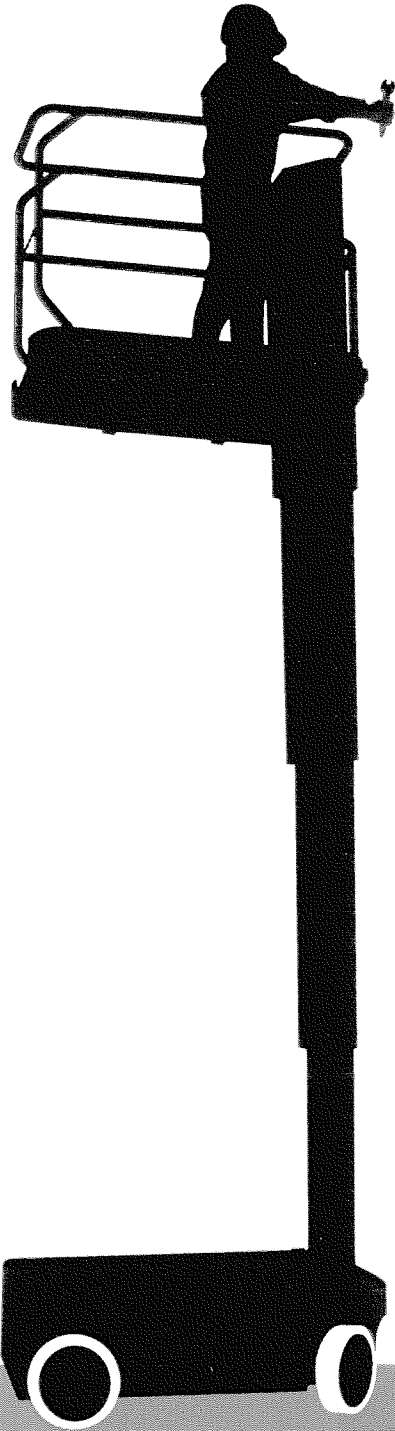


# UpRight

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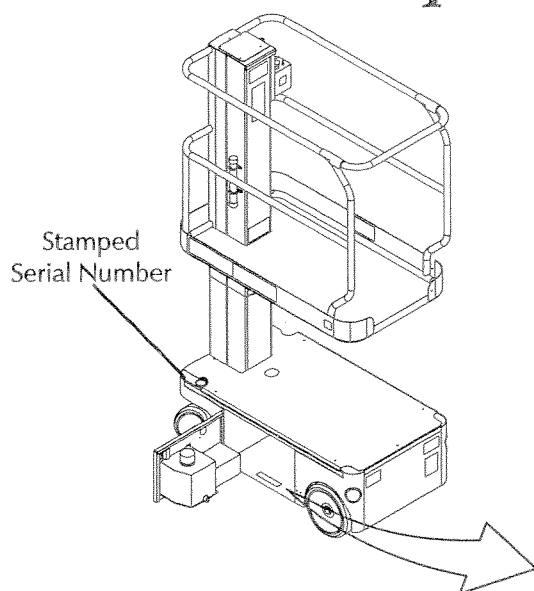


## *TM12*

**WORK PLATFORM**  
European Specification

# Service & Parts Manual

# SERVICE & PARTS MANUAL TM12 Aerial Work Platform Serial Numbers 1141 to Current *European Specification*



When contacting UpRight for service or parts information, be sure to include the MODEL and SERIAL NUMBERS from the equipment nameplate. Should the nameplate be missing the SERIAL NUMBER is also stamped on the top face of the chassis.

<b>UpRight, Inc.</b>	
1775 PARK ST.	SELMA, CA 93662 USA
MODEL NO. <input type="text"/>	MAX. PLATFORM HEIGHT <input type="text"/>
SERIAL NO. <input type="text"/>	BATTERY VOLTAGE <input type="text"/>
MAX. DISTRIBUTED LOAD <input type="text"/>	<input type="text"/>
CAUTION: CONSULT OPERATOR'S MANUAL BEFORE USE.	
THIS PLATFORM IS NOT ELECTRICALLY INSULATED	
<small>P/N 61205-660-00</small>	

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UpRight Ireland,  
Ltd.  
Pottery Road  
Dun Laoire  
Ireland  
TEL: +353-1-202-4100  
FAX: +353-1-202-4105

P/N 060573-020

9902.1-K Rev-A

# Forward

## Introduction

### HOW TO USE THIS MANUAL

This manual is divided into 6 sections. The first page of each section is marked with a black tab that lines up with one of the thumb index tabs on the right side of this page. You can quickly find the first page of each section without looking through the table of contents which follows this page. The section number printed at the top corner of each page can also be used as a quick reference guide.

### SPECIAL INFORMATION



#### DANGER



Indicates the hazard or unsafe practice *will* result in severe injury or death.



#### WARNING



Indicates the hazard or unsafe practice *could* result in severe injury or death.



#### CAUTION



Indicates the hazard or unsafe practice could result in *minor* injury or property damage.

NOTES: Give helpful information.

### WORKSHOP PROCEDURES

**CAUTION:** Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause personal injury, or could damage a machine or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by UpRight, Inc., might be done, or of the possible hazardous consequences of each conceivable way, nor could UpRight Inc. investigate all such ways. Anyone using service procedures or tools, whether or not recommended by UpRight Inc., must satisfy themselves thoroughly that neither personal safety nor machine safety will be jeopardized.

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice. No part of this publication may be reproduced, stored in retrieval system, or transmitted, in any form by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. This includes text, figures and tables.

TM12 Work Platform

## Introduction & Specifications

General description and machine specifications.

1.0

## Machine Preparation & Operation

Information on how to Operate the Work Platform and how to prepare for it for operation.

2.0

## Maintenance

Preventative maintenance and service information.

3.0

## Troubleshooting

Causes and solutions to typical problems.

4.0

## Schematics

Schematics and valve block diagram with description and location of components.

5.0

## Illustrated Parts Breakdown

Causes and solutions to typical problems.

6.0

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## *NOTES*



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## 1.0 Introduction

### PURPOSE OF EQUIPMENT

This manual provides illustrations and instructions for the operation and maintenance of the TM12 Work Platform manufactured by Upright, Inc. Selma, California. (See Figure 1-1).

### SCOPE

This manual includes both operation and maintenance responsibilities concerning the TM12 Work Platform's readiness. The Maintenance Section covers scheduled maintenance, troubleshooting, repair, adjustment and replacement.

## 1.1 General Information

### DESCRIPTION

The TM12 Work Platform is a self-propelled aerial work platform designed to be used as a means of elevating personnel and equipment and to provide a mobile work platform. They are designed to provide mobility with the platform elevated is automatically limited to the low speed range.

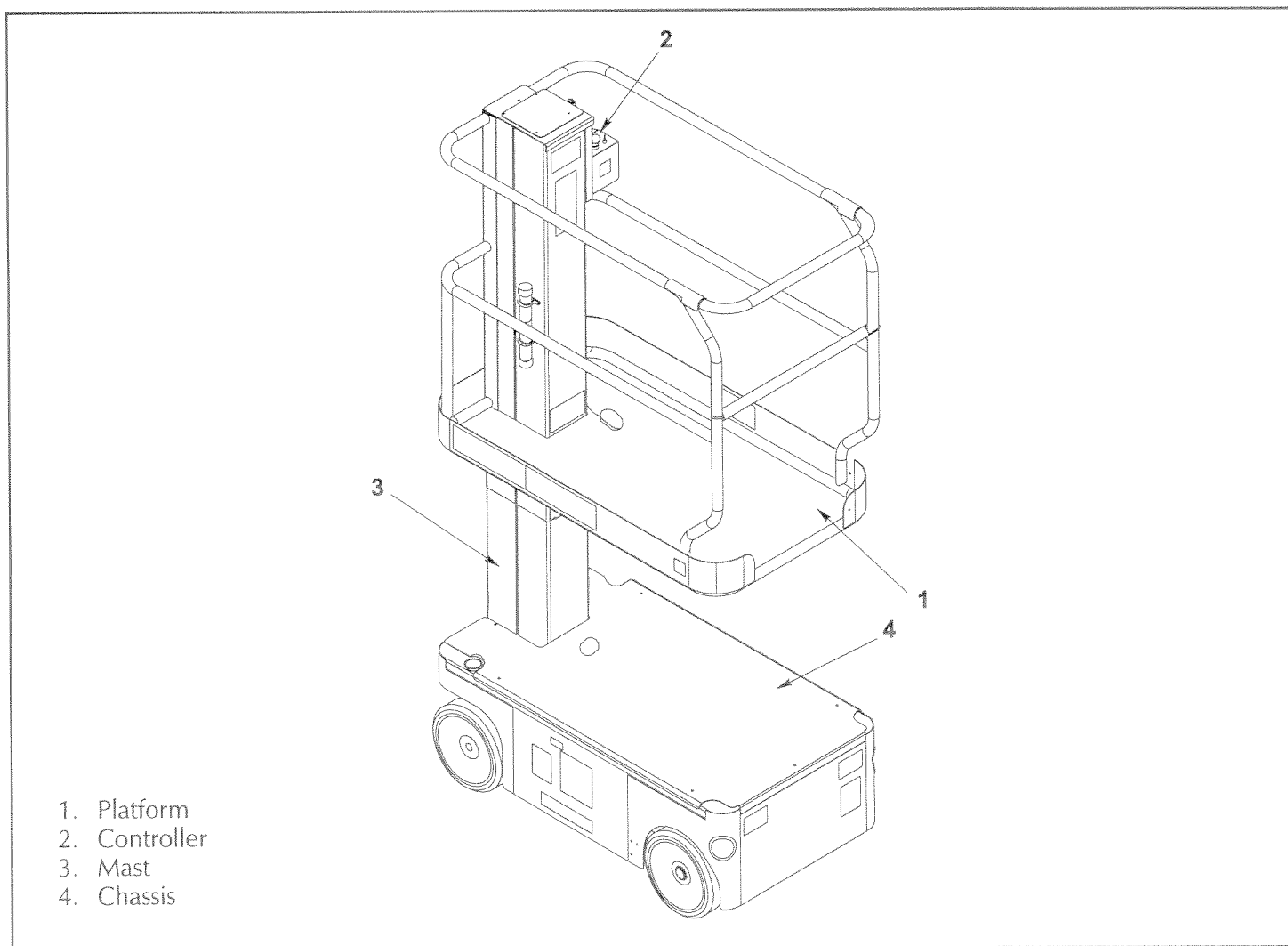


Figure 1-1: TM12 Work Platform

## 1.2 Specifications\*

### PURPOSE AND LIMITATIONS

The objective of the TM12 Work platform is to provide a quickly deployable, self-propelled, variable height work platform. The elevating function shall only be used when the work platform is on a firm level work area. The work platform is intended to be self-propelled when in relatively close proximity to the work area.

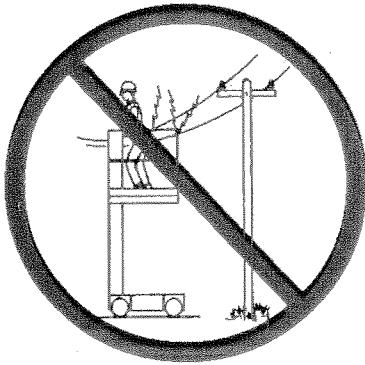
Table 1-1: Specifications

ITEM	TM12
Platform Size: (inside Toeboards)	74 cm x 1.05 m (29 in. x 41 in.)
Maximum Platform Capacities	200 kg (500 lbs.) or two people
Platform Height	
Working Height	5.79 m (19 ft.)
Max. Platform Height	3.83 m (12 ft. 7 in.)
Min. Platform Height	48 cm (19 in.)
Weight	630 kg (1390 lbs.)
Dimensions	
Overall Width	5.79 m (19 ft.)
Overall Height	3.83 m (12 ft. 7 in.)
Overall Length	48 cm (19 in.)
Driveable Height	3.83 m (12 ft. 7 in.)
Surface Speed	
Platform Lowered	3.65 km/h (2.27 mph)
Platform Raised	.87 km/h (.54 mph)
Lift Speed - Raise/Lower	20 sec./23 sec.
Energy Source	24V battery pack (4-220 ampere hour, 6 volt batteries, min. wt. 28.12 kg (62 lbs)), 4 HP DC electric motor
System Voltage	24 VDC
Battery Charger	25 AMP, 110 VAC, 60 Hz.
Battery Duty Cycle	25% for 8 hours
Hydraulic Tank Capacity	7 l (1.8 gallons)
Hydraulic System Pressure, Max.	152 bar (2200 psi)
Hydraulic Fluid	
Normal use (>0° C [32°F])	ISO #46
Low Temp use (-23 to 0° C [-10 to 32° F])	5W-20 Motor Oil
Lift System	One Single Stage Lift Cylinder
Drive Control	Proportional
Control System	Proportional Joystick Controller with toggle Selector Switch, red mushroom Emergency Stop and foot-operated Interlock Switch
Horizontal Drive	Dual Front wheel
Tires	30.5 cm (12 in.) diameter solid rubber, non-marking
Parking Brakes	Dual, Spring Applied, Hydraulic Release
Turning Brakes (inside)	37 cm (14.5 in.)
Gradeability	25% (14°)
Wheel Base	97.8 cm (38.5 in.)
Guardrails	97 cm (38 in.)
Toeboard	152 mm (6 in.)

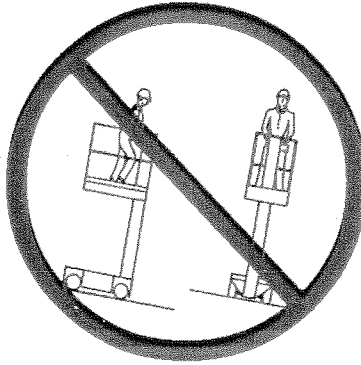
## WARNING

All personnel shall carefully read, understand and follow all safety rules, operating instructions and the Scaffold Industry Association's MANUAL OF RESPONSIBILITIES before performing maintenance on or operating any UpRight aerial work platform.

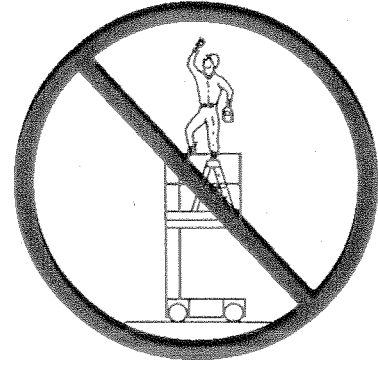
## **SAFETY RULES**



NEVER operate the machine within ten feet (3 meters) of power lines.  
**THIS MACHINE IS NOT INSULATED.**



NEVER elevate the platform or drive the machine while elevated unless the machine is on a firm level surface.



NEVER sit, stand, or climb on guardrail or midrail.

NEVER operate the machine without first surveying the work area for surface hazards such as holes, drop-offs, bumps and debris before operating machine.

NEVER operate the machine if all guardrails are not properly in place and secured with all fasteners properly torqued.

SECURE chain or bar across entrance after mounting platform.

MACHINE must be driven only on smooth level floor surface.

NEVER use ladders, planks or other devices to increase the height of the platform.

NEVER attach overhanging loads to the platform or increase the platform size.

DISTRIBUTE all loads evenly on the platform. See specifications for capabilities.

NEVER elevate platform if it contains more than one person or more than rated load (see specifications back page).

LOOK up, down and around for overhead obstructions and electrical conductors.

NEVER change operating or safety systems.

CLOSE and secure cage after entering platform.

INSPECT the machine thoroughly for cracked welds, loose or missing hardware, hydraulic leaks, damaged control or power cables and loose wire connections.

NEVER use the machine as a freight or personnel elevator.

NEVER recharge battery near sparks or open flame. Batteries that are being charged emit highly explosive hydrogen gas.

AFTER USE secure the work platform against unauthorized use by turning key switch off and removing key.

NEVER replace any component or part with anything other than original UpRight replacement parts without the manufacturer's consent.

NEVER use machine as a welding ground. Welding ground must be attached to same structural element which is being repaired.

Read, understand and follow all safety rules and operating instructions before attempting to operate the machine.

## 2.1 Preparation for Use



### WARNING



STAND CLEAR when cutting the metal banding to avoid being cut when the banding snaps back.

1. Remove the metal banding from the machine.
2. Lift the front of the machine and remove banding and blocks from front wheels.
3. Lower machine.
4. Close the Emergency Lowering Valve (Figure 2-1) by pushing in and turning clockwise until the detent engages.
5. Connect the negative battery lead terminal (Figure 2-2).

## 2.2 Preparation For Shipment

1. Grease all grease fittings per lubrication instructions in Section 3.0, Maintenance.
2. Fully lower the platform.
3. Disconnect the battery negative (-) lead from the battery terminal (Figure 2-2).
4. Band the Platform Assembly to the Chassis.

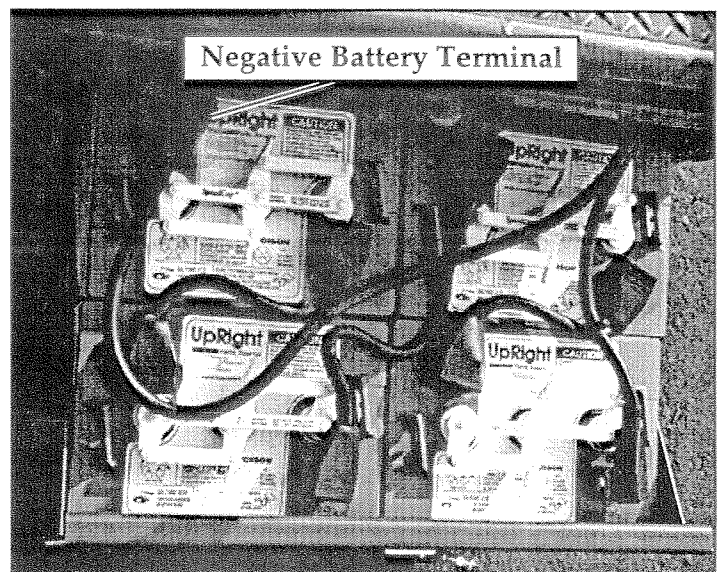


Figure 2-2: Battery Compartment

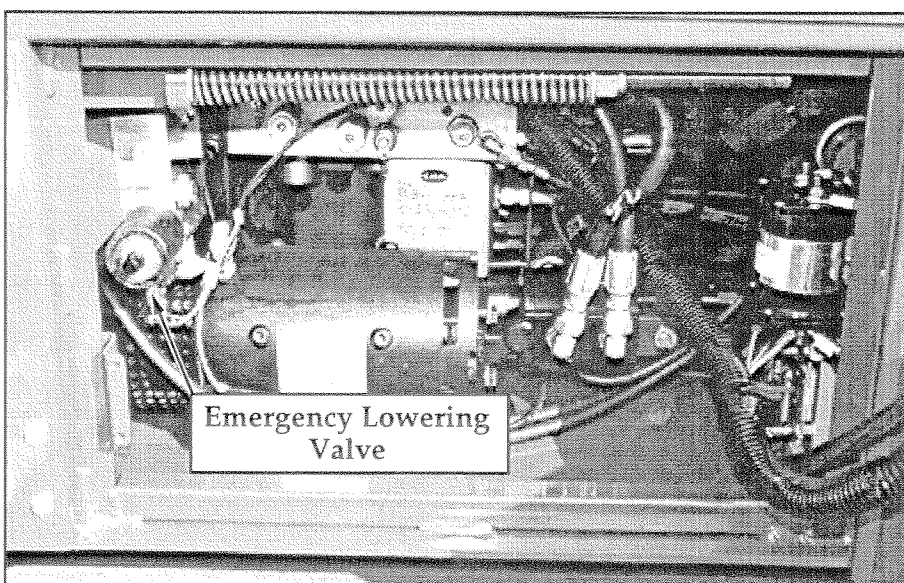


Figure 2-1: Chassis Module, Right Side

## 2.3 Forklifting Of Work Platform

NOTE: Forklifting is for transporting only.



### CAUTION



See specifications for weight of work platform and be certain that forklift is of adequate capacity to lift platform.

Forklift from the side by lifting under the Chassis (Figure 2-3).

## 2.4 Lifting Work Platform

Secure straps to chassis tie down/lift points **only** (Figure 2-3).



### CAUTION



When attaching straps or chains to the right rear tie down/lift points be careful not to damage the Brake Cylinder or hose.

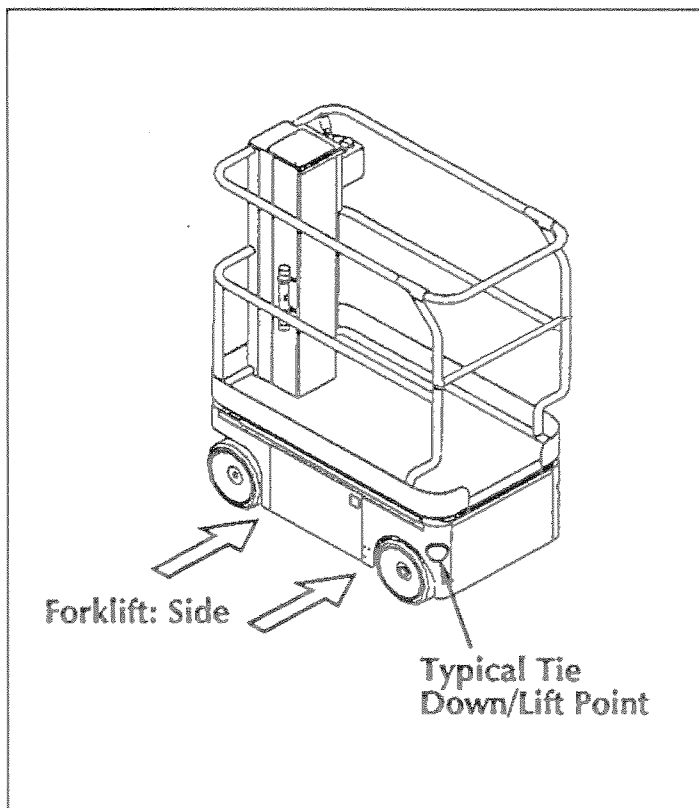


Figure 2-3: Transporting Machine

## 2.5 Transport

1. Maneuver the work platform into transport position and chock wheels.
2. Secure the work platform to the transport vehicle with chains or straps of adequate load capacity attached to the chassis tie down points (Figure 2-3).



### CAUTION



When attaching straps or chains to the right rear tie down/lift points be careful not to damage the Brake Cylinder or hose.

Over-tightening of chains or straps attached to tie down lugs may result in damage to work platform.

3. Open Emergency Lowering Valve by pushing in and turning fully counterclockwise.

## 2.6 Storage

No preparation is required for normal storage. Regular maintenance per Table 3-1 should be performed. If the work platform is to be placed in long term storage (dead storage) use the following preservation procedure.

1. Clean painted surfaces. If the paint surface is damaged, repaint.
  2. Fill the hydraulic tank to operating level with the Platform fully lowered, fluid should be visible on the dipstick.
  3. Coat all exposed unpainted metal surfaces with preservatives.
- 
1. Disconnect the battery ground cable terminal and secure to the chassis.
  2. Disconnect the remaining battery leads and secure to the chassis.
  3. Remove the batteries and place in alternate service.

## *2.7 General Functioning*

Refer to the Hydraulic and Electrical Schematics, Section 5.

The battery powered electric motor directly drives a two section hydraulic pump. The low section supplies oil under pressure to operate steering and joins the high section flow to provide oil to the other work platform functions. The oil flow is directed to the different functions by electrically activated solenoid valves.

### *Driving*

Set both Emergency Stop Switches ON (pull out).

Set chassis Key Switch to PLATFORM.

Mount the platform and close the sliding rail.

With the Foot Switch depressed and the Drive/Lift Switch in DRIVE, the machine will drive at a speed proportional to the angle of the Control Lever.

With platform elevated, driving is reduced to "Creep" speed.

### *Steering*

Steering is controlled by pressing the steering toggle switch (top of joystick) left or right.

Steering is not self centering. Wheels must be positioned to direction of desired travel.

### *Raising and Lowering The Platform*

Set both Emergency Stop Switches ON (pull out).

Set chassis Key Switch to PLATFORM.

Mount the platform and close the sliding rail.

With the Foot Switch depressed and the Drive/Lift Switch in LIFT, the platform will raise and lower at a speed proportional to the angle of the Control Lever.

To lower the platform using the Emergency lowering Valve, push in Emergency Lowering Knob (Figure 2-4) and turn counterclockwise.

**NOTE:** Platform will not raise unless Emergency Lowering Knob is released (Push in and turn clockwise).



## *2.8 Design features*

The TM12 Work Platform has the following features:

- The drive speed is limited to Creep Speed when operating the work platform while the platform is elevated.
- The platform descent rate is controlled by an orifice (Fixed Speed). In the last 25mm of platform lowering, the oil flows through the cushion orifice only slowing the platform descent even further (Cushion Speed). The lift cylinder is equipped with a velocity fuse to prevent descent should a hose rupture.
- Parking brakes are automatically engaged when the Drive Switch is released and the machine comes to a full stop or if power is lost.
- The Chassis Controls and Controller are equipped with an Emergency Stop Switch for stopping all powered functions.
- The Foot Switch must be depressed for the Controller to function.
- An alarm (60 Hz) is provided to signal when the Platform is lowering.
- A Lift Switch is located in the Chassis Control Panel on the right side of the Chassis for lifting and lowering the Platform from ground level.
- The Tilt Alarm (600 Hz) is activated on slopes of 2 degrees side to side and fore and aft when the machine is elevated.
- An Emergency Lowering Valve is provided in the Chassis Module to lower the Platform in the event electrical power is lost.

## 2.9 Controls and Indicators

The controls and indicators for operation of the TM12 Work Platform are shown in Figure 2-6. The name and function of each control and indicator are listed in Table 2-1. The index numbers in Figure 2-6 correspond to the index numbers in Table 2-1. **The operator shall know the location of each control and indicator and have a thorough knowledge of the function and operation of each before attempting to operate the unit.**

Table 2-1: Controls and Indicators

### Platform Controls

INDEX NO.	NAME	FUNCTION
1	Foot Switch	Provides power to the Controller only when depressed, preventing accidental activation of the Controller.
2	Emergency Stop Switch	Push red button to cut off power to all functions (OFF). Turn clockwise to provide power (ON).
3	Control Lever (Joystick)	Move joystick forward or backward to proportionally control Drive Valves or Lift and Down Valves depending on position of Drive/Lift Switch.
4	(Steering Switch)	Push switch right or left to control steering. <b>Steering is not self-centering. Wheels must be returned to straight ahead position by operating Steering Switch.</b>
5	Drive/Lift Switch	Selecting <b>DRIVE</b> allows the machine to move forward or reverse. Selecting <b>LIFT</b> allows the Platform to raise or lower.

Table 2-1: Controls and Indicators

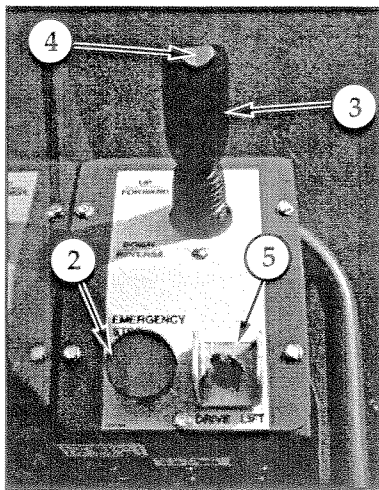
### Chassis Controls

INDEX NO.	NAME	FUNCTION
6	Emergency Stop Switch	Push red button to cut off power to all functions (OFF). Pull out to provide power (ON).
7	Chassis Lift Switch	Toggle switch to <b>UP</b> to lift the platform and toggle switch to <b>DOWN</b> to lower the platform.
8	Chassis Key Switch	Turn switch to <b>PLATFORM</b> to provide power to Controller and to <b>CHASSIS</b> to provide power to Chassis Controls.
9	Volt/Hour Meter	Indicates state of battery charge and hours machine has been operated.
10	Emergency Lowering Valve	Push in and turn knob counterclockwise to lower the Platform. To close, push in and turn clockwise until detent engages. <b>The Platform cannot be raised until this valve closes.</b>
11	Brake Release	Remove nut to relieve tension on the spring, disengaging brakes. Replace nut and tighten until spring length measures 248-254mm (9.75 - 10 in.) and brake bars fully engage tires. <b>DO NOT operate the machine with the Brakes disengaged.</b>
12	Charge Indicator	LED illuminates when batteries are charging. When batteries are fully charged the LED will blink.
13*	Down Alarm (60 Hz)	Sounds an audible signal anytime the Platform is lowering during normal operation. If the Emergency Lowering Valve is used the alarm does not sound.
14*	Tilt Alarm (600 Hz)	Sounds an audible signal when the platform is elevated and a slope of 2° side to side or 2° for and aft.

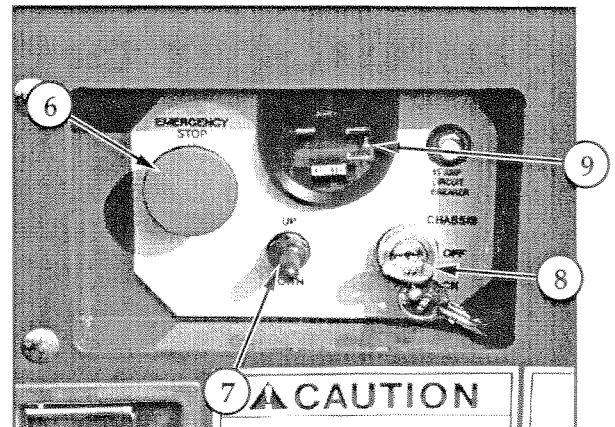
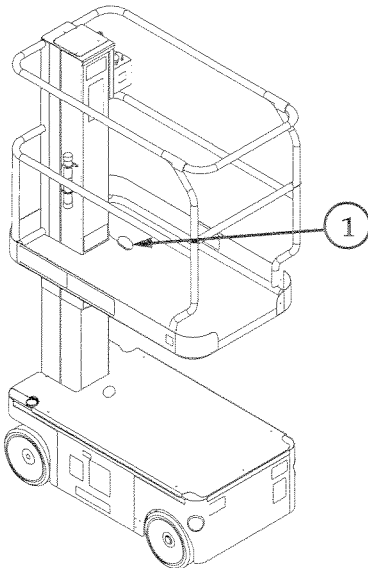
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# Machine Preparation & Operation

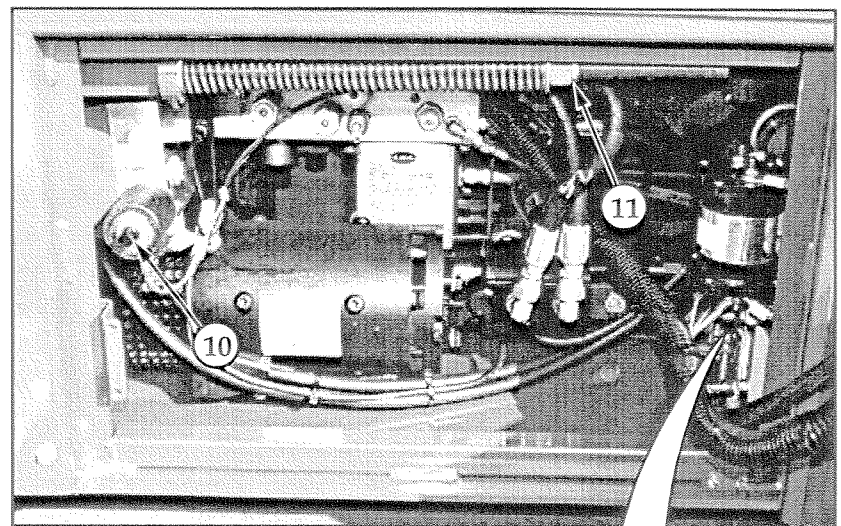
Section  
2.9



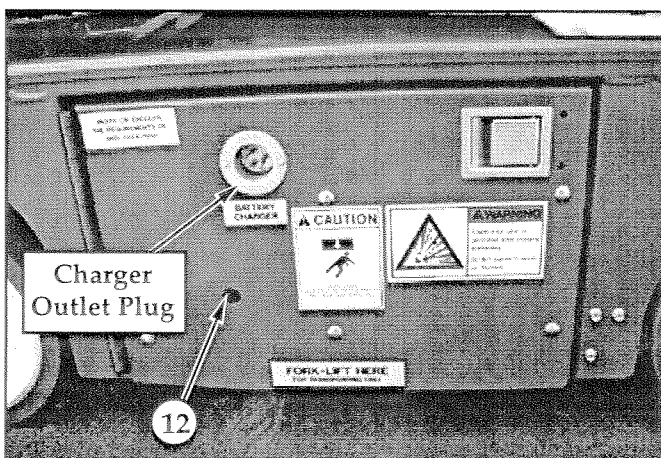
Controller



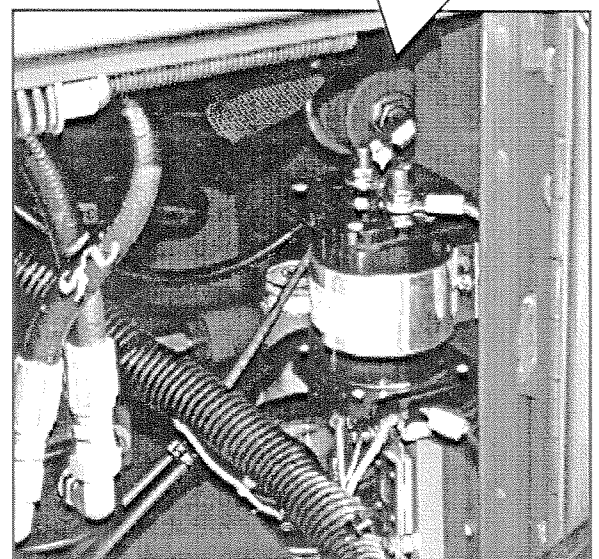
Chassis Control Panel



Chassis Module, Right Side



Chassis Module, Left Side



Tilt Sensor

Figure 2-4: Controls and Indicators

## 2.10 Pre-Operation Inspection

NOTE: Carefully read, understand and follow all safety rules, operating instructions, labels and the Scaffold Industry Association's MANUAL OF RESPONSIBILITIES. Perform the following steps each day before use.



### WARNING



**DO NOT** perform service on or in the Mast Assembly with the Platform elevated unless the Platform is properly blocked.

1. Open module doors.
2. Check the level of the hydraulic oil with the platform fully lowered. Oil should be visible on the dipstick. Add hydraulic oil if necessary (see Sections 1.2 and 3.3)
3. Check that fluid level in the batteries is correct (see Battery Maintenance, Section 3.3).
4. Verify that batteries are charged.
5. Check that AC extension cord has been disconnected from the chassis outlet.
6. Carefully inspect the entire work platform for damage such as cracked welds or structural members, loose or missing parts, oil leaks, damaged cables or hoses, loose connections and tire damage.
7. Move machine, if necessary, to unobstructed area to allow for full elevation.
8. Turn Chassis and Platform Emergency Stop Switches ON (Figure 2-1) by pulling up.
9. Turn the Chassis Key Switch (Figure 2-1) to **CHASSIS**.
10. Push Chassis Lift Switch (Figure 2-1) to **UP** position and fully elevate Platform.
11. Visually inspect the Mast Assembly for damage or erratic operation. Check for missing or loose parts.
12. Check Level Sensor (Figure 2-1) operation by pushing the sensor off of level while pushing the Chassis Lift Switch to **UP** position, the alarm should sound.
13. Partially lower the Platform by pushing Chassis Lift Switch to **DOWN** and check the operation of the audible lowering alarm.
14. Open the Emergency Lowering Valve (Figure 2-1) to check for proper operation by pushing in on the knob and turning 1/4 turn counterclockwise. Once the Platform is fully lowered, close the valve by pushing in on the knob and turning 1/4 turn clockwise until the detent engages.
15. Turn the Chassis Key Switch to **PLATFORM**.
16. Close and latch module doors.
17. Check that route is clear of persons, obstructions, holes and drop-offs, is level and capable of supporting the wheel loads.
18. After mounting platform lower sliding mid-rail.
19. Position Drive/Lift to **DRIVE**.
20. While depressing Foot Switch, slowly position the Control Lever to **FORWARD** then **REVERSE** to check for speed and directional control. The farther the Control Lever is pushed or pulled from center the faster the machine will travel.
21. Push the Steering Switch, on the top of the Control Lever, **RIGHT** then **LEFT** to check for steering control.
22. Push the Emergency Stop Switch Button.

## 2.11 Operation

**NOTE:** Before operating work platform, ensure that the pre-operation and safety inspection has been completed, any deficiencies have been corrected and the operator has been thoroughly trained on this machine.

### TRAVEL WITH PLATFORM LOWERED

1. Check that route is clear of people, obstructions, holes and drop-offs, is level and capable of supporting wheel loads.
2. Verify Chassis Key Switch is on **PLATFORM** and Chassis Emergency Stop Switch is **ON**, pull up.
3. After mounting Platform lower sliding mid-rail.
4. Check clearances above, below and to the sides of the machine.
5. Turn Controller Emergency Stop Switch **ON** by pulling up. When the button is pushed down, Emergency Stop Switch will automatically go to **OFF** position.
6. Position Drive/Lift Switch to **DRIVE**.
7. While depressing Foot Switch, slowly push or pull the Control Lever to **FORWARD** or **REVERSE** position to travel in the desired direction. The farther the Control Lever is pushed or pulled from center, the faster the machine will travel.

### STEERING

1. Position Drive/Lift Switch to **DRIVE**.
2. While depressing the Foot Switch, push the Steering Switch, on the end of the Control Lever, to **RIGHT** or **LEFT** to turn wheels in the desired direction. Observe the tires while maneuvering the work platform to ensure proper direction.

**NOTE:** Steering is not self-centering. Wheels must be returned to straight ahead position by operating Steering Switch.

## ELEVATING PLATFORM



### WARNING



**LOOK** up and around for obstructions before performing the lift function.

**DO NOT** elevate the Platform unless the work platform is on a firm and level surface.

**DO NOT** operate the work platform within 3 meters (10 ft.) of any electrical lines. **THIS WORK PLATFORM IS NOT INSULATED.**

**NEVER** enter the space between Chassis and Platform while Platform is elevated.

1. Position Drive/Lift Switch to **LIFT**.
2. While depressing Foot Switch, push Control Lever to **UP**.

### TRAVEL WITH PLATFORM ELEVATED



### WARNING



Travel with Platform elevated **ONLY** on firm and level surfaces.

**NOTE:** Work Platform will travel at reduced speed when Platform is elevated.

1. Check that route is clear of people, obstructions, holes and drop-offs, is level and capable of supporting the wheel loads.
2. Check clearances above, below and to the sides of Work Platform.
3. Position Drive/Lift Switch to **DRIVE**.
4. While depressing Foot Switch, slowly push or pull the Control Lever to **FORWARD** or **REVERSE** position to travel in the desired direction.

## LOWERING PLATFORM

1. Position Drive/Lift Switch to **LIFT**.
2. While depressing Foot Switch, pull Control Lever to **DOWN**.

## EMERGENCY LOWERING

The Emergency Lowering Valve is located just inside the right door of the Chassis Module (Figure 2-4).

1. Open the Emergency Lowering Valve by pushing in on the knob and turning 1/4 turn counterclockwise.

**NOTE:** The Down Alarm will not sound when using the Emergency Lowering Valve.

2. Once the Platform is fully lowered, be certain that the Emergency Lowering Valve is closed again. The Platform will not elevate if the Emergency Lowering Valve has not been closed.
3. To close the Emergency Lowering Valve, push in on the knob and turn 1/4 turn clockwise until the detent engages.

## AFTER USE EACH DAY

1. Ensure that the Platform is fully lowered.
2. Park the machine on level ground, preferably under cover. Secure against vandals, children or unauthorized operation.
3. Turn the Key Switch to OFF (center position) and remove the key to prevent unauthorized operation.

## PARKING BRAKE RELEASE (Figure 2-5)

Perform the following only when the machine will not operate under it's own power and it is necessary to move the machine or when towing the machine up a grade or winching onto a trailer to transport.

1. Remove the spring compression nut so the spring is loose and the Brake Bars are away from the tires.
2. The machine will now roll when pushed or pulled.

After moving the machine and before normal operation:

1. Replace the spring compression nut and tighten until the spring measures 248-254 mm (9 3/4- 10 in.) in length. Verify that the Brake Bars have fully engaged the tires before the machine is operated.

<b>⚠</b>	<b>WARNING</b>	<b>⚠</b>
<p>Never operate work platform with the Parking Brake released. Serious injury or damage could result</p>		

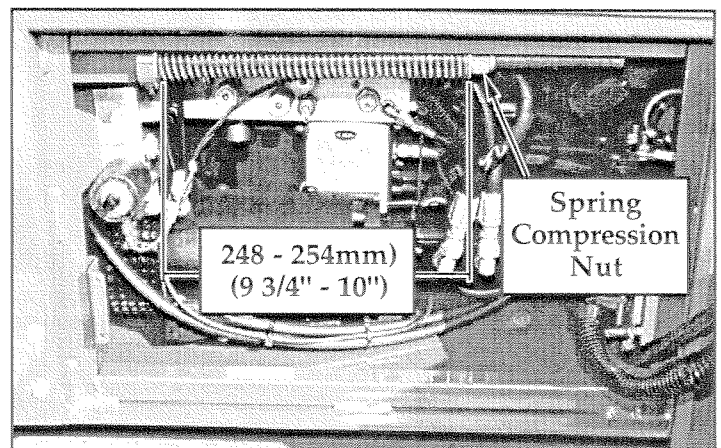


Figure 2-5: Brake Release

## 3.0 Introduction

This section contains instructions for the maintenance of the TM12 Work Platform. Procedures for the operational checkout adjustment, scheduled maintenance, and repair/removal are included.

Referring to *Section 2* will aid in understanding the operation and function of the various components and systems of the TM12 Work Platform and help in diagnosing and repair of the machine.



### **SPECIAL TOOLS**

The following is a list of special tools that are required to perform certain maintenance procedures. These tools may be purchased from your dealer.

Description	Part Number
Inclineometer	010119-000
Gauge, 0-3000 psi	014124-030
Fitting, Quick Disconnect	063965-002

## 3.1 Preventative Maintenance (Table 3-1)

The complete inspection consists of periodic visual and operational checks, together with all necessary adjustments to assure proper performance. Daily inspection will prevent abnormal wear and prolong the life of all systems. The inspection and maintenance schedule is to be performed at regular intervals. Inspection and maintenance shall be performed by personnel who are trained and familiar with mechanical and electrical procedures. Complete descriptions of the procedures are in the text following the table.

	<b>WARNING</b>	
<p>Before performing preventative maintenance, familiarize yourself with the operation of the machine.</p> <p>Always block the platform whenever it is necessary to enter the area between the Chassis and Platform when the platform is elevated.</p>		

The Preventative Maintenance Table has been designed to be used for machine service and maintenance repair. **Please copy the following page and use the Preventative Maintenance Table as a checklist when inspecting a machine for service.**



# Maintenance

## Preventative Maintenance Table Key

### Interval

Daily=each shift or every day

30d=every month or 30 days

3m=every 3 months

1y=every year

Y=Yes/Acceptable

N=No/Not Acceptable

R=Repaired/Acceptable

## Preventative Maintenance Report

Date: \_\_\_\_\_

Owner: \_\_\_\_\_

Model No: \_\_\_\_\_ Serial No: \_\_\_\_\_

Serviced By: \_\_\_\_\_

Service Interval: \_\_\_\_\_



Table 3-1: Preventative Maintenance

COMPONENT	INSPECTION OR SERVICES	INTERVAL	Y	N	R
Battery System	Check electrolyte level	Daily			
	Check battery cable condition	Daily			
	Charge batteries	Daily			
	Check charger condition & operation	Daily			
	Check specific gravity	30d			
	Clean exterior	3m			
	Clean terminals	3m			
Hydraulic Oil *	Check oil level	Daily			
	Drain and replace oil	1y			
Hydraulic System	Check for leaks	Daily			
	Check line connections	30d			
	Check for exterior wear	30d			
Drive Motors	Check for operation and leaks	Daily			
Emergency Down	Check procedure for Emergency Down batteries	3m			
Hydraulic Pump	Check for fitting leaks	Daily			
	Wipe clean	30d			
	Check for leaks at mating surfaces	30d			
	Check mounting bolts for proper torque	30d			
Controller	Check condition & operation	Daily			
Control Cable	Check the exterior of the cable for pinching, binding or wear	Daily			
Platform Deck and Rails	Check fasteners for proper torque	Daily			
	Check welds for cracks	Daily			
	Check condition of deck	Daily			
	Check entry way closure	Daily			
Elevating Assembly	Inspect for external damage, dents, loose rivets or cracks	Daily			
	Check chains and sheaves for wear	3m			
	Inspect and adjust sequence straps	30d			
Chassis	Check cables for pinch or rubbing points	Daily			
	Check welds for cracks	Daily			
	Check casters for damage	Daily			
	Check component mounting for proper torque	3m			
Lift Cylinder	Check for leaks	Daily			
Entire Unit	Check fitting for proper torque	30d			
	Perform pre-operation inspection	Daily			
	Check for and repair collision damage	Daily			
	Lubricate	3m			
	Check fasteners for proper torque	3m			
Labels	Check for corrosion; remove and repaint	3m			
	Check for peeling, missing, or unreadable labels & replace	Daily			
Drive Wheels	Check for loose components	Daily			
Steering System	Oil pivot pins	3m			
	Oil king pins	3m			
	Check steering cylinder for leaks	30d			
	Check hardware & fittings for proper torque	6m			

\* NOTE: Use ISO #46 during summer and ISO #32 during winter.



## 3.2 Blocking Elevating Assembly (Figure 3-1)

 <b>WARNING</b> 
<p><b>BEFORE</b> entering area between Chassis and Platform ensure that Platform is properly blocked.</p>

### INSTALLATION

1. Park the Work Platform on firm level ground.
2. Verify Platform Emergency Stop Switch is **ON**.
3. Turn Chassis Key Switch to **CHASSIS**.
4. Position Chassis Lift/Lower Switch to **UP** and elevate Platform approximately 1.2m (4 feet).
5. Place a wood block, 5cm x 10cm x 46cm (2 in. x 4 in. x 18 in.) long between the #2 Mast and Chassis just behind the Mast Assembly.
6. Push Chassis Lift Switch to **DOWN** position and gradually lower Platform until the #2 Mast is supported by the block (Figure 3-1).

### REMOVAL

1. Push Chassis Lift Switch to **UP** position and gradually raise Platform until wood block can be removed.
2. Remove block.
3. Push Chassis Lift Switch to **DOWN** position and completely lower Platform.

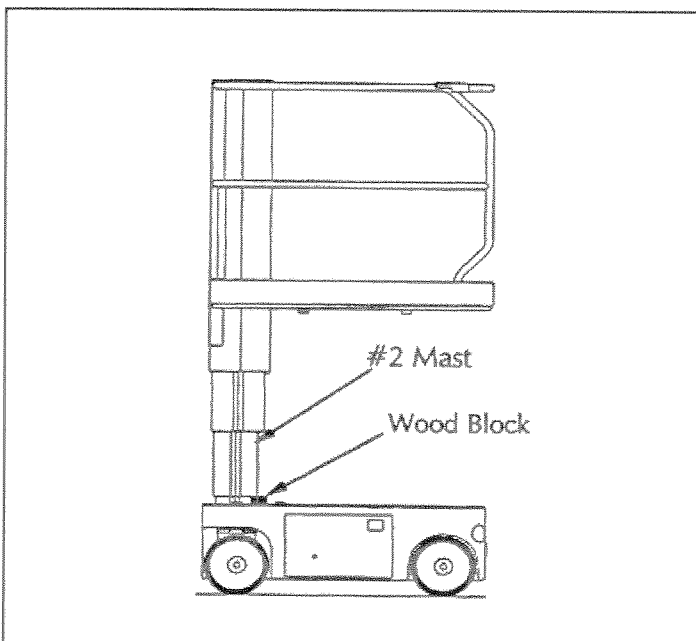




Figure 3-1: Blocking the Elevating Assembly



## 3.3 Battery Maintenance

Electrical energy for the motor is supplied by four 6 volt batteries wired in series for 24 volts DC. Proper care and maintenance of the batteries and motor will ensure maximum performance from the Work Platform.

 <b>WARNING</b> 
<p>Hazard of explosive gas mixture. Keep sparks, flame and smoking materials away from batteries.</p> <p>Always wear safety glasses when working with batteries</p> <p>Battery fluid is highly corrosive. Rinse away any spilled fluid thoroughly with clean water.</p>

### BATTERY INSPECTION AND CLEANING

Check battery fluid level daily, especially if Work Platform is being used in a warm, dry climate. If required, add distilled water only; use of tap water with high mineral content will shorten battery life.

 <b>CAUTION</b> 
<p>If battery water level is not maintained, batteries will not fully charge, creating a low discharge rate which will damage Motor/Pump unit and void warranty.</p>

Batteries should be inspected periodically for signs of cracks in the cases, electrolyte leakage and corrosion of the terminals. Inspect cables for worn spots or breaks in the insulation and for broken cable terminals.

Clean batteries that show signs of corrosion at the terminals or onto which electrolyte has overflowed during charging. Use a baking soda solution to clean the batteries, taking care not to get the solution inside the cells. Rinse thoroughly with clean water. Clean battery and cable contact surfaces to a bright metal finish whenever a cable is removed.

## BATTERY CHARGING (Figure 3-2)

Charge batteries at end of each work shift or sooner if batteries have been discharged.

⚠
CAUTION
⚠

Charge batteries in a well-ventilated area. Do not charge batteries when the work platform is in an area containing sparks or flames.

Permanent damage to batteries will result if batteries are not immediately recharged after discharging.

Never leave charger operating unattended for more than two days.

Never disconnect cables from batteries when charger is operating.

Keep charger dry.

When night air temperatures fall below 18°C (65°F), batteries charged in unheated areas should be placed on charger as soon after use as possible. Under such conditions a 4 hour equalize charge once a week in the early afternoon will improve state of charge and battery life.

1. Check battery fluid level. If electrolyte level is lower than 10 mm ( $\frac{3}{8}$  in.) above plates add distilled water only.
2. The outlet plug for the battery charger is located in the left chassis door. Connect extension cord (12 gauge conductor minimum and 15 m (50 ft.) in length maximum) to the charger plug. Connect other end of extension cord to properly grounded outlet of proper voltage and frequency.
3. Charger turns on automatically after a short delay, the LED charge indicator will illuminate.
4. Charger turn off automatically when batteries are fully charged, the LED charge indicator will blink.

## BATTERY CELL EQUALIZATION

The specific gravity of the electrolyte in the battery cells should be equalized monthly. To do this, charge batteries as outlined in *Battery Charging*. After this initial charge, check the electrolyte level in all cells and add distilled water as necessary. Then, turn the charger on for an additional eight hours. During this time, the charging current will be low (four amps) as cells are equalizing.

After equalization, the specific gravity of all cells should be checked with a hydrometer. The temperature corrected specific gravity in this state should be 1.260. If any corrected readings are below 1.230, the batteries containing such cells should be replaced.

Do not check the specific gravity in a cell to which water has been just been added. If there is not enough electrolyte in a fully charged cell to obtain a sample for the hydrometer, add water and continue charging for one to two hours to adequately mix the water and electrolyte.

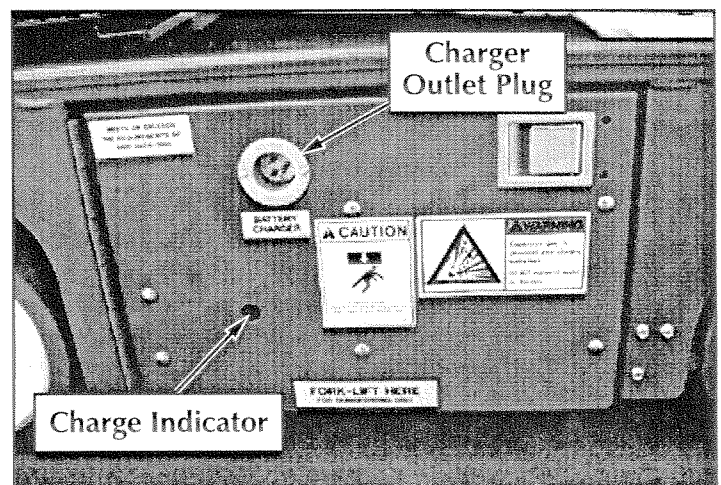
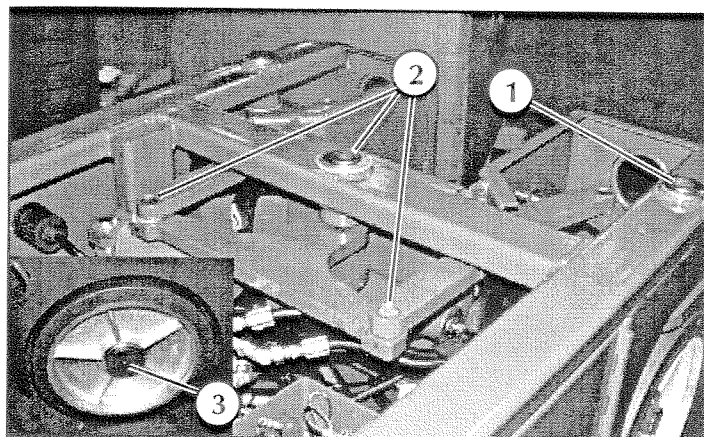


Figure 3-2: Battery Charger

## 3.4 Lubrication

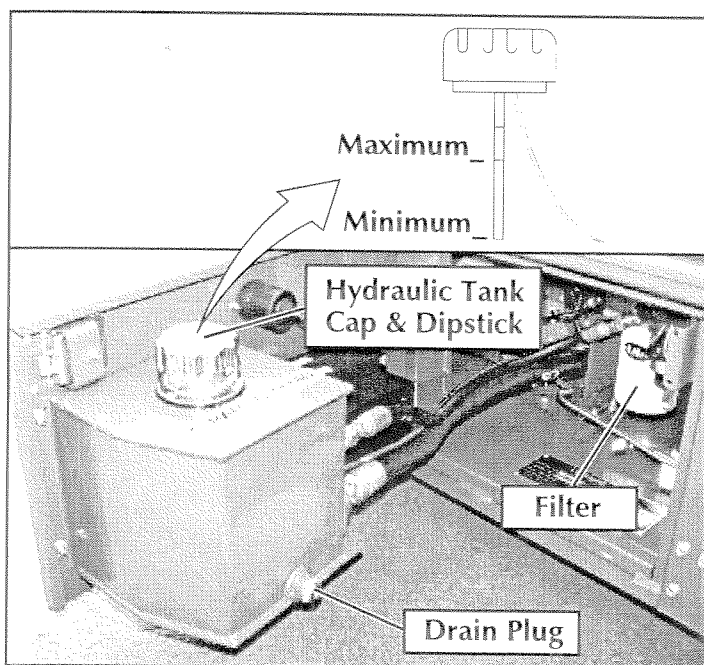
Refer to Figure 3-3 for location of items that require lubrication service. Refer to the appropriate sections for lubrication information on the Hydraulic Oil Tank and Filter.



1. King Pin Bearings
2. Steering Linkage (not all pivots are visible)
3. Rear Wheel Bearings

**Figure 3-3: Lubrication Points**

Apply one or two drops of motor oil to each bearing.



**Figure 3-4: Hydraulic Oil Tank and Filter**

## HYDRAULIC OIL TANK AND FILTER (Figure 3-4)

### Fluid Level

With Platform fully lowered, oil should be visible on the dipstick, if not, fill the tank until oil registers on the dipstick. **DO NOT** fill above the lower line on the dipstick or when the Platform is elevated.

### Oil and Filter Replacement

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.



### CAUTION



The hydraulic oil may be of sufficient temperature to cause burns. Wear safety gloves and safety glasses when handling hot oil.

2. Provide a suitable container to catch the drained oil. Hydraulic tank has a 7 liter (1.8 gal.) capacity.
3. Open left module door.
4. Remove the drain plug and allow all oil to drain.
5. Re-install the drain plug.
6. Unthread the filter from the Control Valve Block.
7. Apply a thin film of clean hydraulic oil (ISO #46) to the gasket of the replacement filter.
8. Thread the replacement filter onto the filter head until the gasket makes contact, then rotate the filter 3/4 of a turn further.
9. Fill the hydraulic reservoir with hydraulic oil (see Section 1.2) until the oil comes up just past the end of the dipstick (Fig 3-4). Hydraulic tank has a 7 liter (1.8 gallon) capacity.

## 3.5 Setting Hydraulic Pressures (figure 3-5)

**NOTE:** Check the hydraulic pressures whenever the pump, manifold or relief valves have been serviced or replaced.



### WARNING



The hydraulic oil may be of sufficient temperature to cause burns. Wear safety gloves and safety glasses when handling hot oil.

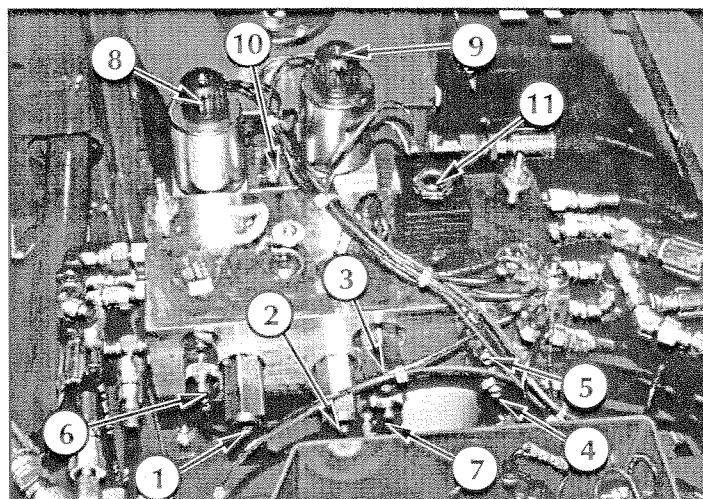
The oil in the hydraulic system is under very high pressure which can easily cause severe cuts. **Obtain medical assistance immediately if cut by hydraulic oil.**

## LIFT RELIEF VALVE (Fig. 3-5)

1. Operate the hydraulic system 10-15 minutes to warm the oil.
2. Loosen locknut or remove cover on the Lift Relief Valve and turn adjusting screw counter-clockwise two full turns.
3. Place the maximum rated load, see Table 1-1, on the Platform.
4. Turn the Chassis Key Switch to **CHASSIS**. Position the chassis Lift Switch to **UP** position and hold it there.
5. Slowly turn the Lift Relief Valve adjusting screw clockwise to increase the pressure until the Platform just begins to raise.
6. Release the Chassis Lift Switch. Tighten locknut or replace Lift Relief Valve cover and torque to 8 Nm (6 Ft/Lbs).

## LOW DRIVE RELIEF VALVE (Figure 3-5)

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Move machine so the front is against a wall or other unmovable object.
3. Install guage in lower guage port.
4. Loosen locknut or remove cover on the Drive Relief Valve and turn adjusting screw counter-clockwise two full turns.



- |                         |                           |
|-------------------------|---------------------------|
| 1. Lift Relief          | 7. Lower Guage Port       |
| 2. Low Drive Relief     | 8. Steering Valve         |
| 3. Steering Relief      | 9. Drive/Lift Valve       |
| 4. Fwd. C-Balance Valve | 10. Proportional Valve    |
| 5. Rev. C-Balance Valve | 11. Forward/Reverse Valve |
| 6. Upper Guage Port     |                           |

Figure 3-5: Hydraulic Manifold

5. While one person drives the machine forward against the wall, slowly turn the Drive Relief Valve adjusting screw clockwise to increase the pressure until the guage reads 121 bar (1750 psi).
6. Tighten locknut or replace Lift Relief Valve cover and torque to 8 Nm (6 Ft/Lbs).
7. Remove guage and replace cap.

## STEERING RELIEF VALVE

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Install guage in lower guage port.
3. Loosen locknut or remove cover on the Steering Relief Valve and turn adjusting screw counter-clockwise two full turns.
4. While one person holds the Steering Switch to steer right or left, slowly turn the Steering Relief Valve adjusting screw clockwise to increase the pressure until the guage reads 52 bar (750 psi).
5. Tighten locknut or replace Steering Relief Valve cover and torque to 8 Nm (6 Ft/Lbs).
6. Remove guage and replace cap.

## COUNTERBALANCE VALVES (Figure 3-5)

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Remove lower guage port cap and install the pressure guage assembly.
3. Remove the red Control Cable wire from terminal #9.
4. Lift work platform and block front wheels off ground.
5. Loosen the locknuts on Counterbalance Valves.
6. With the Chassis Key Switch on **DECK** and the Drive/Lift Switch in **DRIVE**, depress the Foot Switch and slowly pull the Control Lever to **REVERSE** to drive the wheels.
7. Adjust the Forward Counterbalance Valve by turning the adjustment screw until the pressure guage indicates 55 bar (800 psi).
8. Slowly push the Control Lever to **FORWARD** to drive the wheels.
9. Adjust the Reverse Counterbalance Valve by turning the adjustment screw until the pressure guage indicates 55 bar (800 psi).
10. Check the settings by slowly moving the Control Lever **FORWARD**, then **REVERSE**, checking the guage to ensure pressures are properly set. Re-adjust as needed.
11. Tighten locknuts on valves to 8 Nm. Remove blocks and lower work platform to ground.
12. Reconnect the red Control Cable wire to terminal #9.
13. Remove the guage from the guage port and re-install cap.
14. Check for proper operation of the drive system and brake.

## 3.6 Switch Adjustments

### TILT SENSOR

#### Introduction

The Tilt Sensor has three wires; red-power (24v in), black-ground, white-output (24v out). To verify the sensor is working properly, there are two LED's under the sensor; green indicates the sensor is on (has power), red indicates the sensor is level and the white wire is 'hot' (24v out).

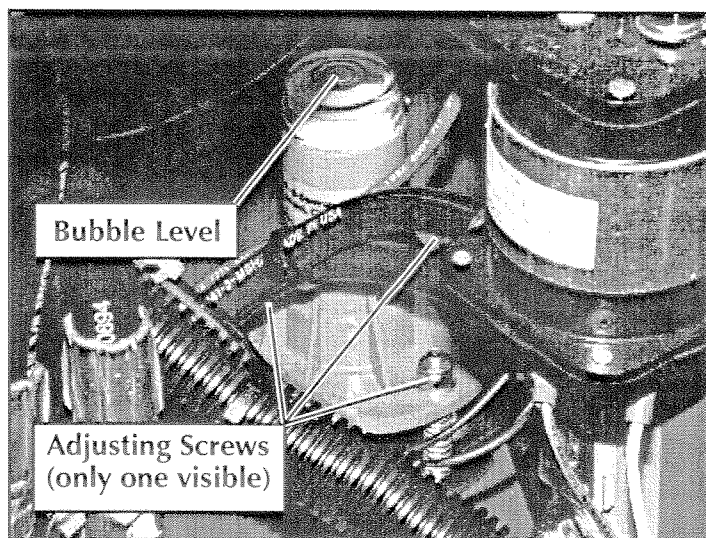


Figure 3-6: Tilt Sensor Adjustment

### Adjustment (Figure 3-6)

1. Place machine on firm level surface  $\pm 1/4^\circ$ .
2. Use the Inclineometer (p/n 010119-000) to ensure front and rear of Chassis is level  $\pm 1/4^\circ$ .
3. Adjust the three leveling screws until the bubble is centered in the circle on the attached bubble level.

### PROPORTIONAL CONTROLLER

To perform the adjustment, the Controller (Control Box) must be opened by removing the two screws at the top corners of the Controller and rotating the top forward to expose the proportional controller.

1. Push Control Lever just far enough to illuminate the **PWM** LED indicator.
2. Set the 'Lo' pot so the motor turns on when the LED lights up but the machine does not move.
3. Select **LIFT** with Drive/Lift Switch and elevate Platform 152 mm (6 in).
4. Select **DRIVE** with Drive/Lift Switch.
5. Push Control Lever fully to **FORWARD** or **REVERSE** and check that machine speed is 6.1 m (20 Ft.) in 18-22 seconds.
6. Adjust 'Mid' trimpot if required, turning clockwise increases speed.
7. Lower platform fully.
8. Push Control Lever to **FORWARD** or **REVERSE** and check that machine speed is 6.1 m (20 Ft.) in 5-5 seconds.
9. Adjust 'Hi' trimpot if required.

### 3.7 Hydraulic Manifold (figure 3-5)

Though it is not necessary to remove the manifold to perform all maintenance procedures, a determination should be made as to whether or not the manifold should be removed before maintenance procedures begin.

#### REMOVAL

1. Remove the battery ground cable.
2. Tag and disconnect the solenoid valve leads from the terminal strip.
3. Tag, disconnect, and plug hydraulic hoses.
4. Remove the filter.
5. Remove the locknuts, jam nut and bolts that hold the manifold to the mounting bracket.
6. Remove manifold block.

#### DISASSEMBLY

**NOTE:** Mark all components as they are removed so as not to confuse their location during assembly. Refer to Figure 3-5 often to aid in disassembly and assembly.

1. Remove coils from solenoid valves.
2. Remove spool valve covers and spool valves.
3. Remove solenoid valves, relief valves, and counterbalance valves.
4. Remove fittings, plugs, springs, balls, and orifices.

#### CLEANING AND INSPECTION

1. Wash the manifold in cleaning solvent to remove built-up contaminants and then blow out all passages with clean compressed air.
2. Inspect the manifold for cracks, thread damage and scoring where O-rings seal against internal and external surfaces.
3. Wash and dry each component and check for thread damage, torn or cracked O-rings and proper operation.
4. Replace parts and O-rings found unserviceable.

#### ASSEMBLY

**NOTE:** Lubricate all O-rings before installation to prevent damage to O-rings. Seat all balls in manifold block by lightly tapping on the ball with a brass drift.

1. Install fittings, plugs, springs, balls, and orifices. Use one drop of Locktite #242 on each screw-in orifice.

2. Install counterbalance valves, relief valves, solenoid valves and spool valves.

**NOTE:** Refer to Table 3-2 for the proper torque values when installing any hydraulic component.

3. Install coils on solenoid valves.

#### INSTALLATION

**NOTE:** Refer to Table 3-2 for hydraulic component torque specifications.

1. Attach manifold assembly to mounting brackets with bolts, washers, and locknuts.
2. Connect solenoid leads to terminal strip (as previously tagged).
3. Connect hydraulic hoses. Be certain to tighten hoses to manifold.
4. Install oil filter.
5. Operate each hydraulic function and check for proper function and leaks.
6. Adjust all hydraulic pressures according to instructions in Section 3.5.



1. Valve Block
2. Front Bracket
3. Rear Bracket
4. Filter Adapter
5. Proportional Valve Block
- 6.
7. Proportional Valve
8. Drive Plug, 9mm
9. Steering Valve
10. Forward/Reverse Valve
11. Plug
12. Ball, 11mm (7/16 in.)
13. Steering Relief Cartridge
14. Relief Cartridge
15. Counterbalance Valve
16. Gauge Connector
17. Drive Plug, 10mm
18. Spring
19. Drive/Lift Valve
20. Spring
21. Plug, #6
22. Plug, #4

23. Plug, Soc. Hd.
24. Fitting
25. Fitting
26. Fitting
27. 90° Elbow Fitting
28. 90° Elbow Fitting
29. 90° Elbow Fitting
30. 90° Elbow Fitting
- 31.
32. Tee Fitting
33. Filter
34. Ball, 8mm (5/16 in.)
- 35.
36. O-ring
37. Washer, 1/4 Flat
38. Locknut, 1/4
39. Screw, 1/4 x 4
40. Brake Orifice
41. Tee Fitting
42. Fitting
43. 90° Elbow Fitting
44. Fitting
45. Screw, 1/4 x 3 3/4
46. Screw, 10-24 x 2

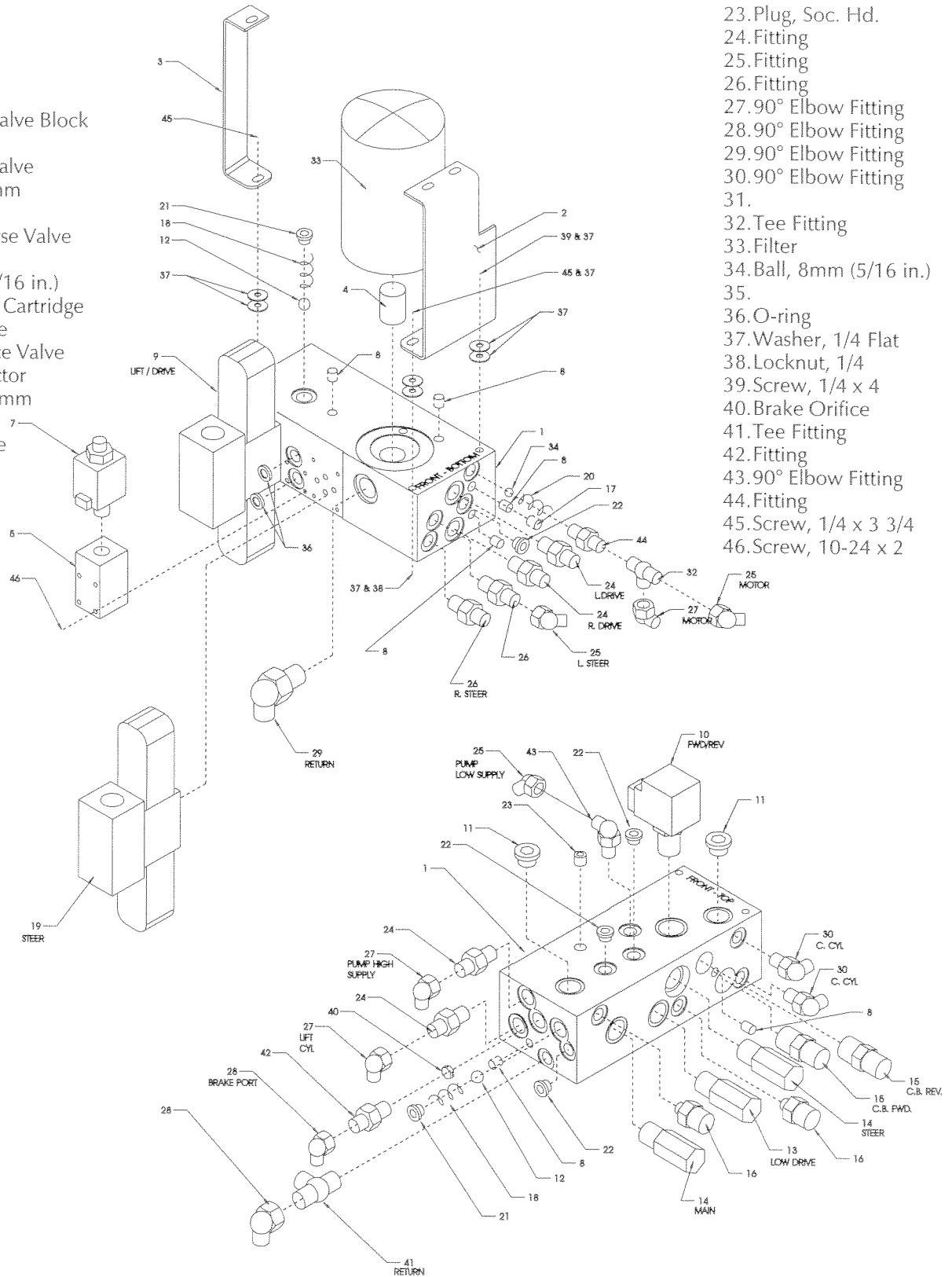


Figure 3-7: Hydraulic Manifold, Exploded View

## 3.8 Hydraulic Pump (figure 3-8)

### REMOVAL

**NOTE:** If the hydraulic tank has not been drained, suitable means for plugging the hoses should be provided to prevent excessive fluid loss.

1. Mark, disconnect and plug the hose assemblies.
2. Loosen the capscrews and remove the pump assembly from the motor.

### INSTALLATION

1. Lubricate the pump shaft with general purpose grease and attach the pump to the motor with the capscrews.
2. Using a crisscross pattern, torque each capscrew a little at a time until all capscrews are torqued to 27 Nm (20 Ft/Lbs).
3. Unplug and reconnect the hydraulic hoses.
4. Check the oil level in the hydraulic tank before operating the work platform.

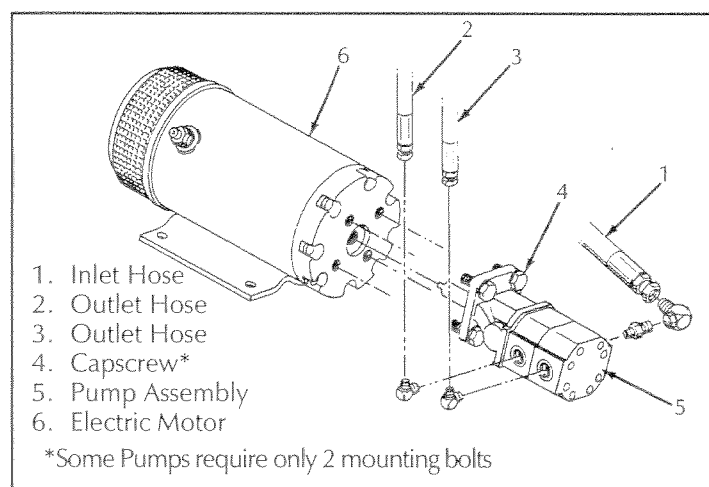


Figure 3-8: Hydraulic Pump

## 3.9 Hydraulic Drive Motors and Hubs (figure 3-9)

### REMOVAL

1. Use a 1000 Kg (one ton) capacity jack to raise the front of the machine. Position blocks under the machine to prevent the work platform from falling if the jack fails.
2. Block the rear wheels to prevent the machine from rolling.
3. Remove the cotter pin, nut, and washer.
4. Remove the wheel.

**NOTE:** Before disconnecting hoses, thoroughly clean off all outside dirt around fittings. (After disconnecting hoses and before removing from vehicle, IMMEDIATELY plug port holes.)

5. Tag, disconnect and plug the hose assemblies to prevent foreign material from entering.
6. Remove the roll pin, securing the pivot pin to the steering arm on the wheel yoke, by driving it through the steering arm with a punch.
7. Support the drive motor/wheel yoke assembly and remove the retaining ring at the top of the wheel yoke pivot. Remove the drive motor/wheel assembly from the machine.
8. Remove the locknuts, flat washers, capscrews and drive motor from the wheel yoke.

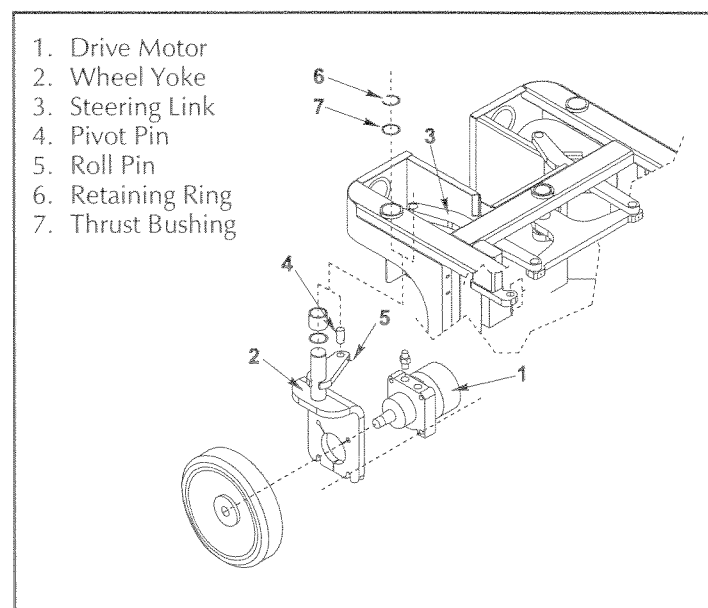


Figure 3-9: Drive Motor Installation



## INSTALLATION

1. Position the drive motor in the wheel yoke and secure with capscrews, flat washers and locknuts.
2. Install the drive motor/wheel yoke assembly into the pivot bearing along with the lower thrust washer, thrust bushing, and retaining ring.
3. Install the pivot pin in the wheel yoke steering arm and steering link and secure with a new roll pin.
4. Remove the plugs from the hose assemblies and connect to the drive motor.
5. Install the shaft key, wheel, washer and slotted nut. Torque the locknut to 102 Nm (75 Ft/Lbs). Install a new cotter pin. **DO NOT** back-off the nut to install cotter pin.
6. Remove blocks, lower the jack and remove. Operate the drive system and check for leaks.

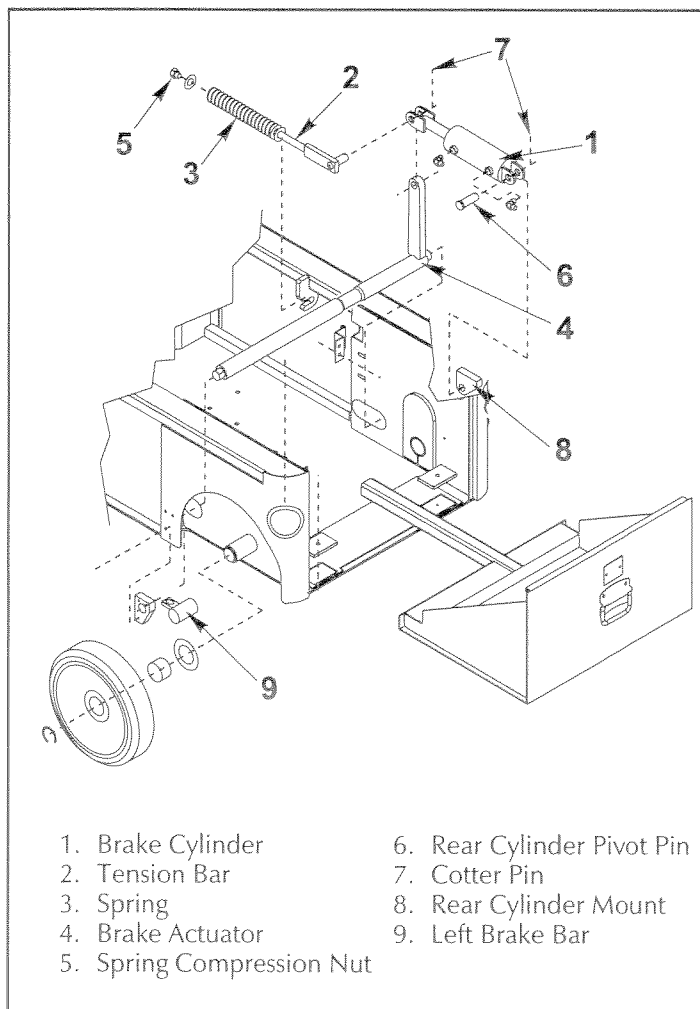


Figure 3-10: Brake Cylinder Installation

## 3.10 Brake Cylinder (figure 3-10 & 3-11)

The Brake Cylinder and the Steering Cylinder are the same unit. Refer to the Steering Cylinder section for rebuilding information.

The brake cylinder is located inside the right rear chassis wall above the wheel.

## REMOVAL

1. Block the wheels to prevent the work platform from rolling when the brake is removed.
2. Use a 1000 Kg (one ton) capacity jack to raise the rear of the machine. Position blocks under the machine to prevent the work platform from falling if the jack fails.
3. Block the front wheels to prevent the machine from rolling.
4. Remove the spring compression nut and flat washer from the tension bar.
5. Remove the retaining ring and right rear wheel.
6. remove the cotter pin and pivot pin from the rear cylinder mount.
7. Remove the cotter pin from the tension bar pivot allowing the cylinder to be lowered.
8. Disconnect the hose assemblies and cap the openings to prevent foreign material from entering.
9. Remove the cylinder from the chassis.

## INSTALLATION

1. Connect the hose assemblies.
2. Install the tension bar pivot through the cylinder clevis and brake actuator and secure with a new cotter pin.
3. Install the pivot pin through the cylinder mounting tabs and rear cylinder mount and secure with a new cotter pin.
4. Install the wheel and retaining ring.
5. Install the flat washer and spring compression nut on the tension bar. Tighten the nut until at least flush with the tension bar shaft or until the brake bar has full engagement with the tire.
6. Lower the machine and operate the drive circuit and check that the brake bars retract and clear the tires when driving and fully engage the tires when stopped. Check for leaks

## 3.11 Steering Cylinder (figure 3-11)

### REMOVAL

1. Mark and disconnect the hose assemblies from the cylinder fittings and immediately cap the openings to prevent foreign material from entering.
2. Remove the cotter pins from the pivot pins.
3. Remove the pivot pins while supporting the cylinder. Remove the cylinder.

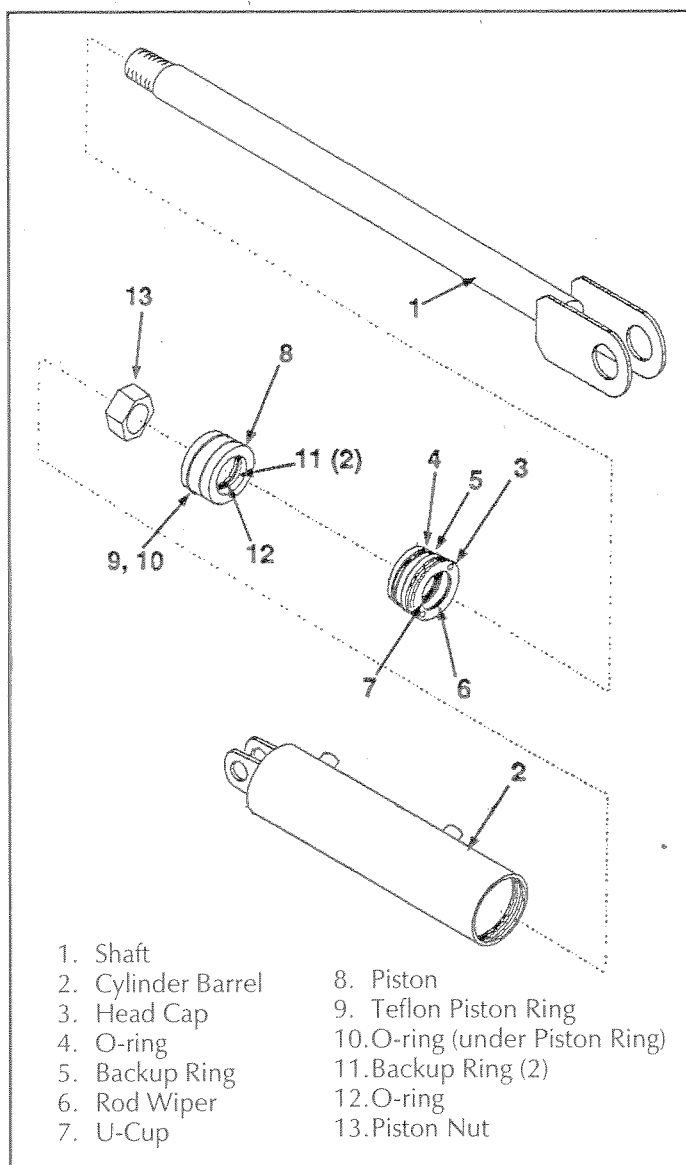


Figure 3-11: Brake and Steering Cylinder

### DISASSEMBLY

1. Unscrew the headcap from the barrel tube.
2. Withdraw the piston and shaft assembly from the barrel tube.
3. Remove the piston nut, piston and headcap.
4. Remove the rod wiper, U-cup, O-ring and backup ring from the headcap and discard the seals.
5. Remove the internal backup rings and O-ring, piston seal and piston rod seal from the piston and discard.

### CLEANING AND INSPECTION

1. Wash all metal parts in cleaning solvent and blow dry with filtered compressed air.
2. Inspect all threaded components for stripped or damaged threads.
3. Check the inside surface of the cylinder barrel for scoring or excessive wear.
4. Check the piston and headcap for scoring or excessive wear.
5. Inspect the surface of the shaft for scoring or excessive wear.

### ASSEMBLY

1. Lubricate and install new rod wiper, U-cup, O-ring and backup ring on the headcap.
2. Install the headcup onto the shaft.
3. Install the new internal backup rings and O-ring, piston seal and piston rod seal on the piston.
4. Install the piston on the shaft and secure with the piston nut, torque to 339 Nm (250 Ft/Lbs).
5. Lubricate the piston seal with clean hydraulic fluid and install the shaft assembly in the cylinder barrel.
6. Screw headcup into cylinder barrel hand tight, then turn 1/4 turn further.

### INSTALLATION

1. Position the cylinder assembly in the chassis and insert pivot pins and secure with new cottor pins.
2. Connect the hose assemblies to the fittings.
3. Operate the steering circuit several times through-out its' entire range of travel to expel trapped air and check for leaks.

## 3.12 Lift Cylinder (figure 3-12 & 3-13)

### REMOVAL (Figure 3-11)

1. Fully lower platform.
2. Provide a suitable container to catch the hydraulic fluid, then disconnect the hydraulic hose. Immediately plug hoses to prevent foreign material from entering.
3. Remove velocity fuse, adapter and fitting from the base of the cylinder.
4. Remove retaining ring securing cylinder to the Chassis.
5. Remove top mast cover.
6. Remove capscrew, washers and locknut securing cylinder rod to the upper cylinder mount.
7. Attach a suitable hoisting device and sling to the cylinder. Carefully remove cylinder by lifting up through the top of the mast.

### DISASSEMBLY (Figure 3-12)

1. Unscrew the headcap and withdraw the rod and piston assembly from the barrel tube.
2. Separate and remove the two part piston and then headcap from the cylinder rod.
3. Remove the O-ring, backup ring, U-cup and rod wiper from the head cap.

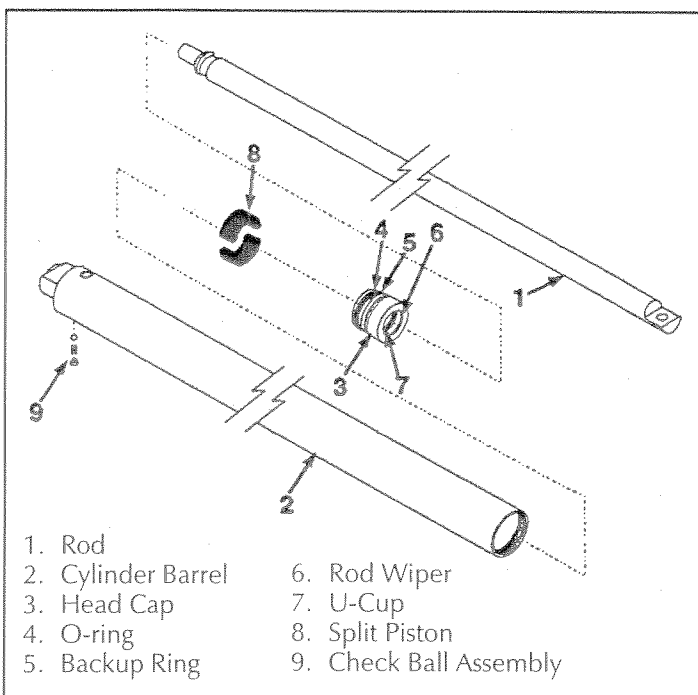


Figure 3-12: Lift Cylinder

4. Remove the check ball assembly from the cylinder barrel. Do not remove the plug unless it has been leaking.

### CLEANING AND INSPECTION

1. Clean all metal parts in solvent and blow dry with filtered compressed air.
2. Check all threaded parts for stripped or damaged threads.
3. Check the bearing surfaces inside of the headcap, outer edges surface of the piston, inside of the cylinder barrel and the shaft for signs of scoring or excessive wear.
4. Replace all seals and O-rings.

### REASSEMBLY (Figure 3-12)

1. Lubricate and install new O-ring, backup ring, U-cup and rod wiper on the head cup.

**NOTE: Multipurpose lubricant should be used.**

2. Install the headcup on the cylinder rod from the piston end.
3. Install the split piston on the rod.
4. Lubricate the piston and install the piston and rod assembly in the barrel tube, making sure the flat in the cylinder rod points in the same direction as the fitting port.
5. Thread the headcap into the barrel tube and hand tighten, then turn 1/4 turn further.
6. Install the check ball assembly, seating the ball with a brass drift before installing the spring and plug.

### INSTALLATION (Figure 3-13)

1. Attach a suitable hoisting device and sling to the cylinder. Carefully lower cylinder through the top of the Mast. The flat in the cylinder rod and fitting port at the base of the cylinder face to the rear of the machine.
2. Secure the base of the cylinder to the Chassis with the retaining ring.
3. Install capscrew, washers and locknut securing cylinder rod to the upper cylinder mount.
4. Install top mast cover.
5. Install velocity fuse, adapter and fitting into the base of the lift cylinder.
6. Unplug hydraulic hose and attach to the velocity fuse.
7. Test with weight at rated Platform load to check system operation. Check for leaks

## 3.13 Mast Assembly (figure 3-13)

### REMOVAL

1. Raise the Platform approximately 76 cm (30 in.) and block the Mast Assembly, see Section 3.2.
2. Attach a suitable hoisting device and sling to the Platform and support the Platform.
3. Tag and disconnect the control cable wires in the Controller and remove the top mast cover.
4. Remove the cable clamp securing the control cable to the Platform and feed the cable into the inner can.
5. Remove Platform chain mounts and lower Platform mast bearings.
6. Pull outer chains up and feed into inner can.
7. Remove the Platform using the hoist by pulling straight up off of the Mast Assembly.
8. Support the next can with the sling and hoisting device.

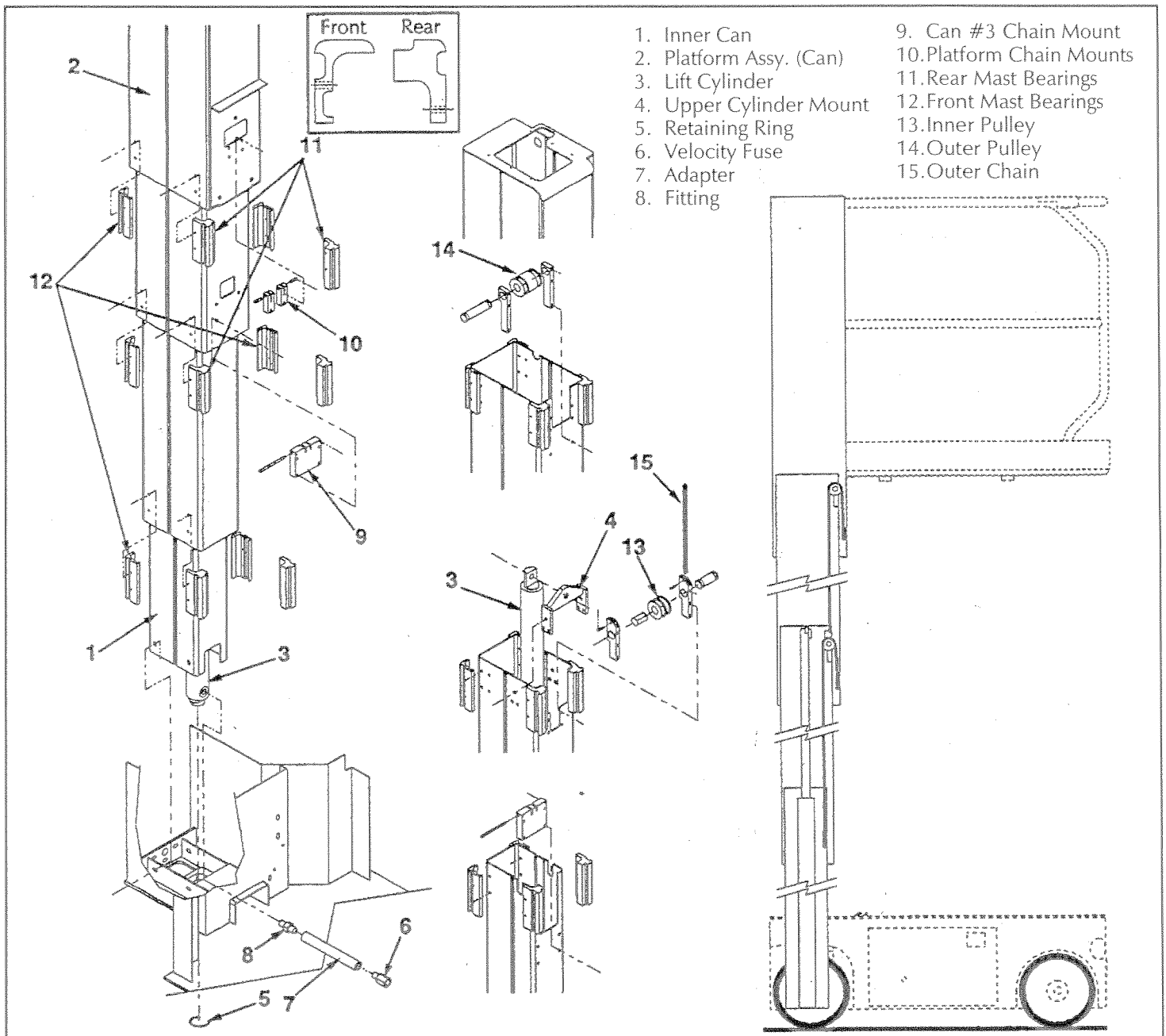


Figure 3-13: Mast Assembly

9. Remove the chain mounts and lower mast bearings.
10. Remove the can with the hoisting device.
11. Support the next can with the sling and hoisting device.
12. Remove capscrew, washers and locknut securing cylinder rod to the upper cylinder mount.
13. Remove the lower mast bearings.
14. Remove the can with the hoisting device.
15. Support the inner can with the sling and hoisting device.
16. Remove locknuts, washers and carriage bolts securing the can to the Chassis.
17. Remove the can with the hoisting device.

## INSTALLATION

1. Using the hoisting device and sling lower the inner can over the lift cylinder (if installed).
2. Secure inner can to the Chassis with the locknuts, washers and carriage bolts.
3. Using the hoisting device and sling, partially lower the next can over the first. Support the can with the sling along with the blocking device used to support the Mast Assembly, see Section 3.2.
4. Install the lower mast bearings, refer to Figure 3-13 to help determine front and rear bearings.

**NOTE: Always use Locktite Primer #770 and Retainer #405 on the capscrews that secure the mast bearings to the masts.**

5. Install capscrew, washers and locknut securing cylinder rod to the upper cylinder mount.
6. Pull the inner chains attached to the inner can up and over the inner pulley.
7. Using the hoisting device and sling carefully lower the third can over the first two
8. Install the lower mast bearings and chain mount.
9. Using the hoisting device and sling carefully lower the Platform Assembly over the three cans.
10. Install the lower mast bearings.
11. Move the outer chains attached to the top of the second can up and over the outer pulley.
12. Install the outer chain mounts.
13. Install the cable clamp securing the control cable to the Platform and pull the cable through the hole in the platform can.
14. Connect the control cable wires to the Controller.
15. Remove the blocking device from the Mast Assembly.

16. Raise and lower the Platform, checking for proper operation and leaks.
17. Install the top mast cover.

## 3.14 Electric Motor (Figure 3-14)

### TROUBLESHOOTING

1. Read the nameplate to become familiar with the motor, especially the rated voltage.
2. Try to turn the shaft by hand. Keep motor leads separated while doing this. If the shaft turns freely go to step 3. If the shaft won't turn, proceed to step 2A.
- 2A. The shaft could be tight for a number of reasons, this check is to determine if the tightness is of a temporary nature only. Obtain power to produce the nameplate voltage. **Do not Make A Permanent Connection.** First touch the motor leads quickly to the power supply just long enough to observe if the shaft runs. If it does turn, then hold the motor leads on the power supply for a longer time. If the motor sounds normal, go to step 3. If the motor sounds noisy, it should be taken apart as described in the disassembly section.
3. If the motor turned freely, connect an ammeter in the circuit as shown in Figure 3-14A. With rated voltage applied and the shaft running free, the ammeter should read less than 20% of the nameplate full load current. If the motor meets the above conditions, then it can be assumed the original problem is external to the motor.

### DISASSEMBLY

1. Remove thru bolts.
2. Remove pulley end cover.
3. Pull the armature out of the assembly in one swift motion.
4. Remove commutator end cover.

**NOTE: Do not place the stator ring in any mechanical holding device during the disassembly or assembly operation. Permanent distortion or other damage will result.**

### INSPECTION

Once the motor has been disassembled, go through the following check-list steps to determine where the problem lies.

1. Bearings should spin smoothly and easily and have ample lubrication and be free of corrosion.

2. Armature should be checked for grounds and shorted turns. Re-finish commutator surface if pitted or excessively worn.
3. Brushes should be checked for wear and to ensure that they are free in the brush holders.

**NOTE: Observe how brushes are assembled in brush holders and position of brush lead. New brushes must be installed in the same manner. Brushes should be removed as follows:**

- Remove brush spring clip from its mounting on brush assembly.
  - Lift brush assembly from brush holder.
  - Disconnect brush assembly lead.
  - New brush assembly to be installed by reversing above procedure.
4. Inspect wire harness and all connections for signs of damage due to overheating.
  5. Check stator to see if it is securely mounted.

## REASSEMBLY

1. Install new brushes and be sure they are free in the holder. Install brush with the lead wires positioned as when received. Raise all brushes to the locked position. (See Figure 3-14B and step 3 in the Inspection section).
2. Place commutator cover on a work bench with brush assembly facing upward.
3. Place the bearing spring into the bearing bore.
4. Take a complete armature assembly, including bearings, and insert commutator end bearing into the bearing bore.

**NOTE: Do not re-use bearings which have been removed from armature shaft. Keep assembly in a vertical position. Use extreme care not to damage armature with bearing pullers. New bearings should be installed by pressing inner race of bearing onto proper position on armature shaft.**

5. Set the brushes to final position as shown in Figure 3-14B.
6. Place the complete stator down over the vertical armature, and into position on the commutator cover.
7. The stator assembly must be placed in a definite relationship with the commutator covers in order to obtain a neutral brush setting. There is a match-mark on both items. **These two marks must line up exactly. Rotate until they do.**
8. Assemble the pulley end cover in the proper relationship. Insert mounting bolts and tighten alternately to ensure a good mechanical alignment.
9. Spin the shaft by hand to see if it is free. Be sure motor leads (if used) are not touching together. If the leads are touching, a generator action will give the effect of friction in the motor. A no-load test can now be performed. At rated voltage, observe the no-load current. It should be less than 20% of the nameplate full load current. Anything higher indicates:
  - Brushes are not on neutral setting (check match-marks for exact alignment).
  - Faulty armature.

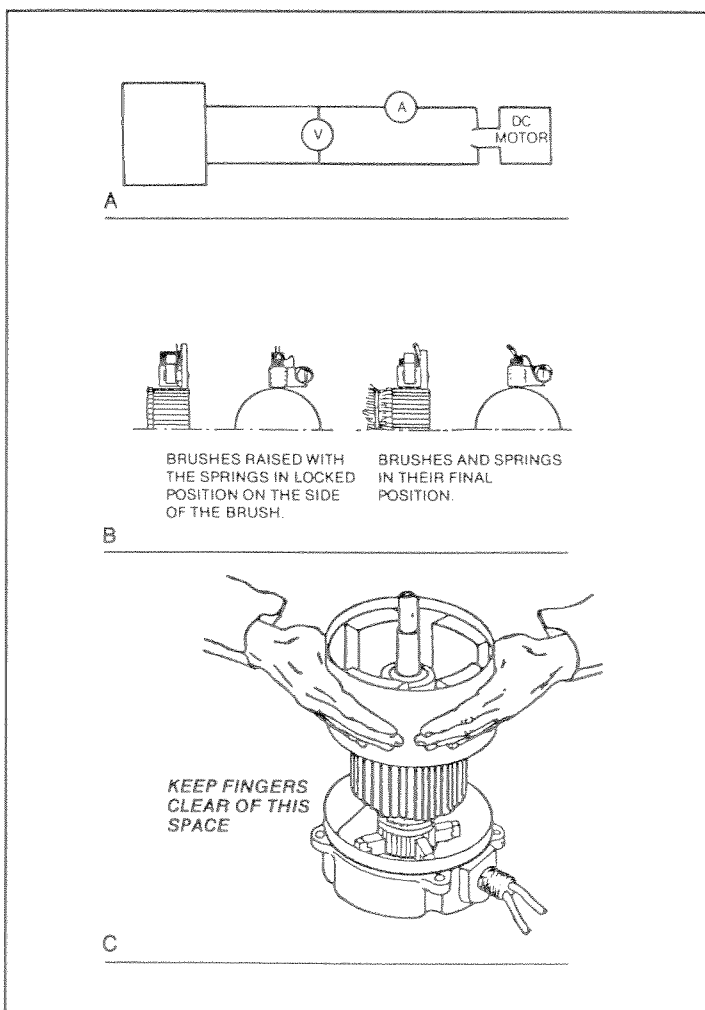


Figure 3-14: Electric Motor Service

## 3.15 Torque Specifications

### HYDRAULIC COMPONENTS

Use the following values to torque hydraulic components used on UpRight Work Platforms.

**Note:** Always lubricate threads with clean hydraulic oil prior to installation.

Table 3-2: Hydraulic Component Torque

TYPE: SAE PART SERIES	CARTRIDGE POPPET (Ft/Lbs Nm)	FITTINGS (Ft/Lbs Nm)	HOSES (In/Lbs Nm)
#4	N/A N/A	N/A N/A	135-145 15-16
#6	N/A N/A	10-20 14-27	215-245 24-28
#8	25-30 34-41	25-30 34-41	430-470 49-53
#10	35-40 47-54	35-40 47-54	680-750 77-85
#12	85-90 115-122	85-90 115-122	950-1050 107-131
#16	130-140 176-190	130-140 176-190	1300-1368 147-155

### FASTENERS

Use the following values to torque fasteners used on UpRight Work Platforms unless a specific torque value is called out for the part being installed.

Table 3-3: Bolt Torque

THREAD SIZE <small>American National Standard-UNF (fine)</small>	WIDTH ACROSS FLATS	TORQUE VALUE	
		ENGLISH	METRIC
1/4	7/16	110 In/Lbs	12 Nm
5/16	1/2	190 In/Lbs	22 Nm
3/8	9/16	30 Ft/Lbs	41 Nm
7/16	5/8	50 Ft/Lbs	68 Nm
1/2	3/4	75 Ft/Lbs	102 Nm
5/8	15/16	150 Ft/Lbs	203 Nm
3/4	1 1/8	250 Ft/Lbs	339 Nm
7/8	1 5/16	400 Ft/Lbs	542 Nm
1	1 1/2	600 Ft/Lbs	813 Nm

Spool Valve and Subplate (DO1 & DO4) fasteners: 7 Nm (50 In/Lbs).

Coil nuts: 3 Nm (30 In/Lbs).

### Notes:

NOTES:



## 4.0 Introduction

Tables 4-1 and 4-2 contain troubleshooting Truth Tables for the TM12 Work Platform. These tables are to be used in conjunction with the Electrical and Hydraulic Schematics in Section 6. Identify the symptom the machine exhibits and locate the corresponding components that may be the source of the problem.

## GENERAL PROCEDURE

Troubleshooting should be carried out in two steps. First, thoroughly study both hydraulic and electric schematics to determine possible causes. Loose terminal connections and short circuits are always a potential cause when troubleshooting. Second, check suspect components electrically, hydraulically and mechanically to determine if they are at fault.



### **WARNING**



When troubleshooting, ensure that the work platform is resting on a firm, level surface.

When performing any service on, or in the Elevating Assembly area, which requires the Platform to be raised, the Elevating Assembly must be blocked.

Unplug the machine or disconnect the batteries ground cable when replacing or testing the continuity of any electrical component.

# Troubleshooting

Component	Function	Lower Controls	Upper Controls	Raise Platform	Lower Platform	Drive Forward	Drive Reverse	Steer Right	Steer Left	Tilt Alarm ALM2	Down Alarm ALM1	Battery Charger
Battery BAT		X	X									X
15 Amp Circuit Breaker CB		X	X	X	X	X	X	X	X	X	X	
Controller CONT		X	X	X	X	X	X	X	X			
Diode D1								X		X		
Diode D2										X		
Diode D3						X						
Diode D4										X		
Diode D5			X							X		
Diode D6								X				
Diode D7									X			
Diode D8				X								
Diode D9										X		
Diode D10											X	
Diode D11											X	
175 Amp Fuse FU		X	X	X	X	X	X	X	X	X	X	X
Limit Switch, Down LS1					X						X	
Electric Motor MOT		X	X	X	X	X	X	X	X			
Motor Start Relay R1				X	X	X	X	X	X			X
Down Alarm Relay R2											X	
Tilt Sensor Power Relay R3										X		
Platform Down Relay R4				X	X	X	X	X	X	X		
Tilt Alarm Relay R5						X						
Up/Forward Relay R6				X		X						
Down/Reverse Relay R7						X	X					
Proximity Relay R8				X		X	X					
Tilt Sensor SEN1				X	X	X	X	X	X	X		
Right Steer Solenoid SOL1								X				
Left Steer Solenoid SOL2									X			
Drive Solenoid SOL3						X						
Reverse Solenoid SOL4							X					
Lift Solenoid SOL5				X								
Down Solenoid SOL6					X							
Proportional Solenoid SOL7				X	X	X	X					
Emergency Stop Switch (Chassis) SW1		X	X	X	X	X	X	X	X			
Selector Key Switch (Chassis) SW2		X	X	X	X	X	X	X	X			
Emergency Stop Switch (Controller) SW3		X	X	X	X	X	X	X	X			
Foot Switch SW4		X	X	X	X	X	X	X	X			
Drive/Lift Switch SW5				X	X	X	X					
Lift Switch (Chassis) SW6				X								
Proximity Switch SW7				X		X						

Table 4-1: Truth Table - Electrical Schematic

# Troubleshooting

## Section 4.2

Component	Function	Raise Platform	Lower Platform	Steer Right	Steer Left	Drive Forward	Drive Reverse	Brakes
Low Drive Check Valve CV1				X	X	X		X
High Drive Check Valve CV2						X		
Drive Make-up Check Valve CV3						X	X	
Steering Cylinder CYL1				X	X			
Brake Cylinder CYL2								X
Lift Cylinder CYL3	X							
Cushion Cylinder CYL4						X	X	
Filter FL1	X	X	X	X	X	X	X	X
Suction Screen Filter FL2	X	X	X	X	X	X	X	X
Drive Motor MOT1						X	X	
Drive Motor MOT2						X	X	
Brake Orifice ORF1								X
Down Orifice ORF2		X						
Down Orifice ORF3		X						X
Cushion Cylinder Orifices ORF4,5						X	X	
Flow Control Orifice ORF6	X	X						
Duplex Pump PMP	X	X	X	X	X	X	X	X
Lift Relief Valve RV1	X					X	X	
Low Drive Relief Valve RV2	X					X	X	
Steering Relief Valve RV3				X	X			
Steering Valve V1				X	X			
Forward Counterbalance Valve V2						X		
Reverse Counterbalance Valve V3							X	
Drive/Lift Valve V4	X					X	X	
Forward/Reverse Valve V5						X	X	
Proportional Valve V6	X					X	X	
Velocity Fuse V7	X	X						
Down & Emergency Lowering Valve V8	X	X						

Table 4-2: Truth Table - Hydraulic Schematic

*Notes:*

## 5.0 Introduction

This section contains electrical and hydraulic power schematics, and associated information for maintenance purposes.

The diagrams are to be used in conjunction with Table 4-1: Troubleshooting Guide. They allow understanding of the makeup and functions of the systems for checking, tracing, and faultfinding during troubleshooting analysis.

The components that comprise the electrical and hydraulic systems are given a reference designation and are explained as to function and location in the following tables.

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Figure 5-4: Hydraulic Schematic .....	5-5
Figure 5-5: Hydraulic Manifold & Cylinder Valve Assy ....	5-5

## 5.1 Electrical Schematic

Table 5-1: Electrical Schematic Legend (065416-002)

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm, Down	Provides warning sound (60 Hz) when the Platform is lowering.	Inside electrical box on right door. Red wire for 60Hz.
ALM2	Alarm, Tilt	Provides warning sound (600 Hz) when platform is on elevated slopes of 2° side to side and 2° fore and aft.	Inside electrical box on right door. White wire for 600 Hz.
BAT	Batteries (4), 6 volts each	Energy storage	Slide-out tray at rear of chassis.
CB	Fuse, 15 Amp Circuit Breaker	Overload protection for electric motor	
CONT	Controller, Proportional  &  Switch, Steering	Supplies power to; Motor Start Relay circuit at T2 & T9, Up/Forward & Down /Reverse Relays, and Proportional Coil. Supplies power to either Right or Left Steer Valve Solenoids	Platform Controller right center.  Top of Controller Joystick.
D1	Diode	Supplies power to Motor Start Circuit, from Steer Right Circuit.	On Fanning Strip between terminals T1 & T2.
D2	Diode	Supplies power to Motor Start Circuit, from Steer Left Circuit.	On Fanning Strip between terminals T3 & T2.
D3	Diode	Provides power to Drive Coil from Reverse Circuit.	On Fanning Strip between terminals T6 & T4.
D4	Diode	Provides power to Motor Start Circuit from Lift Circuit.	On Fanning Strip between terminals T7 & T2.
D5	Diode	Provides power to Controller for high speed lift.	On Fanning Strip between terminals T7 & T9.
D6-D8	Diodes	Protects diodes 1,2 & 5 from voltage spikes.	On Fanning Strip
D9	Diode	Provides power to Tilt Alarm.	Inside electrical box.
D10-D11	Diodes	Provide power to Down Alarm	Inside electrical box.
FU	Fuse, 175 Amp	Overload protection for electric motor	Inside right chassis door under Motor Start Relay.
LS1	Switch, Down Limit	Provides power to Platform Down Relay when platform is down.	Behind Mast Assembly on Chassis.
MOT	Motor, Electric	Provides power to Drive Hydraulic Pump.	Center right of Chassis Module.
MTR	Meter, Low Voltage/Hour	Shows state of charge of Batteries and hours machine has operated.	Chassis Control Panel.
R1	Relay, Motor Start	Connects Batteries to Motor.	Inside right Chassis Door. Mounted on front bulkhead.

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
R2	Relay, Down Alarm	Energized with Down Coil, relay provides power to Down Alarm from down circuit and prevents Motor Start Relay from closing.	Middle relay in Electrical Box
R3	Relay, Tilt Sensor Power	Supplies power to Tilt Sensor.	Relay closest to center of machine in electrical box.
R4	Relay, Platform Down	Energized when Platform is down, cuts power to Tilt Sensor circuit and provides power to Motor Start Relay.	Relay closest to rear of machine in electrical box.
R5	Relay, Tilt Alarm	Energized by Tilt Sensor when level, provides power to Motor Start Relay when elevated. When machine is not within 2° of level, Motor Start Relay circuit opens and power is provided to Tilt Alarm.	Relay closest to outside of machine electrical box.
R6	Relay, Up/Forward	When energized by Controller, provides power to Drive Lift Switch.	Controller
R7	Relay, Down/Reverse	When energized by Controller, provides power to Drive Lift Switch.	Controller
R8	Relay, Proximity Switch	Energized by Proximity Switch.	
SEN1	Sensor, Tilt	Cuts power to Tilt Alarm Relay (R5) when Platform is on slopes of 2° side to side and 2° fore and aft to activate Tilt Alarm.	Right front of Chassis Module.
SOL1	Solenoid, Right Steer (coil)	Shifts Steer Valve to <b>RIGHT</b> turn position	Top end of Spool Valve mounted towards front of machine.
SOL2	Solenoid, Left Steer (coil)	Shifts Steer Valve to <b>LEFT</b> turn position	Bottom end of Spool Valve mounted towards front of machine.
SOL3	Solenoid, Drive (coil)	Shifts Drive/Lift Valve to Drive position	Bottom end of Spool Valve mounted towards rear of machine.
SOL4	Solenoid, Reverse (coil)	Opens Reverse Valve	Top of Manifold Block towards front of machine.
SOL5	Solenoid, Lift (coil)	Shifts Drive/Lift Valve to lift position.	Top end of Spool Valve mounted towards rear of machine.

Table 5-1: (cont'd.)

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
SOL6	Solenoid, Down (coil)	Opens Down Valve	Inside right chassis door towards rear of machine.
SOL7	Solenoid, Proportional (coil)	Opens Proportional Valve.	Left side of Manifold Block, between Drive/Lift and Steering Valves.
SW1	Switch, Chassis Emergency Stop Button.	Control Circuit shut-off	Chassis Control Panel.
SW2	Switch, Chassis Selector (Key Switch)	Provides power to either the Chassis Controls or the Controller.	Chassis Control Panel.
SW3	Switch, Controller Emergency Stop Button.	Control Citcuit shut-off.	Platform Controller, bottom left.
SW4	Switch, Foot	Supplies power to Controller.	Platform deck.
SW5	Switch, Drive/Lift Selector.	Supplies power to Drive and Reverse, or Up and Down Valve coils.	Controller bottom right.
SW6	Switch, Chassis Lift	Provides power to either Up or Down circuits.	Chassis Control Panel.
SW7	Switch, Proximity	Provides power to Up/Forward Relay.	Controller
SW8	Switch, Up Limit	Stops platform at predetermined height.	Second mast section.

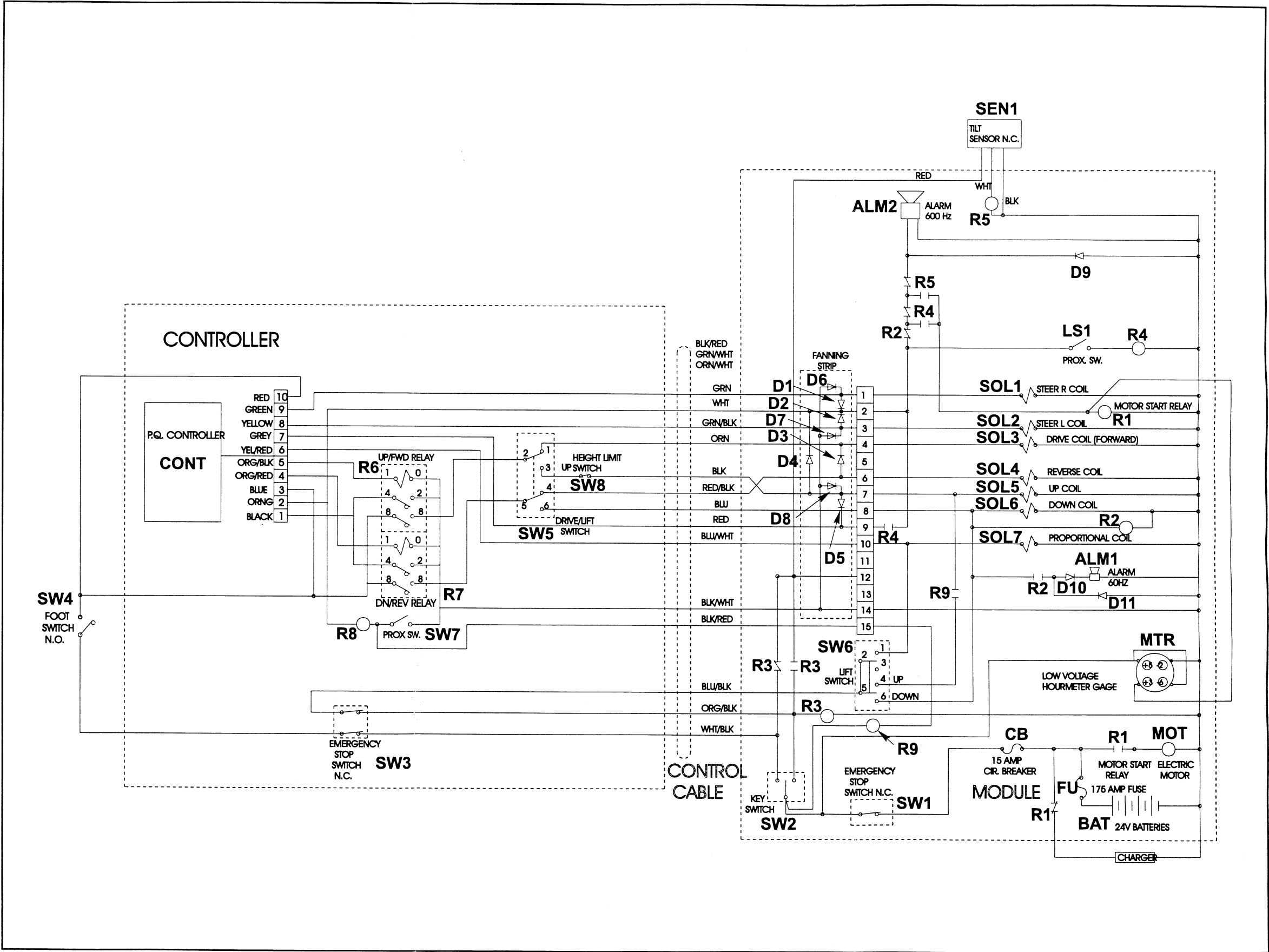


Figure 5-1: Electrical Schematic (065416-002)

## 5.3 Hydraulic Schematic

Table 5-2: Hydraulic Schematic Legend (065415-001)

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve, Low Drive	Prevents oil from second side of pump from entering first side circuit	Under plug at upper right corner on rear of Manifold Block.
CV2	Check Valve, High Drive	Prevents oil from first side of pump from entering second side circuit	Under plug on bottom of Manifold Block.
CV3	Check Valve, Drive Make-up	Supplies extra oil when required by Drive Motors, during steering	Under fitting at lower right corner on front of Manifold Block.
CYL1	Cylinder, Steering	Provides force to turn front wheels	Inside Chassis Module through left door.
CYL2	Cylinder, Brake	Stops machine from moving while parked	Right rear wheel well.
CYL3	Cylinder, Lift	Provides force to lift Platform.	Inside the Mast Assembly.
CYL4	Cylinder, Cushion	Provides smooth starting and stopping when driving.	Front center of Chassis Module on bulkhead.
FL1	Filter	Filters oil returning to Tank.	Bottom of Manifold Block.
FL2	Suction Screen	Traps particles in Hydraulic Tank.	Inside Hydraulic Tank at outlet.
MOT1	Drive Motor	Provides tractive effort for work platform.	On left front Steering Spindle.
MOT2	Drive Motor	Provides tractive effort for work platform.	On right front Steering Spindle.
ORF1	Orifice, Brake	Delays the engagement of the Brake Cylinder.	Under center fitting on rear of Manifold Block.
ORF2	Orifice, Down	Controls the platform rate of descent.	Under top left fitting on Cylinder Valve Assembly.
ORF3	Orifice, Down	Controls the platform rate of descent.	Under top middle fitting on Cylinder Valve Assembly.
ORF4,5	Orifice, Cushion Cylinder	Controls drive cushion rate.	Inside each end of Drive Cushion Cylinder.
ORF6	Flow Control, Lift	Controls elevation rate of Platform.	Bottom of cylinder Valve Assembly.
PMP	Duplex Pump	Supplies hydraulic oil flow for all functions.	On electric motor at center right of Chassis Module.

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
RV1	Valve, Lift Relief	Provides over pressure protection to second side of Pump and limits Platform lifting capacity.	Right side of Manifold Block, upper left corner.
RV2	Valve, Low Drive Relief	Provides over pressure protection to first side of Pump when driving.	Right side of Manifold Block, lower center.
RV3	Valve, Steering	Provides over pressure protection to first side of Pump and steering components when steering	Right side of Manifold Block, upper center.
V1	Valve, Steering	Provides directional control for Steering Cylinder.	Left side of Manifold Block, towards front.
V2	Valve, Forward Counterbalance	Prevents machine from running away on slopes and cushions stops.	Right side of Manifold Block, near lower right corner.
V3	Valve, Reverse Counterbalance	Prevents machine from running away on slopes and cushions stops.	Right side of Manifold Block, near upper right corner.
V4	Valve, Drive/Lift	Provides control of oil for Drive or Lift functions.	Left side of Manifold Block, towards rear.
V5	Valve, Forward/Reverse	Provides control of oil for Forward or Reverse drive.	Top of Manifold Block, towards front.
V6	Valve, Proportional	Controls oil flow into Drive and Lift circuits by proportionally dumping oil back to tank.	Left side of Manifold Block, between Steering and Drive/Lift Valves.
V7	Valve, Velocity Fuse	Locks Lift Cylinder if line breaks.	On long adapter at base of Lift Cylinder.
V8	Valve, Down and Emergency Lowering	Allows oil to flow out of Lift Cylinder to Tank, manually operated for Emergency Lowering.	Right side of Cylinder Valve Assembly.



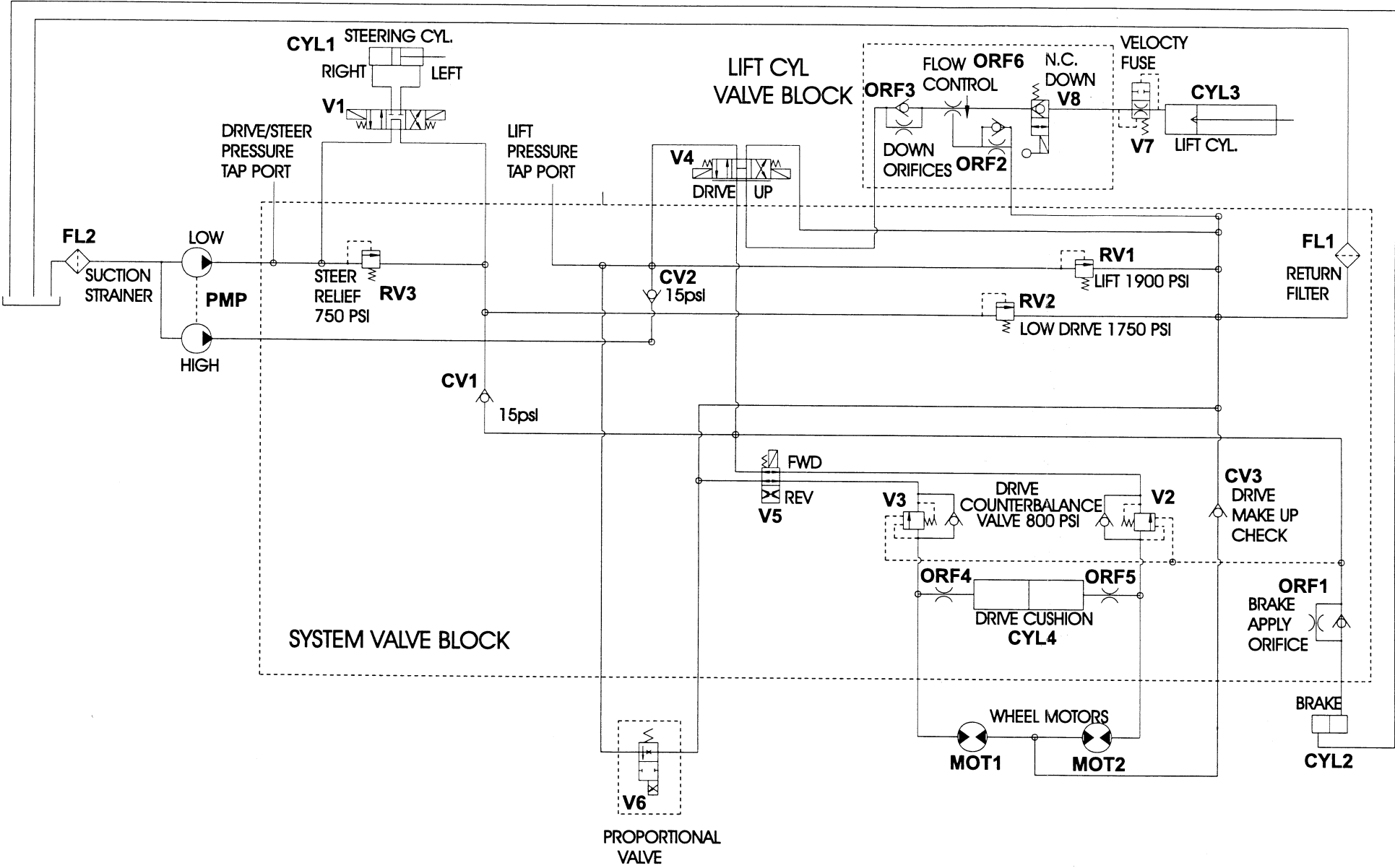


Figure 5-2: Hydraulic Schematic (065415-001)

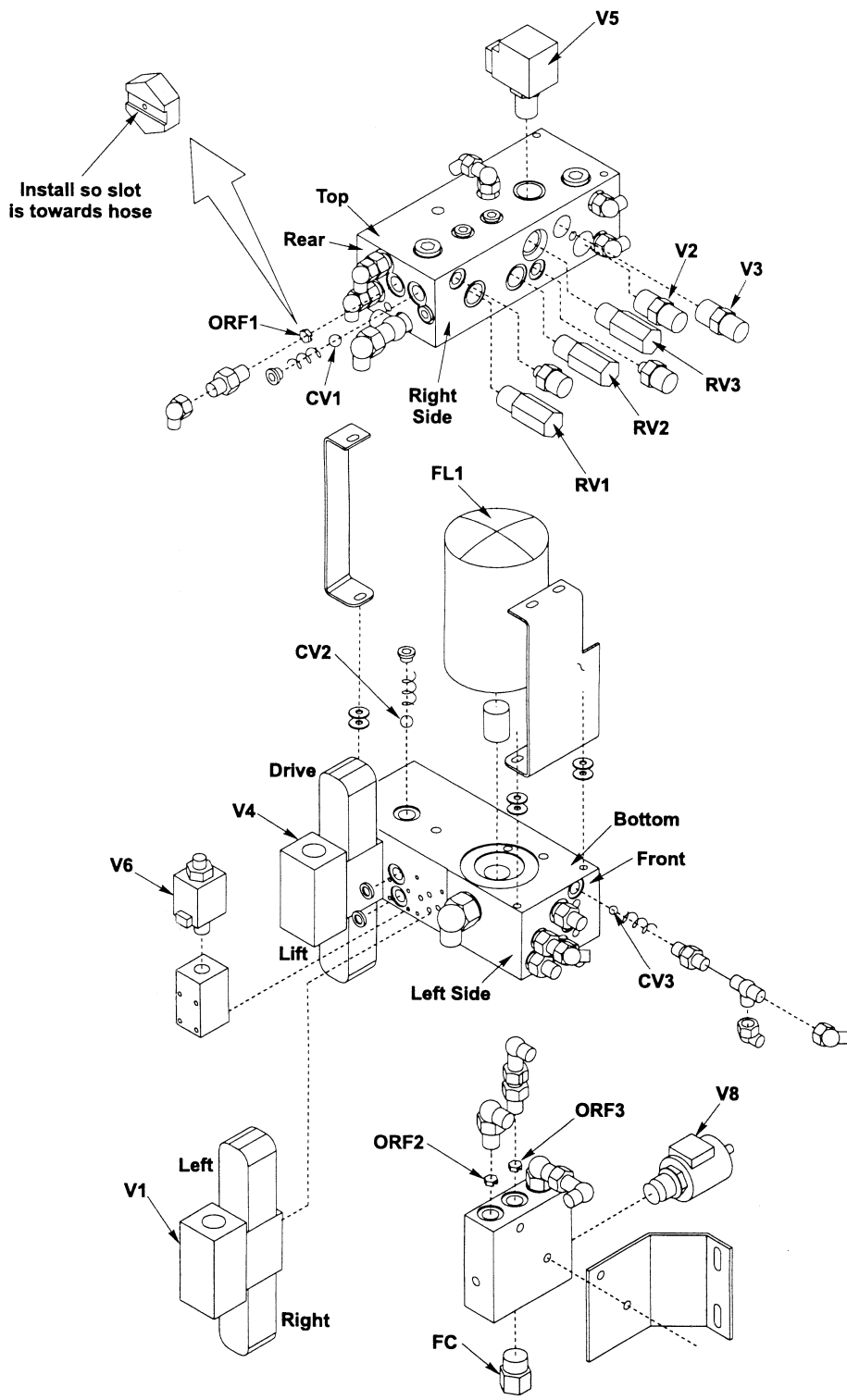


Figure 5-3: Hydraulic Manifold and Cylinder Valve Assembly

## 6.0 Introduction

This section lists and illustrates the replaceable assemblies and parts of the TM12 Work Platform, as manufactured by Upright, Inc.

Each parts list contains the component parts for that assembly indented to show relationship where applicable.

## 6.1 Index

Assembly	Page
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Hose Kit Installation .....	6-23
Control Valve Assembly .....	6-24
Cylinder Valve Assembly .....	6-26

# Illustrated Parts Breakdown

## FINAL ASSEMBLY TM12

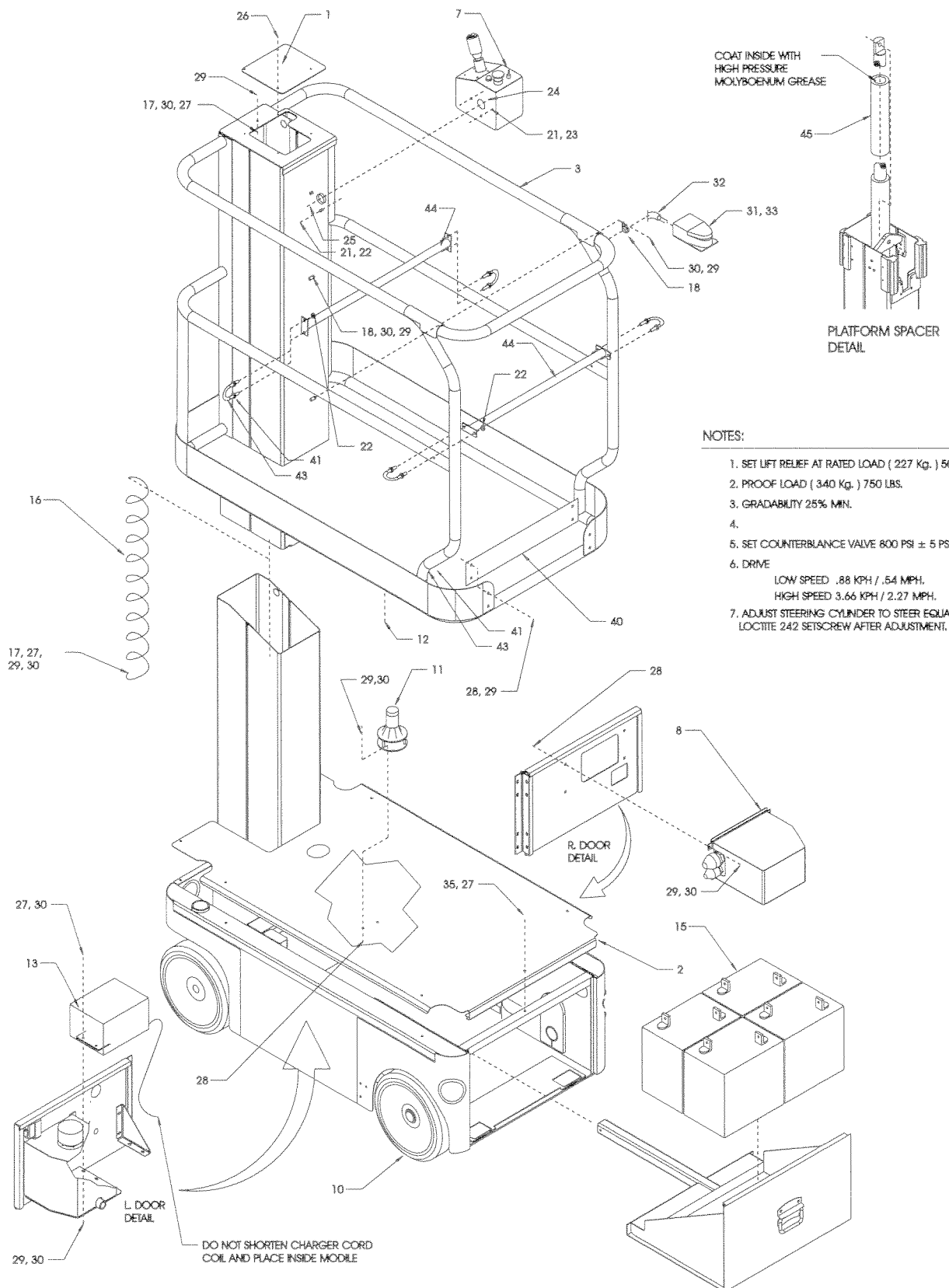
065400-002

ITEM	PART	DESCRIPTION	QTY.
1	065543-000	COVER 4M	1
2	065536-000	TOP COVER	1
3	065580-000	PLATFORM WELDMENT	1
5	065412-004	DECAL KIT INSTL ( NOT SHOWN )	1
6	065411-011	HOSE KIT (NOT SHOWN)	1
7	065410-003	CONTROLLER ASSY	1
8	065408-001	ELEC. BOX ASSY	1
10	065401-001	BASIC ASSY	1
11	029945-013	LEVEL SENSOR	1
12	010080-006	T-CLIP	4
13	063948-002	BATTERY CHARGER	1
15	015796-000	BATTERY 6V	4
16	065409-001	CONTROL CABLE ASSY	1
17	013919-018	CLAMP	4
18	013919-016	CLAMP	2
21	011240-005	WASHER 5/16 STD FLAT	6
22	011248-005	LOCKNUT 5/16-18UNC HEX	10
23	011253-006	SCREW 5/16-18UNC HHC X 3/4	2
24	026616-008	NIPPLE 1 CHASE	1
25	029939-004	LOCKNUT 1 NPT	1
26	013923-004	SCREW #10 SLFTP X 1/2	4
27	011252-006	SCREW 1/4-20UNC HHC X 3/4	11
28	011829-006	BOLT 1/4-20UNC CARRGE X 3/4	18
29	011248-004	LOCKNUT 1/4-20UNC HEX	25
30	011240-004	WASHER 1/4 DIA STD FLAT	18
31	063906-000	FOOTSWITCH	1
32	029490-099	WIRE 16 AWG 2 CONN	FT 5
33	064479-000	FOOTSWITCH GUARD	1
35	014252-004	NUT-SERT 1/4-20 UNC	7
38	065375-000	*CYL TUBE ASSY	1
39	065369-001	*HOSE GUARD X 18	2
40	065589-000	TOEBOARD	1
41	020495-010	NUT JAM HEX 5/16-18	8
42	030768-001	LABEL CE (NOT SHOWN)	1
43	014924-010	U-BOLT 5/16-18	4
44	066594-000	MIDRAIL WELDMENT	2
45	018290-008	TUBE 2 OD X .219 WALL X 8 3/4 LG	1
-	065415-001	HYD SCHM	REF
-	065416-002	ELEC SCHM	REF

\*Not Shown-See Hose Kit

# Illustrated Parts Breakdown

Section  
6.2



## NOTES:

1. SET LIFT RELIEF AT RATED LOAD ( 227 Kg. ) 500 LBS.
2. PROOF LOAD ( 340 Kg. ) 750 LBS.
3. GRADABILITY 25% MIN.
- 4.
5. SET COUNTERBLANCE VALVE 800 PSI  $\pm$  5 PSI
6. DRIVE  
LOW SPEED .88 KPH / .54 MPH.  
HIGH SPEED 3.66 KPH / 2.27 MPH.
7. ADJUST STEERING CYLINDER TO STEER EQUALLY R.H. & L.H.  
LOCTITE 242 SETSCREW AFTER ADJUSTMENT.

FINAL ASSEMBLY,  
TM12  
DRAWING 1 OF 3

# Illustrated Parts Breakdown

## FINAL ASSY TM12

065400-002

ITEM	PART	DESCRIPTION	QTY.
101	062125-048	BATTERY CABLE ASSY 5/16 - 3/8 X 50	1
102	062125-021	BATTERY CABLE ASSY 5/16 - 3/8 X 21	1
103	064195-006	BATTERY CABLE ASSY 5/16 - 5/16 X 6	1
104	064195-014	BATTERY CABLE ASSY 5/16 - 5/16 X 14	1
105	064195-008	BATTERY CABLE ASSY 5/16 - 5/16 X 8	2
106	064195-057	BATTERY CABLE ASSY 5/16 - 5/16 X 57	1
107	029450-099	WIRE 16AWG BLU FT	6.9
108	029451-099	WIRE 16AWG WHT FT	8.9
109	029452-099	WIRE 16AWG BLK FT	5.5
110	029454-099	WIRE 16AWG RED FT	4.4
111	029455-099	WIRE 16AWG BRN FT	7.8
112	029479-099	WIRE 16AWG WHT/BLK FT	1
113	029483-099	WIRE 16AWG RED/WHT FT	4.7
115	063574-099	WIRE 16AWG BLK/WHT FT	7.8
116	062125-007	BATTERY CABLE ASSY 5/16 - 3/8 X 10	1
117	064056-010	FANNING STRIP ASSY	1
118	029825-002	DIODE	3
119	029453-099	WIRE 16AWG ORG FT	4.8
120	005487-099	WIRE 16AWG VIOLET FT	6.6
121	029482-099	WIRE 16AWG GRN/WHT FT	3.7
122	029456-099	WIRE 16AWG YEL FT	2.8
123	029457-099	WIRE 16AWG GRN FT	3.8
124	029475-099	WIRE 16AWG BLU/BLK FT	3.7
125	029478-099	WIRE 16AWG RED/BLK FT	5.8
129	013919-010	CLAMP	1
130	011868-021	BUSHING SNAP	2
133	010154-000	COVER BATTERY TERM.	8
134	029601-013	CONN RING #10 16-14	13
135	029610-001	CONN FORK #6 22-18	43
136	029615-002	CONN FM PUSH .18 16-14	44
137	029620-002	CONN BUTT 16-14	12
138	029601-039	CONN RING 5/16 12-10	1
139	029601-014	CONN RING 1/4 16-14	8
140	029601-021	CONN RING 3/8 12-10	8
142	065409-001	CONTROL CABLE ASSY	REF
144	029601-019	CONN RING 12-10 X #10	1
145	029601-040	CONNRING 16-14 X 5/16	1
146	029601-020	CONN RING 12-10 X 1/4	1

## Section 6.2



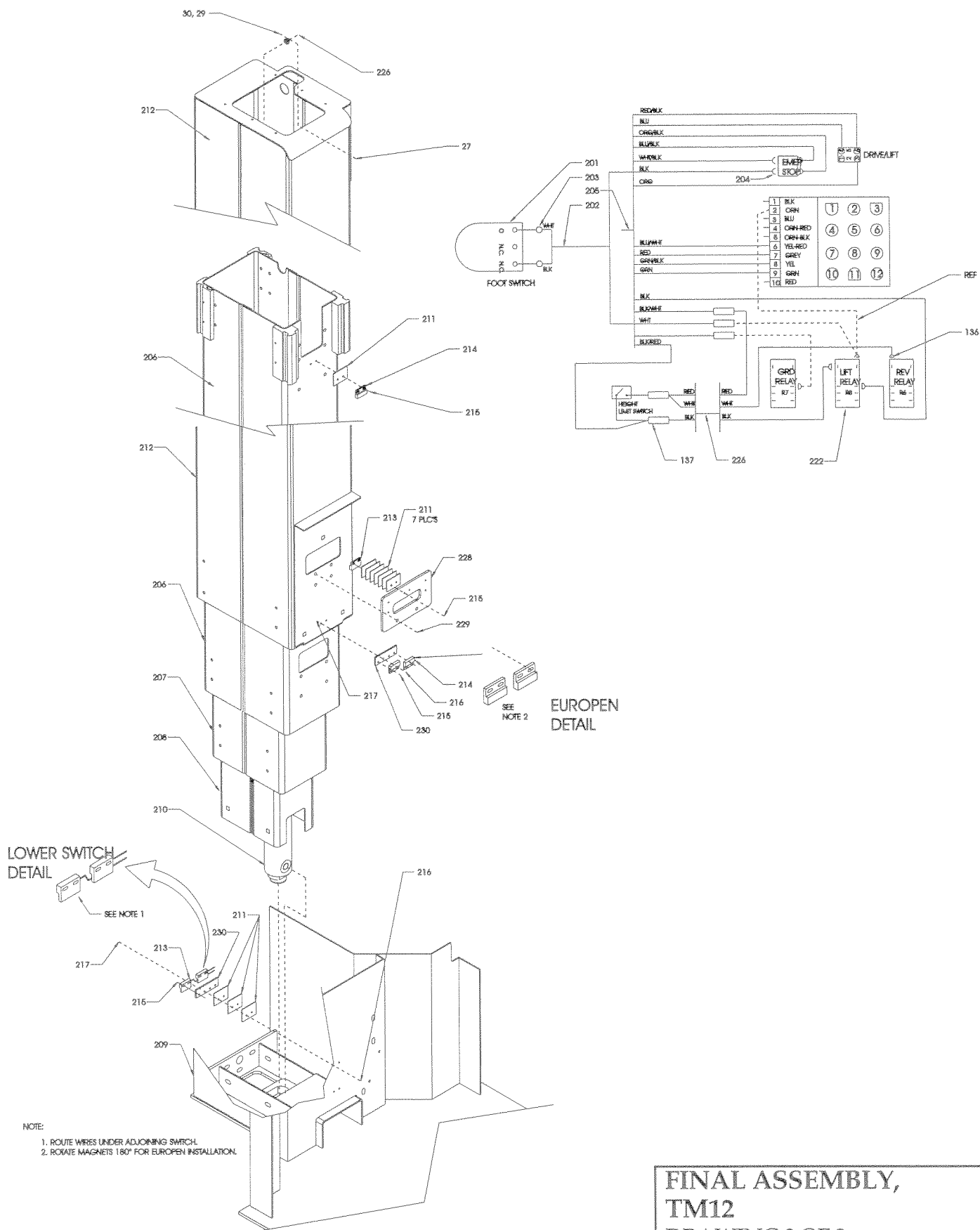
## Illustrated Parts Breakdown

FINAL ASSEMBLY TM12  
065400-002

ITEM	PART	DESCRIPTION	QTY.
201	063906-000	FOOT SWITCH	REF
202	029490-099	WIRE 16 AWG 2 CONN	REF
203	029601-013	CONN RING 16-14 X #10	2
204	029610-006	CONN FORK 16-14 X #6	1
205	065409-001	CONTROL CABLE ASSY	REF
206	065491-001	SECOND INNER MAST WEDMENT 4M	REF
207	065488-001	LOWER INNER MAST WELDMENT	REF
208	065485-001	BASE MAST WELDMENT	REF
209	065402-001	CHASSIS ASSY MAST LIFT	REF
210	065398-000	CYL LIFT	REF
211	065519-000	SWITCH PAD	11
212	065580-000	PLATFORM WELDMENT	REF
213	065373-001	SWITCH SENSOR	3
214	065373-002	SWITCH ACTUATOR	3
215	026551-005	POP-RIVET 1/8 X 1/4 GRIP	6
216	011721-006	SCREW #4-40UNC RD HD X 3/4	4
217	011248-049	LOCKNUT #4-40UNC HEX	6
226	029447-099	CORD RETRACTILE 16 AWG 3 CON	FT 5
228	065357-000	SWITCH PLATE OUTER	1
229	011828-006	SCREW FH SOC 1/4-20UNC X 3/4	2
230	065519-002	SWITCH PLATE FLAT	2

# Illustrated Parts Breakdown

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# Illustrated Parts Breakdown

## BASIC ASSEMBLY

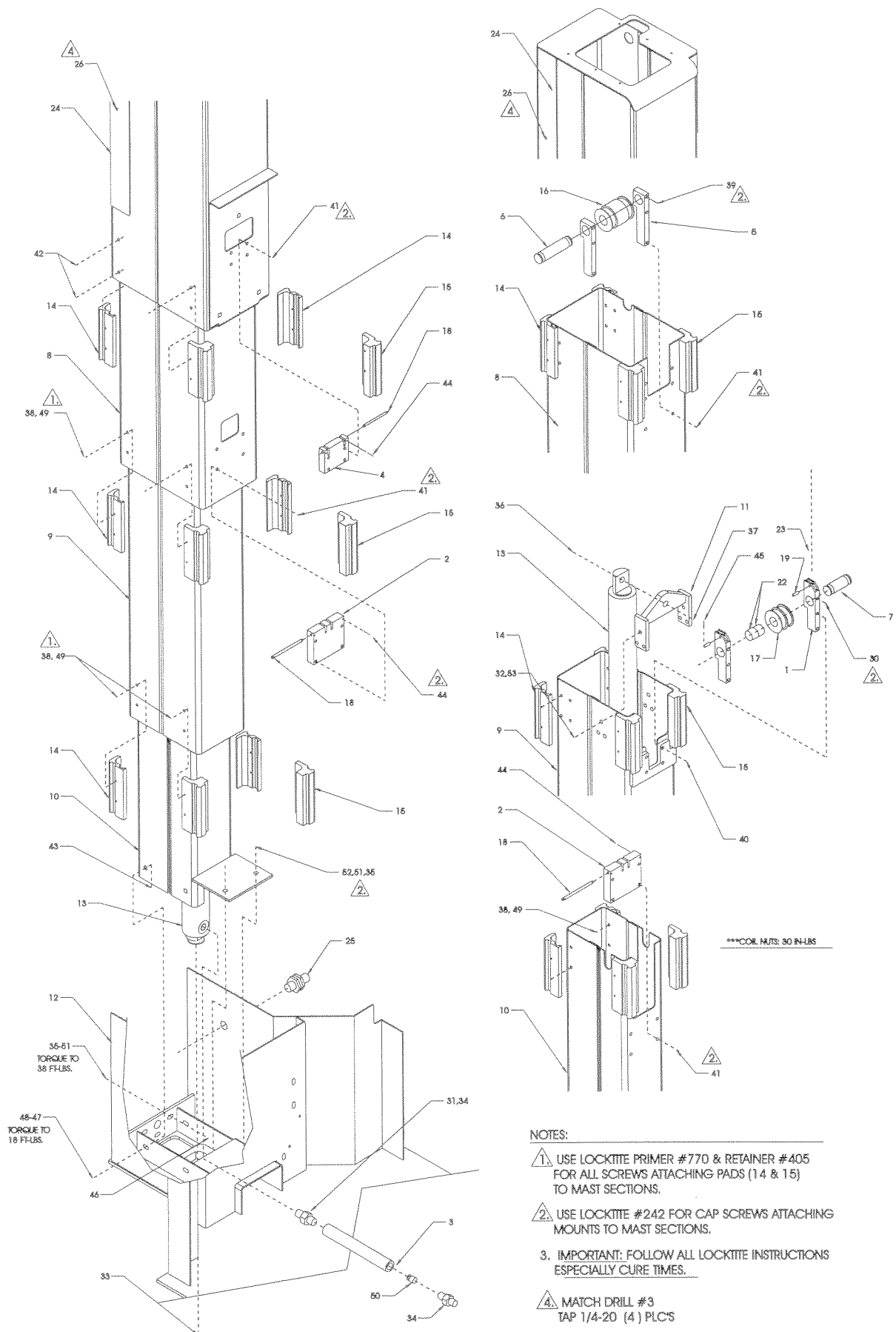
065401-001

ITEM	PART	DESCRIPTION	QTY.
1	065562-001	INNER MOUNT	2
2	065561-001	ANCHOR INNER	2
3	065552-000	ADAPTER	1
4	065542-001	OUTER ANCHOR	1
5	065540-000	OUTER MOUNT	2
6	065539-001	OUTER AXLE	1
7	065538-001	INNER AXLE	1
8	065491-001	SECOND INNER MAST WEDMENT 4M	1
9	065488-001	LOWER INNER MAST WELDMENT	1
10	065485-001	BASE MAST WELDMENT	1
11	065450-001	CYL. BAR & PAD WELDMENT	1
12	065402-001	CHASSIS ASSY MAST LIFT	1
13	065398-000	CYL LIFT	1
14	065389-000	FRONT PAD	12
15	065388-000	REAR PAD	12
16	065387-001	PULLEY OUTER	1
17	065386-001	PULLEY INNER	1
18	065383-001	PIN	3
19	065382-001	ANCHOR PIN	2
22	062642-019	BEARING 7/8 ID X 3/4 LG	2
23	062167-103	CHAIN LEAF	4
24	065580-000	PLATFORM WELDMENT	REF
25	065366-001	SWITCH, PROXIMITY	1
26	013336-011	GREASE ZERK	4

ITEM	PART	DESCRIPTION	QTY.
30	012553-012	SCREW 1/4-20UNC SOC HD x 1 1/2	2
31	011979-006	O-RING	1
32	011253-004	SCREW 5/16-18UNC HHC X 1/2	6
33	013315-009	RING RETAINING	1
34	011941-009	FITTING STR 8MB-6MJ	2
35	011248-006	LOCKNUT 3/8-16UNC HEX	5
36	011248-008	LOCKNUT 1/2-13UNC HEX	1
37	011256-016	SCREW 1/2-13UNC HHC X 2	1
38	013923-004	SCREW #10-ABHWH X 1/2	44
39	012553-010	SCREW 1/4-20UNC SOC HD x 1 1/4	2
40	012553-008	SCREW 1/4-20UNC SOC HD X 1	4
41	012553-006	SCREW 1/4-20UNC SOC HD X 3/4	18
42	026553-001	POP-RIVET 3/16 X 1/8 GRIP	4
43	011830-006	BOLT CARRIAGE 5/16-18UNC X 3/4	4
44	011735-005	ROLL PIN 1/8 x 5/8	6
45	011751-006	COTTER PIN 1/16 X 3/4	4
46	011254-008	CAP SCREW 3/8-16 HHC X 1	3
47	011248-005	LOCKNUT 5/16-18 UNC	4
48	011240-005	WASHER 5/16 STD FLAT	4
49	013949-003	WASHER #10 EXT. STAR	44
50	063096-010	FUSE VELOCITY	1
51	011240-006	WASHER 3/8 STD FLAT	5
52	011254-032	SCREW, HHC. 3/8-16 X 4	2
53	011238-005	WASHER 5/16 DIA SPLIT LOCK	6

# Illustrated Parts Breakdown

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# Illustrated Parts Breakdown

## CHASSIS ASSEMBLY

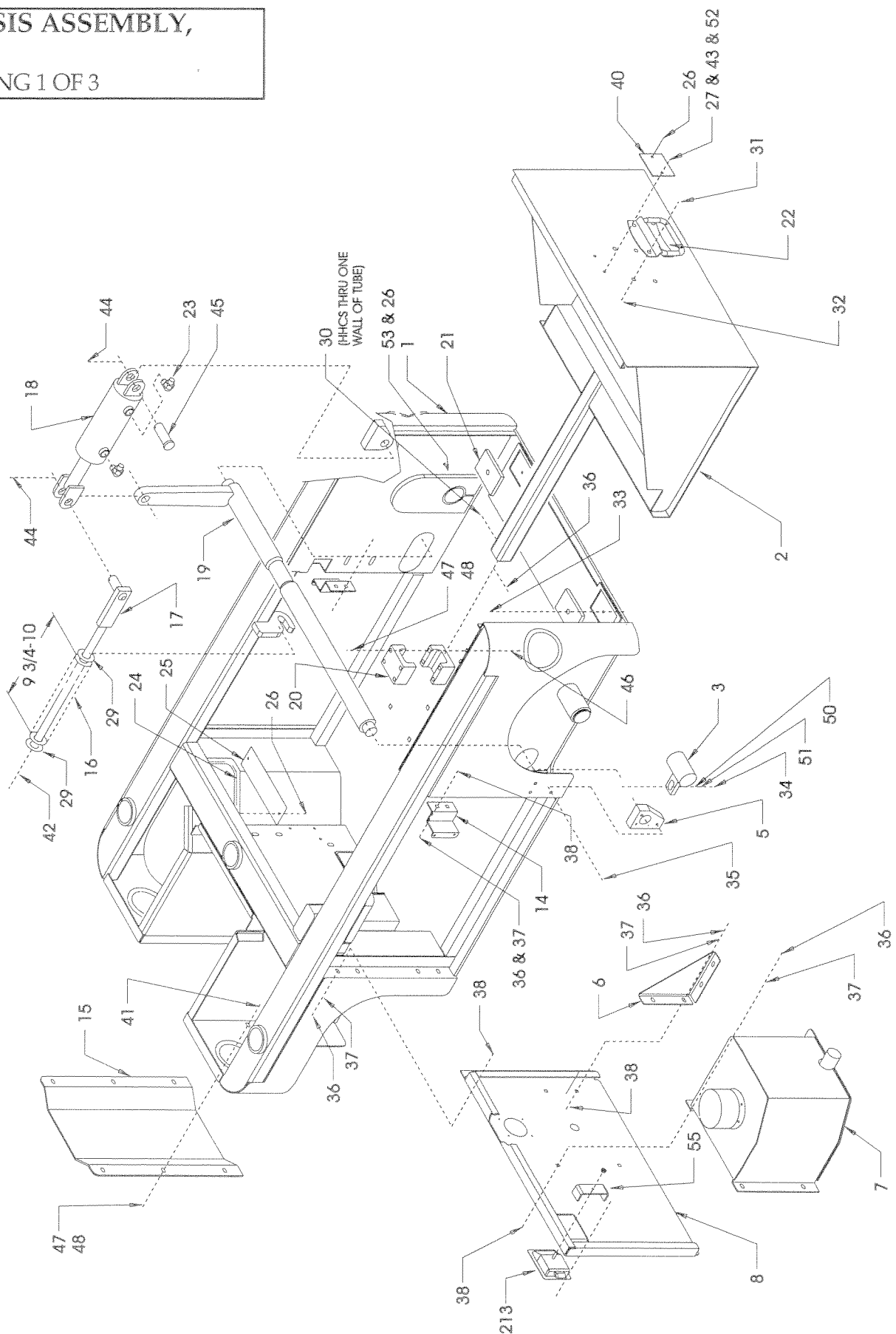
065402-001

ITEM	PART	DESCRIPTION	QTY.
1	065420-001	CHASSIS WELDMENT 4M	1
2	065465-000	BATTERY PAN WELDMENT	1
3	065472-000	PRESSURE MOUNT WELDMENT	2
5	065384-000	BRAKE BEARING	2
6	065531-000	CHARGER MOUNT	1
7	065407-000	HYDRAULIC TANK ASSY	1
8	065480-001	DOOR PANEL WELDMENT LH	1
14	065537-000	CATCH	2
15	065532-000	FRONT COVER	1
16	010121-010	SPRING COMPRESSION	1
17	065474-000	TENSION BAR WELDMENT	1
18	065397-001	CYLINDER BRAKE	1
19	065469-000	BRAKE ACTUATOR WELDMENT	1
20	065385-000	GUIDE PAD	2
21	065380-000	SLIDE PAD	2
22	026541-016	HANDLE	1
23	011935-001	FITTING 45° 4MBH - 4MJ	2
24	061796-099	GROMMET (EDGING)	FT
25	065656-000	WEAR PAD	2
26	026553-002	RIVET 3/16 X .120-.250 GRIP	6
27	026553-004	RIVET 3/16 X .250-.325 GRIP	1
29	014996-010	WASHER 5/8 SAE	2
30	011252-006	SCREW HHC 1/4-20 UNC x 3/4	1
31	064397-003	NUT ACORN 10-24 NC	4
32	011709-004	SCREW MACH RD HD 10-24 UNC x 1/2	4
33	026553-006	RIVET 3/16 .376-.500	2
34	011256-012	SCREW HHC 1/2-13 UNC x 1 1/2	2
35	014066-006	SCREW 1/4 AB x 3/4	6
36	011248-004	NUT HEX 1/4-20 UNC	15
37	011240-004	WASHER FLAT STD 1/4	14
38	011829-006	BOLT CARRIAGE 1/4-20 UNC x 3/4	14
40	065569-000	LATCH PLATE	1
41	011830-006	BOLT CARRIAGE 5/16-18 x 3/4	6
42	011248-010	NUT HEX 5/8-11 UNC	1
43	011240-003	WASHER STD FLAT #10	1
44	011753-010	COTTER PIN	2
45	011848-041	PIN 3/4 PIVOT	1
46	011830-026	BOLT CARRIAGE 5/16-18 x 3 1/4	4
47	011248-005	NUT HEX 5/16-18 UNC	10
48	011240-005	WASHER FLAT STD 5/16	10
50	011240-008	WASHER 1/2 STD FLAT	2
51	011238-008	WASHER 1/2 SPLIT LOCK	2
52	010414-001	LOCKING PIN ASSY X 6	1
53	029918-010	TIE WRAP	1
55	065352-000	CHANNEL	2

# Illustrated Parts Breakdown

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CHASSIS ASSEMBLY,  
TM12  
DRAWING 1 OF 3



# Illustrated Parts Breakdown

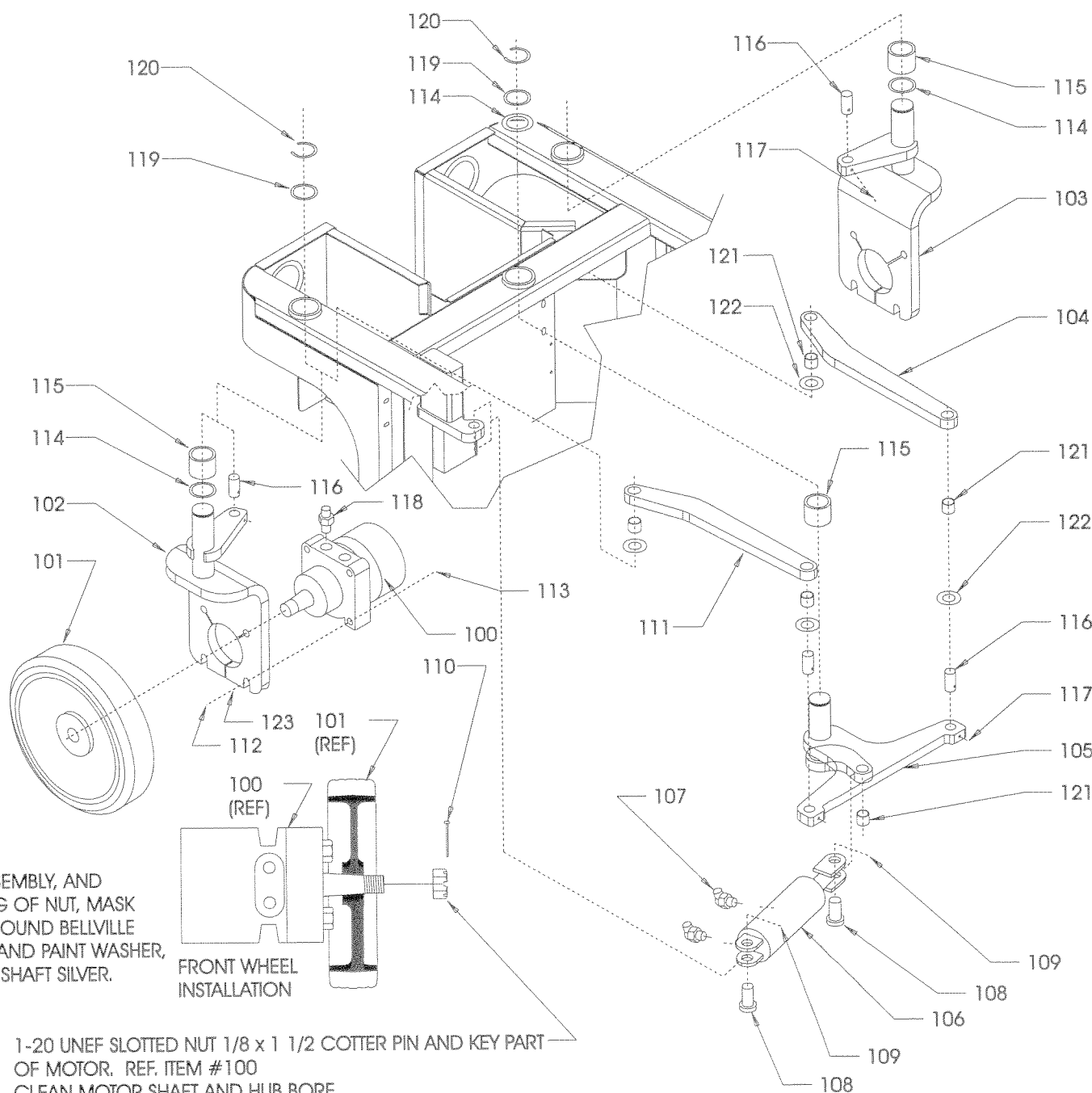
## CHASSIS ASSEMBLY

065402-001

ITEM	PART	DESCRIPTION	QTY.
100	061817-002	MOTOR HYDRAULIC	2
101	065393-002	WHEEL, DRIVE	2
102	065454-000	WHEEL YOKE, L.H.	1
103	065453-000	WHEEL YOKE, R.H.	1
104	065517-000	STEER LINK RH	1
105	065445-000	BELL CRANK WELDMT	1
106	065397-002	CYLINDER, STEERING	1
107	011934-001	FITTING, 90° 4MBH-4MJ	2
108	011848-041	PIN 3/4 PIVOT	2
109	011753-010	PIN COTTER 1/8 x 1 1/4	2
110	011753-012	PIN COTTER 1/8 x 1 1/2	2
111	065518-000	STEER LINK LH	1
112	011256-026	SCREW HHC GR5 1/2-13 UNC x 3 1/4	8
113	011248-008	NUT HEX 1/2-13 UNC	8
114	010092-011	WASHER THRUST 1 1/2	3
115	027931-068	BEARING 1 1/2	3
116	065534-000	STEER PIN	4
117	011736-012	ROLL PIN 3/16 DIA. x 1 1/2	4
118	011941-013	FITTING STRAIGHT 10-6S	4
119	011786-007	BUSHING MACHINE 1 1/2 I.D.	3
120	013315-009	RETAINING RING	3
121	027931-022	BEARING 3/4 I.D.	5
122	010092-005	WASHER THRUST 3/4 I.D.	4
123	011240-008	WASHER FLAT STD 1/2	8

# Illustrated Parts Breakdown

Section  
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NOTE:  
AFTER ASSEMBLY, AND  
TORQUING OF NUT, MASK  
WHEEL AROUND BELLVILLE  
WASHER, AND PAINT WASHER,  
NUT, AND SHAFT SILVER.

FRONT WHEEL  
INSTALLATION

1-20 UNEF SLOTTED NUT 1/8 x 1 1/2 COTTER PIN AND KEY PART  
OF MOTOR. REF. ITEM #100  
CLEAN MOTOR SHAFT AND HUB BORE.  
LUBRICATE NUT FACE AND THEADS.  
TORQUE SLOTTED NUT TO 75 ± 5 FT LBS BOTH WHEELS.

CHASSIS ASSEMBLY,  
TM12  
DRAWING 2 OF 3

# Illustrated Parts Breakdown

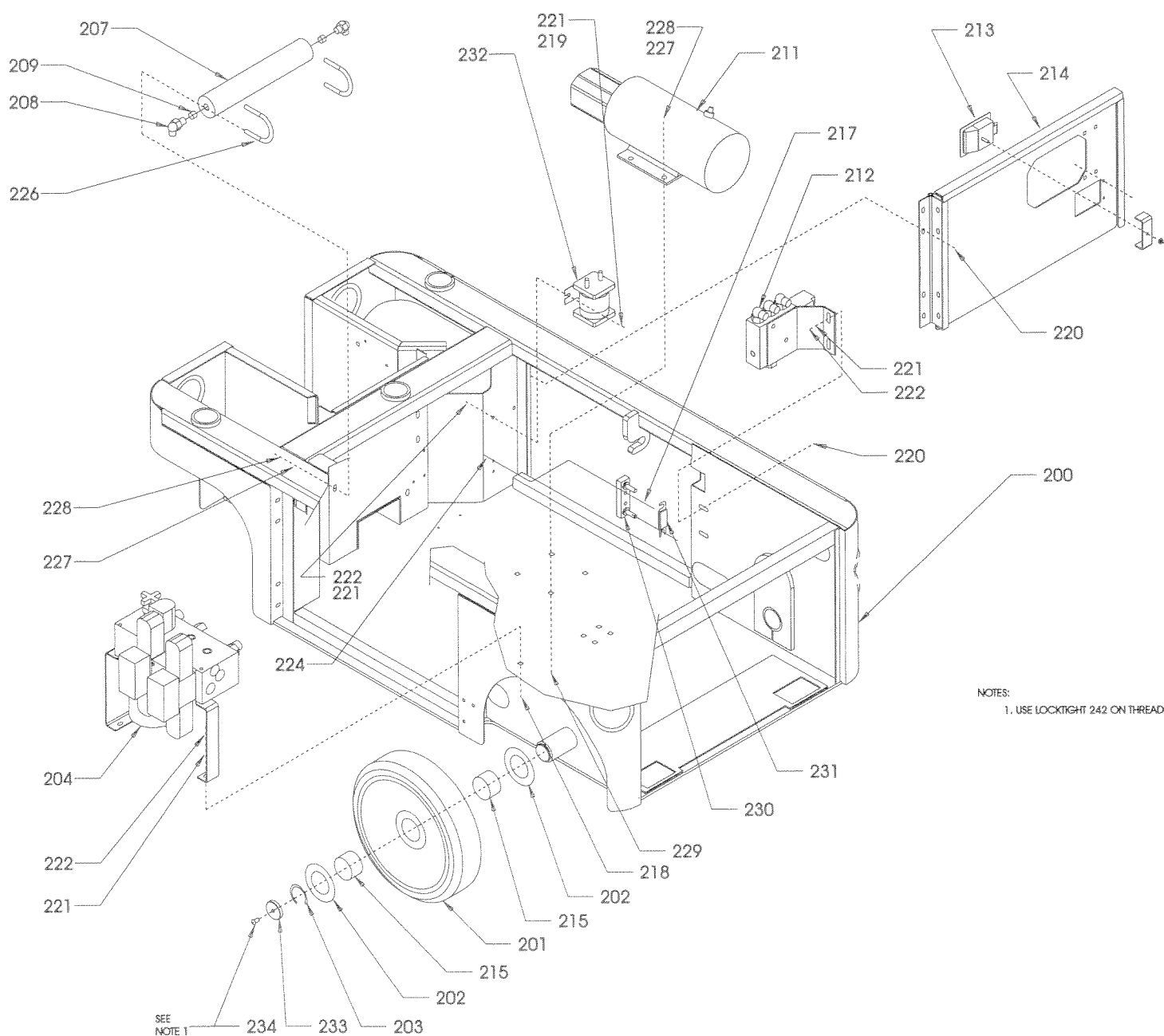
## CHASSIS ASSEMBLY

065402-001

ITEM	PART	DESCRIPTION	QTY.
200	065420-001	CHASSIS WELDMENT	REF
201	065392-002	WHEEL IDLER	2
202	011786-014	BUSHING MACHINE 1 3/4 I.D.	4
203	013315-009	RETAINING RING 1 1/2	2
204	065404-001	CONTROLL VALVE ASSEMBLY	1
207	065396-000	CYLINDER CUSHION	1
208	011934-003	FITTING 90° 6MBH - 4MJ	2
209	065556-001	ORIFICE	2
211	015797-000	POWER UNIT	1
212	065405-002	CYLINDER VALVE ASSEMBLY	1
213	065395-000	LATCH	2
214	065483-000	PANEL WELDMENT RH	1
215	027931-069	BEARING 1 3/4	4
217	011709-008	SCREW 10-24 x 1	2
218	011829-008	CARRIAGE BOLT 1/4-24 x 1	3
219	011252-006	SCREW HHC 1/4-20 x 3/4	2
220	011829-006	CARRIAGE BOLT 1/4-20 x 3/4	14
221	011240-004	WASHER FLAT STD 1/4	20
222	011248-004	NUT HEX 1/4-20 UNC	20
224	011248-003	NUT HEX 10-24 UNC	2
226	014924-007	U-BOLT	2
227	011240-005	WASHER FLAT 5/16	6
228	011248-005	NUT HEX 5/16-18	6
229	011830-008	BOLT CARRIAGE 5/16-18 x 1	4
230	010149-000	FUSE BLOCK	1
231	010148-001	FUSE	1
232	010122-001	RELAY	1
233	065513-000	END CAP	1
234	011823-006	SCREW 3/8-16UNC BUTT	1

# Illustrated Parts Breakdown

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CHASSIS ASSEMBLY,  
TM12  
DRAWING 3 OF 3

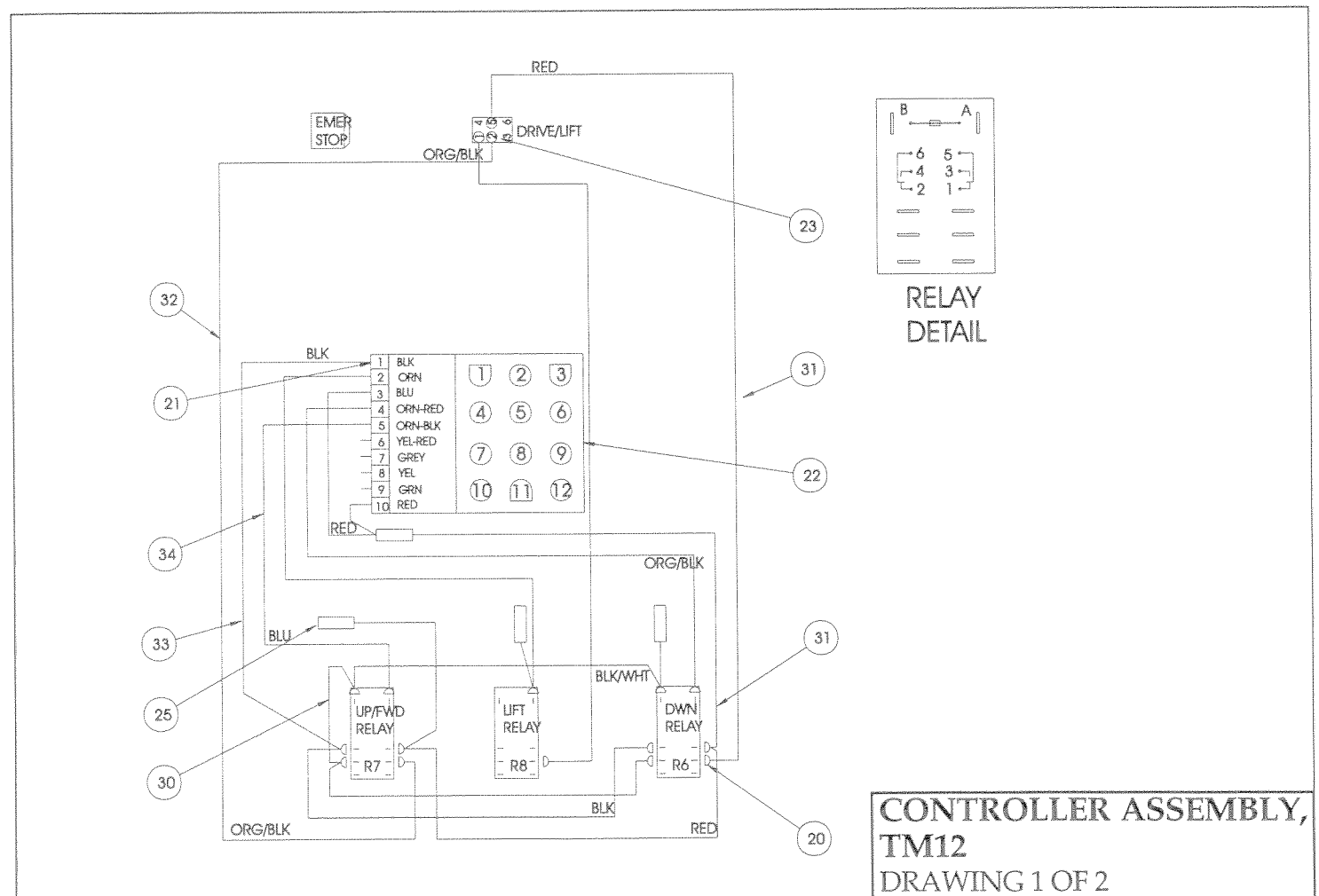


# Illustrated Parts Breakdown

## CONTROLLER ASSEMBLY

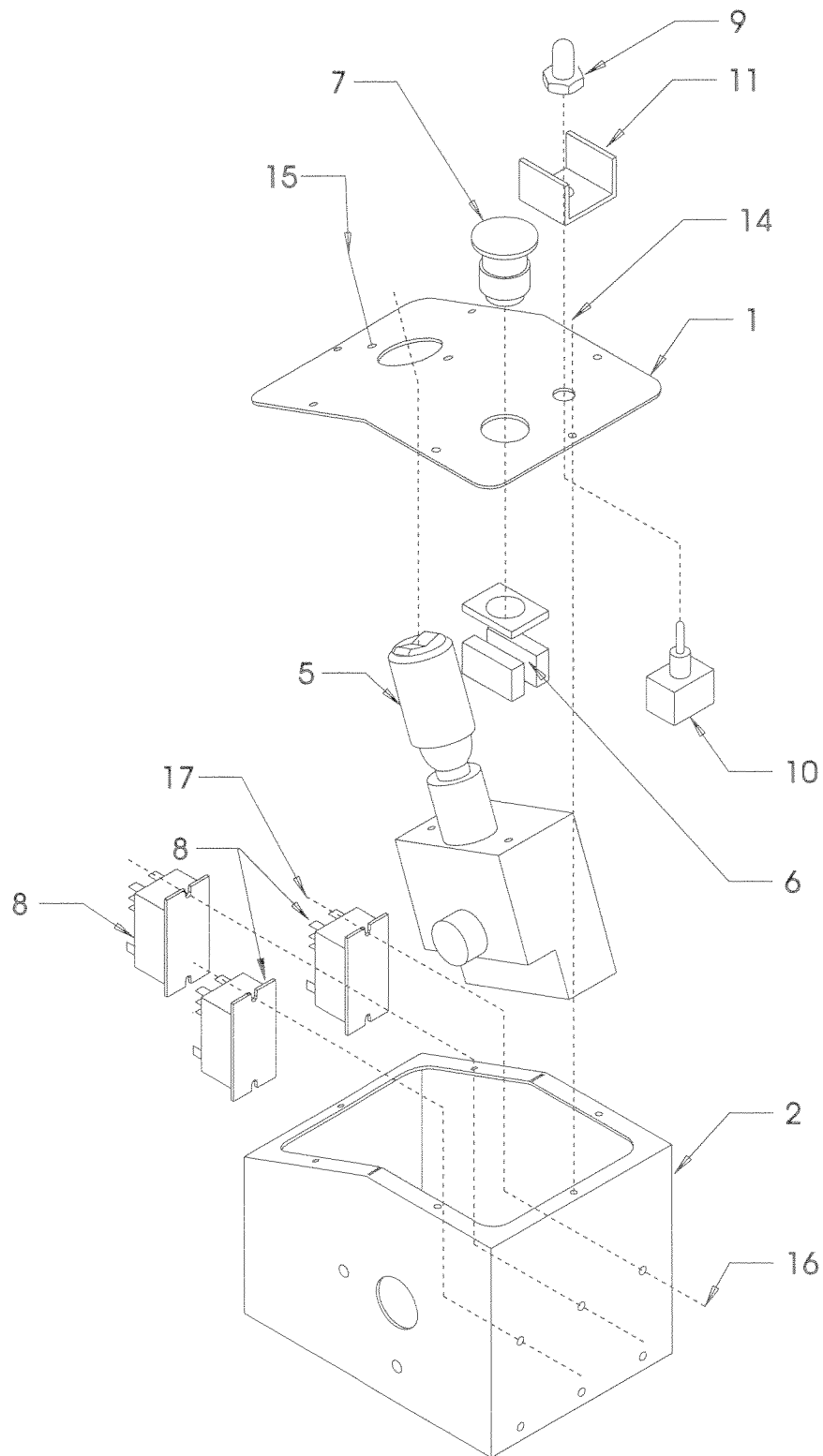
065410-003

ITEM	PART	DESCRIPTION	QTY.
1	065597-001	CONTROL COVER	1
2	065594-000	CONTROLLER WELDMENT	1
5	063975-000	CONTROLLER PQ	1
6	066805-011	CONTACT BLOCK	2
7	066805-006	PUSHBUTTON	1
8	063951-002	RELAY	3
9	029872-000	BOOT	1
10	015941-001	SWITCH TOGGLE	1
11	008271-000	SWITCH GUARD	1
14	011826-004	SCREW 10-32 SLFTP X 1/2	6
15	011811-006	SCREW 10-32 SLFTP X 3/4	2
16	011715-004	SCREW 6-32 MACH RDHD X 1/2	6
17	011248-047	LOCKNUT 6-32 HEX	6
20	029615-002	CONN FM PUSH 16-14 X .187	12
21	063956-002	PIN	6
22	063956-003	PLUG CONN	1
23	029601-013	CONN RING 16-14 X #10	2
25	029620-003	CONN BUTT 16-14	4
30	063574-099	WIRE 16 AWG BLK/WHT	FT 2
31	029454-099	WIRE 16 AWG RED	FT 1.5
32	029477-099	WIRE 16 AWG ORG/BLK	FT .5
33	029452-099	WIRE 16 AWG BLK	FT 2
34	029450-099	WIRE 16 AWG BLU	FT 1



# Illustrated Parts Breakdown

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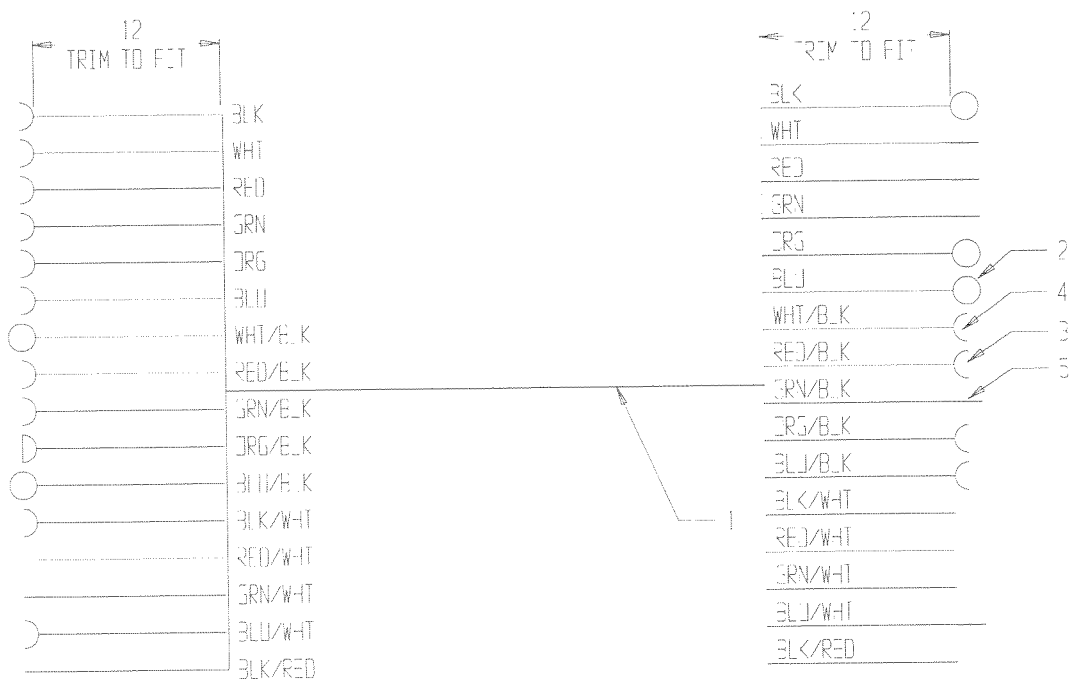


**CONTROLLER ASSEMBLY,  
TM12**  
DRAWING 1 OF 2

# Illustrated Parts Breakdown

## CONTROL CABLE ASSEMBLY 065409-001

ITEM	PART	DESCRIPTION	QTY.
1	065394-001	CORD RETRACT 18 GA 16COND	1
2	029601-005	CONN. RING #10	5
3	029931-001	CONN. PUSH FM X .25	2
4	029610-001	CONN FORK #6	12
5	063956-002	PIN	5



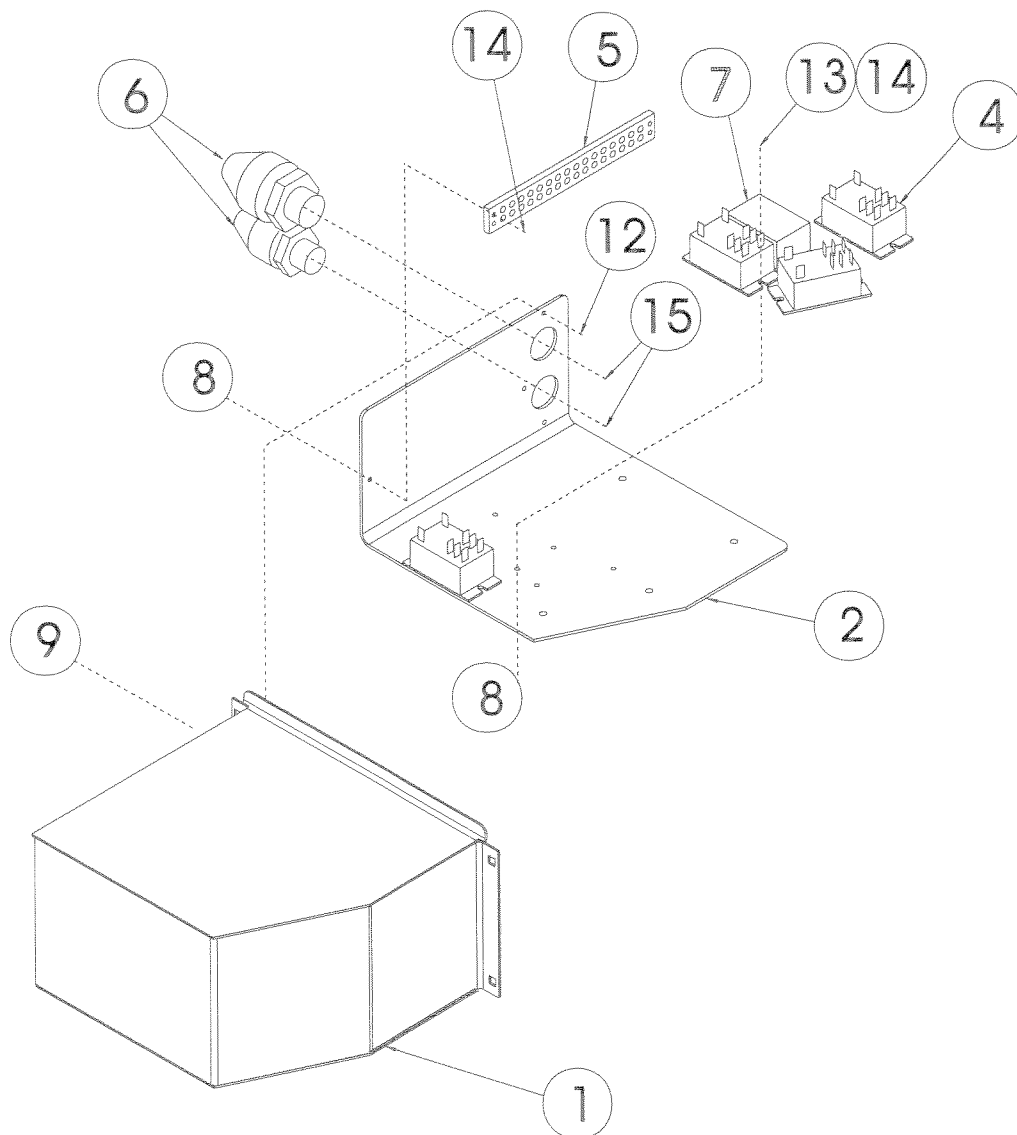
# Illustrated Parts Breakdown

Section  
6.2

## ELECTRICAL BOX ASSEMBLY

065408-001

ITEM	PART	DESCRIPTION	QTY.
1	065457-000	BOX, ELECT. WELDMT	1
2	065551-000	ELECTRICAL PLATE	1
4	029863-009	RELAY 24 Vdc	4
5	029928-006	TERMINAL BLOCK	1
6	029925-001	CONNECTOR CABLE	2
7	027962-007	RELAY FLANGE MOUNT 24VDC	1
8	062734-006	SCREW, FLTHD 6-32 x 3/4	12
9	011709-003	SCREW, RDHD 10-24 x 3/8	2
12	011250-003	NUT, #10-24	2
13	011240-001	WASHER, FLAT #6 STD	10
14	011248-047	NUT, #6-32	12
15	029939-003	LOCKNUT, CONDUIT 3/4	2

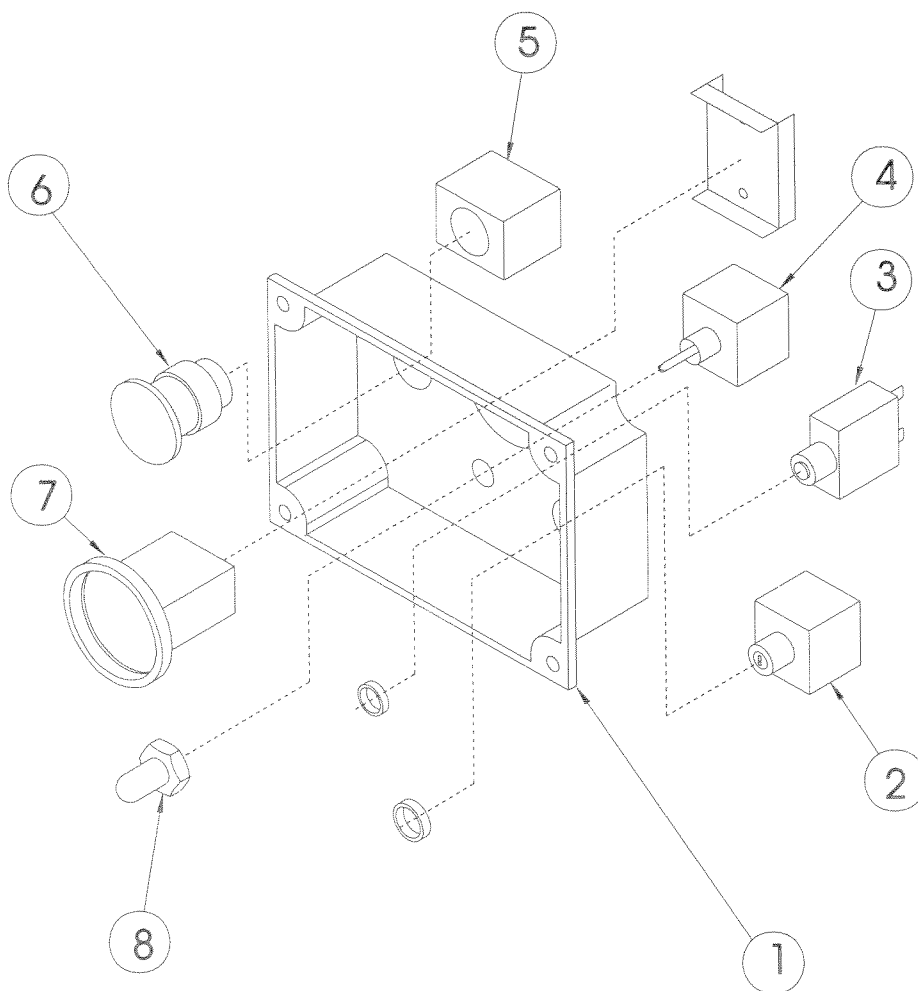


# Illustrated Parts Breakdown

## ELECTRICAL PANEL ASSEMBLY

065403-002

ITEM	PART	DESCRIPTION	QTY.
1	065550-001	SWITCH BOX	1
2	010155-000	SWITCH KEY SELECTOR	1
3	029868-007	CIRCUIT BREAKER	1
4	012798-001	SWITCH TOGGLE SPDT	1
5	066805-011	SWITCH CONTACT BLK	1
6	066805-006	SWITCH HEAD-MUSHROOM	1
7	029959-000	HOUR METER / BAT LV IND	1
8	029872-000	BOOT SWITCH COVER	1



# Illustrated Parts Breakdown

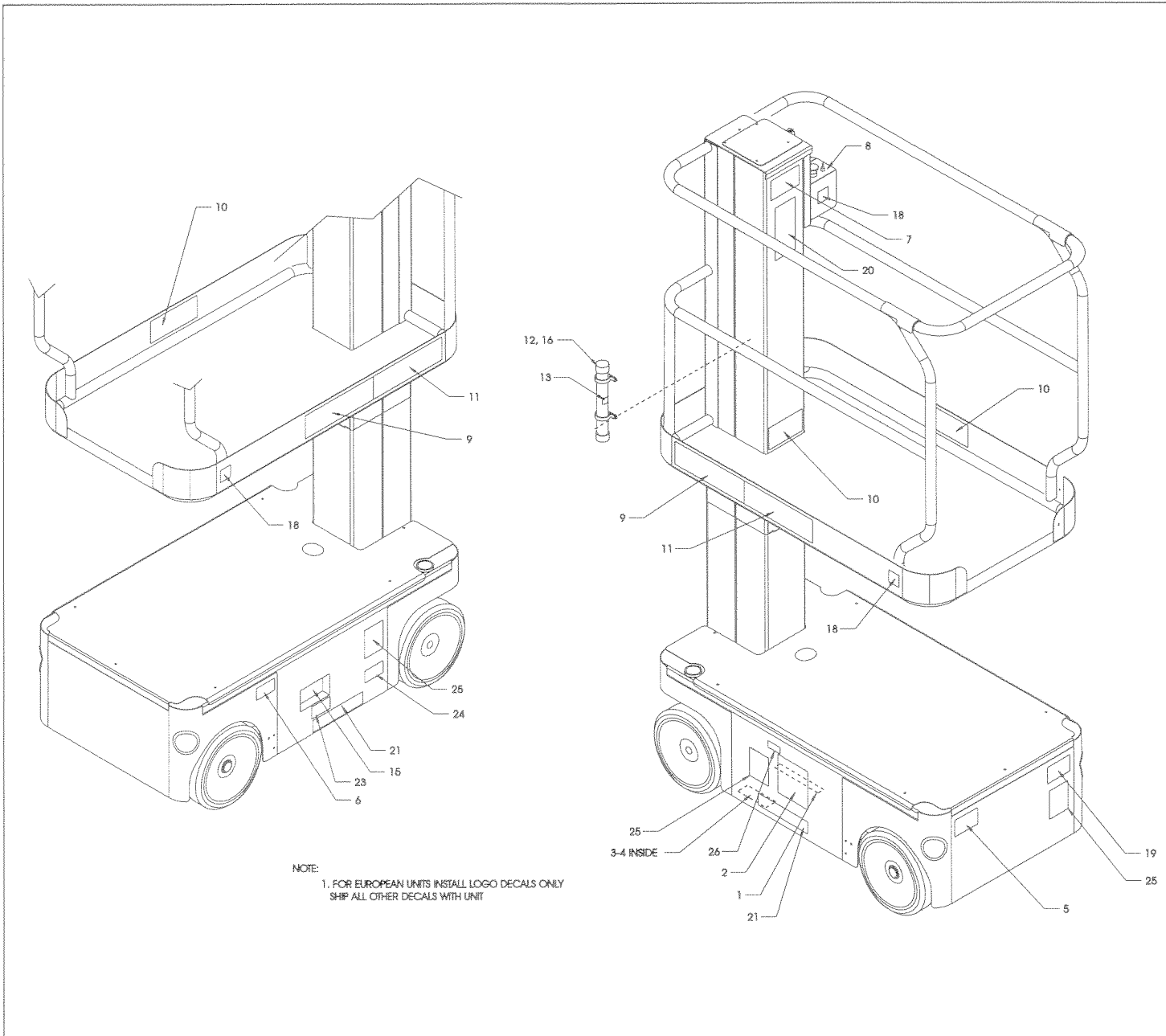
Section  
6.2

## LABEL KIT

065412-004

ITEM	PART	DESCRIPTION	QTY.
1	060197-000	LABEL HYD OIL	1
2	066552-000	LABEL HYDROGEN GAS	1
3	061205-001	NAME PLATE	1
4	065368-000	TACK	4
5	005221-000	LABEL BATTERY FLUID	1
6	005223-001	LABEL EMERGENCY DOWN	1
7	066554-000	LABEL BEFORE OPERATING	1
8	065567-000	LABEL CONTROLLER	1
9	061683-003	LABEL UPRIGHT	2
10	066557-001	LABEL MAX LOAD 500 LBS.	3
11	061684-014	LABEL TM12	2
12	065099-000	INST. TUBE ASSY	1

ITEM	PART	DESCRIPTION	QTY.
13	003610-000	LABEL TUBE INST.	1
15	065568-000	LABEL CONTROLS	1
16	060574-020	USER MANUAL	1
18	064444-000	LABEL USA	3
19	062562-001	LABEL BATTERIES	1
20	066550-001	LABEL DANGER	1
21	14222-003-99	LABEL FORK LIFT	2
23	066555-000	LABEL RELIEF VALVE	1
24	066568-000	LABEL LOWER PLATFORM	1
25	066556-000	LABEL COLLISION HAZARD	3
26	066522-000	LABEL BATTERY CHARGER	1



# Illustrated Parts Breakdown

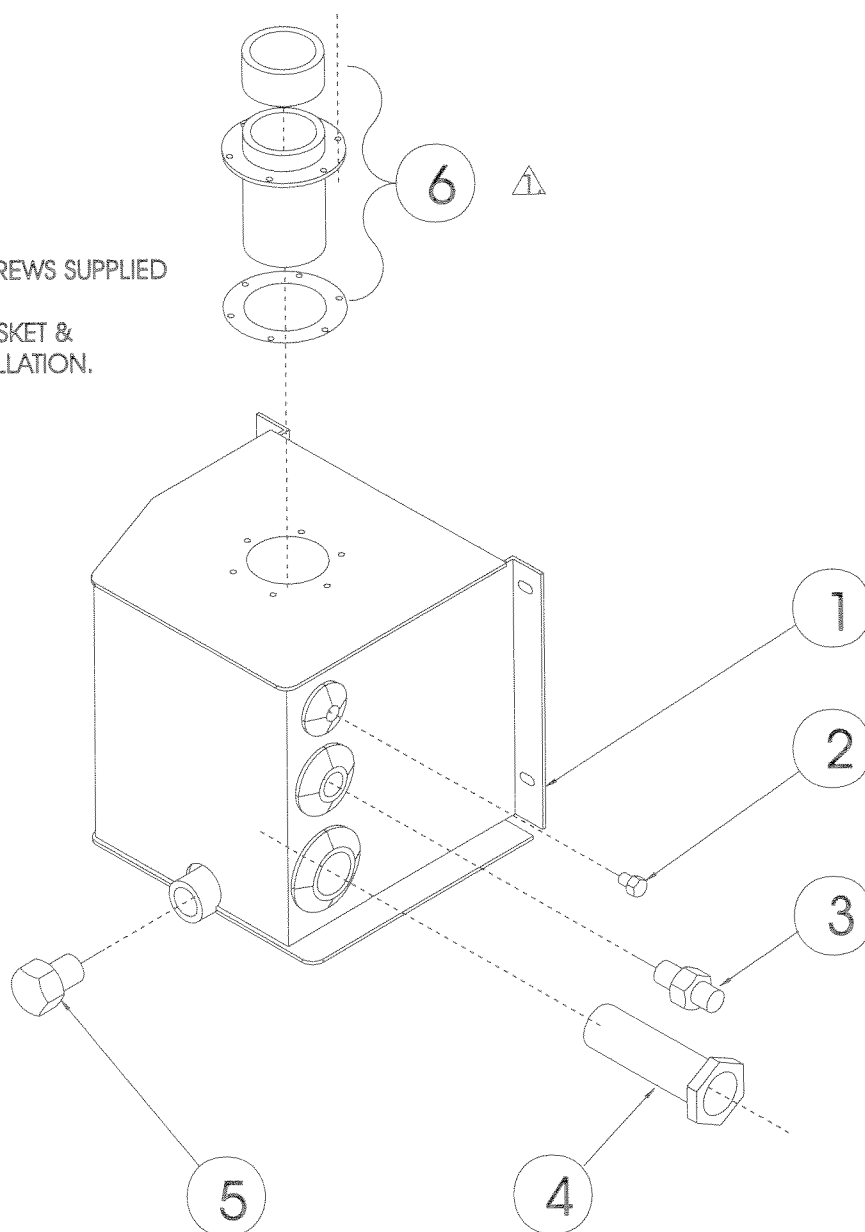
## HYDRAULIC TANK ASSEMBLY

065407-000

ITEM	PART	DESCRIPTION	QTY.
1	065476-000	TANK WELDMENT	1
2	011920-002	PLUG PIPE SOC HD 1/4-18 NPTF	1
3	011939-015	FITTING 8MP-8MJ	1
4	061818-000	SUCTION SCREEN/FITTING	1
5	021305-006	PLUG, MAGNETIC	1
6	005963-001	FILLER BREATHER	1

### NOTES:

- ⚠ USE EXISTING SCREWS SUPPLIED W/ BREATHER. SILICON SEAL GASKET & SCREWS @ INSTALLATION.



# Illustrated Parts Breakdown

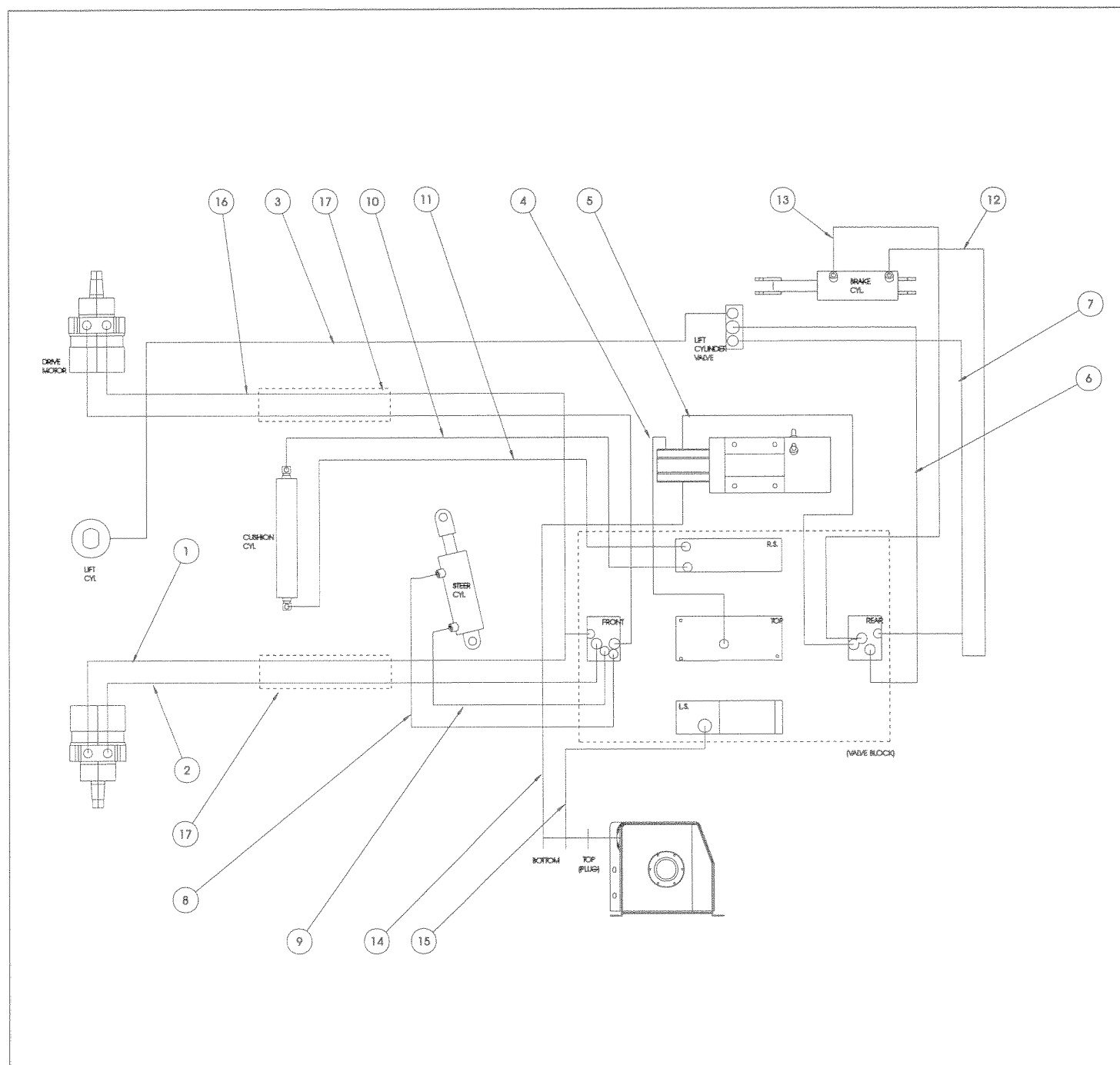
Section  
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## HOSE KIT INSTALLATION

065411-011

ITEM	PART	DESCRIPTION	QTY.
1	065419-029	HOSE ASSY 1/4 X 29 (6FJX-6FJX)	1
2	065419-027	HOSE ASSY 1/4 X 27 (6FJX-6FJX)	2
3	065375-000	CYLINDER TUBE ASSY (STEEL) 3/8 DIA.	REF
4	060861-018	HOSE ASSY 3/8 X 18 (6FJX-6FJX)	1
5	060861-063	HOSE ASSY 3/8 X 25 (6FJX-6FJX)	1
6	060861-021	HOSE ASSY 3/8 X 12 (6FJX-6FJX)	1
7	061351-042	HOSE ASSY 1/8 X 10 (4FJX-4FJX)	1
8	061351-043	HOSE ASSY 1/8 X 11 (4FJX-4FJX)	1
9	061351-044	HOSE ASSY 1/8 X 12 (4FJX-4FJX)	1

ITEM	PART	DESCRIPTION	QTY.
10	061351-045	HOSE ASSY 1/8 X 13 (4FJX-4FJX)	1
11	061351-046	HOSE ASSY 1/8 X 17 (4FJX-4FJX)	1
12	061351-052	HOSE ASSY 1/8 X 24 (4FJX-4FJX)	1
13	061351-050	HOSE ASSY 1/8 X 20 (4FJX-4FJX)	1
14	061789-028	HOSE ASSY 3/4 X 28 (12FJX-12MP)	1
15	064156-038	HOSE ASSY 1/2 X 25 (8FJX-8FJX)	1
16	065419-023	HOSE ASSY 1/4 X 23 (6FJX-6FJX)	1
17	065369-099	HOSE GUARD NYLON X 18	REF





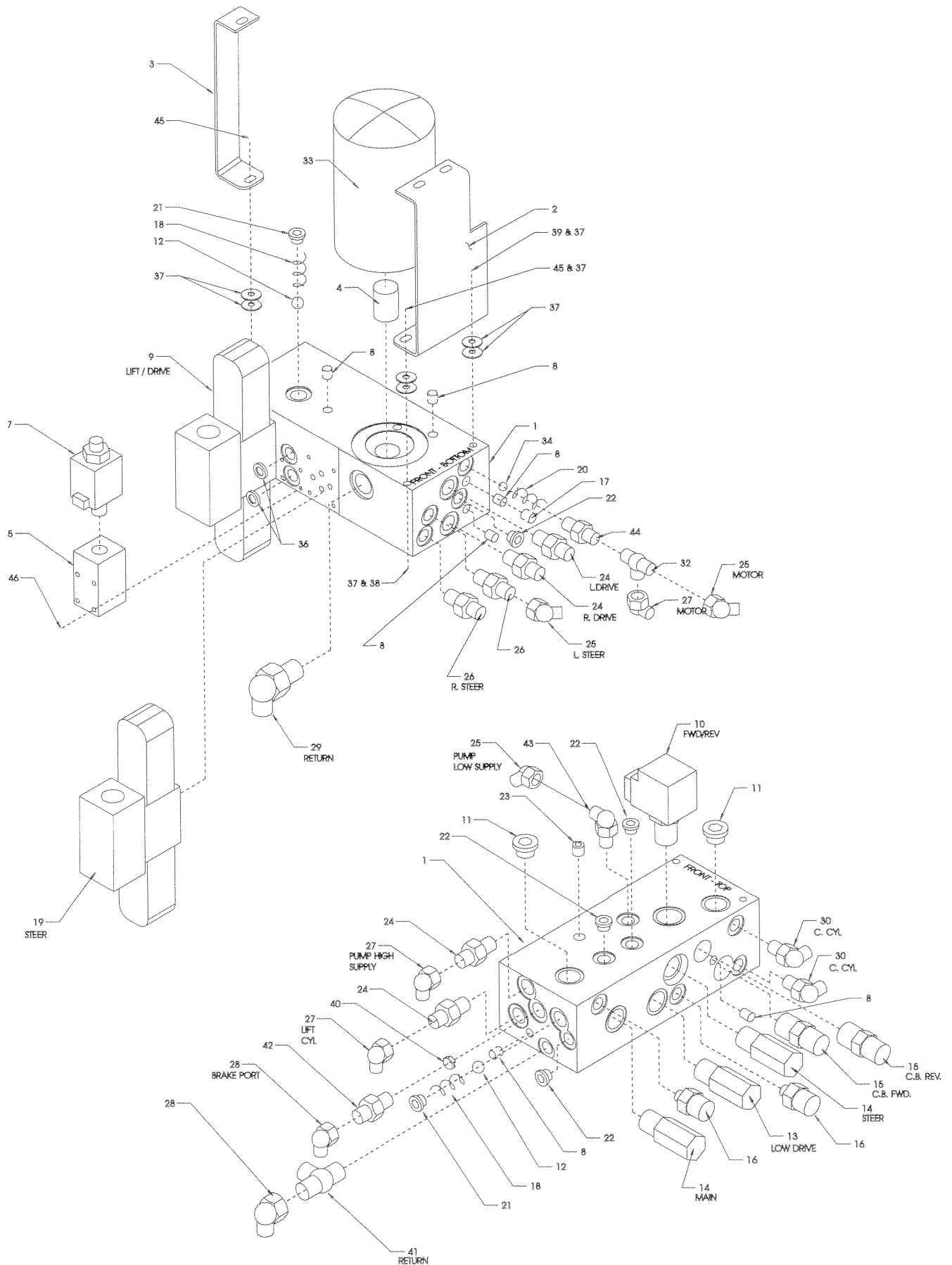
# Illustrated Parts Breakdown

## CONTROL VALVE ASSEMBLY 065404-001

ITEM	PART	DESCRIPTION	QTY.
1	065549-000	VALVE BLOCK MAST LIFT	1
2	065548-000	FRONT BRACKET	1
3	065547-000	REAR BRACKET	1
4	065169-000	FILTER ADAPTER	1
5	065374-000	VALVE BLOCK - PROPORTIONAL	1
7	063986-002	VALVE - PROPORTIONAL	1
8	063977-001	PLUG 9MM	6
9	063928-004	VALVE DIR.	1
10	063923-006	VALVE SOL	1
11	063955-008	PLUG - CAVITY	2
12	061827-000	BALL 7/16	2
13	060390-007	VALVE RELIEF	1
14	060390-008	VALVE RELIEF	2
15	015900-000	VALVE C.B.	2
16	063965-001	CONN GAGE	2
17	063977-002	PLUG 10MM	1
18	015799-000	SPRING	2
19	015763-000	VALVE SOL	1
20	013987-008	SPRING	1
21	012004-006	PLUG #6	2
22	012004-004	PLUG #4	4
23	011920-002	PLUG SOC HD 1/4-18 NPTF	1
24	011941-005	FITTING 6MB-6MJ	4
25	011932-003	FITTING 6FJX-6MJ 45	3
26	011941-001	FITTING 4MB-4MJ ST	2
27	011937-003	FITTING 6FJX-6MJ 90	3
28	011937-001	FITTING 4FJX-4MJ 90	2
29	011934-008	FITTING 8MBH-8MJ 90	1
30	011934-001	FITTING 4MBH-4MJ 90	2
32	020733-002	FITTING 6FJX-6MJ-6MJ TEE	1
33	005154-002	FILTER	1
34	005135-000	BALL 5/16	1
36	011979-008	O-RING	2
37	011240-004	WASHER 1/4 DIA STD FLAT	6
38	011248-004	LOCKNUT 1/4-20UNC HEX	3
39	011252-032	SCREW 1/4-20UNC HHC x 4	1
40	015919-004	ORIFICE # 824	1
41	015961-004	FITTING 4MBH-4MJ-4MJ TEE	1
42	011941-004	FITTING 6MB-4MJ ST	1
43	011934-026	FITTING 4MBH-6MJ 90	1
44	011941-002	FITTING STR 4MB-6MJ	1
45	011252-030	SCREW 1/4-20 HHC x 3 3/4	2
46	014412-016	SCREW SOC HD 10-24 x 2	4

# Illustrated Parts Breakdown

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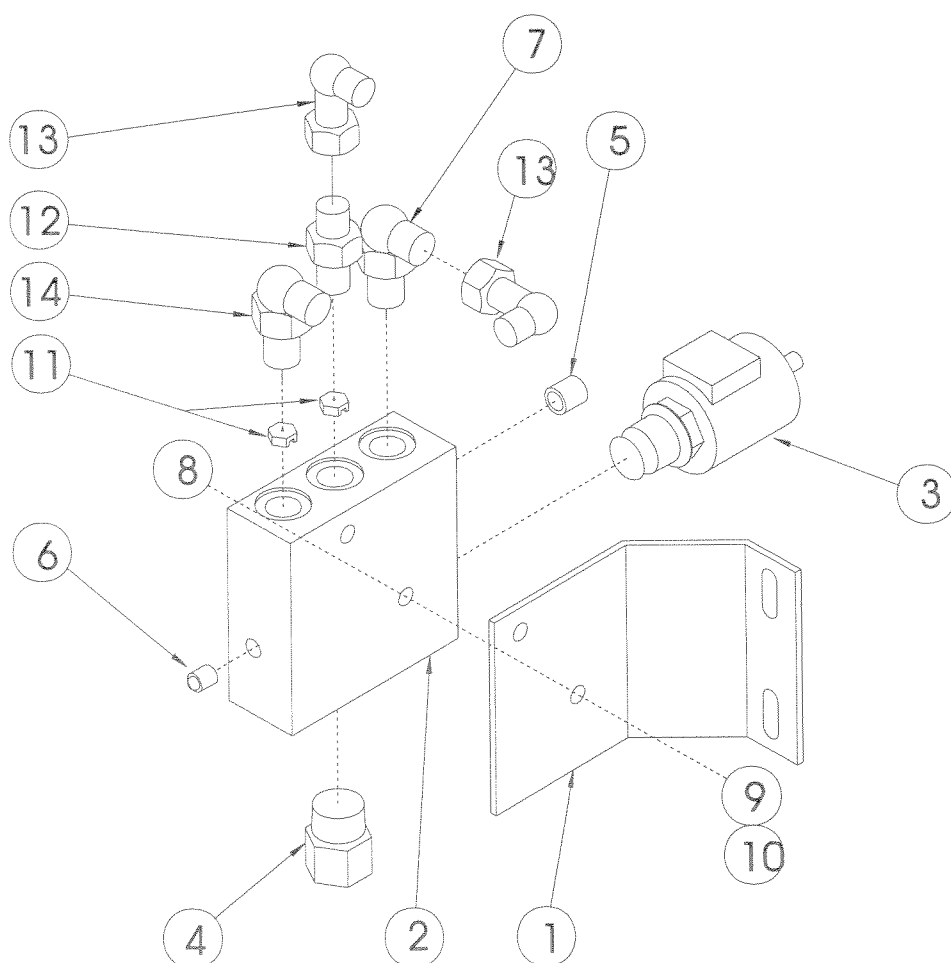


# Illustrated Parts Breakdown

## CYLINDER VALVE ASSEMBLY

065405-002

ITEM	PART	DESCRIPTION	QTY.
1	065546-000	DOWN VALVE BRACKET	1
2	065545-000	VALVE BLOCK	1
3	063925-002	VALVE SOL 24 VDC	1
4	063924-005	VALVE FLOW CONTROL 1 GPM	1
5	011920-002	PLUG SOC.HD. 1/4-18 NPTF	1
6	063977-001	PLUG 9mm	1
7	011934-004	FITTING, 90 6MB-6MJ	1
8	011253-018	SCREW 5/16-18 HHC X 2 1/4	2
9	011240-005	WASHER, FLAT STD 5/16	2
10	011248-005	NUT HEX 5/16-18	2
11	015919-000	ORIFICE	2
12	011941-005	FITTING STR 6MB-6MJ	1
13	011937-003	FITTING 90 6JX-6MJ	2
14	011934-003	FITTING 90 6MB-4MJ	1



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