replace.</p>
<p>TROUBLE WITH LIFTING OR LOWERING</p> <p>Oil sprays or flows from the top of the lift cylinder.</p> <p>Squealing sounds when lifting forks.</p> <p>Forks do not lift to top.</p> <p>Weak, slow or uneven action of hydraulic system.</p> <p>Forks do not lift, pump motor does not run.</p>	<p>.</p> <p>Defective packing in lift cylinder</p> <p>a. Oil level too low.</p> <p>b. Lift linkage binding.</p> <p>Oil level too low.</p> <p>a. Defective pump or relief valve.</p> <p>b. Worn lift cylinder.</p> <p>c. Load larger than capacity.</p> <p>d. Defective lift motor solenoid.</p> <p>e. Battery charge low.</p> <p>a. Battery is dead or disconnected.</p> <p>b. Defective wiring.</p> <p>c. Defect in electrical system for operating pump motor.</p>	<p>Repair lift cylinder.</p> <p>Identify oil leak.</p> <p>Apply grease.</p> <p>Add oil to reservoir.</p> <p>Check pressure. Adjust as necessary.</p> <p>Replace cylinder.</p> <p>Refer to I.D.plate for capacity.</p> <p>Replace solenoid (4, Figure 12-15) on electrical panel.</p> <p>Charge battery.</p> <p>Check and recharge if required.</p> <p>Check and repair as required.</p> <p>Check lift switch in control head, as well as the solenoid.</p>
<p>Forks do not lift, motor runs.</p>	<p>Defect in hydraulic system.</p>	<p>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.</p>

Table 4-1 Troubleshooting Chart - Continued

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
<p>TROUBLE WITH LIFTING OR LOWERING - Continued</p> <p>Forks lift, but will not go down.</p>	<p>Defect in hydraulic system</p>	<p>Check lowering control switch in control head and lowering solenoid on valve assembly (17, Figure 12-15). Replace as required.</p>
<p>Load will not hold</p> <p>Platform does not lift to top. Pump motor runs.</p> <p>Forks creep downward under load when in a raised position.</p>	<p>a. Oil bypassing internally in control valve</p> <p>b. Worn lift cylinder or packing.</p> <p>a. Oil level too low.</p> <p>b. Load larger than capacity.</p> <p>c. Batteries need charging.</p> <p>Leak in hydraulic system, lift cylinder or lowering valve.</p>	<p>Replace valve assembly (4, Figure 12-15).</p> <p>Repack cylinder.</p> <p>Add oil to reservoir.</p> <p>Refer to nameplate on side of mast for maximum load capacity.</p> <p>Change batteries.</p> <p>Check for leaking fitting in hydraulic line and repair as required. Repack lift cylinder or replace valve assembly (7, Figure 12-15).</p>
<p>MISCELLANEOUS</p> <p>Steering arm does not return to the upright position.</p> <p>Truck moves forward when arm is pulled down.</p> <p>Steering arm jerks excessively starting or stopping the truck.</p> <p>Drive motor is jerky.</p>	<p>a. Weak return spring.</p> <p>b. Binding.</p> <p>a. Belly-button switch defective.</p> <p>b. Short in control head.</p> <p>Drive wheel worn.</p> <p>Motor internally damaged or worn.</p>	<p>Replace spring.</p> <p>Check and free the binding item. Verify that the cable has not been damaged. Repair or replace as needed.</p> <p>Check for short, and repair or replace as necessary.</p> <p>Check wiring and repair as required.</p> <p>Replace drive wheel if worn to within 3/4 inch of hub.</p> <p>Replace motor.</p>

4-2. CONTROLLER TROUBLESHOOTING

4-2.1. Zapi Handset

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.

Remove the rubber plug from the CNC connector of the controller and plug in the Zapi Handset connector as shown in [Figure 4-1](#).

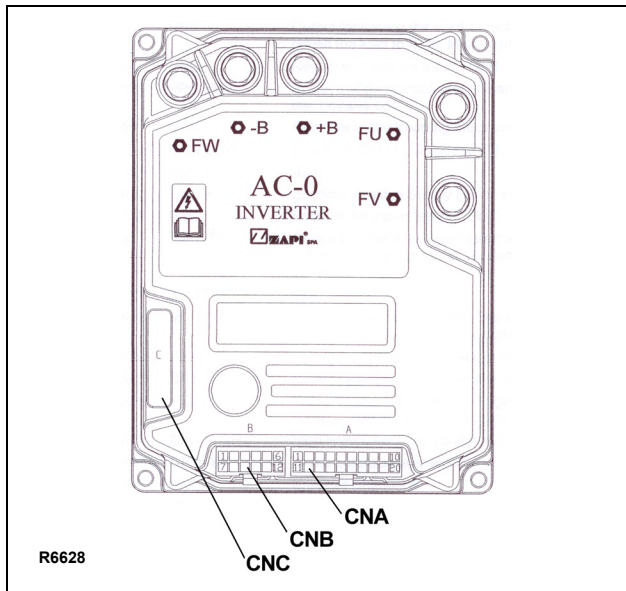


Figure 4-1 Zapi Controller

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 (1, [Figure 4-2](#)) and the ENTER button (3) at the same time to enter the MAIN MENU.
3. Press the ROLL down button (2) or the ROLL up button (1) to find the ALARMS display.
4. Press the ENTER button (3) to view the alarms.
5. Press the OUT button (6) 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 (1, [Figure 4-2](#)) and the ENTER button (3) at the same time to enter the MAIN MENU.
3. Press the ROLL down button (2) or the ROLL up button (1) to find the TESTER display.
4. Press the ENTER button (3) 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 (6) to exit the tests.

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 (1, [Figure 4-2](#)) and the SET up button (5) at the same time to enter the CONFIG MENU.
3. Press the ROLL down button (1) or the ROLL up button (2) to find the SET OPTIONS display.
4. Press the ENTER button (3) to view the options.
5. Press the ROLL down (2) or the ROLL up button (1) to find the option to be changed.
6. Press the SET up button (5) 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 (4) to exit the options.

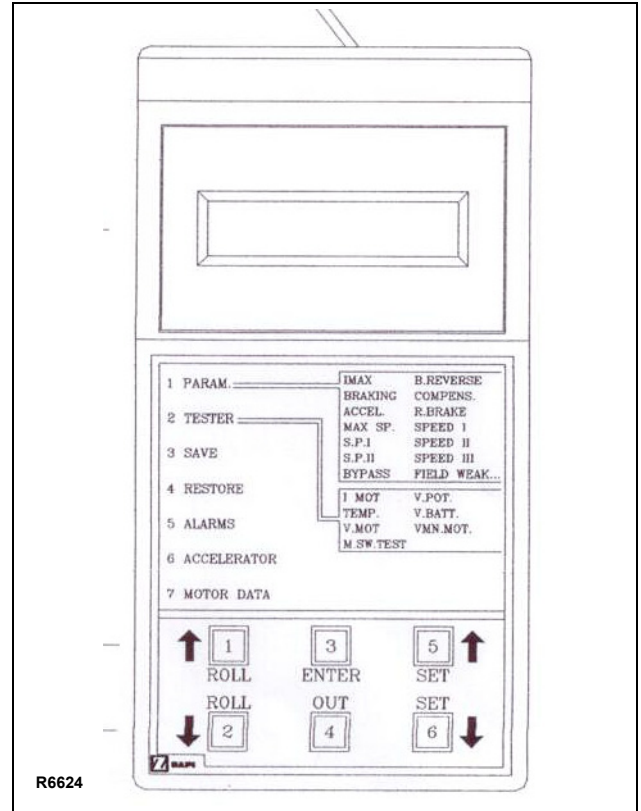


Figure 4-2 Zapi Handset

Table 4-2 Set Options

Parameter	Factory Setting	Description
TILLER switch	HANDLE	This option handles the input CNB#3 (Table 4-5). This input opens when the operator leaves the truck (released). It is connected to a Keyswitch controlled voltage when the operator is present.
SET INPUT #1	OPTION #1	<p>(Standard Version only). This option handles the digital input CNA#15. It can be set as:</p> <ul style="list-style-type: none"> • OPTION #1: CNA is managed as a cutback speed input (SR#1). • OPTION #2: CNA is managed as a digital handbrake input. • OPTION #3: CNA is managed as an inching backward. <p>The input CNA#15 (Table 4-5) can only be used as Aux Lowering request when the MDIPRC is PRESENT.</p> <p>This input must be connected to a Keyswitch controlled voltage. The SR#1 becomes active when CNA#15 (Table 4-5) is open. The inching backward becomes active when the CNA#15 (Table 4-5) is closed to a Keyswitch controlled voltage.</p>

Table 4-2 Set Options - Continued

Parameter	Factory Setting	Description
SET INPUT #2	PRESENT	<p>It can be can be set as:</p> <ul style="list-style-type: none"> • PRESENT: CNA#14 (Table 4-5) is managed as a cutback speed input (SR#2). • OPTION #1: CNA#14 (Table 4-5) is managed as an inching backward. <p>The input CNA#14 (Table 4-5) can only be used as Aux Lifting request when the MDIPRC is PRESENT. This input must be connected to a Keyswitch controlled voltage. The SR#2 becomes active when CNA#14 (Table 4-5) is open. The inching backward becomes active when the CNA#14 (Table 4-5) is closed to a Keyswitch controlled voltage.</p>
SET INPUT #4	OPTION #1	<p>This option handles the digital input CNB#7 (Table 4-5). It can be can be set as:</p> <ul style="list-style-type: none"> • BELLY CNB#7 (Table 4-5) is managed as a Belly Switch input. • BRAKE CNB#7 (Table 4-5) is managed as service brake input. This information can be used also to recognize when the operator is driving with a pressed pedal braking. • EX.HYDRO: CNB#7 (Table 4-5) is managed as Exclusive Hydro. This input must be connected to a Keyswitch controlled voltage. The Belly switch active level is specified on the QUICK INV LOGIC below. <p>The service brake of the exclusive hydro becomes active when CNB#7 is opened.</p>
HOUR COUNTER	RUNNING	<p>This option specifies the hour counter mode. It can be set as:</p> <ul style="list-style-type: none"> • RUNNING: The counter registers travel time only. • key on: The counter registers when the keyswitch is closed.
BATTERY CHECK	Level = 1	<p>This option specifies the handling of the low battery charge detection. It can be set as:</p> <ul style="list-style-type: none"> • Level 0: Nothing happens, the battery charge level is ignored. • Level 1: A BATTERY LOW alarm is raised when the battery level is calculated being less than 10% of the full charge. A BATTERY LOW alarm inhibits the Lifting function. • Level 2: A BATTERY LOW alarm is raised when the battery level is calculated being less than 10% of the full charge. A BATTERY LOW alarm reduces the maximum truck speed down to 24% of the full truck speed then, if the MDI-PRC is absent, inhibits the Lifting function. • Level 3 Equivalent to Level 1; a BATTERY LOW alarm is raised when the battery level is calculated being less than 10% of the full charge. A BATTERY LOW alarm inhibits the Lifting function.
HYDRO KEY ON	OFF	<p>ON/OFF: If this options is programmed ON the traction Inverter manages a hydraulic steering function when the keyswitch is switched ON (only if the AUX OUTPUT #1 option is programmed as HYDRO CONTACT or as WXCLUSIVE HYDRO).</p>
STOP ON RAMP	OFF	Not used.

Table 4-2 Set Options - Continued

Parameter	Factory Setting	Description
AUX OUTPUT #1	BRAKE	<p>This option handles output CNA#3 (Table 4-5). It can be used as:</p> <ul style="list-style-type: none"> • BRAKE: CNA#3 (Table 4-5) drives an electromechanical Brake. • HYDROCOMNT: CNA#3 (Table 4-5) drives the contractor for a hydraulic steering function when the direction input or brake pedal input are active or a movement of the truck is detected. • EX.HYDRO: CNA#3 (Table 4-5) drives the contractor for a hydraulic steering function when the exclusive hydro input is active. • FREE: CNA#3 (Table 4-5) is not used. <p>The current this output can sink is up to 3Adc.</p>
PEDAL BRAKING	NONE	<p>The analog input CNA#18 (Table 4-5) has one of two functions:</p> <ul style="list-style-type: none"> • Pedal Braking input. • Command input for lifting/lowering proportional valves in MDI-PRC version. <p>To turn from the first to the second function is just enough to set PEDAL BRAKING to HNONE.</p> <p>This option handles the analog input CNA#18 (Table 4-5) when used as pedal braking input:</p> <ul style="list-style-type: none"> • ANALOG: With this setting it is possible to modulate the strength of the braking when the accelerator is released. The strength of the braking is proportional to the brake pedal potentiometer connected to this input. When the pedal potentiometer voltage is equal/less than the SET POT BRK MIN, the minimum release braking strength is applied (following the RELEASE BRAKING setting). When the pedal potentiometer voltage is equal/higher than the SET POT BRK MAX, the maximum release braking strength is applied (following the PEDAL BRAKING setting). In the intermediate position, the electrical braking strength is a linear function between the minimum (RELEASED BRAKING) and maximum (PEDAL BRAKING) intensity. When there is also a switch connected to the pedal braking (i.e. SET INPUT #4 to level BRAKE), it must be closed, otherwise the release braking is stuck to the minimum strength disregarding the pedal potentiometer position. • DIGITAL: No pedal potentiometer is expected. Only when both the SET INPUT #4 is Level BRAKE and the brake switch connected to CNB#4 (Table 4-5) is closed, the release electrical braking follows the PEDAL BRAKING setting (maximum strength); in all of the other conditions the release electrical braking follows the RELEASE BRAKING setting (minimum strength). • NONE: The analog input CNA#18 (Table 4-5) is not used for the release braking modulation.
QUICK INVERSION	BELLY	<p>This option specifies the quick inversion mode when the SET INPUT #4 is set BELLY. It can be set as:</p> <ul style="list-style-type: none"> • NONE: The quick inversion function is not managed (no effect when CNB#7 (Table 4-5) switches over). • TIMED: The quick inversion function is timed. • BELLY: The quick inversion function is managed but not timed.

Table 4-2 Set Options - Continued

Parameter	Factory Setting	Description
AUX VOLTAGE #1	100%	This option specifies the percentage of the keyswitch controlled voltage to be applied to the loads on CNA#1 (Table 4-5) (main contactor coil) and CNA#3 (Table 4-5) (electromechanical brake). The voltage modulation is set with a PWM at 1 kHz frequency. After an initial delay of about 1 sec in which the entire keyswitch controlled voltage is applied to the loads, the PWM reduces the voltage at the loads down to the specified percentage.
PERFORMANCE	OPTION #1	This option can be set <ul style="list-style-type: none"> • OPTION#1 • OPTION#2
QUICK INV. LOGIC	OPTION #1	This option specifies the active level for the Belly switch input (CNB#7) <ul style="list-style-type: none"> • OPTION#1: The quick inversion is executed when CNB#7 (Table 4-5) is closed to a Keyswitch controlled voltage. • OPTION#2: The quick inversion is executed when CNB#7 (Table 4-5) is opened from a Keyswitch controlled voltage.
MDI-PRC	ABSENT	This option specifies: <ul style="list-style-type: none"> • PRESENT: The MDI-PRC is connected to the ACO via the CAN Bus: the handling of the Hydraulics is specified on the TRUCK TYPE setting. • ABSENT: The MDI-PRC is not connected to the ACO: the TRUCK TYPE disappears from the SET OPTIONS function list.
MOT SET-UP LOCK	OFF	Not used.

4-2.4.2. Adjustments

To change an adjustment proceed as follows and refer to [Table 4-3](#):

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

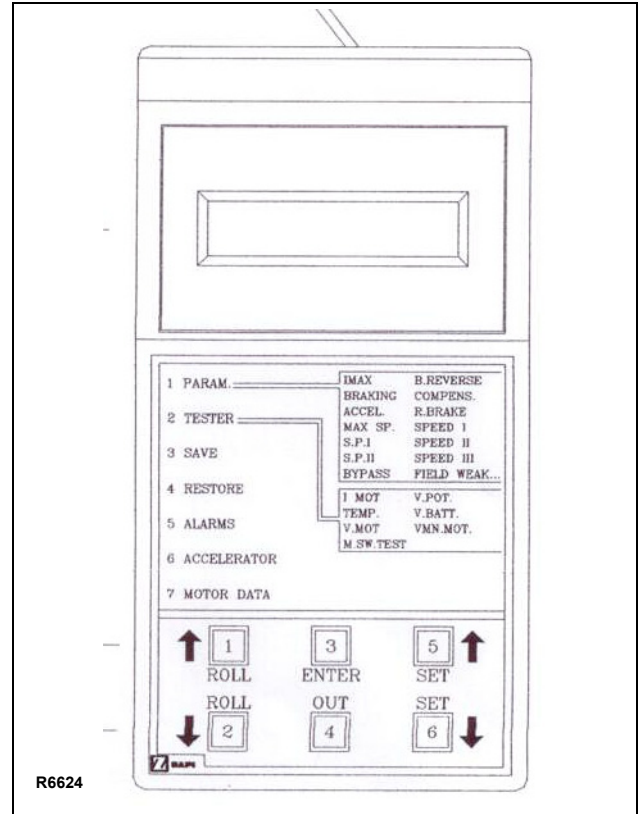


Figure 4-3 Zapi Handset

Table 4-3 Adjustments

Parameter	Factory Setting	Description
SET POT BRK MIN	0.5 V	This setting records the minimum value of braking pedal potentiometer when the braking pedal switch is closed; the procedure is similar to the PROGRAM VACC function. This procedure must be carried out only if the PEDAL BRAKING option is programmed as ANALOG. No adjustment is necessary when PEDAL BRAKING options is programmed as NONE.
SET POT BRK MAX	4.5 V	This setting records the maximum value of braking pedal potentiometer when the braking pedal is fully pressed; the procedure is similar to the PROGRAM VACC function. This procedure must be carried out only if the PEDAL BRAKING option is programmed as ANALOG. No adjustment is necessary when PEDAL BRAKING options is programmed as NONE.
SET BATTERY TYPE	24V	Selects the nominal battery voltage.
ADJUST BATTERY	XX V	Do not modify - Factory adjusted (Fine adjustment of the battery voltage measured by the controller.)
THROTTLE 0 ZONE	9%	Establishes a deadband in the accelerator input curve.

Table 4-3 Adjustments - Continued

Parameter	Factory Setting	Description
THROTTLE X POINT	45%	This parameter together with the THROTTLE Y POINT, changes the characteristic of the accelerator input curve: when the accelerator is de-pressed to X point percent, the corresponding truck speed is Y point percent of the Maximum truck speed. The relationship between the accelerator position and the truck speed is linear between the THROTTLE 0 ZONE and the X point and also between the X point and the maximum accelerator position but with two different slopes (Figure 4-4).
THROTTLE Y POINT	68%	This parameter together with the THROTTLE X POINT, changes the characteristic of the accelerator input curve: when the accelerator is de-pressed to X point percent, the corresponding truck speed is Y point percent of the Maximum truck speed. The relationship between the accelerator position and the truck speed is linear between the THROTTLE 0 ZONE and the X point and also between the X point and the maximum accelerator position but with two different slopes (Figure 4-4).
ADJUSTMENT #01	LEVEL = 5	Adjust the upper level of the battery charge table (Level 0 to 9).
ADJUSTMENT #02	LEVEL = 5	Adjust the lower level of the battery charge table (Level 0 to 9).
LOAD HM FROM MDI	OFF	When set On, the Hourmeter of the Controller is transferred and recorded on the Hourmeter of the Standard MDI (connected on the Serial Link).
CHECK UP DONE	OFF	Turn it On when asked Maintenance service has been executed to cancel the CHECK UP NEEDED warning.
CHECK UP TYPE	NONE	It specifies the handling of the CHECK UP NEEDED warning: <ul style="list-style-type: none"> • NONE: No CHECK UP NEEDED warning. • OPTION#1: CHECK UP NEEDED warning on the handset and MDIPRC after 300 hours. • OPTION#2: Equal to OPTION#1 but Speed reduction after 340 hours. • OPTION#3: Equal to OPTION#2 but the truck definitively stops after 380 hours.

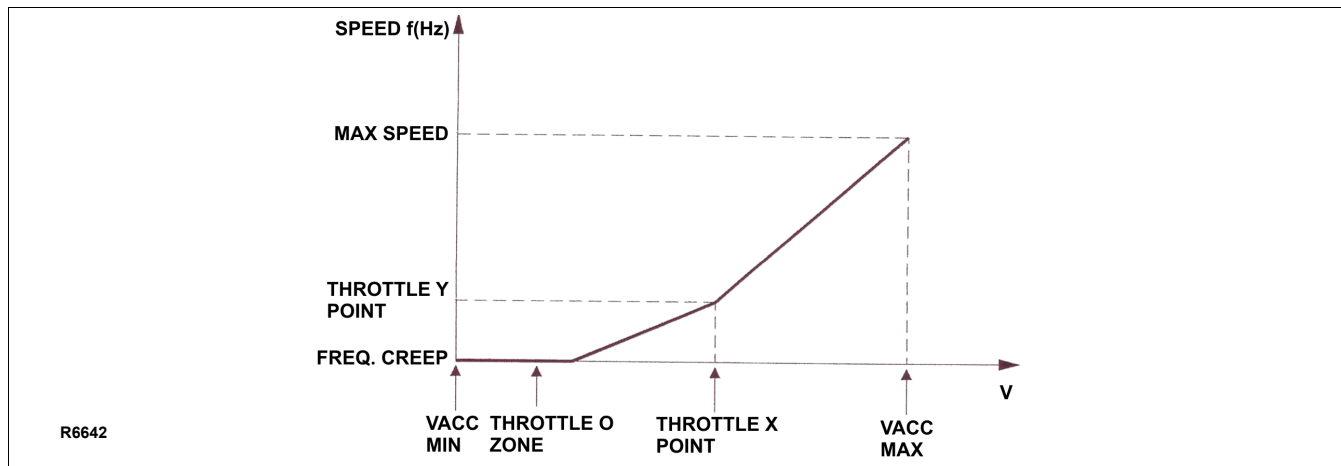


Figure 4-4 Throttle Regulation

4-2.4.3. Parameter Change

To change a parameter proceed as follows and refer to [Table 4-4](#):

1. Connect the Zapi Handset, refer to paragraph [4-2.1](#).
2. Press the ROLL down button (1, [Figure 4-5](#)) and the ENTER button (3) at the same time to enter the MAIN MENU.
3. Press the ROLL down button (1) or the ROLL up button (2) to find the PARAMETER CHANGE display.
4. Press the ENTER button (3) to view the parameters.
5. Press the ROLL down button (2) or the ROLL up button (1) to find the parameter to be changed.
6. Press the SET up button (5) or the SET down button (6) until the desired value setting is reached. The parameter is now set at the desired value.
7. Press the OUT button (4) to exit the parameters.

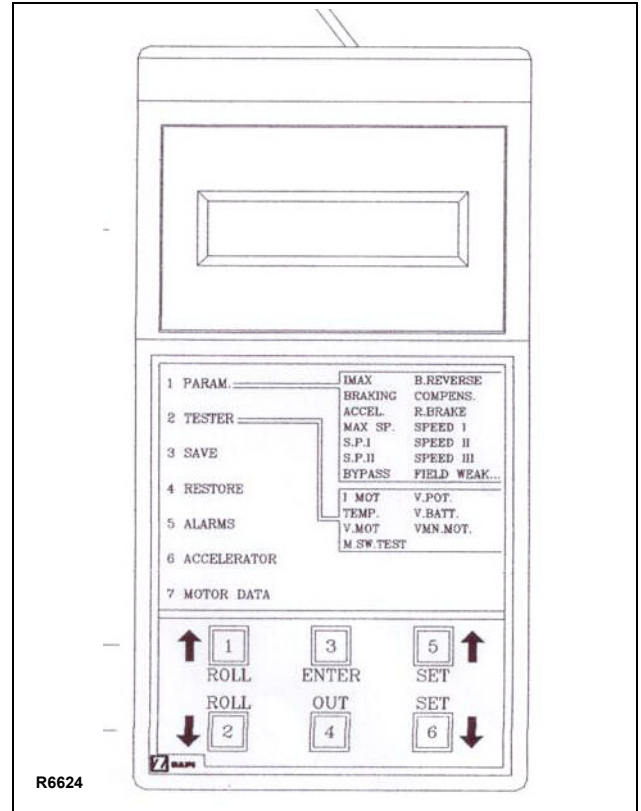


Figure 4-5 Zapi Handset

Table 4-4 Parameter Adjustments

Parameter	Factory Setting	Description
ACCELER. DELAY	LEVEL = 8	Level 0 to 9. It determines the acceleration ramp. At Level 9 the truck takes a long time to accelerate.
RELEASE BRAKING	LEVEL = 5	Level 0 to 9. It controls the deceleration ramp when the travel request is released. At Level 9 the truck brakes abruptly.
INVERS. BRAKING	LEVEL = 4	Level 0 to 9. It controls the deceleration ramp when the direction switch is inverted during travel. At Level 9 the truck brakes abruptly.
PEDAL BRAKING	LEVEL = 9	Level 0 to 9. It controls the deceleration ramp when the travel request is released and the brake pedal switch is pressed to its maximum. At Level 9 the truck brakes abruptly.
SPEED LIMIT BRK	LEVEL = 1	Level 0 to 9. It controls the deceleration ramp when the accelerator has turned down but not completely released. At Level 9 the truck decelerates abruptly.
BRAKE CUTBACK	LEVEL = 5	Level 0 to 9. It controls the deceleration ramp when the a speed reduction input becomes active and the motor slows down. At Level 9 the truck decelerates abruptly.
MAX SPEED FORW	100 Hz	Typically from 90 Hz to 160 Hz. It determines the maximum speed in forward direction.
MAX SPEED BACK	100 Hz	Typically from 90 Hz to 160 Hz. It determines the maximum speed in backward direction.

Table 4-4 Parameter Adjustments - Continued

Parameter	Factory Setting	Description
CUTBACK SPEED	100%	Typically from 10% to 100%. It determines the percentage of the max speed applied when the cutback switch 1 (SR#1 on CNA#15 (Table 4-5) is active. When set to 100% the speed reduction is ineffective.
CUTBACK SPEED 2	37%	Typically from 10% to 100%. It determines the percentage of the max speed applied when the cutback switch 2 (SR#2 on CNA#14 (Table 4-5) is active. When set to 100% the speed reduction is ineffective.
HS CUTBACK	100%	Typically from 10% to 100%. It determine the percentage of the max speed applied when the Hard & Soft function (H&S switch on CNB#4 (Table 4-5) is active. When set to 100% the speed reduction is ineffective.
FREQUENCY CREEP	5.00 Hz	Hz value. This is the minimum speed applied when the forward or reverse switch is closed, but the accelerator at its minimum. In the ACO sense Coils this setting is higher equal than 5 Hz.
RPM CREEP	100%	A Percentage value. Set to 100% and not Used.
MAXIMUM CURRENT	96%	It specifies the percentage of the absolute current (150A) at which the current will be limited. Normally MAXIMUM CURRENT is 100%. DO NOT CHANGE.
INCHING SPEED	0 Hz	Hz value. It determines the speed when the “Inching function” is active.
INCHING TIME	LEVEL = 0	Level 0 to 9. It determines the duration time when the “Inching function” is active.
AUXILIARY TIME	1	Time units value (seconds). For the encoder version, it determines the time duration (in seconds) in which the the frequency was arrived to zero.
ANTIROLLBACK	80%	A Percentage of the Maximum Current. This setting increases the phase current when low frequency during starting operation. It is used to push up, in feedforward way, the torque when it is not possible to control the flux, in feedback way, because of the low frequency.

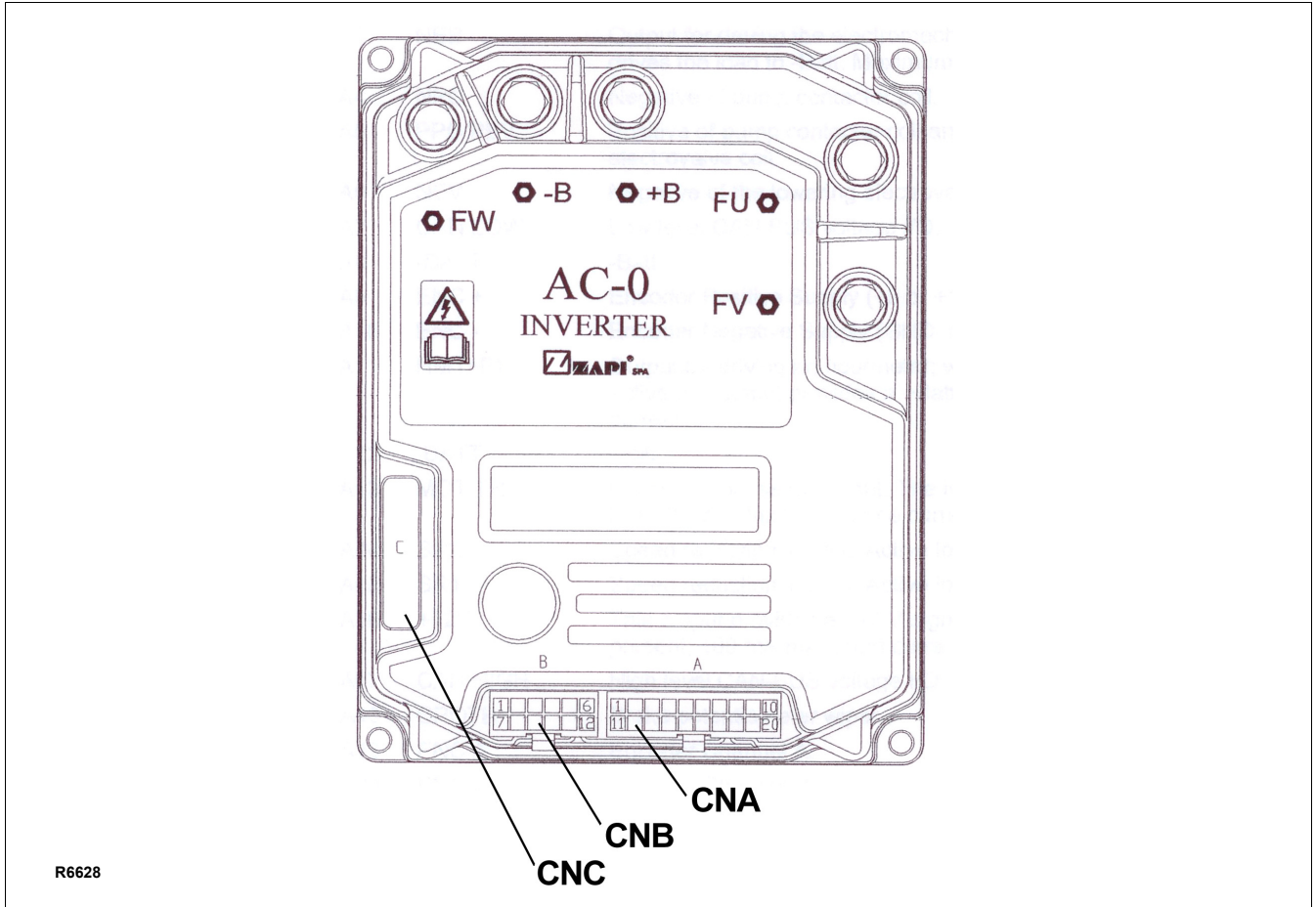


Figure 4-6 Zapi Controller Connections

Table 4-5 Zapi Controller Connector Pins

CNA Connector		
PIN	ABBREVIATION	DESCRIPTION
CNA#1	NMC	Negative of main contactor coil.
CNA#2	PMC	Positive of main contactor coil.
CNA#3	NEB	Output for driving the electromechanical brake coil; drives the load to -Batt. Maximum current: 3 A.
CNA#4	NPC	Negative of pump contactor soil.
CNA#5	PPC/PEV	Positive of pump contactor coil and lowering electrovalve coil.
CNA#6	NEV	Negative of the lowering electrovalve coil.
CNA#7	CAN LOW	Low level CAN-BUS voltage I/O.
CNA#8	-BAT	-Bat.
CNA#9	ENC+	Encoder Positive Supply (+5 or +12 Vdc)
CNA#10	ENC-	Encoder Negative Supply (GND to minus battery)
CNA#11	HM(+B)	Output for driving an hourmeter; when the hourmeter is active this output provides a +Batt signal; 3 maximum current.
Table 4-5 Zapi Controller Connector Pins - Continued		

CNA Connector - Continued		
PIN	ABBREVIATION	DESCRIPTION
CNA#12	-BATT	-Batt.
CNA#13	MOT TH	Motor thermal sensor input. The internal pull-up is a fixed 2mA (Max 5V) source current.
CNA#14	SR2	Speed reduction 2 input. Active low (switch opened).
CNA#15	SR1	Speed reduction 1 input. Active low (switch opened).
CNA#16	+12V	This output provides a +12V signal for the MDI PRC, it present; mA maximum current.
CNA#17	CAN HIGH	High level CAN-BUS voltage I/O.
CNA#18	CPOTB	Brake potentiometer wiper.
CNA#19	ENC A	Encoder Channel A.
CNA#20	ENC B	Encoder Channel B.
CNB Connector		
CONNECTOR PIN	ABBREVIATION	DESCRIPTION
CNB#1	KEY SW	Connected to the power supply through a microswitch (KEY) with a 6.3-10 A fuse in series (this could be mounted on the AC-0 cover).
CNB#2	CM	Common for FW/BW/SR1/SR2/TILLER/H&S/BELLY/LIFTING/ LOWERING microswitches. This connection supplies a keyswitch voltage level.
CNB#3	TILLER SW	Tiller request input. Must be connected to the tiller microswitch, active high.
CNB#4	H&S SW	Hard & Soft request input. Must be connected to the Hard & Soft microswitch, active high.
CNB#5	BACKWARD SW	Backward direction request input. Must be connected to the backward direction microswitch, active high.
CNB#6	FORWARD SW	Forward direction request input. Must be connected to the forward direction microswitch, active high.
CNB#7	BELLY SW	Quick inversion function input; must be connected to the Belly microswitch; it is active high.
CNB#8	LOWERING SW	Lowering request input, active high.
CNB#9	LIFTING SW	Lifting request input, active high.
CNB#10	CPOT	Lifting request input, active high.
CNB#11	NPOT	Negative of accelerator unit, tested for wire disconnection diagnosis.
CNB#12	PPOT	Potentiometer positive: 10V output; keep load >1kΩ.
Table 4-5 Zapi Controller Connector Pins - Continued		

CNC Connector		
CONNECTOR PIN	ABBREVIATION	DESCRIPTION
CNC#1	PCLRxD	Positive serial reception.
CNC#2	NCLRxD	Negative serial reception.
CNC#3	PCLTxD	Positive serial transmission.
CNC#4	NCLTxD	Negative serial transmission.
CNC#5	GND	Negative console power supply.
CNC#6	+12V	Positive console power supply.
CNC#7	FLASH	Must be connected to C8 for the Flash memory programming (if used).
CNC#8	FLASH	Must be connected to C7 for the Flash memory programming (if used).

NOTES

SECTION 5 STEERING ARM, CONTROL HEAD AND COMPARTMENT

5-1. CONTROL HEAD

5-1.1. Control Head Removal

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the cap assembly (24, [Figure 5-2](#)) as described in paragraph 5-1.3.
3. Disconnect harness (15, [Figure 5-1](#)) from potentiometer (21, [Figure 5-2](#)).

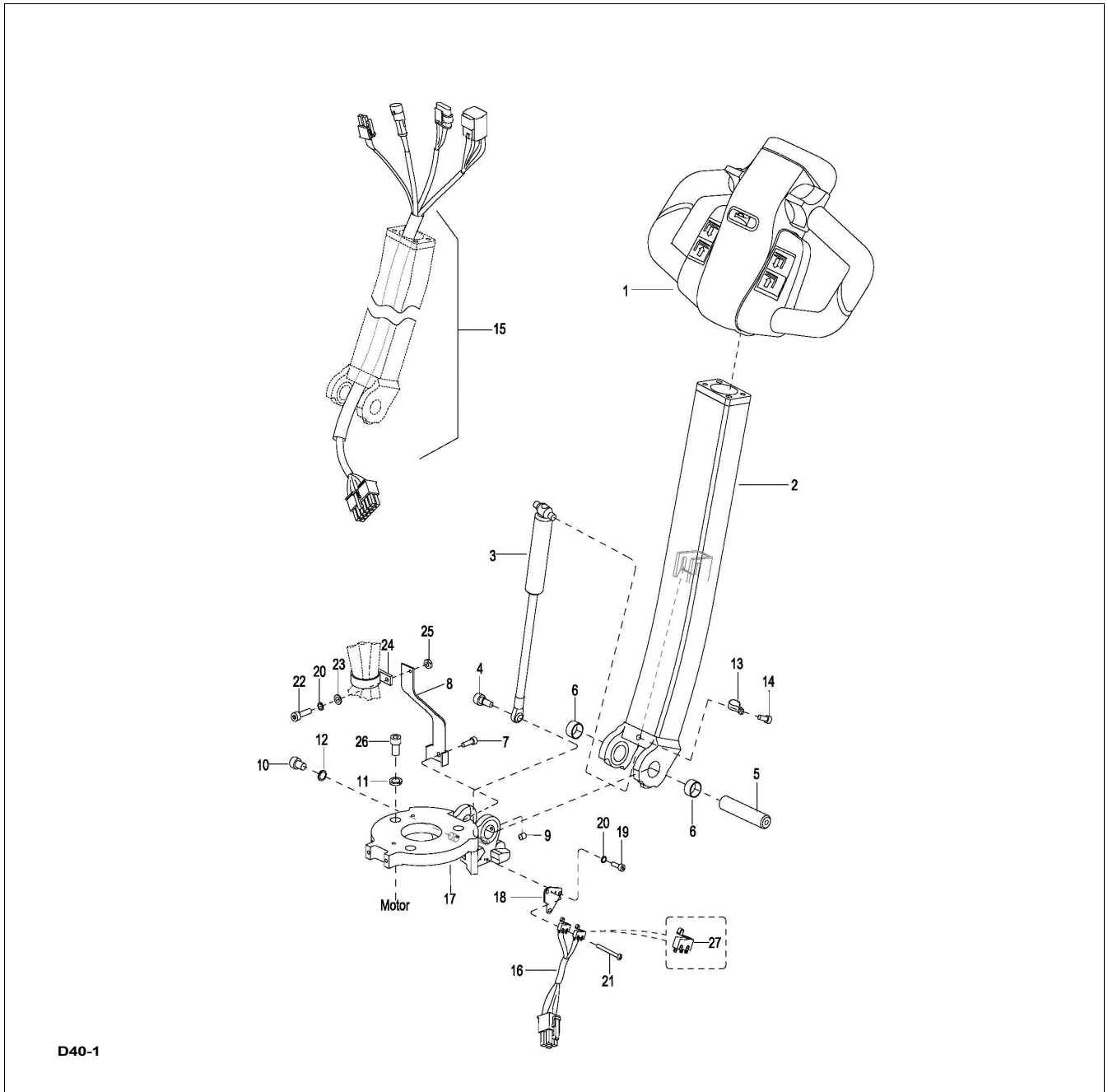


Figure 5-1 Steering Arm

4. Disconnect harness (15, [Figure 5-1](#)) from emergency reverse switch (26, [Figure 5-2](#)).
5. Remove two screws (5), two washers (7) and two flat washers (6).

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

6. Remove two screws (11), two washers (12) and two flat washers (13).
7. Remove the control head and handle (19).

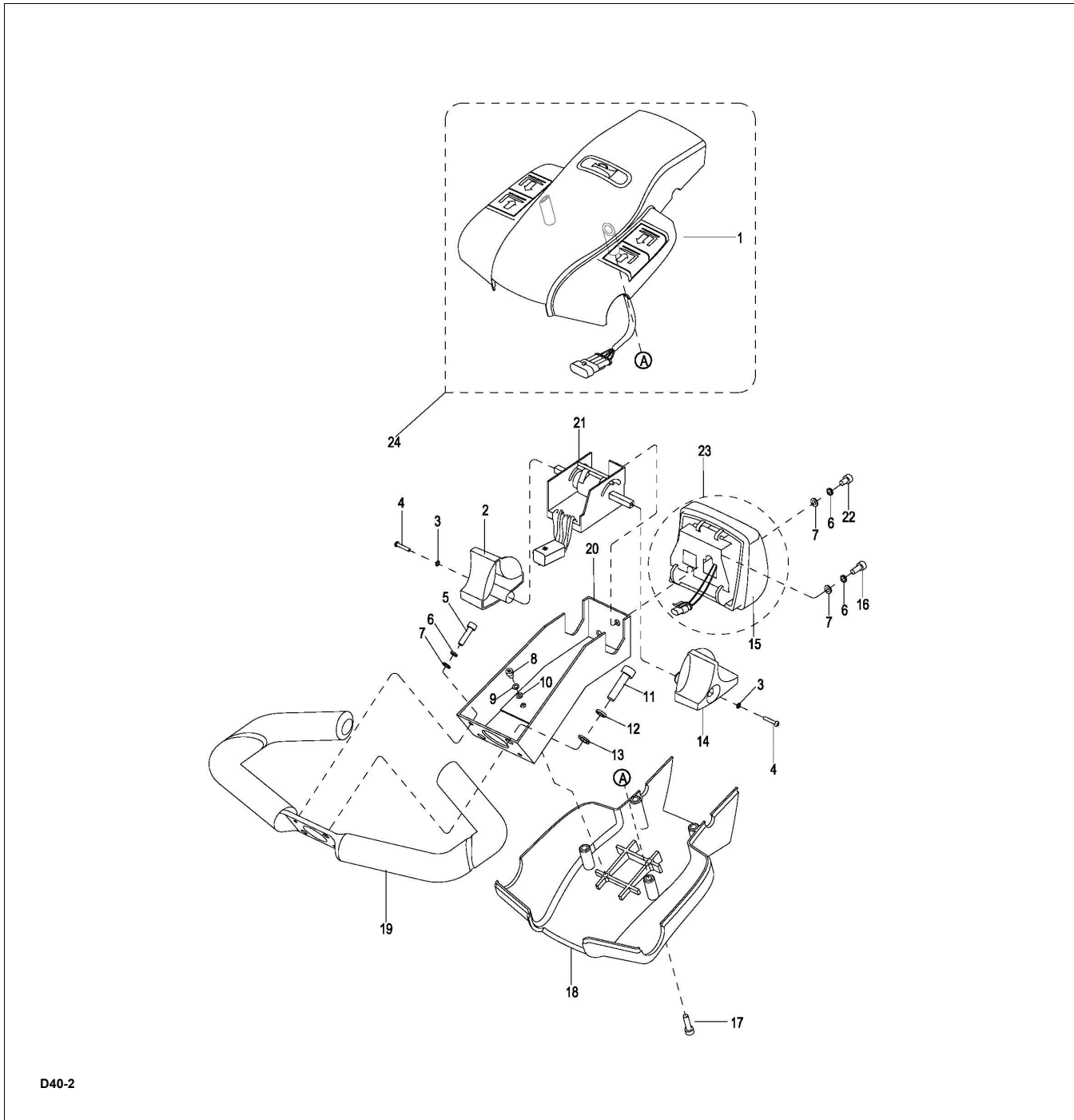


Figure 5-2 Control Head

5-1.2. Control Head Installation

1. Secure control head and handle (19, [Figure 5-2](#)) with two screws (11), two washers (12) and two flat washers (13).
2. Install two screws (5), two washers (6) and two flat washers (7).
3. Reconnect harness (15, [Figure 5-1](#)) to emergency reverse switch (26, [Figure 5-2](#)).
4. Reconnect harness (15, [Figure 5-1](#)) to potentiometer (21, [Figure 5-2](#)).
5. Install the cap assembly as described in paragraph [5-1.4](#).
6. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

5-1.3. Cap Assembly Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove four screws (17, [Figure 5-2](#)) and lift up cap assembly (24).
3. Disconnect harness (23) from harness (15, [Figure 5-1](#)) and remove cap assembly (24, [Figure 5-2](#)).

5-1.4. Cap Assembly Installation.

1. Hold cap assembly (24, [Figure 5-2](#)) in place and connect harness (15, [Figure 5-1](#)) to harness (23, [Figure 5-2](#)).
2. Position cap assembly (24) on control head and secure with four screws (17).
1. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

5-1.5. Speed Potentiometer Replacement.

1. Remove the cap assembly as described in paragraph [5-1.3](#).
2. Disconnect harness (15, [Figure 5-1](#)) from potentiometer (21, [Figure 5-2](#)).
3. Remove screw (4), washer (3) and control knob (2) from potentiometer (21).
4. Remove screw (4), washer (3) and control knob (14) from other side of potentiometer (21).

5. Remove screw (16), screw (22), two lock washers (6) and two flat washers (7) and remove potentiometer (21) and switch assembly (26) from bracket (20).
6. Position new potentiometer (21) and switch assembly (26) in bracket (20) and secure with screw (16), screw (22), two lock washers (6) and two flat washers (7).
7. Install control knob (2) on potentiometer (21) and secure with screw (4), and washer (3).
8. Install control knob (14) on the other side of potentiometer (21) and secure with screw (4), and washer (3).
9. Reconnect harness (15, [Figure 5-1](#)) to potentiometer (21, [Figure 5-2](#)).
10. Install the cap assembly as described in paragraph [5-1.4](#).

5-1.6. Belly-Button Switch Replacement.

1. Remove the cap assembly as described in paragraph [5-1.3](#).
2. Disconnect harness (15, [Figure 5-1](#)) from emergency disconnect switch (26, [Figure 5-2](#)).
3. Remove screw (16), screw (22), two lock washers (6) and two flat washers (7) and remove potentiometer (21) and switch assembly (26) from bracket (20).
4. Remove pin (5, [Figure 5-3](#)), bracket (4), and spring (2) from button (1).
5. Remove two pins (3) and switch assembly (25, [Figure 5-2](#)) from bracket (4, [Figure 5-3](#)).
6. Position the new switch assembly (25, [Figure 5-2](#)) in bracket (4, [Figure 5-3](#)) and secure with two pins (3).
7. Position bracket (4) and springs (2) in button (1) and install pin (5).
8. Position potentiometer (21, [Figure 5-2](#)) and switch assembly (26) in bracket (20) and secure with screw (16), screw (22), two lock washers (6) and two flat washers (7).
9. Reconnect harness (15, [Figure 5-1](#)) to emergency reverse switch (26, [Figure 5-2](#)).
10. Install the cap assembly as described in paragraph [5-1.4](#).

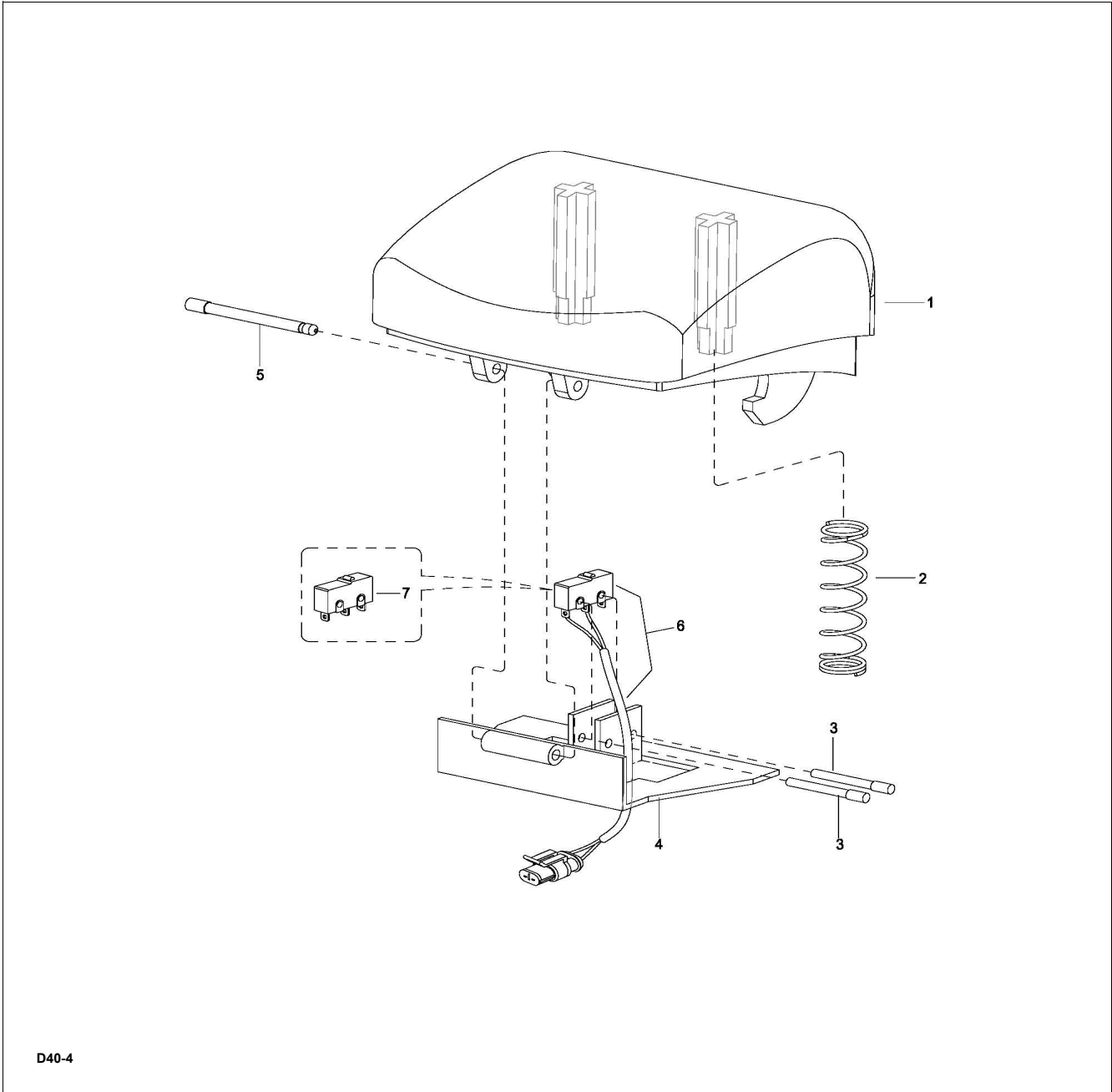
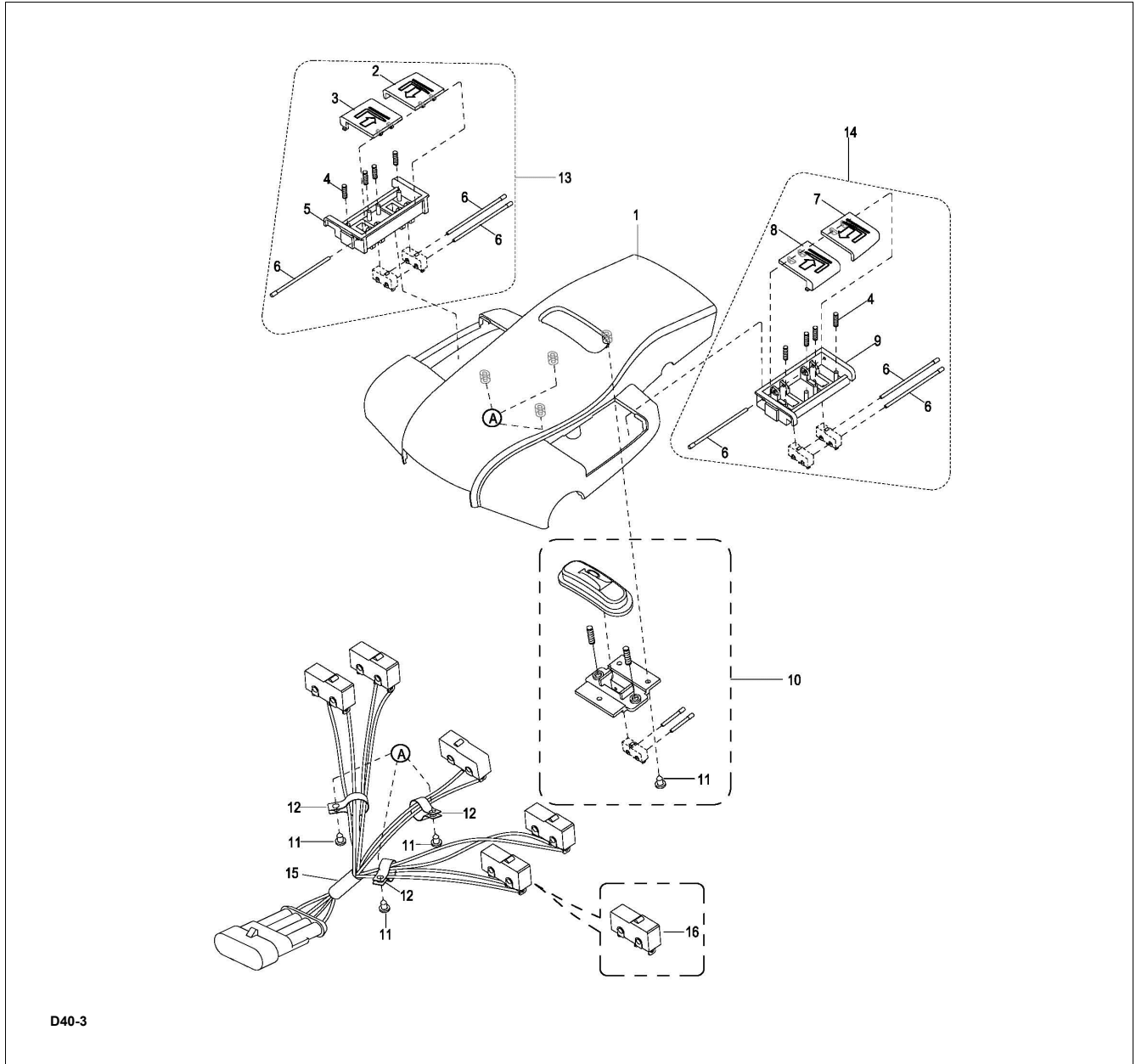


Figure 5-3 Emergency Reverse Switch Assembly

5-1.7. Horn Switch Replacement.

1. Remove the cap assembly as described in paragraph 5-1.3.
2. Remove three screws (11, Figure 5-4), switch bracket and two springs of assembly (10).
3. Remove the two pins of assembly (10) and remove switch (6) from the bracket.
4. Unsolder harness (23, Figure 5-2) from switch.
5. Solder harness (23) to new switch.
6. Position new switch in bracket of assembly (10) and secure with the two pins.
7. Position the bracket with two springs in cover (1) and secure with three screws (11).
8. Install the cap assembly as described in paragraph 5-1.4.



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Figure 5-4 Cap Assembly

5-1.8. Lift and Lower Switch Replacement.

1. Remove the cap assembly as described in paragraph 5-1.3.
2. Remove switch assembly (13 or 14, Figure 5-3) from the cap (16)
3. Remove pin (6) securing buttons (2 and 3) or (7 and 8) from bracket (5 or 9) and remove the buttons.
4. Remove two pins (6), two switches and four springs (4) from bracket (5 or 9).
5. Unsolder harness (23, Figure 5-2) from defective switch.
6. Solder the harness to new switch.
7. Position switches and four springs (4, Figure 5-4) in bracket (5 or 9) and secure with two pins (6).
8. Position switch assembly (13 or 14) in cover (1) and secure with pin (6).
9. Install the cap assembly as described in paragraph 5-1.4.

5-2. COMPARTMENT COVERS

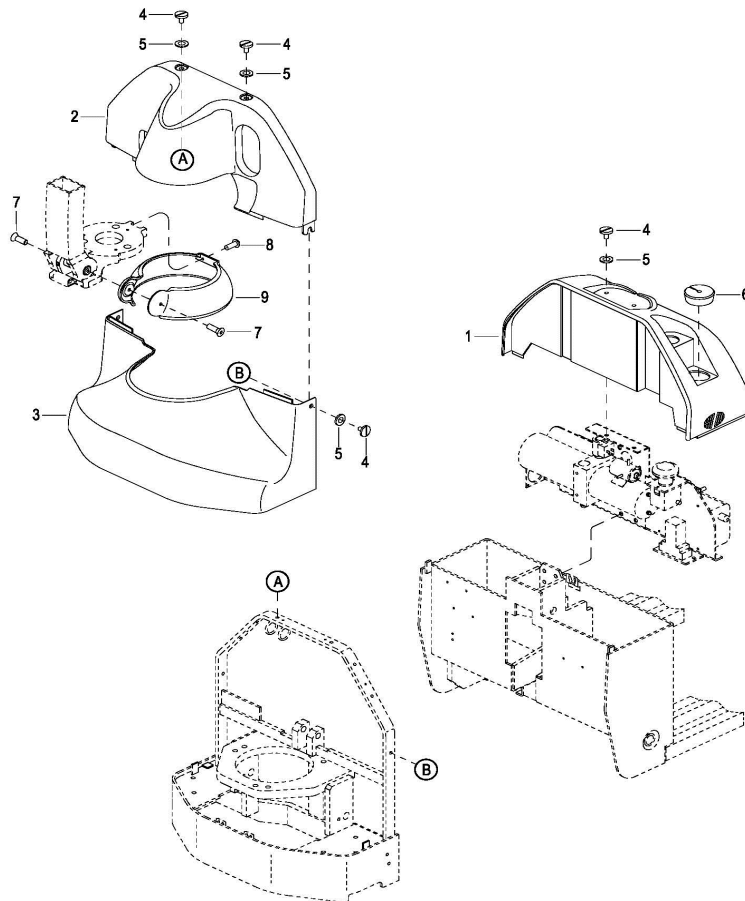
5-2.1. Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Pull charger cable up and remove cap (6, [Figure 5-5](#)) from the cable. Let charger cable back down into cover (1).
3. Remove two screws (4), two washers (5) and cover (1).
4. Disconnect cable (21, [Figure 12-19](#)) from charger (20).
5. Remove four screws (4), four washers (5) and upper cover (2).

6. Remove two screws (7), two screws (8) and middle cover (9).
7. Pull lower cover (3) up and out.

5-2.2. Installation.

1. Position lower cover (3, [Figure 5-5](#)) on the frame.
2. Place middle cover (9) around brake and secure with two screws (7) and two screws (8).
3. Install upper cover (2) and secure with four screws (4) and four washers (5).
4. Reconnect cable (21, [Figure 12-19](#)) to charger (20).



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Figure 5-5 Compartment Cover

5. Feed the cable through cover (1, [Figure 5-5](#)) and position cover (1) on the frame. Secure with two screws (4) and two washers (5).
6. Install cap (4) on cable (3) and position the cap on cover (1).
7. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

5-3. STEERING ARM

5-3.1. Return Spring Replacement.

The steering arm gas return spring (3, [Figure 5-1](#)) is replaced while the steering arm (2) is in the upright position.

1. Secure steering arm (2) in the upright position.
2. Remove screw (4) and free the gas return spring (3) from bracket (17).
3. Pull downward on gas return spring (3) to free it from its seat inside steering arm (13).

4. Position the new gas return spring (3) inside the steering arm being sure it fully engages its seat.
5. Position the opposite end of gas return spring (3) on bracket (17) and install screw (4).

5-3.2. Steering Arm Removal.

1. Remove steering arm gas return spring as described in paragraph [5-3.1](#).
2. Disconnect harness (15, [Figure 5-1](#)) from harness (3, [Figure 12-21](#)).
3. Attach a hoist to steering arm (2, [Figure 5-1](#)).
4. Remove shaft (5) and the steering arm (2).

5-3.3. Steering Arm Installation.

1. Position steering arm (2, [Figure 5-1](#)) over bracket (17) and secure with shaft (5).
2. Reconnect harness (15, [Figure 5-1](#)) to harness (3, [Figure 12-21](#)).
3. Install steering arm gas return spring as described

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. Should it become necessary to move a dead truck, the brake is equipped with an adjusting nut (Figure 6-1) that may be manually loosened to release the brake.

WARNING: Before returning the truck to operation, be sure to return the brake adjusting nut to its original position and check for proper braking function. Failure to return adjusting nut to its original position results in truck having no braking ability.

6-1.1. Air Gap Adjustment.

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 readjusted when it measures more than 0.25 mm.

NOTE: If the air gap measures more than 0.25 mm, the brake may not release properly. Air gap adjustment can be performed as long as the brake pads and rotor function properly or until the adjustable spacer threads are fully engaged (adjustment limit reached).

1. Block load wheels.
2. Remove the compartment covers as described in paragraph 5-2.
3. Using low pressure air, remove any dirt between armatures and magnet body.
4. Using standard feeler gauges, check the gap between the magnet body and the rotor plate. The gap should be 0.25 mm.
5. If necessary, refer to Figure 6-1 and adjust the gap as follows:
 - a. Loosen the three mounting screws by half a turn.
 - f. The threaded air gap adjusting nuts can then be screwed into Magnet Body by turning counterclockwise.
 - g. Turn the three mounting screws clockwise until the gap measures 0.012" (0.25 mm).

- h. The threaded air gap adjusting nuts are then screwed clockwise until they bottom.
 - i. Finally tighten the three mounting screws to 52 in-lb (6 Nm).
 - j. Recheck the gap.
11. Remove load wheel blocks and check operation.
 12. Install the compartment covers as described in paragraph 5-2.

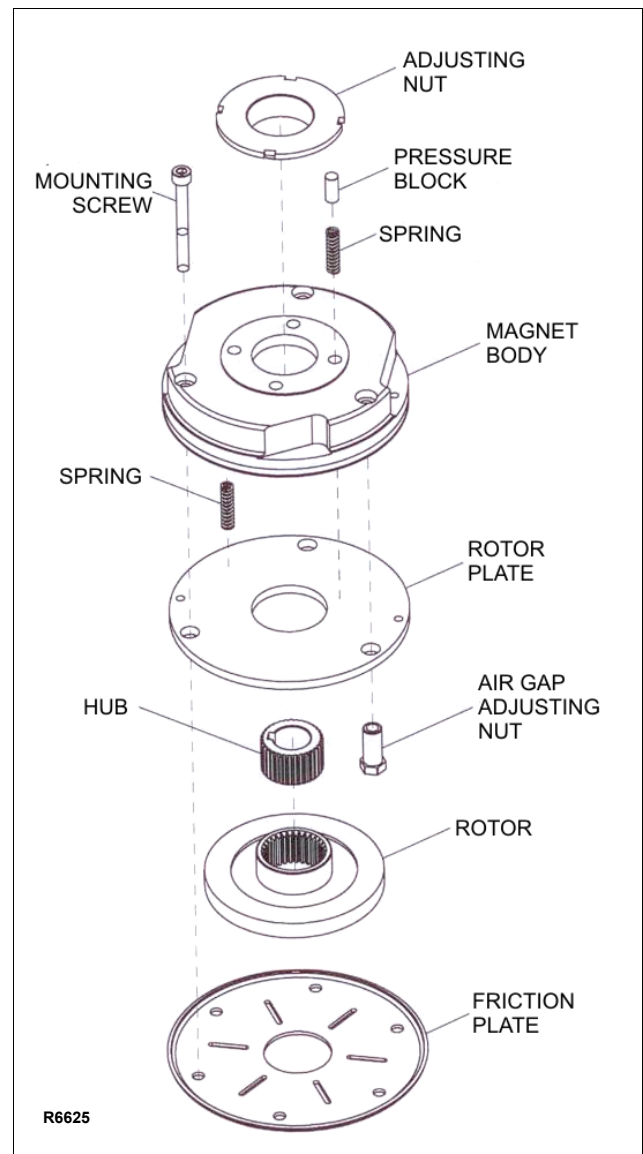


Figure 6-1 Brake Assembly

6-1.2. Stopping Distance Adjustment.

The stopping distance of the truck should require minimal 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).

To adjust stopping distance, proceed as follows:

1. Block load wheels.
2. Remove the compartment covers as described in paragraph 5-2.
3. Rotate the adjusting nut (Figure 6-1) clockwise to SHORTEN the stopping distance or counterclockwise to LENGTHEN the stopping distance.
4. Remove load wheel blocks and check operation.

5. Install the compartment covers as described in paragraph 5-2.

6-1.3. Brake Assembly Replacement

1. Block load wheels.
2. Remove the compartment covers as described in paragraph 5-2.
3. Disconnect electric brake (2, Figure 12-5) from harness (1, Figure 12-21).
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 in-lb (6 Nm).
7. Reconnect electric brake (2, Figure 12-5) from harness (3, Figure 12-21).
8. Remove load wheel blocks and check operation.
9. Install the compartment covers as described in paragraph 5-2.

SECTION 7
TRANSMISSION, DRIVE WHEEL, LOAD WHEEL

7-1. Load Wheel.

7-1.1. Removal

1. Raise forks.
1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Block the drive wheel to prevent the truck from rolling.
3. 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.

NOTE: When shaft (12, [Figure 12-11](#)) is removed, load wheel assembly (13) will drop free.

4. Remove pin (11) securing shaft (12) and remove shaft (12) and load wheel assembly (13).

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. Big Lift LLC recommends that both load wheel assemblies be replaced at the same time. This ensures level and safe operation of the lift truck.

7-1.2. Repair

1. Remove bearings (1, [Figure 7-1](#)) from wheels (2).
2. Inspect bearings (1) and replace if necessary.
3. Reassemble bearings (1) in wheels (2).

7-1.3. Load Wheel Installation

1. Position load wheel assembly (13, [Figure 12-11](#)) in wheel bracket (8).
2. Install shaft (12) and secure with pin (11).
3. Remove blocking from under the truck.
4. Lower the forks.
1. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

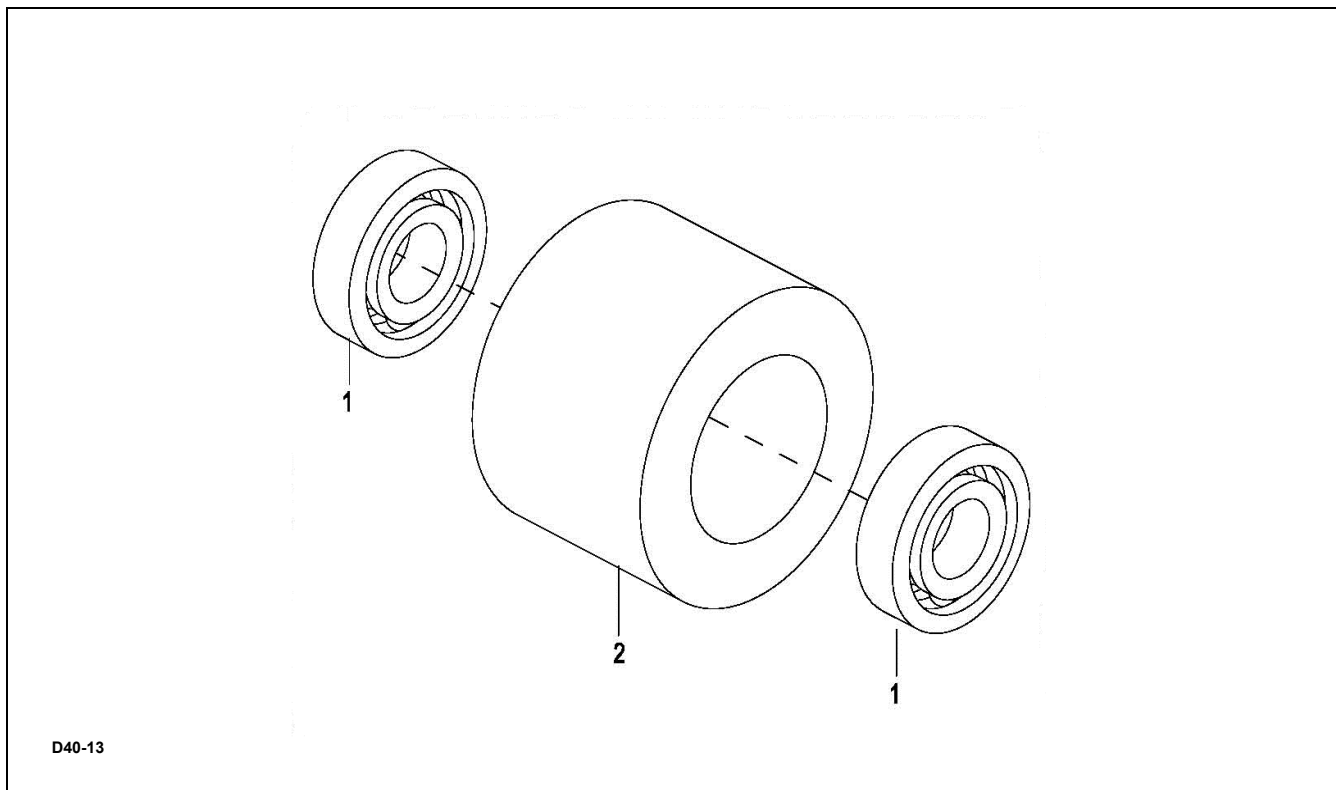


Figure 7-1 Wheel Assembly

7-2. Drive Wheel.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph [5-2](#).
3. Loosen but do not remove the five nuts (15, [Figure 7-2](#)).
4. Jack up the truck so the drive wheel is off the ground; then securely block the truck to prevent movement.
5. Remove five nuts (15), five washers (14), and drive wheel (13) from transmission (12).
6. Install new drive wheel in reverse order of removal.
7. Install the compartment covers as described in paragraph [5-2](#).
8. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph [5-2](#).
3. Remove the brake (2, [Figure 7-2](#)) as described in paragraph [6-1.3](#).
4. Remove the steering arm as described in paragraph [5-3.2](#).
5. Disconnect harness (3, [Figure 12-21](#)) from drive motor (3, [Figure 7-2](#)).
6. Remove drive motor (3) as described in paragraph [10-3](#).
7. Remove drive wheel (13) as described in paragraph [7-2](#).
8. Support the transmission (12) and remove five screws (7), five washers (8) and five flat washers (9)
9. Slowly lower the transmission out the bottom of the frame.
10. Install new transmission by reversing the steps above.

7-3. Transmission.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

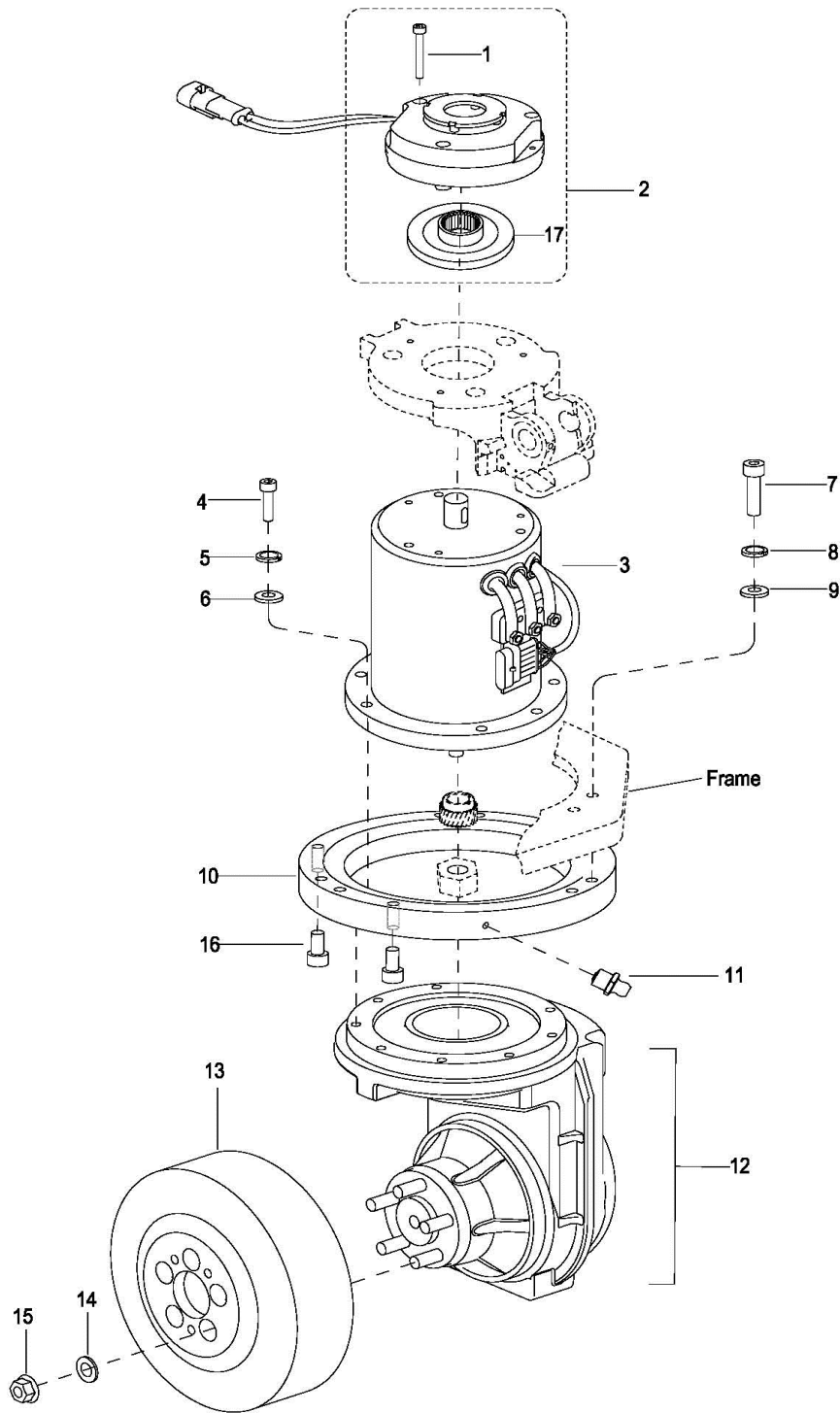


Figure 7-2 Transmission Motor, Brake Mounting

SECTION 8 ELEVATION SYSTEM SERVICING

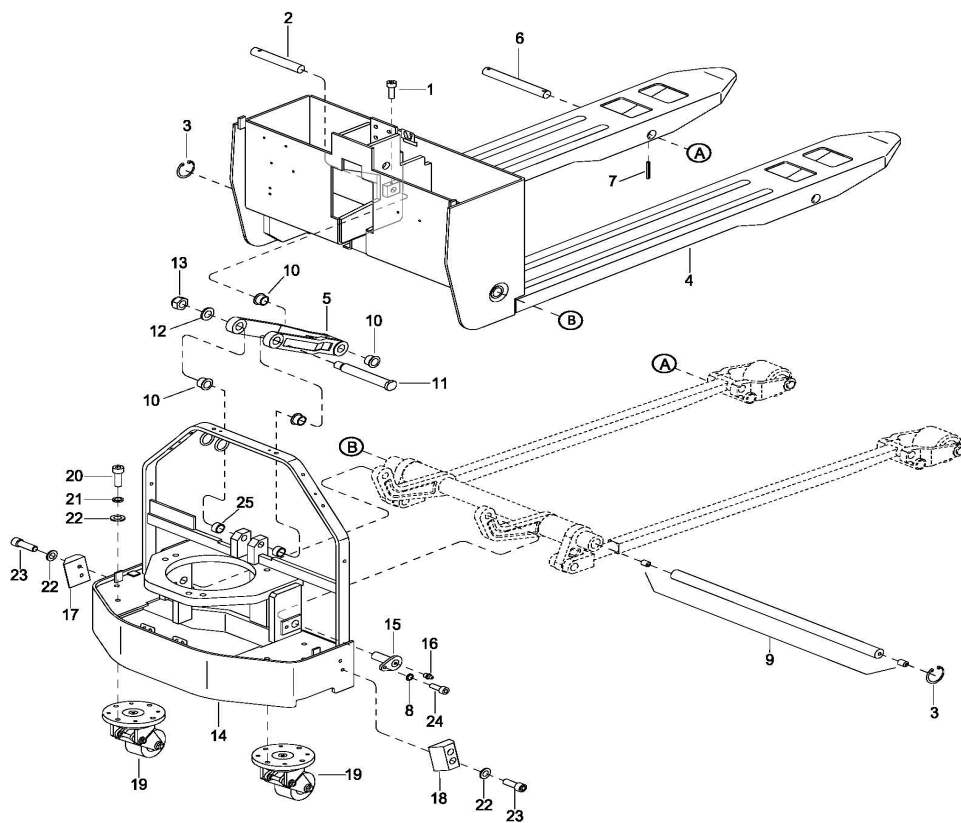
8-1. GENERAL

The elevation system includes the lift linkage, front frame and back frame.

8-2. LIFT LINKAGE

8-2.1. Removal

1. Lift complete truck to height sufficient to permit access to lift linkage under forks. Provide blocking under frame (14, Figure 8-1), the rear of frame (4) and at the tips of the forks.
2. Turn off key switch (21, Figure 12-20) and emergency disconnect (2, Figure 12-19).
3. Remove screw (24, Figure 8-1) and shaft (15) from each side of frame (14).
4. Remove clips (3) from each side of frame (4). Support link assembly (1, Figure 8-2) and remove shaft (9, Figure 8-1).
5. Lower link assembly (1, Figure 8-2) to the floor.
6. Remove pins (7) and remove shafts (6).
7. Lower links (6, Figure 8-2) to the floor.



D40-11

Figure 8-1 Frame

8-2.2. Repair

1. Remove pins (11, [Figure 8-2](#)), shafts (12) and load wheel (13) from wheel brackets (8).
2. Remove pins (11) and shafts (10). Free brackets (8) from tension bars (6).
3. Remove bushings (9) from brackets (8) if replacement is necessary,
4. Remove pins (11) and shafts (3) from connector (5) and free tension bars from connector (5).
5. Loosen nuts (4) and remove clevises (5) from tension bars (15).
6. Remove bushings (2) from link (1) if replacement is necessary.

7. Install reassemble by reversing the steps above.

8-2.3. Installation

1. Position link assembly under frame (4).
2. Position wheel brackets (8, [Figure 8-2](#)) in frame (4, [Figure 8-1](#)) and install shafts (6). Secure shafts (6) with pins (7).
3. Position link assembly (1, [Figure 8-2](#)) and install shafts (15). Secure shafts (15) with screws (24),
4. Remove blocking and lower the truck to the ground.
5. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

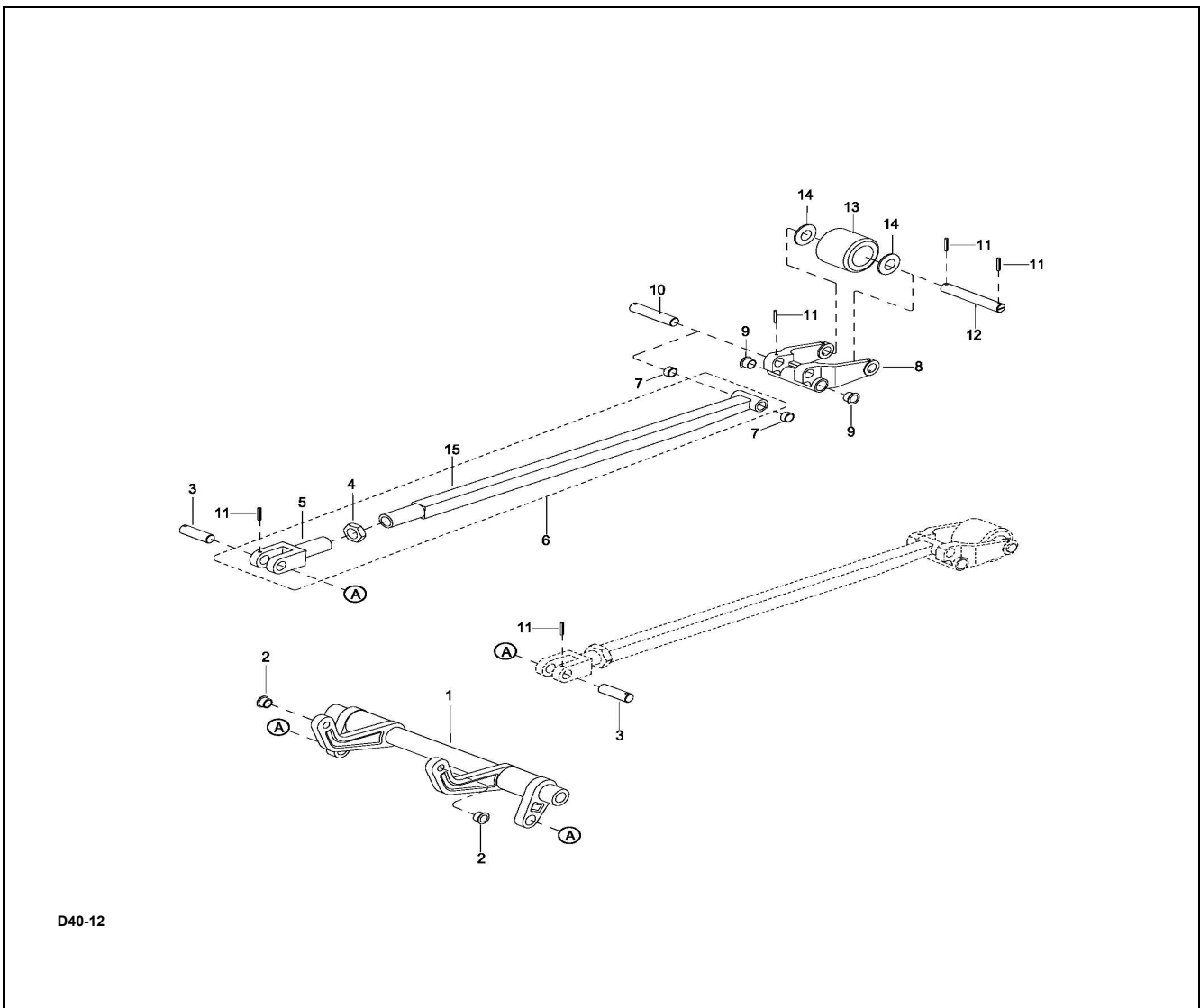


Figure 8-2 Lift Linkage Assembly

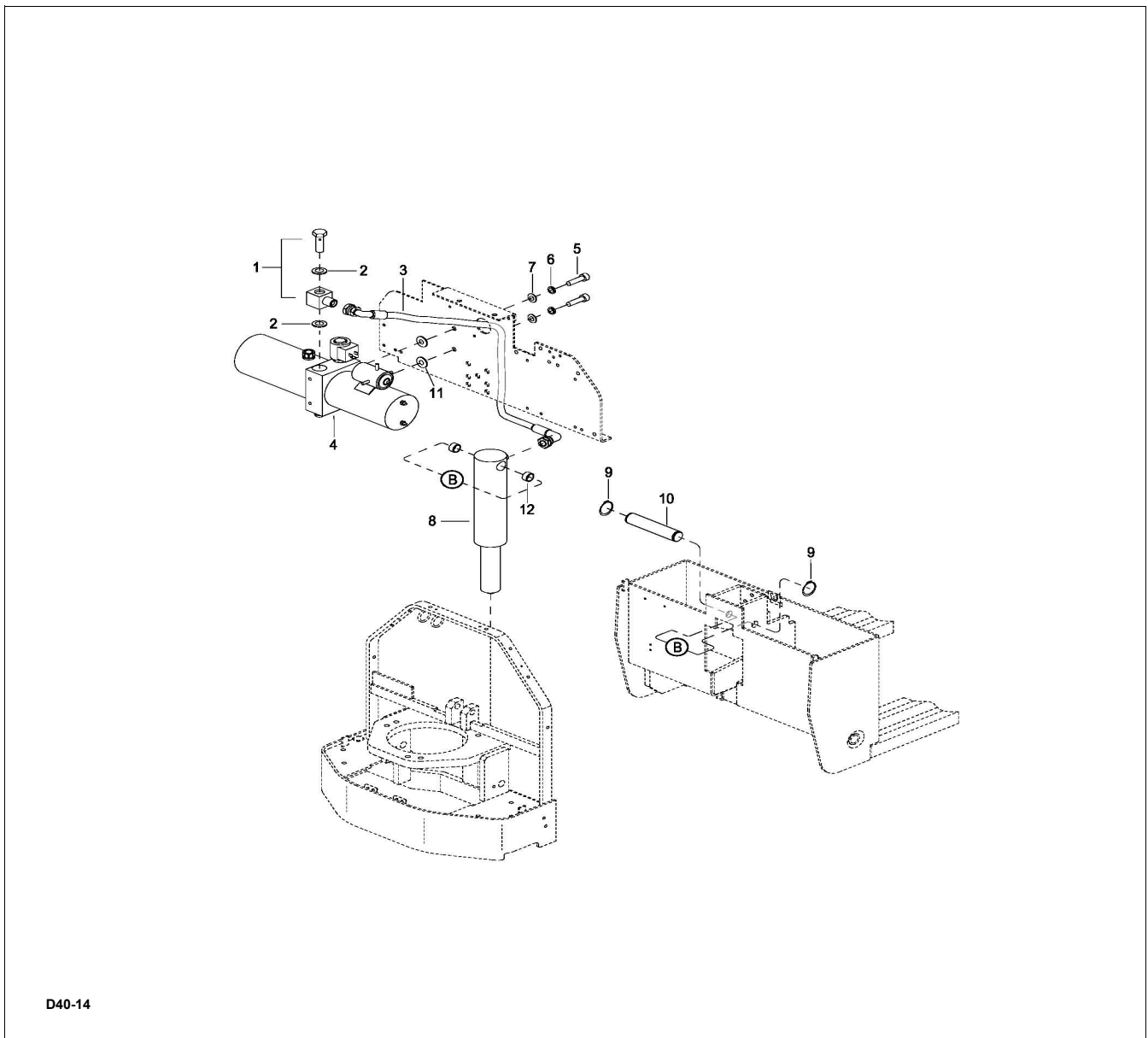
SECTION 9 HYDRAULIC SYSTEM SERVICING

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 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. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
3. Remove the compartment covers as described in paragraph 5-2.



D40-14

Figure 9-1 Hydraulic System

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

4. Refer to [Figure 9-1](#) and remove leaking line or fitting and replace it with a new line or fitting. 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](#).
5. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
6. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
7. 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](#).
8. Install the compartment covers as described in paragraph [5-2](#).

9-2. HYDRAULIC AND ELECTRICAL ASSEMBLY REMOVAL

The hydraulic system and electrical system can be removed as an assembly to provide additional clearance for various maintenance procedures.

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. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
3. Remove the compartment covers as described in paragraph [5-2](#).
4. Disconnect hose (3, [Figure 9-1](#)) from pump and motor assembly (4).
5. Tag and disconnect all harnesses and cables from electrical components on board (4, [Figure 12-17](#)).
6. Support board (4) and remove four screws (1, [Figure 12-17](#)), four lock washers (2) and four flat washers (3).
7. Remove board (4).

9-2.2. Installation

1. Position board (4, [Figure 12-17](#)) on frame and secure with four screws (1, [Figure 12-17](#)), four lock washers (2) and four flat washers (3).
2. Reconnect hose (3, [Figure 9-1](#)) to pump and motor assembly (4).
3. Reconnect all harnesses and cables to electrical components on board (4, [Figure 12-17](#)).
4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
5. Install the compartment covers as described in paragraph [5-2](#).

9-3. HYDRAULIC PUMP, MOTOR, AND RESERVOIR ASSY

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.

9-3.1. Removal

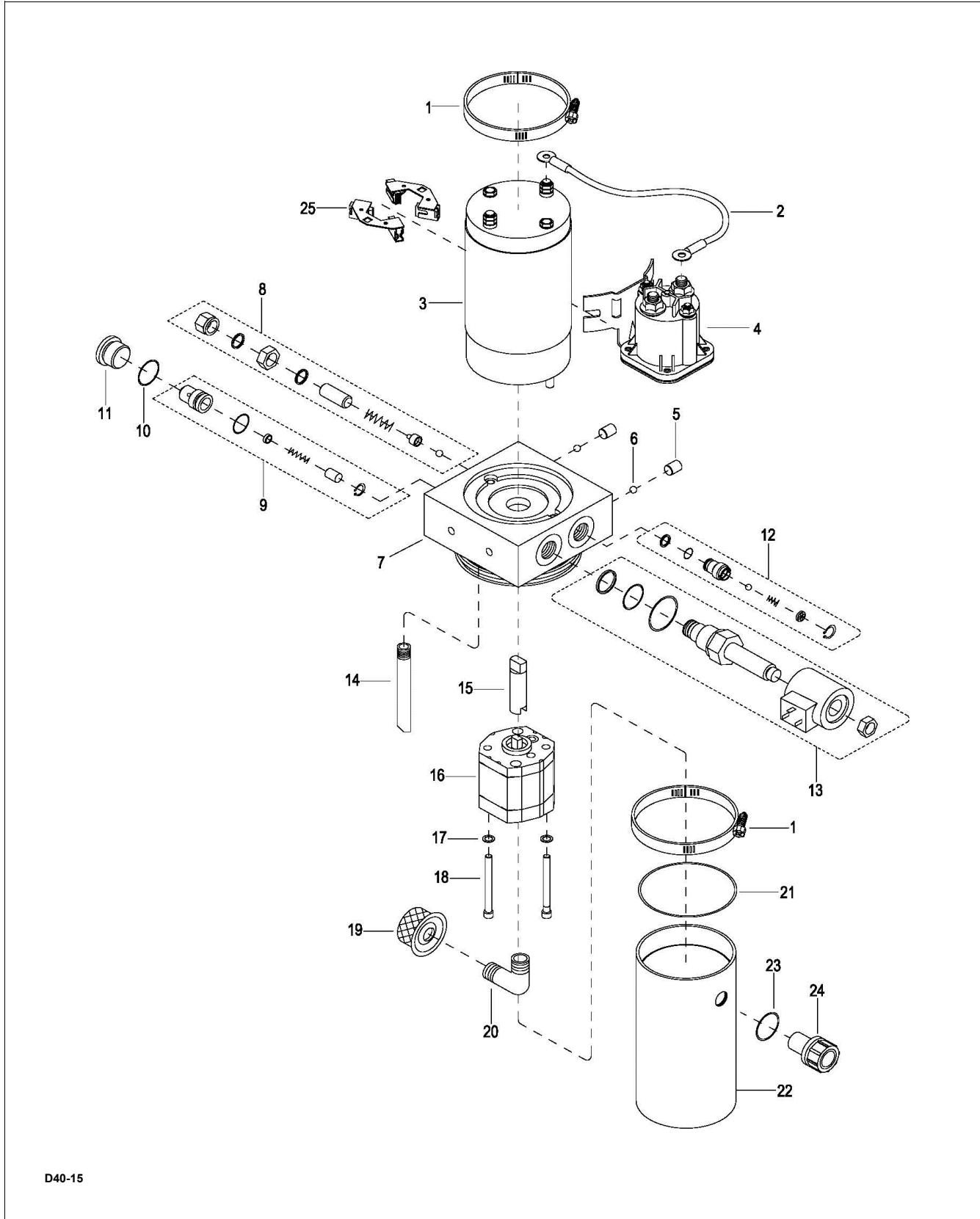
1. Lower forks fully.
2. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
3. Remove the hydraulic and electrical assembly as described in paragraph [9-2](#).

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

4. Remove two screws (5, [Figure 9-1](#)), lock washers (6) and flat washers (7) and remove pump and motor (4).

9-3.2. Disassembly and Reassembly

1. Remove the hydraulic pump/motor assembly as described in paragraph [9-3.1](#).
2. Refer to [Figure 9-2](#) for disassembly and reassembly.



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Figure 9-2 Pump & Motor Assy

9-3.3. Installation

1. Position pump and motor (4, [Figure 9-1](#)) on board and secure with two screws (5), lock washers (6) and flat washers (7).
2. Remove the hydraulic and electrical assembly as described in paragraph [9-2](#).
3. Fill the hydraulic reservoir. 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](#).
4. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
5. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
6. 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](#).
7. Install the compartment cover as described in paragraph [5-2](#).

9-3.4. Lift Cylinder

9-3.4.1. Removal

1. Lower forks fully.
2. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
3. Remove the compartment covers as described in paragraph [5-2](#).
4. Ensure that hydraulic pressure has been relieved from the lift circuit. Disconnect the hydraulic line from the lift cylinder.
5. Disconnect hose (3, [Figure 9-1](#)) from cylinder (8).

WARNING: Frame is heavy. Use care while securing and lifting in order to prevent injury.

6. With suitable hoist, carefully raise frame (4, [Figure 12-10](#)) slightly to relieve pressure on the cylinder (8, [Figure 9-1](#)).
7. Remove retaining rings (9) and pin (10).
8. Remove cylinder (8).

9-3.4.2. Repair

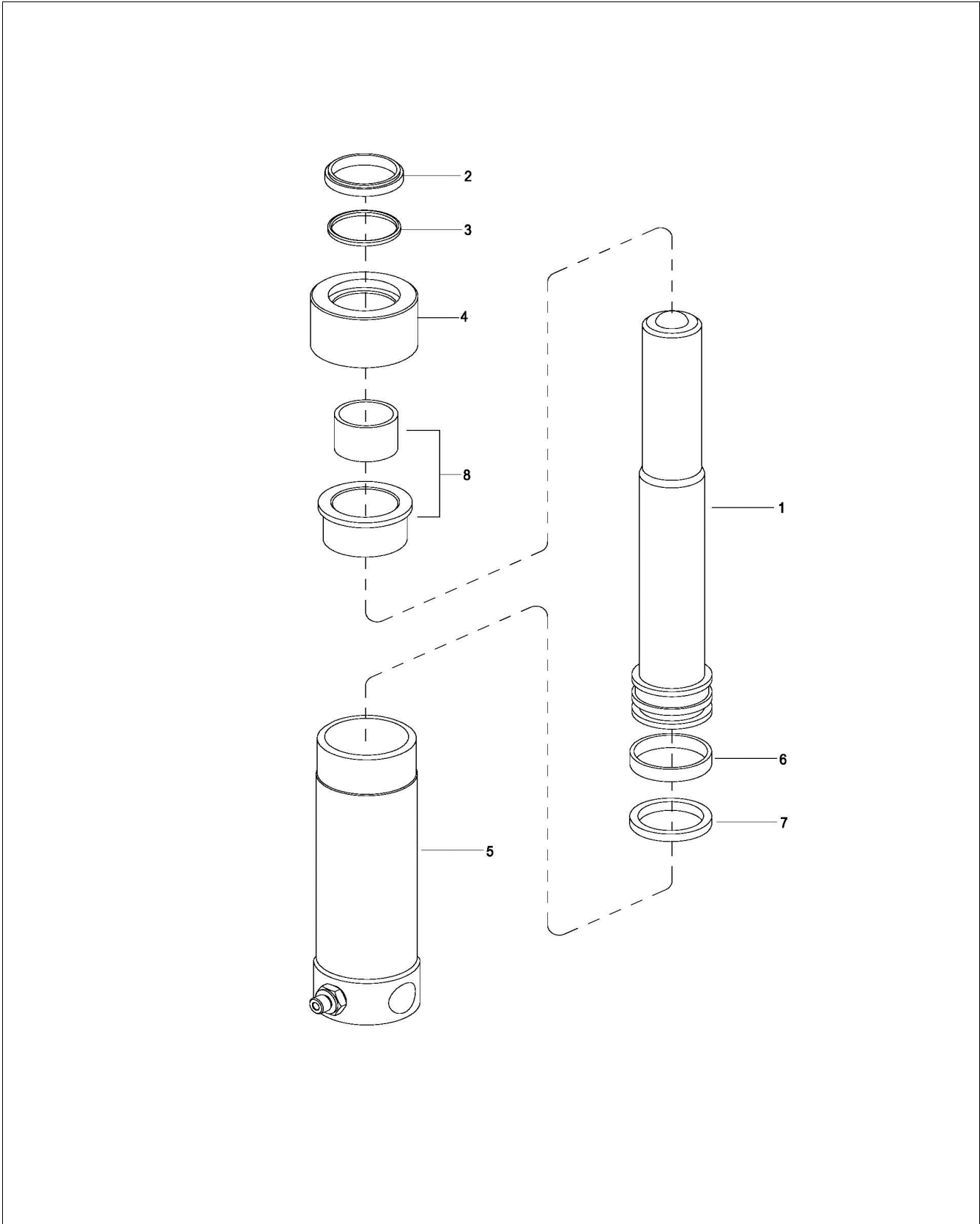
1. Secure the lift cylinder in a vise, clamping lightly at the base of the cylinder.
2. Unscrew gland nut (4, [Figure 9-3](#)) from body (5).
3. Remove wiper (2) and O-ring (3) from gland nut (4).
4. Withdraw the cylinder rod (1) from body (5).
5. Remove bushing (8), guide ring (6) and seal ring (7) from rod (1).

NOTE: If the cylinder body (5) or piston rod (1) are damaged, the entire lift cylinder must be replaced.

6. Replace guide ring (6), seal ring (7), wiper ring (2) and O-ring (3).
7. Coat all parts with hydraulic oil ([Table 3-2](#)).
8. Install new guide ring (6), seal ring (7) and bushing (8) on rod (1).
9. Insert piston rod (1) into body (5).
10. Install wiper (2) and O-ring (3) in gland nut (4).
11. Install gland nut (4) in body (5).

9-3.4.3. Installation

1. Position the cylinder on frame and lower the frame (4, [Figure 12-10](#)) onto the cylinder.
2. Install pin (10) and retaining rings (9).
3. Reconnect the hose (3, [Figure 9-1](#)) to cylinder (8).
4. Fill the hydraulic reservoir. 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](#).
5. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
6. Operate the lift and lower buttons to refill the cylinder and lines with hydraulic oil.
7. 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](#).
8. Install the compartment cover 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](#), 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 pre-programmed unit to assure proper performance settings intended for that particular truck. See [Figure 12-19](#) for the preprogrammed controller number.

It is recommended that the controller exterior be cleaned periodically, and if a Zapi Handset 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. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
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. Controller Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph [5-2](#).

3. Tag and disconnect harness (1, [Figure 12-21](#)) from controller (18, [Figure 10-1](#)).
4. Remove four screws (16), lock washers (17) and remove controller (18).

10-1.4. Controller Installation.

1. Position controller (18, [Figure 10-1](#)) and the board and secure with four screws (16) and lock washers (17).
2. Reconnect harness (1, [Figure 12-21](#)) to controller (18, [Figure 10-1](#)).
3. Install compartment covers as described in paragraph [5-2](#).
1. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.5. Charger Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph [5-2](#).
3. Tag and disconnect harness (1, [Figure 12-21](#)) from charger (20, [Figure 10-1](#)).
4. Tag and disconnect remaining two charger leads from the pump motor and the fuse.
5. Remove three screws (16, [Figure 10-1](#)), screw (23), four lock washers (24), two straps (22) and charger (20).

10-1.6. Charger Installation.

1. Position charger (20, [Figure 10-1](#)) on board and secure with three screws (16, [Figure 10-1](#)), screw (23), four lock washers (24) and two straps (22).
2. Reconnect the two charger leads to the pump motor and the fuse.
3. Reconnect harness (1, [Figure 12-21](#)) to charger (20, [Figure 10-1](#)).
4. Install compartment covers as described in paragraph [5-2](#).
5. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.7. Emergency Disconnect Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Tag and disconnect harness (1, [Figure 12-21](#)) from emergency disconnect (2, [Figure 10-1](#)).
4. Remove the knob from the emergency disconnect (2)
5. Remove two screws (1) and remove emergency disconnect (2) from bracket (3).

10-1.8. Emergency Disconnect Installation.

1. Position emergency disconnect (2, [Figure 10-1](#)) on bracket (3) and secure with two screws (1).
2. Install the knob on the emergency disconnect (2)
3. Reconnect harness (1, [Figure 12-21](#)) to emergency disconnect (2, [Figure 10-1](#)).
4. Install compartment covers as described in paragraph 5-2.
5. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.9. Contactor Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.

3. Tag and disconnect wires from contactor (19, [Figure 10-1](#)).
4. Remove two screws (8), lock washers (9), flat washers (10) and remove contactor (19).

10-1.10. Contactor Installation.

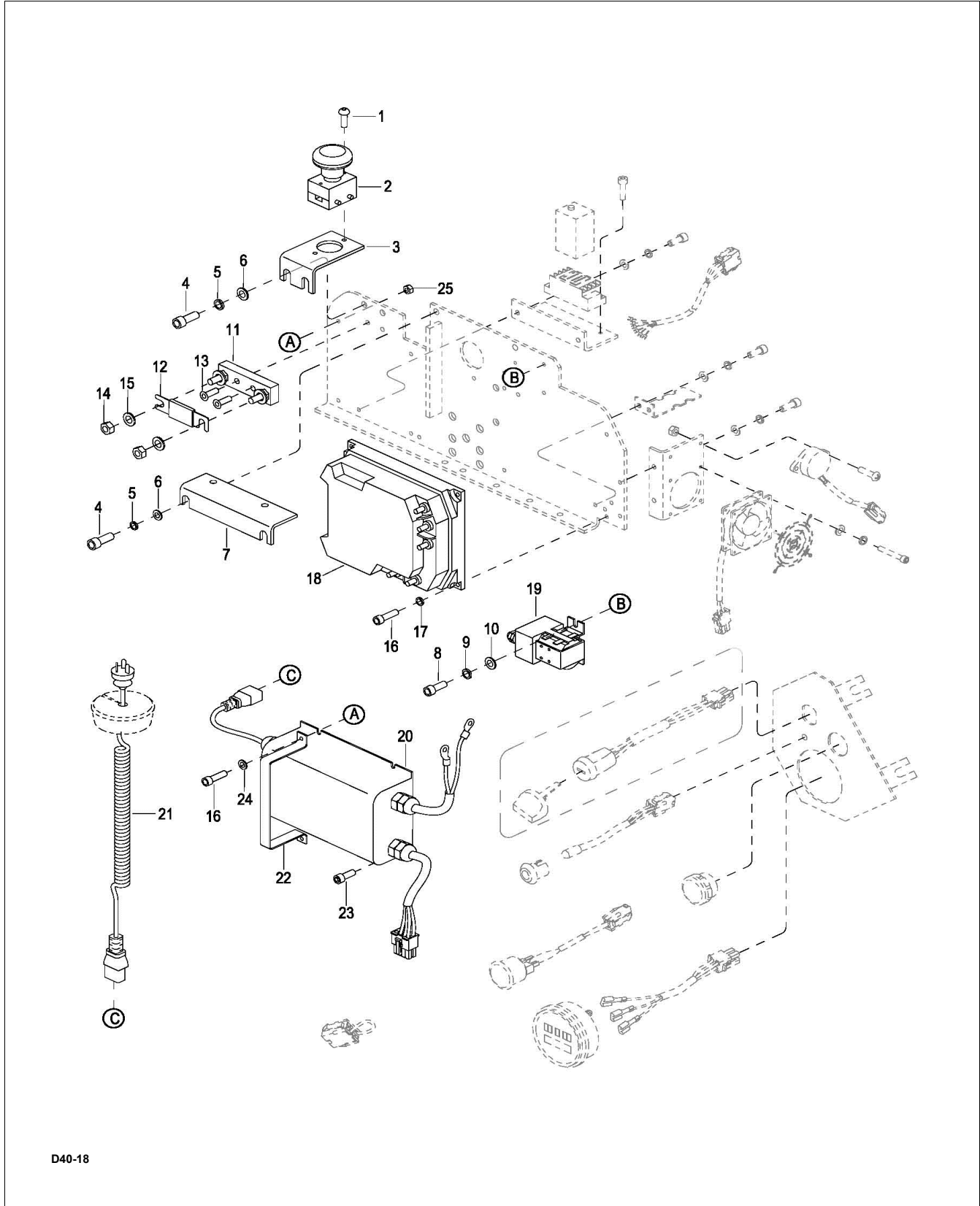
1. Position contactor (19, [Figure 10-1](#)) on the board and secure with two screws (8), lock washers (9) and flat washers (10).
2. Reconnect wires to contactor (19).
3. Install compartment covers as described in paragraph 5-2.
4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.11. Fuse Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Loosen two nuts (14) and rotate and remove fuse (12).

10-1.12. Fuse Installation.

1. Install fuse (12, [Figure 10-1](#)) on the stand (11) and secure two nuts (14).
2. Install compartment covers as described in paragraph 5-2.
3. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).



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Figure 10-1 Electrical Components (Sheet 1)

10-1.13.Cooling Fan Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Tag and disconnect harness (1, [Figure 12-21](#)) from cooling fan (15, [Figure 10-2](#)).
4. Remove four screws (17), four lock washers (18) and four flat washers (19). Remove cooling fan (15) and guard (16) from bracket (11).

10-1.14.Cooling Fan Installation.

1. Position cooling fan (15, [Figure 10-2](#)) and guard (16) on bracket (11) and secure with four screws (17), four lock washers (18) and four flat washers (19).
2. Reconnect harness (1, [Figure 12-21](#)) to cooling fan (15, [Figure 10-2](#)).
3. Install compartment covers as described in paragraph 5-2.
4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.15.Buzzer Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Tag and disconnect harness (1, [Figure 12-21](#)) from buzzer (12, [Figure 10-2](#)).
4. Remove two screws (13) and buzzer (12) from bracket (11).

10-1.16.Buzzer Installation.

1. Position buzzer (12, [Figure 10-2](#)) on bracket (11) and secure with two screws (13).
2. Reconnect harness (1, [Figure 12-21](#)) to buzzer (12, [Figure 10-2](#)).
3. Install compartment covers as described in paragraph 5-2.

4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.17.Key Switch Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Tag and disconnect harness (3, [Figure 12-21](#)) from key switch (20, [Figure 10-2](#)).
4. Free key switch (20) from bracket.

10-1.18.Key Switch Installation.

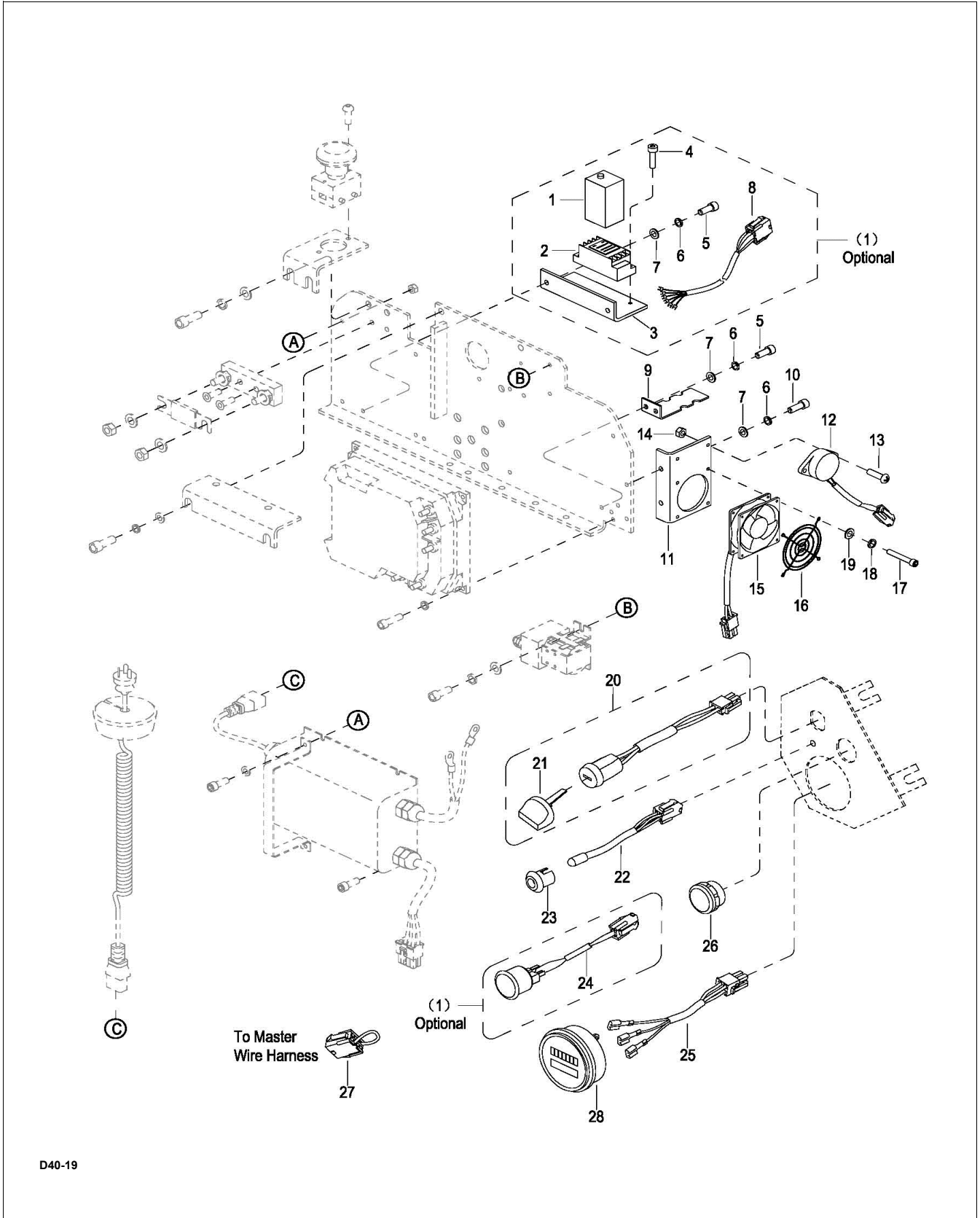
1. Insert key switch (20, [Figure 10-1](#)) in bracket.
2. Reconnect harness (3, [Figure 12-21](#)) to key switch (20, [Figure 10-1](#)).
3. Install compartment covers as described in paragraph 5-2.
4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

10-1.19.Battery Indicator Removal.

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Tag and disconnect harness (3, [Figure 12-21](#)) from battery indicator (25, [Figure 10-1](#)).
4. Remove mounting nuts and bracket and remove battery indicator (25) from bracket.

10-1.20.Battery Indicator Installation.

1. Position battery indicator (25, [Figure 10-1](#)) on bracket and secure with its mounting bracket and nuts.
2. Reconnect harness (3, [Figure 12-21](#)) to battery indicator (25, [Figure 10-1](#)).
3. Install compartment covers as described in paragraph 5-2.
4. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).



D40-19

Figure 10-2 Electrical Components (Sheet 2)

10-1.21.Lift Limit Switch Removal.

1. Lower forks fully.
2. Turn off key switch (21, Figure 12-20) and emergency disconnect (2, Figure 12-19).
3. Remove the compartment covers as described in paragraph 5-2.
4. Tag and disconnect harness (1, Figure 12-21) from limit switch (17, Figure 10-3).
5. Remove two nuts (21), screws (19), lock washers (20) and limit switch (17) from bracket (15).

10-1.22.Lift Limit Switch Installation.

1. Position limit switch (17, Figure 10-3) on bracket (15) and secure with two screws (19), lock washers (20) and nuts (21).
2. Reconnect harness (1, Figure 12-21) to limit switch (17, Figure 10-3).
3. Install compartment covers as described in paragraph 5-2.
4. Turn on key switch (21, Figure 12-20) and emergency disconnect (2, Figure 12-19).

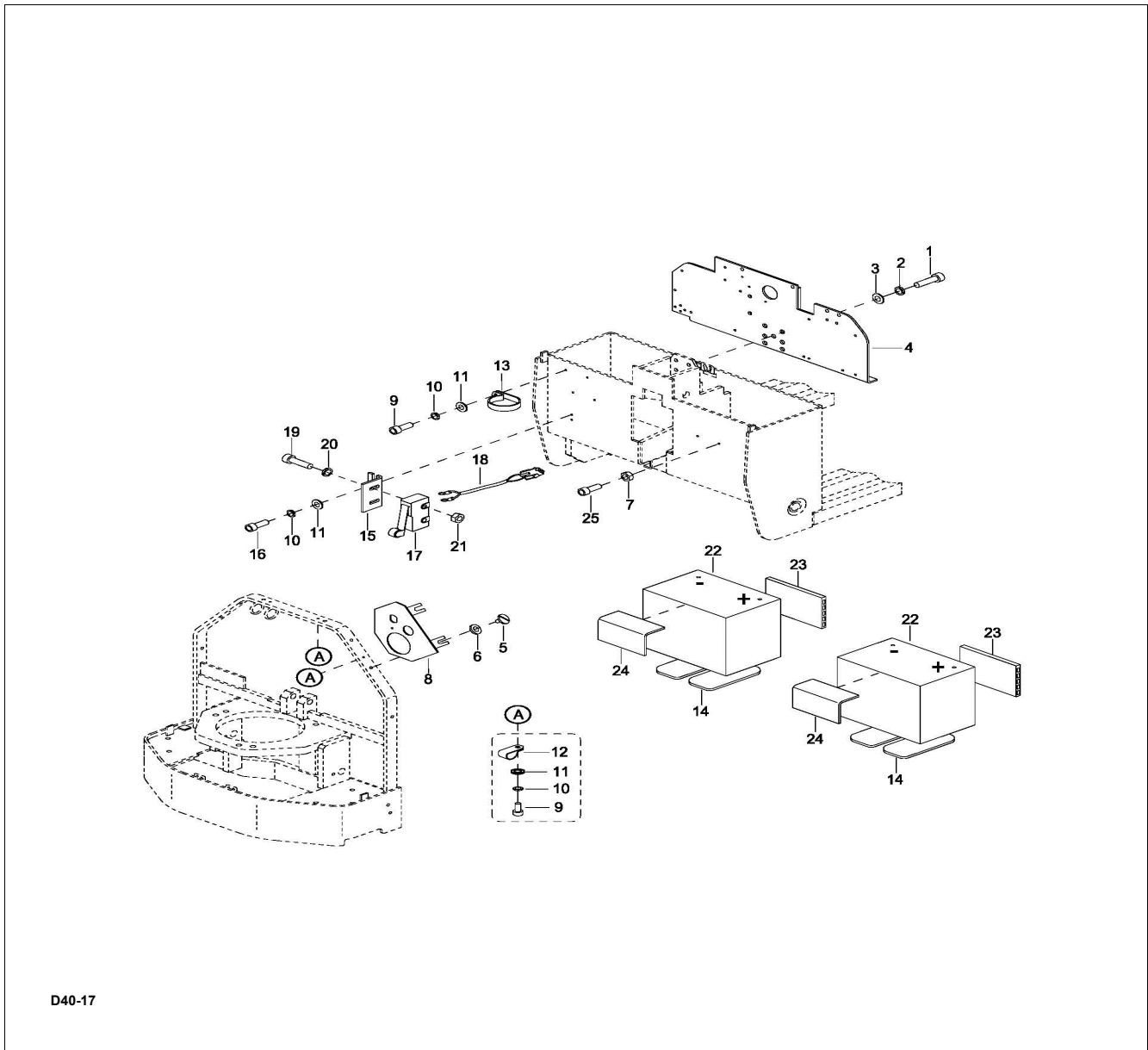


Figure 10-3 Electric System

10-2.PUMP MOTOR.

The pump motor is replaceable but not repairable. Refer to paragraph 9-3.

10-3.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 7-3.

10-4.DEADMAN SWITCH

10-4.1.Replacement

1. Turn off key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).
2. Remove the compartment covers as described in paragraph 5-2.
3. Disconnect wiring from the deadman switch (16, [Figure 12-1](#)).
4. Remove the two screws (19), lock washers (20) and bracket (18) from bracket (17).
5. Remove two screws (21) and switch (16) from bracket (18).
6. Position the new switch (16) on bracket (18) and secure with the two screws (21).
7. Position bracket (18) on bracket (17) and secure with two screws (19) and lock washers (20).
8. Install compartment covers as described in paragraph 5-2.
9. Turn on key switch (21, [Figure 12-20](#)) and emergency disconnect (2, [Figure 12-19](#)).

NOTES

**SECTION 11
OPTIONAL EQUIPMENT**

NOTES

SECTION 12
ILLUSTRATED PARTS BREAKDOWN

Following is an illustrated parts breakdown of assemblies and parts associated with the D40 Lift Truck.

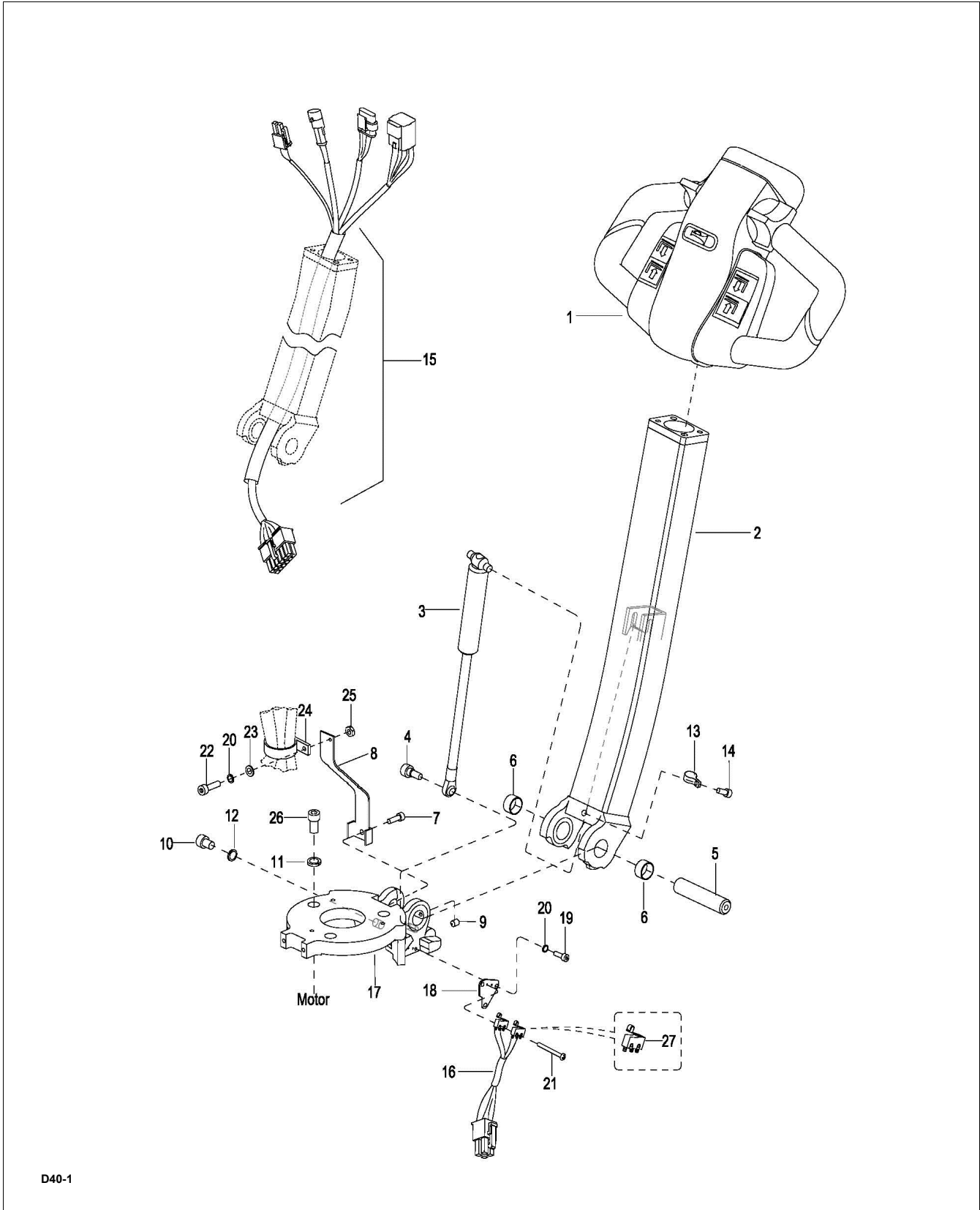
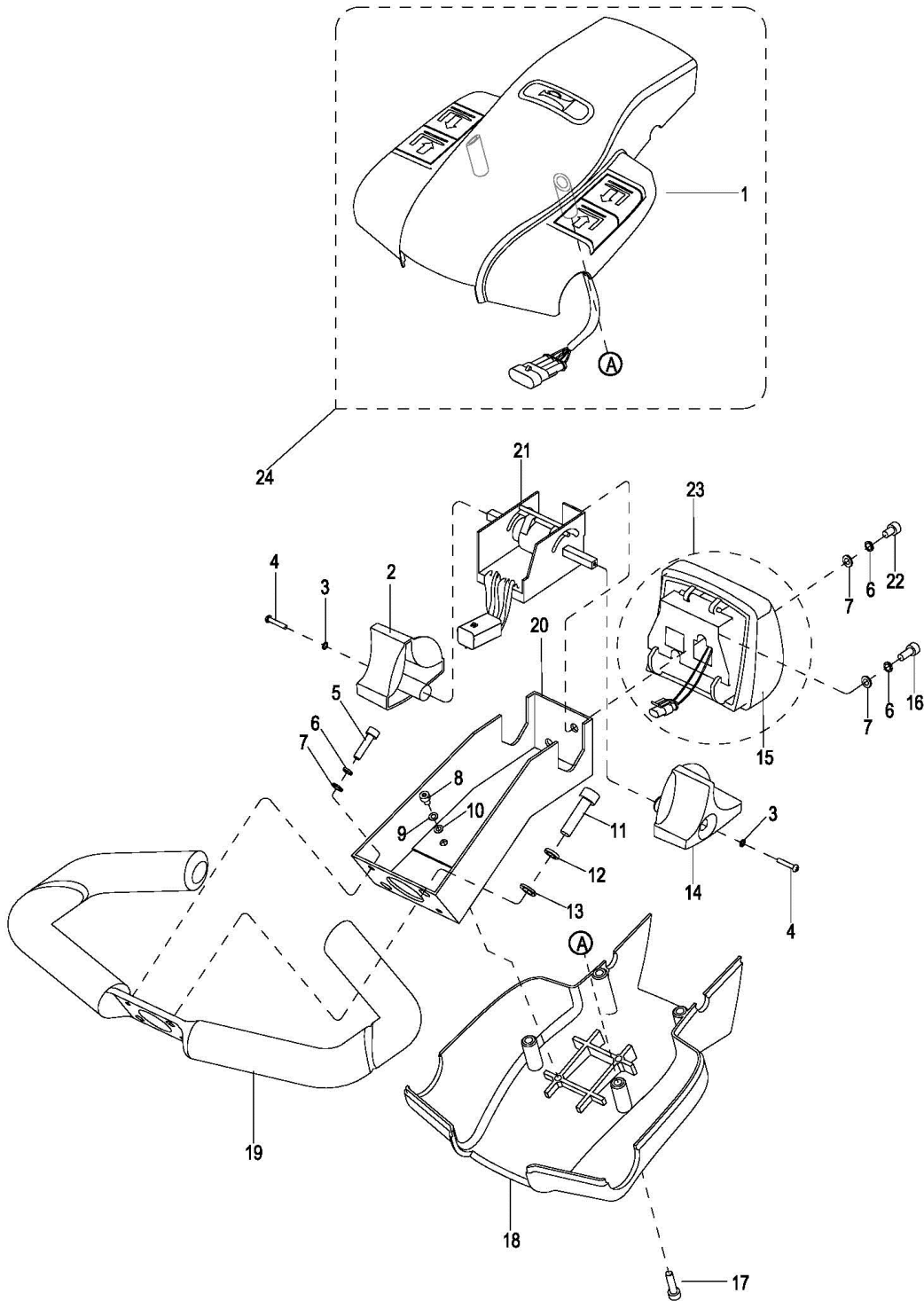


Figure 12-1 Steering Arm

Steering Arm

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1120-340000-00-B	CONTROL HEAD ASSEMBLY	1	See FIGURE 12-2
2	1120-330000-0A	CONTROL ARM ASSEMBLY	1	
3	1120-320000-00	GAS SPRING	1	
4	0000-000151-00	SCREW, M8 X 25	1	
5	1120-300003-00	SHAFT	1	
6	0000-000011-00	BUSHING, 2015	2	
7	0000-000386-00	SCREW, M5 X 20	4	
8	1120-300005-00	BRACKET	1	
9	0000-000016-00	SCREW, M6 X 8	1	
10	0000-000030-00	SCREW, M10 X 16	1	
11	0000-000159-00	LOCK WASHER, M8	3	
12	0000-000063-00	LOCK WASHER, M10	1	
13	0000-000490-00	HARNESS CLAMP	1	
14	0000-000031-00	SCREW, M5 X 8	1	
15	1118-520003-00	WIRE HARNESS	1	
16	1118-520005-10	DEADMAN SWITCH ASSEMBLY	1	
17	1120-300001-0A	BRAKE BRACKET	1	
18	1120-300006-00	SPACER	1	
19	0000-000009-00	SCREW, M4 X 12	2	
20	0000-000122-00	LOCK WASHER, M4	3	
21	0000-000377-00	SCREW, M2 X 20	2	
22	0000-000378-00	SCREW, M4 X 16	1	
23	0000-000702-00	FLAT WASHER, M4	1	
24	0000-000491-00	HARNESS CLAMP	1	
25	0000-000139-00	NUT, M4	1	
26	0000-000109-00	SCREW, M8 X 16	3	
27	1220-560001-00	INCHING SWITCH	2	

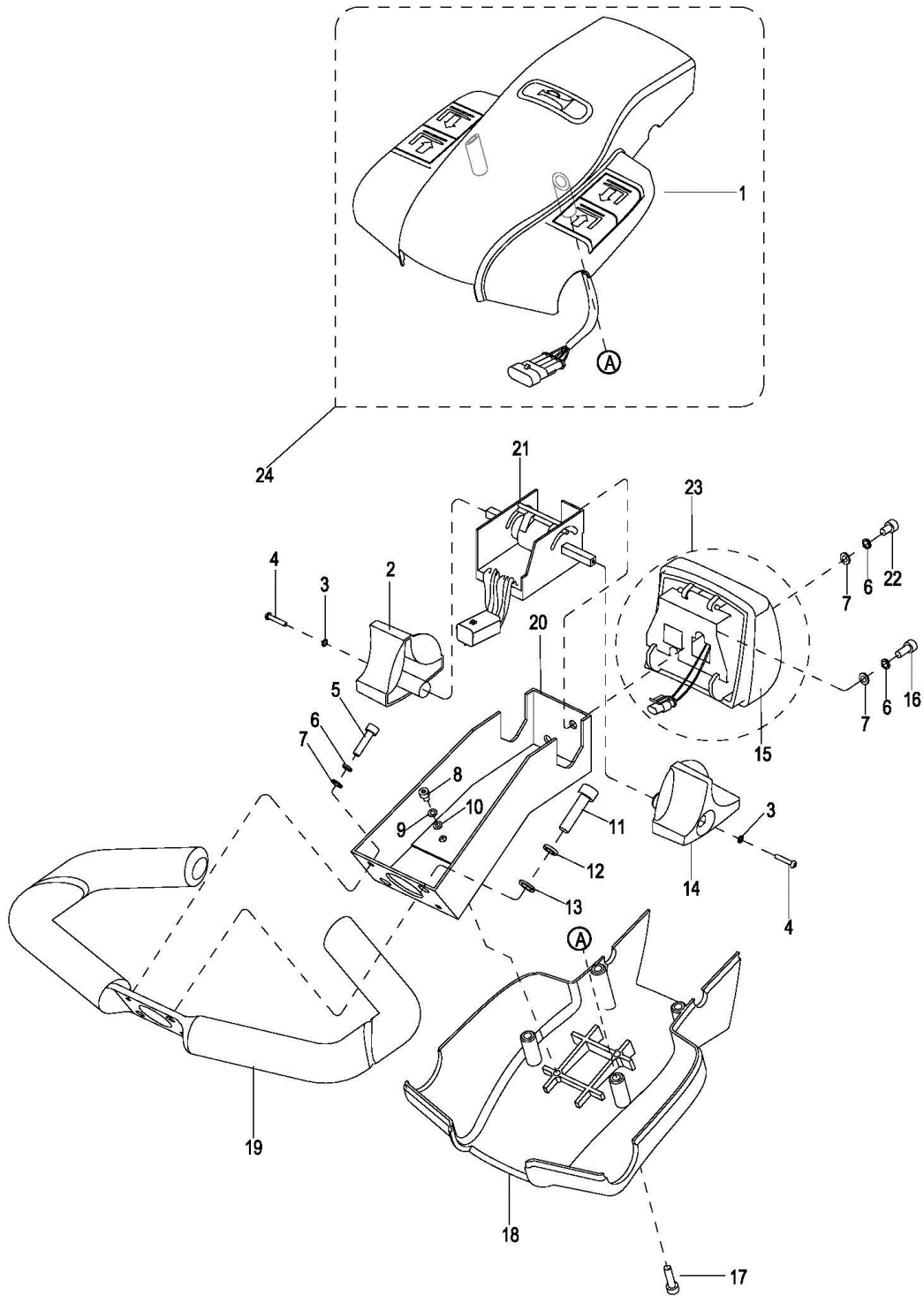


D40-2

Figure 12-2 Control Head

Control Head

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	—	CAP ASSEMBLY	REF	See pos. # 24
2	1120-340005-00	CONTROL KNOB RIGHT SIDE	1	
3	0000-000038-00	LOCK WASHER, M3	2	
4	0000-000037-00	SCREW, M3 X 15	2	
5	0000-000004-00	SCREW, M5 X 12	2	
6	0000-000206-00	LOCK WASHER, M5	4	
7	0000-000390-00	FLAT WASHER, M5	4	
8	0000-000088-00	SCREW, M4 X 8	2	
9	0000-000122-00	LOCK WASHER, M4	2	
10	0000-000702-00	FLAT WASHER, M4	2	
11	0000-000322-00	SCREW, M8 X 25	2	
12	0000-000159-00	LOCK WASHER, M8	2	
13	0000-000176-00	FLAT WASHER	2	
14	1120-340003-00	CONTROL KNOB LEFT SIDE	1	
15	1120-343000-00	SWITCH BOX ASSEMBLY	1	Switches not incl.
16	0000-000004-00	SCREW, M5 X 12	2	
17	0000-000035-00	SCREW, M5 X 20	4	
18	1120-340002-00	COVER	1	
19	1120-341000-00	HANDLE	1	
20	1120-340001-00	CONNECTOR BRACKET	1	
21	1220-520008-0C	ACCELERATOR ASSEMBLY	1	

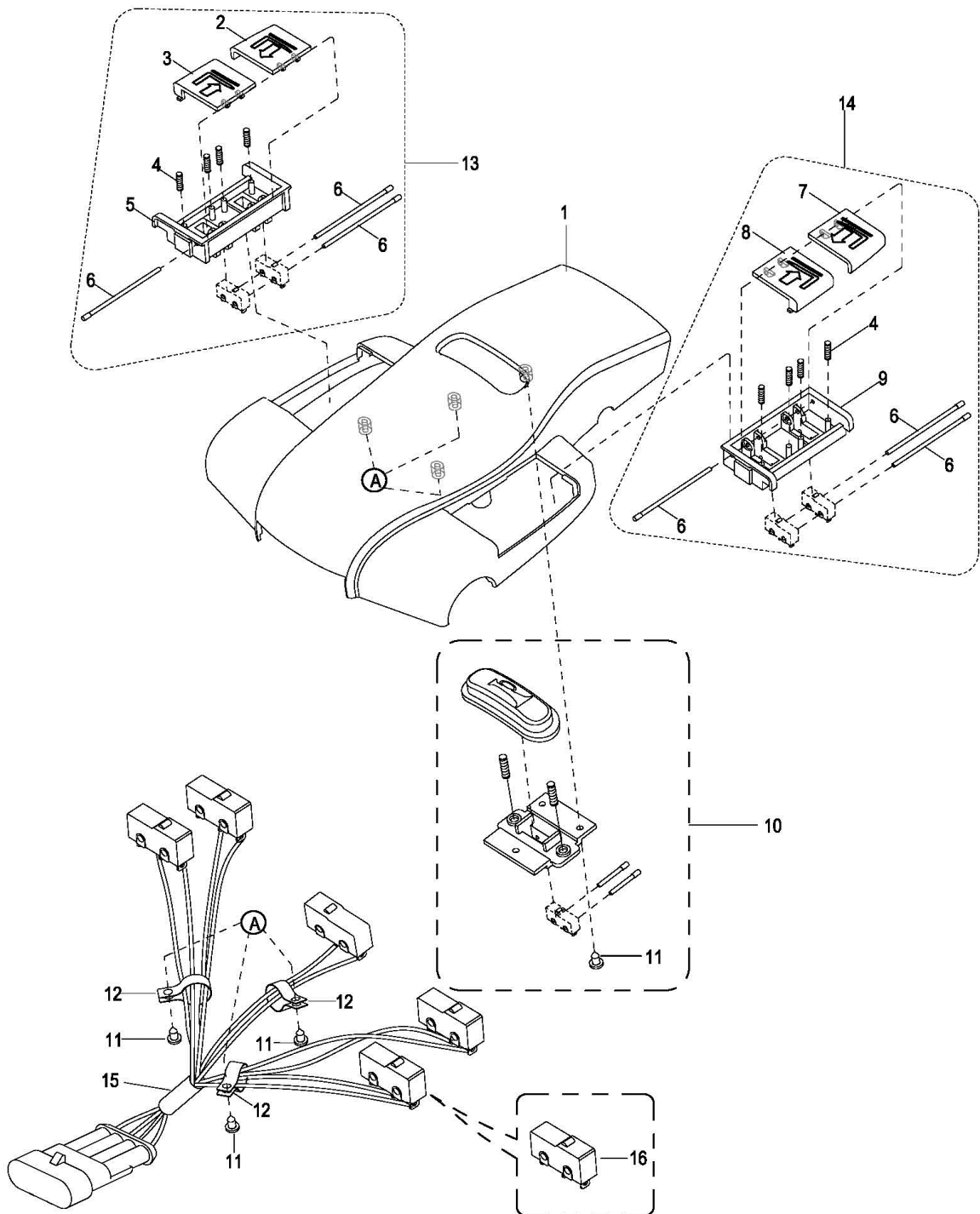


D40-2

Figure 12-2 Control Head - Continued

Control Head - Continued

Pos.	Part Number	Description	Qty. Reqd.	Notes
22	0000-000010-00	SCREW, M5 X 6	1	
23	1120-343000-00-B	CONTROL HEAD M. SWITCH AND HARNESS ASSEMBLY	1	
24	1120-342000-00-B	CAP ASSEMBLY	1	

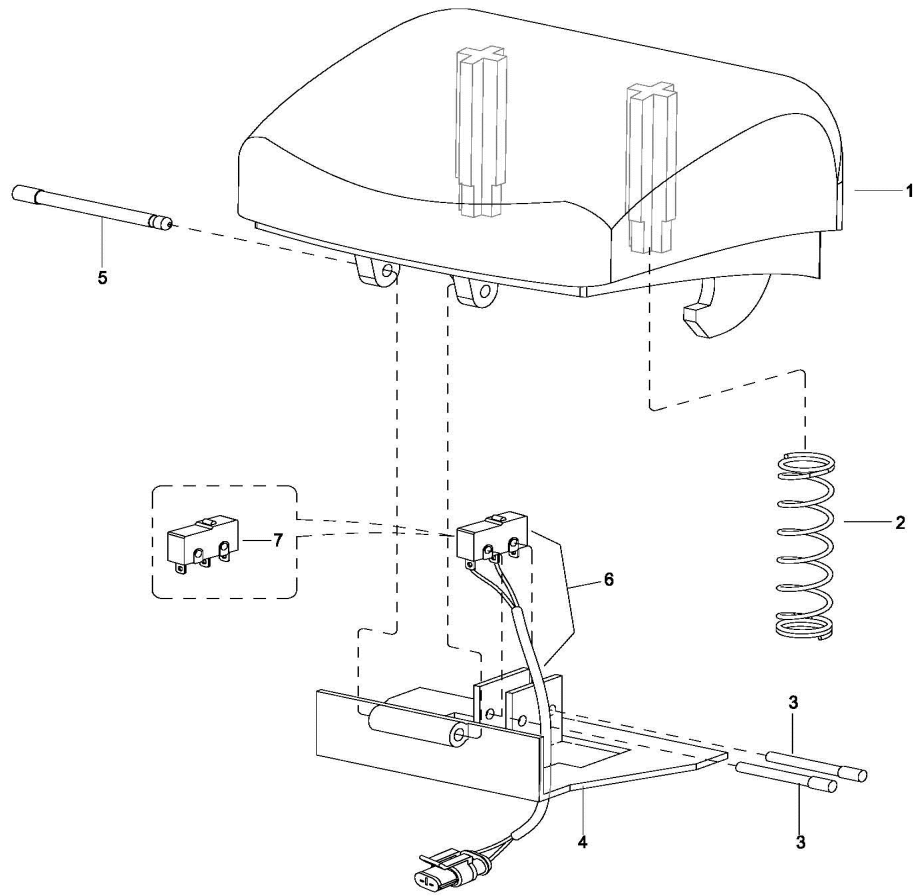


D40-3

Figure 12-3 Cap Assembly

Cap Assembly

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1120-342001-00	COVER	1	
2	1120-342203-00	BUTTON FOR LIFTING (R)	1	
3	1120-342202-00	BUTTON FOR LOWERING (R)	1	
4	1120-342102-00	SPRING	8	
5	1120-342201-00	BUTTON BRACKET (R)	1	
6	1120-342105-00	PIN	6	
7	1120-342104-00	BUTTON FOR LIFTING (L)	1	
8	1120-342103-00	BUTTON FOR LOWERING (L)	1	
9	1120-342101-00	BUTTON BRACKET (L)	1	
10	1120-342002-00	HORN BUTTON	1	
—	1120-342005-00	PIN	2	
—	1120-342003-00	SPRING	2	
—	1120-342004-00	BUTTON BRACKET	1	
11	0000-000039-00	SCREW, ST3.5 X 9.5	6	
12	0000-000490-00	LINE CLAMP	3	
13	1120-342200-00	LIFT/LOWERING SWITCH BOX, RIGHT SIDE	1	
14	1120-342100-00	LIFT/LOWERING SWITCH BOX, LEFT SIDE	1	
15	1220-520006-0C	CONTROL HEAD SWITCH AND HARNESS ASSEMBLY	1	
16	1220-560002-00	MICRO SWITCH	5	



D40-4

Figure 12-4 Emergency Reverse Switch Assembly

Emergency Reverse Switch Assembly

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1120-343002-00	EMERGENCY REVERSE BUTTON	1	
2	1120-343003-00	SPRING	2	
3	1120-342005-00	PIN	2	
4	1120-343001-0A	BRACKET	1	
5	1120-343004-00	PIN	1	
6	1220-520005-0C	REVERSING SWITCH WIRE HAR- NESS	1	Incl. switch
7	1220-560002-00	REVERSING SWITCH	1	

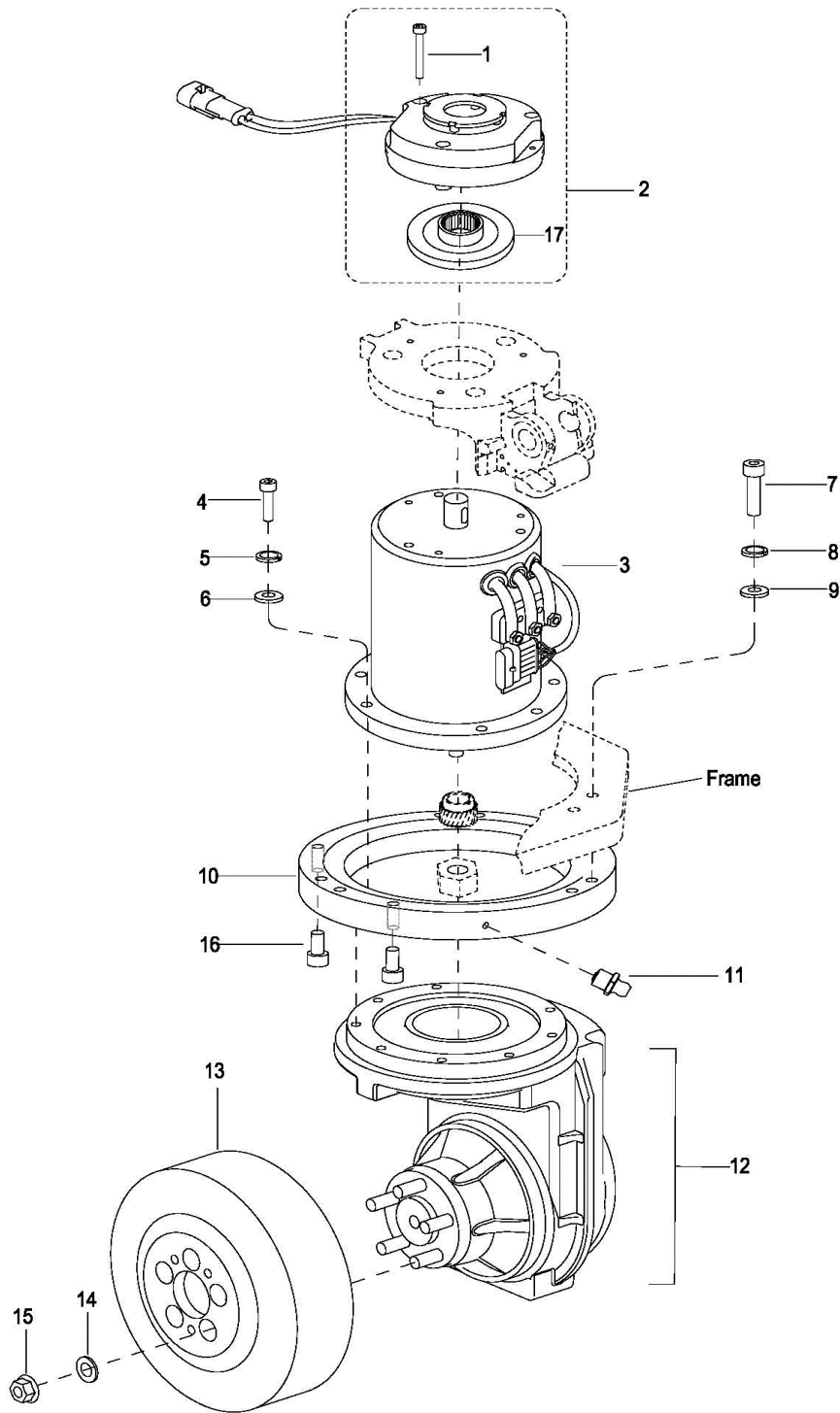
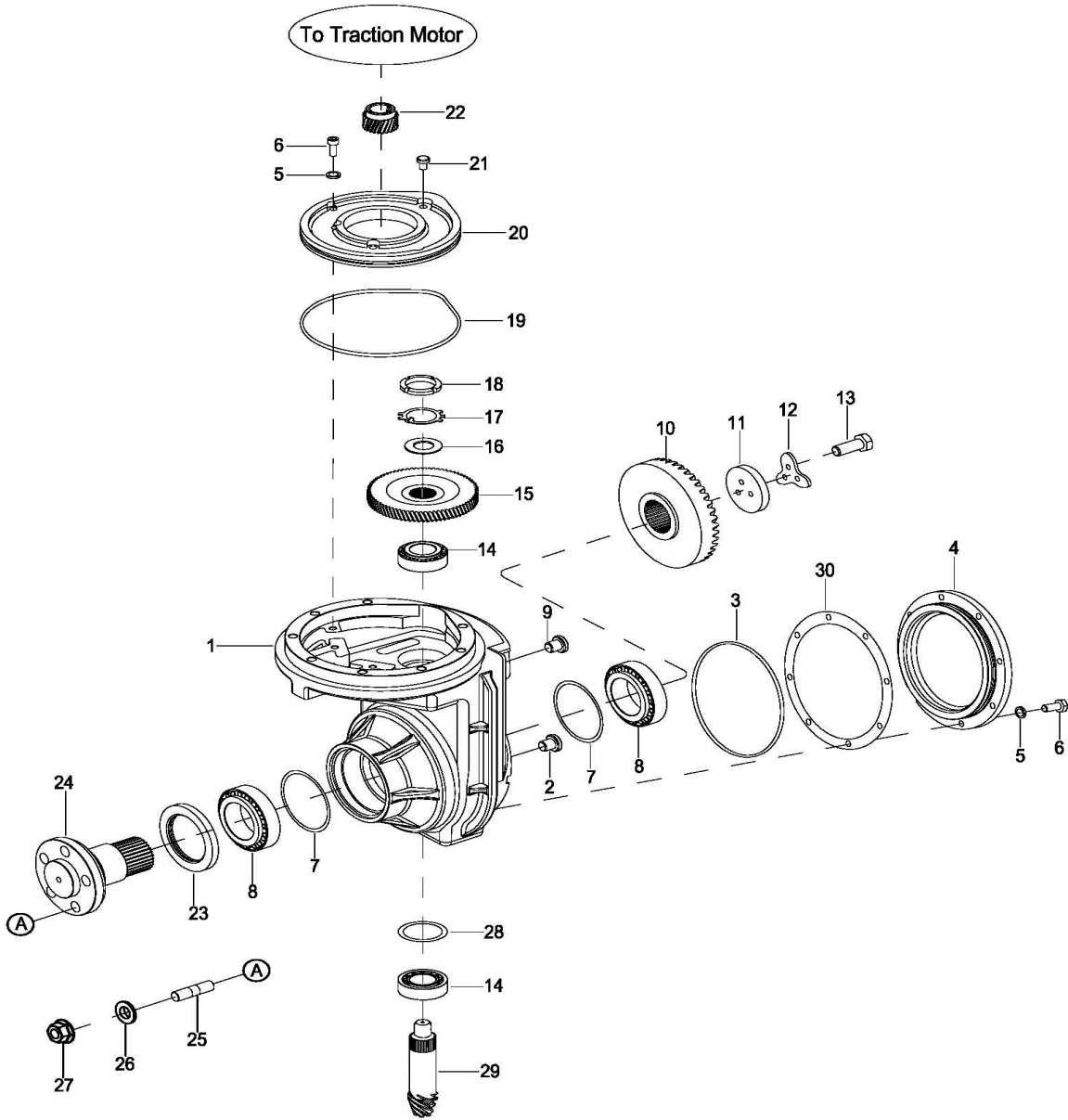


Figure 12-5 Transmission Motor, Brake Mounting

Transmission Motor, Brake Mounting

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000027-00	SCREW, M6 X 55	3	
2	1120-210000-00	BRAKE ASSEMBLY	1	
3	1120-220000-00	MOTOR ASSEMBLY	1	See FIGURE 12-18
4	0000-000154-00	SCREW, M8 X 35	8	
5	0000-000159-00	LOCK WASHER, M8	8	
6	0000-000176-00	FLAT WASHER, M8	8	
7	0000-000155-00	SCREW, M10 X 40	5	
8	0000-000063-00	LOCK WASHER, M10	5	
9	0000-000007-00	FLAT WASHER, M10	5	
10	1120-230000-00	BEARING	1	
11	0000-000013-00	GREASE FITTING, M8	1	
12	4230-210000-10	TRANSMISSION ASSEMBLY	1	Used up to Serial # E2219364 See FIGURE 12-6
12a	1120-240000-30	TRANSMISSION ASSEMBLY	1	Used from Serial # E2219365 See FIGURE 12-7
13	1120-200001-00	DRIVE WHEEL ASSEMBLY	1	
14	0000-000025-00	LOCK WASHER, M12	5	
15	0000-000157-00	NUT, M12 X 1.25	5	
16	0000-000070-00	SCREW, M10 X 25	2	
17	1120-210002-00	BRAKE PLATE	1	

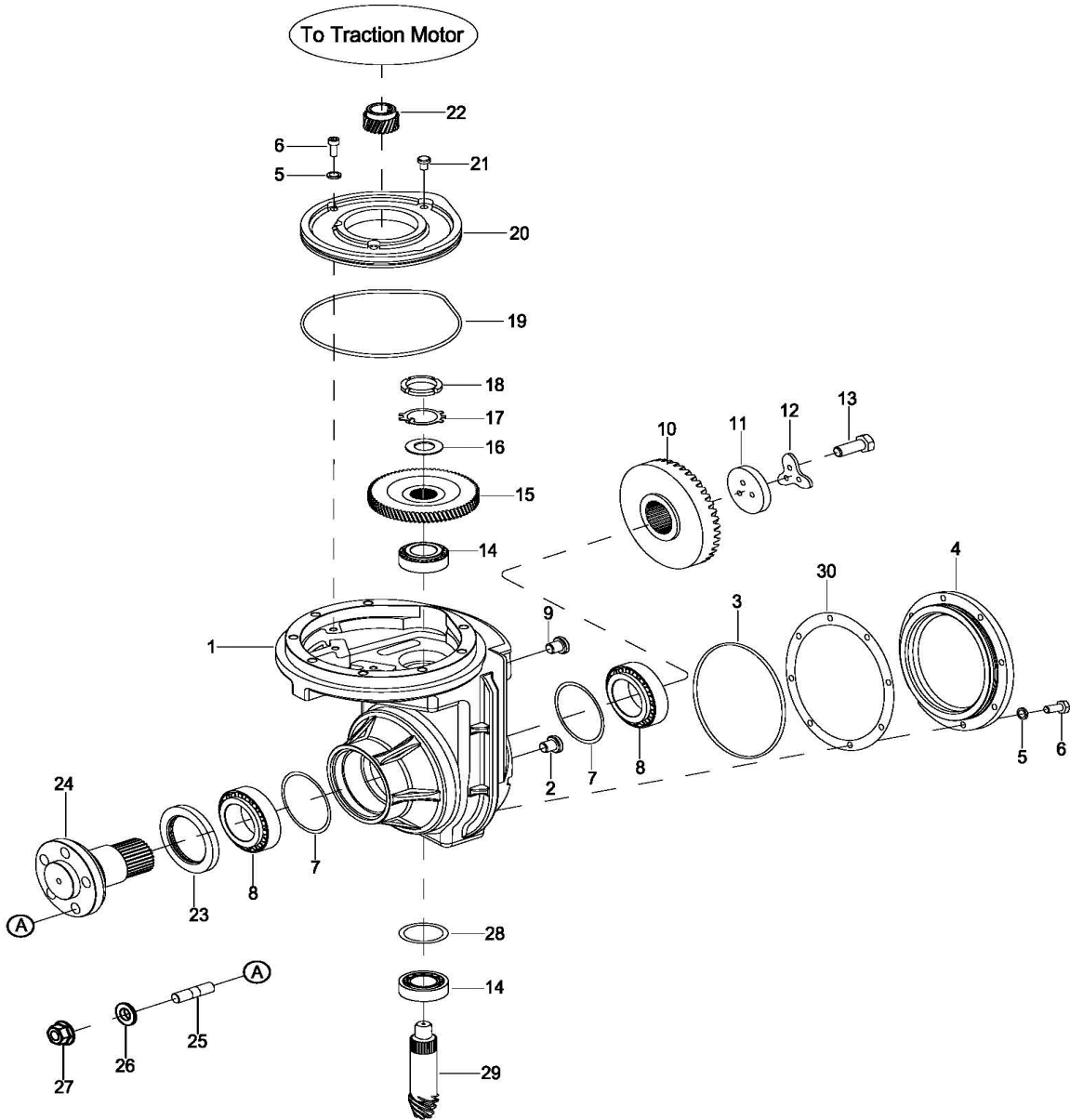


D40-6

Figure 12-6 Transmission Transmission Used up to Serial # E2219364

ransmission Used up to Serial # E2219364

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1120-240001-30	GEAR CASE	1	
2	1120-240002-30	PLUG	1	
3	0000-000214-00	O-RING 135 X 3.1	1	
4	1120-240003-30	COVER	1	
5	0000-000056-00	LOCK WASHER, M6	12	
6	0000-000259-00	BOLT, M6 X 16	8	
7	1120-240004-30	WASHER	—	As Required
8	0000-000961-00	BEARING	2	
9	1120-240005-30	PLUG	1	
10	1120-240006-30	SPIRAL BEVEL GEAR	1	
11	1120-240007-30	WASHER	1	
12	1120-240008-30	LOCKING PLATE	1	
13	0000-000277-00	BOLT, M8 X 25	3	
14	0000-001054-00	BEARING	2	
15	4230-210001-10	GEAR	1	
16	0000-000379-00	FLAT WASHER, M14	1	
17	0000-001055-00	WASHER, M14	1	
18	0000-001056-00	NUT, M14 X 1.5	1	
19	0000-000211-00	O-RING, 150 X 3.1	1	
20	1120-240010-30	COVER	1	
21	1120-240011-30	VENT PLUG	1	
22	4230-210002-10	GEAR	1	
23	1120-240017-30	SEAL WASHER, TC80 X 65 X 8	1	
24	1120-240013-30	OUTPUT SHAFT	1	
25	1120-240014-30	STUDS	5	

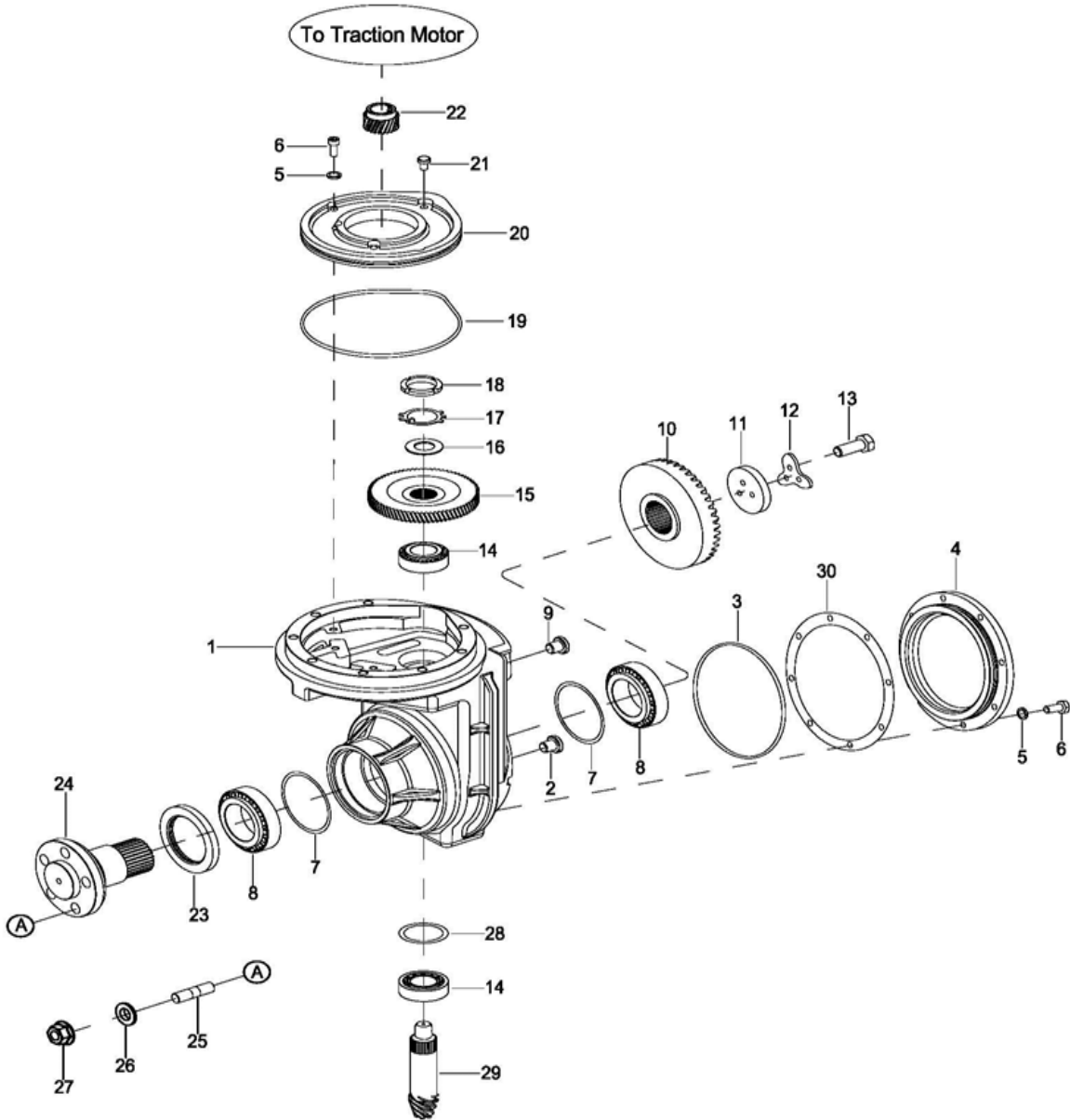


D40-6

Figure 12-6 Transmission Used up to Serial # E2219364

Transmission Used up to Serial # E2219364

Pos.	Part Number	Description	Qty. Reqd.	Notes
26	0000-000025-00	LOCK WASHER, M12	5	
27	0000-000157-00	NUT, M12 X 1.25	5	
28	1120-240015-30	WASHER	—	As Required
29	1120-240016-30	GEAR	1	
30	1120-240018-30	WASHER	1	

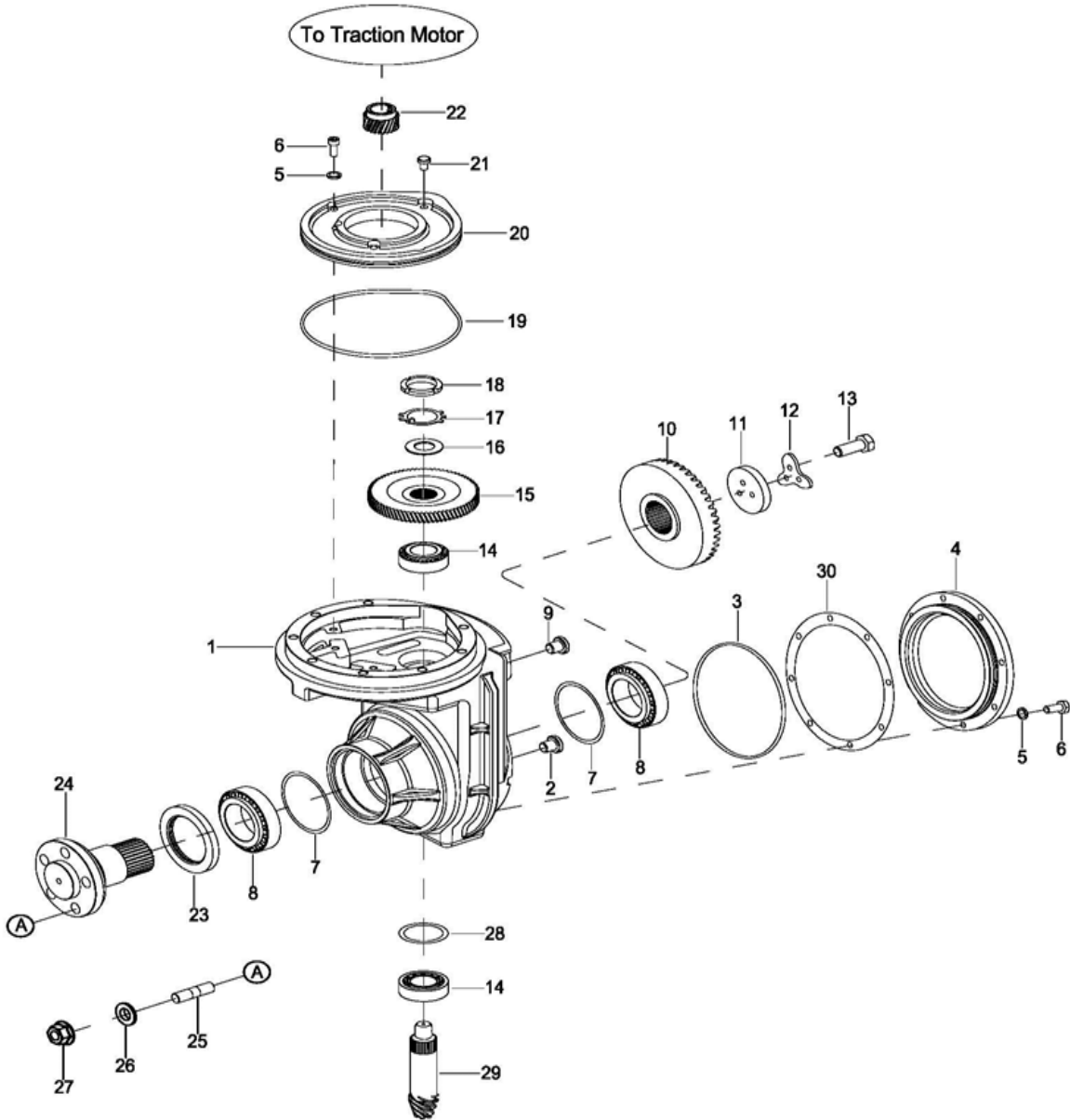


D40-6

Figure 12-7 Transmission Used from Serial # E2219365

Transmission Used from Serial # E2219365

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1120-240001-30	GEAR CASE	1	
2	1120-240002-30	PLUG	1	
3	0000-000214-00	O-RING 135 x 3.1	1	
4	1120-240003-30	COVER	1	
5	0000-000056-00	LOCK WASHER M6	12	
6	0000-000259-00	BOLT M6 x 16	8	
7	1120-240004-30	WASHER	1	
8	0000-000961-00	BEARING	2	
9	1120-240005-30	PLUG	1	
10	1120-240006-30	SPIRAL BEVEL GEAR	1	
11	1120-240007-30	WASHER	1	
12	1120-240008-30	LOCKING PLATE	1	
13	0000-000277-00	BOLT M8 x 25	3	
14	0000-001054-00	BEARING	2	
15	1120-240009-30	GEAR	1	
16	0000-000379-00	FLAT WASHER M14	1	
17	0000-001055-00	WASHER M14	1	
18	0000-001056-00	NUT M14 x 1.5	1	
19	0000-000211-00	O-RING 150 x 3.1	1	
20	1120-240010-30	COVER	1	
21	1120-240011-30	VENT PLUG	1	
22	1120-240012-30	GEAR	1	
23	1120-240017-30	SEAL WASHER TC80 x 65 x 8	1	
24	1120-240013-30	OUTPUT SHAFT	1	
25	1120-240014-30	STUDS	5	

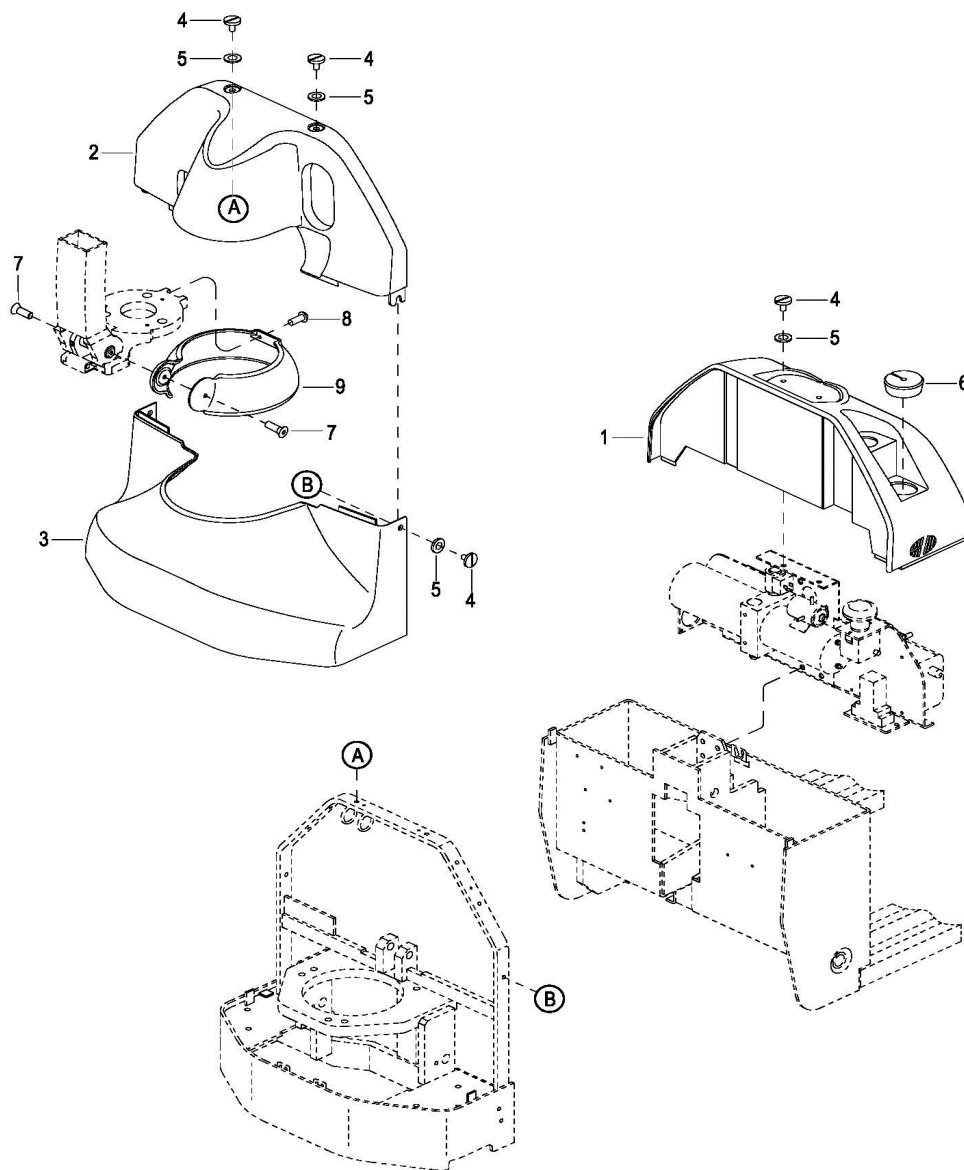


D40-6

Figure 12-7 Transmission Used from Serial # E2219365

Transmission Used from Serial # E2219365

Pos.	Part Number	Description	Qty. Reqd.	Notes
26	0000-000025-00	LOCK WASHER, M12	5	
27	0000-000157-00	NUT, M12 X 1.25	5	
28	1120-240015-30	WASHER	1	
29	1120-240016-30	GEAR	1	
30	1120-240018-30	WASHER	1	

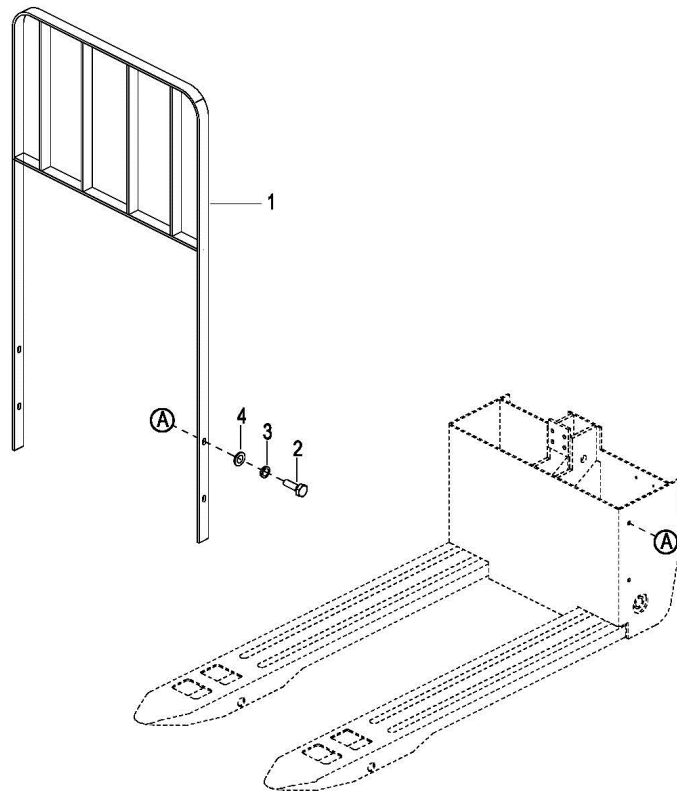


D40-7

Figure 12-8 Compartment Covers

Compartment Covers

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1118-100001-00-01	COVER	1	Black
1a	1118-100001-00-02	COVER	1	Light Blue
1b	1118-100001-00-06	COVER	1	Dark Blue
1c	1118-100001-00-05	COVER	1	Green
2	1118-100002-00	UPPER COVER	1	Big Joe Yellow
2a	1118-100002-00-02	UPPER COVER	1	Light Blue
2b	1118-100002-00-05	UPPER COVER	1	Dark Blue
2c	1118-100002-00-04	UPPER COVER	1	Green
3	1118-100003-00	LOWER COVER	1	Big Joe Yellow
3a	1118-100003-00-02	LOWER COVER	1	Light Blue
3b	1118-100003-00-05	LOWER COVER	1	Dark Blue
3c	1118-100003-00-04	LOWER COVER	1	Green
4	0000-000368-00	SCREW, M8 X 12	6	
5	2214-150002-00	WASHER	6	
6	1118-100005-00	CHARGER CAP	1	
7	0000-000126-00	SCREW, M6 X 16	2	
8	0000-000119-00	SCREW, M5 X 12	2	
9	1118-100004-00-01	MIDDLE COVER	1	Black
9a	1118-100004-00-02	MIDDLE COVER	1	Light Blue
9b	1118-100004-00-06	MIDDLE COVER	1	Dark Blue
9c	1118-100004-00-05	MIDDLE COVER	1	Green

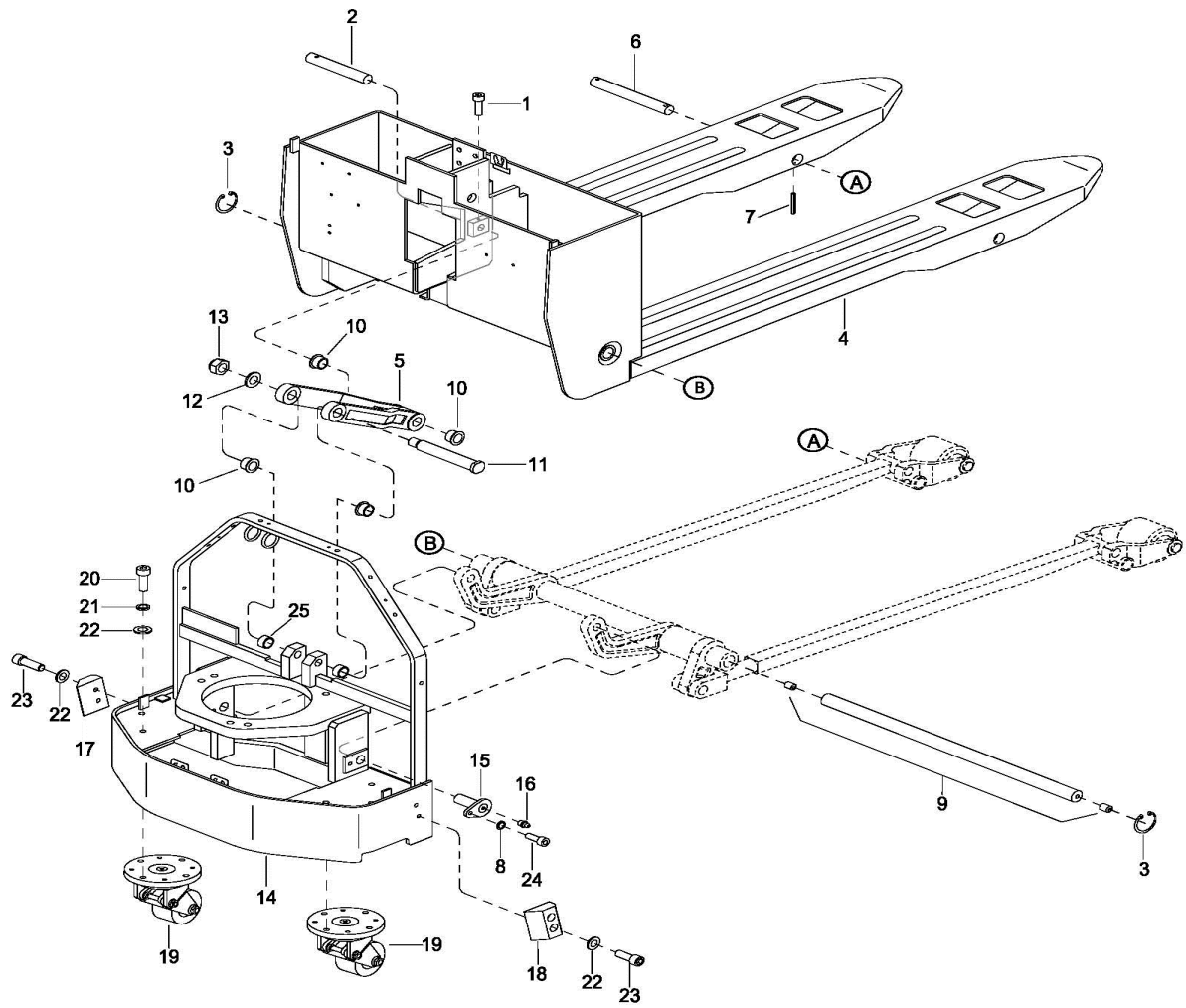


D40-22

Figure 12-9 Load Backrest

Load Backrest

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1118-151000-00	LOAD BACKREST	1	Height 48" (1220mm)
1a	1118-152000-00	LOAD BACKREST	1	Height 60" (1524mm)
2	0000-000270-00	BOLT	4	
3	0000-000060-00	LOCKWASHER	4	
4	10000-000373-00	FLATWASHER	4	

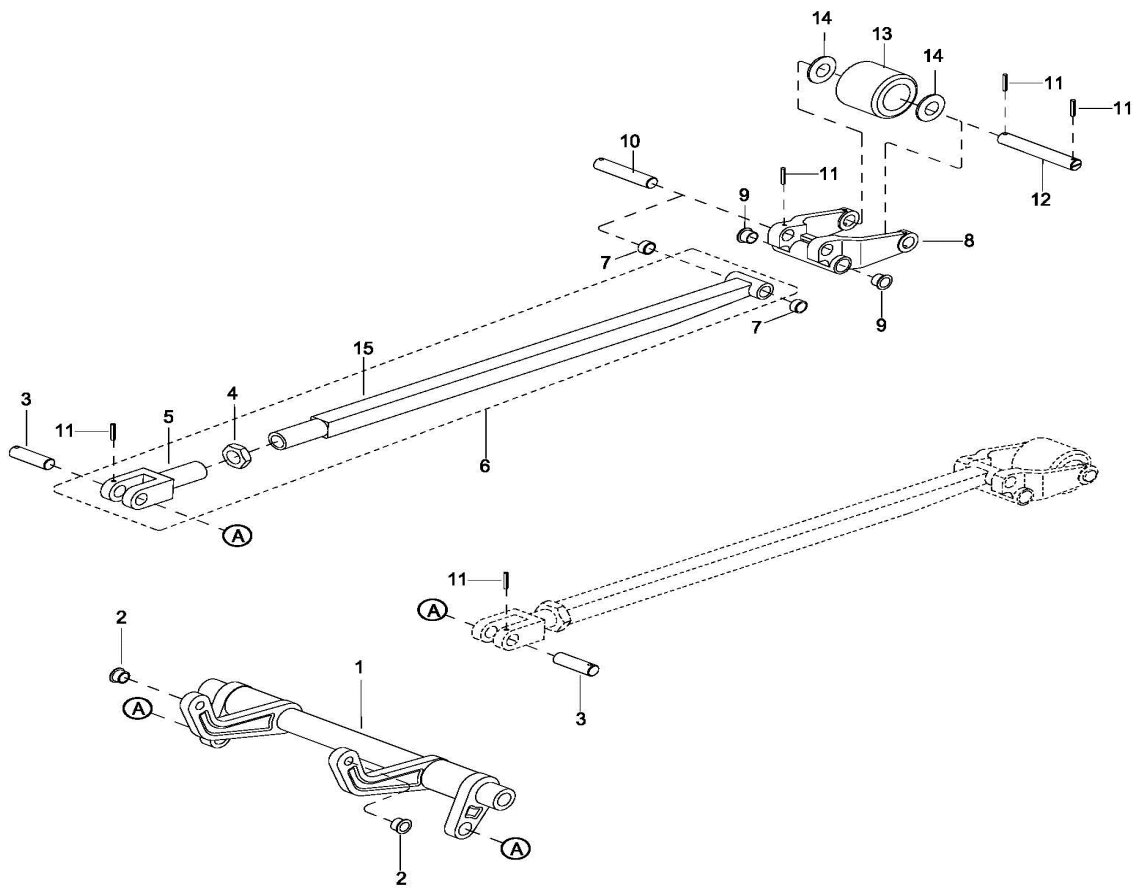


D40-11

Figure 12-10 Frame

Frame

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000396-00	SCREW, M6 X 20	1	
2	1118-130005-00	SHAFT	1	
3	0000-000650-00	SNAP RING, M25	2	
4	1118-110000-40	FORK FRAME	1	Fork width 27" (685mm)
4a	1118-110000-20	FORK FRAME	1	Fork width 22" (540mm)
5	1118-130003-00	LINK	1	
6	1115-130004-0A	SHAFT	2	
7	0000-000708-00	PIN, M5 X 35	2	
8	0000-000056-00	LOCK WASHER, M6	2	
9	1118-130001-20	LONG SHAFT	1	Fork width 27" (685mm)
9a	1118-130001-10	LONG SHAFT	1	Fork width 22" (540mm)
10	0000-000677-00	BUSHING, 1610F	4	
11	1118-130004-00	SHAFT	1	
12	0000-000438-00	FLAT WASHER, M12	1	
13	0000-000057-00	NUT, M12	1	
14	1118-120000-00	BACK FRAME	1	
15	1118-133000-00	SHAFT	2	
16	0000-000013-00	GREASE FITTING, M8	2	
17	1118-100006-00	ANTI-COLLISION BLOCK, L	1	
18	1118-100007-00	ANTI-COLLISION BLOCK, R	1	
19	1118-140000-00	CASTER ASSEMBLY	2	See FIGURE 12-13
20	0000-000151-00	SCREW, M8 X 25	6	
21	0000-000159-00	LOCK WASHER, M8	6	
22	0000-000176-00	FLAT WASHER, M8	10	
23	0000-000109-00	SCREW, M8 X 16	4	
24	0000-000055-00	SCREW, M6 X 16	2	
25	0000-001130-00	BUSHING	2	

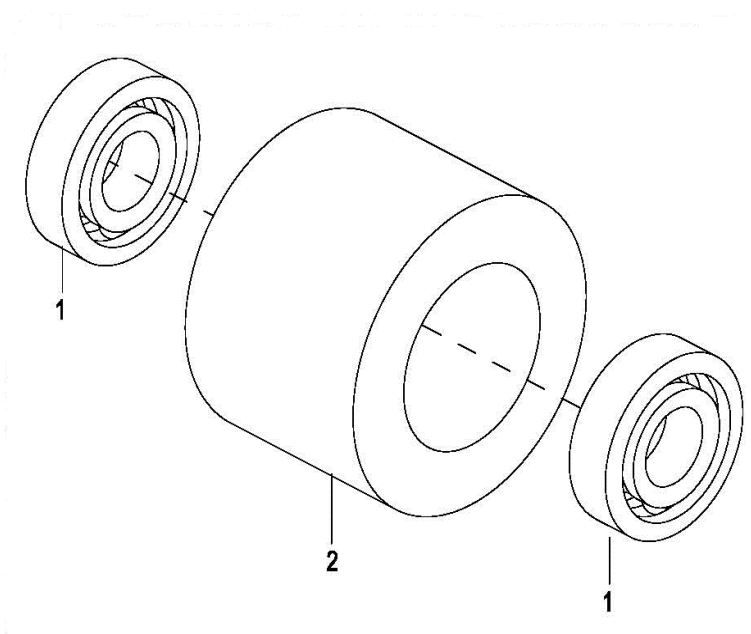


D40-12

Figure 12-11 Lift Link Assembly

Lift Link Assembly

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1219-141000-30	DOWN LINK	1	Fork width 27" (685mm)
1a	1219-141000-10	DOWN LINK	1	Fork width 22" (540mm)
2	0000-001034-00	BUSHING	2	
3	1219-140001-00	SHAFT	2	
4	0000-000101-00	NUT, M22 X 1.5	2	
5	1219-142200-00	CONNECTOR	2	
6	1118-132000-30	LONG LINK	2	Fork length 36" (33")
6a	1118-132000-40	LONG LINK	2	Fork length 42" (39")
6b	1118-132000-10	LONG LINK	2	Fork length 48" (45")
7	0000-000907-00	BUSHING	4	
8	1115-130005-0B	WHEEL BRACKET	2	
9	0000-000908-00	BUSHING	4	
10	1115-130003-00	LOAD WHEEL BRACKET PIVOT SHAFT	2	
11	0000-000708-00	PIN, M5 X 35	8	
12	1115-130007-40	LOAD WHEEL SHAFT	2	
13	1115-133000-40	LOAD WHEEL	1	See FIGURE 12-12
14	0000-000435-00	FLAT WASHER, M20	4	
15	1118-132100-30	LONG ROD	1	Fork length 36" (33")
15a	1118-132100-40	LONG ROD	1	Fork length 42" (39")
15b	1118-132100-10	LONG ROD	1	Fork length 48" (45")

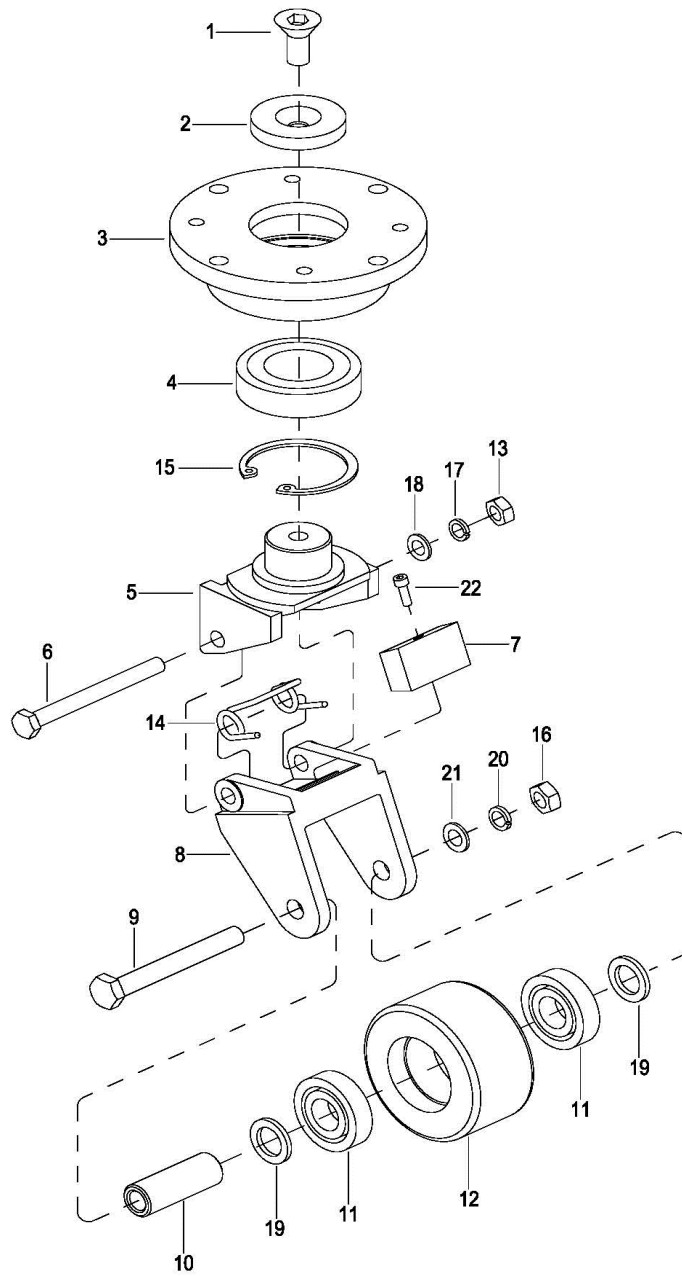


D40-13

Figure 12-12 Load Wheel

Load Wheel

Pos.	Part Number	Description	Qty. Reqd.	Notes
—	1115-133000-40	LOAD WHEEL ASSEMBLY		Including bearings
1	0000-000020-00	BEARING	2	
2	1115-133002-40	LOAD WHEEL	1	

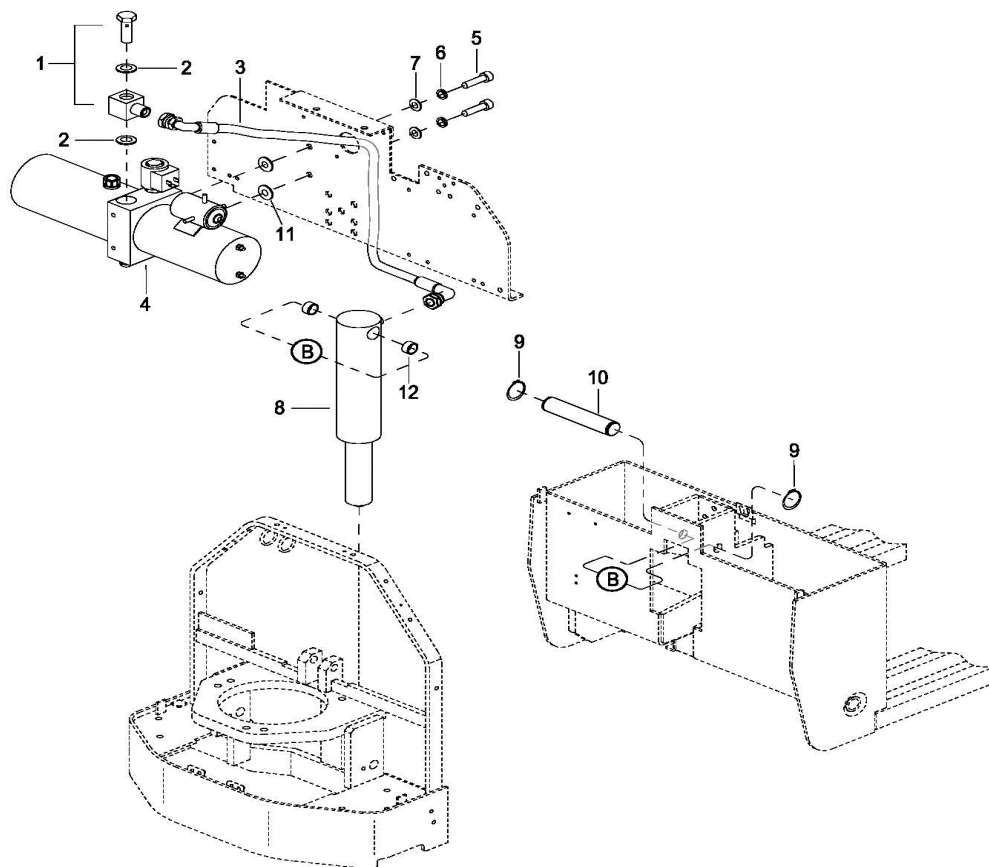


D40-23

Figure 12-13 Caster

Caster

Pos.	Part Number	Description	Qty. Reqd.	Notes
—	1118-140000-00	CASTER ASSEMBLY	2	
1	0000-000985-00	SCREW, M10 X 20	1	
2	1118-140003-00	PLATE	1	
3	1118-140001-00	CASTER SUPPORT	1	
4	0000-000986-00	BEARING	1	
5	1118-140002-00	CASTER SUPPORT	1	
6	0000-000168-00	BOLT, M10 X 90	1	
7	1120-140003-00	PU BLOCK	1	
8	1120-142000-00	WHEEL BRACKET	1	
9	0000-000495-00	BOLT, M12 X 85	1	
10	1120-143001-00	SHAFT	1	
11	0000-000020-00	BEARING, 6204	2	
12	1120-143003-00	PU WHEEL	1	
13	0000-000054-00	NUT, M10	1	
14	1120-140004-00	SPRING	1	
15	0000-000987-00	SNAP RING	1	
16	0000-000165-00	NUT, M12	1	
17	0000-000063-00	LOCK WASHER, M10	1	
18	0000-000007-00	FLAT WASHER, M10	1	
19	0000-000435-00	FLAT WASHER M20	2	
20	0000-000060-00	LOCK WASHER, M12	1	
21	0000-000373-00	FLAT WASHER, M12	1	
22	0000-000004-00	SCREW, M5 X 12	1	

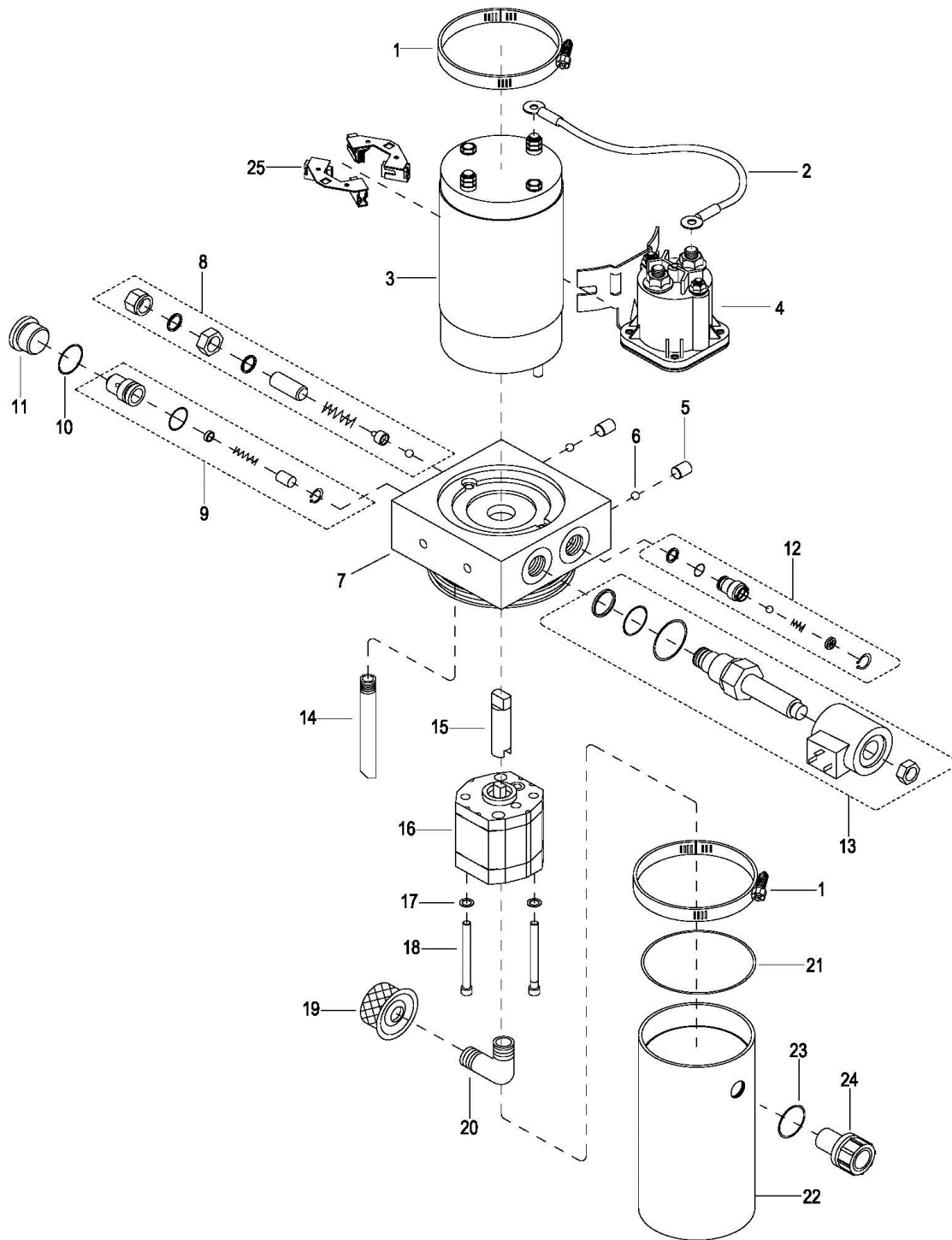


D40-14

Figure 12-14 Hydraulic System

Hydraulic System

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	2706-141400-00	CONNECTOR, M14 X 1.5	1	
2	0000-000044-00	WASHER, M14	2	
3	1118-430000-00	HOSE ASSY	1	
4	1118-420000-00	PUMP & MOTOR ASSY	1	See FIGURE 12-15
5	0000-000321-00	SCREW, M8 X 20	2	
6	0000-000159-00	LOCK WASHER, M8	2	
7	0000-000176-00	FLAT WASHER, M8	2	
8	1118-410000-00	CYLINDER	1	See FIGURE 12-16
9	0000-000293-00	RETAINING RING, M20	2	
10	1118-400001-00	SHAFT	1	
11	0000-000210-00	FLAT WASHER, M8	2	
12	0000-000705-00	BUSHING	2	

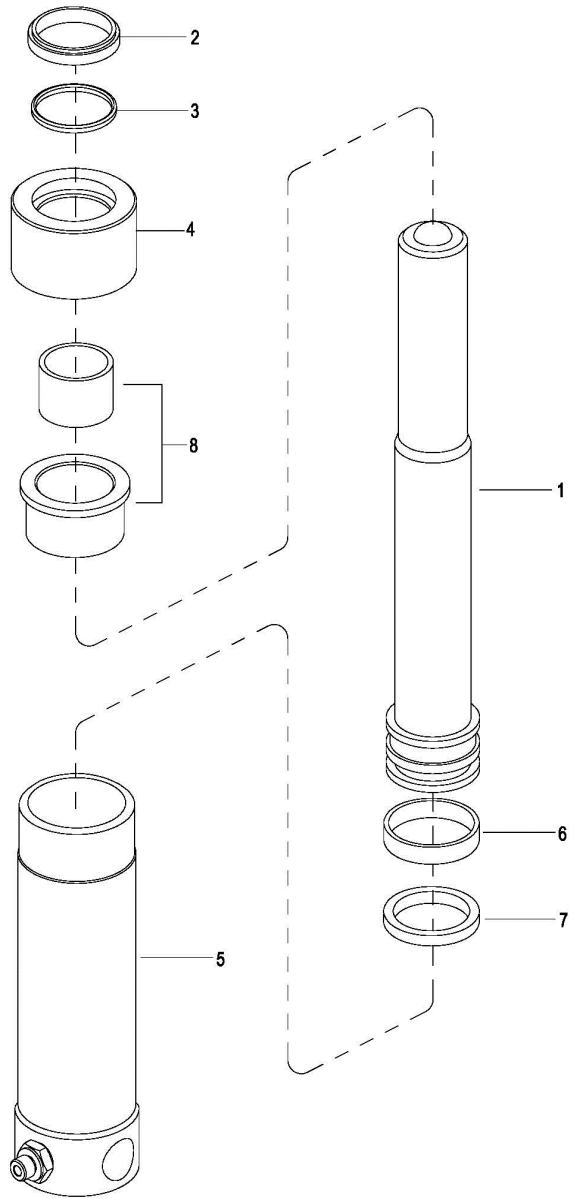


D40-15

Figure 12-15 Pump & Motor Assy

Pump & Motor Assy

Pos.	Part Number	Description	Qty. Reqd.	Notes
—	1118-420000-00	PUMP & MOTOR ASSY	1	
1	1118-420001-00	CLAMP	2	
2	1118-420002-00	WIRE HARNESS	1	
3	1118-420003-00	DC MOTOR, 0.8KW/24V	1	
4	1118-420004-00	RELAY, 24V/150A	1	
5	1118-420005-00	SCREW, M8 X 8	2	
6	1118-420006-00	BALL, 6G20b	4	
7	1118-420007-00	VALVE PLATE	1	
8	1118-420008-00	SAFETY VALVE	1	
9	1118-420009-00	THROTTLE	1	
10	1118-420010-00	O-RING, 16.36 X 2.21	1	
11	1118-420011-00	SCREW	1	
12	1118-420012-00	CHECK VALVE	1	
13	1118-420013-00	SOLENOID VALVE	1	
14	1118-420014-00	RETURN PIPE	1	
15	1118-420015-00	CONNECTING SHAFT	1	
16	1118-420016-00	GEAR PUMP	1	
17	1118-420017-00	WASHER, M5	2	
18	1118-420018-00	SCREW, M5 X 70	2	
19	1118-420019-00	OIL FILTER	1	
20	1118-420020-00	SUCTION PIPE	1	
21	1118-420021-00	O-RING, 69 X 3.5	1	
22	1118-420022-00	OIL TANK	1	
23	1118-420023-00	O-RING, 11.2 X 2.65	1	
24	1118-420024-00	AIR FILTER	1	
25	1118-420025-00	CARBON BRUSH	2	

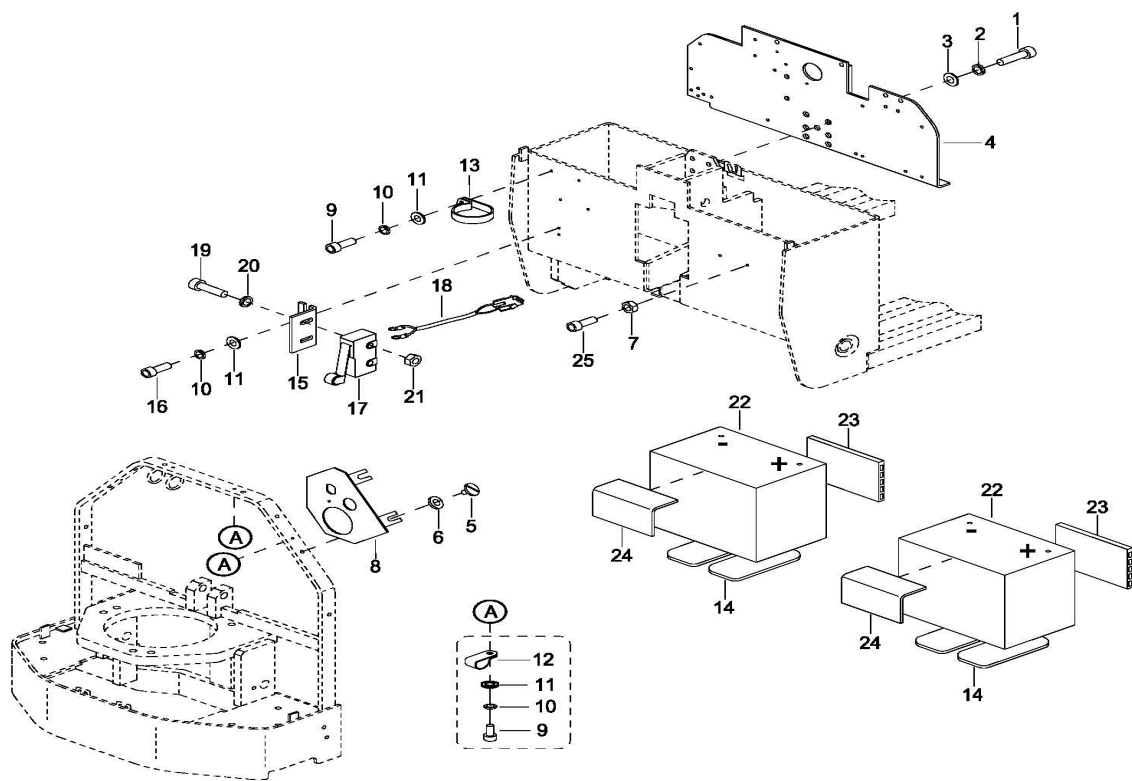


D40-16

Figure 12-16 Lift Cylinder

Lift Cylinder

Pos.	Part Number	Description	Qty. Reqd.	Notes
—	1118-410000-00	LIFT CYLINDER	1	
—	1118-QSY-0A	SEAL KIT	1	Includes Items 2, 3, 7
1	1118-410001-00	PISTON ROD	1	
2	0000-000672-00	WIPER RING, M40 X 50 X 5-6.5	1	
3	0000-000673-00	O-RING, M45 X 3.1	1	
4	1115-410002-0B	GLAND NUT	1	
5	1118-411000-00	CYLINDER BODY	1	
6	1115-410003-0B	GUIDE RING	1	
7	0000-000512-00	VX-SEAL	1	
8	1115-410004-00	BUSHING	1	

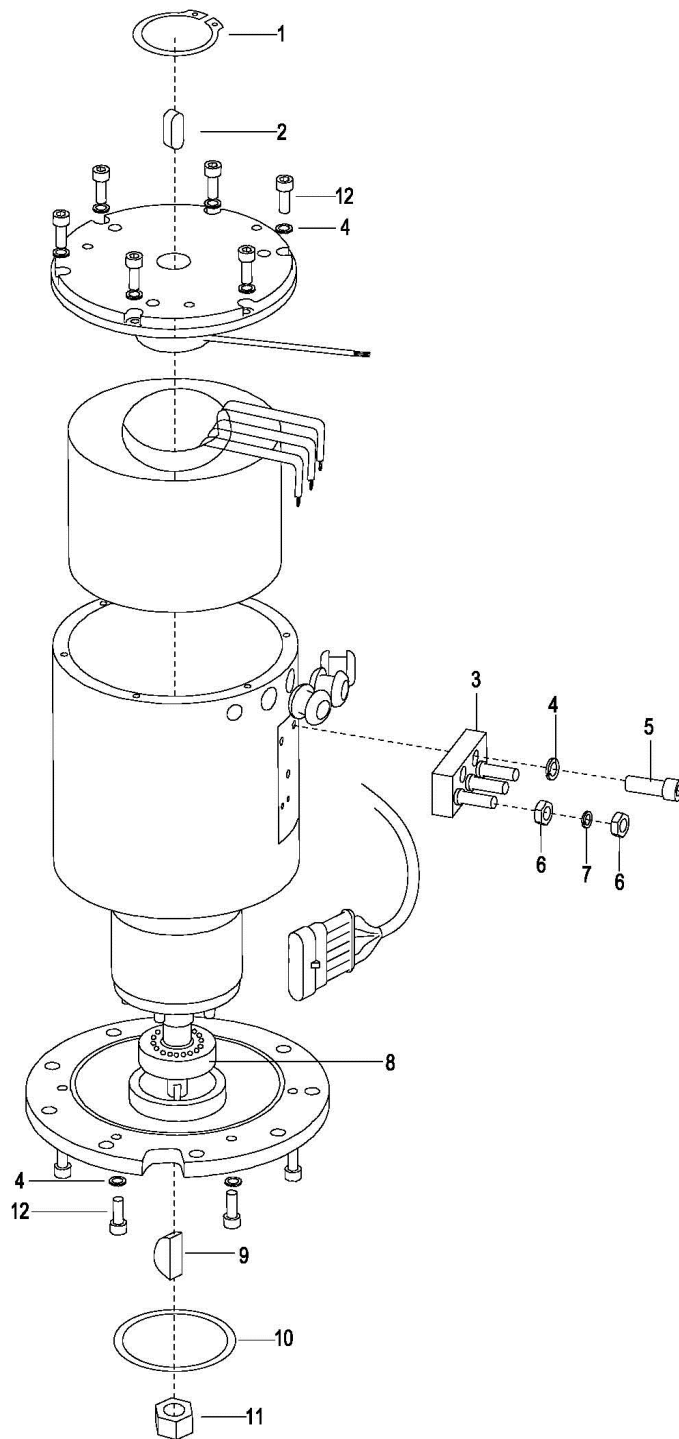


D40-17

Figure 12-17 Electrical System

Electrical System

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000030-00	SCREW, M10 X 16	4	
2	0000-000063-00	LOCK WASHER, M10	4	
3	0000-000007-00	FLAT WASHER, M10	4	
4	1118-511000-00	MOUNTING PLATE	1	
5	0000-000368-00	SCREW, M8 X 12	2	
6	2214-150002-00	WASHER	2	
7	0000-000108-00	NUT, M6	4	
8	1118-540000-00	BOARD	1	
9	0000-000117-00	SCREW, M5 X 10	3	
10	0000-000206-00	LOCK WASHER, M5	5	
11	0000-000390-00	FLAT WASHER, M5	5	
12	0000-001103-00	R HARNESS CLAMP UC-1.5	2	
13	0000-001086-00	R HARNESS CLAMP UC-5	1	
14	2112-410005-00	WASHER	4	
15	1118-500002-00	BRACKET	1	
16	0000-000004-00	SCREW, M5 X 12	2	
17	1120-500006-00	LIFTING LIMIT SWITCH	1	
18	1118-520007-10	WIRE HARNESS OF LIMIT SWITCH	1	
19	0000-001031-00	SCREW, M4 X 30	2	
20	0000-000122-00	LOCK WASHER, M4	2	
21	0000-000139-00	NUT, M4	2	
22	003231	BATTERY	2	
23	1118-100008-00	BOTTOM PLATE	2	
24	1118-100010-00	PLATE	2	
25	0000-000055-00	SCREW, M6 X 16	4	

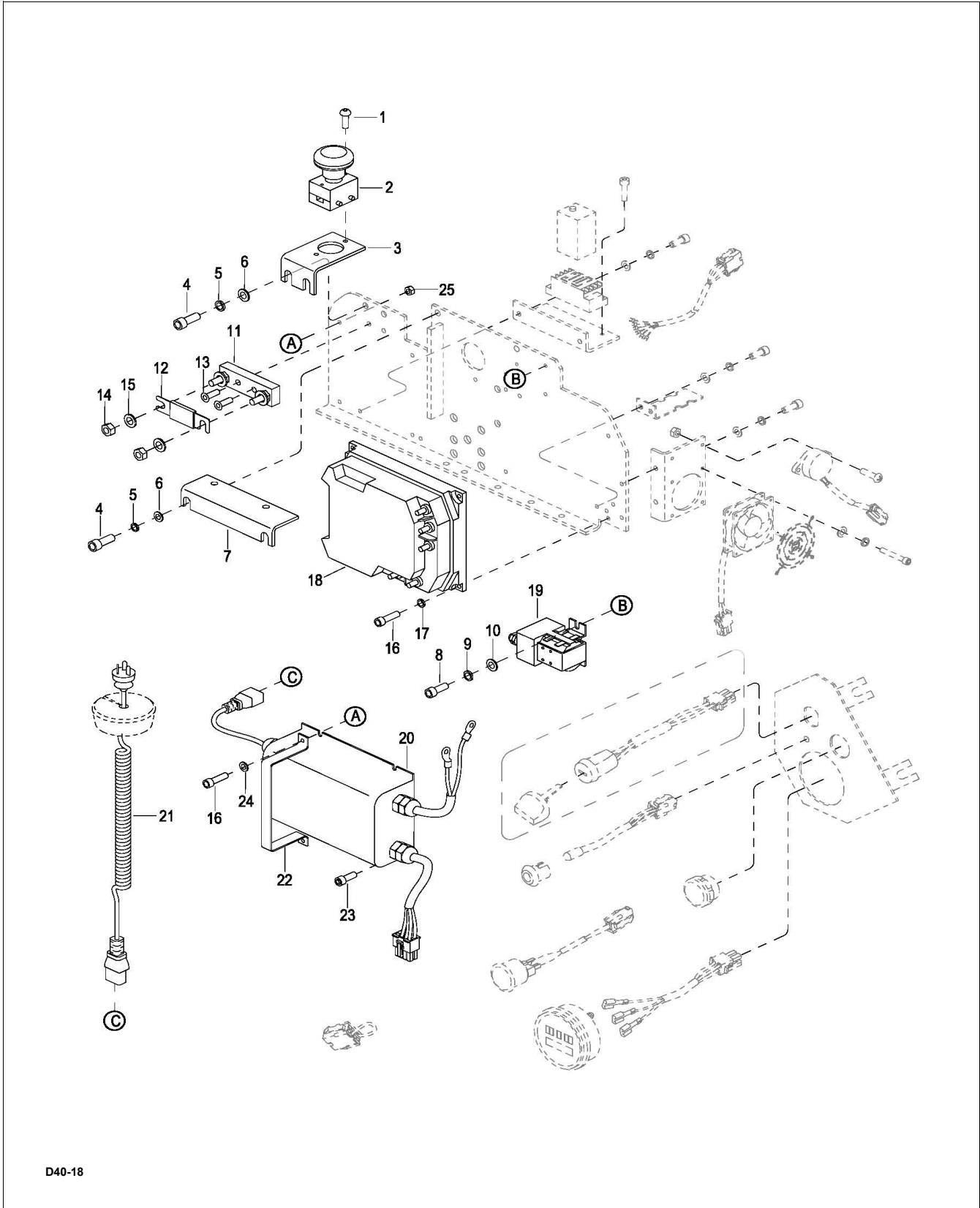


D40-8

Figure 12-18 Motor Assembly

Motor Assembly

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000293-00	RETAINING RING, M20	2	
2	0000-000226-00	KEY	1	
3	1120-220001-00	TERMINAL BLOCK	1	
4	0000-000206-00	LOCK WASHER, M5	17	
5	0000-000117-00	SCREW, M5 X 10	2	
6	0000-000166-00	NUT, M6	6	
7	0000-000056-00	LOCK WASHER, M6	6	
8	1120-220002-00	BEARING	1	
9	0000-000204-00	KEY	1	
10	0000-000409-00	O-RING, M63 X 3.55	1	
11	0000-000436-00	NUT, M12 X 1.5	1	
12	0000-000323-00	SCREW, M5 X 16	14	

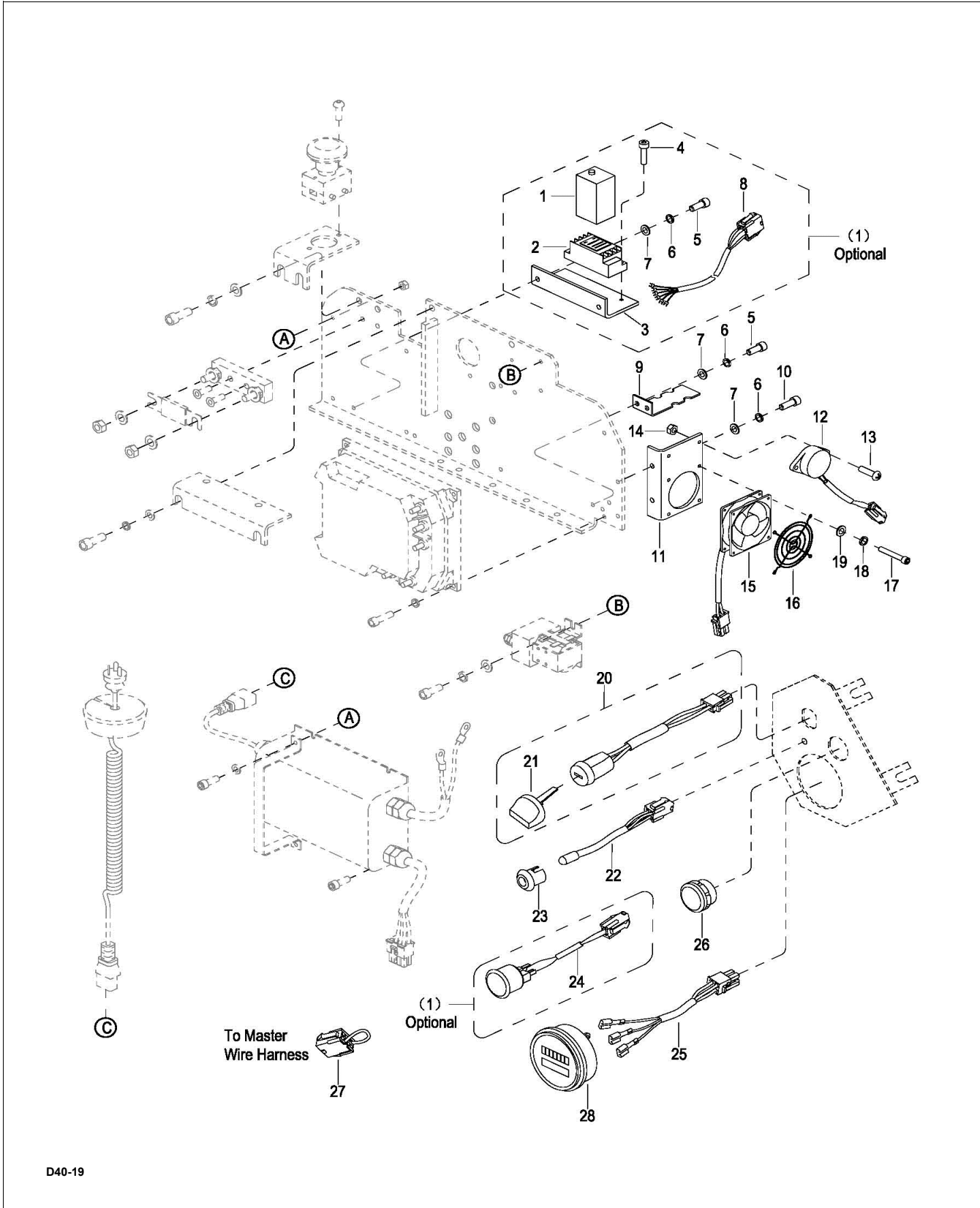


D40-18

Figure 12-19 Electrical Components (Sheet 1)

Electrical Components (Sheet 1)

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	0000-000119-00	SCREW, M5 X 12	2	
2	1115-510008-00	EMERGENCY STOP SWITCH	1	
3	1118-510002-00	MOUNTING PLATE	1	
4	0000-000700-00	SCREW, M8 X 16	4	
5	0000-000159-00	LOCK WASHER, M8	4	
6	0000-000176-00	FLAT WASHER, M8	4	
7	1118-510005-00	UPPER MOUNTING PLATE	1	
8	0000-000077-00	SCREW, M6 X 12	2	
9	0000-000056-00	LOCK WASHER, M6	2	
10	0000-000380-00	FLAT WASHER, M6	2	
11	1120-540001-00-B	FUSE HOLDER	1	
12	1120-540002-00	FUSE, 200A	1	
13	0000-000074-00	SCREW, M6 X 20	2	
14	0000-000550-00	NUT, M8	2	
15	0000-000210-00	FLAT WASHER, M8	2	
16	0000-000004-00	SCREW, M5 X 12	7	
17	0000-000206-00	LOCK WASHER, M5	4	
18	1120-500004-00	CONTROLLER AC0	1	
19	1120-500005-00	CONTACTOR	1	
20	1115-520014-00	CHARGER ASSEMBLY	1	
21	1115-500006-10	CHARGER CABLE	1	
22	1115-500009-00	CHARGER HOOP	2	
23	0000-000031-00	SCREW, M5 X 8	1	
24	0000-000390-00	FLAT WASHER, M5	4	
25	0000-00546-00	NUT, M5	3	

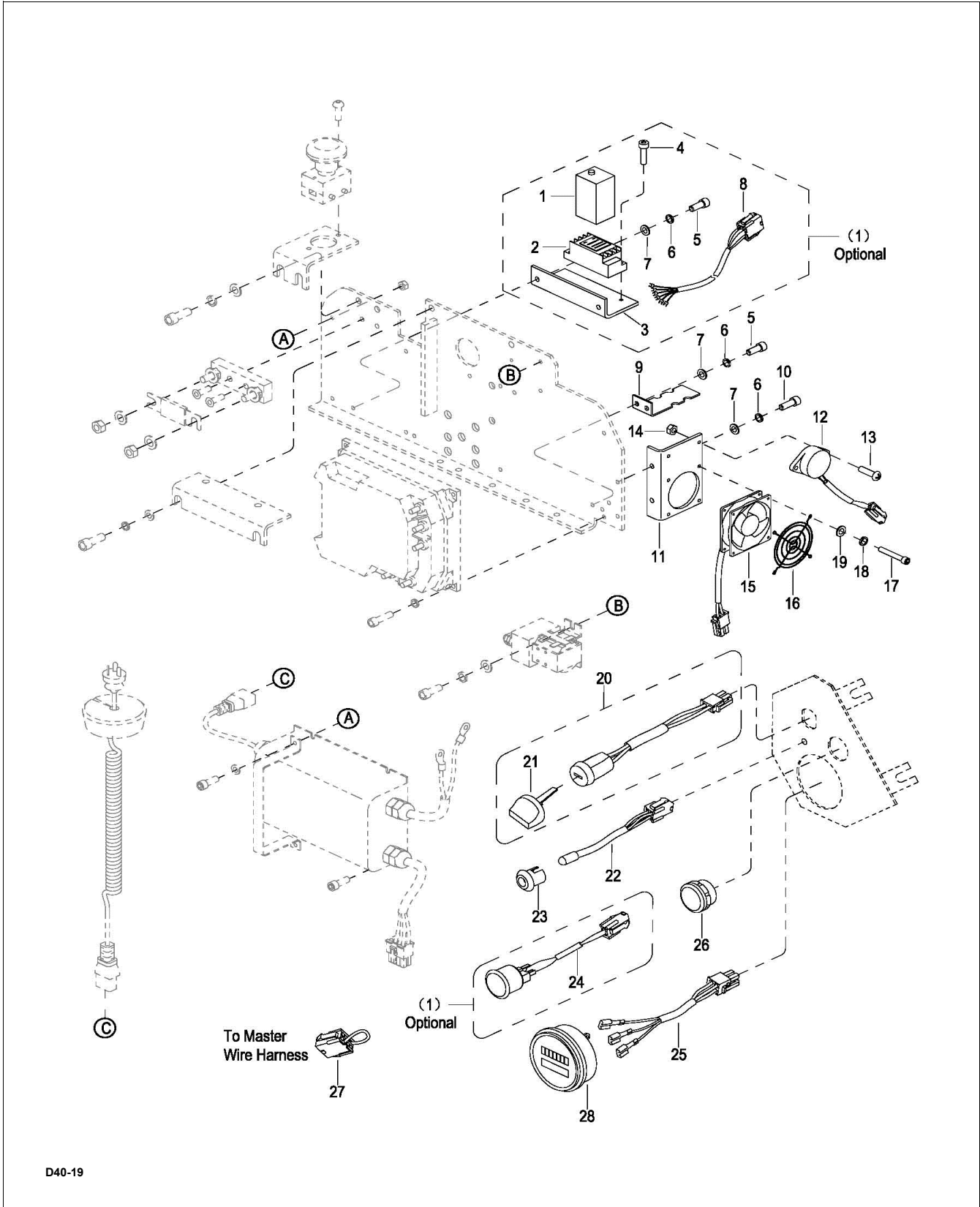


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Figure 12-20 Electrical Components (Sheet 2)

Electrical Components (Sheet 2)

	Part Number	Description	Qty. Reqd.	Notes
1	1118-560001-00	TIMING RELAY	1	Used when Break Release Option on truck
2	1118-560002-00	TIMING RELAY SET	1	Used when Break Release Option on truck
3	1118-510001-00	RELAY BRACKET	1	Used when Break Release Option on truck
4	0000-000009-00	SCREW, M4 X 12	2	Used when Break Release Option on truck
5	000-000031-00	SCREW, M5 X 8	4	
6	0000-000206-00	LOCK WASHER, M5	6	
7	0000-000390-00	FLAT WASHER, M5	6	
8	1118-520006-10	RELAY WIRE HARNESS	1	Used when Break Release Option on truck
9	1118-510004-00	TIE PLATE	1	
10	0000-000004-00	SCREW, M5 X 12	2	
11	1118-510003-00	PLATE	1	
12	1115-520015-00	BUZZER ASSEMBLY	1	
13	0000-000037-00	SCREW, M3 X 12	2	
14	0000-000139-00	NUT, M4	2	
15	1115-520007-00	FAN ASSEMBLY	1	
16	1115-500007-00	FAN GUARD	1	
17	0000-000121-00	SCREW, M4 X 35	4	
18	0000-000122-00	LOCK WASHER, M4	4	
19	0000-000702-00	FLAT WASHER, M4	4	
20	1115-520019-00	2-WAY SWITCH	1	



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Figure 12-20 Electrical Components (Sheet 2) - Continued

Electrical Components (Sheet 2) - Continued

	Part Number	Description	Qty. Reqd.	Notes
21	1115-500016-00	2-WAY SWITCH KEY	2	
22	1115-520013-00	LED WIRE HARNESS	1	
23	1115-510009-00	LAMP HOLDER	1	
24	CK11-520012-00	BRAKE RELEASE BUTTON	1	Used when Break Release Option on truck
25	1115-520005-0A	WIRE HARNESS FOR BDI	1	
26	1280-100005-00	FLAT PLUG	1	<u>Not</u> used when Break Release Option on truck.
27	1118-520008-10	SHORT CIRCUIT SWITCH	1	<u>Not</u> used when Break Release Option on truck.
28	1115-510006-00	BATTERY INDICATOR (BDI)	1	Without hour meter

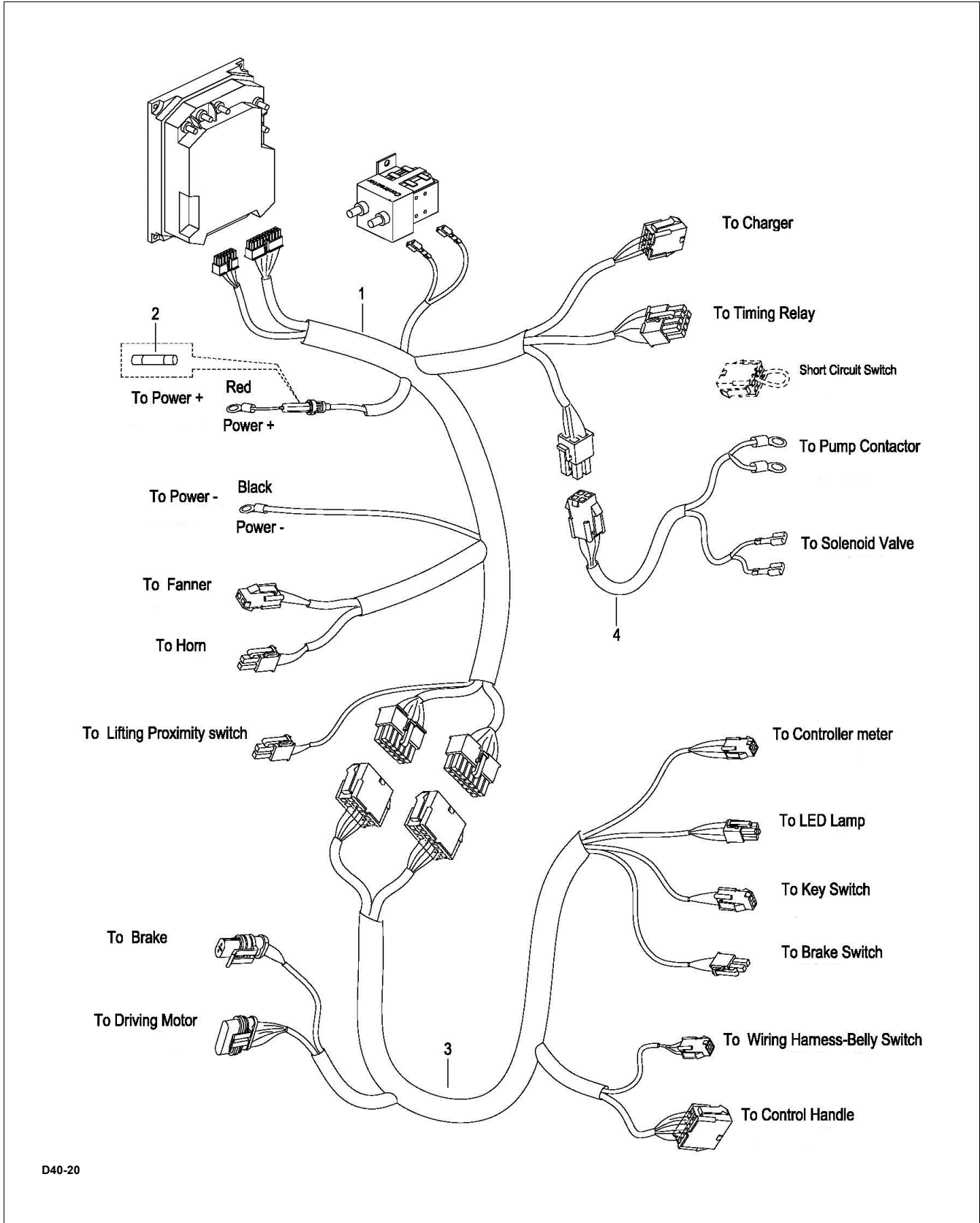
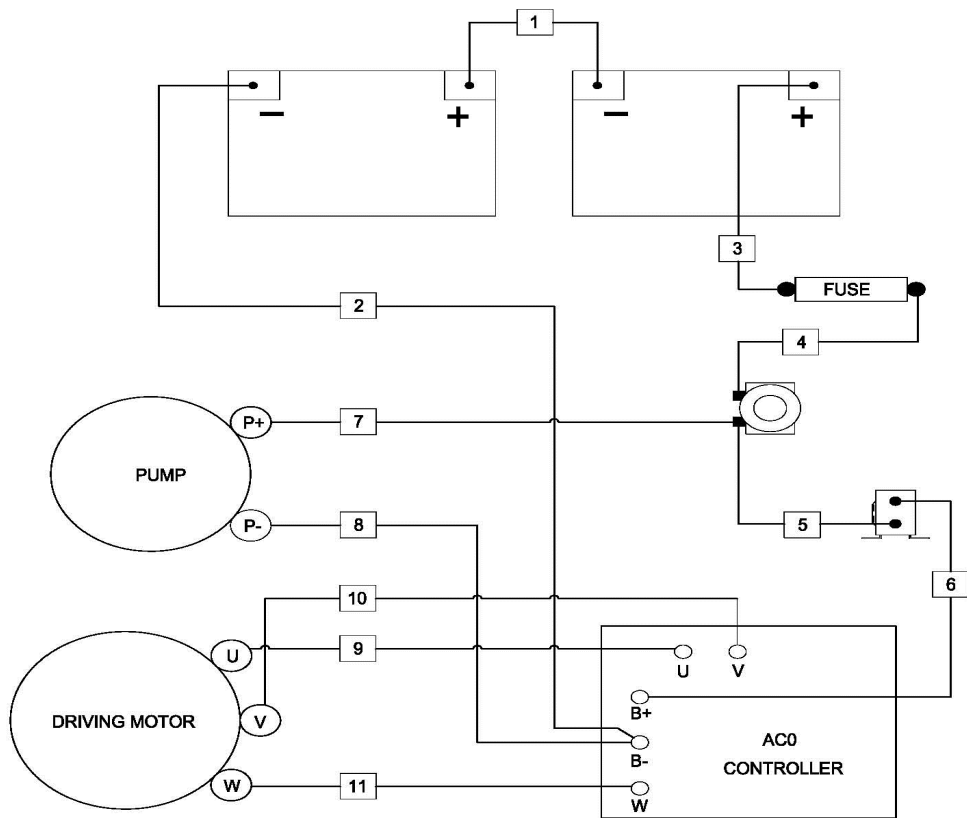


Figure 12-21 Wiring Harness

Wiring Harness

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1118-520001-00	MASTER WIRE HARNESS	1	
2	1120-500010-00	FUSE 10A	1	
3	1118-520002-00	SWITCHING WIRE HARNESS	1	
4	1118-520004-00	WIRE HARNESS OF PUMP	1	



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Figure 12-22 Wiring Cables

Wiring Cables

Pos.	Part Number	Description	Qty. Reqd.	Notes
1	1118-531003-00	CABLE, BATTERY CONNECTOR	1	
2	1118-531002-00	CABLE, BATTERY -	1	
3	1118-531001-00	CABLE, BATTERY +	1	
4	1118-531004-00	F CABLE +	1	
5	1118-531006-00	M CABLE +	1	
6	1118-531008-00	B CABLE+	1	
7	1118-531007-00	PUMP POWER CABLE +	1	
8	1118-531005-00	PUMP POWER CABLE -	1	
9	1118-532001-00	DRIVING MOTOR CABLE U	1	
10	1118-532002-00	DRIVING MOTOR CABLE V	1	
11	1118-532003-00	DRIVING MOTOR CABLE W	1	

NOTES

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