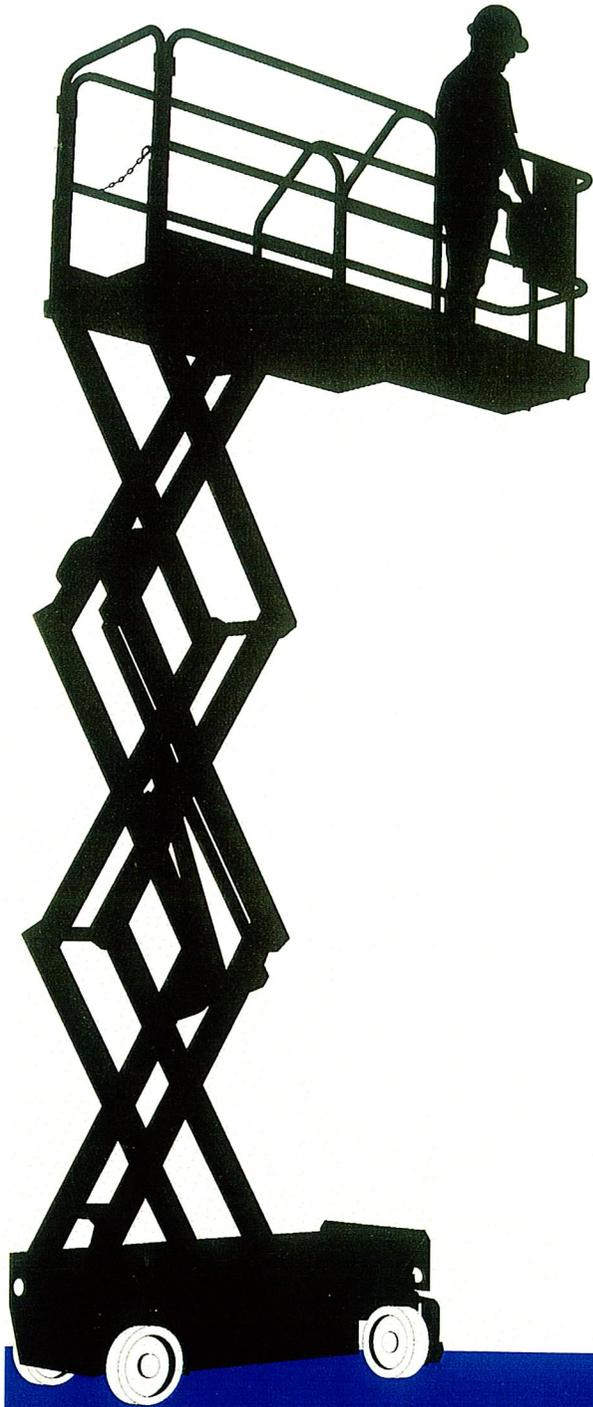


# UpRight

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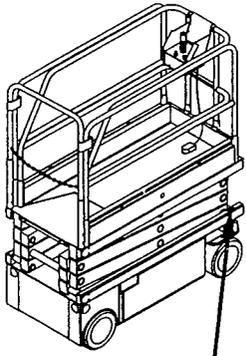


# MX15/19

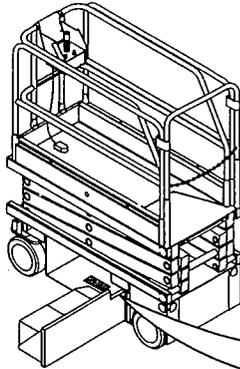
*WORK PLATFORM*

**Service &  
Parts Manual**

# SERVICE & PARTS MANUAL MX15/19 Aerial Work Platform Serial Numbers 12900 to Current



Stamped  
Serial Number



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 right scissor slide block channel above the right front wheel.

<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 61205-000-00</small>	

## UpRight

Call Toll Free in U.S.A.

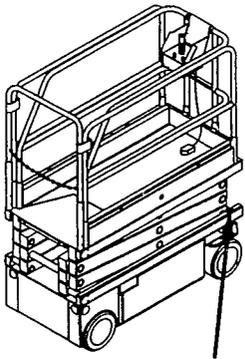
**1-800-926-LIFT**

**UpRight, Inc.**  
1775 Park Street  
Selma, California 93662  
TEL: 559/891-5200  
FAX: 559/896-9012  
PARTSFAX: 559/896-9244

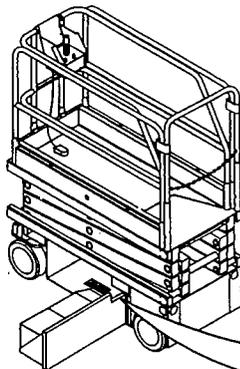
060569-003

12/99 K

# SERVICE & PARTS MANUAL MX15/19 Aerial Work Platform Serial Numbers 12900 to Current



Stamped  
Serial Number



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 right scissor slide block channel above the right front wheel.

<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"/>
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# Forward

## Introduction

### HOW TO USE THIS MANUAL

This manual is divided into 6 sections. The right hand pages 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 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

<b>⚠ DANGER ⚠</b>
Indicates the hazard or unsafe practice <i>will</i> result in severe injury or death.
<b>⚠ WARNING ⚠</b>
Indicates the hazard or unsafe practice <i>could</i> result in severe injury or death.
<b>⚠ CAUTION ⚠</b>
Indicates the hazard or unsafe practice could result in <i>minor</i> 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.

<b>Introduction &amp; Specifications</b>	<b>1.0</b>
General description and machine specifications.	

<b>Machine Preparation &amp; Operation</b>	<b>2.0</b>
Information on how to Operate the Work Platform and how to prepare for it for operation.	

<b>Maintenance</b>	<b>3.0</b>
Preventative maintenance and service information.	

<b>Troubleshooting</b>	<b>4.0</b>
Causes and solutions to typical problems.	

<b>Schematics</b>	<b>5.0</b>
Schematics and valve block diagram with description and location of components.	

<b>Illustrated Parts Breakdown</b>	<b>6.0</b>
Causes and solutions to typical problems.	

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## 1.0 Introduction

### PURPOSE

This manual provides illustrations and instructions for the operation and maintenance of the MX15/19 Work Platforms manufactured by UpRight, Inc. Selma, California. (See Figure 1-1).

### SCOPE

This manual includes both operation and maintenance responsibilities concerning the MX15/19 Work Platform's readiness. The Maintenance Section covers scheduled maintenance, troubleshooting, repair, adjustment and replacement.

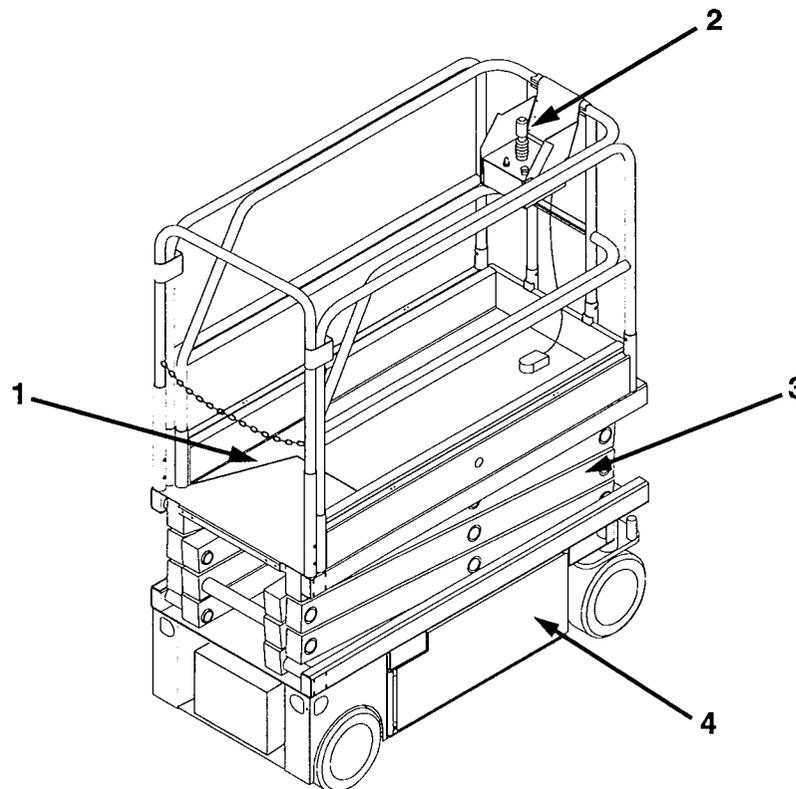
## 1.1 General Information

### DESCRIPTION

The MX15/19 Work Platforms are self-propelled aerial work platforms designed to be used as a means of elevating personnel and equipment to provide a mobile work platform. They are designed to provide mobility with the Platform in a raised or lowered position. Travel with the Platform elevated is automatically limited to the low speed range.

### PURPOSE AND LIMITATIONS

The objective of the MX15/19 Work Platforms 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.



1. Platform
2. Controller
3. Elevating Assembly
4. Chassis

Figure 1-1: MX15/19 Series Work Platform

## 1.2 Specifications\*

Table 1-1: Specifications

ITEM	MX15	MX19
Platform Size (inside Toeboards Deck extended)	28.5 in. x 97 in. (72 cm x 2.46 m)	28.5 in. x 97 in. (72 cm x 2.46 m)
Maximum Platform Capacities	550 lbs. (250 kg.) or two people	500 lbs. (227 kg.) or two people
Height		
Working Height	21 ft. (6.4 m)	25 ft. (7.62 m)
Max. Platform Height	15 ft. (4.57 m)	19 ft. (5.79 m)
Min. Platform Height	35.88 in. (91 cm)	38.88 in. (99 cm)
Weight	1,962 lbs. (890 kg)	2,160 lbs. (980 kg)
Dimensions		
Overall Width	29.75 in. (75 cm)	29.75 in. (75 cm)
Overall Height	76 in. (1.93 m)	79 in. (2.0 m)
Overall Length	62.75 in. (1.59 m)	62.75 in. (1.59 m)
Driveable Height	15 ft. (4.57 m)	19 ft. (5.79 m)
Surface Speed		
Platform Lowered	2.7 mph (4.4 km/h)	2.7 mph (4.4 km/h)
Platform Raised	.7 mph (1.2 km/h)	.7 mph (1.2 km/h)
Lift Speed	12 seconds	15 seconds
Energy Source	24V battery pack (4-220 ampere hour, 6 Volt batteries, min. wt. 62 lbs. (28.12 kg) ea. 4 HP DC electric motor	24V battery pack (4-220 ampere hour, 6 Volt batteries, min. wt. 62 lbs. (28.12 kg) ea. 4 HP DC electric motor
System Voltage	24 VDC	24 VDC
Battery Charger	25 AMP, 110 VAC, 60 Hz	25 AMP, 110 VAC, 60 Hz
Battery Duty Cycle	25% for 8 Hours	25% for 8 Hours
Hydraulic Tank Capacity	2.68 gal. (10.2 l)	2.68 gal. (10.2 l)
Hydraulic System Pressure, Max.	2500 psi (172 bar)	2700 psi (186 bar)
Hydraulic Fluid		
Normal use (>32 °F [0 °C])	ISO #46	ISO #46
Low Temp. Use (-10 to 32 °F [-23 to 0 °C])	5W-20 Motor Oil	5W-20 Motor Oil
Lift System	One Single Stage Lift Cylinder	One Single Stage Lift Cylinder
Drive Control	Proportional	Proportional
Control System	Proportional Joystick Controller with Interlock Lever, Toggle Selector Switch and Red Mushroom Emergency Stop Switch	Proportional Joystick Controller with Interlock Lever, Toggle Selector Switch and Red Mushroom Emergency Stop Switch
Horizontal Drive	Dual Front Wheel	Dual Front Wheel
Tires	12 in. (30.5 cm) diameter Solid Rubber, Non-marking	12 in. (30.5 cm) diameter Solid Rubber, Non-marking
Parking Brakes	Dual, Spring Applied, Hydraulic Release	Dual, Spring Applied, Hydraulic Release
Turning Radius (Inside)	1 in. (25 mm)	1 in. (25 mm)
Gradeability	25% (14°)	25% (14°)
Wheel Base	48.75 in. (1.24 m)	48.75 in. (1.24 m)
Guardrails	39 in. (99 cm) or 43.5 in. (1.10 m)	39 in. (99 cm) or 43.5 in. (1.10 m)
Toeboard	6 in. (152 mm)	6 in. (152 mm)

\*Specifications subject to change without notice.

Hot weather or heavy use may reduce performance.

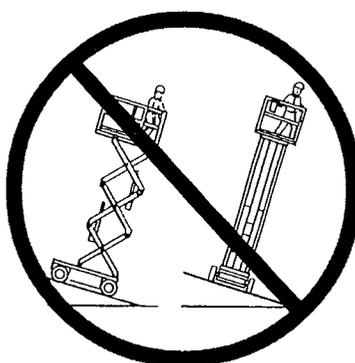
Meets or exceeds all applicable requirements of OSHA and ANSI A92.6-1999.

## 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.



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



**NEVER** elevate the platform or drive the machine while elevated unless the machine is on 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.

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

**SECURE** chain across entrance after mounting platform.

**NEVER** use ladders or scaffolding on the platform.

**NEVER** attach overhanging loads or increase platform size.

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

**DISTRIBUTE** all loads evenly on the platform. See the back cover for maximum platform loads.

**NEVER** use damaged equipment. (Contact UpRight for instructions. See toll free number on back cover.)

**NEVER** change operating or safety systems.

**INSPECT** the machine thoroughly for cracked welds, loose hardware, hydraulic leaks, damaged control cable, loose wire connections and wheel bolts.

**NEVER** climb down elevating assembly with the platform elevated.

**NEVER** perform service on machine while platform is elevated without blocking elevating assembly.

**NEVER** recharge batteries 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 written consent.

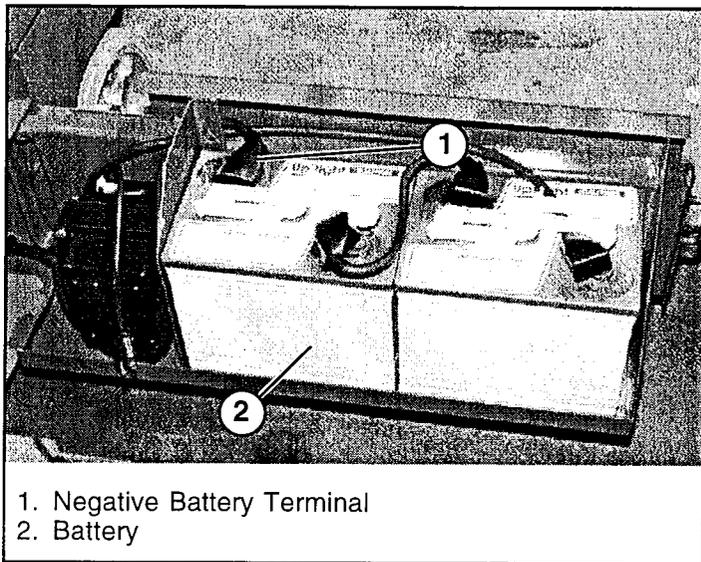
**NOTE:** Read and familiarize yourself with all operating instructions before attempting to operate the Work Platform.

### 2.1 Preparation for Use

#### ⚠ CAUTION ⚠

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

1. Remove the metal banding from the machine.
2. Lift the front of the machine and remove the banding and blocks from the front wheels.
3. Lower the machine.
4. Connect the negative (-) lead to the negative (-) battery terminal in power module (Figure 2-1).



1. Negative Battery Terminal
2. Battery

Figure 2-1: Battery

### 2.2 Transporting Work Platform

#### By Forklift

**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 side or rear using fork pockets provided (Figure 2-2).

#### By Crane

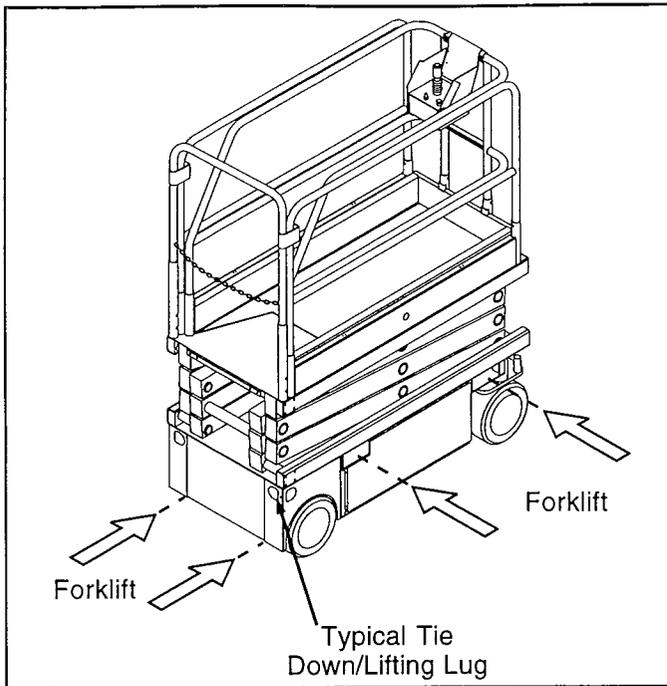
1. Secure straps to chassis lifting/tie down points only (Figure 2-2).

#### By Truck

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 lifting/tie down points (Figure 2-2).

#### ⚠ CAUTION ⚠

Overtightening of chains or straps through tie down lugs may result in damage to work platform.



**Figure 2-2: Transporting Work Platform**

## 2.3 Preparation for Shipment

1. Grease all the grease fittings (see *Section 4.4*).
2. Fully lower the platform.
3. Disconnect the battery negative (-) lead from the battery terminal (Figure 2-1).
4. Band the controller to the front guardrail.
5. Band the elevating linkage to the frame.

## 2.4 Storage

No preparation for storage is required when the work platform is in normal usage. Regular maintenance procedures should continue to be performed (see Figure 4-1 and Table 4-1).

If the work platform is to be placed in long term storage (dead storage), follow the recommended preservation procedures, below.

### **PRESERVATION**

1. Clean painted surfaces. If the paint is damaged, repaint.
2. Fill the hydraulic tank to operating level, fluid will be visible at the Sight Gauge. **DO NOT** fill the hydraulic tank while the platform is elevated.

**NOTE: DO NOT drain the hydraulic system prior to long term storage.**

3. Coat exposed portions of extended cylinder rods with a preservative such as multipurpose grease and wrap with barrier material.
4. Coat all exposed unpainted metal surfaces with preservative.
5. Service the engine according to the manufacturer's recommendations.

### **BATTERY**

1. Disconnect the battery negative (-) cable and secure to the chassis.
2. Disconnect the remaining battery leads and secure to the chassis.
3. Remove the battery and place in alternate service.

## 2.5 Pre-Operation and Safety Inspection

Read, understand and follow all safety rules and operating instructions and then perform the following steps each day before use.

1. Open modules and inspect for damage, oil leaks or missing parts.
2. Check the level of the hydraulic oil with the platform fully lowered. The hydraulic reservoir is located at the rear of the machine. Remove the reservoir cap, oil should be visible on the dipstick. Add ISO #46 hydraulic oil if necessary.
3. Check that fluid level in the batteries is correct.
4. Verify that the batteries are charged.
5. Check that A.C. extension cord has been disconnected from the plug in the right Chassis Module and the module door secured .
6. Check that all guardrails are in place and all fasteners are properly tightened.
7. 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.
8. Move machine, if necessary, to unobstructed area to allow for full elevation.
9. Turn Chassis and Platform Emergency Stop Switches ON (Figure 2-3 & 2-4) by pulling the button out.
10. Turn Chassis Key Switch to **CHASSIS**.
11. Push Chassis Lift Switch to **UP** position and fully elevate platform.

12. Visually inspect the elevating assembly for damage or erratic operation. Check for missing or loose parts.
13. Verify that pothole protection supports have rotated into position under machine.
12. Partially lower the platform by pushing Chassis Lift Switch to **DOWN**, and check operation of the audible lowering alarm.
13. Open the Chassis Emergency Lowering Valve (Figure 2-5) to check for proper operation, by pulling the knob out. When the platform is lowered, release the knob.
14. Turn the Chassis Key Switch to **DECK**.
15. Close and latch module doors.
16. Check that route is clear of persons, obstructions, holes and drop-offs, level and capable of supporting the wheel loads.
17. After mounting platform latch chain across entrance.
18. Pull Emergency Stop Button out to the ON position.
19. Position Drive/Lift Switch to **DRIVE**.
20. While depressing the Interlock Lever, slowly position the Control Lever to **FORWARD** then **REVERSE** to check for speed and directional control. The farther you push or pull the Control Lever from center the faster the machine will travel.
21. Push Steering Switch RIGHT then LEFT to check for steering control.
22. Push the Emergency Stop Switch Button.

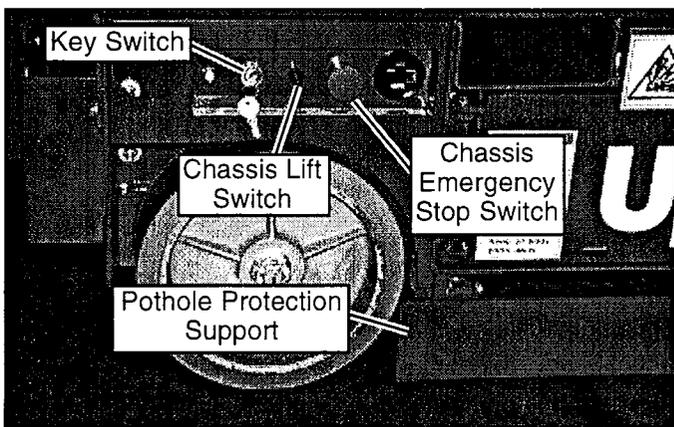


Figure 2-3: Chassis, Right Side

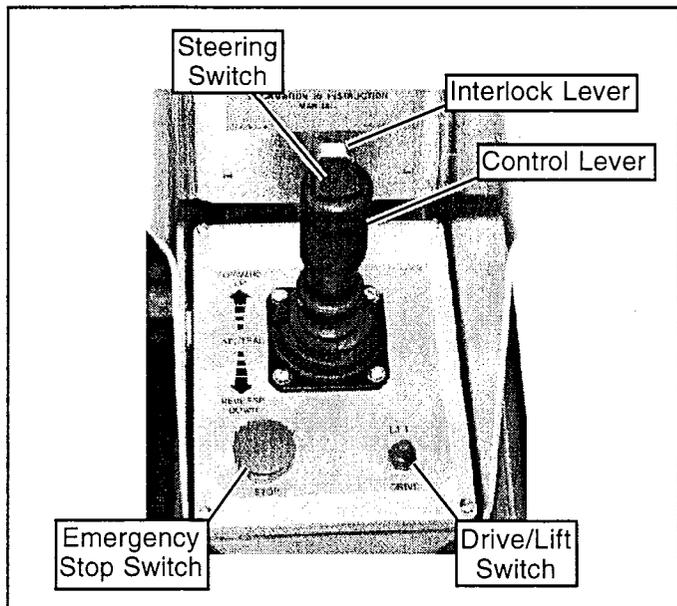


Figure 2-4: Controller

## 2.6 Operation

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

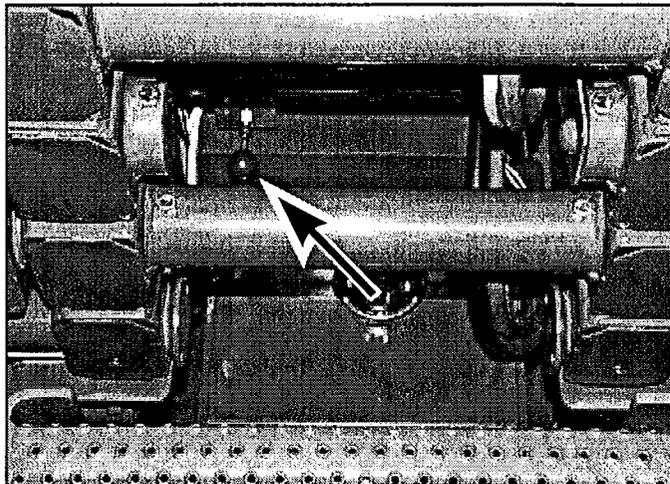
### *Travel With Platform Lowered*

1. Check that route is clear of people, obstructions, holes and drop-offs, is level and is capable of supporting wheel loads.
2. Verify Chassis Key Switch is turned to **DECK** and Chassis Emergency Stop Switch is ON, pull button out.
3. After mounting platform lower top guardrail and latch chain across entrance.
4. Check clearances above, below and to the sides of platform.
5. Pull Controller Emergency Stop Button out to ON position. When button is pushed down Emergency Stop Switch will automatically go to OFF position.
6. Position Drive/Lift Switch to **DRIVE**.
7. While depressing the Interlock Lever, slowly push or pull the Control Lever to **FORWARD** or **REVERSE** position to travel in the desired direction. The farther you push or pull the Control Lever from center the faster the machine will travel.

### *Steering*

1. Position Drive/Lift Switch to **DRIVE**.
2. While depressing the Interlock Lever, push the Steering Switch 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.**



**Figure 2-5: Emergency Lowering Valve Knob**

### *Elevating Platform*

1. Position Drive/Lift Switch to **LIFT**.
2. While depressing the Interlock Lever, push Control Lever forward to **UP**, the farther you push the Control Lever the faster the Platform will elevate.
3. If the machine is not level the Tilt Alarm will sound and the machine will not lift or drive. **If Tilt alarm sounds the platform must be lowered and the machine moved to a level location before attempting to re-elevate the Platform.**

**NOTE:** Pothole protection will automatically lower when platform is raised and automatically raise when platform is lowered completely and driven.

### *Travel With Platform Elevated*

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

1. Check that route is clear of persons, obstructions, holes and drop-offs, is level and capable of supporting the wheel loads.
2. Check clearances above, below and to the sides of platform.
3. Position Drive/Lift Switch to **DRIVE** position.
4. While depressing the Interlock Lever, push Control Lever to **FORWARD** or **REVERSE** for desired direction of travel.
5. If the machine is not level the Tilt Alarm will sound and the machine will not lift or drive. **If the Tilt Alarm sounds the platform must be lowered and the machine moved to a level location before attempting to re-elevate the platform.**

### Lowering Platform

1. Position Drive/Lift Switch to **LIFT**.
2. While depressing the Interlock Lever, pull back on the Control Lever.

### Emergency Lowering

<b>▲ WARNING ▲</b>
If the platform should fail to lower, <b>NEVER</b> climb down the elevating assembly.

The Emergency Lowering Valve Knob is located between the scissors at the rear of the machine.

1. Open the Emergency Lowering Valve by pulling and holding the knob.
2. To close, release the knob.

The platform will not elevate if the Emergency Lowering Valve is open.

### 2.7 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** and remove the key to prevent unauthorized operation.

### 2.8 Parking Brake Release (Figure 6)

Perform the following only when the machine will not operate under its 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.

The Brake Adjustment/Release Bolt is located at the rear of the machine between the rear wheels.

1. To release the brakes loosen the jam nut and bolt until the brakes disengage from the tires.
2. The machine will now roll when pushed or pulled.
3. To re-engage the brakes tighten the bolt until the brakes have fully engaged the tires, secure the bolt with the locknut. Be sure to verify that the brakes have fully engaged the rear tires before the machine is operated.

<b>▲ WARNING ▲</b>
Never operate work platform with the Parking Brakes released. Serious injury or damage could result.
Never tow faster than 1 ft./sec. (.3m/sec.).

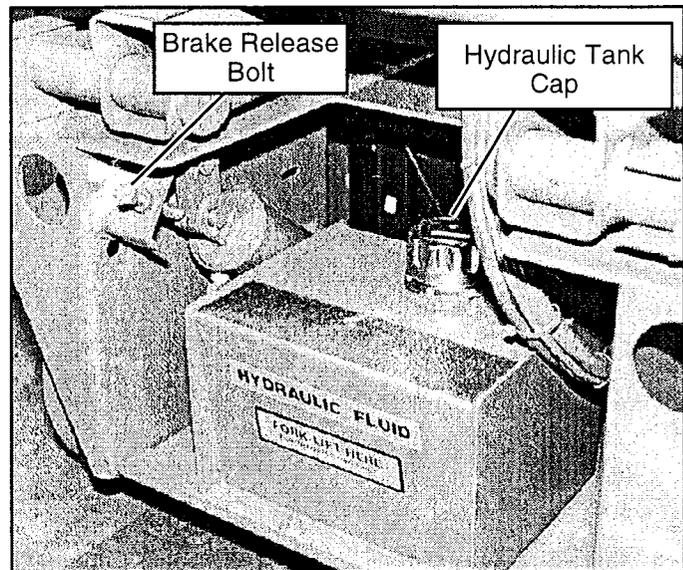


Figure 2-6: Chassis Rear View



## DANGER



Never perform service on the work platform in the Elevating Assembly area while the platform is elevated without first blocking the Elevating Assembly.

### 2.9 Blocking Elevating Assembly (Figure 2-7)

#### Installing Scissors Brace

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 Switch to **UP** and elevate platform approximately 7 Ft. (2.1 m).
5. Rotate Scissor Brace to a vertical position.
6. Lower Platform until end of Scissor Arm Weldment rests on Brace.

#### Storage

1. While holding the Brace, Slowly raise the Platform using the Chassis Controls until the end of the Scissor Arm Weldment clears the Scissor Brace.
2. Rotate Scissor Brace forward to rest on Chassis.

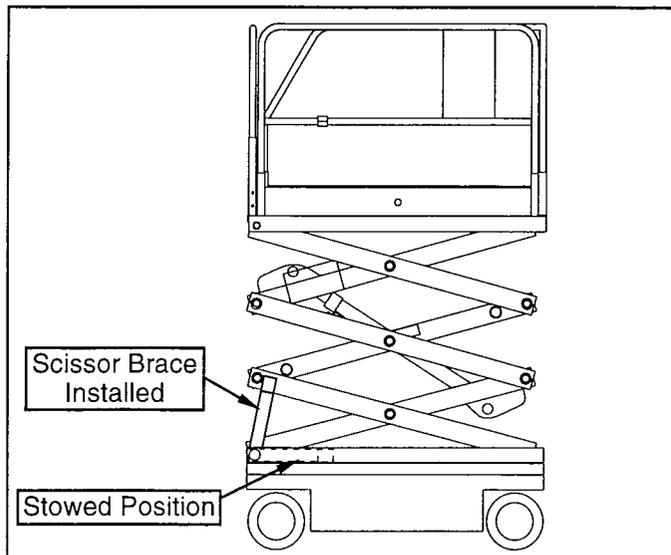


Figure 2-7: Blocking Elevating Assembly

## 2.10 Battery Maintenance

**⚠ WARNING ⚠**

Hazard of explosive gas mixture. Keep sparks, flame and smoking materials away from batteries.

Always wear safety glasses when working with batteries.

Battery fluid is highly corrosive. Rinse away any spilled fluid thoroughly with clean water.

Always replace batteries with UpRight batteries or manufacturer approved replacements weighing at least 62 lbs. (28 kg) each.

Check battery fluid level daily, especially if work platform is being used in a warm, dry climate.

If electrolyte level is lower than  $\frac{3}{8}$  in. (10 mm) above plates add distilled water **only**. DO NOT use tap water with high mineral content it will shorten battery life.

Keep terminals and tops of batteries clean.

Refer to the Service Manual to extend battery life and for complete service instructions.

## 2.11 Battery Charging

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

**⚠ WARNING ⚠**

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.

1. Check battery fluid level. If electrolyte level is lower than  $\frac{3}{8}$  in. (10 mm) above plates add distilled water **only**.
2. Connect extension cord to charger outlet plug in Left Chassis Door. Connect extension cord (12 guage conductor minimum and 50 ft. (15 m) in length maximum) 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 turns off automatically when batteries are fully charged, the LED charge indicator will blink.

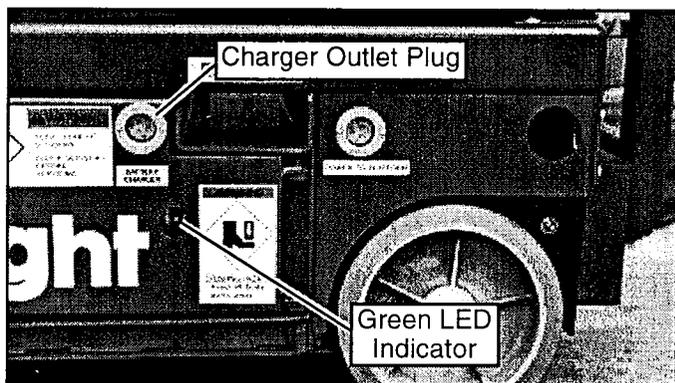


Figure 2-8: Chassis Module, Left Side

## 3.0 Introduction

This section contains instructions for the maintenance of the MX15/19 Work Platforms. Procedures for the operational checkout adjustment, scheduled maintenance, and repair/removal are included.

Referring to *Section 2.0* will aid in understanding the operation and function of the various components and systems of the MX15/19 Work Platforms and help in diagnosing and repair of the machines.

### **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
Inclinometer	010119-000
Gauge, 0-3000 psi	014124-030
Fitting, Quick Disconnect	063965-002
Deutsch Field Kit (Small)	030899-000
Deutsch Field Kit (Large)	030898-000

## 3.1 Preventative Maintenance (Table 3-1)

The complete inspection consists of periodic visual and operational checks, together with all necessary minor 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 use the Elevating Assembly brace whenever it is necessary to enter the Elevating Assembly 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 this table as a checklist when inspecting a machine for service.**

## Preventative Maintenance Table Key

### Interval

- Daily=each shift or every day
- 50h/30d=every 50 hours or 30 days
- 250h/6m=every 250 hours or 6 months
- 1000h/2y=every 1000 hours or 2 years

**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	50h/30d			
	Clean exterior	250h/6m			
	Clean terminals	250h/6m			
Hydraulic Oil	Check oil level	Daily			
	Change filter	250h/6m			
	Drain and replace oil (ISO #46)	1000h/2y			
Hydraulic System	Check for leaks	Daily			
	Check hose connections	50h/30d			
	Check for exterior wear	50h/30d			
Emergency Hydraulic System	Open the emergency lowering valve and check for serviceability	Daily			
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			
Hydraulic Pump	Check for hose fitting leaks	Daily			
	Wipe clean	50h/30d			
	Check for leaks at mating surfaces	50h/30d			
	Check mounting bolts for proper torque	50h/30d			
Drive Motors	Check for operation and leaks	Daily			
Steering System	Lubricate pivot pins	250h/6m			
	Lubricate king pins	250h/6m			
	Check steering cylinder for leaks	50h/30d			
	Check hardware & fittings for proper torque	250h/6m			
Elevating Assembly	Inspect for structural cracks	Daily			
	Check pivot bearings for wear	50h/30d			
	Check pivot pin mounting bolts for proper torque	50h/30d			
	Check Scissor Arms for bending	250h/6m			
Chassis	Check hoses for pinch or rubbing points	Daily			
	Check welds for cracks	Daily			
	Check tires for damage	Daily			
	Check component mounting for proper torque	250h/6m			
Lift Cylinder	Check cylinder rod for wear	50h/30d			
	Check pivot pin retaining bolts	50h/30d			
	Check seals for leaks	50h/30d			
	Check pivot points for wear	50h/30d			
	Check fittings for proper torque	50h/30d			
Entire Unit	Perform pre-operation inspection	Daily			
	Check for and repair collision damage	Daily			
	Lubricate	50h/30d			
	Check fasteners for proper torque	250h/6m			
	Check for corrosion-remove and repaint	250h/6m			
Labels	Check for peeling, missing, or unreadable labels & replace	Daily			

## 3.2 Blocking Elevating Assembly

**⚠ DANGER ⚠**

Never perform service on the work platform in the Elevating Assembly area while Platform is elevated without first blocking the Elevating Assembly.

DO NOT stand in Elevating Assembly area while installing or removing brace.

### BRACE 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 Switch to UP and elevate Platform approximately seven (7) feet (2.1 m) for the MX15 or nine (9) feet (2.7 m) for the MX19.
5. Rotate Scissors Brace towards the rear, holding it perpendicular to the scissor tube.
6. Push Chassis Lift Switch to DOWN position and gradually lower Platform until the scissor tube rests on the brace.

### BRACE REMOVAL

1. Push Chassis Lift Switch to UP position and gradually raise Platform until the Scissors Brace will clear the scissor tube.
2. Rotate Scissors Brace towards the front so that it rests on the Chassis.
3. Push Chassis Lift Switch to DOWN position and completely lower platform.
4. Turn Chassis Key Switch to **DECK**.

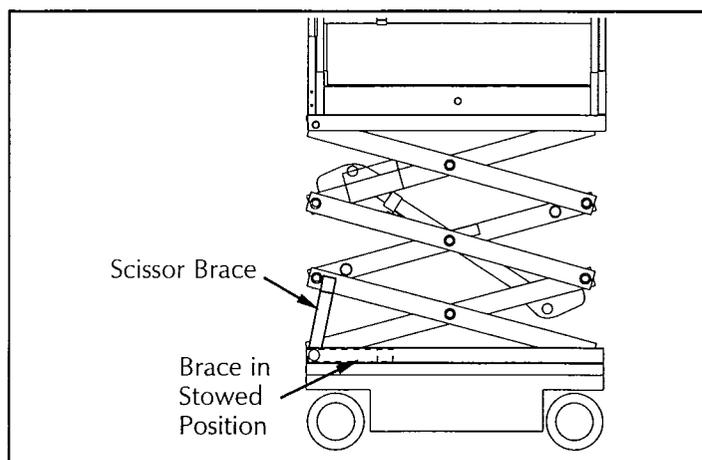


Figure 3-1: Blocking the Elevating Assembly

## 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.

**⚠ WARNING ⚠**

Hazard of explosive gas mixture. Keep sparks, flame and smoking materials away from batteries.

Always wear safety glasses when working with batteries.

Battery fluid is highly corrosive. Rinse away any spilled fluid thoroughly with clean water.

### 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.

**⚠ CAUTION ⚠**

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.

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 clear water. Clean battery and cable contact surfaces to a bright metal finish whenever a cable is removed.

**BATTERY CHARGING**

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 65°F (18°C) batteries charged in unheated areas should be placed on charge 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  $\frac{3}{8}$  in. (10 mm) above plates add distilled water only.
2. The battery charger is located inside the left chassis door. Connect extension cord (12 guage (1.5 mm<sup>2</sup>) conductor minimum and 50 ft. (15 m) in length maximum) to the charger cord or to the outlet plug located in the left chassis door. 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 indicator will come on.
4. Charger switches to trickle charge automatically when batteries are fully charged, the LED 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 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.

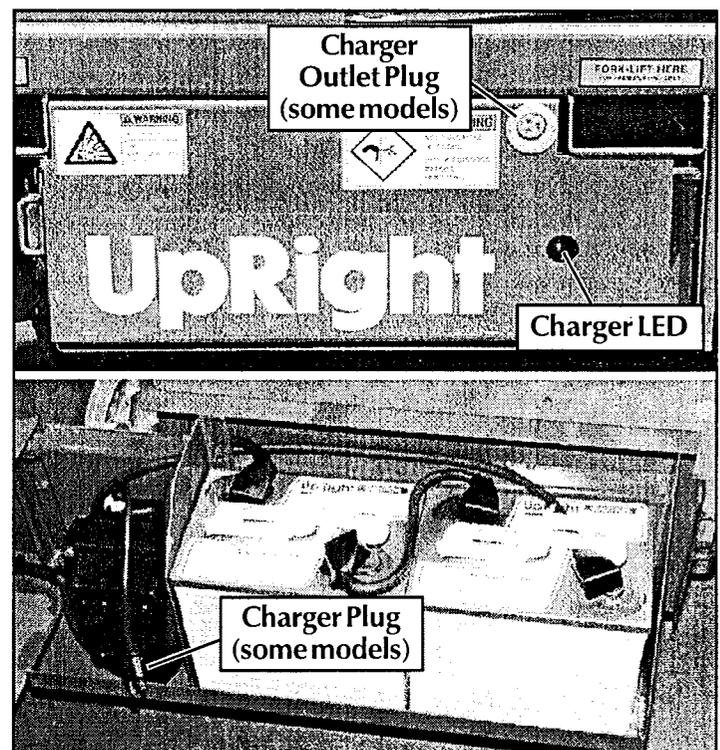


Figure 3-2: Battery Charger

## 3.4 Lubrication

### STEERING LINKAGE

Apply two to three drops of oil to each king pin or linkage bearing.

### HYDRAULIC OIL TANK AND FILTER

#### Fluid Level

With the Platform fully lowered, open the Left Module and remove the reservoir cap, oil should be visible on the dipstick.

#### 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 2.68 gal. (10.2 liter) capacity.
3. Remove the drain plug (the hydraulic tank is located at the rear of the machine) and allow all oil to drain. Dispose of hydraulic fluid properly, contact your local oil recycler.
4. Clean magnet on drain plug and reinstall.
5. Unscrew the filter (located under valve block, easiest access is through the right module) from the filter assembly.
6. Apply a thin film of clean hydraulic oil to the gasket of the replacement filter.
7. Screw the replacement filter onto the filter head until the gasket makes contact, then rotate the filter  $\frac{3}{4}$  of a turn further.
8. Fill the hydraulic reservoir with hydraulic oil until the oil is visible on the dipstick, do not fill above the lower line on the dipstick. Hydraulic tank has a 2.68 gal. (10.2 liter) capacity.

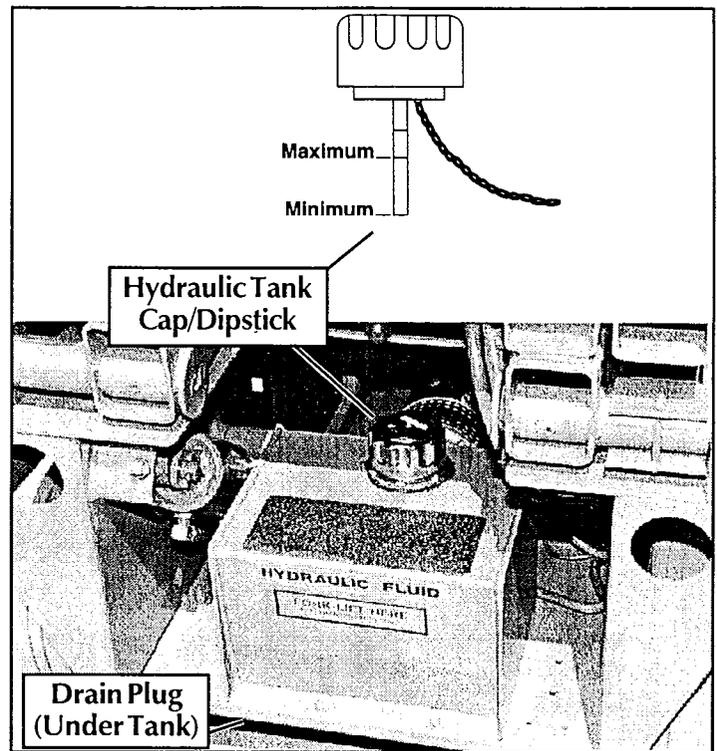


Figure 3-3: Hydraulic Oil Tank

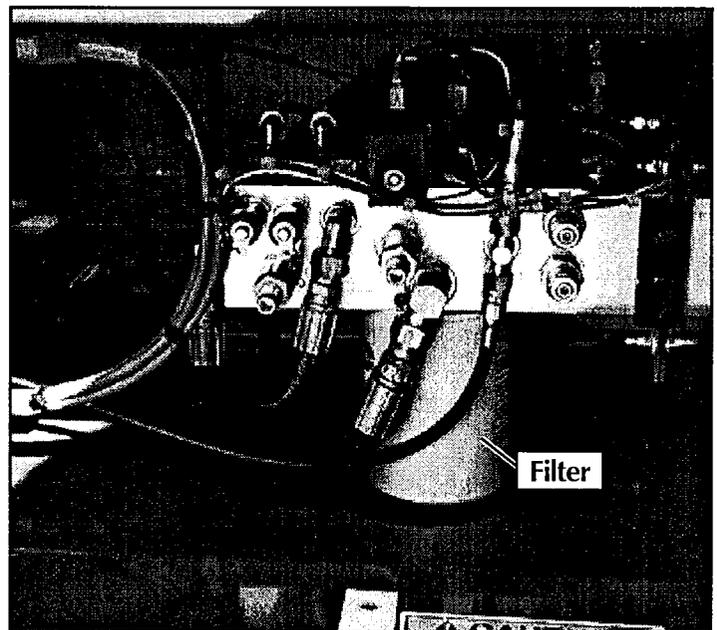


Figure 3-4: Hydraulic Oil Filter

### 3.5 Setting Hydraulic Pressures

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.

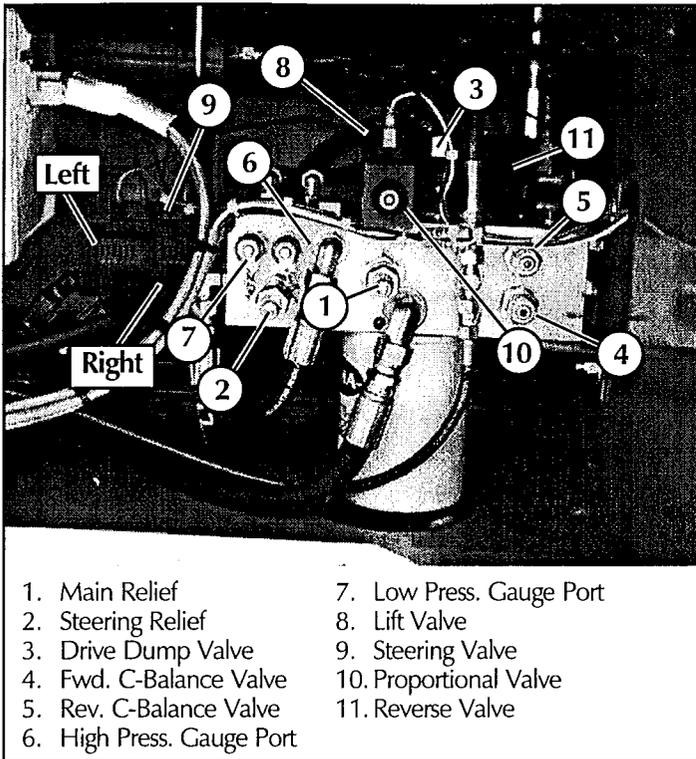
The oil in the hydraulic system is under very high pressure which can easily cause severe cuts. **Obtain medical assistance immediately if cut by hydraulic oil.**

#### STEERING RELIEF VALVE

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Install gauge in low pressure gauge port.
3. Loosen locknut or remove cover on the Steering Relief Valve and turn adjusting screw counterclockwise 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 gauge reads 1200 psi (82.7 bar).
5. Tighten locknut or replace Steering Relief Valve cover and torque to 6 Ft/Lbs (8 Nm).
6. Remove gauge and replace cap.

#### MAIN (LIFT) RELIEF VALVE

1. Operate the hydraulic system 10-15 minutes to warm the oil.
2. Loosen locknut or remove cover on the Main Relief Valve and turn adjusting screw counterclockwise 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 Main 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 Main Relief Valve cover and torque to 6 Ft/Lbs (8 Nm.).



**Figure 3-5: Hydraulic Manifold**

## COUNTERBALANCE VALVES

1. Operate the work platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Remove high pressure gauge port cap and install the pressure gauge assembly.
3. Remove the red Control Cable wire from terminal #A6.
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 or Interlock Lever 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 gauge indicates 800 psi (55 bar).
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 gauge indicates 800 psi (55 bar).
10. Check the settings by slowly moving the Control Lever **FORWARD**, then **REVERSE** checking the gauge to ensure pressures are properly set. Readjust as needed.
11. Tighten locknuts on valves to 6 Ft/Lbs (8 Nm). Remove blocks and lower work platform to ground.
12. Reconnect the red Control Cable wire to the proper terminal.
13. Remove the gauge from the gauge port and reinstall cap.
14. Check for proper operation of the drive system and brake.

### 3.6 Switch Adjustments

#### ⚠ WARNING ⚠

Always use the Elevating Assembly Brace whenever it is necessary to enter the Elevating Assembly when the Platform is elevated.

## TILT SENSOR

### Introduction

The Tilt Sensor has three wires; red-power (24 v in), black-ground, white-output (24 v 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' (24 v out).

### Adjustment

1. Place machine on firm level surface  $\pm 1/4^\circ$ .
2. Use the Inclinator (P/N: 10119-000-00) to ensure front and rear of Chassis is level  $\pm 1/4^\circ$ .
3. Use the Chassis Controls to raise Platform to approximately 9 feet (2.7 m).
4. Install the Scissors Brace, see page 3-3.
5. Remove Tilt Sensor Electrical Box cover at front of machine.
6. Adjust the three leveling locknuts until the bubble is centered in the circle on the attached bubble level.
7. Replace the Tilt Sensor Electrical Box cover.
8. Store the Scissors Brace and lower the Platform.

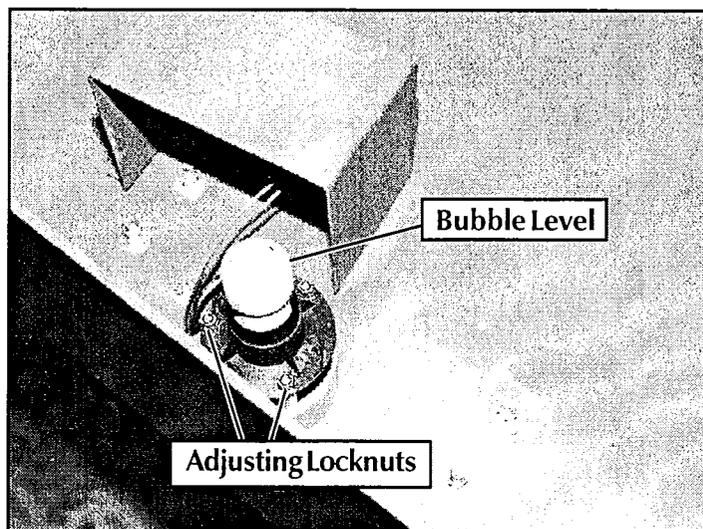


Figure 3-6: Tilt Sensor Adjustment

## DOWN LIMIT SWITCH

The Down Limit Switch cuts power to the High Speed Circuit and supplies power to the Tilt Sensor Circuit when the Platform is elevated. The Down Limit Switch is a proximity switch that uses a magnet to close the switch. The switch is located on the left side of the Tilt Sensor Electrical Box at the front of the machine. The magnet is mounted on a bracket attached to the lower inner scissor arm assembly.

Down limit adjustment for MX15 - 35 inches for MX19 - 45 inches.

No adjustment of the switch should be necessary. If for some reason the switch fails to close when the Platform is down, bend the bracket, the magnet is mounted on, just enough to actuate the switch. DO NOT allow the magnet to hit the switch.

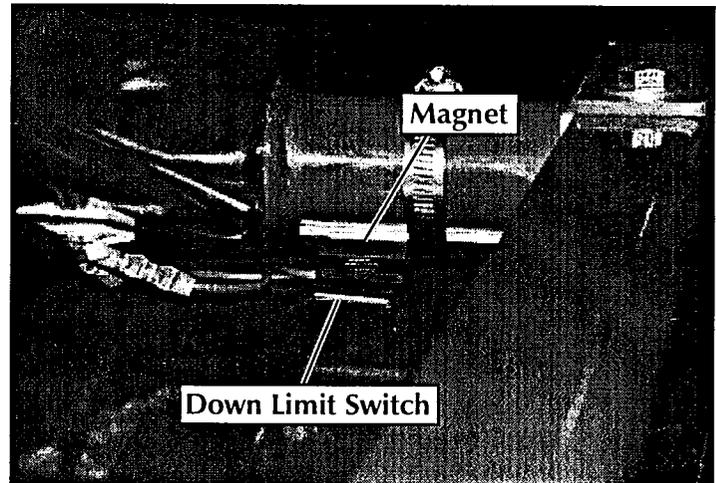


Figure 3-7: Down Limit Switch

## UP LIMIT SWITCH

The Up Limit Switch cuts power to the Lift (Up) Solenoid when the Platform is fully elevated, preventing the Lift Cylinder from 'bottoming out'. The Up Limit Switch is a mercury switch that is located just in front of the right rear scissor pivot on the lower inner scissor assembly.

To adjust the switch, disconnect the wires to the switch and install a jumper, connecting the wires together. Slowly, elevate the Platform to full height. Place a mark on the Chassis where the scissor slide block currently is. Lower the Platform just enough to move the slide block  $1/4$ - $1/2$  in. (7-13 mm), mark this location. Install a continuity tester or ohmmeter across the Up Limit Switch. Rotate the switch until it just opens, secure the switch with the mounting screw and reconnect the wires to the switch.

Lower and raise the Platform to verify the adjustment, the slide block should stop at the second mark on the Chassis.

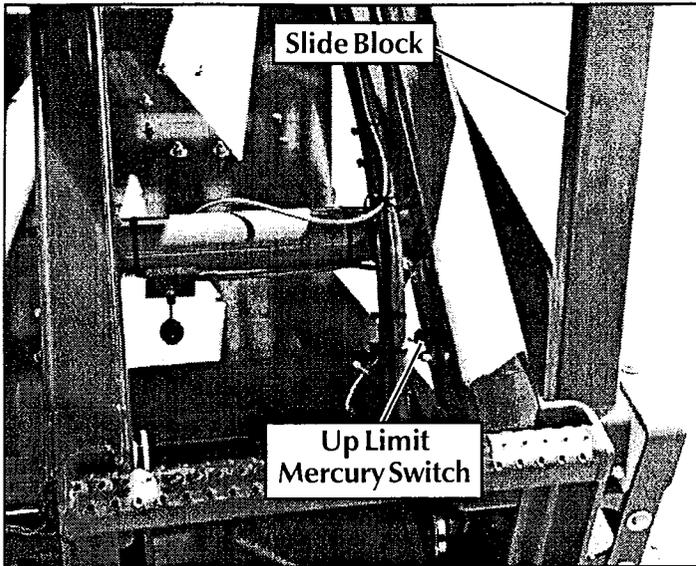


Figure 3-8: Up Limit Switch Adjustment

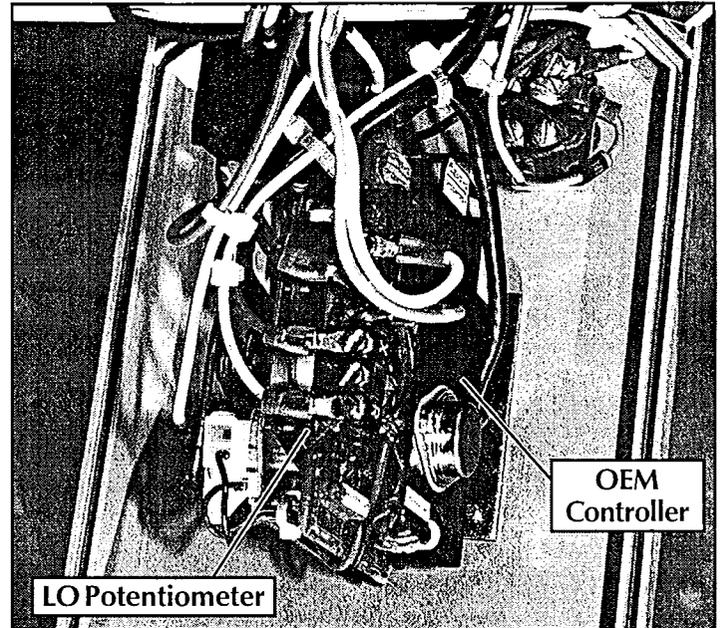


Figure 3-9: OEM Proportional Controller Adjustment

## OEM Controller

To perform the adjustment the Controller (Control Box) must be opened by removing the screws at the corners of the Controller and rotating the top forward to expose the proportional controller. Remove the potting material from the LO potentiometer adjustment screw if necessary.

**Only the LO potentiometer might require adjustment, DO NOT attempt to adjust the other potentiometers as they are preset at the factory.**

1. Select Lift with Drive/Lift Switch and elevate Platform.

**IMPORTANT: Platform must be raised above limit switch cut out before adjusting controller.**

2. Select Drive with Drive/Lift Switch.
3. Push Control Lever fully to **FORWARD** or **REVERSE** and check that machine speed is 20 ft. (6.1 m) in 35-37 seconds.
4. Adjust 'LO' trim pot if required, turning clockwise increases speed.

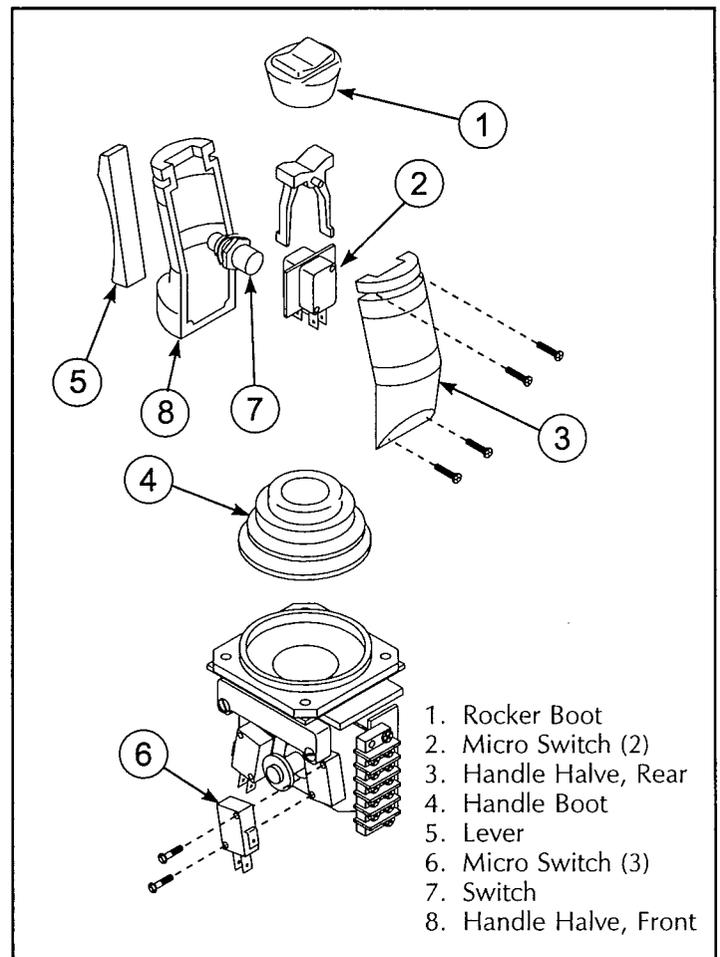


Figure 3-10: Proportional Controller  
(Refer to page 6-34 for repair parts list)

### 3.7 Hydraulic Manifold (Figure 3-11)

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. Tag and disconnect the solenoid valve leads.
2. Tag, disconnect and plug hydraulic hoses.
3. Remove the bolts that hold the manifold to the mounting bracket, being careful not to damage the ground wires.
4. Remove manifold block.

#### DISASSEMBLY

**NOTE: Mark all components as they are removed so as not to confuse their location during assembly. Refer to Figure 3-11 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 and plugs.

#### 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.**

1. Install fittings and plugs.
2. Install counterbalance valves, relief valves, solenoid valves and spool valves.

**Note: Refer to Table 3-2 (page 3-18) for the proper torque values when installing any hydraulic component.**

3. Install coils on solenoid valves.

#### INSTALLATION

**Note: Refer to Table 3-2 (page 3-18) for hydraulic component torque specifications.**

1. Attach manifold assembly to mounting brackets with bolts, make sure all the ground wires are attached with the right hand bolt.
2. Connect solenoid leads (as previously tagged).
3. Connect hydraulic hoses. Be certain to tighten hoses to manifold.
4. Operate each hydraulic function and check for proper function and leaks.
5. Adjust all hydraulic pressures according to instructions in *Section 3.5*.

1. Valve Block
2. Filter
3. Filter Adapter
4. Plug, 9MM Expander
5. Valve, Steering
6. Valve, Lift & Valve, Reverse
7. Valve, Drive Dump
8. Valve, Main Relief & Valve, Steering Relief
9. Valve, Counterbalance
10. Plug, Cavity
11. Fitting, 90° Elbow
12. Plug, #4
13. Fitting, 90° Long
14. Fitting, Straight
15. Fitting, 90° Elbow
16. Plug, Cavity
17. Connector, Gauge
18. Fitting, 90° Elbow
19. Valve Block, Proportional
20. Valve, Proportional
21. O-Ring
22. Screw, Soc Hd Cap 10-24 X 2
23. Fitting, 45° Elbow
24. Fitting, 90° Elbow
25. Fitting, 90° Elbow
26. Fitting, 90° Elbow
27. Fitting, Tee
28. Valve, Pothole
29. Valve, Check
30. Fitting, 90° Elbow
31. Fitting, 90° Elbow
32. Fitting, Straight

**NOTE: Refer to parts section for part numbers.**

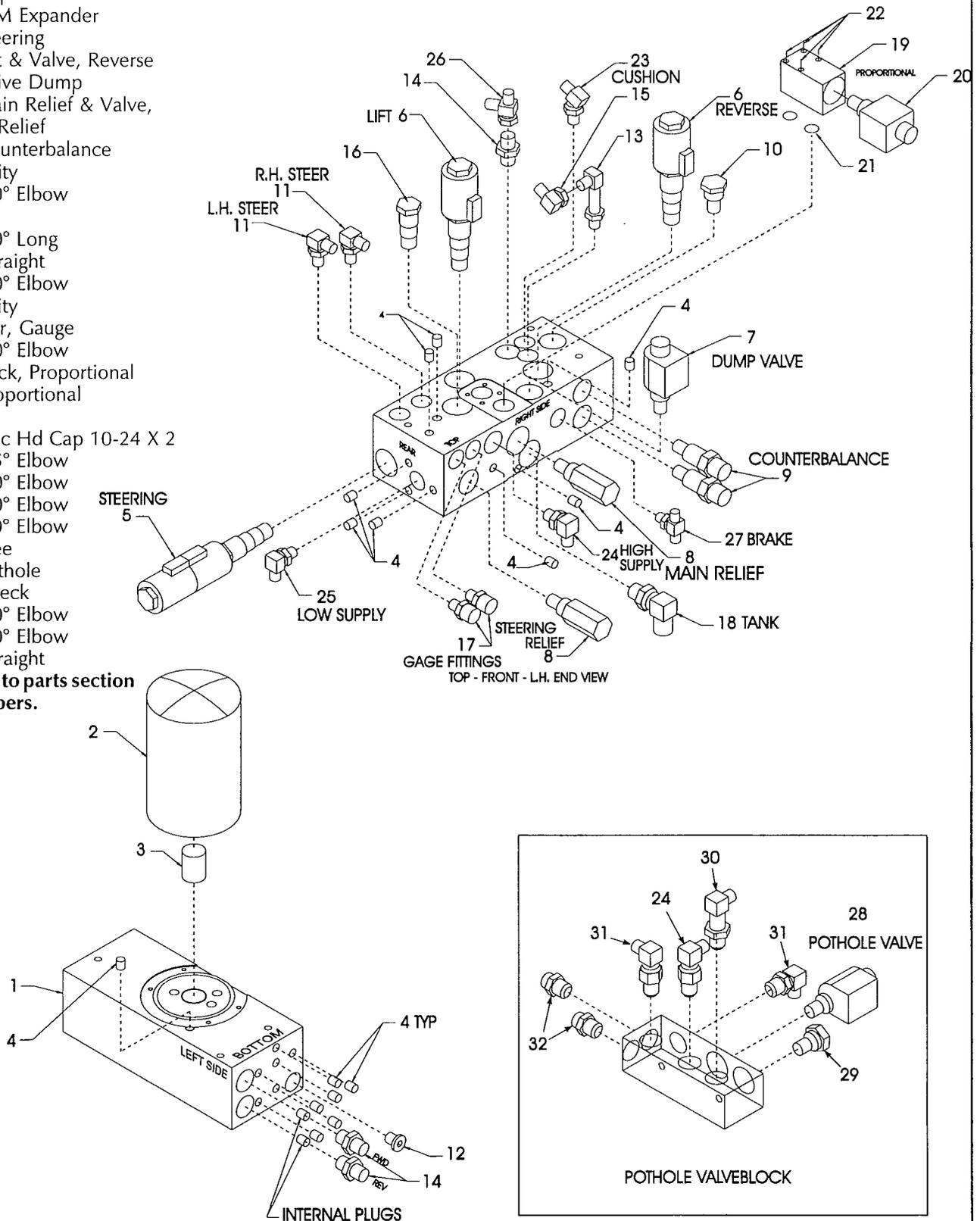


Figure 4-11: Hydraulic Manifold, Exploded View

## 3.8 Hydraulic Pump MX15/19 Pothole Domestic

### 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 20 Ft/Lbs (27 Nm).
3. Unplug and reconnect the hydraulic hoses.
4. Check the oil level in the hydraulic tank before operating the work platform.

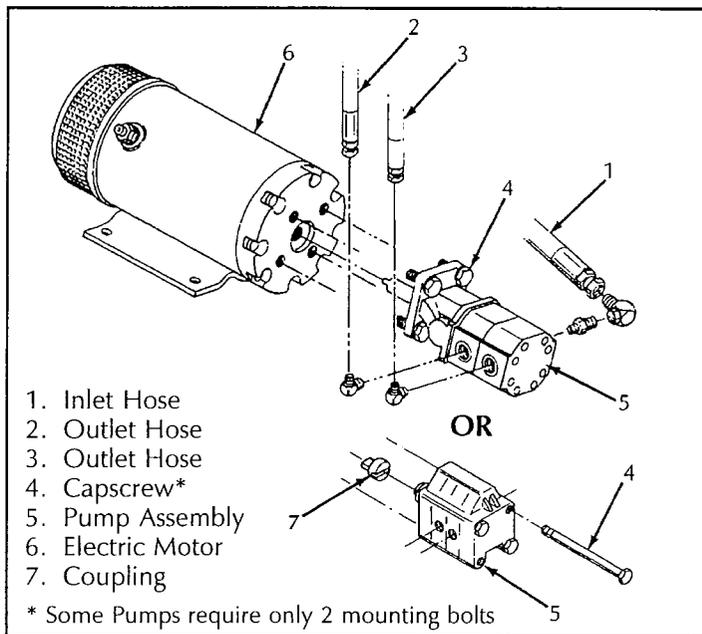


Figure 3-12: Hydraulic Pump

## 3.9 Hydraulic Drive Motors and Hubs

### REMOVAL

1. Use a 1 ton (1000 Kg) capacity jack to raise the front of the machine. Position blocks under the 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, slotted nut, wheel and shaft key.

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

4. Tag, disconnect and plug the hose assemblies to prevent foreign material from entering.
5. Remove the locknuts, capscrews and drive motor.

### INSTALLATION

1. Position the drive motor in the wheel yoke and secure with capscrews and locknuts.
2. Install the shaft key, wheel and slotted nut. Torque the slotted nut to 75 Ft/Lbs (102 Nm). Install a new cotter pin, **DO NOT** back-off the nut to install the cotter pin.
3. Remove the plugs from the hose assemblies and connect to the drive motor.
4. Remove blocks, lower the jack and remove. Operate the drive system and check for leaks.

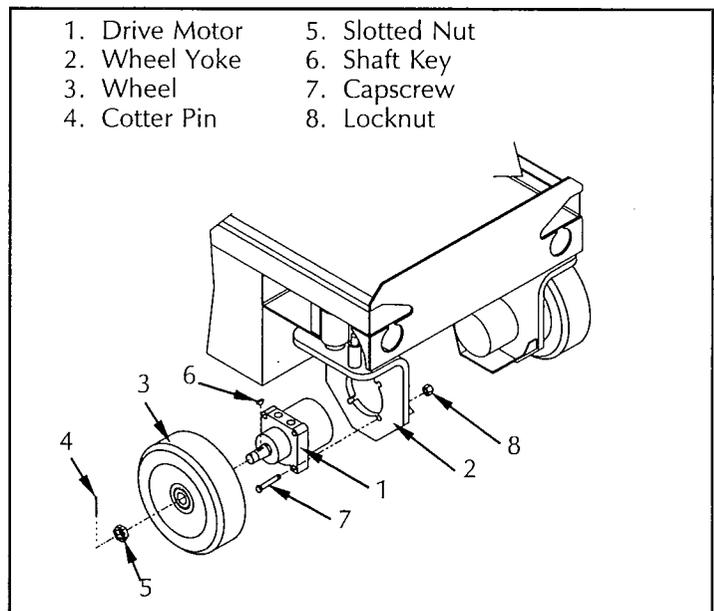


Figure 3-13: Drive Motor Installation

## 3.10 Brake Cylinder

The brake cylinder is located between the rear wheels at the rear of the chassis.

### REMOVAL

1. Block the wheels to prevent the work platform from rolling when the brake is removed.
2. Remove the adjustment nut and bolt.
3. Tag and disconnect the hose assemblies and cap the openings to prevent foreign material from entering.
4. Remove the shoulder bolt and locknut that mounts the cylinder rod to the brake tube.
5. Remove the cotter pin and pivot pin from the rear cylinder mount. Remove the cylinder.

### DISASSEMBLY

1. Remove the set screw from the outside barrel assembly and unscrew the cylinder.
2. Completely disassemble the cylinder including removing the piston nut and piston.
3. Remove all the seals and o-rings noting their location to aid in re-assembly.

### CLEANING AND INSPECTION

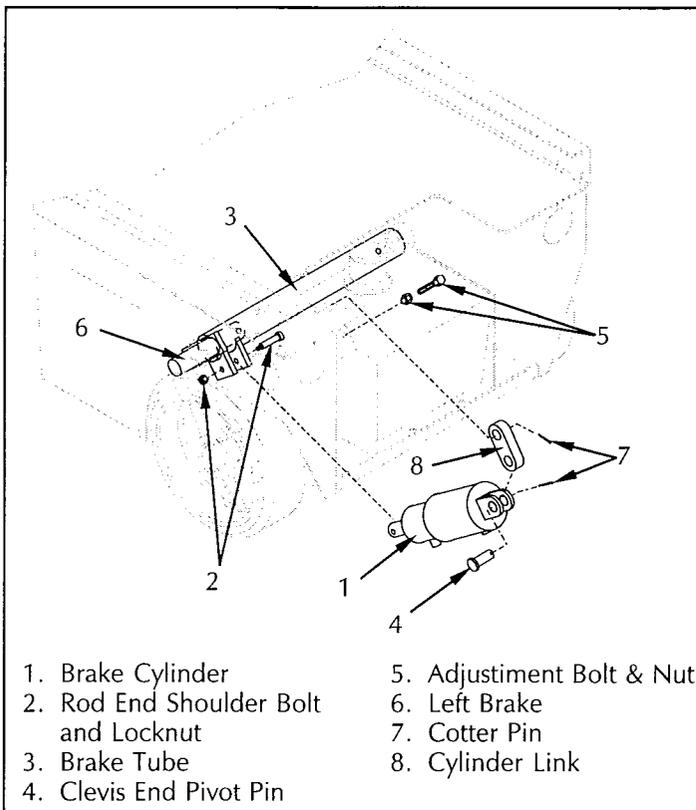
1. Wash all the metal parts in cleaning solvent and blow dry with filtered compressed air.
2. Inspect all the threaded components for stripped or damaged threads.
3. Check the inside surface of the cylinder barrel for scoring or excessive wear.
4. Check the piston and headcap for scoring or excessive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

### ASSEMBLY

1. Lubricate and install new seals and O-rings.
2. Install the headcap onto the shaft.
3. Install the new internal backup rings and O-rings on the piston.
4. Install the piston on the shaft and secure with the piston nut, torque to 250 Ft/Lbs (339 Nm).
5. Lubricate the piston seal with clean hydraulic fluid and install the shaft assembly in the inner cylinder barrel.
6. Install the spring and screw the cylinder barrels together until tight and the ports are in-line.
7. Install the set screw.

### INSTALLATION

1. Install the clevis end pivot pin through the cylinder clevis and cylinder link and secure with a new cotter pin.
2. Install the rod end shoulder bolt through the cylinder rod and brake tube mounting tabs and secure with the locknut.
3. Install the hydraulic hoses.
4. Install the adjustment bolt and locknut. Tighten the bolt until the brakes fully engage the tires, secure with the locknut.
5. Lower the machine and operate the drive circuit and check that the brakes retract and clear the tires when driving and fully engage the tires when stopped. Check for leaks.



**Figure 3-14: Brake Cylinder Installation**

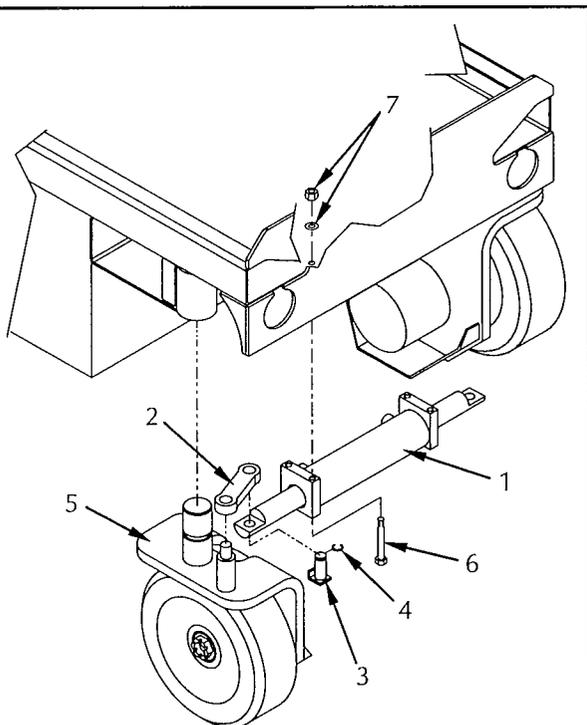
## 3.11 Steering Cylinder

### REMOVAL

1. Turn the wheels to the straight position.
2. Elevate the Platform and block the Elevating Assembly with the Brace (see page 3-3).
3. Tag and disconnect the hose assemblies from the cylinder fittings and immediately cap the openings to prevent foreign material from entering.
4. Remove the retaining rings from the pivot pins.
5. Remove the locknuts, washers and capscrews, while supporting the cylinder. Remove the cylinder.

### DISASSEMBLY

1. Unscrew the internal head caps from the barrel, removing one head cap assembly from the rod.
2. Withdraw the other head cap, piston and shaft assembly from the barrel tube.
3. Remove the snap rings from the piston washers and remove the piston washers, piston, O-ring and head cap.



- |                      |                       |
|----------------------|-----------------------|
| 1. Steering Cylinder | 5. Wheel Yoke, R.H.   |
| 2. Steering Link     | 6. Capscrew           |
| 3. Pivot Pin         | 7. Locknut and Washer |
| 4. Retaining Ring    |                       |

Figure 3-15: Steering Cylinder Installation

4. Remove the rod wiper, u-cup, O-ring and backup ring from the headcap and discard the seals.
5. Remove the piston ring and O-ring from the piston and discard.

### CLEANING AND INSPECTION

1. Wash all the metal parts in cleaning solvent and blow dry with filtered compressed air.
2. Inspect all the 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 headcaps 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 headcaps.
2. Install one headcap onto the shaft.
3. Install the new piston rings and O-ring on the piston.
4. Install the O-ring, piston and piston washers on the shaft. Secure piston washers with snap rings.
5. Lubricate the piston seal with clean hydraulic fluid and install the shaft assembly in the cylinder barrel.
6. Install the other head cap into cylinder barrel and tighten both head caps.

### INSTALLATION

1. Position the cylinder assembly in the chassis and secure with capscrews, washers and locknuts.
2. Insert pivot pins and secure with retaining rings.

**NOTE: On some machines the pivot pins do not have the anti-rotation tab welded on the bottom and require bonding to the steering cylinder shaft with Loctite 609®.**

3. Connect the hose assemblies to the fittings.
4. Operate the steering circuit several times throughout its entire range of travel to expel trapped air and check for leaks.

## 3.12 Lift Cylinder

### REMOVAL

1. Elevate Platform and install Brace (see page 3-3).
2. Provide a suitable container to catch the hydraulic fluid, then disconnect the hydraulic hoses. Immediately plug hoses to prevent foreign material from entering.
3. Remove emergency lowering valve cable and down valve wires from the emergency lowering/down valve.
4. Remove the cable bracket from the lift cylinder.
5. Remove capscrews and locknuts securing lift cylinder pivot pins.
6. Remove lower pivot pin and lower cylinder to rest on Chassis.
7. Attach a suitable hoisting device and sling to the cylinder and remove upper pivot pin.
8. Carefully remove cylinder.

### DISASSEMBLY

1. Remove the fittings, orifice, spring and down valve from the cylinder assembly.
2. Loosen the set screw and unscrew the thread cap. Unscrew the internal head cap and withdraw the rod and piston assembly from the barrel tube.
3. Remove the piston from the rod and then remove the head cap from the cylinder rod.
4. Remove all o-rings, seals and wipers from the head cap and cylinder barrel.

### 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 head cap, inside of the cylinder barrel and the rod for signs of scoring or excessive wear.
4. Replace all seals and O-rings.

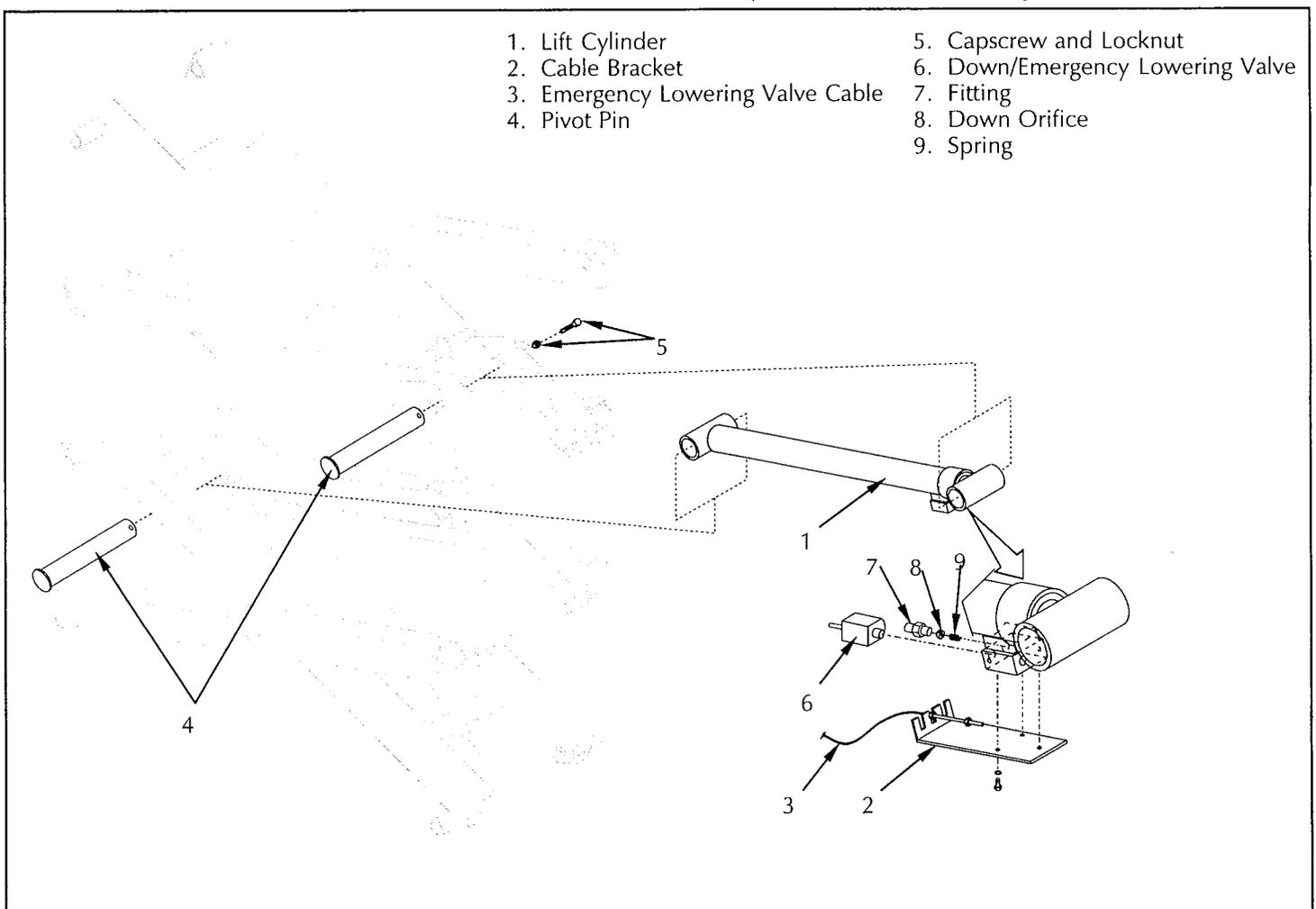


Figure 3-16: Lift Cylinder

### REASSEMBLY

1. Lubricate and install new O-rings, seals and wipers in the cylinder barrel and on the head cap.

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

2. Install the thread cap, head cap and piston on the cylinder rod.
3. Lubricate the piston and install the piston and rod assembly in the barrel tube.
4. Install the head cap into the barrel tube.
5. Thread the thread cap onto the barrel tube and tighten, secure with the set screw.
6. Install the down valve, orifice, spring and fittings.

### INSTALLATION

1. Coat both pivot pins with anti-seize compound.
2. Attach a suitable hoisting device and sling to the cylinder. Carefully position cylinder in the Elevating Assembly and install the upper pivot pin.
3. Install the capscrew and locknut.
4. Carefully lift the cylinder and align the lower mount and install the pivot pin. Install the capscrew and locknut securing the pivot pin.
5. Install the cable bracket and connect the emergency lowering valve Cable and down valve wires.
6. Unplug hydraulic hoses and attach to the cylinder.
7. Replace hydraulic fluid removed from lift cylinder.
8. Test with weight at rated Platform load to check system operation. Check for leaks and level of fluid.

### 3.13 Electric Motor (Figure 3-17)

#### 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 3-17A. 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. Refinish commutator surface if pitted or excessively worn.

- 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 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.
- Inspect wire harness and all connections for signs of damage due to overheating.
  - Check stator to see it is securely mounted.

## REASSEMBLY

- 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 3-17B and step 3 in the Inspection section).
- Place commutator cover on a work bench with brush assembly facing upward.
- Place the bearing spring into the bearing bore.
- Take a complete armature assembly, including bearings, and insert commutator end bearing into the bearing bore.

**Note: Do not reuse 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.**

- Set the brushes to final position as shown in Figure 3-17B.
- Place the complete stator down over the vertical armature, and into position on the commutator cover.
- 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.**
- Assemble the pulley end cover in the proper relationship. Insert mounting bolts and tighten alternately to ensure a good mechanical alignment.
- 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.

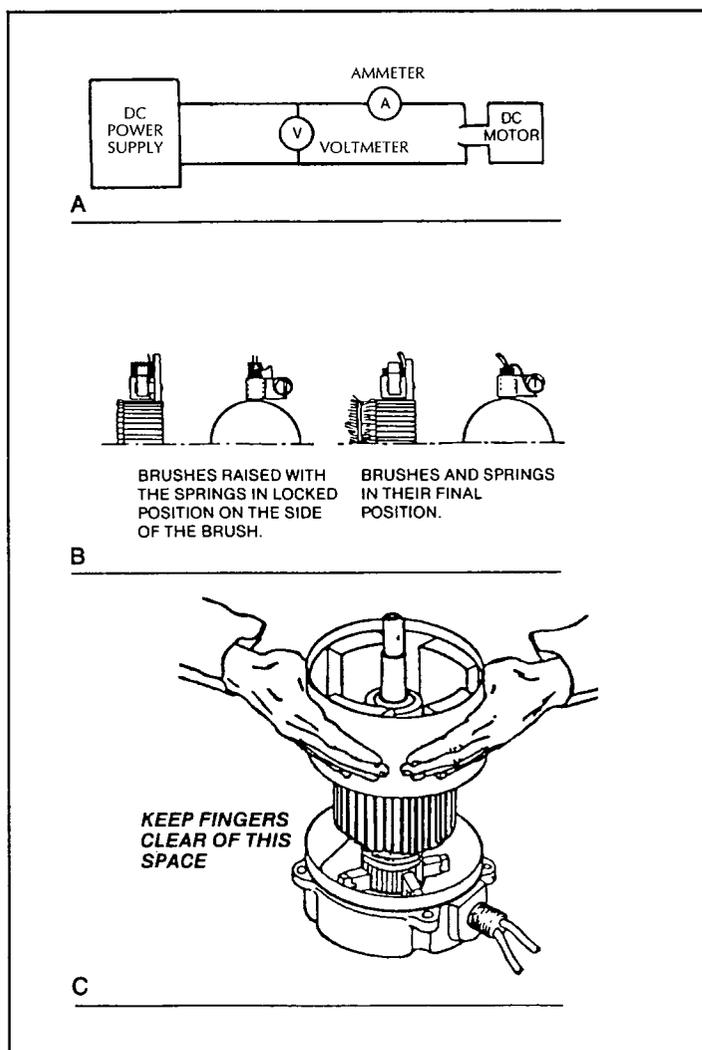


Figure 3-17: Electric Motor Service

## 3.14 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: SAEPART SERIES	CARTRIDGE POPPET		FITTINGS		HOSES	
	(Ft/Lbs	Nm)	(Ft/Lbs	Nm)	(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

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

Coil nuts: 30 IN/Lbs (3 Nm)

### 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

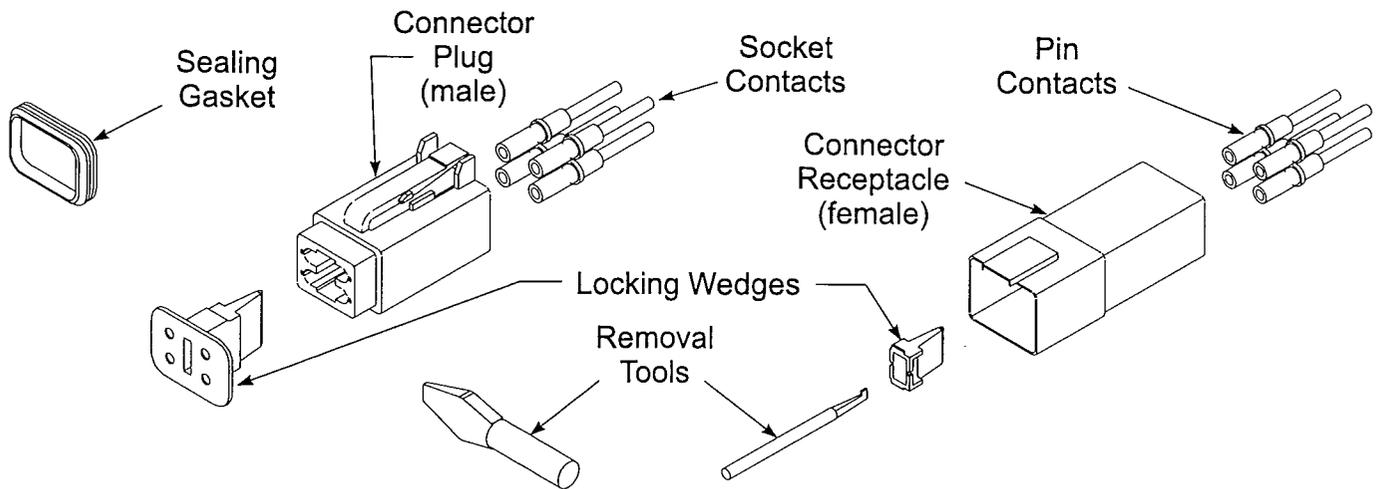


Figure 3-18: Deutsch Connectors

## 3.15 DEUTSCH CONNECTORS

Deutsch connectors are designed so that connector parts, contacts or electrical cables may be replaced without replacing the entire connector.

### MALE CONNECTOR (PLUG)

1. Disconnect the male connector (plug) from the female connector (receptacle).
2. Using the flat end of the Removal Tool (or flat blade screwdriver), pry the Locking Wedge from the Male Connector. Care should be taken that the Silicon Gasket is not damaged during this procedure.
3. Check all parts for damage. Replace all parts which are damaged or worn.
4. Replace or re crimp the wires and contacts. Refer to "Crimping" procedure.

### FEMALE CONNECTOR (RECEPTACLE)

1. Disconnect the male connector (plug) from the female connector (receptacle).
2. Using the notched end of the Removal Tool (or a wire hook), pull the Locking Wedge from the Female Connector.
3. Check all parts for damage. Replace all parts which are damaged or worn.
4. Replace or re crimp the wires and contacts. Refer to "Crimping" procedure.

**RELEASING LOCKING FINGERS**

1. The Locking Fingers can be released following the removal of the Locking Wedge of either the male or female connector.
2. Use the removal tool (or flat bladed screwdriver) to push the Locking Fingers aside. This will release the grip on the contact.
3. Pull the wire and contact out of the connector.

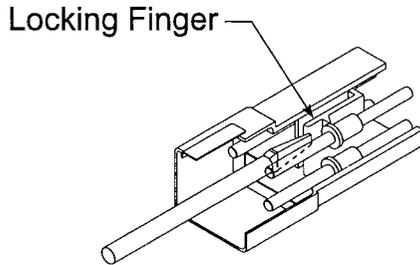


Figure 3-19: Releasing Locking Finger

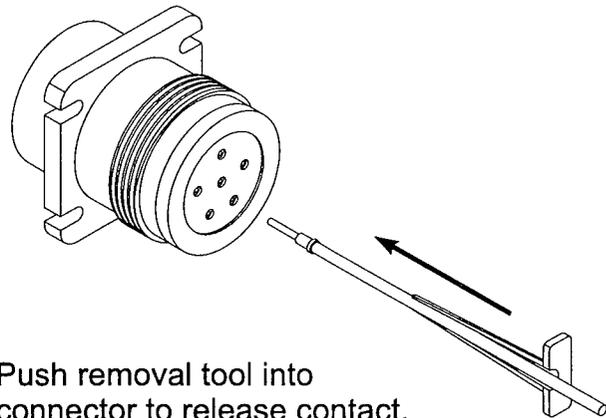
**CRIMPING**

**NOTE: Complete crimping instructions are included in each Field Kit.**

1. Strip 1/4" (6 mm) from the wire.
2. Insert the contact into the crimping tool.
3. Insert the stripped wire into the contact. Copper strands should be visible in the bleed hole of the contact and no copper strands should be loose (outside) of the contact barrel.
4. Completely close the handles of the crimping tool. Release the handles of the crimping tool and remove the crimped contact.
5. Inspect the crimped contact to ensure that all strands are secure in the crimp barrel.

**REMOVING CONTACT FROM HEAVY DUTY PLUG**

1. Slip the removal tool along the wire to be replaced.
2. Push the removal tool into the connector until the contact is released.
3. Pull the wire and contact out of the plug.



Push removal tool into connector to release contact.

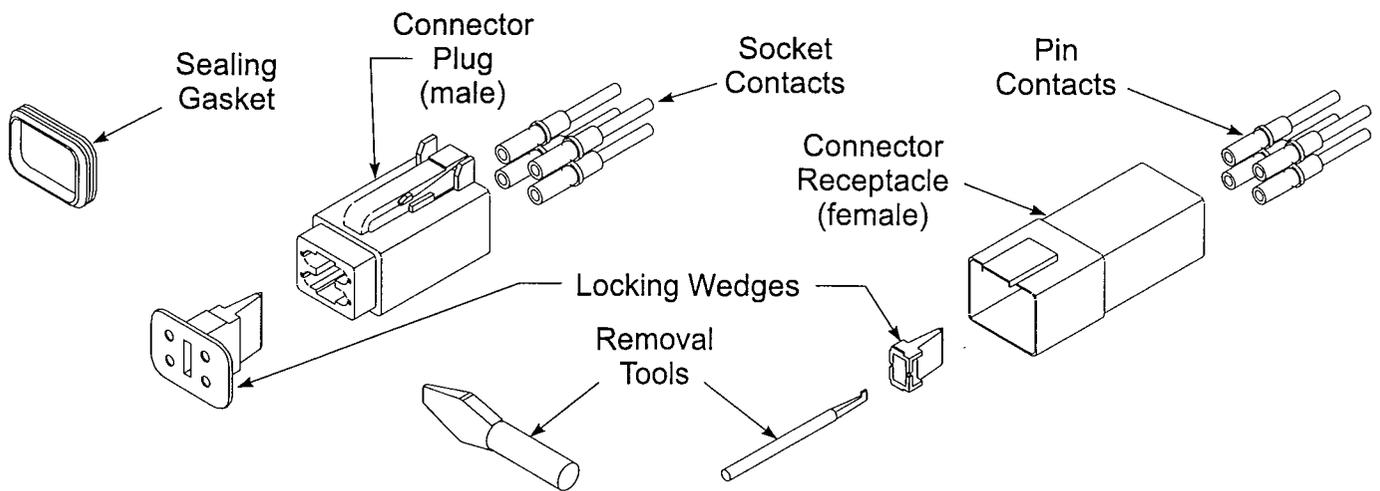
Figure 3-20: Removing Contact From Heavy Duty Connector

**FIELD KITS**

UpRight provides field kits which include contacts, seals, replacement parts, a crimping tool, miscellaneous electrical terminals and a contact removal tool for the heavy duty connectors.

Small Field Kit  
(UpRight P/N 030899-000)

Large Field Kit  
(UpRight P/N 030898-000)



**Figure 3-18: Deutsch Connectors**

## 3.15 DEUTSCH CONNECTORS

Deutsch connectors are designed so that connector parts, contacts or electrical cables may be replaced without replacing the entire connector.

### MALE CONNECTOR (PLUG)

1. Disconnect the male connector (plug) from the female connector (receptacle).
2. Using the flat end of the Removal Tool (or flat blade screwdriver), pry the Locking Wedge from the Male Connector. Care should be taken that the Silicon Gasket is not damaged during this procedure.
3. Check all parts for damage. Replace all parts which are damaged or worn.
4. Replace or rerimp the wires and contacts. Refer to "Crimping" procedure.

### FEMALE CONNECTOR (RECEPTACLE)

1. Disconnect the male connector (plug) from the female connector (receptacle).
2. Using the notched end of the Removal Tool (or a wire hook), pull the Locking Wedge from the Female Connector.
3. Check all parts for damage. Replace all parts which are damaged or worn.
4. Replace or rerimp the wires and contacts. Refer to "Crimping" procedure.

## 4.0 Introduction

Table 4-1 provides a logical sequence of tests that are designed to isolate problems with MX15/19 machines. This table includes a list of probable causes and remedies.



### 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.

Disconnect the batteries ground cable when replacing or testing the continuity of any electrical component.

## 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. Refer to Tables 5-1 and 5-2 for Reference Designations used in Table 4-1.

**Table 4-1: Troubleshooting**

TROUBLE	PROBABLE CAUSE	REMEDY
All functions inoperable, Electric Motor does not start.	<ol style="list-style-type: none"> <li>1. Open control circuit Circuit Breaker (CB).</li> <li>2. Blown Electric Motor Fuse (FU1).</li> <li>3. Faulty Battery Charger.</li> <li>4. Faulty Battery(ies) (BAT).</li> <li>5. Faulty Electric Motor (MOT).</li> <li>6. Faulty Motor Relay (CR1).</li> <li>7. Emergency Stop Switch (SW1, SW3) failed open.</li> <li>8. Faulty Controller switch.</li> </ol>	<p>Check control circuit Circuit Breaker. Reset if open.</p> <p>Check 175 amp Electric Motor Fuse. Replace if blown.</p> <p>Check the voltage output of the Battery Charger. If less than 24 VDC, repair or replace.</p> <p>After completely charging Batteries, test each Battery. Replace as required.</p> <p>While operating the steering function, check voltage across the Electric Motor terminals. If 24 VDC is present, replace the Motor.</p> <p>While operating the steering, check voltage across the coil terminals of Motor Relay. If no voltage is present, proceed with step 7. If 20 VDC or more, check continuity across the contact terminals of Motor Relay while still operating the steering function. If there is no continuity, replace the faulty Motor Relay.</p> <p>With the Emergency Stop Switch in the ON position, check continuity across the contacts. If none, replace.</p> <p>Check operation. Replace switch if required.</p>
All functions inoperable. Electric Motor starts when control is actuated.	<ol style="list-style-type: none"> <li>1. Hydraulic Reservoir low.</li> <li>2. Faulty Hydraulic Pump (PMP).</li> <li>3. Faulty Controller (CONT).</li> <li>4. Proportional Valve (V6).</li> <li>5. Switch 5Faulty</li> </ol>	<p>Check hydraulic fluid level, top off as required.</p> <p>Check pressure and delivery of the Hydraulic Pump. Replace if required.</p> <p>Check operation. Replace if required.</p> <p>Check operation, replace if required.</p> <p>Check and replace</p>
Electric Motor continues to run after controls are returned to the OFF position.	Motor Relay (CR1) contacts fused together.	With 0 voltage at the coil terminals of the Motor Relay (CR1) check continuity across the contact terminals. If there is continuity, replace the Motor Relay.
Steering inoperable or functions sluggishly.	<ol style="list-style-type: none"> <li>1. Faulty Steering Switch.</li> <li>2. Mechanical damage.</li> <li>3. Steering Valve (V1) stuck.</li> <li>4. Steering Cylinder (CYL1) piston seal leaking.</li> <li>5. Steering Relief.</li> <li>6. Faulty Diode</li> </ol>	<p>Test Steering Switch for continuity. Replace if faulty.</p> <p>Inspect all steering components. Replace damaged parts.</p> <p>Inspect Steering Valve. If spool is sticking, replace.</p> <p>Check Steering Cylinder for leakage from one port to another. Repair as required.</p> <p>Adjust the relief valve, if not adjustable replace.</p> <p>Test and replace steer Diodes</p>
Work platform will not steer right.	<ol style="list-style-type: none"> <li>1. Faulty Steering Switch.</li> <li>2. Faulty Diode.</li> <li>3. Faulty Steer Right Solenoid (SOL1).</li> </ol>	<p>Test Controller Switch for continuity. Replace if faulty.</p> <p>Test Diode. Replace if faulty.</p> <p>Test Steer Right Solenoid. If the proper voltage is present and the coil is not magnetized, replace.</p>

TROUBLE	PROBABLE CAUSE	REMEDY
Work platform will not steer left.	<ol style="list-style-type: none"> <li>1. Faulty Steering Switch.</li> <li>2. Faulty Diode</li> <li>3. Faulty Steer Left Solenoid (SOL2).</li> </ol>	<p>Test Steering Switch for continuity. Replace if faulty.</p> <p>Test Diode. Replace if faulty.</p> <p>Test Steer Left Solenoid. If the proper voltage is present and the coil is not magnetized, replace.</p>
Work platform will not drive forward or reverse. Lift function operable.	<ol style="list-style-type: none"> <li>1. Faulty Drive/Lift Selector Switch.</li> <li>2. Faulty Drive Dump Valve.</li> <li>3. Mechanical failure.</li> <li>4. Worn Drive Motors (MOT1, MOT2).</li> <li>5. Faulty relay.</li> </ol>	<p>Check continuity of Drive/Lift Switch. Replace if faulty.</p> <p>Check the Drive Dump Valve. If the spool is not shifting, replace the valve.</p> <p>Inspect Drive Motor shafts, hubs, and keys.</p> <p>Check hydraulic pressure being delivered to the Drive Motors. If sufficient, replace Drive Motors.</p> <p>Test relay, replace if faulty.</p>
No high speed drive.	<ol style="list-style-type: none"> <li>1. Faulty Relay (CR4).</li> <li>2. Faulty Down Limit Switch (S11).</li> <li>3. Faulty Proportional Coil/Valve(SOL7/V6).</li> </ol>	<p>Test Relay (CR4). Replace if faulty.</p> <p>Check Switch for continuity. Replace if faulty.</p> <p>Test coil and valve. If faulty, replace.</p>
No drive forward but drives in reverse. Lift function operable.	<ol style="list-style-type: none"> <li>1. Faulty Drive/Lift Selector Switch.</li> <li>2. Faulty Counterbalance Valves (V2, V3).</li> </ol>	<p>Test Drive/Lift Switch for continuity. Replace if faulty.</p> <p>Check pressure of Counterbalance Valves. Replace or reset valves as required.</p>
No drive forward but drives in reverse. No lift function.	<ol style="list-style-type: none"> <li>1. Faulty Controller.</li> <li>2. Faulty Relay CR2</li> <li>3. Faulty Controller switch.</li> <li>4. Faulty Counterbalance Valves (V2, V3).</li> </ol>	<p>Check operation of Controller switch. Replace if required.</p> <p>Check and Replace</p> <p>Check operation of Controller switch. Replace if required</p> <p>Check pressure of Counterbalance Valves. Replace or reset valves as required.</p>
No drive reverse but drives in forward. Lift function operable.	<ol style="list-style-type: none"> <li>1. Faulty Diode.</li> <li>2. Faulty Relay CR2</li> <li>3. Faulty Reverse Valve (SOL3, V5).</li> <li>4. Faulty Counterbalance Valves (V2, V3).</li> </ol>	<p>Test Diode. Replace if faulty.</p> <p>Check and Replace</p> <p>Test Reverse Coil, if proper voltage is present and coil is not magnetized, replace.</p> <p>Check pressure of Counterbalance Valves. Replace or reset valves as required.</p>
No drive reverse but drives in forward. No lift function.	1. Faulty Relay CR2	Check and replace

Table 4-1: Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Platform will not elevate or elevates slowly.	<ol style="list-style-type: none"> <li>Emergency Down Valve (V7) open.</li> <li>Platform overloaded.</li> <li>Faulty Diode.</li> <li>Faulty Lift Valve Coil.</li> <li>Faulty Drive/Lift Selector Switch.</li> <li>Lift/Main Relief Valve (RV1) out of adjustment or faulty.</li> <li>Drive/Lift Valve (V4) sticking.</li> <li>Faulty CR2 Relay.</li> <li>Faulty Controller (CONT).</li> </ol>	<p>Close Emergency Down Valve.</p> <p>Observe maximum load rating .</p> <p>Test Diode, replace if faulty.</p> <p>Test Lift Valve Coil. If proper voltage is present and coil is not magnetized, replace.</p> <p>Test Drive/Lift Switch for continuity. Replace if faulty.</p> <p>Adjust the Lift/Main Relief Valve. If not adjustable, replace.</p> <p>Replace the Lift Valve.</p> <p>Test relay, replace if faulty.</p> <p>Check operation of Controller. Replace if required.</p>
Platform drifts down after being elevated.	<ol style="list-style-type: none"> <li>Emergency Lowering/Down Valve (V7) partly open or faulty.</li> </ol>	<p>Ensure that the Emergency Lowering Valve is completely closed. Replace the valve.</p>
Platform will not lower. Drive function operable.	<ol style="list-style-type: none"> <li>Faulty Down Valve Coil SOL4.</li> <li>Down Valve (V7) stuck.</li> <li>Plugged Down Orifice (ORF2).</li> <li>Faulty relay CR2.</li> </ol>	<p>Test Down Valve Coil. If proper voltage is present and coil is not magnetized, replace.</p> <p>Replace the Down Valve.</p> <p>Remove and Clean Orifice.</p> <p>Test Relay. Replace if faulty.</p>
Motion Alarm does not sound.	<ol style="list-style-type: none"> <li>Faulty Down Alarm (ALM1).</li> <li>Faulty Relay.</li> </ol>	<p>Check voltage to Down Alarm . If proper voltage is present, replace the Alarm.</p> <p>Test Relay. Replace if faulty.</p>
Brake will not release.	<ol style="list-style-type: none"> <li>Brake Orifice (ORF1) plugged.</li> <li>Faulty Brake Cylinder (CYL2).</li> <li>Brake out of adjustment.</li> </ol>	<p>Remove and Clean Orifice.</p> <p>Check and replace seals in Brake Cylinder.</p> <p>Adjust bolt to disengage brakes from tires when driving <b>only</b>.</p>
Brake will not lock wheel.	<ol style="list-style-type: none"> <li>Brake Orifice (ORF1) plugged.</li> <li>Faulty Brake Cylinder (CYL2).</li> <li>Brake out of adjustment.</li> </ol>	<p>Remove and Clean Orifice.</p> <p>Check and replace seals in Brake Cylinder.</p> <p>Adjust bolt so brakes fully engage tires when not driving .</p>

*NOTES*

Large empty rectangular area for taking 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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## 5.3 Electrical Schematic

**Table 5-1: Electrical Schematic - 065616-020**

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm, Down	Provides warning sound (60 Hz) when the Platform is lowering.	Mounted on electrical box inside right chassis door. Red wire for 60 Hz.
ALM2	Alarm, Tilt	Provides warning sound (600 Hz) when Platform is elevated on slopes of 2° side to side and 2° fore and aft.	Mounted on electrical box inside right chassis door. White wire for 600 Hz.
BAT	Batteries (4), 6 volts each	To store energy. both chassis doors.	Two each, inside
CB	Circuit Breaker	Overload protection for the control circuit.	Chassis Control Panel.
CONT	Controller, Joystick	Supplies power to; Motor Start Relay circuit, Proportional Coil, and Up/Forward or Down/Reverse circuits. Includes switches SW4, SW5, SW6, SW7, & SW8.	Platform Controller center.
CR1 Contact	Relay, Motor Start	Connects Batteries to Motor.	Inside right Chassis Door.
CR2 Contact	Relay, Drive/Lift	Energized when Drive/Lift Switch is in <b>DRIVE</b> , closes Reverse and Drive Dump circuits and opens Down and Up circuits.	Electrical Box.
CR3 Contact	Relay, Tilt Alarm	Energized by Platform Down Relay when the Platform is down and by Tilt Sensor when Platform is elevated and machine is level, providing power to Motor Start Relay. When machine is not within 2° of level Motor Start Relay circuit opens and power is provided to Tilt alarm.	Electrical box
CR4 Contact	Relay, Platform Down, Pothole Protection	Energized when Platform is down, cuts power to Tilt Sensor circuit, provides power to Joystick 'R' terminal for high speed operation and to Tilt Alarm Relay.	Electrical box
D1	Diode	Supplies power to Motor Start Circuit, from Steer Right Circuit.	On Controller terminal strip between C3 and C6.
D2	Diode	Supplies power to Motor Start Circuit, from Steer Left Circuit.	On Controller terminal strip between C4 and C6.
D3	Diode	Provides power to Joystick + terminal when Drive/Lift Switch is in <b>DRIVE</b> .	On Drive/Lift selector switch.

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
D4	Diode	Provides power to Tilt Sensor Circuit from Controller Circuit preventing feedback from Chassis Circuit.	Between Chassis Key Switch and terminal A7.
D5	Diode	Provides power to Tilt Sensor Circuit from Chassis Circuit preventing feedback from Controller Circuit.	Between terminals A6 & A7
D6	Diode	Provides power to Proportional Circuit from Chassis Lift Switch and prevents feedback into Lift Circuit.	Between Chassis Lift Switch and terminal A14.
D7	Diode	Provides power to Lift Circuit from Chassis Lift Switch and prevents feedback into Proportional Circuit.	Between Chassis Lift Switch and terminal A5.
D8	Diode	Prevents feedback in level sensor circuit	Between R4 & A10
D9	Diode	Provides power to Drive Dump Coil from Reverse Circuit.	On Chassis Terminal Strip between A3 and A4.
D10	Diode	Power to motor start	Between A3 & A4
FU1	Fuse, 175 AMP	Overload protection for the electric motor.	Inside right chassis door above batteries.
MOT	Motor, Electric	Provides power to Drive Hydraulic Pump.	Center right of Chassis Module.
MTR	Meter, Hour	Shows hours machine has operated.	Chassis Control Panel.
SNSR	Sensor, Tilt	Cuts power to Tilt Alarm Relay (CR3) when Platform is on slopes of 2° side to side and 2° fore and aft to activate Tilt Alarm.	Inside Tilt Sensor Box at front of Chassis.
SOL1	Solenoid, Right Steer (coil)	Shifts Steer Valve to <b>RIGHT</b> turn position.	Rear of manifold block, solenoid closest to block.
SOL2	Solenoid, Left Steer (coil)	Shifts Steer Valve to <b>LEFT</b> turn position.	Rear of manifold block, solenoid farthest from block.
SOL3	Solenoid, Foward/Reverse (coil)	Shifts Foward/Reverse Valve to reverse position.	Bottom end of Spool Valve mounted towards rear of machine.

Table 5-1: (cont'd.)

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
SOL4	Solenoid, Down (coil)	Opens Down Valve.	Mounted on Lift Cylinder.
SOL5	Solenoid, Drive Dump (coil)	Closes Drive Dump Valve.	Top of Manifold Block towards front, next to Proportional Valve.
SOL6	Solenoid, Lift (coil)	Shifts Lift Valve from Drive to Lift position.	Top of Manifold Block towards rear, next to Proportional Valve.
SOL7	Solenoid, Proportional (coil)	Closes Proportional Valve.	Top center of Manifold Block.
SOL8	Solenoid	PHP Down	PHP Valve
SOL9	Solenoid	PHP Up	PHP Valve
SW1	Switch, Chassis Emergency Stop Button.	Control Circuit shut off.	Chassis Control Panel.
SW2	Switch, Chassis Key	Provides power to either the Chassis Lift Switch or the Controller.	Chassis Control Panel.
SW3	Switch, Controller Emergency Stop Button	Control Circuit shut off.	Platform Controller bottom left.
SW4	Switch, Interlock Lever	Provides power to Controller.	On front of Joystick.
SW5	Switch, Joystick Power	Provides power to Joystick X term. and Motor Start Relay thru Joystick circuit board.	Front switch closest to center of Joystick when Joystick is held in assembled position.
SW6	Switches, Steering	Provides power to either Right or Left Steer Valve Solenoids.	Rocker actuator on top of Joystick, switch bodies inside Joystick handle.
SW7	Switch, Joystick Down/Reverse	Provides power to Joystick + term. during LIFT operation or to Down/Reverse circuit when Joystick is pulled back.	Left front switch on Joystick when Joystick is held in assembled position.
SW8	Switch, Joystick Lift/Forward	Provides power to Drive/Lift circuit when Joystick is pushed forward.	Left rear switch on Joystick when Joystick is held in assembled position.
SW9	Switch, Drive/Lift Selector	Provides power to Drive/Lift Relay, Steer Switches, Joystick + term. and Joystick R term. through Platform Down Relay contacts when in DRIVE. And to Joystick R term. during LIFT.	Controller bottom right.
SW10	Switch, Chassis Lift	Provides power to either UP or Down circuits.	Chassis Control Panel.
SW11	Switch, Down Limit	Provides power to Platform Down Relay when Platform is down.	Mounted on left side of Tilt Sensor Box at front of Chassis.
SW12	Switch, Up Limit	Cuts power to Lift Coil when fully elevated, preventing Lift Cylinder from 'bottoming out'.	Mounted in front of right rear scissor pivot on lower inner Scissor Assembly.

NOTE:

1. TERMINAL X AND THE BOARD IS ENERGIZED WHEN S1 IS ACTIVATED.
2. COLORS SHOWN NEXT TO CONNECTOR NUMBER REFER TO THE CABLE WIRES EXTERNAL TO THE LOWER BOX.

LEGEND

- A# CHASSIS CONTROL BOX TERMINAL STRIP
- C#-# CHASSIS CONTROL BOX CONNECTOR DESIGNATION. FIRST # IS THE CONNECTOR NUMBER - SECOND # IS THE PIN NUMBER.
- VALVE COIL
- R# RELAY CONTACT N/O
- R# RELAY CONTACT N/C
- R# RELAY COIL

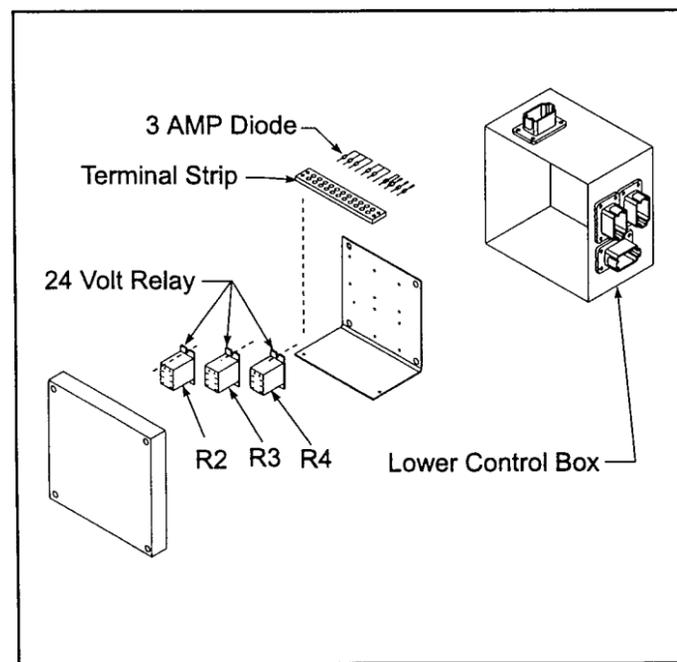


Figure 5-1: Relay and Terminal Strip Identification

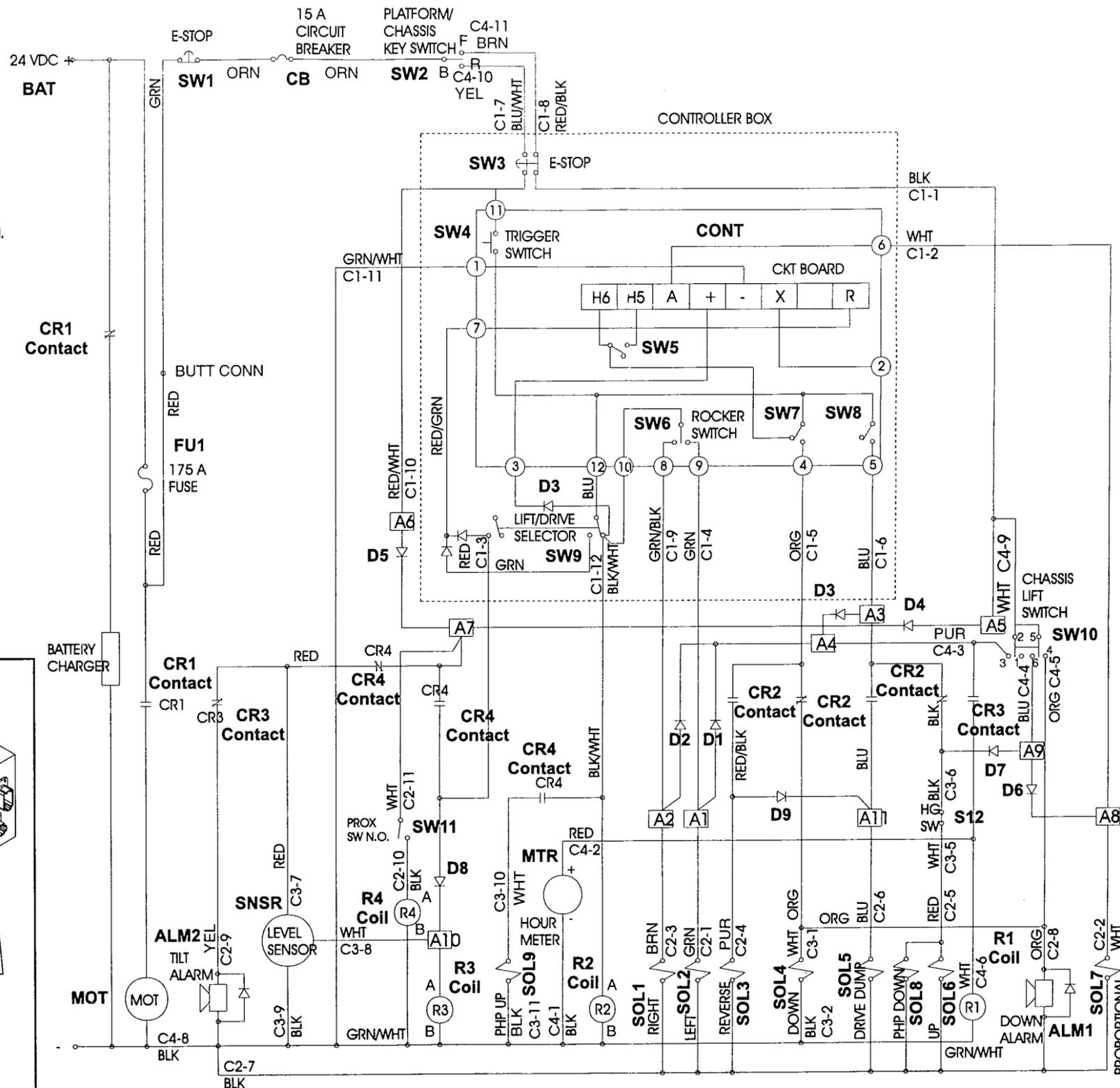
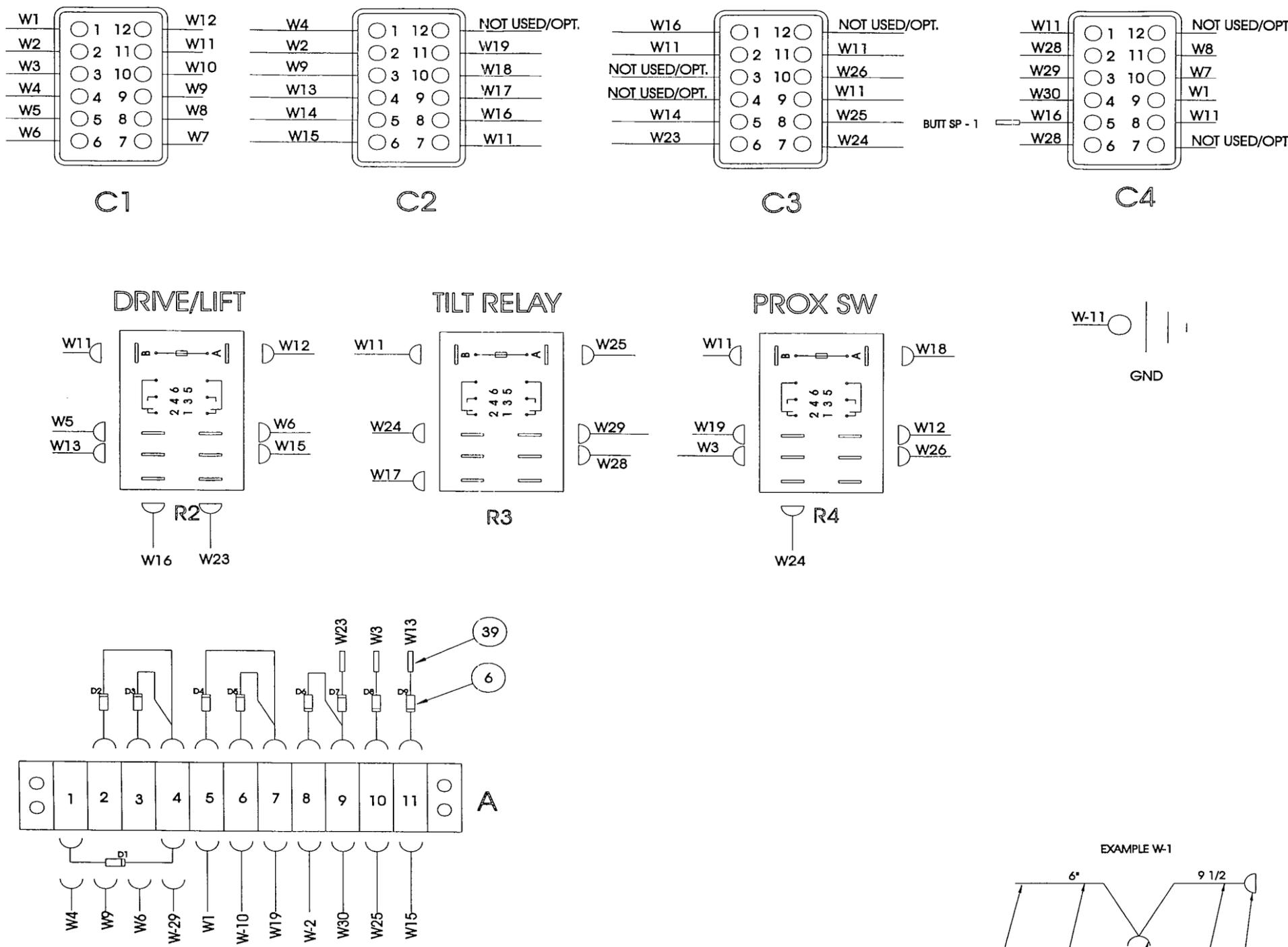


Figure 5-2: Electrical Schematic - 065616-020



SEE EXAMPLE

WIRE NO.	WIRE COLOR	A.W.G.	LENGTH	FROM	TO	LENGTH	TO	LENGTH	TO
W-1	BLK	16	6	C1-1	A5	9 1/2	C4-9	-	-
W-2	WHT	16	6 1/2	C1-2	A8	5 1/2	C2-2	-	-
W-3	RED	16	6	C1-3	R4-4	6	D8	-	-
W-4	GRN	16	8 1/2	C1-4	A1	7 1/2	C2-1	-	-
W-5	ONG	16	13	C1-5	R2-6	-	-	-	-
W-6	BLU	16	13	C1-6	R2-5	9 1/2	A3	-	-
W-7	BLU/WHT	16	8 1/2	C1-7	C4-10	-	-	-	-
W-8	RED/BLK	16	8 1/2	C1-8	C4-11	-	-	-	-
W-9	GRN/BLK	16	8	C1-9	A2	8	C2-3	-	-
W-10	RED/WHT	16	7	C1-10	A6	-	-	-	-
W-11	GRN/WHT	16	6 1/2	C1-11	GND	-	-	-	-
W-12	BLK/WHT	16	8 1/2	C1-12	R4-5	3 1/2	R2-A	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-13	RED/BLK	16	6	C2-4	R2-4	6	D9	-	-
W-14	RED	16	6	C2-5	C3-5	-	-	-	-
W-15	BLU	16	4 1/2	C2-6	R2-3	10 1/2	A 11	-	-
W-11	GRN/WHT	16	5 1/2	C2-7	GND	-	-	-	-
W-16	ONG	16	6	C2-8	BUTT SP-1	3	C4-5	-	-
W-16	ONG	16	4 1/2	BUTT SP-1	R2-2	10 1/2	C3-1	-	-
W-17	WHT/BLK	16	4	C2-9	R3-2	-	-	-	-
W-18	BLK	16	6	C2-10	R4-A	-	-	-	-
W-19	WHT	16	5 1/2	C2-11	A7	11 1/2	R4-6	-	-
W-20	NO CONN.	-	-	C2-12	-	-	-	-	-
W-16	-	-	-	-	-	-	-	-	-
W-11	GRN/WHT	16	9	C3-2	GND	-	-	-	-
W-21	NO CONN.	-	-	C3-3	-	-	-	-	-
W-22	NO CONN.	-	-	C3-4	-	-	-	-	-
W-14	-	-	-	-	-	-	-	-	-
W-23	BLK	16	10 1/2	C3-6	R2-3	8 1/2	D7	-	-
W-24	RED	16	8 1/2	C3-7	R3-6	3 1/2	R4-2	-	-
W-25	WHT	16	9	C3-8	R3-A	10	A 10	-	-
W-11	GRN/WHT	16	9	C3-9	GND	-	-	-	-
W-26	GRN	16	13	C3-10	R4-3	-	-	-	-
W-11	GRN/WHT	16	9	C3-11	GND	-	-	-	-
W-27	NO CONN.	-	-	C3-12	-	-	-	-	-
W-11	GRN/WHT	16	3	C4-1	GND	-	-	-	-
W-28	RED	16	8 1/2	C4-2	R3-3	9	C4-6	-	-
W-29	RED/BLK	16	8 1/2	C4-3	R3-5	11	A4	-	-
W-30	BLU	16	10 1/2	C4-4	A9	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-31	NO CONN.	-	-	C4-7	-	-	-	-	-
W-11	GRN/WHT	16	3 1/2	C4-8	GND	-	-	-	-
W-	-	16	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-32	NO CONN.	-	-	C4-12	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-11	GRN/WHT	16	3 1/2	R2-B	R3-B	3 1/2	R4-B	10	GND
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-

LEGEND:

- D# = DIODE NUMBER
- A# = TERMINAL NUMBER
- BUTT SP # = BUTT SPLICE NUMBER
- R#-# = FIRST # IS RELAY NUMBER SECOND # IS TERMINAL DESIGNATION. (EXAMPLE: R4-A = RELAY #4 & TERMINAL A)
- C#-# = FIRST # IS CONNECTOR NUMBER SECOND # IS PIN DESIGNATION. (EXAMPLE: C2-5 = CONNECTOR 2 & PIN 5)

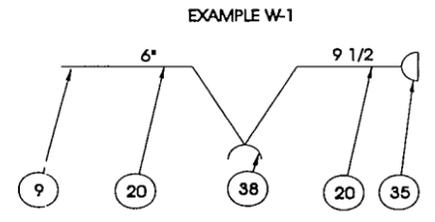


Figure 5-3: Lower Control Box Electrical Diagram

NOTES:

## 5.2 Hydraulic Schematic

**Table 5-2: Hydraulic Schematic - 065616-020**

REFERENCE DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve, Pothole Protection	Maintains PHP cylinder Full Extension	Pothole Valve Block
CYL1	Cylinder, Steering	Provides force to turn front wheels.	Under Chassis between front wheels.
CYL2	Cylinder, Brake	Stops machine from moving while parked.	Under Chassis between rear wheels.
CYL3	Cylinder, Lift	Provides force to lift Platform.	Inside the Scissor Assembly.
CYL4	Cylinder, Cushion	Provides smooth starting and stopping when driving.	Right top center of Chassis Module.
CYL5 (2)	Pothole Protection Cylinders	Lower Pothole Protection Bars	Bottom Rear of Chassis
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	On left front Steering Spindle.
MOT2	Drive Motor	Provides tractive effort for work	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 hose fitting on Lift Cylinder Valve Block.
ORF 3,4	Orifice, Cushion Cylinder	Controls drive cushion rate.	Inside each end of Drive Cushion Cylinder.
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 highside of Pump and limits Platform lifting capacity.	Right side of Manifold Block, upper left corner.
RV2	Valve, Steering Relief	Provides over pressure protection to low 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, 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, 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.
V8	Drive Dump Valve	Dumps Excess Oil from Drive Motors to Tank	Valve Block
V9	Pothole Protection Valve	Controls Pothole Protection Cylinders	Pothole Protection Valve Block



Table 5-3: Valve Block

REFERENCE	DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve, Pothole Protection	Check Valve, Pothole Protection	Maintains P-H-P cylinder Full Extension	Valve Block
FL1	Filter	Filter	Filters oil returning to Tank.	Bottom of Manifold Block.
ORF2	Office, Down	Office, Down	Controls the Platform rate of descent.	Valve Block.
RV1	Valve, Lift Relief	Valve, Lift Relief	Provides over pressure protection to upper left corner.	Right side of Manifold Block.
RV2	Valve, Steering Relief	Valve, Steering Relief	Provides over pressure protection to low side of Pump and steering components when steering.	Right side of Manifold Block.
V1	Valve, Steering	Valve, Steering	Provides directional control for Steering Cylinder.	Left side of Manifold Block towards front.
V2	Valve, Forward	Valve, Forward	Prevents machine from running away on slopes and near lower right corner.	Right side of Manifold Block.
V3	Valve, Reverse	Valve, Reverse	Prevents machine from running away on slopes and near upper right corner.	Right side of Manifold Block.
V4	Valve, Drive/Lift	Valve, Drive/Lift	Provides control of oil for Drive or Lift functions.	Left side of Manifold Block towards rear.
V5	Valve, Forward/Reverse	Valve, Forward/Reverse	Provides control of oil for Forward or Block, towards front.	Top of Manifold Block.
V6	Valve, Proportional	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, Down and Emergency	Valve, Down and Emergency	Allows oil to flow out of Lift Cylinder operated for Emergency Lowering to Tank, manually.	Right side of Lift Cylinder Valve Assembly.
V8	Drive Dump Valve	Drive Dump Valve	Dumps Excess Oil from Drive Motors to Tank	Valve Block
V9	Pothole Protection Valve	Pothole Protection Valve	Controls Pothole Protection Cylinders	Valve Block

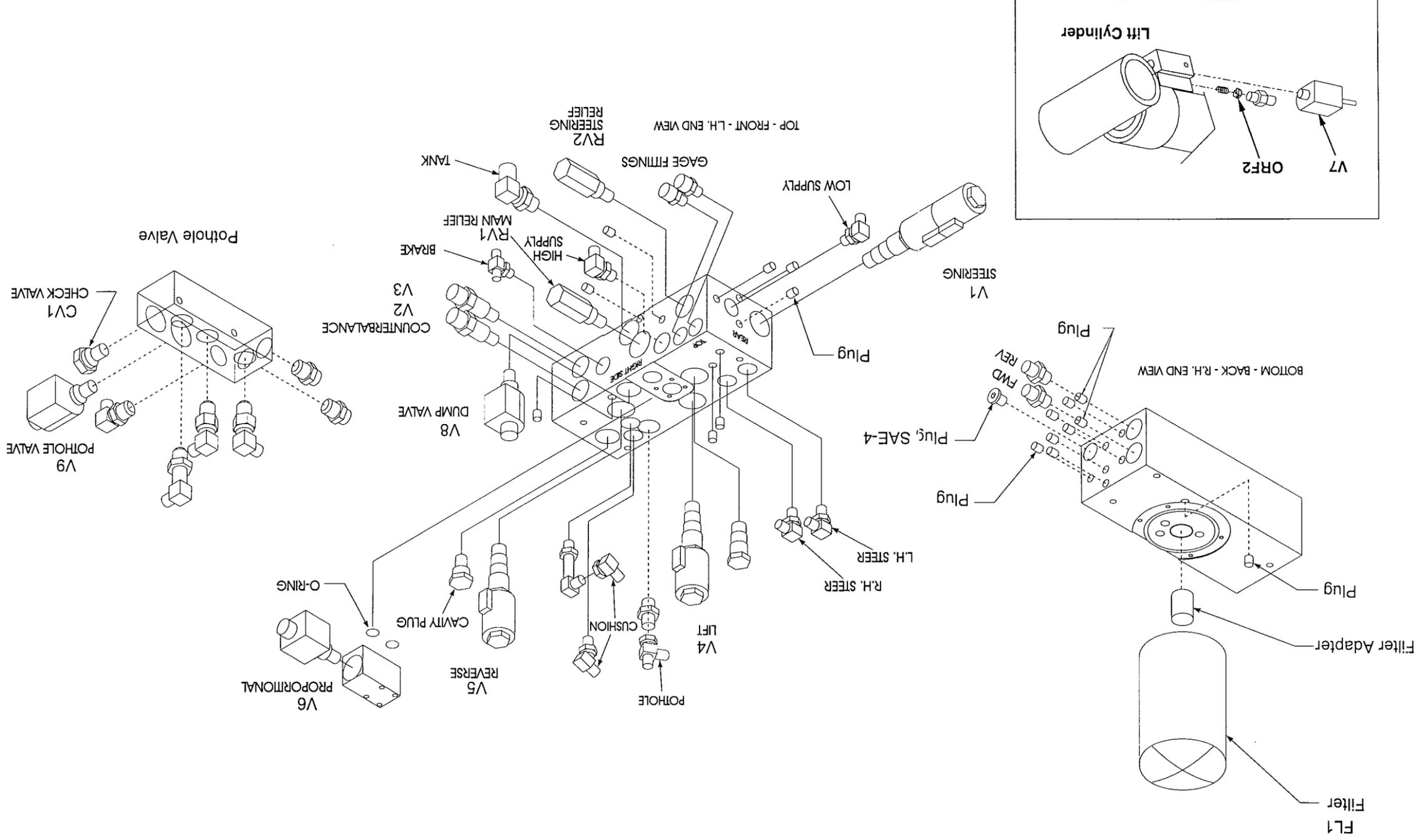


Figure 5-5: Valveblocks

## 6.0 Introduction

This section lists and illustrates the replaceable assemblies and parts of the MX15/19 Work Platform, as manufactured by UpRight, Inc.

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

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## FINAL ASSEMBLY

MX15

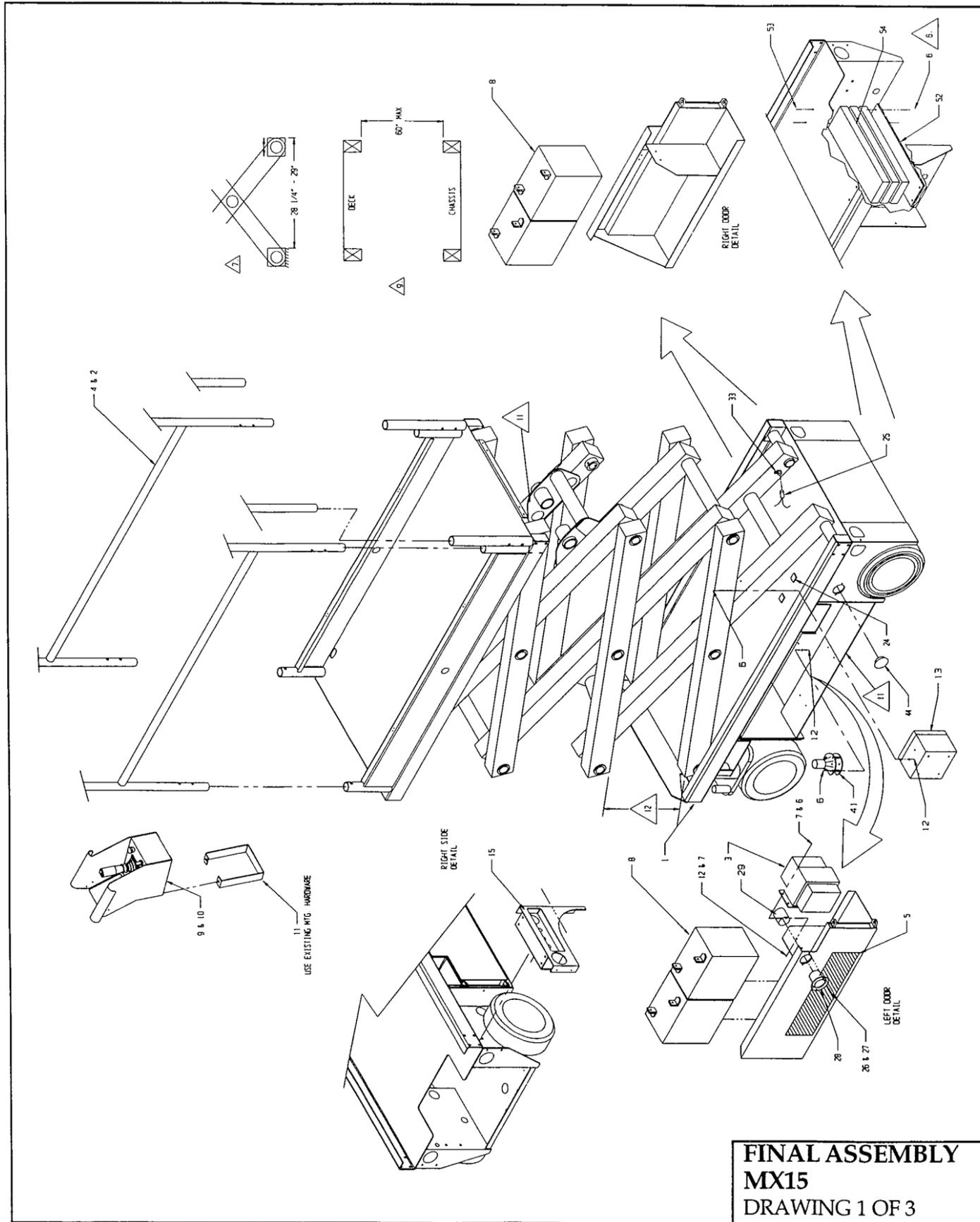
065600-010

ITEM	PART	DESCRIPTION	QTY.
1	065601-010	BASIC ASSY	1
2	065614-000	EXTENSION DECK	1
3	063944-001	CHARGER	1
4	065603-004	PLATFORM GUARDRAIL INSTL.	1
5	065612-026	LABEL INSTL.	1
6	011248-004	LOCK NUT 1/4-20 HEX	14
7	011240-004	WASHER 1/4 STD FLAT	14
8	015796-000	BATTERY 6V	4
9	066020-016	CONTROLLER ASSY	1
10	065609-014	CONTROLLER CABLE ASSY	1
11	065746-000	CONTROLLER GUIDE	1
12	011252-006	SCREW 1/4-20UNC HHC X 3/4	4
13	067346-000	ELEC. BOX	1
15	065980-000	WHEEL COVER ASSY	1
24	013283-002	CABLE MOUNT	2
25	063497-001	MERCURY SWITCH	1
26	011715-004	SCREW RD HD 6-32 X 1/2	2
27	011248-047	NUT, 6-32 HEX	2
28	029961-000	INLINE PLUG	1
29	029961-001	SEAL, INLINE PLUG	1
30	065611-020	HOSE KIT ( NOT SHOWN )	1
33	013919-013	CLAMP	3
34	066307-015	LADDER WELDMENT	1
36	011254-008	SCREW HHC 3/8-16 X 1	8
37	011240-006	WASHER 3/8 STD FLAT	16
38	011248-006	NUT HEX ESNA 3/8-16	8
41	029945-011	LEVEL SENSOR	1
44	066516-002	HOLE PLUG 1.75 DIA	1
45	065615-020	HYDRAULIC SCHEM.	REF
46	065616-020	ELECTRICAL SCHEM.	REF
52	065798-000	MOUNTING PLATE, BALLAST	1
53	011252-048	SCREW 1/4-20 HHCS X 6	4
54	019775-017	BAR	3
101	062125-052	BATTERY CABLE ASSY 5/16 - 3/8 X 52	1
102	062125-022	BATTERY CABLE ASSY 5/16 - 3/8 X 22	1
103	064195-018	BATTERY CABLE ASSY 5/16 - 5/16 X 18	1
104	064195-114	BATTERY CABLE ASSY 5/16 - 5/16 X 114	1

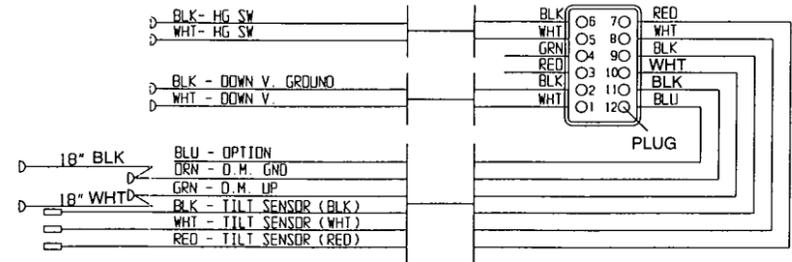
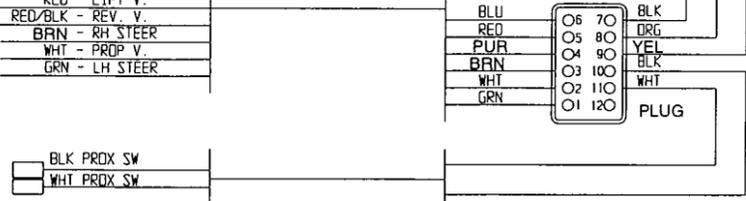
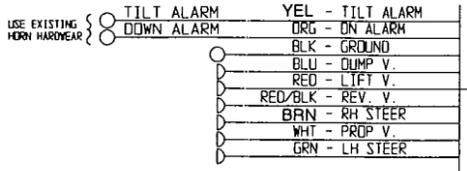
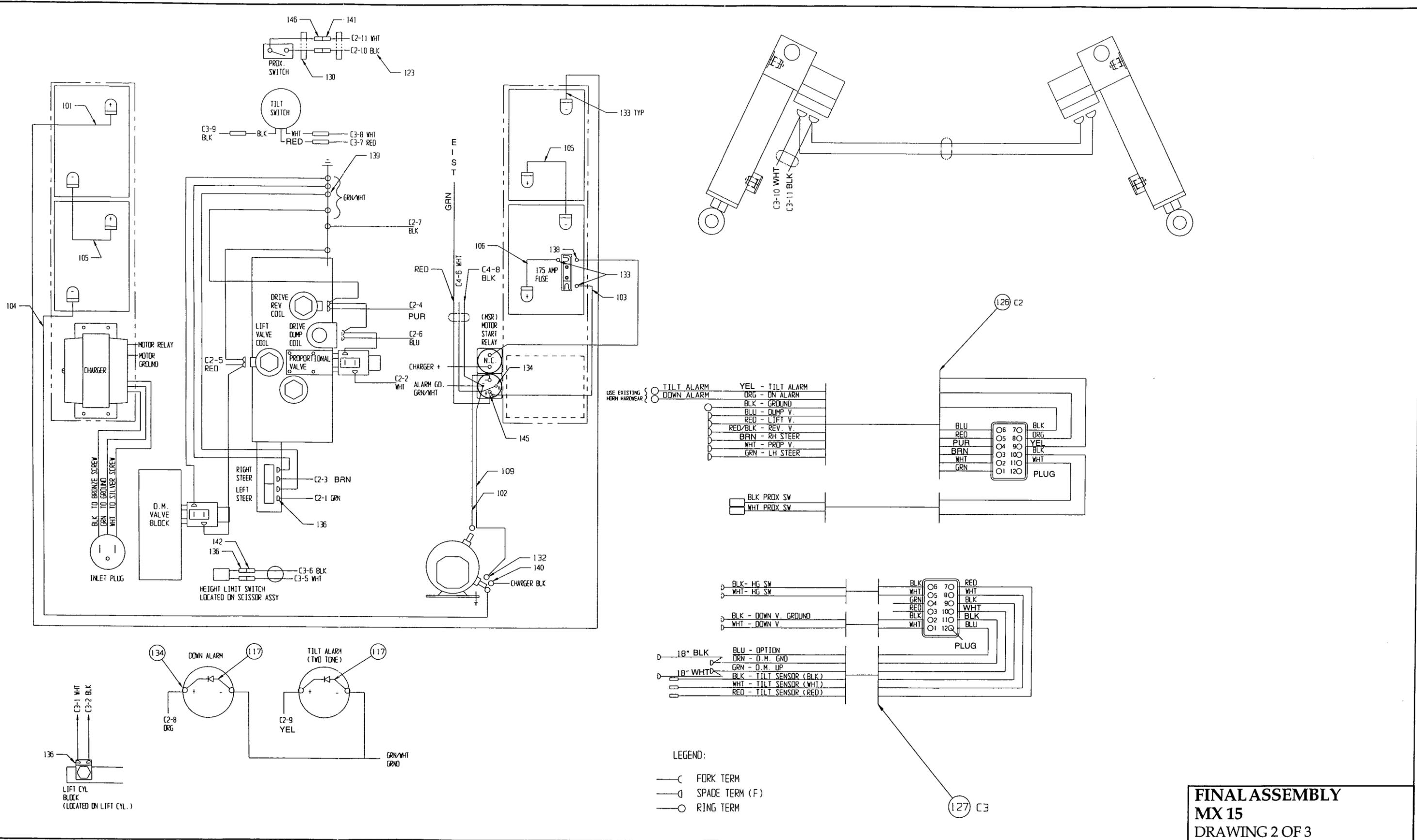
ITEM	PART	DESCRIPTION	QTY.
105	064195-014	BATTERY CABLE ASSY 5/16 - 5/16 X 14	2
106	064195-019	BATTERY CABLE ASSY 5/16 - 5/16 X 19	1
107	029450-099	WIRE 16AWG BLU	FT 6.9
108	029451-099	WIRE 16AWG WHT	FT 8.9
109	029452-099	WIRE 16AWG BLK	FT 5.5
112	011249-003	NUT HEX ESSNA 10-32 UNF	4
113	011240-003	WASHER 3/16 STD FLAT	4
114	011275-006	SCREW HHC 10-32 UNF	4
115	066490-000	SWITCH, PROX	1
116	066489-000	SWITCH MOUNT	1
117	029825-002	DIODE	2
119	029453-099	WIRE 16AWG ORN	FT 4.8
120	029458-099	WIRE 16AWG PUR	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	029477-099	WIRE 16AWG ORN/BLK	FT 4.8
126	065942-001	WIRE ASSY REF C2	1
127	065943-001	WIRE ASSY REF C3	1
132	029601-015	CONN RING 3/8 16-14	1
133	010154-001	COVER BATTERY TERM.	10
134	029601-013	CONN RING #10 16-14	10
135	029610-001	CONN FORK #6 22-18	25
136	029615-002	CONN FM PUSH .187 16-14	40
137	029620-002	CONN BUTT 16-14	9
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	1
141	029616-001	CONN FEMALE PUSH 16-14	4
142	014914-001	CONN MALE PUSH 16-14	2
143	029620-003	CONN BUTT 12-10	2
144	029601-019	CONN RING 12-10 X #10	3
145	029601-040	CONN RING 16-14 X 5/16	1
146	014914-003	CONN M PUSH 22-18	2

# Illustrated Parts Breakdown

Section  
6.2

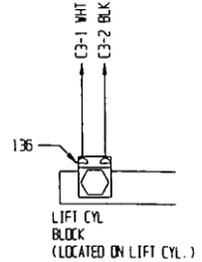
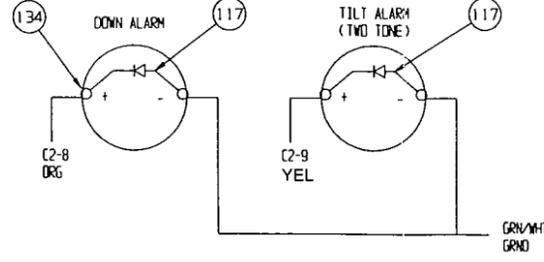


# Illustrated Parts Breakdown



LEGEND:

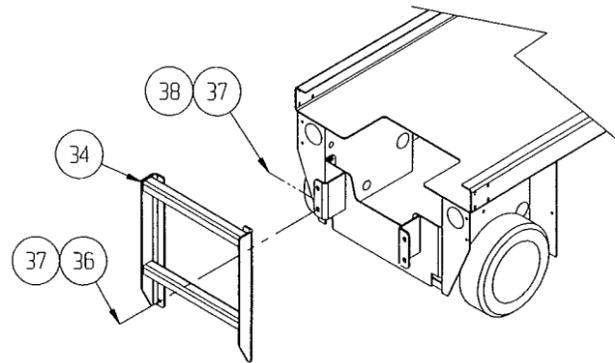
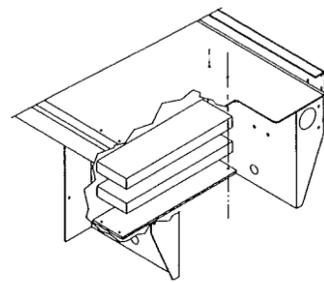
- C— FORK TERM
- D— SPADE TERM (F)
- O— RING TERM



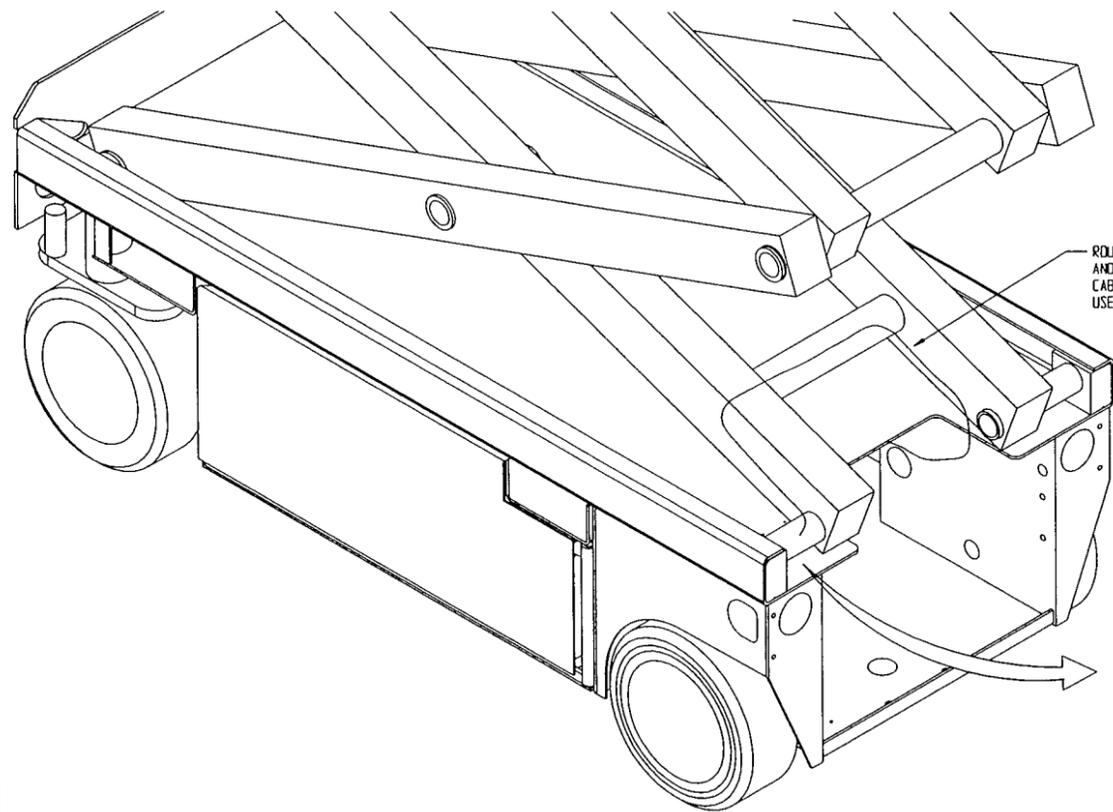
**FINAL ASSEMBLY**  
**MX 15**  
 DRAWING 2 OF 3

127 C3

# Illustrated Parts Breakdown

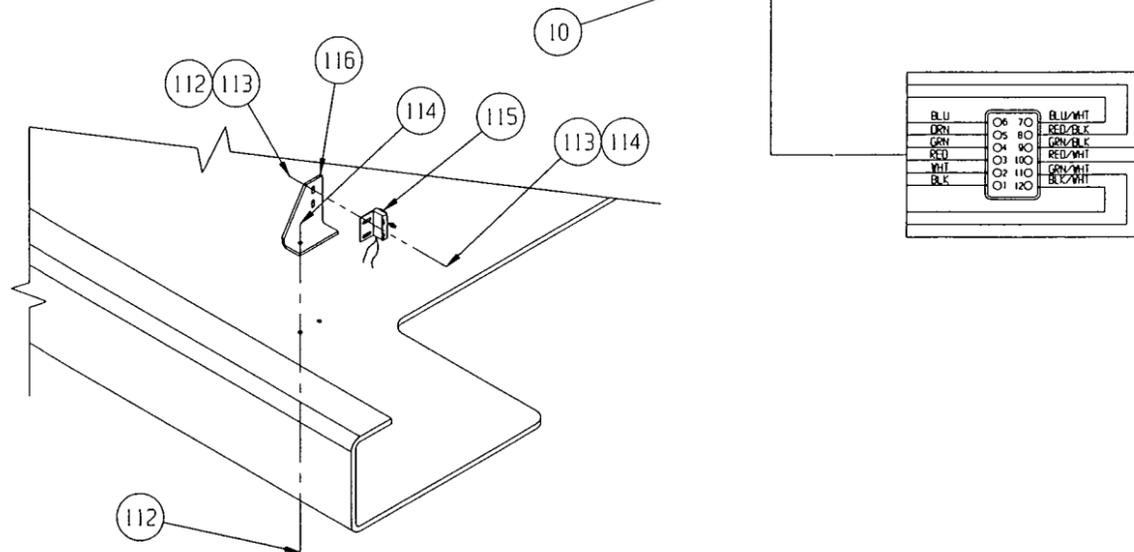
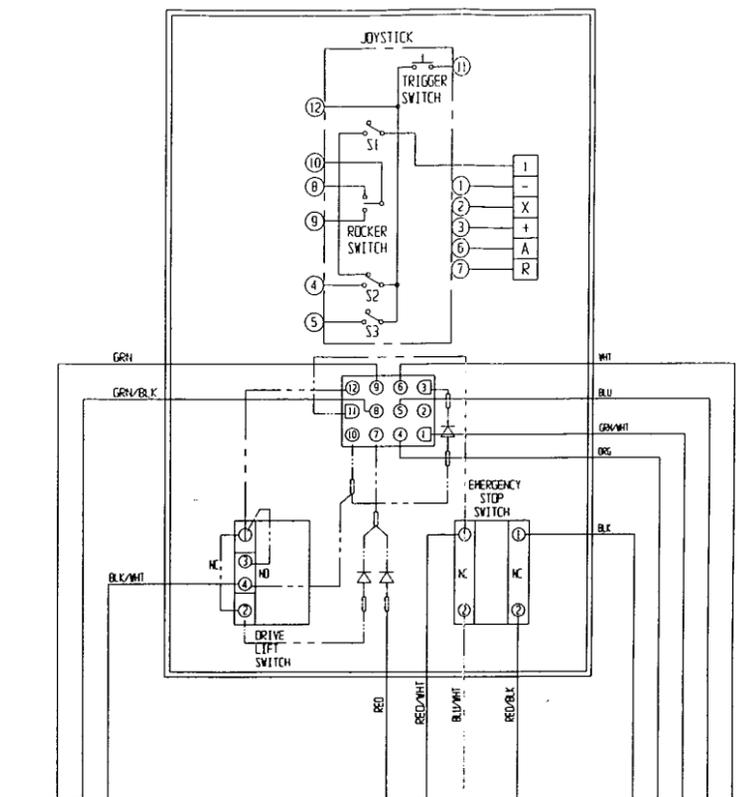


BALLAST & LADDER  
DETAIL



ROUTE SWITCH WIRES UNDER LINKAGE  
AND 2-CONDUCTOR WIRE WITH CONTROL  
CABLE INTO CHASSIS.  
USE TIE WRAPS AS NEEDED.

CABLE CONNECTIONS



**FINAL ASSEMBLY**  
**MX 15**  
DRAWING 3 OF 3

## FINAL ASSEMBLY

MX19

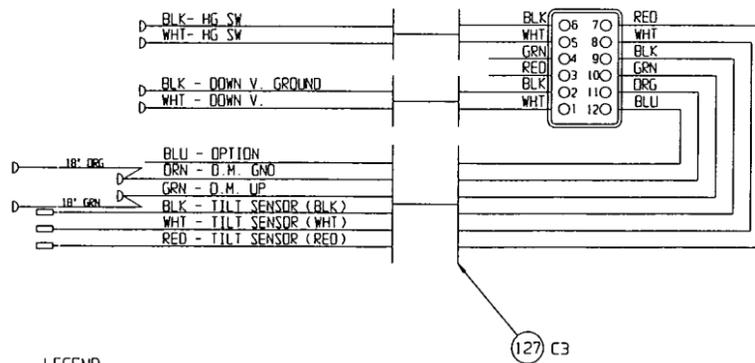
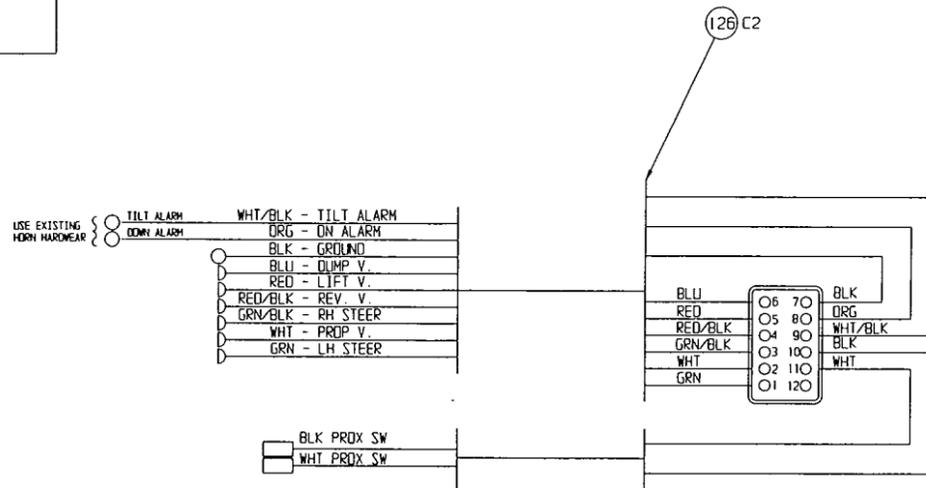
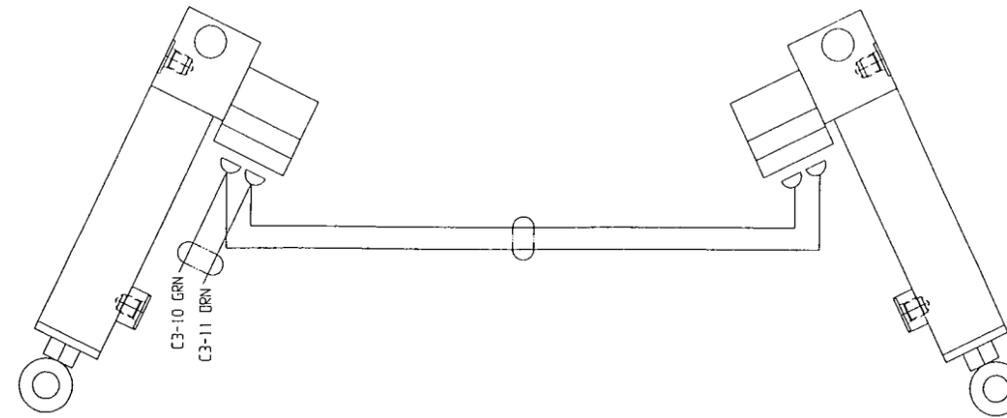
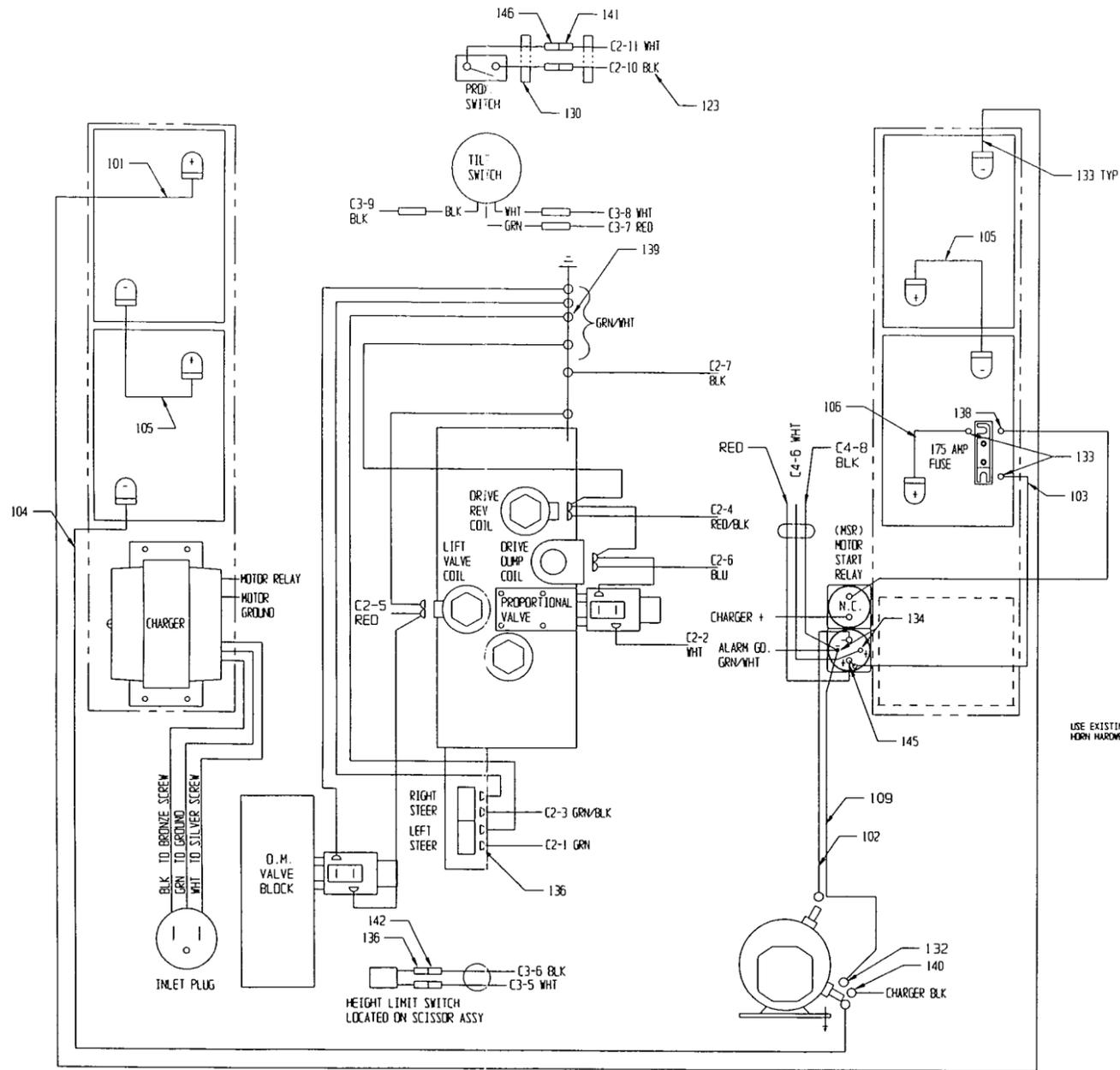
065700-010

ITEM	PART	DESCRIPTION	QTY.
1	065701-010	BASIC ASSY	1
2	065614-000	EXTENSION DECK	1
3	063944-001	CHARGER	1
4	065603-004	PLATFORM GUARDRAIL INSTL.	1
5	065712-026	LABEL INSTL.	1
6	011248-004	LOCK NUT 1/4-20 HEX	14
7	011240-004	WASHER 1/4 STD FLAT	14
8	015796-000	BATTERY 6V	4
9	066020-016	CONTROLLER ASSY	1
10	065609-015	CONTROLLER CABLE ASSY	1
11	065746-000	CONTROLLER GUIDE	1
12	011252-016	SCREW 1/4-20UNC HHC X 2	4
13	067346-000	ELEC. BOX	1
14	066516-009	HOLE PLUG	4
15	065980-000	WHEEL COVER ASS'Y	1
16	065963-001	BALLAST PLATE	4
17	065962-000	BALLAST BAR	4
18	065963-010	BALLAST WA	1
19	065613-000	COVER CWT	4
20	011254-018	HHCS 3/8-16 UNC X 2-1/4	4
21	011254-020	HHCS 3/8-16 UNC X 2-1/2	4
24	013283-002	CABLE MOUNT	2
25	063497-001	MERCURY SWITCH	1
26	011715-004	SCREW RD HD 6-32 X 1/2	2
27	011248-047	NUT, 6-32 HEX	2
28	029961-000	INLINE PLUG	1
29	029961-001	SEAL, INLINE PLUG	1
30	065611-020	HOSE KIT ( NOT SHOWN )	1
31	011252-056	SCREW, HHCS 1/4-20 UNC X 7	2
32	011252-014	SCREW, HHCS 1/4-20 UNC X 1-3/4	2
33	013919-013	CLAMP	3
34	066307-019	LADDER WELDMENT	1
36	011254-008	SCREW HHC 3/8-16 X 1	8
37	011240-006	WASHER 3/8 STD FLAT	16
38	011248-006	NUT HEX ESNA 3/8-16	8
40	011252-020	SCREW, HCCS 1/4-20 UNC X 2-1/2	2
41	029945-011	LEVEL SENSOR	1
44	066516-002	HOLE PLUG 1.75 DIA	1
45	065615-020	HYDRAULIC SCHEM.	REF
46	065616-020	ELECTRICAL SCHEM.	REF
52	065798-000	MOUNTING PLATE, BALLAST	1
53	011252-048	SCREW 1/4-20 HHCS X 6	4
54	019775-017	BAR	3
101	062125-052	BATTERY CABLE ASSY 5/16 - 3/8 X 52	1
102	062125-022	BATTERY CABLE ASSY 5/16 - 3/8 X 22	1
103	064195-018	BATTERY CABLE ASSY 5/16 - 5/16 X 18	1
104	064195-114	BATTERY CABLE ASSY 5/16 - 5/16 X 114	1

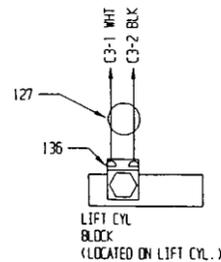
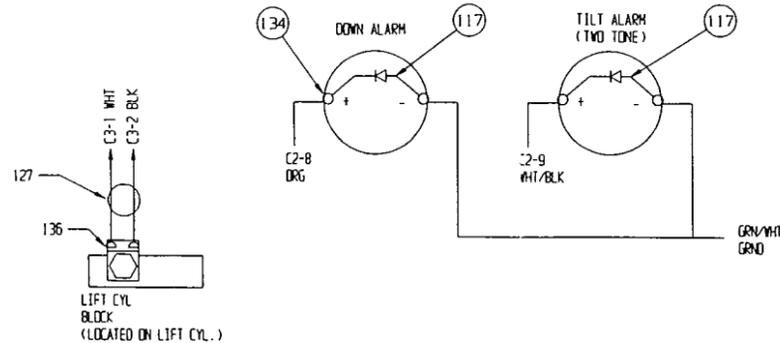
ITEM	PART	DESCRIPTION	QTY.
105	064195-014	BATTERY CABLE ASSY 5/16 - 5/16 X 14	2
106	064195-019	BATTERY CABLE ASSY 5/16 - 5/16 X 19	1
107	029450-099	WIRE 16AWG BLU	FT 6.9
108	029451-099	WIRE 16AWG WHT	FT 8.9
109	029452-099	WIRE 16AWG BLK	FT 5.9
112	011249-003	NUT HEX ESNA 10-32 UNF X 3/4	4
113	011240-003	WASHER 3/16 STD FLAT	4
114	011275-006	SCREW HHC 10-32 UNF X 3/4	4
115	066490-000	PROX. SWITCH	1
116	066489-000	SWITCH MOUNT	1
117	029825-002	DIODE	2
119	029453-099	WIRE 16AWG ORN	FT 4.8
120	029458-099	WIRE 16AWG PUR	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	029477-099	WIRE 16AWG ORN/BLK	FT 4.8
126	065942-001	WIRE ASS'Y REF C2	1
127	065943-001	WIRE ASS'Y REF C3	1
132	029601-015	CONN RING	2
133	010154-001	COVER BATTERY TERM.	10
134	029601-013	CONN RING #10 16-14	10
135	029610-001	CONN FORK #6 22-18	25
136	029615-002	CONN FM PUSH .187 16-14	40
137	029620-002	CONN BUTT 16-14	9
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	1
141	029616-001	CONN FEMALE PUSH 16-14	4
142	014914-001	CONN MALE PUSH 16-14	2
143	029620-003	CONN BUTT 12-10	2
144	029601-019	CONN RING 12-10 X #10	3
145	029601-040	CONN RING 16-14 X 5/16	1
146	014914-003	CONN M PUSH 22-18	2



# Illustrated Parts Breakdown



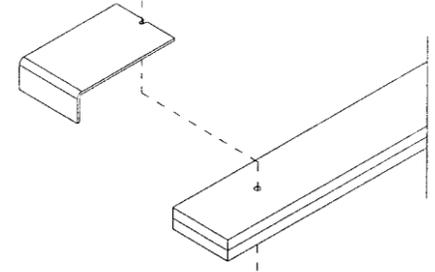
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 —> FORK TERM  
 —| SPADE TERM (F)  
 —○ RING TERM



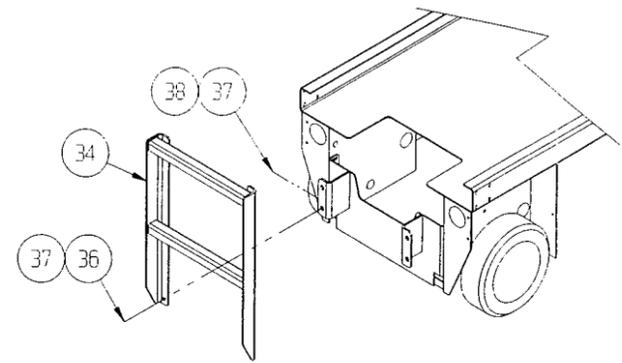
**FINAL ASSEMBLY**  
**MX19**  
 DRAWING 2 OF 3

# Illustrated Parts Breakdown

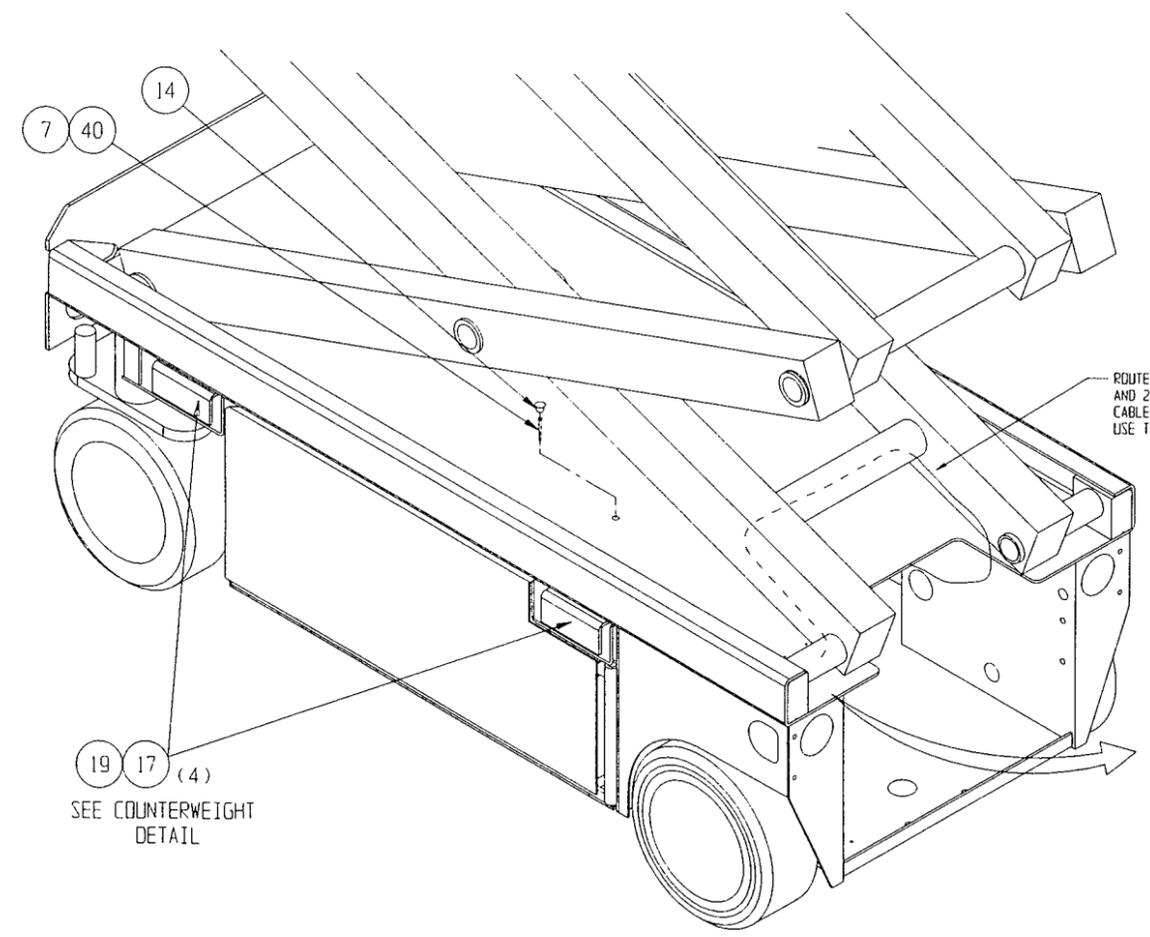
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COUNTERWEIGHT DETAIL



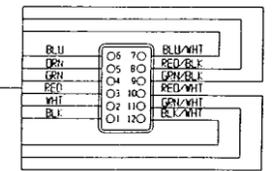
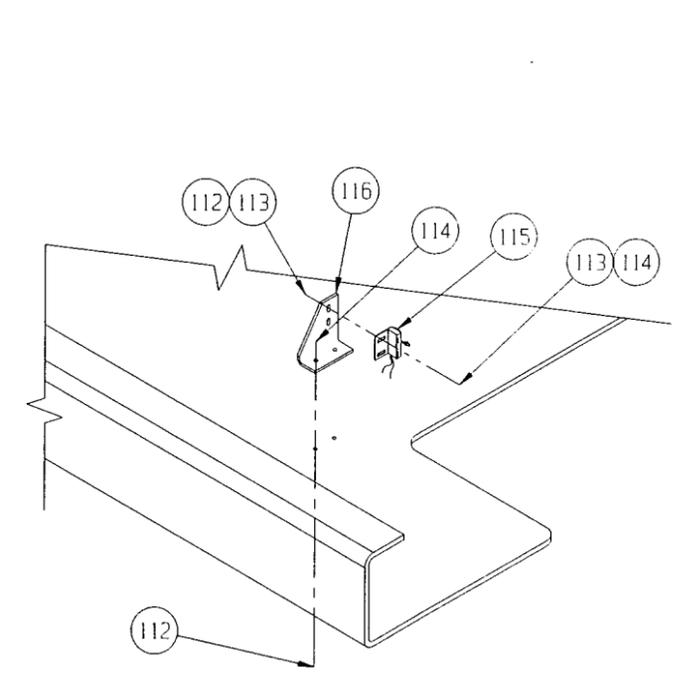
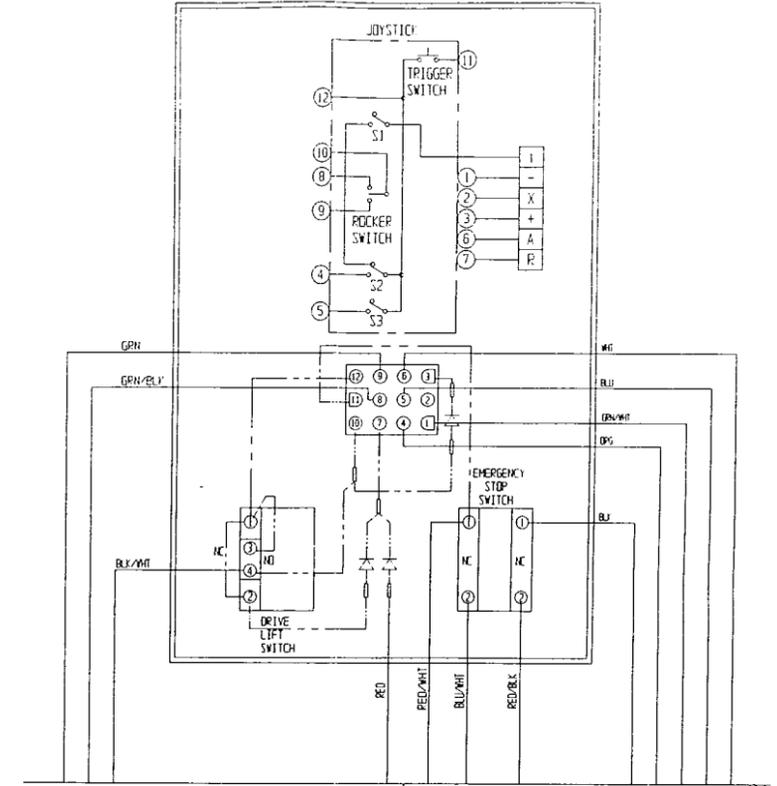
LADDER DETAIL



19 17 (4)  
SEE COUNTERWEIGHT  
DETAIL

ROUTE SWITCH WIRES UNDER LINKAGE  
AND 2-CONDUCTOR WIRE WITH CONTROL  
CABLE INTO CHASSIS.  
USE TIE WRAPS AS NEEDED.

CABLE CONNECTIONS



**FINAL ASSEMBLY**  
**MX19**  
DRAWING 3 OF 3

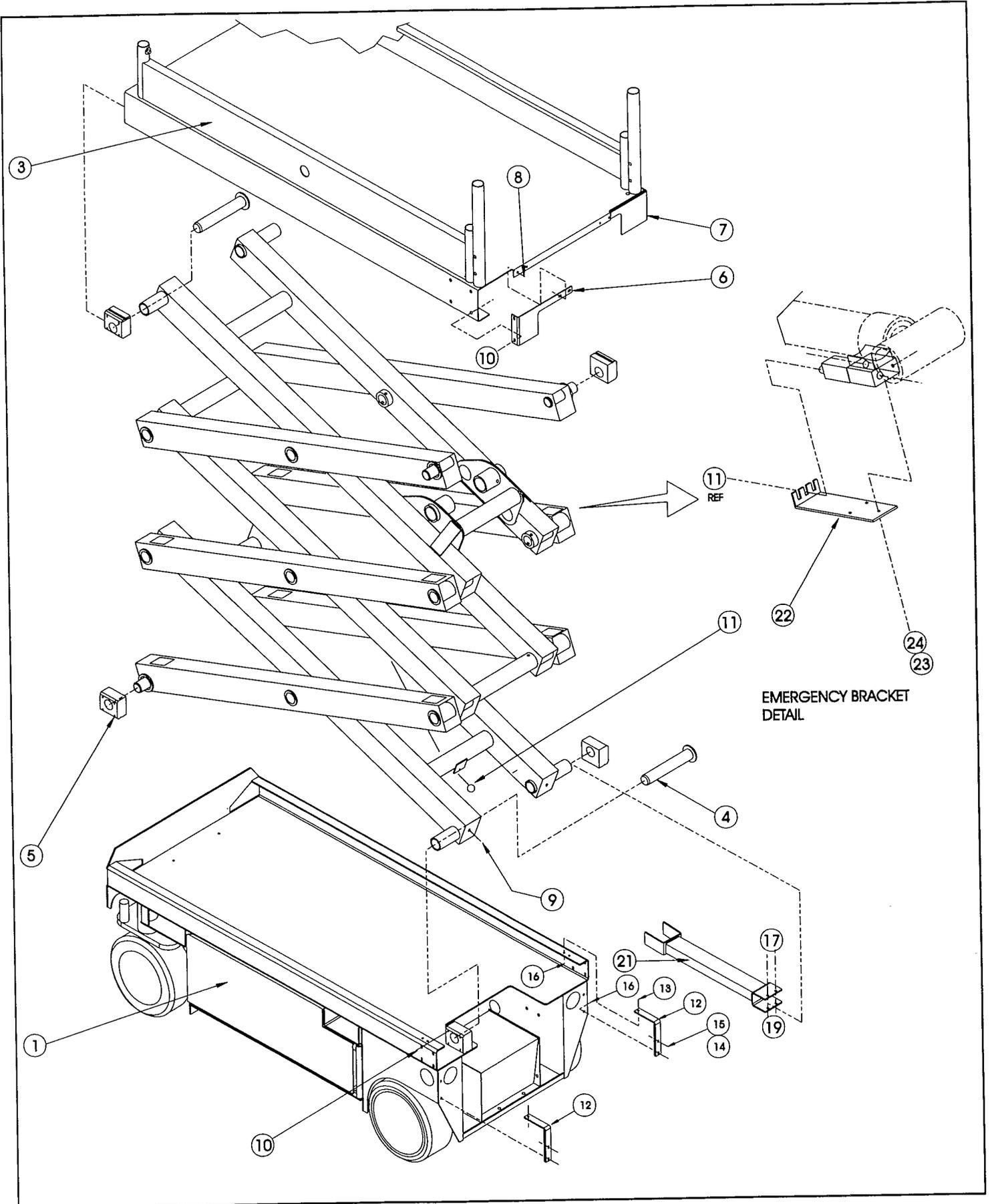
## BASIC ASSEMBLY

MX15

065601-010

ITEM	PART	DESCRIPTION	QTY.
1	065602-010	CHASSIS ASS'Y	1
2	065605-000	SCISSOR ARM ASS'Y X15	1
3	066250-001	PLATFORM WELDMENT	1
4	065698-000	LOWER PIVOT PIN WELDMENT	4
5	065726-000	SLIDE PAD	8
6	065728-000	DECK BRACKET L.H.	1
7	065727-000	DECK BRACKET R.H.	1
8	014027-006	SCREW HHD SLFTP 1/4-28 x 3/4	4
9	011739-020	ROLLPIN 3/8 DIA. x 2 1/2	4
10	014066-008	SCREW SLFTP 1/4-AB x 1	16
11	065754-000	EMERGENCY LOWERING CABLE	1
12	065937-001	BEARING RETENTION ANGLE	2
13	011254-034	SCREW HHC 3/8-16UNC X 4 1/4	2
14	011254-014	SCREW HHC 3/8-16UNC X 1 3/4	4
15	011240-006	WASHER 3/8 STD FLAT	4
16	011248-006	NUT HEX ESNA 1/4-20UNC	8
17	011252-022	SCREW HHC 1/4-20 x 2-3/4	2
19	011248-004	LOCK NUT HEX 1/4-20	2
21	065764-000	SCISSOR CHOCK WELDMENT X15/19	1
22	065770-000	CABLE BRKT EMER LOWER	1
23	011252-004	SCREW HHC 1/4-20 x 1/2	3
24	011238-004	LOCKWASHER 1/4	3

# Illustrated Parts Breakdown



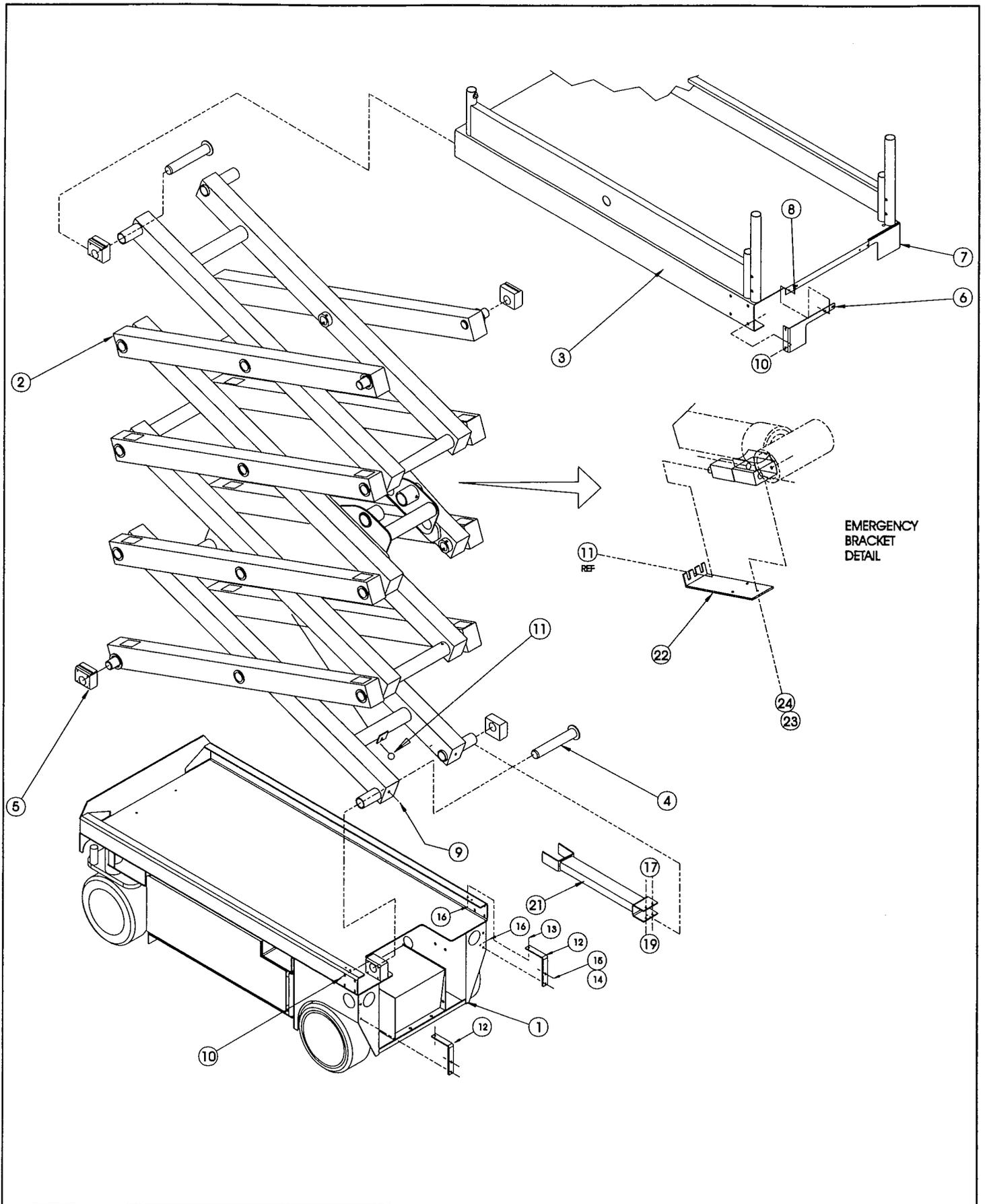
## BASIC ASSEMBLY

MX19

065701-010

ITEM	PART	DESCRIPTION	QTY.
1	065602-010	CHASSIS ASS'Y	1
2	065705-000	SCISSOR ARM ASS'Y X19	1
3	066250-001	PLATFORM WELDMENT	1
4	065698-000	LOWER PIVOT PIN WELDMENT	4
5	065726-000	SLIDE PAD	8
6	065728-000	DECK BRACKET L.H.	1
7	065727-000	DECK BRACKET R.H.	1
8	014027-006	SCREW HHD SLFTP 1/4-28 x 3/4	4
9	011739-020	ROLLPIN 3/8 DIA. x 2 1/2	4
10	014066-008	SCREW SLFTP 1/4-AB x 1	16
11	065754-000	EMERGENCY LOWERING CABLE	1
12	065937-001	BEARING RETENTION ANGLE	2
13	011254-034	SCREW HHC 3/8-16UNC X 4 1/4	2
14	011254-014	SCREW HHC 3/8-16UNC X 1 3/4	4
15	011240-006	WASHER 3/8 STD FLAT	4
16	011248-006	NUT HEX ESNA 1/4-20UNC	8
17	011252-022	SCREW HHC 1/4-20 x 2-3/4	2
19	011248-004	LOCK NUT 1/4-20	2
21	065764-000	SCISSOR CHOCK WELDMENT X15/19	1
22	065770-000	CABLE BRACKET EMER. LOWER	1
23	011252-004	SCREW HHC 1/4-20 x 1/2	3
24	011238-004	LOCKWASHER 1/4	3

# Illustrated Parts Breakdown



## CHASSIS ASSEMBLY

MX15/19

065602-010

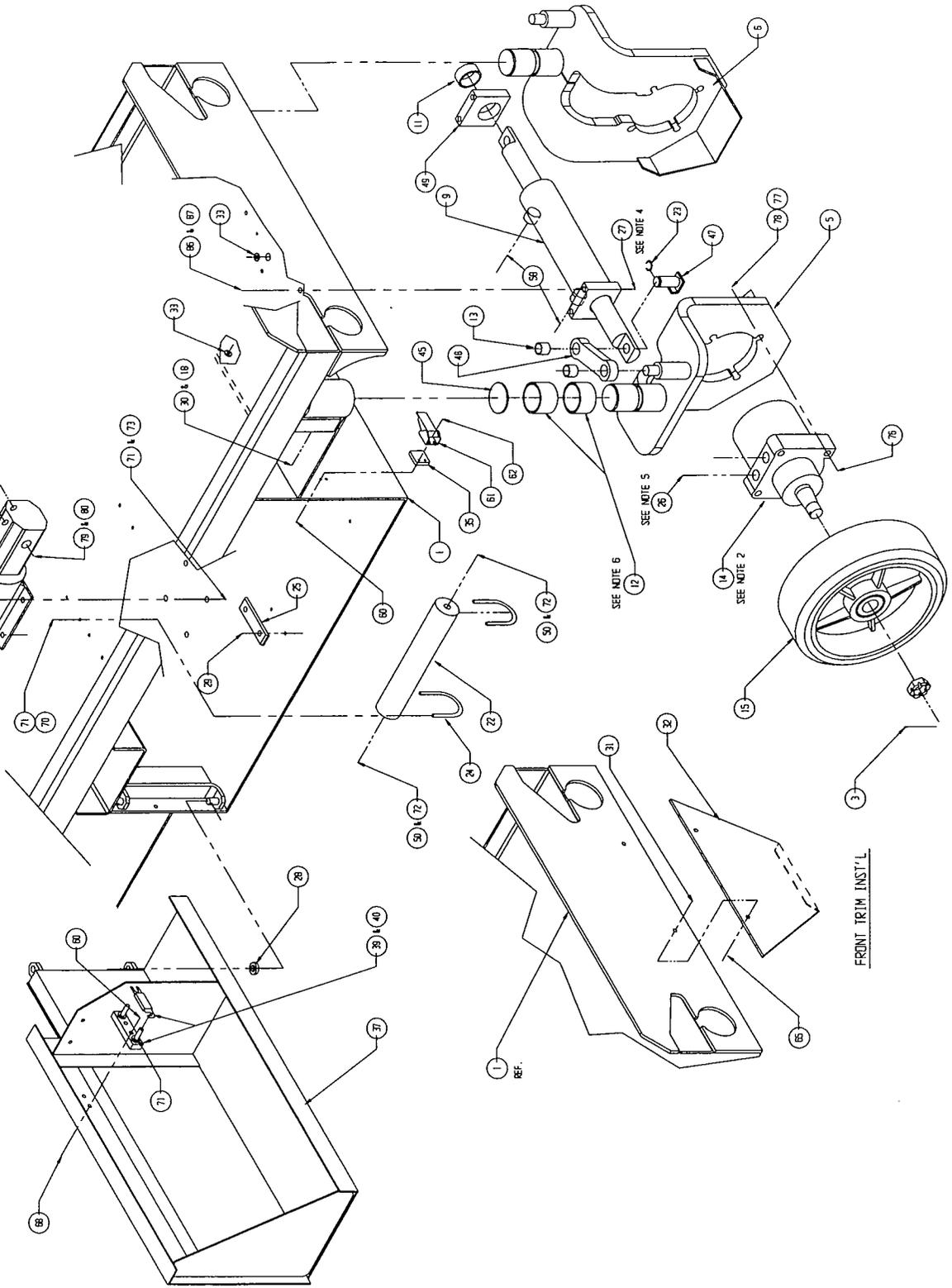
ITEM	PART	DESCRIPTION	QTY.
1	065620-010	CHASSIS WELDMENT X15	1
2	065678-000	BRAKE PIVOT WELDMENT	1
3	011753-012	COTTER PIN 1/8 X 1 1/2	12
4	065685-000	BRAKE ACTUATOR WELDMENT	2
5	065690-000	YOKE WELDMENT R.H. X15	1
6	065691-000	YOKE WELDMENT L.H. X15	1
7	065637-000	HYDRAULIC TANK ASS'Y X15	1
8	015797-000	POWER UNIT	1
*	015797-010	PUMP	1
*	015797-011	MOTOR	1
*	010145-001	BRUSHES (8), MOTOR	1
9	065371-000	STEERING CYLINDER	1
*	065371-010	SEAL KIT	1
10	011781-020	BEARING	4
11	027931-072	BEARING	2
12	027931-059	BEARING	4
13	027931-022	BEARING	4
14	061817-002	MOTOR DRIVE	2
*	061817-011	SLOTTED NUT	1
*	061817-015	SHAFT KEY	1
*	061817-010	SEAL KIT	1
15	065743-000	DRIVE WHEEL	2
16	065744-000	IDLER WHEEL	2
18	011273-006	NUT HEX 3/8-16 JAM	2
19	065657-001	TRAY WELDMENT L.H.	1
20	066604-000	BRAKE CYLINDER	1
*	066604-010	SEAL KIT	1
21	027931-071	BEARING	2
22	065396-000	CUSHION CYLINDER	1
23	013315-010	RING, RETAINING "E"	2
24	014924-007	U-BOLT	2
25	063728-001	SLIDE BLOCK	4
26	011932-003	FITTING, 45° 6FJX-6M	4
27	011254-032	SCREW HHC 3/8-16 x 4	4
29	026553-004	RVT POP 3/16 DIA. .25-.38 GRIP	8
30	011287-008	SCREW SET 3/8-16 x 1	6
31	011252-008	SCREW HHC 1/4-20 x 1	6
32	065756-000	FRONT TRIM COVER	1
33	012956-010	GROMMET	2
35	063029-000	BUS BAR	1
36	065617-010	VALVE BLOCK ASS'Y	1
37	065650-001	TRAY WELDMENT R.H. X15/19	1
39	010149-000	FUSE BLOCK	1
40	010148-001	FUSE 175 AMP	1
42	065736-000	WHEEL COVER L.H. X15/19	1
44	065737-001	FORKLIFT POCKET	1
45	065733-000	THRUST PAD 1/4 UHMW	2
47	065800-000	WELDMENT, STEER PIN	2
48	065731-000	STEER LINK X15/19	2
49	065732-000	STEER GUIDE	2
51	063973-001	VALVE N.C.	2

ITEM	PART	DESCRIPTION	QTY.
52	066322-000	CYLINDER LINK	1
53	065742-001	VALVE BRACKET X15/19	1
54	065742-002	VALVE BRACKET X15/19	1
55	066096-016	SCREW 1/2-13UNC SQ HD x 2	1
56	018183-058	TUBE 1-3/8 O.D. x 1/8 WALL x 5/8 LG	1
57	066802-001	VALVE ASSY	1
58	011934-001	FITTING 4MBH-4MJ	7
60	011248-002	LOCK NUT 8-32	6
61	005299-000	LATCH TOGGLE	2
62	011708-004	SCREW MACH RD HD 8-32 x 1/2	4
64	011246-005	LOCK NUT 5/16-18	1
65	011248-004	LOCK NUT 1/4-20	10
66	011240-004	WASHER FLAT STD 1/4	6
67	011252-006	SCREW HHC 1/4-20 x 3/4	3
68	011709-008	SCREW MACH HD RD 10-24 x 1	2
69	011248-003	LOCK NUT 10-24	2
70	011248-005	LOCK NUT 5/16-18	12
71	011240-005	WASHER FLAT STD 5/16	22
72	011934-003	FITTING 90 6MBH-4MJ	3
73	011253-008	SCREW HHC 5/16-18 x 1	8
75	011941-013	FITTING 10MB-6MJ	4
76	011256-026	SCREW HHC 1/2-13 x 3-1/4	8
77	011240-008	WASHER FLAT STD 1/2	8
78	011248-008	LOCK NUT 1/2-13	8
79	011941-012	FITTING 8MB-12MJ	1
80	011937-007	FITTING 90 12FJX-12MJ	1
81	011934-004	FITTING 90 6MBH-6MJ	2
83	011261-017	NUT HEX 1-14 UNF	2
84	011754-012	COTTER PIN 5/32 x 1-1/2	2
85	011757-010	COTTER RUE RING	2
86	011240-006	WASHER FLAT STD 3/8	12
87	011248-006	LOCK NUT 3/8-16	10
89	011254-020	SCREW HHC 3/8-16 x 2-1/2	2
91	011848-041	CLEVIS PIN 3/4 x 2	1
92	063329-008	WASHER, FLAT 1" I.D. 2" O.D.	2
94	011273-008	NUT 1/2-13 JAM HEX	1
95	011252-030	SCREW HHC 1/4-20 x 3-3/4	1
96	011252-020	SCREW HHC 1/4-20 UNC X 2 1/2	2
98	011252-032	SCREW HHC 1/4-20 x 4	1
99	063559-006	SHOULDER BOLT 3/8 x 2 X 5/16-18 THD	1
100	066807-003	ALARM DOWN	1
101	066807-001	ALARM DUAL TONE	1
102	011252-006	SCREW RD HD 6-32 X 3/4	2
103	011848-036	CLEVIS PIN 5/8 X 2 1/4	2
104	011848-019	CLEVIS PIN 3/4 X 2 1/2	2
105	011780-040	BEARING 5/8 X 13/16 X 1/2 LG	4
107	014996-010	WASHER 5/8 SAE FLAT PLATED	8
108	010122-001	SOLENOID	1
109	065970-001	CYLINDER POT HOLE	2
*	065970-011	SEAL KIT	1
110	065971-000	POTHOLE RAIL WELDMENT L.H.	1
111	065971-001	POTHOLE RAIL WELDMENT R.H.	1

\* Not Shown

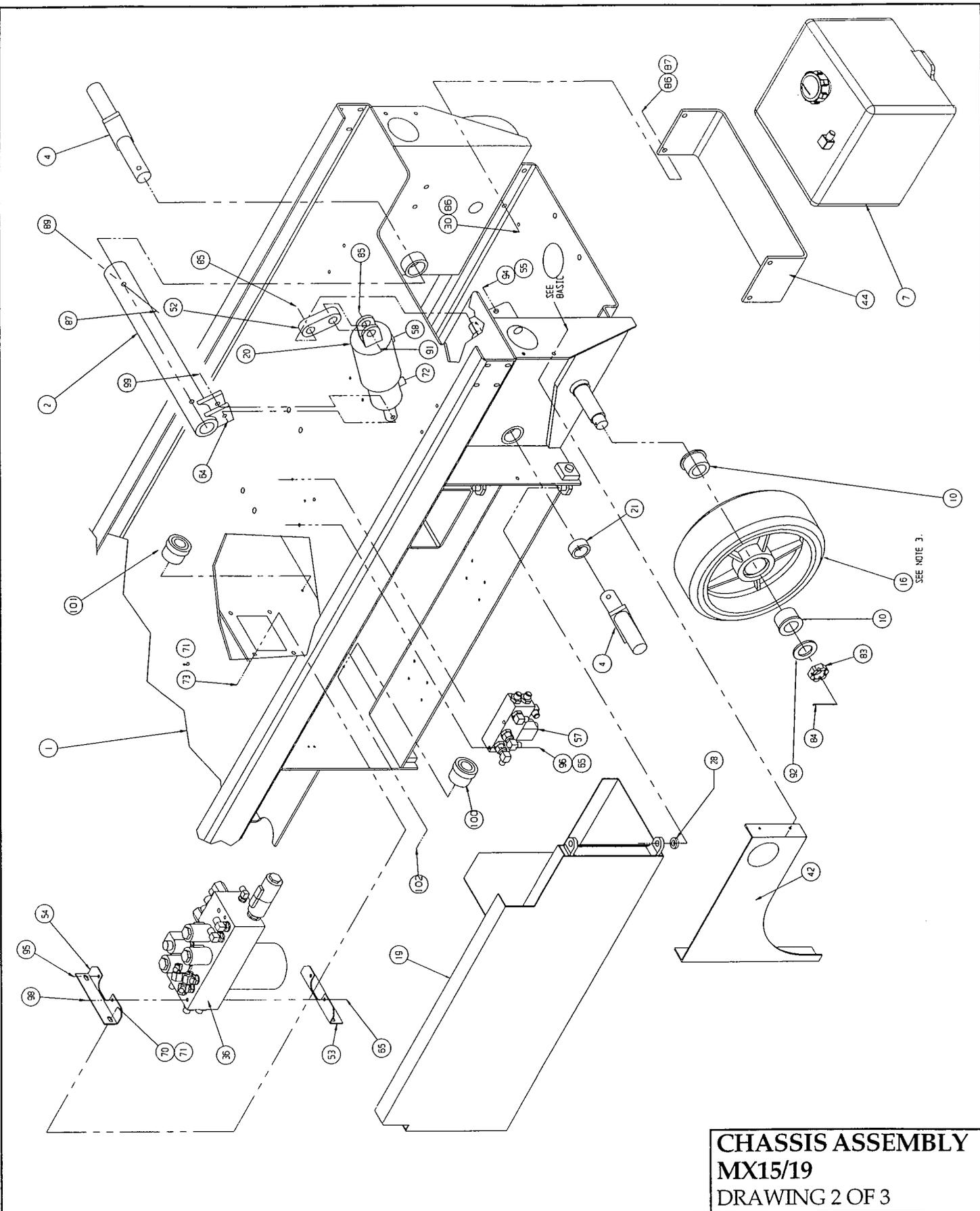
# Illustrated Parts Breakdown

- NOTES:**
- 1-20 UNKF SLOTTED NUT & 1/8 x 1-1/2 COTTER PIN INCLUDED WITH ITEM (9) DRIVE MOTOR. CLEAN MOTOR SHAFT AND HUB BORE. LUBRICATE MOTOR SHAFT AND HUB BORE WITH GREASE.
  2. AFTER LOOSENING NUTS, MUST REMOVE NUT AND COTTER PIN AND PAINT NUT, COTTER PIN, AND SHAFT SILVER.
  3. WHEEL (16) MUST TURN FREELY WITH NUT FIRMLY TIGHTENED & BACKED OFF 1-2 SLOTS MAXIMUM.
  4. INSTALL AS SHOWN TO REDUCE HYDRAULIC HOSE DAMAGE.
  5. ROTATE 45° (26) FITTING TO BEAR AGAINST THE MOTOR CUT OUT-- BOTH SIDES.
  6. LOCATE 80 GRN ITEM (12) BOTTOM BEARING AND STAKE.



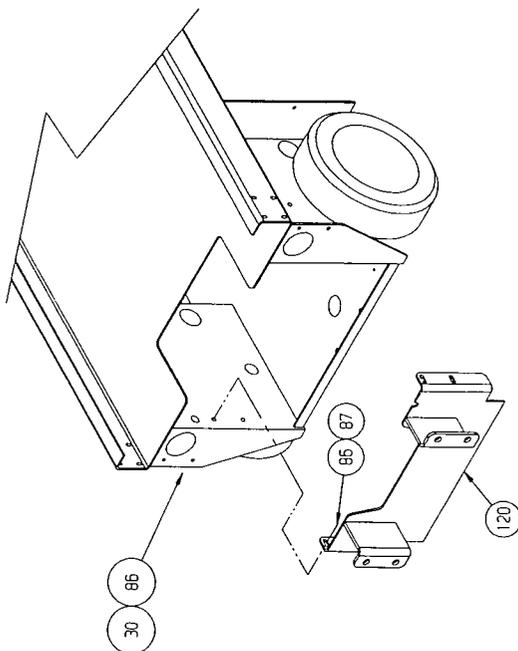
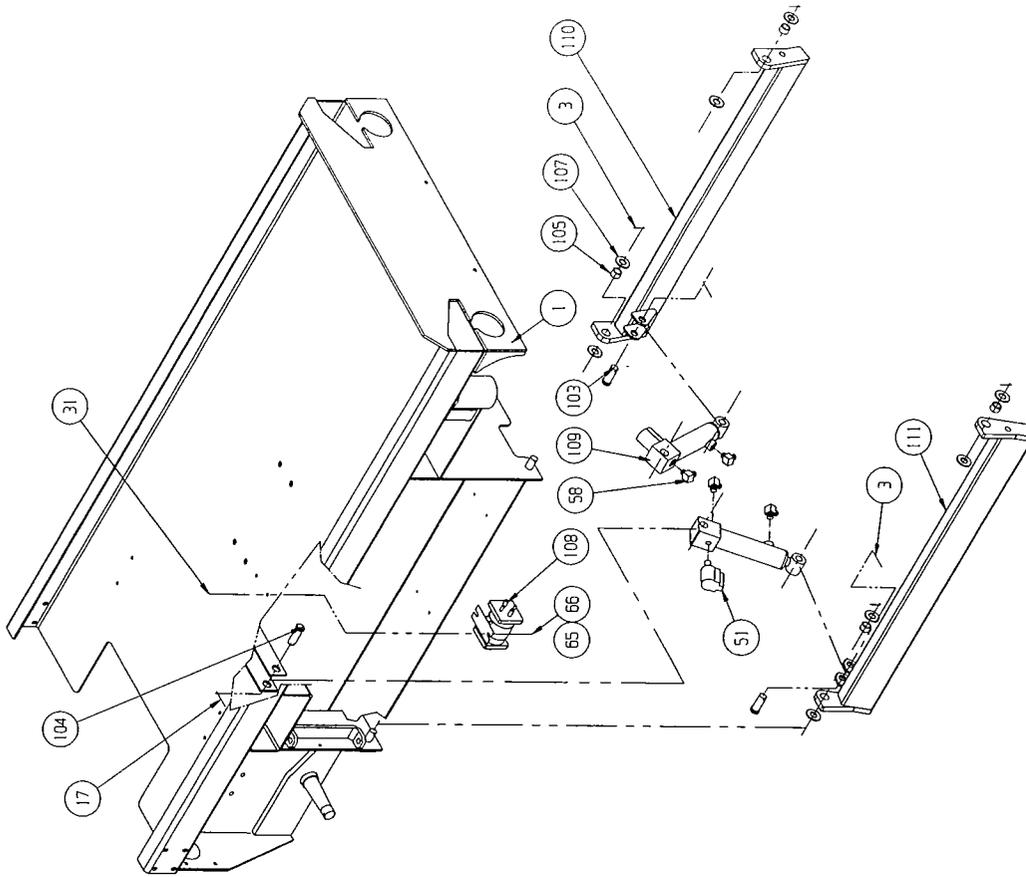
**CHASSIS ASSEMBLY**  
**MX15/19**  
 DRAWING 1 OF 3

# Illustrated Parts Breakdown



**CHASSIS ASSEMBLY**  
**MX15/19**  
DRAWING 2 OF 3

# Illustrated Parts Breakdown



LADDER SUPPORT  
DETAIL

**CHASSIS ASSEMBLY**  
**MX15/19**  
DRAWING 3 OF 3

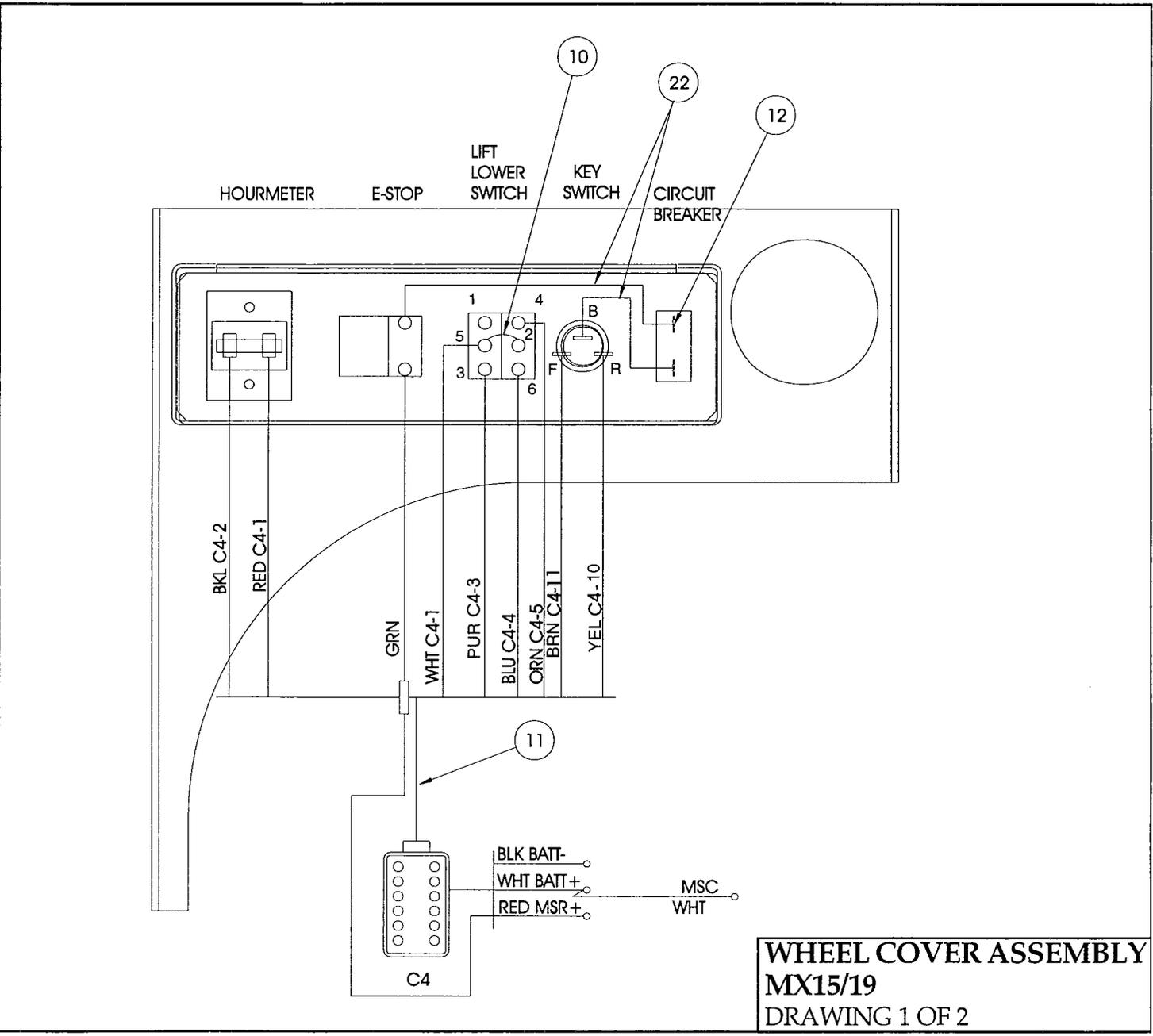
# Illustrated Parts Breakdown

## WHEEL COVER ASSEMBLY MX15/19 065980-000

ITEM	PART	DESCRIPTION	QTY.
1	065979-000	WHEEL COVER WELDMENT	1
2	010155-000	KEYSWITCH	1
*	010155-001	KEY	1
3	029868-007	CIRCUIT BREAKER	1
4	063667-002	SWITCH CONTACT BLOCK	1
5	012798-001	SWITCH TOGGLE	1
6	063667-001	SWITCH HEAD MUSHROOM	1
7	029925-001	CONNECTOR CABLE	1
8	029939-003	LOCKNUT 3/4 NPT	1

ITEM	PART	DESCRIPTION	QTY.
9	029872-000	BOOT SWITCH COVER	1
10	029932-002	JUMPER	1
11	067340-000	WIRE ASSY LOWER CONTROLS	1
12	029931-003	CONN FM PUSH	3
14	015752-000	HOURMETER	1
17	065978-000	COVER	1
22	029453-099	WIRE 16AWG ORN	FT 1
25	011811-006	SCREW SLFTP F HWH 10-32 X 3/4	4

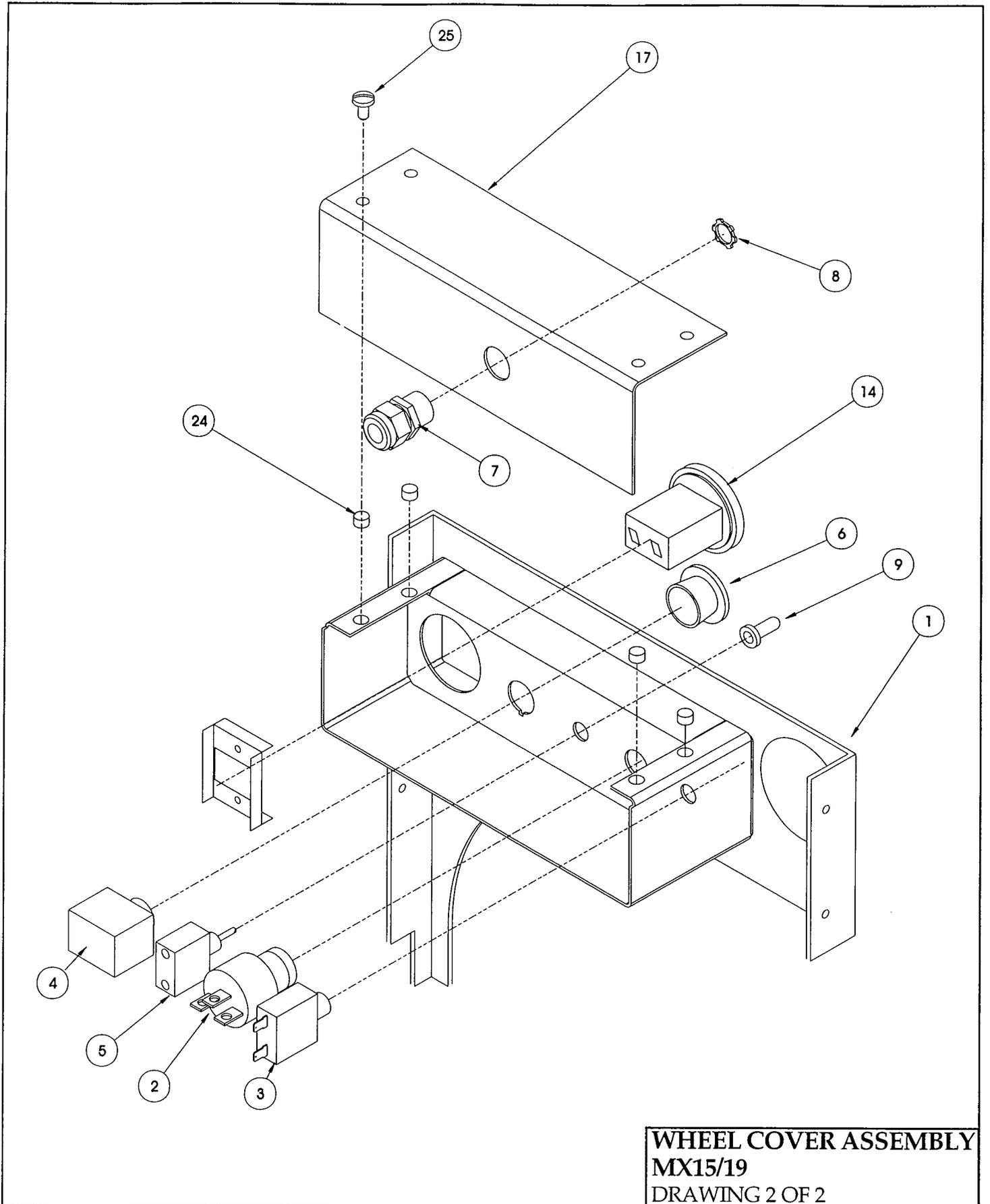
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**WHEEL COVER ASSEMBLY  
MX15/19  
DRAWING 1 OF 2**

# Illustrated Parts Breakdown

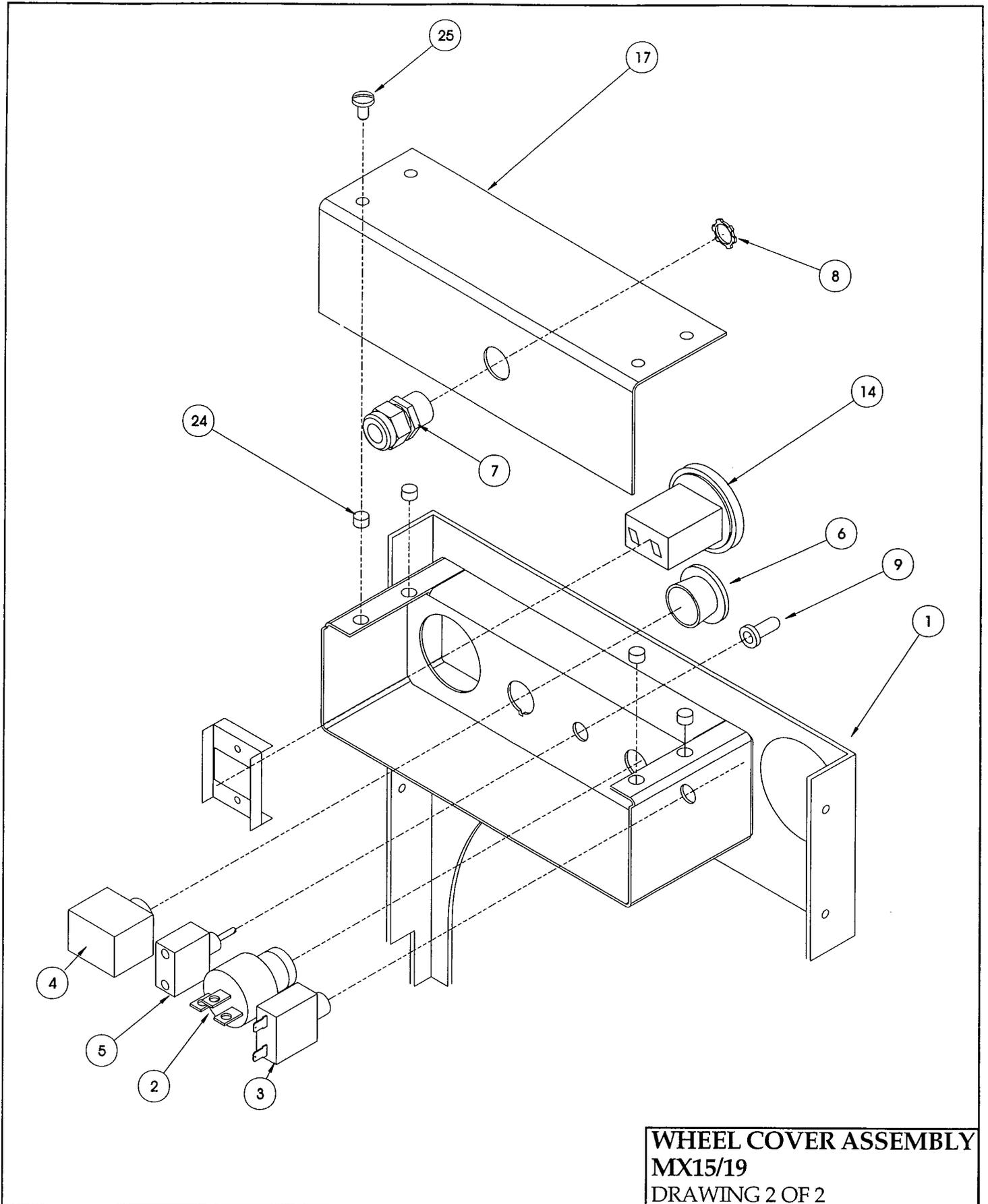
Section  
6.2



**WHEEL COVER ASSEMBLY**  
**MX15/19**  
DRAWING 2 OF 2

# Illustrated Parts Breakdown

Section  
6.2



**WHEEL COVER ASSEMBLY**  
**MX15/19**  
DRAWING 2 OF 2

## SCISSOR ASSEMBLY

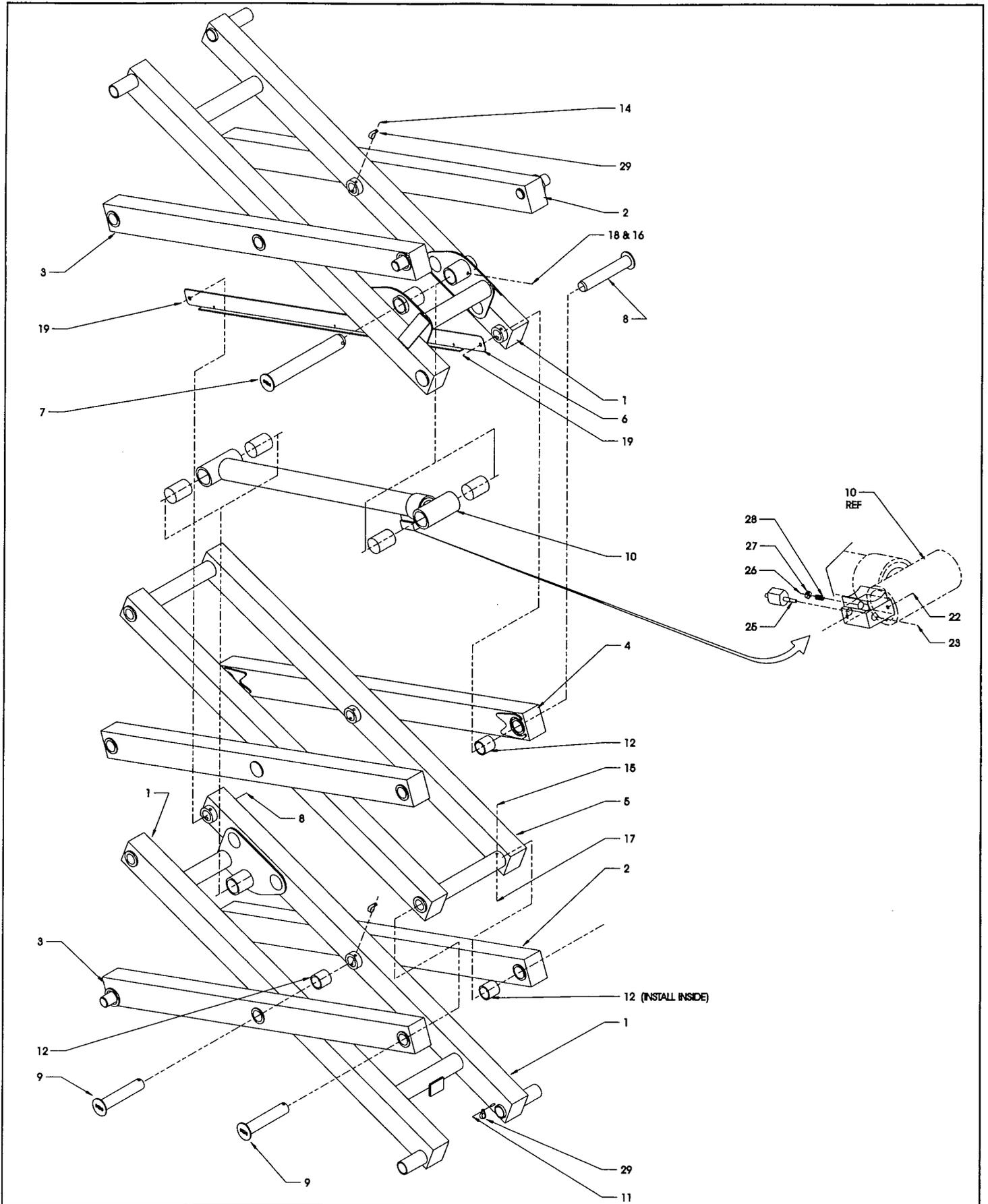
MX15

065605-000

ITEM	PART	DESCRIPTION	QTY.
1	065640-000	INNER ARM WELDMENT	2
2	065671-000	OUTER BEAM EWLDMENT R.H.	2
3	065672-000	OUTER BEAM WELDMENT L.H.	2
4	065675-001	OUTER BEAM WELDMENT	2
5	065677-000	INNER CENTER BEAM WELDMENT	1
6	065687-000	CABLE GUIDE	1
7	065696-000	CYLINDER PIN WELDMENT	2
8	065697-000	PIN KEEPER WELDMENT	2
9	065920-000	PIVOT PIN WELDMENT	12
10	065372-001	LIFT CYLINDER	1
*	065372-011	SEAL KIT	1
11	011248-004	LOCKNUT 1/4-20UNC HEX	1
12	066183-002	BUSHING	14
14	011253-024	SCREW 5/16-18UNC HHC X 3	3
15	011253-022	SCREW 5/16-18UNC HHC X 2 3/4	11
16	011254-026	SCREW 3/8-16UNC HHC X 3 1/4	2
17	011248-005	LOCKNUT 5/16-18UNC HEX	16
19	065688-000	GUARD RIVET	2
21	011248-006	LOCKNUT 3/8-16UNC HEX	2
22	012004-004	PLUG #4	1
23	012004-006	PLUG #6	1
25	066179-000	VALVE	1
26	011941-005	FITTING 6MB-6MJ ST	1
27	015919-001	ORIFICE #840	1
28	005133-000	SPRING	1
29	013919-009	CLAMP	3

\* Not Shown

# Illustrated Parts Breakdown



# Illustrated Parts Breakdown

## SCISSOR ASSEMBLY

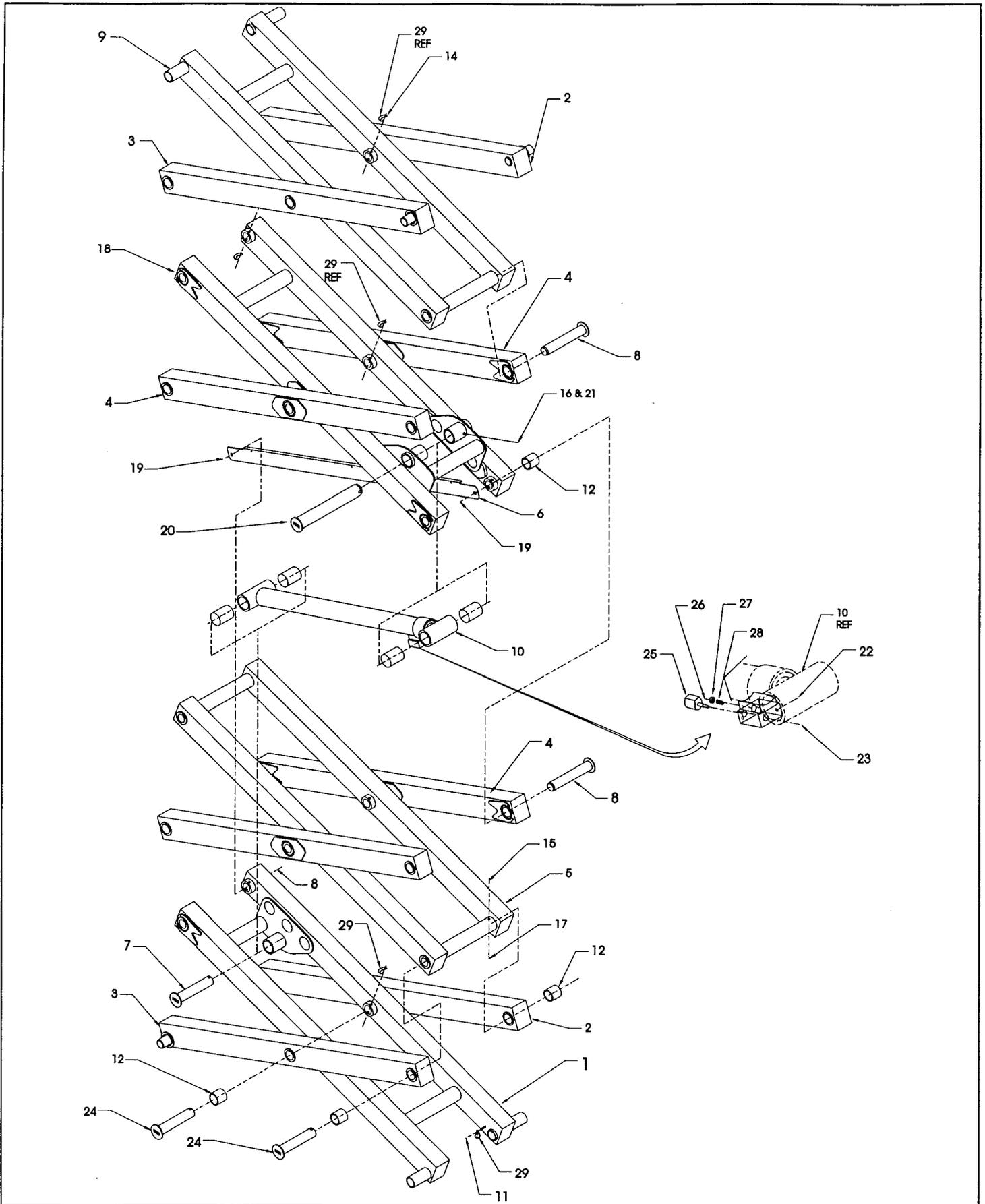
MX19

065705-000

ITEM	PART	DESCRIPTION	QTY.
1	065640-001	INNER ARM WELDMENT	1
2	065671-000	OUTER BEAM WELDMENT R.H.	2
3	065672-000	OUTER BEAM WELDMENT L.H.	2
4	065675-000	OUTER BEAM WELDMENT	4
5	065677-000	INNER CENTER BEAM WELDMENT	1
6	065687-000	CABLE GUIDE	1
7	065696-000	CYLINDER PIN WELDMENT	1
8	065697-000	PIN KEEPER WELDMENT	2
9	065721-000	UPPER BEAM WELDMENT	1
10	065372-001	LIFT CYLINDER	1
*	065372-011	SEAL KIT	1
11	011248-004	LOCKNUT 1/4-20UNC HEX	1
12	066183-002	BUSHING	20
14	011253-024	SCREW 5/16-18UNC HHC X 3	4
15	011253-022	SCREW 5/16-18UNC HHC X 2 3/4	16
16	011254-026	SCREW 3/8-16UNC HHC X 3 1/4	2
17	011248-005	LOCKNUT 5/16-18UNC HEX	20
18	065722-000	INNER BEAM WELDMENT	1
19	065688-000	GUARD RIVET	2
20	065750-000	CYLINDER PIN WELDMENT	1
21	011248-006	LOCKNUT 3/8-16UNC HEX	2
22	012004-004	PLUG #4	1
23	012004-006	PLUG #6	1
24	065920-000	PIVOT PIN WELDMENT	18
25	066179-000	VALVE	1
26	011941-005	FITTING 6MB-6MJ ST	1
27	015919-001	ORIFICE	1
28	005133-000	SPRING	1
29	013919-009	CLAMP	4

\* Not Shown

# Illustrated Parts Breakdown



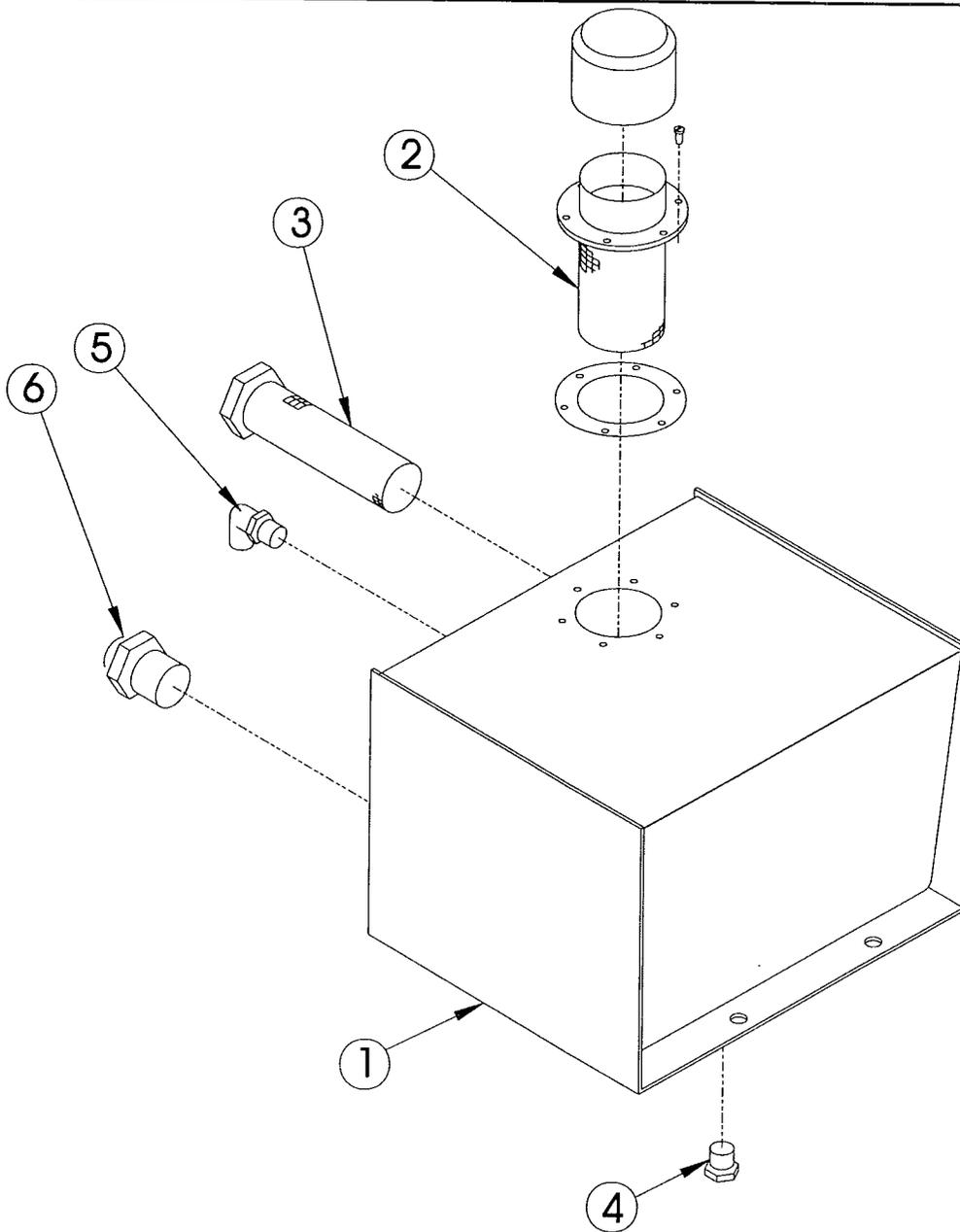
# Illustrated Parts Breakdown

## HYDRAULIC TANK ASSEMBLY

MX15/19

065637-000

ITEM	PART	DESCRIPTION	QTY.
1	065699-000	HYDRAULIC TANK WELDMENT	1
2	005963-001	FILLER CAP & NECK	1
*	005963-010	GASKET	1
3	061818-000	SUCTION SCREEN	1
4	021305-006	PLUG - MAGNETIC	1
5	011940-004	FITTING 4MP-4MJ 90°	1
6	011939-015	FITTING 8MP-8MJ	1

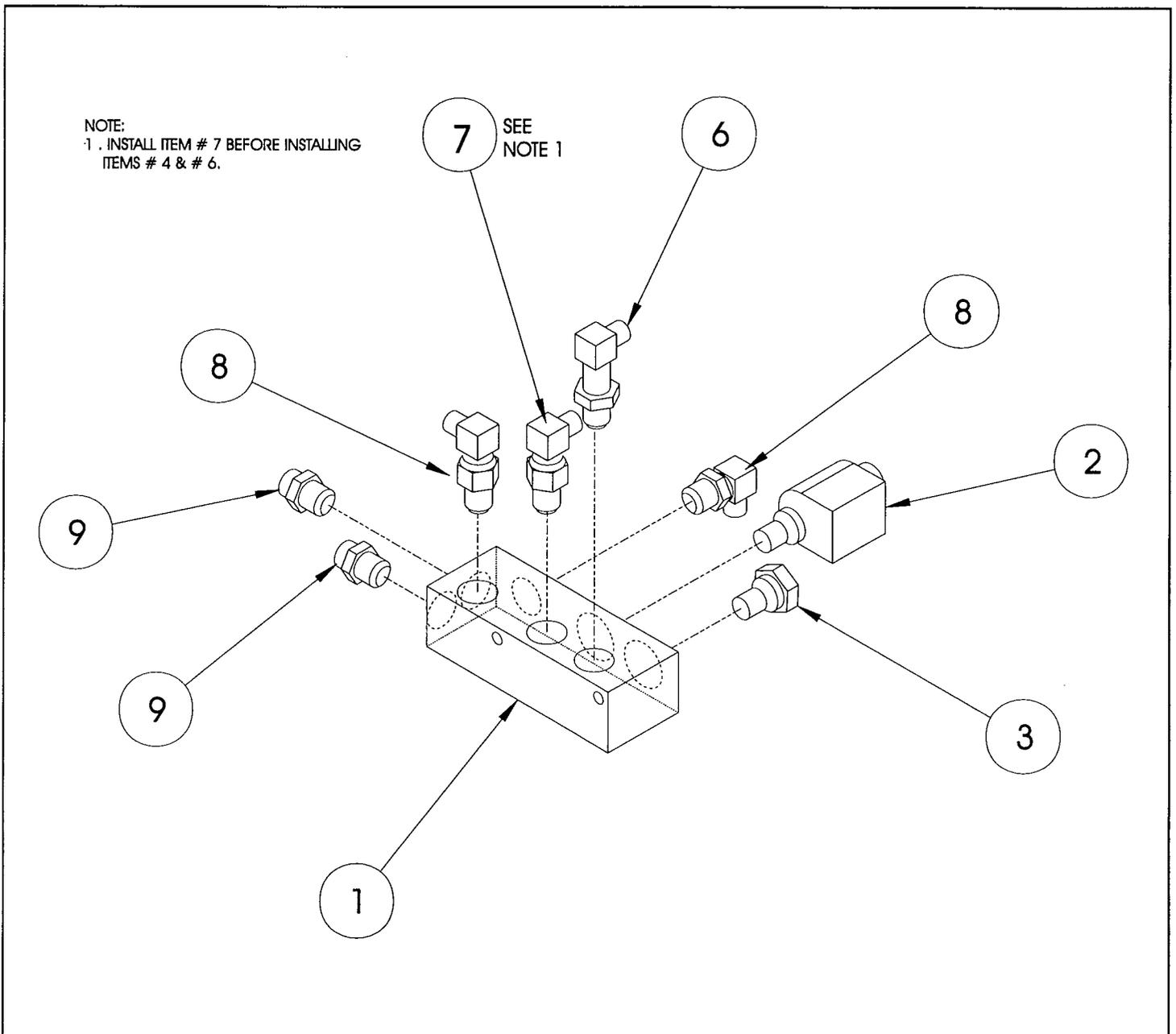


# Illustrated Parts Breakdown

Section  
6.2

## POT HOLE VALVE ASSEMBLY MX15/19 066802-001

ITEM	PART	DESCRIPTION	QTY.
1	066704-001	VALVE BLOCK	1
2	063973-001	VALVE, N.C.	1
3	012822-017	VALVE, CHECK	1
6	015736-001	FITTING, 90 4FJX-4MJ LONG	1
7	011934-026	FITTING, 90 6MBH-6MJ	1
8	011934-001	FITTING, 90 4MB-4MJ	2
9	011941-001	FITTING, STR 4MB-4MJ	2



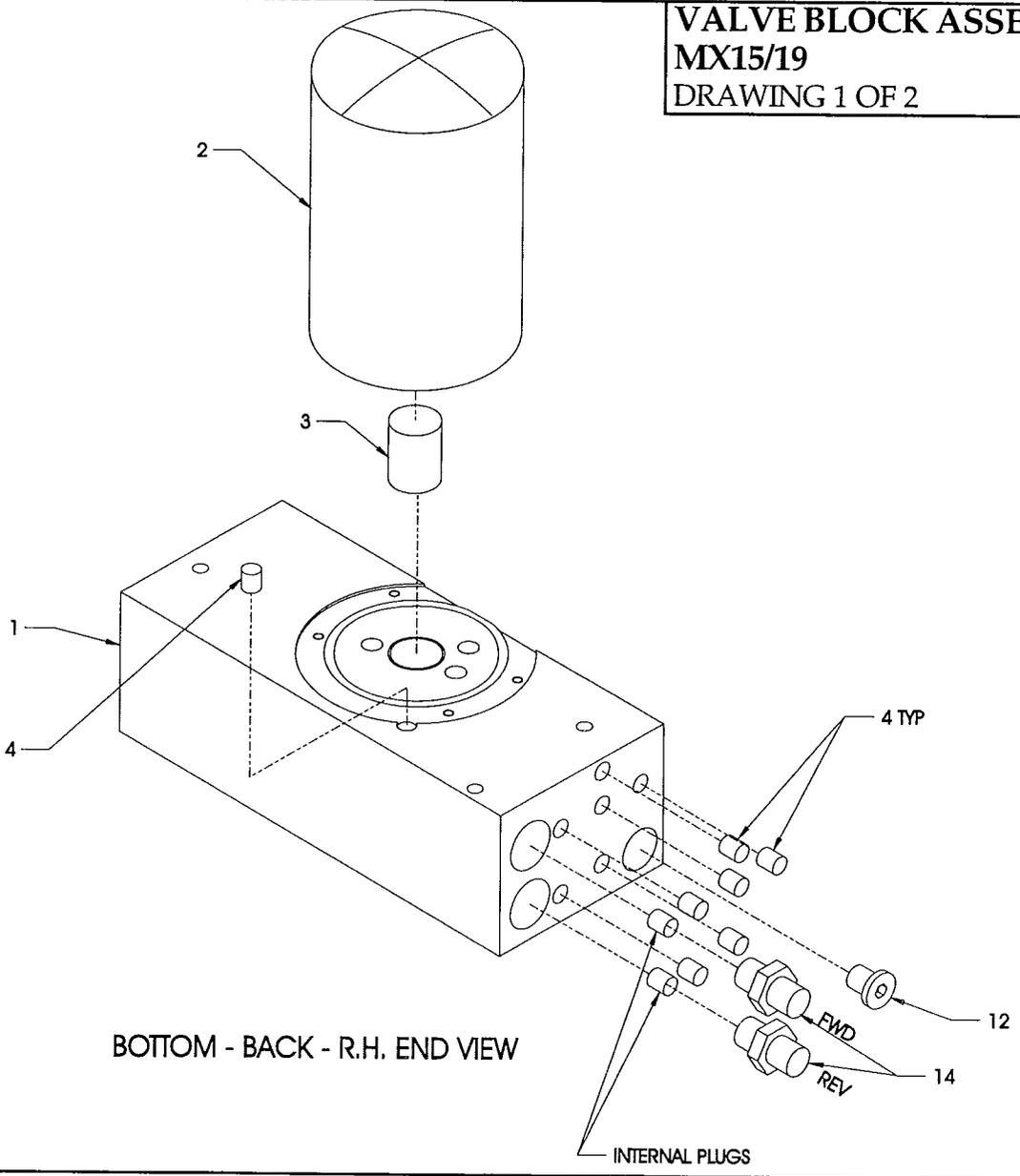
# Illustrated Parts Breakdown

**VALVE BLOCK ASSEMBLY**  
**MX15/19**  
065617-010

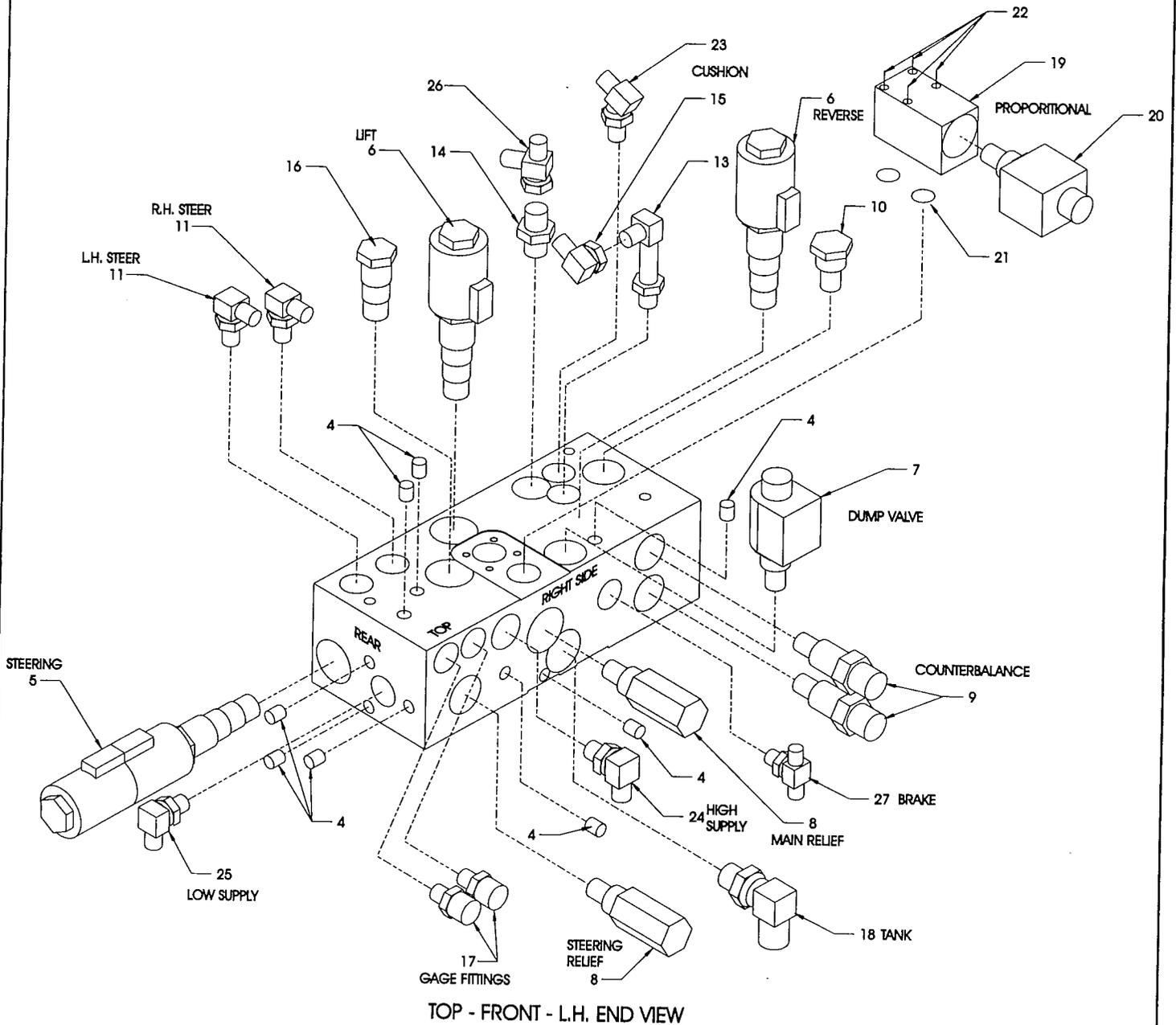
ITEM	PART	DESCRIPTION	QTY.
1	066099-000	VALVE BLOCK	1
*	030576-009	VALVE BLOCK, SERVICE	1
2	005154-002	FILTER CARTRIDGE	1
3	065169-000	FILTER ADAPTER	1
4	063977-001	9MM EXPANDER PLUG	17
5	063923-007	CARTRIDGE VALVE 4 WAY 3 POS TANDEM	1
6	063923-006	CARTRIDGE VALVE 4 WAY 2 POS REV.	2
7	063923-005	CARTRIDGE VALVE 2 WAY	1
8	012877-007	RELIEF VALVE DIRECT ACTING ADJSTBL.	2
9	015900-000	COUNTERBALANCE VALVE	2
10	063955-008	CAVITY PLUG -8 X 2 WAY	1
11	011934-001	ELBOW 90° 4MBH-4MJ	1
12	012004-004	PLUG SAE-4	1
13	015736-001	ADAPTER 90° LONG 4MBH-4MJ	1

ITEM	PART	DESCRIPTION	QTY.
14	011941-005	ADAPTER STR. 6MB-6MJ	2
15	011937-001	ADAPTER 90° 4FJX-4MJ	1
16	063955-003	CAVITY PLUG 10-4 MODIFIED	1
17	063965-001	TEST FITTINGS ISO	2
18	011934-008	ADAPTER 90° 8MBH-8MJ	1
19	065374-000	PROPORTIONAL VALVE BLOCK	1
20	063986-002	PROPORTIONAL VALVE	1
21	011979-008	O-RING	2
22	014412-016	10-24 X 2 SOC HD BOLT	4
23	011935-001	ADAPTER 45° 4MBH-4MJ	1
24	011934-004	ADAPTER 90° 6MBH-6MJ	1
25	011934-026	ADAPTER 90° 4MB-6MJ	1
26	020733-002	ADAPTER TEE 6FJX-6MJ-6MJ	1
27	011936-001	ADAPTER TEE 4MB-4MJ-4MJ	1

**VALVE BLOCK ASSEMBLY**  
**MX15/19**  
DRAWING 1 OF 2



# Illustrated Parts Breakdown



**VALVE BLOCK ASSEMBLY**  
**MX15/19**  
DRAWING 2 OF 2

# Illustrated Parts Breakdown

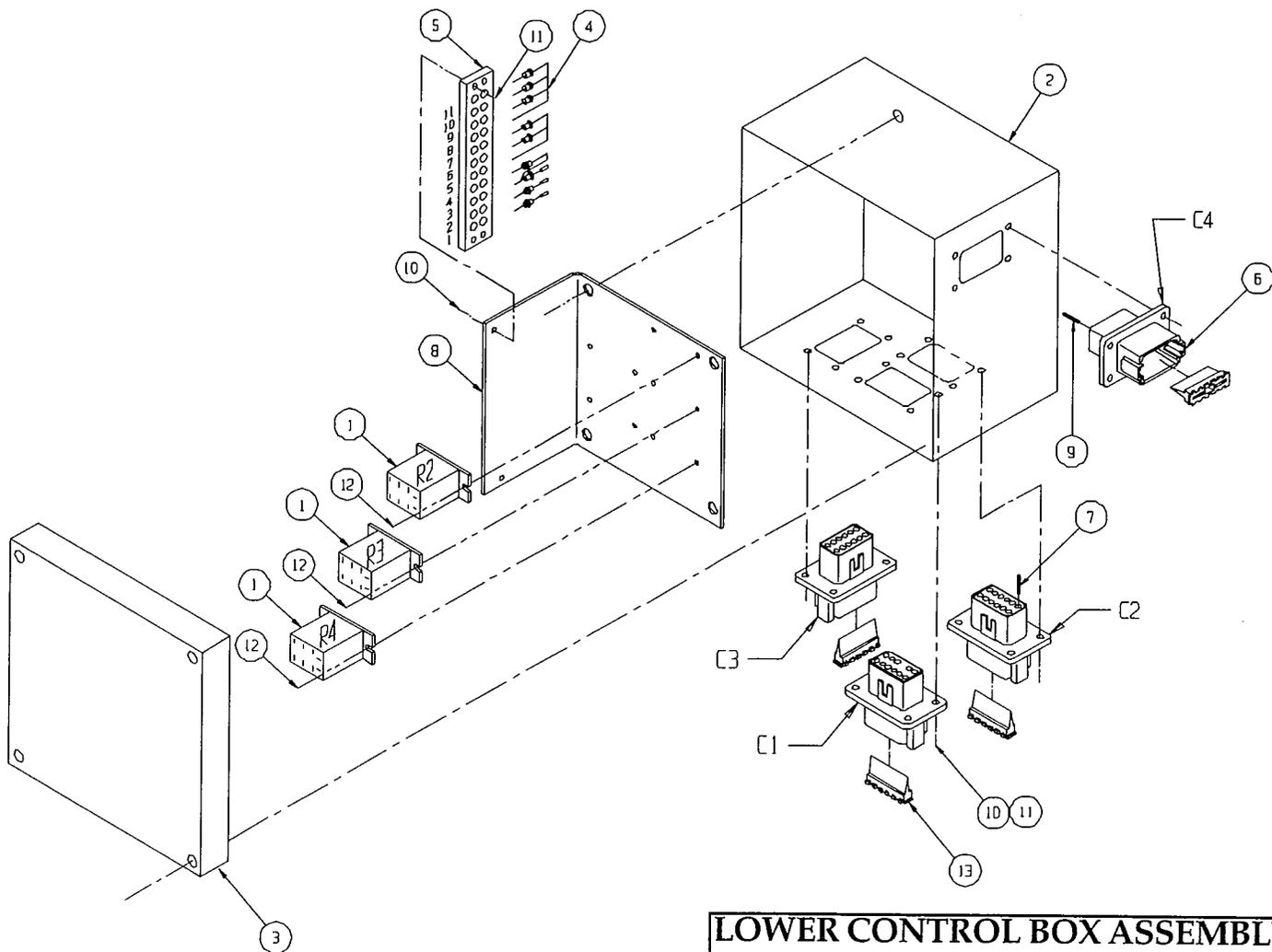
## LOWER CONTROL BOX ASSEMBLY

MX15/19

067346-000

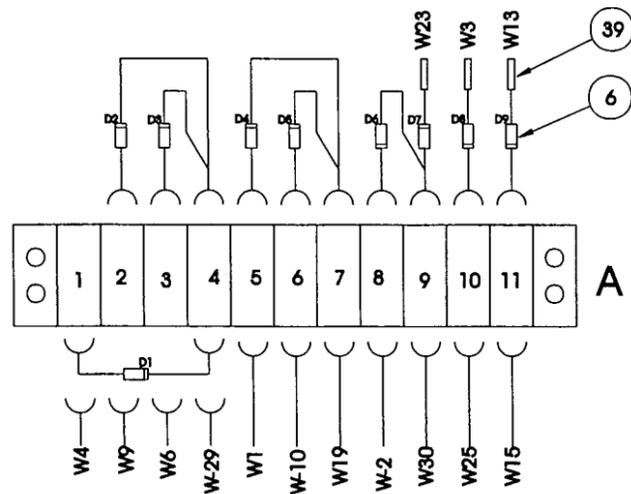
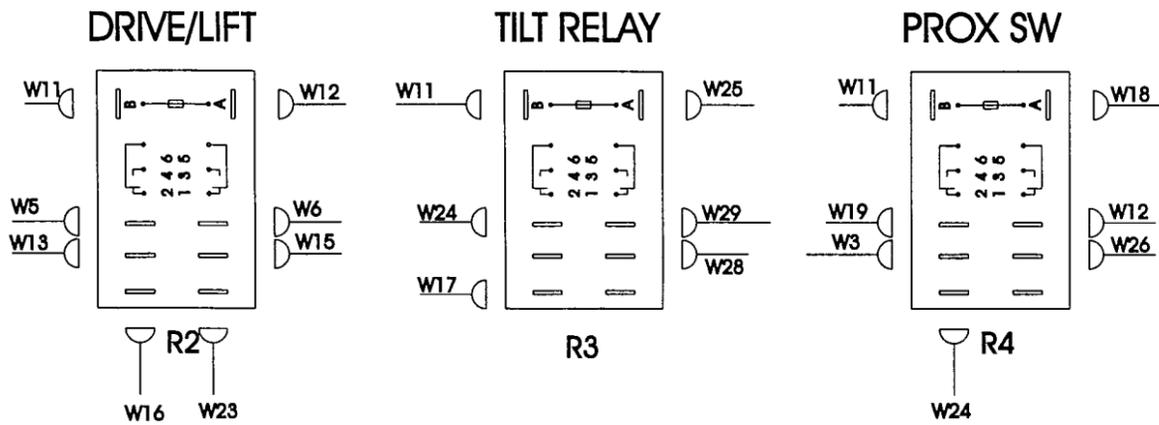
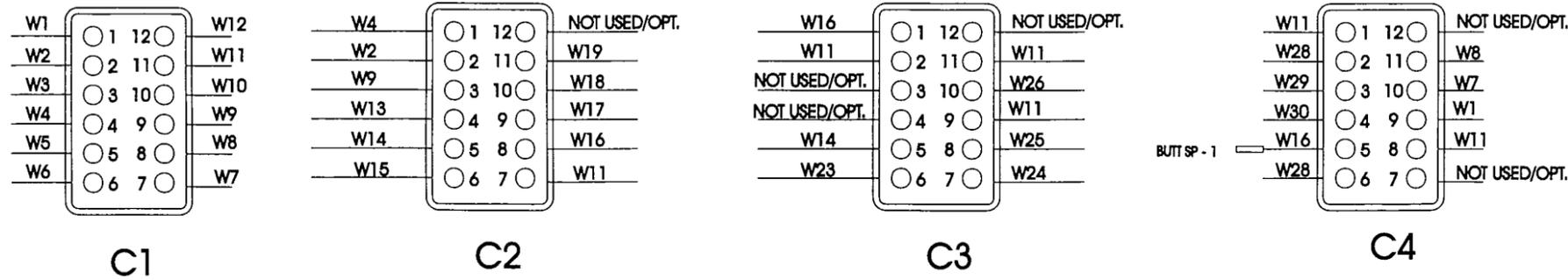
ITEM	PART	DESCRIPTION	QTY.
1	063951-002	RELAY 24 VDC	3
2	067347-000	LOWER CONTROL BOX	1
3	066761-001	LOWER CONTROL BOX LID	1
4	029825-002	DIODE 3AMP	8
5	029928-007	TERMINAL BLOCK 11	1
6	068760-002	RECEPTACLE 12 PIN	4
7	068762-000	CONNECTOR PIN	42
8	067345-000	LOWER BOX ANGLE	1
9	068764-000	CONNECTOR PIN PLUG	6
10	011248-047	NUT HEX ESNA 6-32	18
11	011715-004	SCREW MRH 6-32 X 1/2	18
12	005503-003	SCREW SELF TAP #6 X 3/8	8
13	068761-000	LOCK WEDGE	4
20	029452-099	WIRE 16 AWG BLK	FT 2.5
21	029451-099	WIRE 16 AWG WHT	FT 2

ITEM	PART	DESCRIPTION	QTY.
22	029454-099	WIRE 16 AWG RED	FT 2.5
23	029457-099	WIRE 16 AWG GRN	FT 2.5
24	029453-099	WIRE 16 AWG ORG	FT 2
25	029450-099	WIRE 16 AWG BLU	FT 2.5
26	029479-099	WIRE 16 AWG WHT/BLK	FT .5
27	029478-099	WIRE 16 AWG RED/BLK	FT 2
28	029350-099	WIRE 16 AWG GRN/BLK	FT 1.5
29	029351-099	WIRE 16 AWG BLK/WHT	FT 1
30	029352-099	WIRE 16 AWG RED/WHT	FT 1
31	029353-099	WIRE 16 AWG GRN/WHT	FT 3.5
32	029354-099	WIRE 16 AWG BLU/WHT	FT 1.5
35	029931-003	CONN FM PUSH 16-14	21
36	029601-012	CONN RING #10 16-14	4
37	029610-001	CONN FORK #6 22-18	6
38	029610-006	CONN FORK #6 16-14	10



**LOWER CONTROL BOX ASSEMBLY**  
**MX15/19**  
 DRAWING 1 OF 2

# Illustrated Parts Breakdown



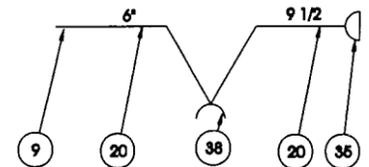
SEE EXAMPLE

WIRE NO.	WIRE COLOR	A.W.G.	LENGTH	FROM	TO	LENGTH	TO	LENGTH	TO
W-1	BLK	16	6	C1-1	A5	9 1/2	C4-9	-	-
W-2	WHT	16	6 1/2	C1-2	A8	5 1/2	C2-2	-	-
W-3	RED	16	6	C1-3	R4-4	6	D8	-	-
W-4	GRN	16	8 1/2	C1-4	A1	7 1/2	C2-1	-	-
W-5	ONG	16	13	C1-5	R2-6	-	-	-	-
W-6	BLU	16	13	C1-6	R2-6	9 1/2	A3	-	-
W-7	BLU/WHT	16	8 1/2	C1-7	C4-10	-	-	-	-
W-8	RED/BLK	16	8 1/2	C1-8	C4-11	-	-	-	-
W-9	GRN/BLK	16	8	C1-9	A2	8	C2-3	-	-
W-10	RED/WHT	16	7	C1-10	A6	-	-	-	-
W-11	GRN/WHT	16	6 1/2	C1-11	GND	-	-	-	-
W-12	BLK/WHT	16	8 1/2	C1-12	R4-5	3 1/2	R2-A	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-13	RED/BLK	16	6	C2-4	R2-4	6	D9	-	-
W-14	RED	16	6	C2-5	C3-5	-	-	-	-
W-16	BLU	16	4 1/2	C2-6	R2-3	10 1/2	A 11	-	-
W-11	GRN/WHT	16	5 1/2	C2-7	GND	-	-	-	-
W-16	ONG	16	6	C2-8	BUTT SP-1	3	C4-5	-	-
W-16	ONG	16	4 1/2	BUTT SP-1	R2-2	10 1/2	C3-1	-	-
W-17	WHT/BLK	16	4	C2-9	R3-2	-	-	-	-
W-18	BLK	16	6	C2-10	R4-A	-	-	-	-
W-19	WHT	16	5 1/2	C2-11	A7	11 1/2	R4-6	-	-
W-20	NO CONNL.	-	-	C2-12	-	-	-	-	-
W-16	-	-	-	-	-	-	-	-	-
W-11	GRN/WHT	16	9	C3-2	GND	-	-	-	-
W-21	NO CONNL.	-	-	C3-3	-	-	-	-	-
W-22	NO CONNL.	-	-	C3-4	-	-	-	-	-
W-14	-	-	-	-	-	-	-	-	-
W-23	BLK	16	10 1/2	C3-6	R2-3	8 1/2	D7	-	-
W-24	RED	16	8 1/2	C3-7	R3-6	3 1/2	R4-2	-	-
W-25	WHT	16	9	C3-8	R3-A	10	A 10	-	-
W-11	GRN/WHT	16	9	C3-9	GND	-	-	-	-
W-26	GRN	16	13	C3-10	R4-3	-	-	-	-
W-11	GRN/WHT	16	9	C3-11	GND	-	-	-	-
W-27	NO CONNL.	-	-	C3-12	-	-	-	-	-
W-11	GRN/WHT	16	3	C4-1	GND	-	-	-	-
W-28	RED	16	8 1/2	C4-2	R3-3	9	C4-6	-	-
W-29	RED/BLK	16	8 1/2	C4-3	R3-5	11	A4	-	-
W-30	BLU	16	10 1/2	C4-4	A9	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-31	NO CONNL.	-	-	C4-7	-	-	-	-	-
W-11	GRN/WHT	16	3 1/2	C4-8	GND	-	-	-	-
W-	-	16	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
W-32	NO CONNL.	-	-	C4-12	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-11	GRN/WHT	16	3 1/2	R2-8	R3-8	3 1/2	R4-8	10	GND
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-
W-	-	-	-	-	-	-	-	-	-

LEGEND:

D# = DIODE NUMBER  
 A# = TERMINAL NUMBER  
 BUTT SP # = BUTT SPLICE NUMBER  
 R#-# = FIRST # IS RELAY NUMBER SECOND # IS TERMINAL DESIGNATION. (EXAMPLE: R4-A = RELAY #4 & TERMINAL A)  
 C#-# = FIRST # IS CONNECTOR NUMBER SECOND # IS PIN DESIGNATION. (EXAMPLE: C2-5 = CONNECTOR 2 & PIN 5)

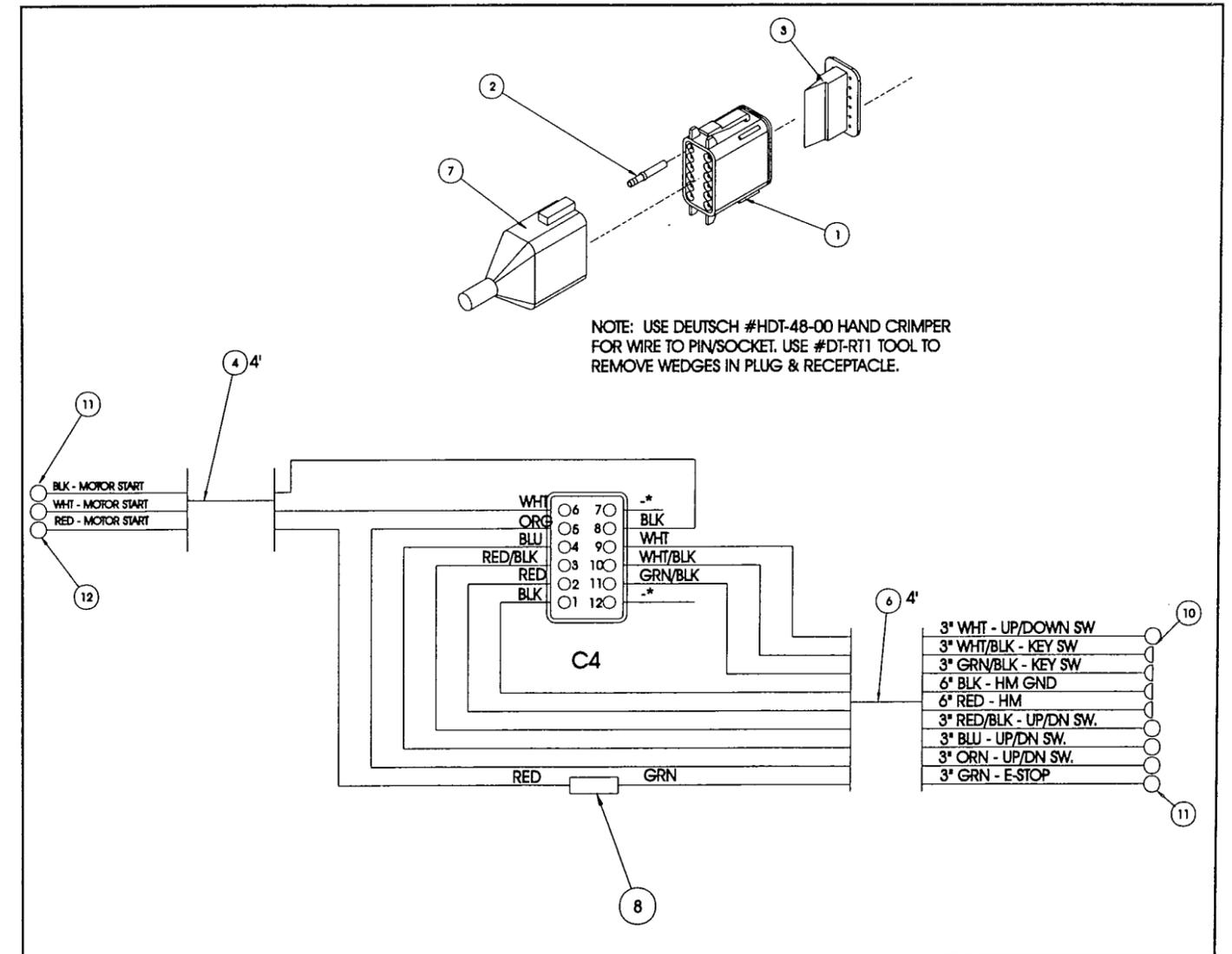
EXAMPLE W-1



LOWER CONTROL BOX ASSEMBLY  
 MX 15/19  
 DRAWING 2 OF 2

**LOWER CONTROL CABLE ASSEMBLY**  
**MX15/19**  
 067340-000

ITEM	PART	DESCRIPTION	QTY.
1	068760-000	CONNECTOR PLUG	1
2	068762-001	CONTACT SOCKET	12
3	068761-001	LOCKING WEDGE	1
4	029447-099	WIRE 16 AWG 3 COND.	FT4
6	067646-099	WIRE 16 AWG 9 COND.	FT5
7	068908-000	BOOT PLUG	1
8	029620-002	CONN BUTT 61-14	1
10	029931-003	CONN FM PUSH 1/4 14-16	4
11	029601-013	CONN RING #10 16-14	7
12	029601-015	CONN RING 3/8 16-14	1



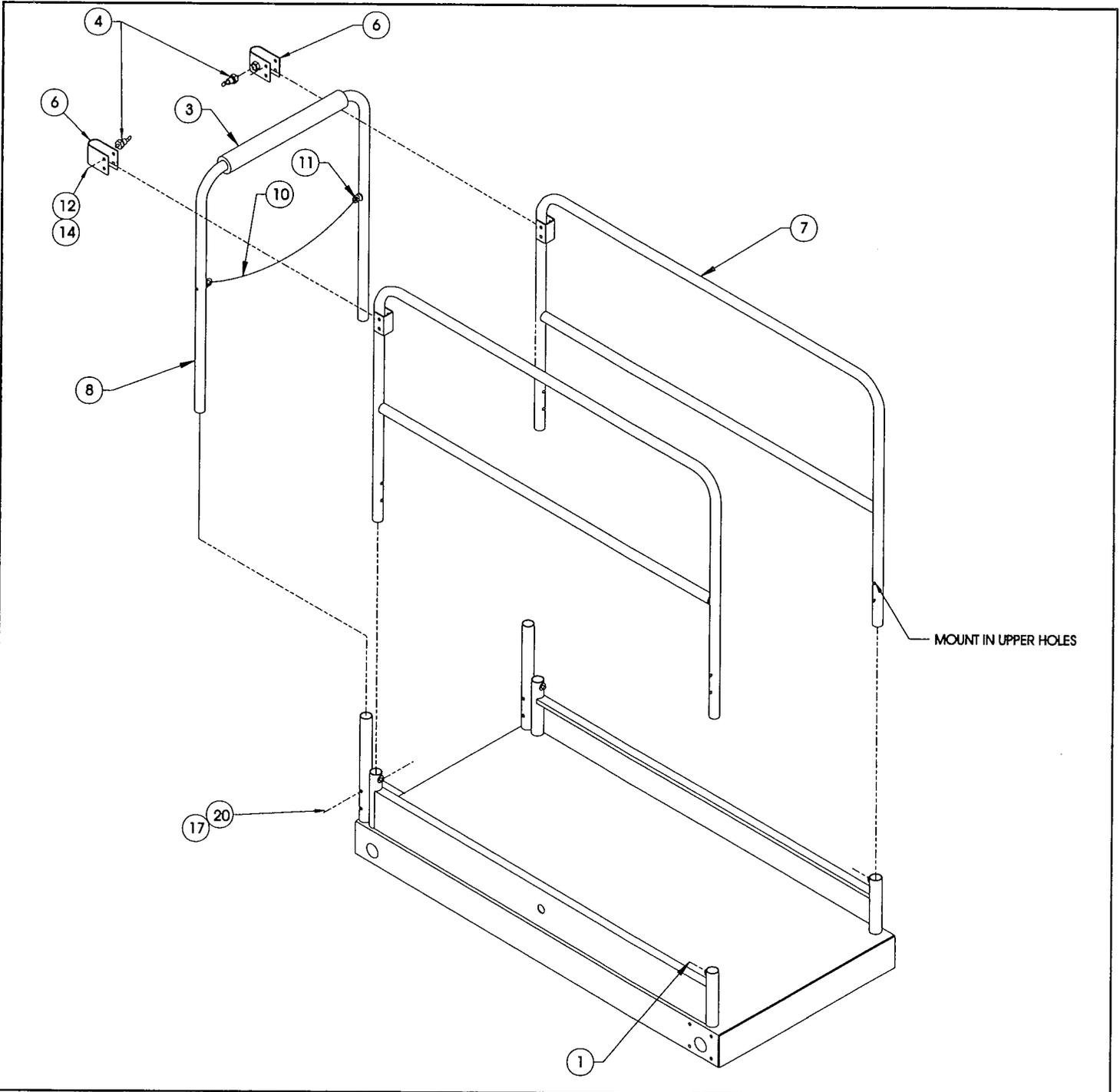
NOTES:

# Illustrated Parts Breakdown

## PLATFORM GUARDRAIL ASSEMBLY MX15/19 065603-004

ITEM	PART	DESCRIPTION	QTY.
1	066171-003	CAP SCREW 3/8-16 X 2 1/4 (FULL THREAD)	4
3	066692-022	FOAM TUBING	1
4	003570-000	RETAINING PIN ASSY	2
6	066498-000	WELDMENT, GATE LATCH	2
7	066257-007	WELDMENT SIDE RAIL	2
8	066261-001	WELDMENT, END RAIL	1

ITEM	PART	DESCRIPTION	QTY.
10	063133-003	CHAIN ASS'Y	1
11	015748-002	REPAIR LINK	1
12	011248-005	NUT 5/16-18	4
14	011253-018	SCREW 5/16-18 HHC X 2 1/4	4
17	011254-018	SCREW 3/8-16 HHC X 2 1/4	2
20	011248-006	NUT 3/8-16 HEX	2

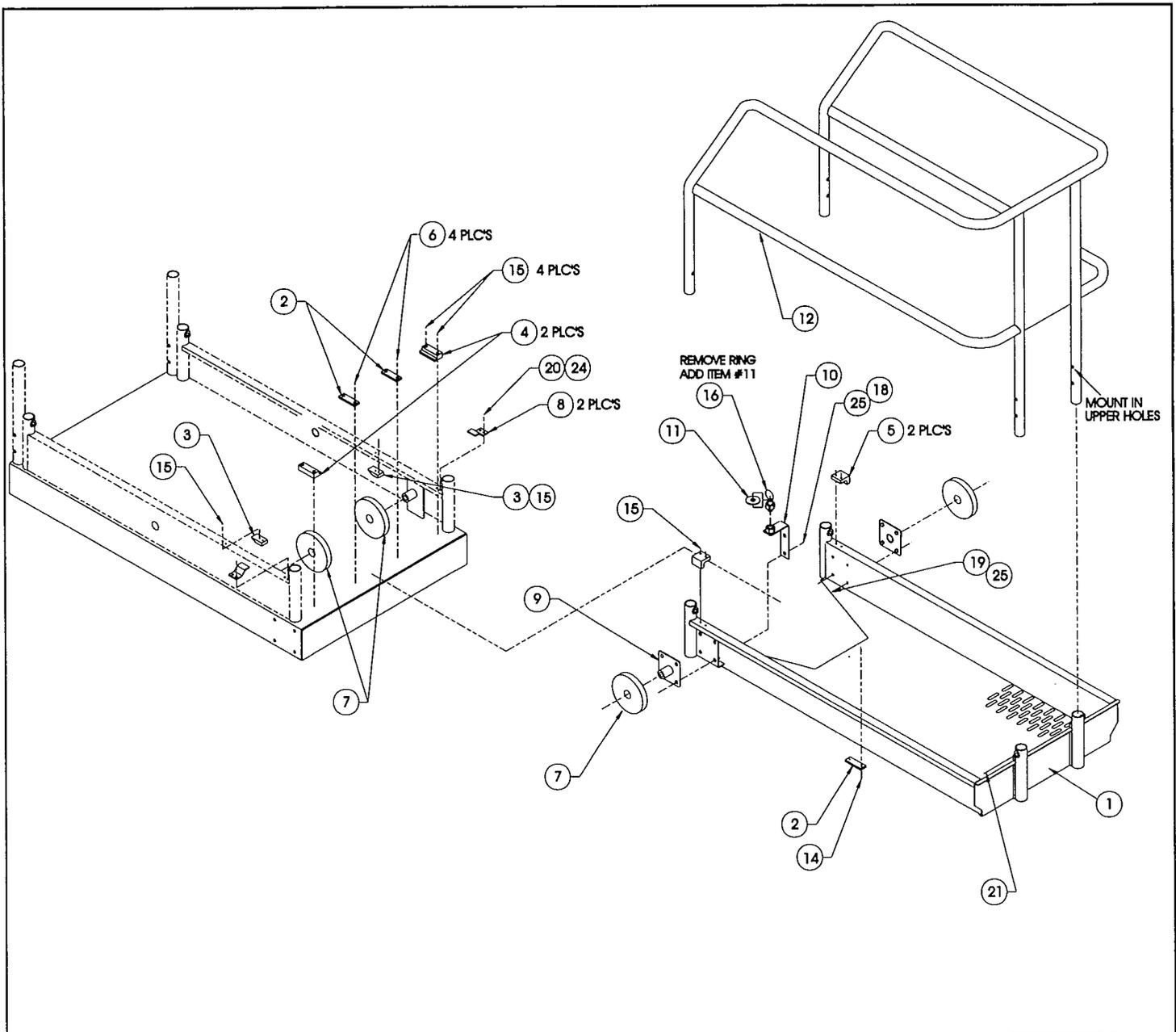


# Illustrated Parts Breakdown

## DECK EXTENSION INSTALLATION MX15/19 065614-000

ITEM	PART	DESCRIPTION	QTY.
1	066251-001	WELDMENT DECK EXT.	1
2	066198-000	WEAR PAD	3
3	066193-000	STOP	2
4	066176-000	WEAR PAD	2
5	066170-000	WEAR PAD	2
6	026553-002	RIVET 3/16 DIA X .126-.250	4
7	066195-000	PLATFORM ROLLER	4
8	066407-000	BRACKET	2
9	066256-000	WELDMENT ROLLER MOUNT	2
10	066410-000	WELDMENT DECK STOP	1
11	015924-020	WASHER, 2" FENDER	1

ITEM	PART	DESCRIPTION	QTY.
12	066260-001	WELDMENT EXT. RAIL X15	1
14	026553-004	RIVET 3/16 DIA X 3/8 GRIP	2
15	026553-008	RIVET 3/16 DIA X 1/2 GRIP	12
16	003570-000	RETAINING PIN ASSY	1
18	011254-016	SCREW HHC 3/8-16 X 2	2
19	011254-014	SCREW HHC 3/8-16 X 1 3/4	6
20	011252-006	SCREW HHC 1/4-20 X 3/4	4
21	066171-003	BOLT TAP 3/8-16UNC X 2 1/4	4
24	011240-004	WASHER 1/4 FLAT	12
25	011238-006	WASHER 3/8 LOCK	8



# Illustrated Parts Breakdown

## CONTROLLER ASSEMBLY

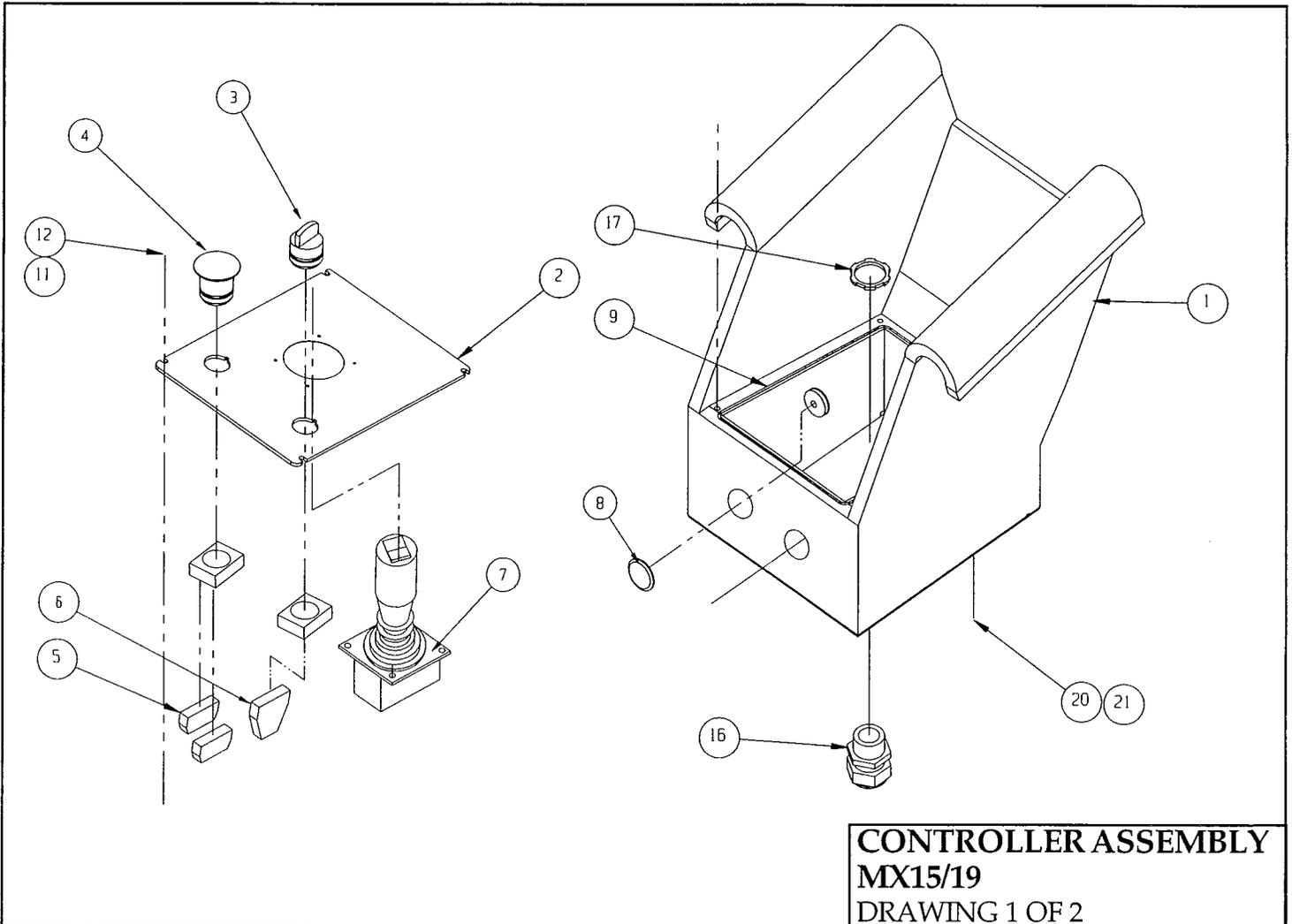
MX15/19

066020-016

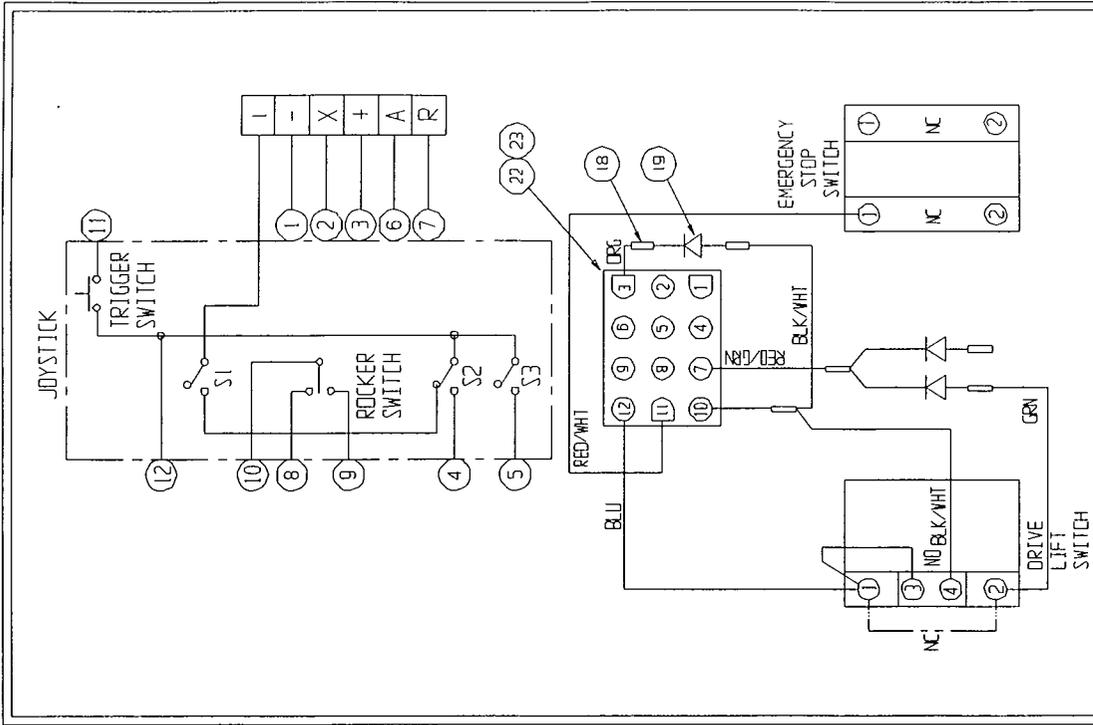
ITEM	PART	DESCRIPTION	QTY.
1	101188-000	BOX, CONTROLLER	1
2	101223-002	COVER, CONTROLLER	1
3	066805-002	SWITCH, SELECTOR-2 POSITION	1
4	066805-006	SWITCH, PUSH BUTTON	1
5	066805-011	CONTACT, NC	2
6	066805-012	CONTACT, NO-NC	1
7	066786-000	CONTROLLER, OEM	1
*	066786-010	PC Board w/POT	1
*	066786-016	BOOT, ROCKER SWITCH	1
*	066786-024	STEERING MICRO SWITCH	2
*	066544-013	BOOT, HANDLE	1
*	068592-008	DRIVE MICRO SWITCH	3
*	066786-011	HANDLE HALVE, FRONT	1
*	066786-012	HANDLE HALVE, REAR	1
*	066786-013	GASKET, HANDLE	2
*	066786-021	SWITCH, PUSH BUTTON	1
8	069220-000	COVER, HOLE	2
9	101158-099	O-RING	1
11	011709-004	SCREW, RD HD MACH 10-24 UNCX1/2	4
12	011238-002	WASHER, LOCK, SPLIT #10	-

ITEM	PART	DESCRIPTION	QTY.
16	029925-010	CONN CABLE	1
17	029939-003	LOCKNUT 3/4	1
18	029620-002	BUTT. CONN. 14-16 GA	2
19	029825-002	DIODE	3
20	029352-099	WIRE 16 GA. THHN COP RED/WHT	FT1
21	029457-099	WIRE 16 GA. THHN COP GREEN	FT1
22	063956-003	CONN. 12 PIN	1
23	063956-010	CONN. PIN M	9
24	029453-099	WIRE 16 GA. THHN COP ORANGE	FT.5
25	029351-099	WIRE 16 GA. THHN COP BLK/WHT	FT2
26	029450-099	WIRE 16 GA. THHN COP BLUE	FT1
30	029352-099	WIRE 16 GA. THHN COP RED/WHT	FT.5

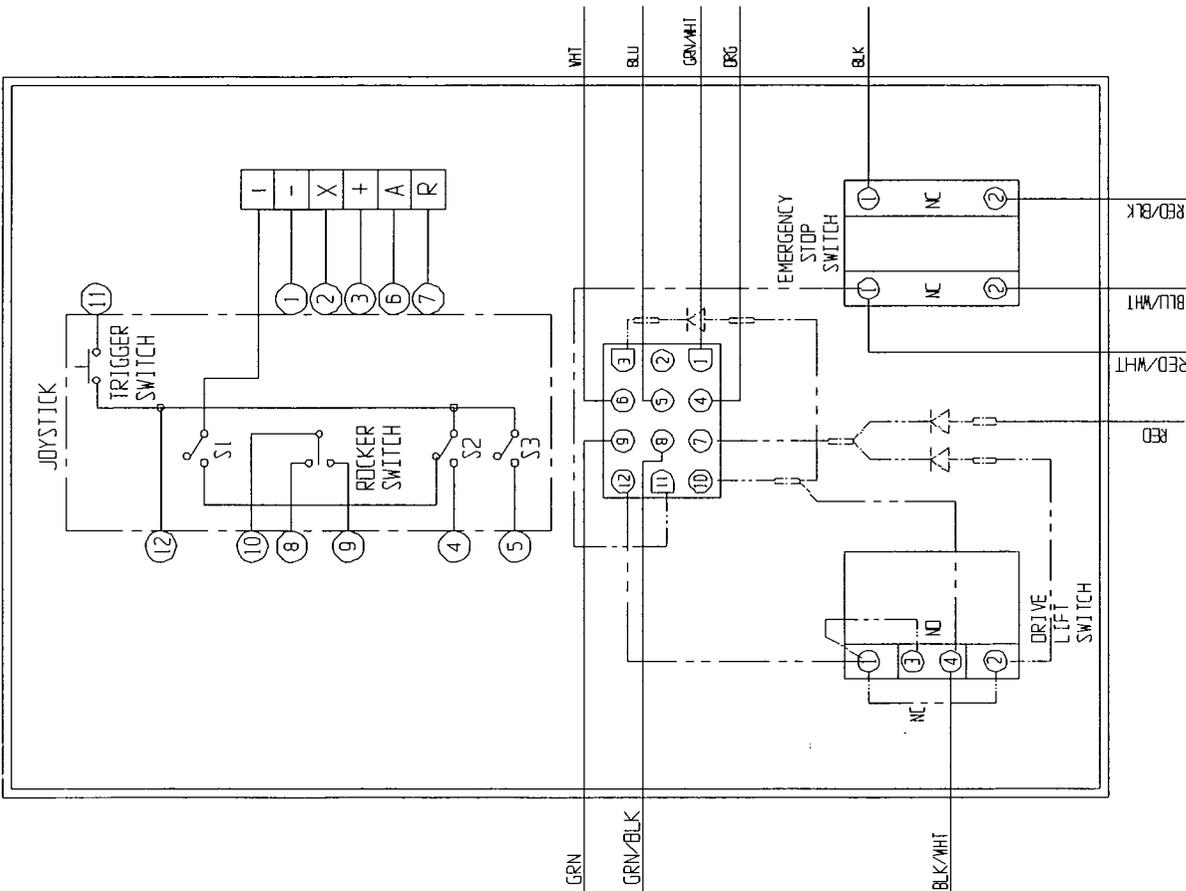
\* Not Shown



# Illustrated Parts Breakdown



STANDARD BOX WIRING



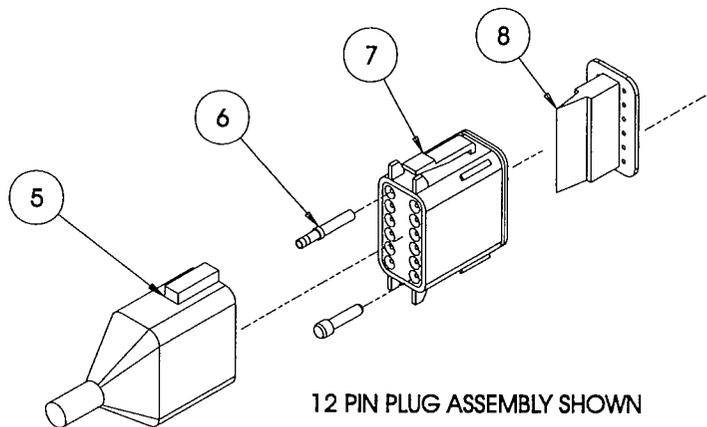
CABLE CONNECTIONS (REF)

**CONTROLLER ASSEMBLY**  
**MX15/19**  
 DRAWING 2 OF 2

# Illustrated Parts Breakdown

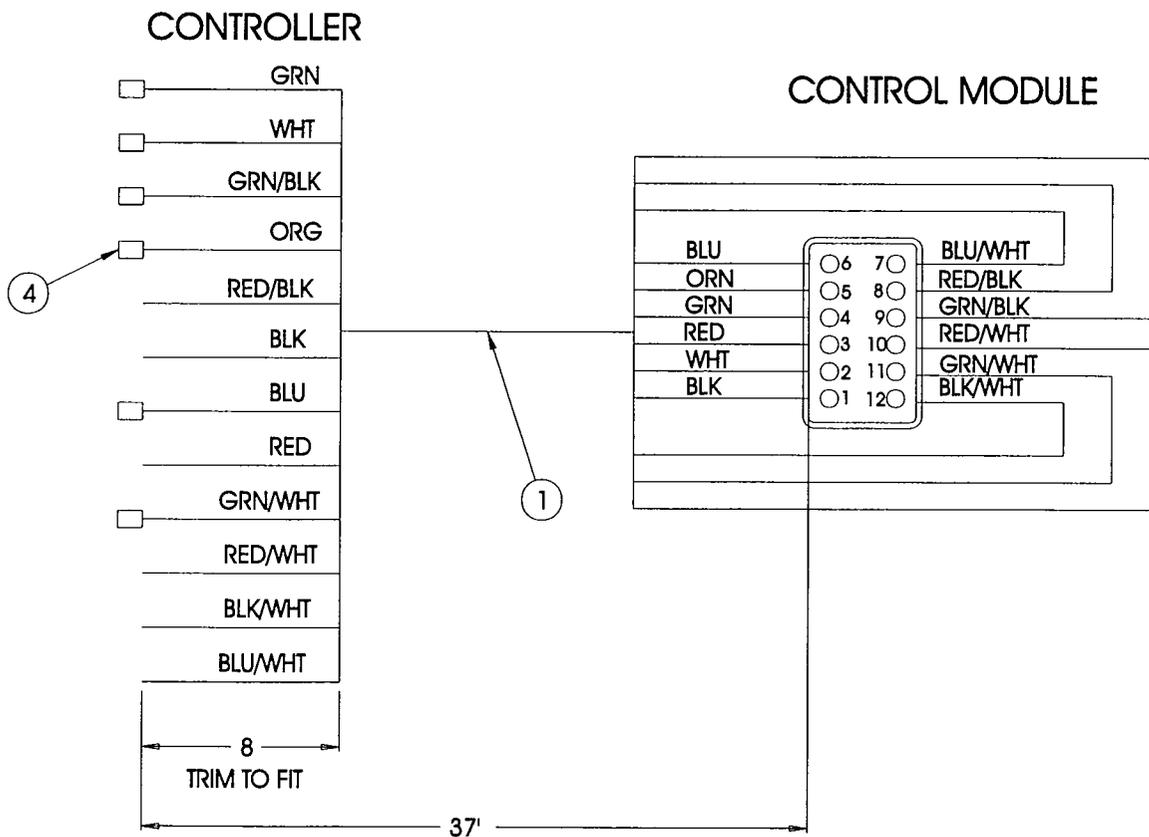
## CONTROL CABLE ASSEMBLY MX15 065609-014

ITEM	PART	DESCRIPTION	QTY.
1	060214-099	CABLE 16AWG 15 COND	FT37
4	063956-010	CONN PIN MALE	6
5	068908-000	PLUG BOOT 12 PIN	1
6	068762-001	SOCKET CONTACT	12
7	068760-000	PLUG 12 PIN CONNECTOR	1
8	068761-001	LOCKING WEDGE 12 PIN	1



12 PIN PLUG ASSEMBLY SHOWN

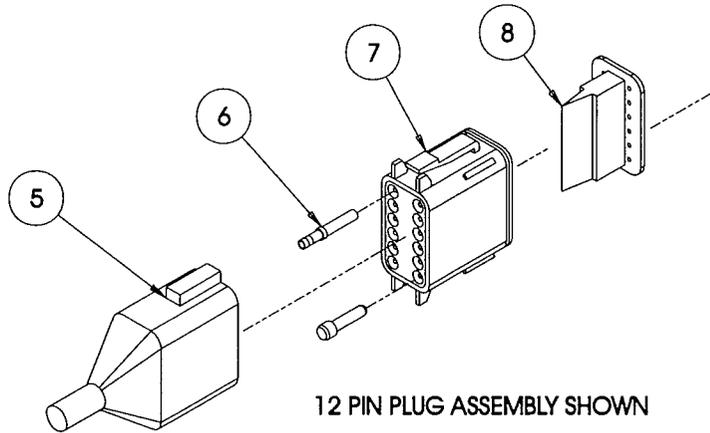
NOTE: USE DEUTSCH #HDT-48-00 HAND CRIMPER FOR WIRE TO PIN/SOCKET. USE #DT-RT1 TOOL TO REMOVE WEDGES IN PLUG & RECEPTACLE.



# Illustrated Parts Breakdown

## CONTROL CABLE ASSEMBLY MX19 065609-015

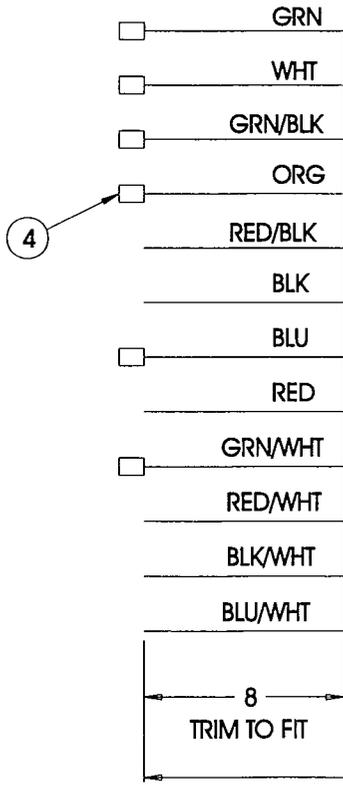
ITEM	PART	DESCRIPTION	QTY.
1	060214-099	CABLE 16AWG 15 COND	FT40
4	063956-010	CONN PIN MALE	6
5	068908-000	PLUG BOOT 12 PIN	1
6	068762-001	SOCKET CONTACT	12
7	068760-000	PLUG 12 PIN CONNECTOR	1
8	068761-001	LOCKING WEDGE 12 PIN	1



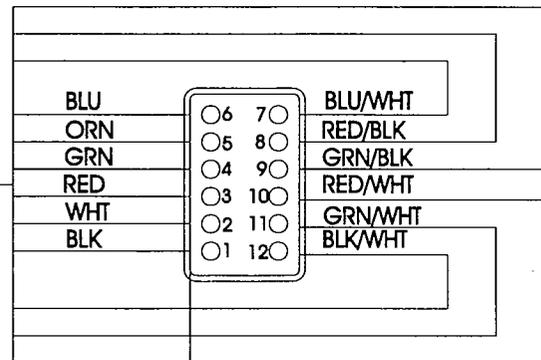
12 PIN PLUG ASSEMBLY SHOWN

NOTE: USE DEUTSCH #HDT-48-00 HAND CRIMPER FOR WIRE TO PIN/SOCKET. USE #DT-RT1 TOOL TO REMOVE WEDGES IN PLUG & RECEPTACLE.

### CONTROLLER



### CONTROL MODULE



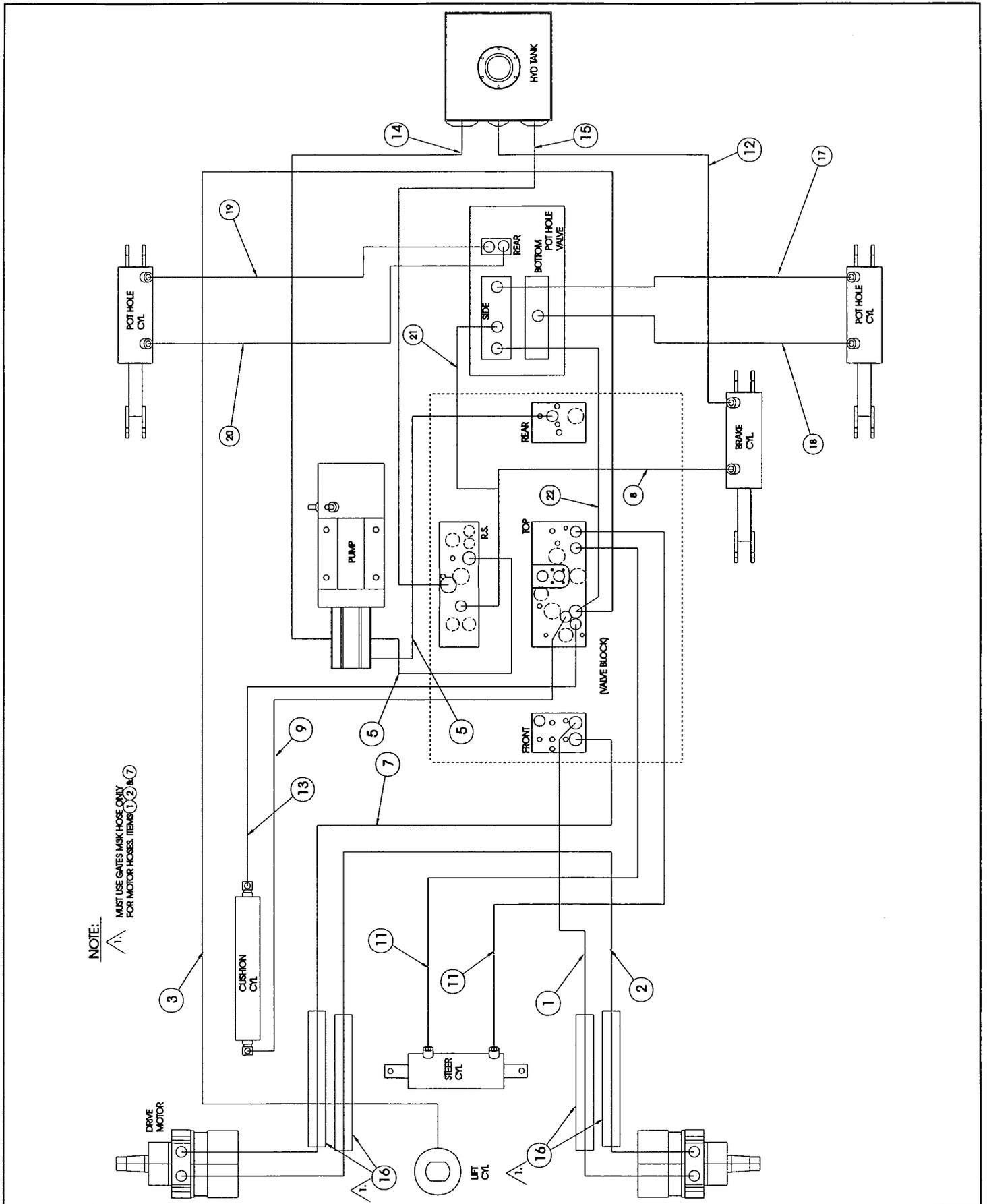
## HOSE KIT INSTALLATION

MX15/19

065611-020

ITEM	PART	DESCRIPTION	QTY.
1	060861-016	HOSE ASSY 3/8 X 36 1/2 (6FJX-6FJX)	1
2	060861-048	HOSE ASSY 3/8 X 24 (6FJX-6FJX)	1
3	060861-093	HOSE ASSY 3/8 X 152 (6FJX-6FJX)	1
5	060861-024	HOSE ASSY 3/8 X 17 (6FJX-6FJX)	2
7	060861-007	HOSE ASSY 3/8 X 27 (6FJX-6FJX)	1
8	061351-021	HOSE ASSY 1/8 X 46 1/2 (4FJX-4FJX)	1
9	061351-045	HOSE ASSY 1/8 X 13 (4FJX-4FJX)	1
11	061351-023	HOSE ASSY 1/8 X 29 (4FJX-4FJX)	2
12	061351-037	HOSE ASSY 1/8 X 15 (4FJX-4FJX)	1
13	061351-053	HOSE ASSY 1/8 X 27 (4FJX-4FJX)	1
14	061789-018	HOSE ASSY 3/4 X 18 (12FJX-12MP)	1
15	064156-037	HOSE ASSY 1/2 X 37 (8FJX-8FJX)	1
16	065369-099	HOSE GUARD NYLON X 10	REF
17	061351-057	HOSE ASSY 1/8 X 28 (4FJX-4FJX)	1
18	061351-052	HOSE ASSY 1/8 X 24 (4FJX-4FJX)	1
19	061351-022	HOSE ASSY 1/8 X 30 (4FJX-4FJX)	1
20	061351-011	HOSE ASSY 1/8 X 18 (4FJX-4FJX)	1
21	065234-001	HOSE ASSY 1/4 X 20 (4FJX-4FJX)	1
22	062192-035	HOSE ASSY 1/4 X 16 (6FJX-6FJX)	1

# Illustrated Parts Breakdown



NOTE:

1. MUST USE GATES MARK HOSE ONLY FOR MOTOR HOSES. ITEMS 1, 2, & 7

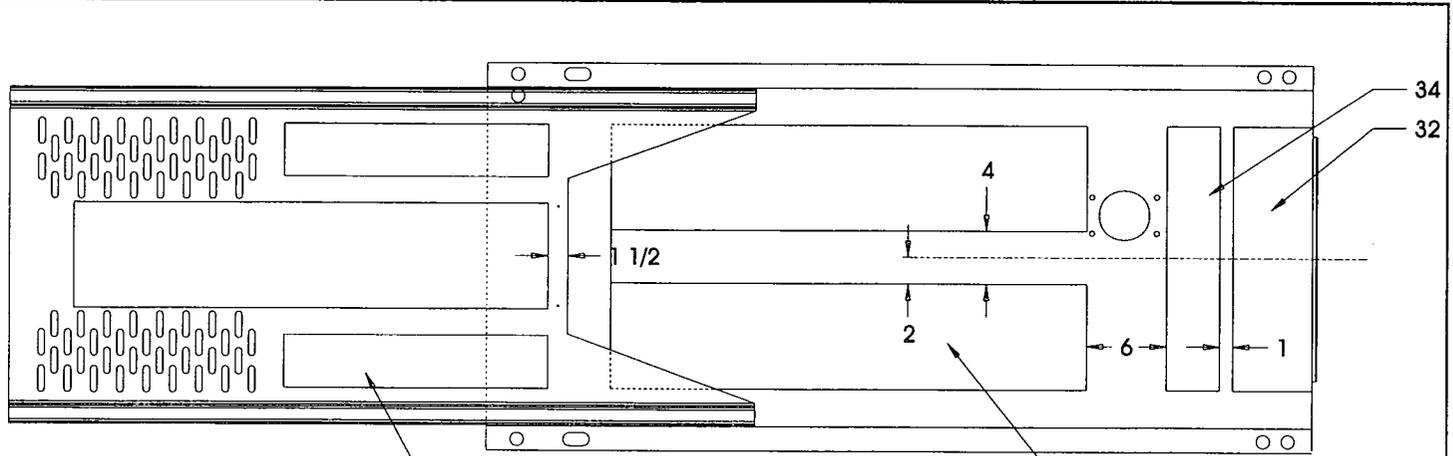
# Illustrated Parts Breakdown

## LABEL INSTALLATION MX15 065612-026

## LABEL INSTALLATION MX19 065712-026

ITEM	PART	DESCRIPTION	QTY.
1	061683-004	LABEL UPRIGHT	2
2	061684-022	LABEL MX 15	2
3	061683-014	LABEL UPRIGHT	2
4	066550-000	LABEL DANGER	1
5	060577-004	ANSI MANUAL	1
6	010076-000	MANUAL CASE	1
7	060570-003	USER MANUAL X15/19	1
8	011248-004	LOCKNUT 1/4-20UNC HEX	4
9	011252-006	SCREW 1/4-20UNC HHC X 3/4	4
10	011240-004	WASHER 1/4 STD FLAT	4
11	066559-000	LABEL CONTROLS	1
12	101251-000	LABEL DANGER	1
13	066552-000	LABEL WARNING	2
14	066553-000	LABEL WARNING KEEP CLEAR	2
15	066554-000	LABEL CAUTION	1
16	066555-000	LABEL CAUTION	1
17	066556-000	LABEL CAUTION	1
18	101250-001	LABEL MAX LOAD 550 LBS	2
19	066558-000	LABEL EMERG. LOWERING	1
20	101222-004	LABEL CONTROLLER	1
22	005221-000	LABEL BATTERY	2
23	14222-003-99	FORK LIFT HERE	5
25	063255-001	LABEL SCISSOR BRACE	1
26	010076-001	LABEL INST.	1
27	061220-001	LABEL ANSI	1
28	101252-001	MAX WHEEL LOAD	1
29	061205-005	NAME PLATE	1
30	065368-000	TACK	4
31	064444-000	LABEL USA	4
32	060830-003	SAFETY WALK 6 X 20	1
33	060830-002	SAFETY WALK 8 X 36	3
34	060830-001	SAFETY WALK 4 X 20	3
35	062562-001	LABEL DANGER	2
36	066522-000	LABEL BATTERY CHARGER	1
37	066556-001	LABEL WARNING	4

ITEM	PART	DESCRIPTION	QTY.
1	061683-004	LABEL UPRIGHT	2
2	061684-023	LABEL MX 19	2
3	061683-014	LABEL UPRIGHT	2
4	066550-000	LABEL DANGER	1
5	060577-004	ANSI MANUAL	1
7	060570-003	USER MANUAL X15/19	1
6	010076-000	MANUAL CASE	1
8	011248-004	LOCKNUT 1/4-20UNC HEX	4
9	011252-006	SCREW 1/4-20UNC HHC X 3/4	4
10	011240-004	WASHER 1/4 STD FLAT	4
11	066559-000	LABEL CONTROLS	1
12	101251-000	LABEL DANGER	1
13	066552-000	LABEL WARNING	2
14	066553-000	LABEL WARNING KEEP CLEAR	2
15	066554-000	LABEL CAUTION	1
16	066555-000	LABEL CAUTION	1
17	066556-000	LABEL CAUTION	1
18	101250-000	LABEL MAX LOAD 500 LBS	2
19	066558-000	LABEL EMERG. LOWERING	1
20	101222-004	LABEL CONTROLLER	1
22	005221-000	LABEL BATTERY	2
23	14222-003-99	FORK LIFT HERE	5
25	063255-001	LABEL SCISSOR BRACE	1
26	010076-001	LABEL INST.	1
27	061220-001	LABEL ANSI	1
28	101252-001	MAX WHEEL LOAD	1
29	061205-005	NAME PLATE	1
30	065368-000	TACK	4
31	064444-000	LABEL USA	4
32	060830-003	SAFETY WALK 6 X 20	1
33	060830-002	SAFETY WALK 8 X 36	3
34	060830-001	SAFETY WALK 4 X 20	3
35	062562-001	LABEL DANGER	2
36	066522-000	LABEL BATTERY CHARGER	1
37	066556-001	LABEL WARNING	4



SAFETY TREAD FOR ROLL OUT DECK

**LABEL INSTALLATION  
MX15/19  
DRAWING 1 OF 2**



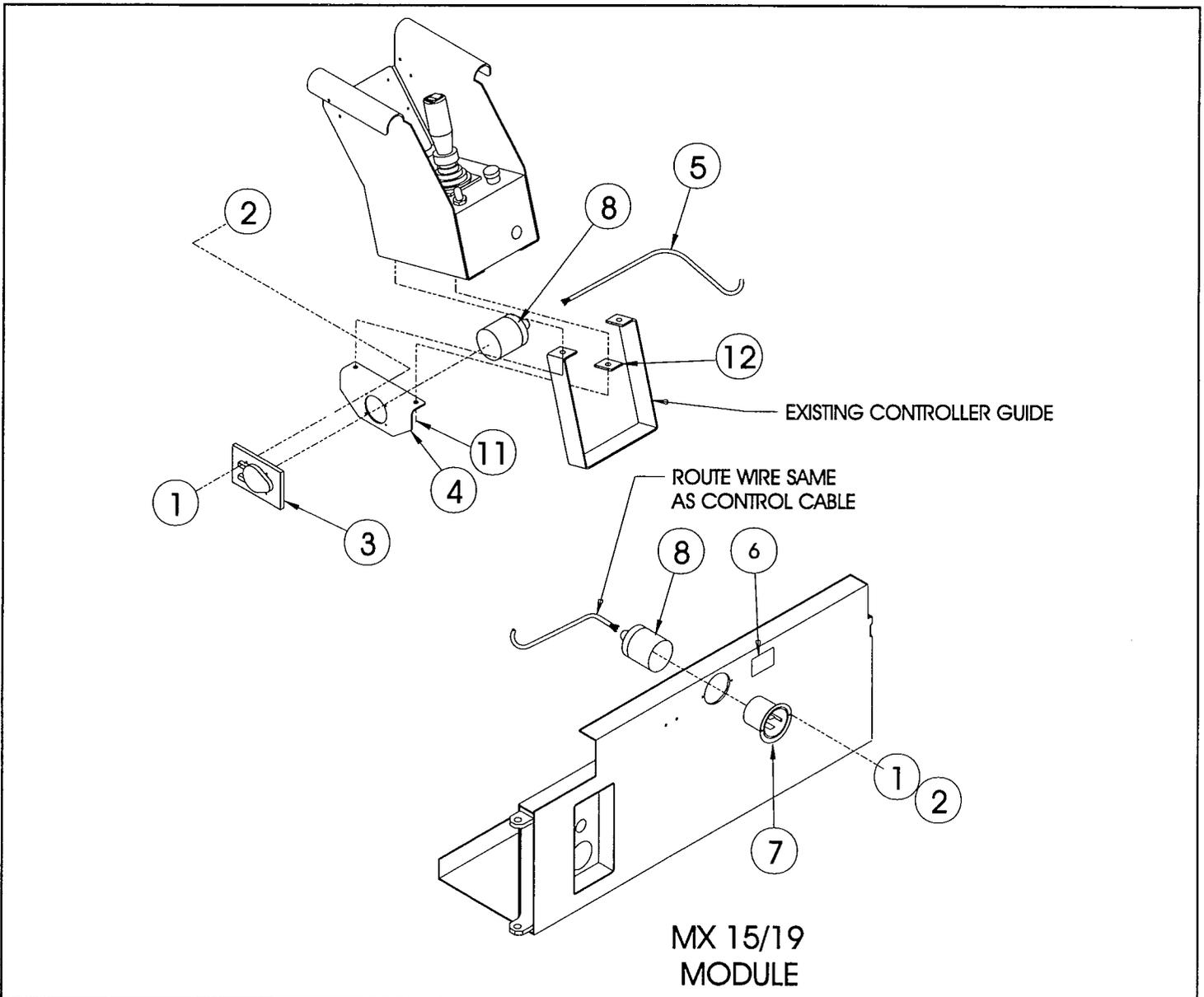
# Illustrated Parts Breakdown

## POWER TO PLATFORM OPTION

MX15/19

065713-001

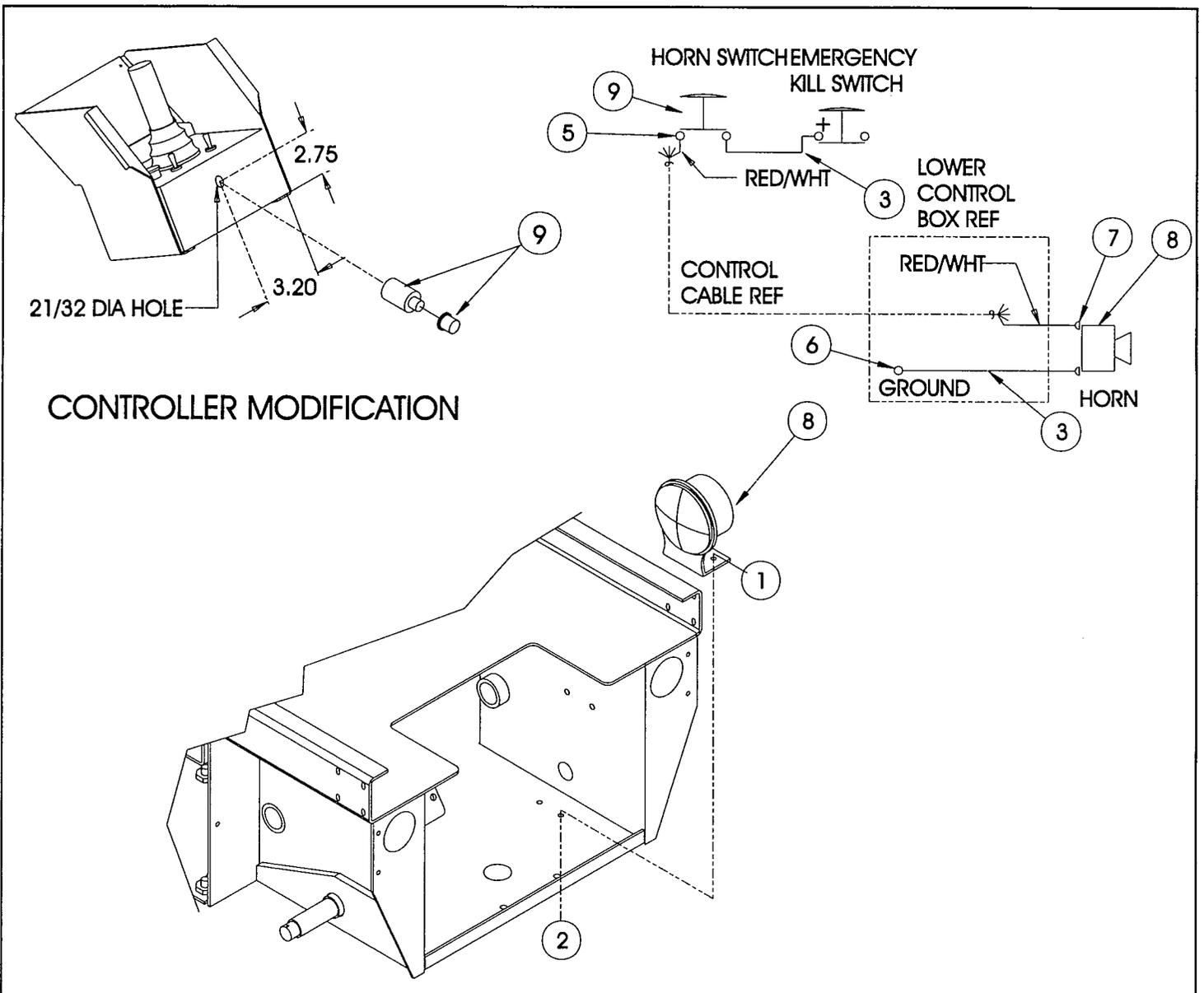
ITEM	PART	DESCRIPTION	QTY.
1	011715-004	SCREW, RD. HD. #6-32 X 1/2 LG.	2
2	011248-047	NUT, ESNA #6-32	8
3	008942-001	OUTLET	1
4	066505-000	BRACKET	1
5	029495-099	WIRE, 14GA 3 COND.	37'
6	068639-000	LABEL, POWER TO PLATFORM	1
7	029961-000	INLET PLUG	1
8	029961-001	SEAL INLET PLUG	2
9	011715-006	SCREW RD HD #6-32 X 3/4 LG	4
11	011252-006	SCREW, H.H.C. 1/4 X 3/4 LG.	2
12	065682-000	SPACER	1



# Illustrated Parts Breakdown

**HORN OPTION**  
**MX15/19**  
066614-000

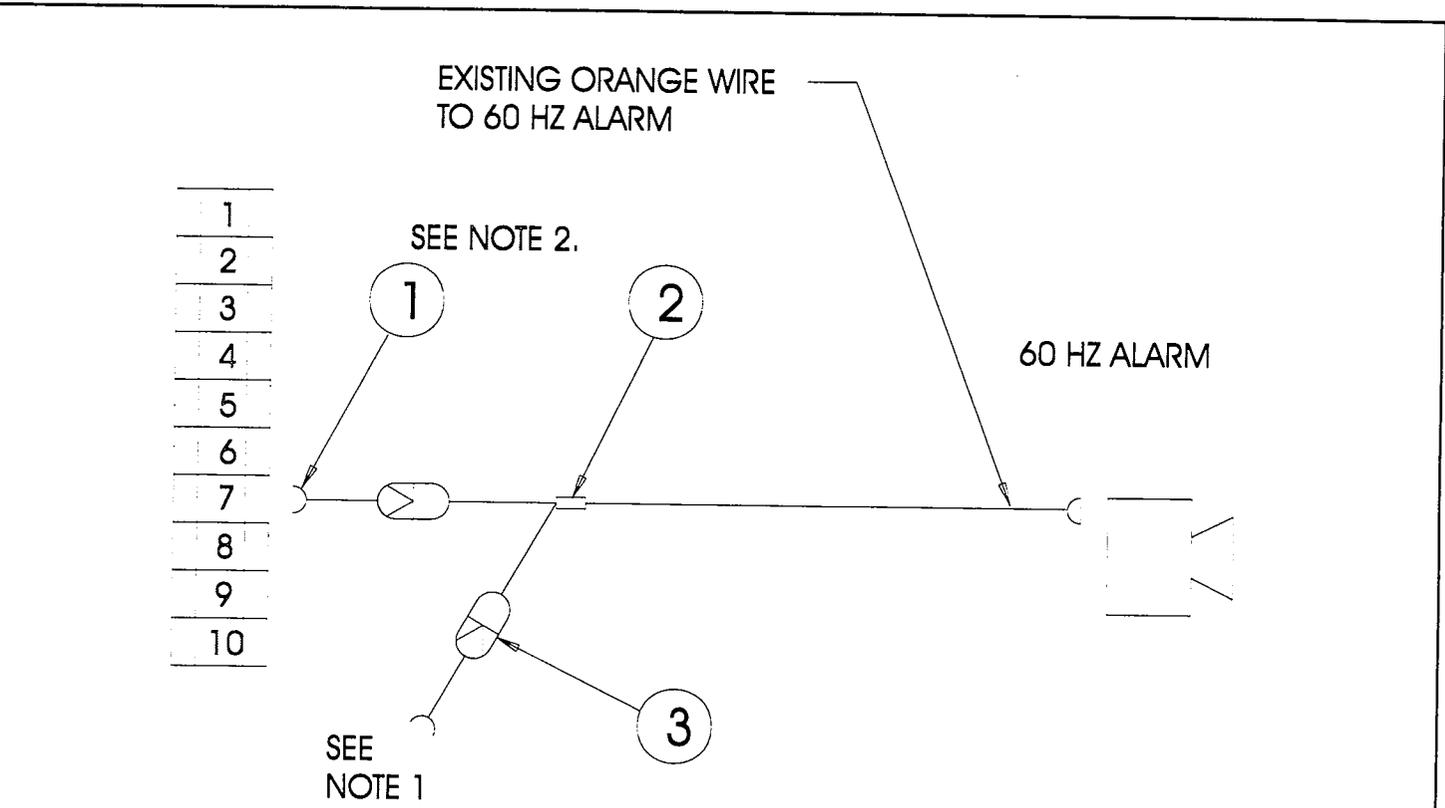
ITEM	PART	DESCRIPTION	QTY.
1	11252-008-00	SCREW HHC 1/4-20 X 1	2
2	11248-004-00	NUT HEX 1/4-20	2
3	29452-099-00	WIRE 16 GA BLACK	FT1.0
5	29610-002-00	CONNECTOR FORK	3
6	29601-014-00	CONNECTOR RING	1
7	29615-002-00	CONNECTOR PUSH	2
8	29958-000-00	HORN 24V	1
9	63917-000-00	SWITCH PUSHBUTTON	1



# Illustrated Parts Breakdown

MOTION ALARM OPTION  
MX15/19  
065715-001

ITEM	PART	DESCRIPTION	QTY.
1	029610-002	CONN FORK 16-14 #8	2
2	029620-002	CONN BUTT 16 GA	1
3	029825-002	DIODE 3AMP	2



NOTE:

1. a. FOR ALL MOTION ALARM CONNECT TO TB-8
- b. FOR FWD/REV MOTION ALARM CONNECT TO R2 COIL
- c. FOR REV MOTION ALARM CONNECT TO TB-3

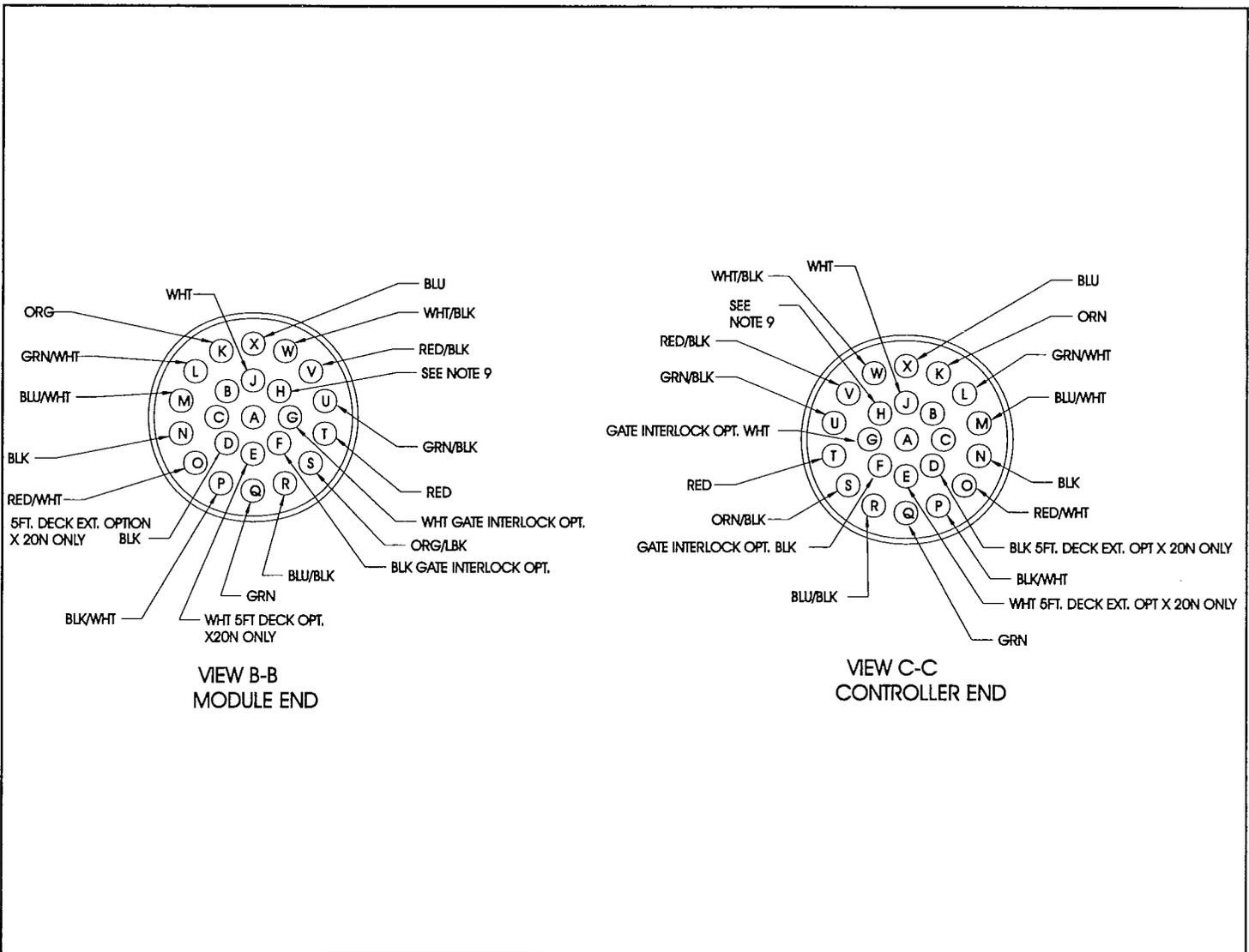
NOTES:

# Illustrated Parts Breakdown

## REMOVABLE CONTROLLER OPTION MX15/19 061898-001

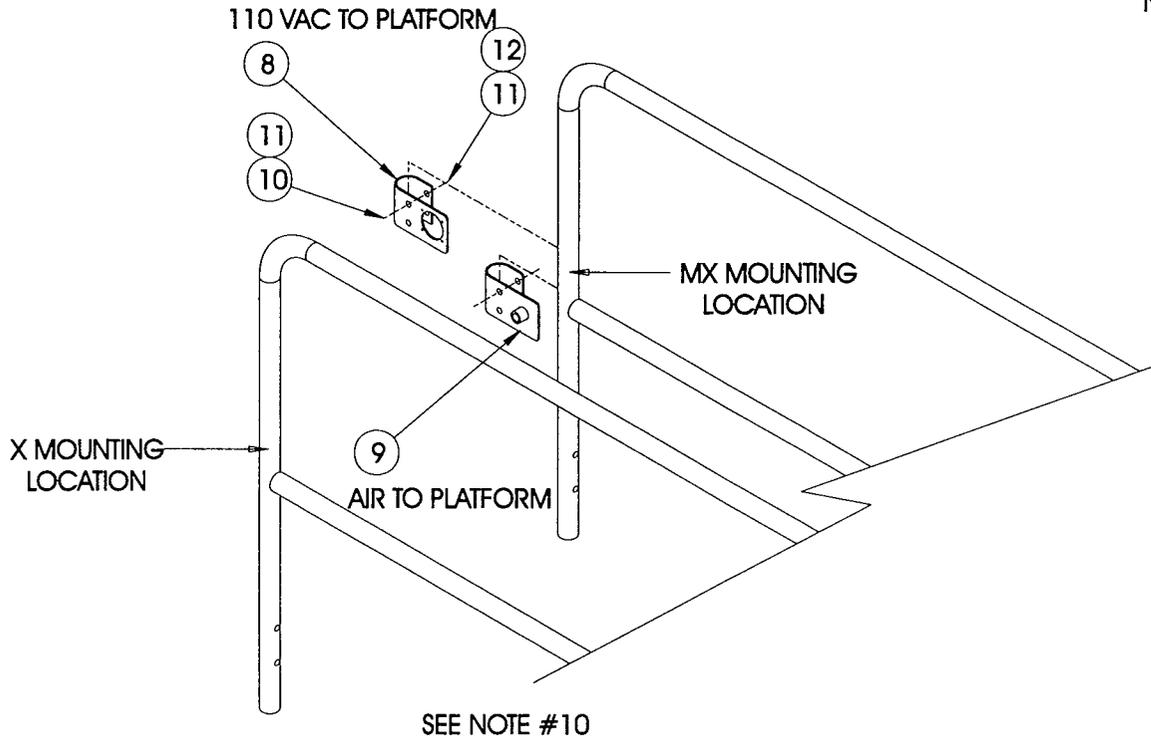
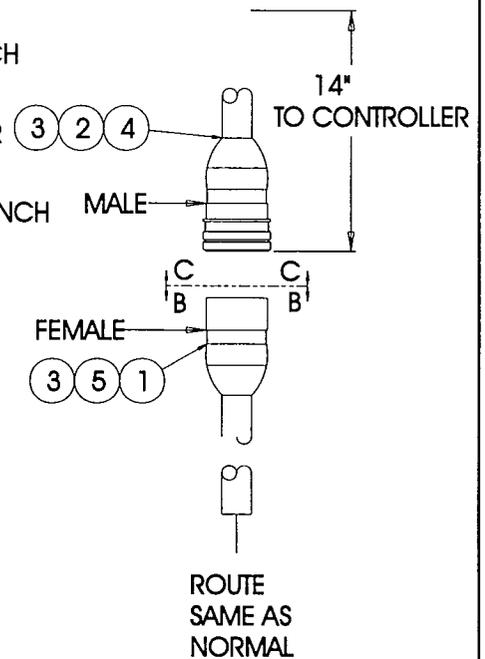
ITEM	PART	DESCRIPTION	QTY.
1	028800-003	PLUG CONNECTOR (FEMALE)	1
2	028800-004	PIN CONTACT (MALE)	15
3	028800-015	PLUG SEALING	16
4	028800-016	RECEPTACLE CONNECTOR W/ CLAMP (MALE)	1
5	028800-005	SOCKET CONTACT (FEMALE)	15
8	030719-001	110 VAC BRACKET	1
9	030719-002	AIR BRACKET WELDMENT	1
10	011254-016	SCREW HHC GRD5 3/8-16UNC X 2	4
11	011240-006	WASHER 3/8 STD FLAT	4
12	011248-006	NUT HEX ESNA 3/8-16	2

Items 8 through 12 see note #10



# Illustrated Parts Breakdown

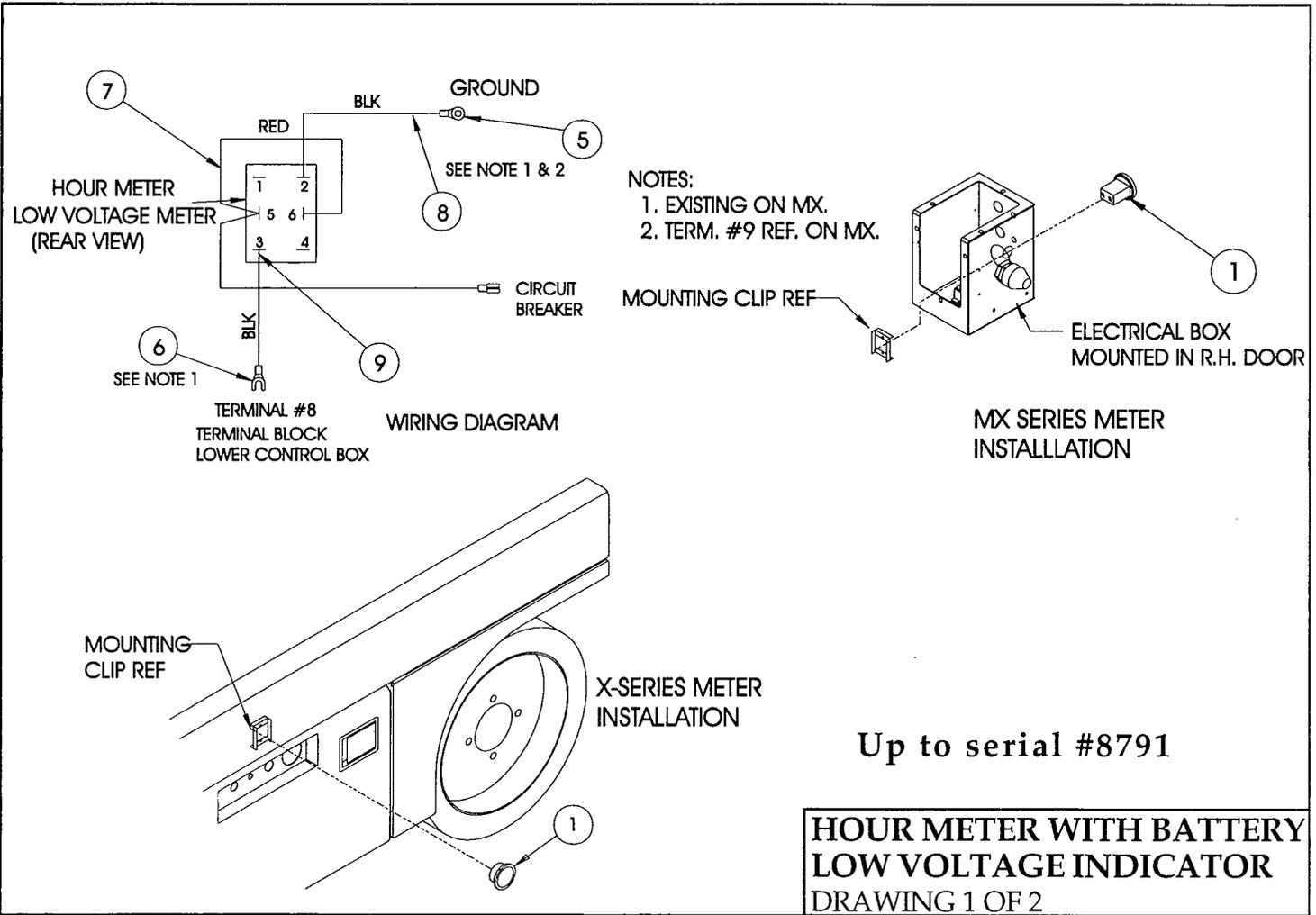
1. CUT OFF CONTROL CABLE 14 INCHES BELOW STRAIN RELIEF ON CONTROLLER.
2. CUT OUTER CABEL COVER OF LINKAGE CABEL BACK APPROXIMATELY 1-1/2 INCH AND STRIP APPROXIMATELY 1/4 INCH OF EACH END.
3. CRIMP SOCKETS (28800-005) ONTO WIRE ENDS AND INSERT INTO CONNECTOR (28800-016), REF. VIEW B-B.
4. CUT OUTER CABEL COVER OF CONTROLLER END BACK APPROXIMATELY 1-1/2 INCH AND STRIP APPROXIMATELY 1/4 INCH OF EACH END.
5. SLIDE BOOT AND CLAMP ONTO CABLE.
6. CRIMP PINS (28800-004) ONTO WIRE ENDS AND INSERT INTO CONNECTOR (28800-003), REF. VIEW C-C.
7. CLAMP BOOT TO CONNECTOR.
8. CONNECT CONTROLLER AND TEST MACHINE FOR PROPER FUNCTION.
9. USE TERMINAL " H " FOR HORN OPTION OR IF AUX WIRE IS REQUIRED.
10. ITEM #8 THRU 12 REQD ONLY FOR 110 VAC AND/OR AIR TO PLATFORM.



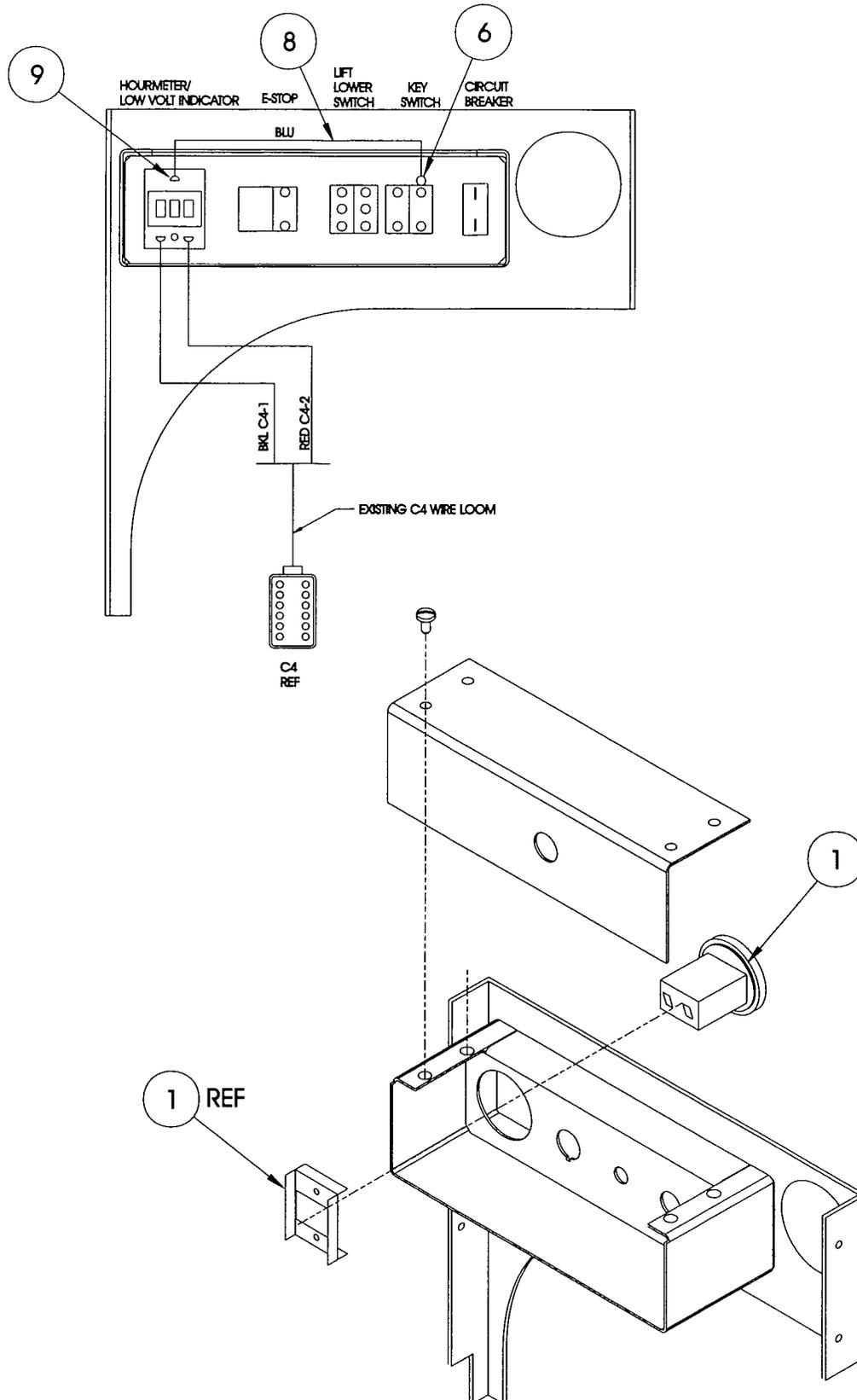
# Illustrated Parts Breakdown

**HOUR METER WITH BATTERY LOW  
VOLTAGE INDICATOR OPTION, MX15/19**  
066613-000

ITEM	PART	DESCRIPTION	QTY.
1	029959-000	HR/LOW VOLTAGE IND.	1
5	029601-013	CONN RING TERM	1
6	029601-002	CONN FORK TERM	1
7	029454-099	WIRE 16GA RED X 12"	1.0FT
8	029456-099	WIRE 16GA YELLOW X 15"	1.33FT
9	029931-003	CONN PUSH TERM	4



# Illustrated Parts Breakdown



Serial #8792 to current

**HOUR METER WITH BATTERY  
LOW VOLTAGE INDICATOR  
DRAWING 2 OF 2**

NOTES:



# UpRight

Call Toll Free in U.S.A.

**1-800-926-LIFT**

**UpRight, Inc.**

1775 Park Street

Selma, California 93662

TEL: 559/891-5200

FAX: 559/896-9012

PARTSFAX: 559/896-9244

**060569-003**

12/99 K