

Service Manual

LX31/41/50 European Model

Serial Numbers 4022 - Current

P/N 067904-028

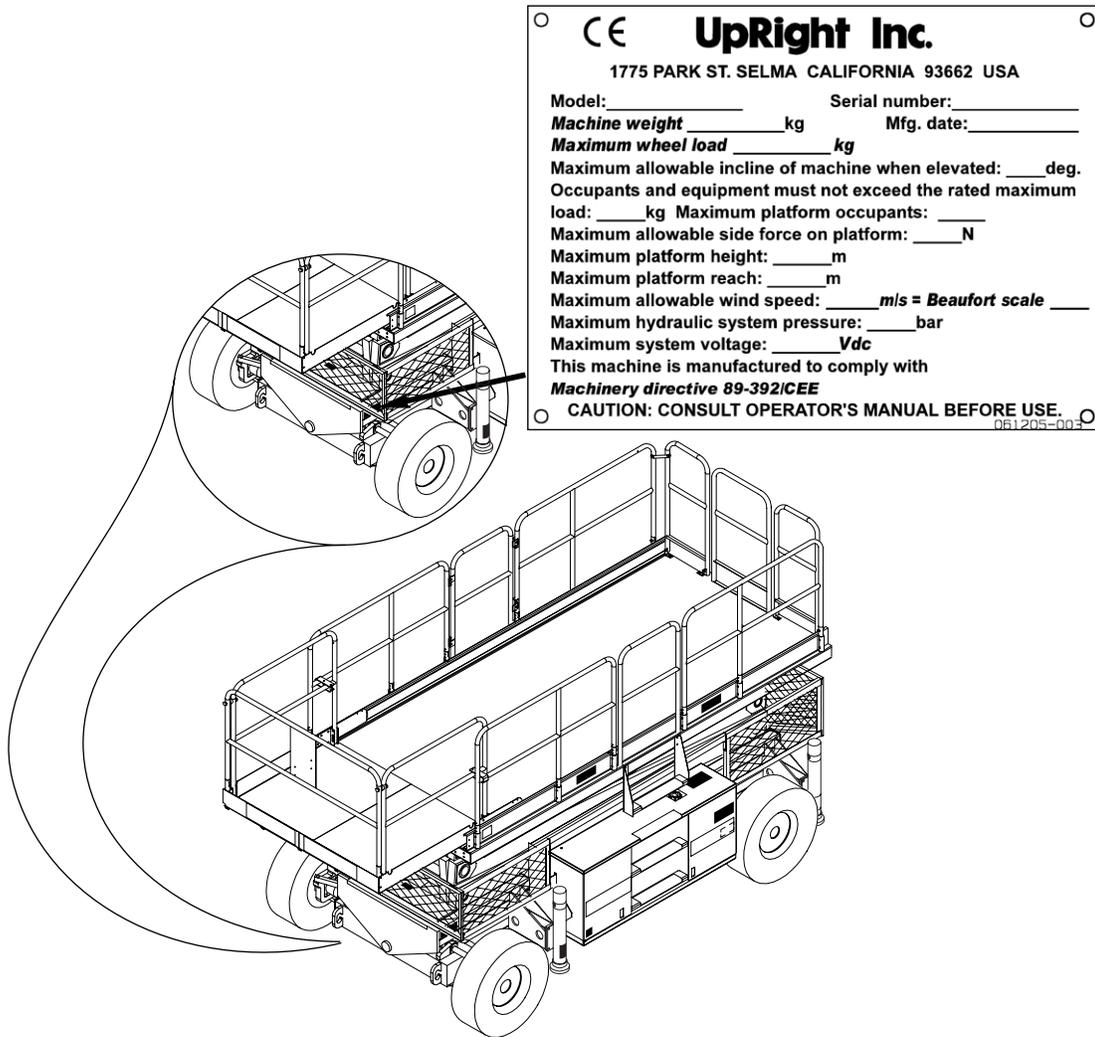
UpRight

LX31/41/50

European Models

Serial Numbers 4022 - Current

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 top of the chassis above the left front axle pivot.



CE		UpRight Inc.	
1775 PARK ST. SELMA CALIFORNIA 93662 USA			
Model: _____	Serial number: _____		
Machine weight _____ kg	Mfg. date: _____		
Maximum wheel load _____ kg			
Maximum allowable incline of machine when elevated: ____ deg.			
Occupants and equipment must not exceed the rated maximum load: _____ kg Maximum platform occupants: _____			
Maximum allowable side force on platform: _____ N			
Maximum platform height: _____ m			
Maximum platform reach: _____ m			
Maximum allowable wind speed: _____ m/s = Beaufort scale _____			
Maximum hydraulic system pressure: _____ bar			
Maximum system voltage: _____ Vdc			
This machine is manufactured to comply with			
Machinery directive 89-392/CEE			
CAUTION: CONSULT OPERATOR'S MANUAL BEFORE USE.			
<small>061205-003</small>			

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UpRight

EC Declaration of Conformity of Machinery
EC-Konformitätserklärung für Maschinen
Declaration De Conformite CE pour les Machines
Declaracion De Conformidad CE Para Maquinaria
Dichiarazione Di Conformità CE Per Le Macchine
CE Conformiteitsverklaring voor Machinery
EU Deklaration Avseende Överensstämelse För Maskinutrustning
EF-Samavarserklæring For Maskiner
EU Vaatimustenmukaisuuskäytäntö

Modello
Verticaal model
Malli

LX31 - LX41 - LX50

Serienummer
Numero de serie
Maticola

4275 +

Notified body
Notifizierte Stelle
Organisme notifie
Organismo notificado
Aangemelde instantie
Myndighet
Avendte harmoniserede standarder
Udpeget organ
Asiasta on tehty ilmoitus seuraaville taholle
Ente Notificatore

Technische
Dienstbier & Pix
Hundert Beete 13
D-91334 Hemhofen
DEUTSCHLAND

ID Number CE 0533

LX31 0533 86 01
LX41 0533 87 01
LX50 0533 88 01

EC Type Examination Certificate number
EC-Typenprüfung Zertifikat-Nr
Examen type CE Numero de Certificat
Inspeccion tipo CE Numero de certificado
Attestato di certificazione CE nr
Onderzoek van het type EC Certificaatnummer
EU typp kontroll Certifieringsnummer
EF-typeproving Sertifikatnummer
EF-typegodkendelse Nummer pa typeattest
EU-tyyppitarkastuksen nr.

Quality Assurance Manager
Leiter Qualitätssicherung
Directeur de l'Assurance Qualite
Gerente de Garantia de Calidad
Responsabile Garanzia di Qualità
Kvaliteitscontrole Manager
Kvaliteitskontroll Chef
Kvalitetssikringschef
Kvalitetssikringschef
Laadunvalvoja

March 2001

Date
Datum
Fecha
Data
Dato
Paivamaara

Manufacturer
Hersteller
Fabricant
Fabricante
Fabbricante

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Description..... Aerial Work Platform
Bezeichnung..... Arbeitsbühne
Description..... Plate-forme elevatrice de personnel
Descripción..... Plataforma aerea de trabajo con motor
Descrizione..... Piattaforma di sollevamento motorizzata
Beschrijving..... Mechanisch aangedreven werkplatform
Beskrivning..... Hög-och sänkbar arbetsplattform
Beskrivelse..... Selvgående arbeidsplattform
Beskrivelse..... Motordrevet loftepattform
Kuvaus..... Konevoimalla toimiva nostolava
Selvgående personarbetslift

Original document
do not discard



SUOMI

Yllämainittu laite täyttää seuraavat vaatimukset:
Direktiivi Muutettuna direktiivillä Hvzäksytyt yhdenmukaiset standardit
 98/37/EC EN60204-1:1997 Koneurvallisuus

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Sähkömagneettinen yhteensopivuus

SVENSKA

Maskinen som specificeras ovan överensstämmer med följande bestämmelser:
 Med ändringar enligt direktiven Harmoniserade standarder som har tillämpats:
Direktiv 98/37/EC EN60204-1:1997 Säkerhet hos maskinutrustning

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Elektromagnetisk kompatibilitet

DANSK

Den anførte maskine er i overensstemmelse med følgende bestemmelser:
 Som ændret ved Rådets direktiver Anvendte harmoniserede standarder:
Direktiv 98/37/EC EN60204-1:1997 Maskinsikkerhed

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 EMC

NORSK

Den ovenfor angitte maskinen samsvarer med følgende bestemmelser:
 Med endringer i Rådets direktiv Anvendte harmoniserte standarder:
Direktiv 98/37/EC EN60204-1:1997 Maskinsikkerhet

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Elektromagnetisk kompatibilitet

ESPAÑOL

La máquina especificada arriba de estas líneas cumple con las disposiciones indicadas a continuación:
 Según las enmiendas de las Directivas Estándares armonizados adoptados:
Directiva 98/37/EC EN60204-1:1997 Seguridad de la maquinaria

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Compatibilidad electromagnética

ENGLISH

The Machine specified herein complies with the following provisions:
As amended by Directive Harmonized Standards Safety of Machinery
 98/37/EC EN60204-1:1997

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Electromagnetic compatibility

DEUTSCH

Die obengenannte Maschine entspricht den folgenden Bestimmungen:
Geändert durch Richtlinien Harmonisierte Normen: Maschinensicherheit –
98/37/EC EN60204-1:1997 Elektrische Maschinenausrüstung

89/336/EEC 93/68/EEC EN 50081-1:1992 EN 50082-1:1992 Elektromagnetische Kompatibilität

NEDERLANDS

De bovenvermelde machine voldoet aan de volgende voorwaarden:
 Zoals gewijzigd door richtlijnen Aanvaarde geharmoniseerde normen:
Richtlijn 98/37/EC EN60204-1:1997 Veiligheid van machinerie

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Elektromagnetische compatibiliteit

FRANCAIS

La machine décrite ci-dessus est conforme aux normes ci-dessous:
 Amendée par la directive Normes harmonisées adoptées
98/37/EC EN60204-1:1997 Sécurité des machines

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Compatibilité électromagnétique

ITALIANO

La macchina sopra specificata è conforme alle seguenti disposizioni:
Modificata dalle Direttive Norme armonizzate adottate Sicurezza del macchinario
98/37/EC EN60204-1:1997

89/336/EEC 93/68/EEC EN50081-1:1992 EN50082-1:1992 Compatibilità elettromagnetica

FOREWORD

This manual contains instructions for the maintenance of the machine. Referring to the Operator Manual will aid in understanding the operation and function of the various components and systems of the machine, and help in diagnosing and repair of the machine.

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.

This manual consists of five (5) parts.

OPERATOR MANUAL

A copy of the Operator Manual that is stored on every UpRight Aerial Work Platform.

SECTION 1 - GENERAL INFORMATION

Contains generic information relevant to all UpRight Aerial Work Platforms.

SECTION 2 - SERVICE AND REPAIR

Detailed information specific to this UpRight Aerial Work Platform.

SECTION 3 - TROUBLESHOOTING

Causes and solutions to typical problems.

SECTION 4 - SCHEMATICS

Electric and Hydraulic schematics.

NOTES:

OPERATOR MANUAL

WARNING

All personnel shall carefully read, understand and follow all safety rules and operating instructions before operating or performing maintenance on any UpRight aerial work platform.

Safety Rules

Electrocution Hazard



THIS MACHINE IS NOT INSULATED!

Tip Over Hazard



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

Collision Hazard



NEVER position the platform without first checking for overhead obstructions or other hazards.

Fall Hazard



NEVER climb, stand or sit on platform guardrails or midrail.

USE OF THE AERIAL WORK PLATFORM: This aerial work platform is intended to lift persons and his tools as well as the material used for the job. It is designed for repair and assembly jobs and assignments at overhead workplaces (ceilings, cranes, roof structures, buildings etc.). All other uses of the aerial work platform are prohibited!

THIS AERIAL WORK PLATFORM IS NOT INSULATED! For this reason it is imperative to keep a safe distance from live parts of electrical equipment!

Exceeding the specified permissible maximum load **is prohibited!** See "Special Limitations" on page 4 for details.

The use and operation of the aerial work platform as a lifting tool or a crane (lifting of loads from below upwards or from up high on down) **is prohibited!**

NEVER exceed the manual force allowed for this machine. See "Special Limitations" on page 4 for details.

DISTRIBUTE all platform loads evenly on the platform.

NEVER operate the machine without first surveying the work area for surface hazards such as holes, drop-offs, bumps, curbs, or debris; and avoiding them.

OPERATE machine only on surfaces capable of supporting wheel loads.

NEVER operate the machine when wind speeds exceed this machine's wind rating. See "Beaufort Scale" on page 4 for details.

IN CASE OF EMERGENCY push EMERGENCY STOP switch to deactivate all powered functions.

IF ALARM SOUNDS while platform is elevated, STOP, carefully lower platform. Move machine to a firm, level surface.

Climbing up the railing of the platform, standing on or stepping from the platform onto buildings, steel or prefab concrete structures, etc., **is prohibited!**

Dismantling the swing gate or other railing components **is prohibited!** Always make certain that the swing gate is closed and securely locked!

It is prohibited to keep the swing gate in an open position (held open with tie-straps) when the platform is raised!

To extend the height or the range by placing of ladders, scaffolds or similar devices on the platform **is prohibited!**

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

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

VERIFY that all labels are in place and legible before using.

NEVER use a machine that is damaged, not functioning properly, or has damaged or missing labels.

To bypass any safety equipment **is prohibited** and presents a danger for the persons on the aerial work platform and in its working range.

NEVER charge batteries near sparks or open flame. Charging batteries emit explosive hydrogen gas.

Modifications to the aerial work platform **are prohibited** or permissible only at the approval by UpRight.

AFTER USE, secure the work platform from unauthorized use by turning both keyswitches off and removing key.

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INTRODUCTION

This manual covers the operation of the LX 31, LX 41 and LX50 Internal Combustion Work Platform. **This manual must be stored on the machine at all times.**

GENERAL DESCRIPTION

1. Platform

The platform has a reinforced steel floor, guardrails with midrail, toeboards and an entrance gate at the rear and both sides of the platform. The guardrails can be folded down for access through doors or for shipment.

2. Slide-out Deck

⚠ WARNING ⚠

DO NOT use the maintenance platform without guardrails properly assembled and in place

3. Platform Controls

The platform controls contain the controls to operate the machine. It should be hung on the front, left, or right guardrail.

4. Manual Case

5. Elevating Assembly

The platform is raised and lowered by the elevating assembly; a five section scissor assembly powered by two single-stage lift cylinders.

6. Scissor Guard

7. Control Module

The control module contains the fuel tank, hydraulic valve manifold, horn/alarms, battery, and chassis control panel.

8. Power Module

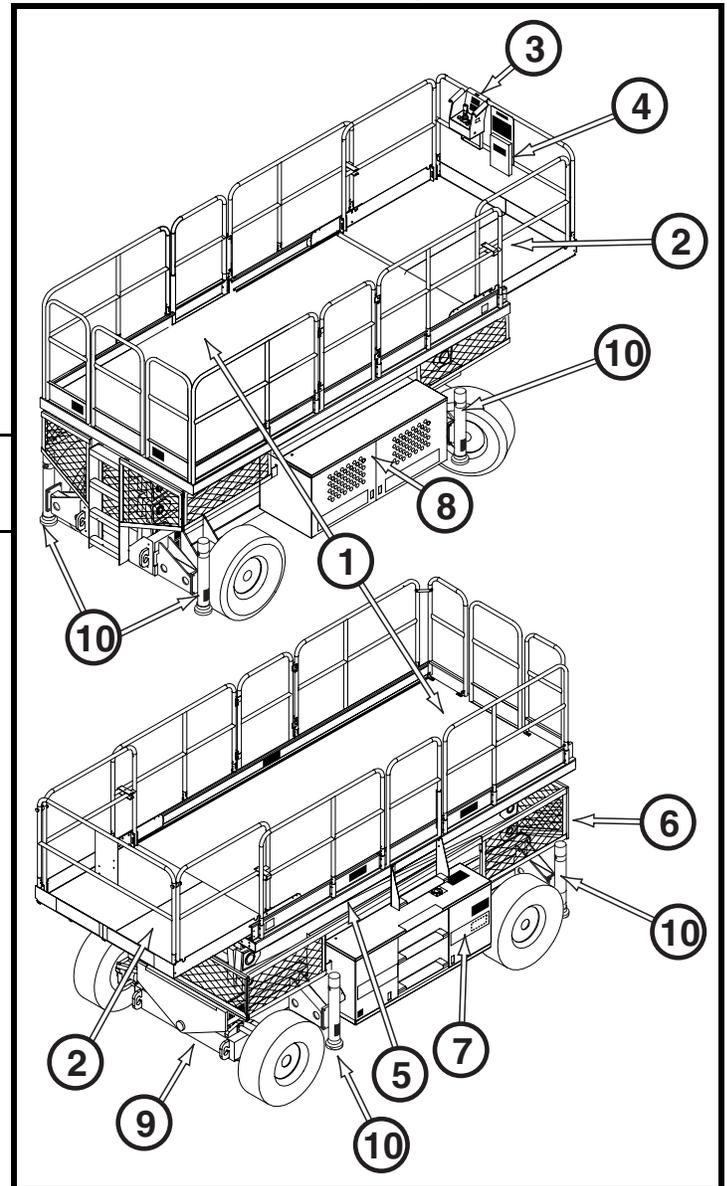
The power module contains the engine, the hydraulic pump, the hydraulic reservoir.

9. Chassis

The chassis is a structural frame that supports all the components of the Work Platform.

10. Outriggers (optional)

Figure 1: LX Series Work Platform



SPECIAL LIMITATIONS

ALL MODELS:

Travel with the platform raised is limited to a creep speed range.

Elevating of the Work Platform is limited to firm, level surfaces only.

⚠ DANGER ⚠

The elevating function shall ONLY be used when the work platform is level and on a firm surface.

The work platform is NOT intended to be driven over uneven, rough, or soft terrain.

PLATFORM CAPACITY

The maximum capacity for the MACHINE, including occupants is determined by model and options, and is listed in "Specifications" on page 22.

⚠ DANGER ⚠

DO NOT exceed the maximum platform capacity or the platform occupancy limits for this machine.

MANUAL FORCE

Manual force is the force applied by the occupants to objects such as walls or other structures outside the work platform.

The maximum allowable manual force is limited to 200 N (45 lbs.) of force per occupant, with a maximum of 400 N (90 lbs.) for two or more occupants.

⚠ DANGER ⚠

DO NOT exceed the maximum amount of manual force for this machine.

BEAUFORT SCALE

Never operate the machine when wind speeds exceed 45 km/h (28 mph) [Beaufort scale 6].

BEAUFORT RATING	WIND SPEED				GROUND CONDITIONS
	m/s	km/h	ft/s	mph	
3	3,4-5,4	12,25-19,4	11.5-17.75	7.5-12.0	Papers and thin branches move, flags wave.
4	5,4-8,0	19,4-28,8	17.75-26.25	12.0-18	Dust is raised, paper whirls up, and small branches sway.
5	8,0-10,8	28,8-38,9	26.25-35.5	18-24.25	Shrubs with leaves start swaying. Wave crests are apparent in ponds or swamps.
6	10,8-13,9	38,9-50,0	35.5-45.5	24.5-31	Tree branches move. Power lines whistle. It is difficult to open an umbrella.
7	13,9-17,2	50,0-61,9	45.5-56.5	31.-38.5	Whole trees sway. It is difficult to walk against the wind.

LIFT OVERLOAD ALARM

All models include a feature that alerts the operator when the platform load is exceeded. If the alarm sounds during the lift function, lower the platform and reduce the platform load.

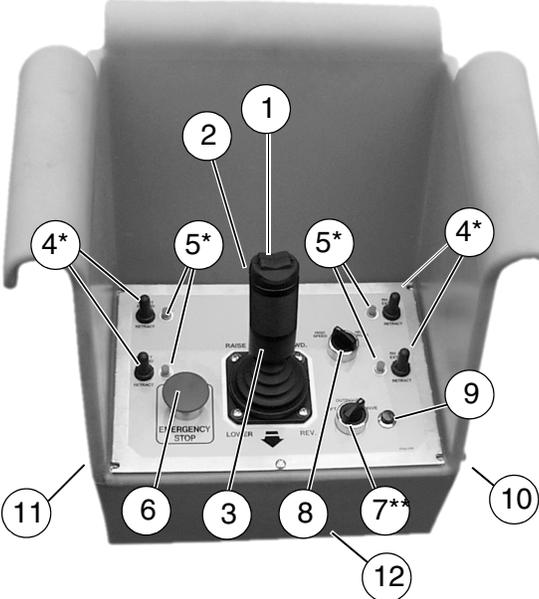
⚠ DANGER ⚠

Never operate the machine with a platform load greater than the rated capacity.

CONTROLS AND INDICATORS

Figure 2: Controls and Indicators

Platform Controls



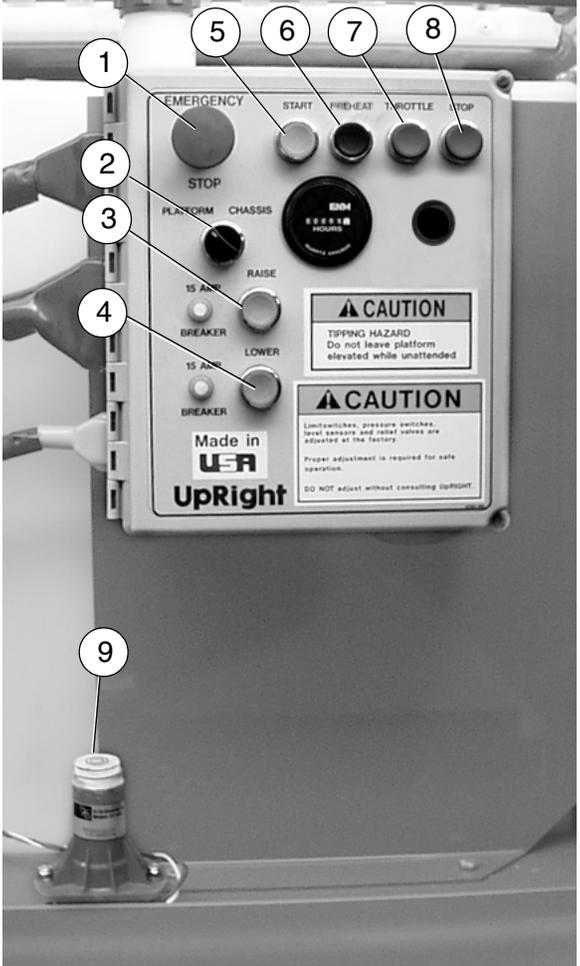
- 1 Steering Switch
- 2 Interlock Lever Switch
- 3 Control Lever
4. Outrigger Switches
5. Outrigger Indicator Lights
6. Emergency Stop Switch
7. Lift/Drive Switch
8. Drive Speed/Torque Selector Switch
9. Drive Enable Indicator
10. Key Switch
11. Glow Plug Button
12. Horn Button

Outrigger Options

* Outrigger Switches and Outrigger Lights are installed on outrigger equipped machines only.

** Outrigger selection is available on outrigger equipped machines only.

Chassis Controls



<ol style="list-style-type: none"> 1 Emergency Stop 2 Platform/Chassis Switch 3 Raise Button 4 Lower Button 5 Start Button 	<ol style="list-style-type: none"> 6 Glow Plug Button 7 Throttle Button 8 Stop Button 9 Level Sensor
---	--

PRE-OPERATION & SAFETY INSPECTION

NOTE: Carefully read, understand and follow all safety rules, operating instructions, labels and National Safety Instructions/Requirements. Perform the following steps each day before use.

1. Open modules and inspect for damage, fluid leaks or missing parts.
2. Check the hydraulic fluid level sight gauge on the hydraulic tank with the platform fully lowered. Add fluid if necessary.
3. Check that fluid level in the battery is correct (see "Battery Maintenance" on page 16).
4. Check the engine oil level and fuel level.
5. Check that all guardrails are in place, the slide-out deck extension is secured with the pin, and all fasteners are properly tightened.
6. Check tire pressure: 3,4 bar (**50 psi**).
7. Carefully inspect the entire work platform for damage such as cracked welds or structural members, loose or missing parts, fluid leaks, damaged cables or hoses, loose connections and tire damage.
8. While the engine is cool, check the engine coolant level.

CAUTION

DO NOT check coolant when engine or radiator is hot; hot coolant can cause severe burns.

SYSTEM FUNCTION INSPECTION

WARNING

STAND CLEAR of the work platform while performing the following checks.

Before operating the work platform, survey the work area for surface hazards such as holes, drop-offs, bumps and debris.

*Check in **ALL** directions, including above the work platform, for obstructions and electrical conductors.*

Protect control console cable from possible damage while performing checks.

1. Move the machine, if necessary, to an unobstructed area to allow for full elevation.
2. Place chassis and platform emergency stop switches in the ON position (Figure 2) by pulling the buttons out.
3. Verify that the Platform/Chassis switch is set to PLATFORM.
4. Turn the Platform Controls key switch clockwise to ON. Turn fully clockwise to start the engine, releasing the key once the engine starts.

NOTE: If the engine is cold, depress the glow plug button and hold for 6 seconds to heat the glow plugs.

5. Position the Lift/Drive switch to the DRIVE position. The drive enable light should be ON.
6. With the speed range switch first in HIGH TORQUE and then in HIGH SPEED, depress the interlock lever switch and slowly push the control lever to FORWARD then REVERSE positions to check for speed and directional control. The farther you push or pull the control lever, the faster the machine will travel.
7. Depress the interlock lever switch and push the steering switch RIGHT then LEFT to check for steering control.

8. Optional Outrigger Equipped Machines:
 - a. With the Lift/Outrigger/Drive switch in DRIVE, depress the interlock lever switch on the control lever and position each Outrigger switch to the EXTEND position.
 - Outriggers should be disabled. If an outrigger extends during this test **STOP**. Remove the machine from service until it is repaired.
 - b. Turn the Drive/Outrigger/Lift switch to OUTRIGGER.
 - c. Depress the interlock lever switch on the control lever and position each Outrigger switch to the EXTEND position to deploy all four (4) outriggers.
 - Check the outrigger indicator lights; they should be ON.
 - d. Depress the Interlock Lever switch on the control lever and position each Outrigger switch to the RETRACT position.
 - Partially retract all four (4) outriggers. The outrigger indicator lights should FLASH.
 - Fully retract all four (4) outriggers. The outrigger indicator lights should be OFF.
9. Open the Control Module covers to gain access to the chassis controls and level sensor.
10. Turn the Platform/Chassis switch to CHASSIS.
11. Push the throttle button in. Push the Raise button to elevate platform while pushing the level sensor off of level. The platform should only partially elevate and the tilt alarm should sound. If the platform continues to elevate and/or there is no alarm, **STOP** and remove the machine from service until it is repaired.
12. Release the level sensor and fully elevate the platform.
13. Visually inspect the elevating assembly, lift cylinder, cables and hoses for damage or erratic operation. Check for missing or loose parts.
14. Lower the platform partially by pushing in on the Lower button, and check operation of the audible lowering alarm.
15. Open the chassis emergency lowering valve to check for proper operation (refer to “Emergency Lowering” on page 11). Once the platform is fully lowered, close the valve by releasing the knob.
16. Turn the Platform/Chassis switch to PLATFORM.
17. Close and secure the module covers.
18. Enter the platform making sure the gate is latched.
19. Position the Lift/Drive switch to LIFT.
20. Depress the interlock lever switch and slowly push the control lever to UP to raise the platform; fully actuate the control lever to check proportional lift speed. Slowly pull the control lever to the DOWN position to lower the platform. Check that the lowering alarm sounds.
21. Optional Outrigger Equipped Machines:
 - a. With the Lift/Outrigger/Drive switch in LIFT, depress the interlock lever switch on the control lever and position any outrigger switch to the EXTEND position.
 - Outriggers should be disabled. If an outrigger extends during this test, **STOP**. Lower the platform and remove the machine from service until it is repaired.
22. Turn the controller key switch to OFF, push the Emergency Stop button, and dismount the platform.

OPERATION

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

! WARNING !

Never operate the work platform with the parking brakes released. Serious injury or damage could result.

TRAVEL WITH PLATFORM LOWERED

1. Verify the following:
 - the chassis Emergency Stop button is in the ON position (pull out)
 - the drive enable indicator is ON
 - the Platform/Chassis switch is on PLATFORM.

NOTE: If the drive enable indicator is OFF, verify that the platform is fully lowered and (if so equipped) the outriggers are fully retracted.

2. After mounting the platform, close and latch the gate. Check that the guardrails are in position and properly assembled, with the fasteners properly torqued.
3. Check that the route is clear of persons, obstructions, holes and drop-offs, and is capable of supporting the wheel loads.
4. Check clearances above, below and to the sides of the platform.
5. Pull the controller Emergency Stop button out to the ON position.
6. Turn the controller key switch fully clockwise to start the engine, releasing the key once the engine starts.

NOTE: If the engine is cold, hold the glow plug button in for 6 seconds to heat the glow plugs.

7. Set the Lift/Drive switch to DRIVE.
8. Set the speed range switch to HIGH TORQUE.
9. Grasp the control lever so that the interlock lever switch is depressed (releasing the interlock lever switch cuts power to controller). Slowly push or pull the control lever to FORWARD or REVERSE to travel in the desired direction. The farther you push or pull the control lever from center, the faster the machine will travel.
10. While moving, push the speed range switch to HIGH SPEED for travel on level surfaces or to HIGH TORQUE for climbing grades or traveling in confined areas.

TRAVEL WITH WORK PLATFORM ELEVATED

Travel with the platform elevated **ONLY** on firm and level surfaces.

NOTE: The work platform will travel at reduced speed when in the elevated position, and only if the front axle is parallel with the rear axle.

1. Check that the 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 the platform.
3. Position the Lift/Drive switch to the DRIVE position.
4. Push the control lever to FORWARD or REVERSE for the desired direction of travel.
5. If the machine quits driving and the tilt alarm sounds, immediately lower the platform and move the machine to a level location before re-elevating the platform.

STEERING

Push the steering switch **RIGHT** or **LEFT** to turn the wheels. Observe the tires while maneuvering to insure proper direction.

NOTE: Steering is not self-centering. Wheels must be returned to the straight ahead position by operating the steering switch.

RAISING AND LOWERING THE PLATFORM

The machine must be on a firm, level surface, capable of supporting the weight of the machine. On machines equipped with optional outriggers, use the outriggers to level the machine (refer to “Leveling the Platform (Outrigger equipped machines only)” on page 10.

1. Position the Lift/Drive switch to LIFT.
2. While holding the control lever so the interlock lever switch is depressed, push the control lever slowly to UP to raise the platform. Pushing the control lever farther increases the lift speed.
3. When the work task is completed, position the Lift/Drive switch to LIFT, and lower the platform by pulling back on the control lever until the platform is fully lowered.

LEVELING THE PLATFORM (OUTRIGGER EQUIPPED MACHINES ONLY)

⚠ WARNING ⚠

When using outriggers, all four (4) outriggers must be in firm contact with the supporting surface.

OUTRIGGER SWITCHES AND INDICATOR LIGHTS

For each outrigger, there is an outrigger switch and an outrigger indicator light (refer to Figure 2).

Each outrigger switch will raise and lower one outrigger.

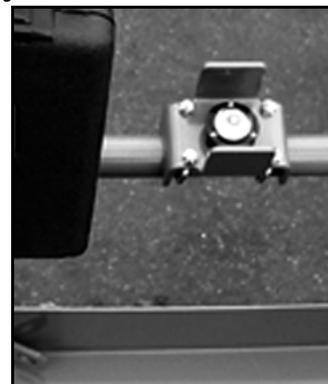
Each outrigger indicator light will indicate the position of one outrigger.

- When the indicator light is OFF - the outrigger is fully retracted.
- When the indicator light is FLASHING - the outrigger is partially extended.
- When the indicator light is ON - the outrigger is in firm contact with the supporting surface.

TO LEVEL THE PLATFORM (EXTEND THE OUTRIGGERS)

Figure 3: Platform Orbit Bubble Level

1. Make sure that the extension deck is retracted before operating the outriggers.
2. Look around the machine; make sure that there is nothing obstructing the outriggers, and that the surface beneath them is suitable to support the weight of the machine.
3. Position the Lift/Outrigger/Drive switch set to OUTRIGGER.
4. Depress the interlock lever switch on the control lever, and operate the outrigger switches to extend each outrigger until it is making firm contact with the supporting surface.
5. While observing the bubble level on the guardrail, extend the outrigger opposite the position of the bubble until the platform is level. For example: if the bubble is to the front and left in the orbit, extend the rear right outrigger. Continue to adjust until the bubble is centered in the small circle indicating that the platform is level.
6. Confirm that all four (4) outriggers are in firm contact with the supporting surface. The outriggers are in contact with the supporting surface when the indicator lights are ON.



TO RETRACT THE OUTRIGGERS

1. Fully lower the platform.
2. Position the Lift/Outrigger/Drive switch set to OUTRIGGER.
3. Depress the interlock lever switch on the control lever, and position each outrigger switch to RETRACT.
 - The outrigger indicator lights will be OFF when the outriggers are fully retracted.
 - The drive enable indicator light will not come on until all four outriggers are fully retracted.

EMERGENCY LOWERING

LX31 AND LX41

The emergency lowering control knob is located at the rear of the machine at the base of the scissor assembly.

1. Open the emergency lowering valve by pulling on the knob and holding it.
2. Once the platform is fully lowered, release the knob to close the valve.

Figure 4: Emergency Lowering Valve, LX31 and LX41



LX50

The emergency lowering control switch is located at the rear of the machine at the base of the scissor assembly.

1. Open the emergency lowering valve by pushing down on the toggle switch and holding it.
2. Once the platform is fully lowered, release the toggle switch to close the valve.

Figure 5: Emergency Lowering, LX50



TOWING OR WINCHING

Perform the following only when the machine will not operate under its own power and it is necessary to move the machine or when winching onto a transport vehicle (see “Transporting the Work Platform” on page 14).

CAUTION

DO NOT tow or winch the machine faster than 0,3 m/s (1 ft./s). Faster speeds will damage drive components and void the warranty.

PARKING BRAKE RELEASE

WARNING

Never operate the work platform with the parking brakes released. Serious injury or damage could result.

Never release the brakes if the machine is on a slope.

Chock the wheels before releasing the parking brakes.

Hook the machine to a towing vehicle before releasing the parking brakes.

Figure 6: Parking Brake Release Pump



1. Close the needle valve by turning the knob clockwise.
2. Pump the brake release pump until the parking brakes release and the wheels can be turned.
3. The machine will now roll when pushed or pulled.
4. Be sure to open the needle valve and verify that the parking brakes have engaged before the machine is operated.

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.

FOLD DOWN GUARDRAILS

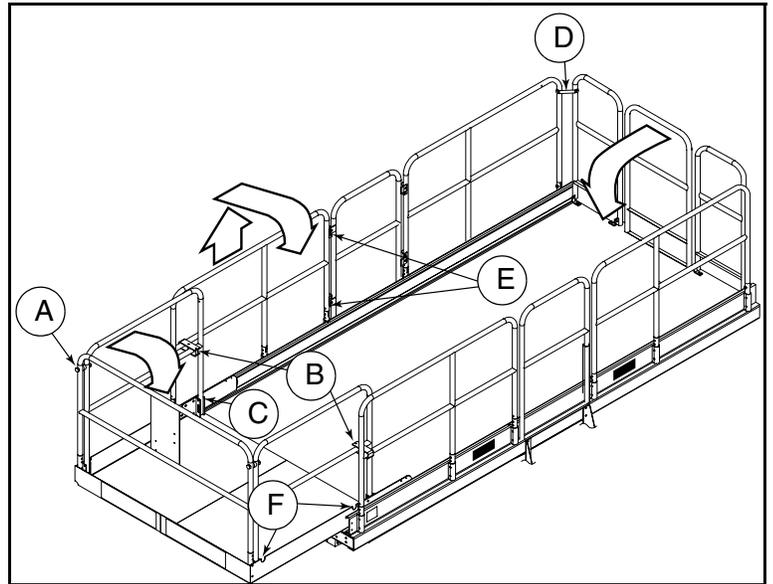
This procedure is only for passing through doorways. Guardrails must be returned to proper position before using the machine.

Figure 7: Fold Down Guardrails

FOLD DOWN PROCEDURE

NOTE: When performing the following procedures, retain all fasteners.

1. Place the controller on the platform.
2. Starting at the slide-out deck:
 - remove nuts, bolts and washers from the top front corners of guardrails (A)
 - remove the nuts, bolts and washers from the slide-out deck side guardrail mid-rails (B)
 - remove nuts, bolts and washers located at the top of the sockets that hold the slide-out deck side guardrails to the deck (C)
 - fold the side guardrails down onto the slide-out deck platform
 - leave the end rail up and slide the deck all the way in.
3. Go to the rear of the platform:
 - close and latch the rear gate
 - remove the nuts, bolts, washers, and corner brackets from the top of the rear guardrail
 - fold the rear guardrail down onto the platform, being careful to keep the gate latched.
4. Unlatch the side gate so the left side guardrails can be folded down in two separate pieces. Also remove the nuts, bolts and washers opposite the gate latch on the right side guardrail so it too can be separated into two pieces (E).
5. Fold the rear half of the side guardrails onto the deck:
 - lift up and fold down so the guardrails rest on the deck, on top of the rear guardrail.
6. Fold the front half of the side guardrails onto the deck:
 - lift up and fold down so the guardrails rest on the slide-out deck, with the guardrail posts resting in the cutouts on the slide-out deck toeboard (F).
7. Lift up and fold down the front slide-out deck guardrail.



ERECTION PROCEDURE

1. Raise the front guardrail, making sure it is pushed down to secure the guardrail in the vertical position.
2. Raise the side guardrails, making sure each is pushed down to secure the guardrail in the vertical position; align holes and install bolts, washers and nuts. Tighten securely.
3. Raise one of the slide-out deck side guardrail assemblies; align holes and install bolts, washers and nuts. Tighten securely. Repeat this procedure for the other slide-out deck side guardrails.
4. Raise the rear guardrail, and install the corner brackets, nuts, bolts and washers.
5. Hang the controller from the front guardrail.
6. Before operating work platform check that all fasteners are in place and properly torqued.

⚠ WARNING ⚠

Before operating machine, guardrails must be securely fastened in their proper position.

TRANSPORTING THE WORK PLATFORM

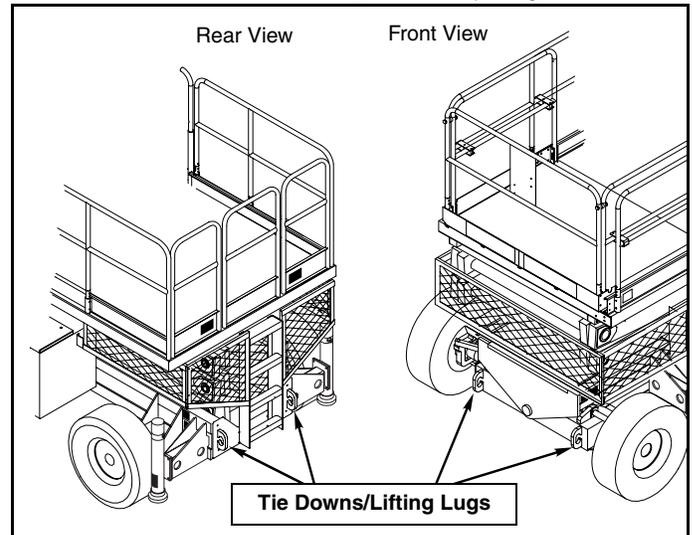
PREPARATION FOR SHIPMENT

1. Fully lower the platform.
2. Disconnect the battery negative (-) lead from the battery terminal.
3. Band the controller to the front guardrail.
4. Band the elevating linkage to the frame.

LIFTING BY CRANE

1. Secure straps to chassis tie down/lifting lugs only.
2. Place the platform onto the transport vehicle in transport position.
3. Chock the wheels.
4. Secure the work platform to the transport vehicle with chains or straps of adequate load capacity attached to the chassis tie down/lifting lugs.

Figure 8: Transporting Work Platform



DRIVING OR WINCHING ONTO A TRUCK OR TRAILER

NOTE: Do not winch faster than 0,3 m/s (1 ft/s).

1. Move the machine onto the truck or trailer;
 - A. To **Drive** the machine onto the transport vehicle:
 - a. Move the work platform up the ramp and into transport position.
 - b. Set the wheels straight and turn off the machine.
 - c. Chock the wheels.
 - B. To **Winch** the machine onto the transport vehicle:
 - a. Move the work platform up to the ramp.
 - b. Attach the winch cable to the tie down/lifting lugs.
 - c. Release the parking brakes (refer to "Towing or Winching" on page 12).
 - d. Winch the platform into transport position
 - e. Chock the wheels.
2. Secure the work platform to the transport vehicle with chains or straps of adequate load capacity attached to the chassis tie down/lifting lugs.

CAUTION

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

MAINTENANCE

BLOCKING THE ELEVATING ASSEMBLY

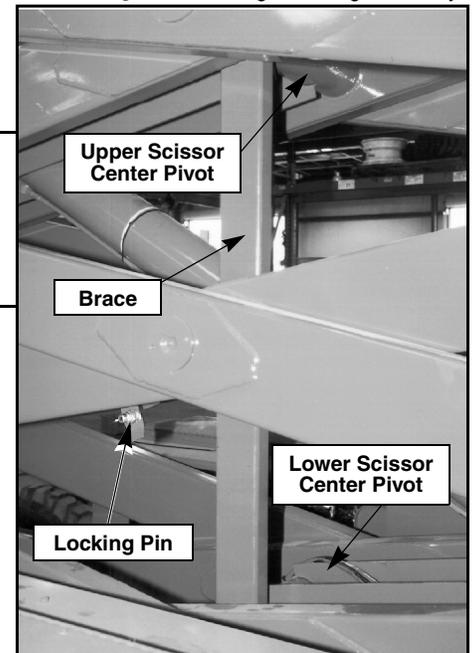
⚠ WARNING ⚠

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

DO NOT stand in elevating assembly area while deploying or storing brace.

BRACE INSTALLATION

1. Park the work platform on firm, level ground.
2. Verify that the platform Emergency Stop button is ON.
3. Turn the Platform/Chassis switch to CHASSIS.
4. Start the engine, using the chassis controls.
5. Push the Throttle button in. The button will stay in and the engine speed will increase. Using the Raise button, elevate the platform until the scissor brace can be rotated to the vertical position.
6. From the left side of the machine, disengage the locking pin securing the brace. Rotate the scissor brace counterclockwise until it is vertical and between the two scissor center pivots.
7. Push the Lower button and gradually lower the platform until the brace is supporting the platform.
8. Disengage the throttle by pushing the Throttle button in again. The button will retract and the engine will come to idle speed.



BRACE REMOVAL

1. Using the chassis controls, gradually raise the platform until the scissor brace clears the two scissor center pivots.
2. Rotate the scissor brace clockwise until the locking pin engages.
3. Push the Lower button to completely lower the platform.
4. Make sure the Throttle button is disengaged and Platform/Chassis switch is on PLATFORM.

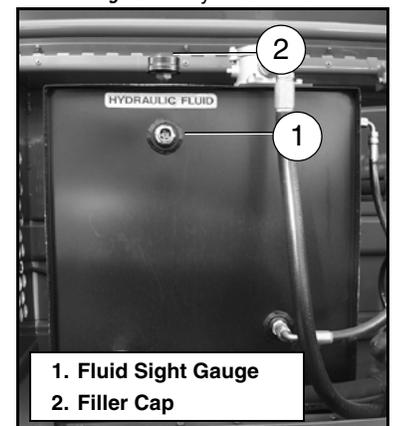
HYDRAULIC FLUID

The hydraulic fluid tank is located in the Power Module.

NOTE: Never add fluid if the platform is elevated.

1. Make sure that the platform is fully lowered.
2. Check fluid level by observing the fluid sight gauge
3. Remove the filler cap to fill with the appropriate fluid.

Figure 10: Hydraulic Fluid Tank



BATTERY MAINTENANCE

Figure 11: Battery Location

⚠ WARNING ⚠

Hazard of explosive gas mixture. Keep sparks, flame, and smoking material away from battery.

Always wear safety glasses when working with batteries.

Battery fluid is highly corrosive. Thoroughly rinse away any spilled fluid with clean water.

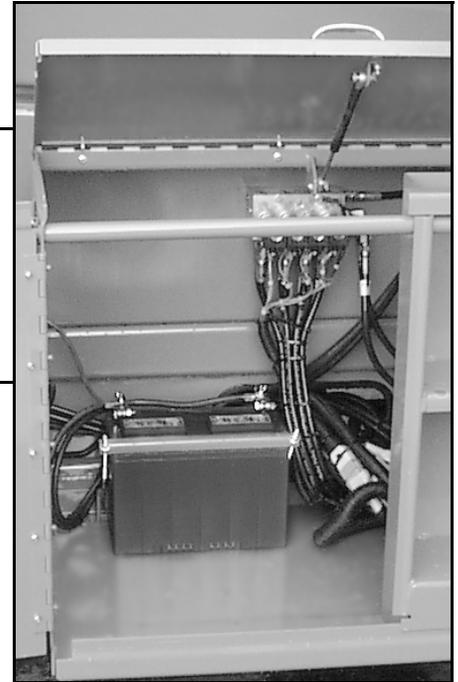
Always replace batteries with UpRight batteries or manufacturer approved replacements.

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

If the electrolyte level is lower than 10 mm (**3/8 in.**) above plates, add distilled water **ONLY**. Do not use tap water with high mineral content; it will shorten battery life.

The battery and cables should be inspected regularly for signs of cracks in the case, electrolyte leakage and corrosion of the terminals. Inspect the cables for worn spots or breaks in the insulation and for broken cable terminals.

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



ENGINE

COOLANT

The coolant recovery tank is mounted on the inside of the door of the power module.

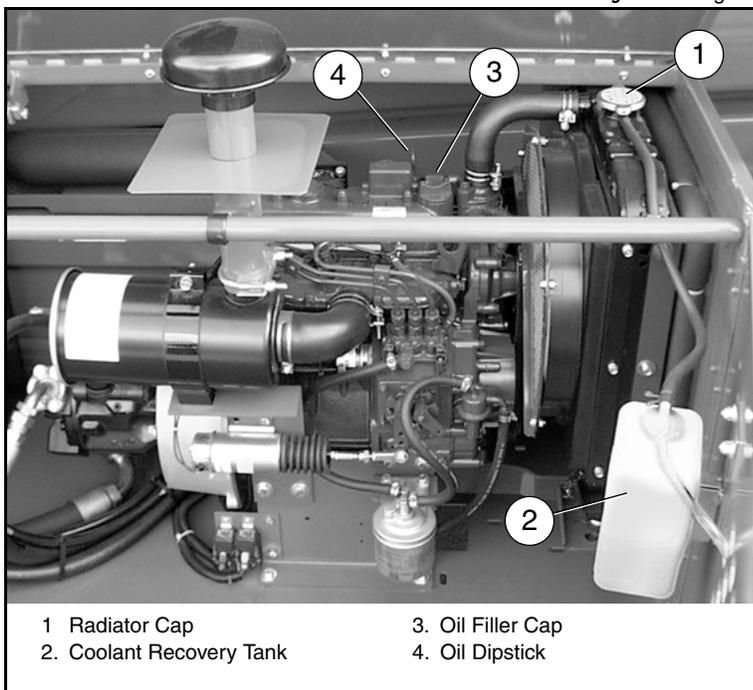
1. Remove the cap on the coolant recovery tank.
2. Add coolant to the "FULL" mark.

NOTE: Never remove the radiator cap when the engine is hot.

OIL

The engine **must not be running** when you check and replenish the engine oil. Refer to the Service Manual to change the oil filter.

1. Remove the oil dipstick and check the level indicator marks.
2. If the level is low, remove the oil filler cap.
3. Replenish with the proper engine oil (refer to the engine service manual that came with the machine).



⚠ CAUTION ⚠

DO NOT check coolant when engine or radiator is hot; hot coolant can cause severe burns.

FUEL

The fuel tank for is located in the Control Module, behind the chassis controls. The tank is translucent. Check the fuel level by observing the level of the liquid through the tank.

Figure 13: Fuel Supply



PREVENTATIVE MAINTENANCE SCHEDULE

The complete inspection consists of periodic visual and operational checks, along with periodic 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.

⚠ WARNING ⚠

Before performing preventative maintenance, familiarize yourself with the operation of the machine.

Always block the elevating assembly whenever it is necessary to enter the scissor assembly to perform maintenance while the platform is elevated (see page 15).

The daily preventative maintenance table has been designed for machine service and maintenance repair. Please photocopy the Daily Preventative Maintenance Check List and use the table as a checklist when inspecting the machine for service.

DAILY PREVENTATIVE MAINTENANCE CHECK LIST

MAINTENANCE TABLE KEY

Y = Yes/Acceptable

N = No/Not Acceptable

R = Repaired/Acceptable

MAINTENANCE REPORT

Date: _____

Owner: _____

Model No: _____

Serial No: _____

Serviced By: _____

COMPONENT	INSPECTION OR SERVICES	Y	N	R
Battery	Check electrolyte level			
Chassis	Check hoses for pinch or rubbing points			
	Check welds for cracks			
Control Cable	Check the exterior of the cable for pinching, binding or wear			
Controller	Check switch operation			
Drive Motors	Check for operation and leaks			
Elevating Assembly	Inspect for structural cracks			
Emergency Lowering System	Operate the emergency lowering valve and check for serviceability			
Entire Unit	Check for and repair collision damage			
Hydraulic fluid	Check fluid level			
Hydraulic Pump	Check for hose fitting leaks			
Hydraulic System	Check for leaks			

COMPONENT	INSPECTION OR SERVICES	Y	N	R
Labels	Check for peeling, missing, or unreadable labels & replace			
Platform Deck and Rails	Check welds for cracks			
	Check condition of deck			
Tires and Wheels	Check for damage			
Engine Oil and Filter	Check level and condition			
	Check for leaks			
Engine Fuel System	Check fuel level			
	Check for leaks			
	Check air cleaner			
Engine Coolant	Check coolant level (with engine cold)			
Torque Hubs	Check for leaks			

NOTES:

LABELS

These labels shall be present and in good condition before operating the work platform. Be sure to read, understand and follow these labels when operating the work platform.



2 010076-001



4 060197-000

CE UpRight Inc.
1775 PARK ST. SELMA CALIFORNIA 93662 USA
Model: _____ Serial number: _____
Machine weight: _____ kg Mfg. date: _____
Maximum wheel load: _____
Maximum allowable incline of machine when elevated: _____ deg.
Occupants and equipment must not exceed the rated maximum load: _____ kg Maximum platform occupants: _____
Maximum allowable side force on platform: _____ N
Maximum platform height: _____ m
Maximum platform reach: _____ m
Maximum allowable wind speed: _____ m/s=Beaufort scale
Maximum hydraulic system pressure: _____ bar
Maximum system voltage: _____ Vdc
This machine is manufactured to comply with Machinery directive 89-392/CEE
CAUTION: CONSULT OPERATOR'S MANUAL BEFORE USE. 061205-003

5 061205-003



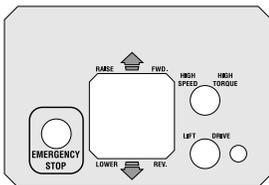
6 030768-002



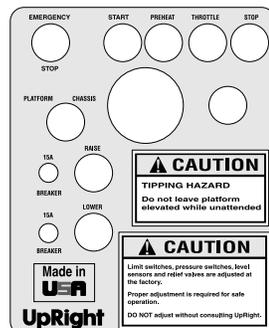
7 064936-099



9 066552-000



11 067642-011
(Outrigger Units: 067642-004)



12 067481-001

LED INDICATOR CODE

- STEER RIGHT
- HIGH SPEED
- STEER LEFT
- UP LIFT
- ENGINE CHOKE/GLOW
- TILT ALARM
- AXLE FLOAT
- DOWN
- FORWARD
- REVERSE
- THROTTLE

13 067480-000

LED INDICATOR CODE

- LEFT FRT RETRACT
- RIGHT AFT EXTEND
- LEFT FRT EXTEND
- RIGHT AFT RETRACT
- RIGHT FRT RETRACT
- LEFT AFT EXTEND
- RIGHT FRT EXTEND
- LEFT AFT RETRACT
- STEER RIGHT
- HIGH SPEED
- STEER LEFT
- UP LIFT
- ENGINE CHOKE/GLOW
- TILT ALARM
- AXLE FLOAT
- DOWN
- FORWARD
- REVERSE
- THROTTLE

13 067480-001
(Outrigger Units)

USE OF THE AERIAL WORK PLATFORM: This aerial work platform is intended to lift persons and their tools as well as the material used for the job. IT IS designed for repair and assembly jobs and assignments at overhead workplaces (ceilings, cranes, roof structures, buildings etc.). All other uses of the aerial work platform ARE PROHIBITED!
THIS AERIAL WORK PLATFORM IS NOT INSULATED! For this reason it is imperative to keep a safe distance from the parts of electrical equipment!
ALL occupants must wear an approved fall restraint properly attached to a designated platform anchorage point. Attach only one fall restraint to each anchorage point.
Exceeding the specified permissible maximum load on the platform IS PROHIBITED!
The use and position of the aerial work platform as a lifting tool or a crane (lifting of loads from below upwards or from up high on down) IS PROHIBITED!
NEVER exceed 400 N of side force.
DISTRIBUTE all platform loads evenly on the platform.
NEVER operate the machine without first surveying the work area for surface hazards such as holes, drop-offs, bumps, curbs, or debris, and avoiding them.
OPERATE machine only on surfaces capable of supporting wheel loads.
NEVER operate the machine when wind speeds exceed 20mph (12.5m/sec = Beaufort scale 6).
IN CASE OF EMERGENCY push emergency stop button to deactivate all powered functions.
Climbing up the railing of the platform, standing on or stepping from the platform onto buildings, steel or precast concrete structures, etc. IS PROHIBITED!
Disassembling the swing gate or the liftable bar or other railing components IS PROHIBITED! Always make certain that the swing gate or the liftable bar is closed and securely locked! IT IS PROHIBITED to keep the swing gate or the liftable bar in an open position (e.g. held open with tie-straps) when the platform is raised!
To extend the height or the range by placing of ladders, scaffolds or similar devices on the platform IS PROHIBITED!
INSPECT the machine thoroughly for cracked welds, loose or missing hardware, hydraulic leaks, loose wire connections, and damaged cables or hoses before using.
VERIFY that all labels are in place and legible before using.
NEVER use a machine that is damaged, not functioning properly, or has damaged or missing labels.
IF ALARM SOUNDS while platform is elevated, STOP, carefully lower platform. Move machine to a firm, level surface.
To bypass any safety equipment IS PROHIBITED and presents a danger for the persons on the aerial work platform and in its working range.
NEVER charge batteries near sparks or open flame. Charging batteries emit explosive hydrogen gas.

14 067195-001



15 067478-000



17 067822-000



22 LX31/LX41: 066562-000



22 LX50: 066562-003



25 027898-000



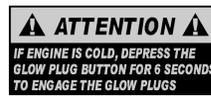
26 LX31: 066557-060



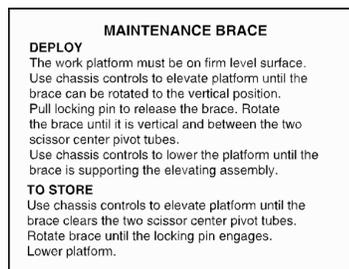
26 LX41: 066557-057



26 LX50: 066557-054



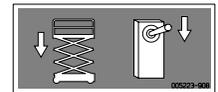
34 067822-001



38 066561-001



40 LX31/LX41: 066558-001



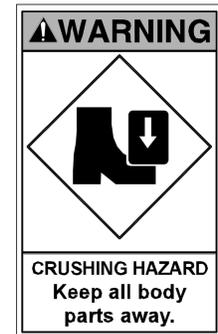
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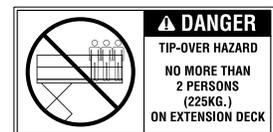
41 066556-000



42 068639-000



43 066556-001
(Outrigger Units)

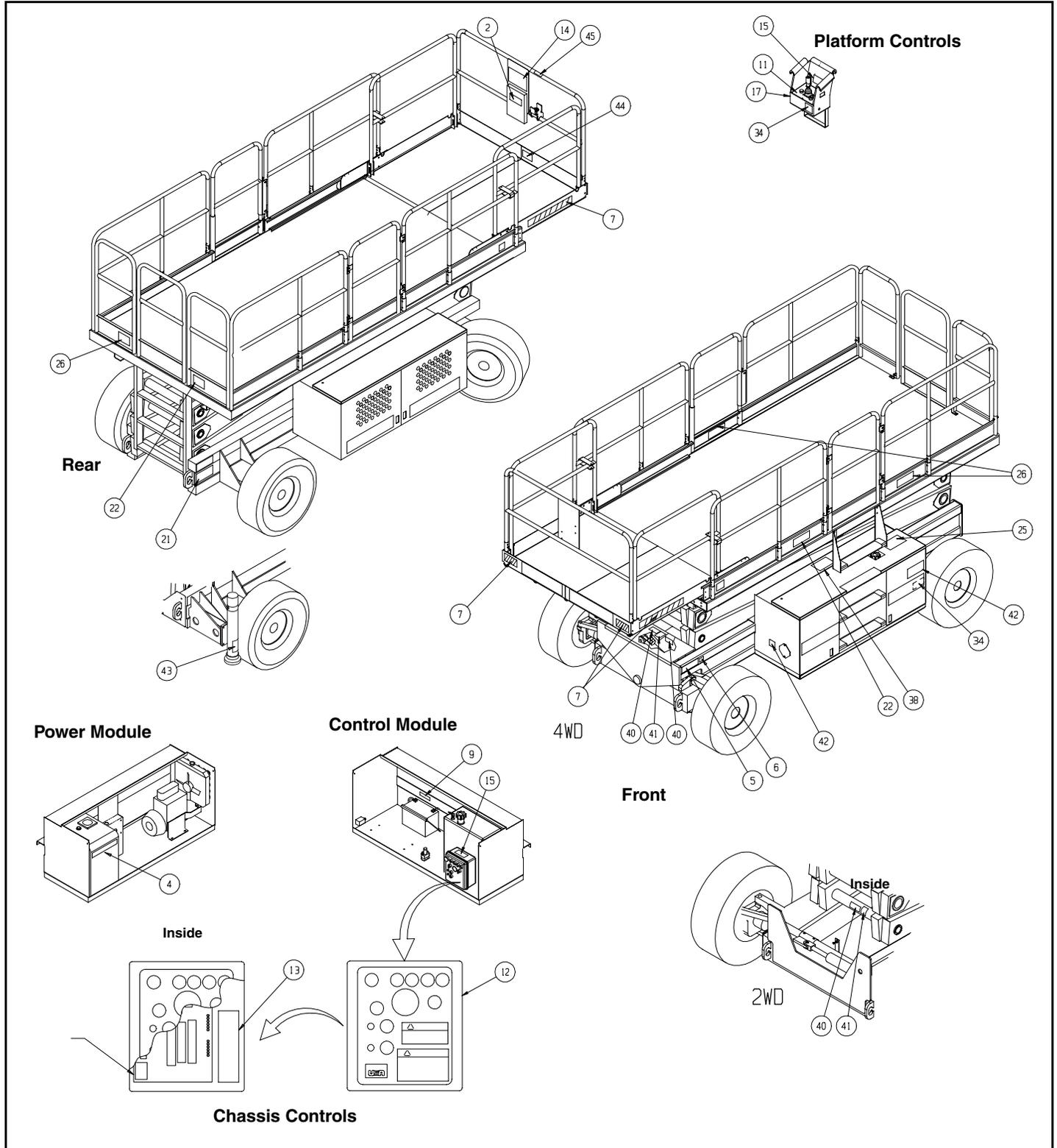


44 066551-051



45 066551-003
(Outrigger Units)

Figure 14: Safety Labels Locations



SPECIFICATIONS

Specifications subject to change without notice. Refer to the Service Manual for service and repair information. Refer to the Parts Manual for illustrated parts breakdown. Hot weather or heavy use may reduce performance. Meets or exceeds all applicable national safety requirements

ITEM	LX31	LX41	LX50
Platform Size (Inside toeboards)			
Standard	3,96 m x 1,73 m [156 in x 68 in.]	3,96 m x 1,73 m [156 in x 68 in.]	3,96 m x 1,73 m [156 in x 68 in.]
Slide-out Deck Extended	4,83 m x 1,73 [190 in. x 68 in.]	4,83 m x 1,73 [190 in. x 68 in.]	4,83 m x 1,73 [190 in. x 68 in.]
Max. Platform Capacity			
Standard	907 kg [2,000 lbs.]	680 kg [1,500 lbs.]	454 kg [1,000 lbs.]
With Rear Deck Option	794 kg [1750 lbs.]	567 kg [1,250 lbs.]	341 kg [750 lbs.]
On Extension	227 kg [500 lbs.]	227 kg [500 lbs.]	227 kg [500 lbs.]
Max. No. of occupants			
Standard	5 people	5 people	4 people
With Rear Deck Option	5 people	4 people	3 people
Height			
Working Height	11,45 m [37 ft. 6 in.]	14,34 m [47 ft. 3 in.]	17,1 m [56 ft.]
Max. Platform Height	9,45 m [31 ft.]	12,34 m [40 ft. 6 in.]	15,1 m [49 ft. 6 in.]
Min. Platform Height	1,43 m [56.3 in.]	1,66 m [65.3 in.]	1,9 m [76 in.]
Drivable Height	8 m [26 ft. 3 in.]	8 m [26 ft. 3 in.]	8 m [26 ft. 3 in.]
Dimensions			
Weight, Standard	2WD: 4314 kg [9,511 lbs.] 4WD: 4436 kg [9,780 lbs.]	5026 kg [11,080 lbs.] 5148kg [11,349 lbs.]	6242 kg [13,761 lbs.] 6364 kg [14,030 lbs.]
Weight, Dual Deck	2WD: 4645 kg [10,241 lbs.] 4WD: 4767 kg [10,440 lbs.]	5357 kg [11,810 lbs.] 5479 kg [12,079 lbs.]	6460 kg [14,242 lbs.] 6583 kg [14,513 lbs.]
Overall Width	2,29 m [90 in.]	2,29 m [90 in.]	2,29 m [90 in.]
Overall Height, guardrails up	2,53 m [99.8 in.]	2,76 m [109 in.]	3 m [118.3 in.]
Overall Height, guardrails lowered	1,64 m [64.5 in.]	1,87 m [73.5 in.]	2,1 m [82.5 in.]
Overall Length, deck in	4,02 m [160 in.]	4,02 m [160 in.]	4,02 m [160 in.]
Overall Length, deck extended	4,89 m [192 in.]	4,89 m [192 in.]	4,89 m [192 in.]
Surface Speed			
Platform Lowered	0 to 5,0 km/h [0 to 3.1 mph]	0 to 5,0 km/h [0 to 3.1 mph]	0 to 5,0 km/h [0 to 3.1 mph]
Platform Raised	0 to 0,48 km/h [0 to 0.5 mph]	0 to 0,48 km/h [0 to 0.5 mph]	0 to 0,48 km/h [0 to 0.5 mph]
System Voltage	12 Volt DC	12 Volt DC	12 Volt DC
Hydraulic Tank Capacity	107 liters [28.3 US Gallons]	107 liters [28.3 US Gallons]	107 liters [28.3 US Gallons]
Maximum Hydraulic System Pressure	207 bar [3000 psi]	207 bar [3000 psi]	207 bar [3000 psi]
Hydraulic Fluid			
Normal Temperature: above 0° C [32° F]	ISO #46	ISO #46	ISO #46
Low Temperature: below 0° C [32° F]	ISO #32	ISO #32	ISO #32
Extreme Temperature: below -17° C [0° F]	ISO #15	ISO #15	ISO #15
Lift System	One Single Stage Lift Cylinder	One Single Stage Lift Cylinder	Two Single Stage Lift Cylinders
Lift Speed	Raise: 40 sec. Lower: 52 sec.	Raise: 45 sec. Lower: 60 sec.	Raise: 80 sec. Lower: 112 sec.
Power Source	Diesel 20 HP Kubota, 3 Cylinder, Water Cooled	Diesel 20 HP Kubota, 3 Cylinder, Water Cooled	Diesel or HP Kubota, 3 Cylinder, Water Cooled
Drive Control	Proportional	Proportional	Proportional
Control System	Smooth one-hand Joystick	Smooth one-hand Joystick	Smooth one-hand Joystick
Horizontal Drive	2WD: 2 Wheel, Hyd. Motors 4WD: 4 Wheel, Hyd. Motors	2 Wheel, Hyd. Motors 4 Wheel, Hyd. Motors	2 Wheel, Hyd. Motors 4 Wheel, Hyd. Motors
Tires	10-16.5 NHS 8 Ply	10-16.5 NHS 8 Ply	10-16.5 NHS 8 Ply Poly Filled
Tire Air Pressure	3,4 bar [50psi.]	3,4 bar [50psi.]	NA
Parking Brakes	Dual Disc, Spring Applied, Hydraulic Release	Dual Disc, Spring Applied, Hydraulic Release	Dual Disc, Spring Applied, Hydraulic Release
Turning Radius (inside)	1,22 m [48 in.]	1,22 m [48 in.]	1,22 m [48 in.]
Maximum Gradeability:	2WD: 17° [30%] 4WD: 19° [35%]	17° [30%] 19° [35%]	13,5° [24%] 13,5° [24%]
Wheel Base	2WD: 2,9 m [114.5 in.] 4WD: 2,95 m [116 in.]	2,9 m [114.5 in.] 2,95 m [116 in.]	2,9 m [114.5 in.] 2,95 m [116 in.]
Ground Clearance	0,24 m [9.5 in.]	0,24 m [9.5 in.]	0,24 m [9.5 in.]
Guardrails	1.1 m [43.5 in.] high, Fold Down with gate.	1.1 m [43.5 in.] high, Fold Down with gate.	1.1 m [43.5 in.] high, Fold Down with gate.
Noise Level			

GENERAL INFORMATION

This section contains generic instructions for the repair and maintenance of UpRight Aerial Work Platforms. Referring to the Operator Manual will aid in understanding the operation and function of the various components and systems of the machine, and help in diagnosing and repair of the machine.

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1-1 HAZARD INDICATORS

⚠ DANGER ⚠

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING ⚠

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION ⚠

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to the machine.

1-2 WORKSHOP PROCEDURES

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.

⚠ WARNING ⚠

Be sure to read, understand and follow all safety rules, operating instructions, and the Scaffold Industry Association's MANUAL OF RESPONSIBILITIES of ANSI A92.6-1999 before performing maintenance on or operating any UpRight Aerial Work Platform.

⚠ WARNING ⚠

Never perform service on the machine in the elevating assembly area while platform is elevated without first blocking the elevating assembly.

DO NOT stand in elevating assembly area while deploying or storing brace.

Refer to the Operator Manual for elevating assembly blocking instructions.

1-3 TORQUE SPECIFICATIONS

HYDRAULIC COMPONENTS

NOTE: Always lubricate threads with clean hydraulic fluid prior to installation

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

Table 1-1: Torque Specifications for Hydraulic Components

Type: SAE Port 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	107-119
#16	130-140	176-190	130-140	176-190	1300-1368	147-155

FASTENERS

This standard applies to the preloading of fasteners measured by installation torque.

NOTE: For other preloading methods or fasteners consult UpRight Engineering Department.

This general standard applies to all SAE and Metric fasteners unless otherwise specified.

THREAD CONDITION

- For lubricated or zinc plated fasteners use $K = .15$
- For dry unplated fasteners use $K = .20$

TORQUE TABLES

Table 1-2: Torque Specifications for SAE Fasteners

	Nominal Thread Size	 SAE J429 Grade 5			 SAE J429 Grade 8			
		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		
			K=,15	K=,20		K=,15	K=,20	
		lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.	
Unified Coarse Thread Series	1/4 -20	2,000	75	100	2850	107	143	
	5/16 - 18	3,350	157	210	4700	220	305	
			lbs.	ft-lbs.	ft-lbs.	lbs.	ft-lbs.	ft-lbs.
	3/8-16	4,950	23	31	6950	32.5	44	
	7/16-14	6,800	37	50	9600	53	70	
	1/2-13	9,050	57	75	12800	80	107	
	9/16-12	11,600	82	109	16400	115	154	
	5/8-11	14,500	113	151	20300	159	211	
	3/4-10	21,300	200	266	30100	282	376	
	7/8-9	29,435	321	430	41550	454	606	
1-8	38,600	483	640	54540	680	900		
	Nominal Thread Size	Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		
			K=,15	K=,20		K=,15	K=,20	
		lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.	
Unified Fine Thread Series	1/4 -28	2,300	85	115	3250	120	163	
	5/16-24	3,700	173	230	5200	245	325	
			lbs.	ft-lbs.	ft-lbs.	lbs.	ft-lbs.	ft-lbs.
	3/8-24	5,600	26	35	7900	37	50	
	7/16-20	7,550	42	55	10700	59	78	
	1/2-20	10,200	64	85	14400	90	120	
	9/16-18	13,000	92	122	18300	129	172	
	5/8-18	16,300	128	170	23000	180	240	
	3/4-16	23,800	223	298	33600	315	420	
	7/8-14	32,480	355	473	45855	500	668	
1-12	42,270	528	704	59670	745	995		

Table 1-3: Torque Specifications for Metric Fasteners, U.S. Customary Units

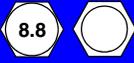
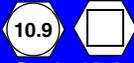
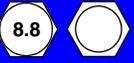
Nominal Thread Size	 Grade 8.8			 Grade 10.9			 Grade 12.9		
	Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque	
		K =,15	K =,20		K =,15	K =,20		K =,15	K =,20
mm	lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.
3	-	-	-	-	-	-	823	14.6	19.5
3.5	-	-	-	-	-	-	1,109	22.9	30.5
4	-	-	-	-	-	-	1,436	33.9	45.2
5	1,389	41.0	54.7	1,987	58.7	78.2	2,322	68.6	91.2
6	1,966	69.7	92.9	2,813	100.0	132.8	3,287	116.8	155.8
7	2,826	116.8	155.8	4,044	167.3	223.0	4,727	195.6	260.2
		ft-lbs.	ft-lbs.		ft-lbs.	ft-lbs.		ft-lbs.	ft-lbs.
8	3,579	14.1	18.8	5,122	20.1	26.9	5,986	23.6	31.4
10	11,742	27.9	37.2	8,117	39.9	53.3	9,486	46.7	62.3
12	8,244	48.7	64.9	11,797	69.7	92.2	13,787	81.1	108.4
14	11,246	77.4	103.3	16,093	110.6	147.5	18,808	129.1	172.6
16	15,883	125.4	166.7	21,971	173.3	230.9	25,677	202.1	269.2
18	19,424	171.9	229.4	26,869	238.2	317.2	31,401	278.1	371.0
20	2,304	243.4	325.3	34,286	337.8	449.9	40,070	394.6	525.9
22	30,653	331.9	442.5	42,403	458.8	612.2	49,556	536.2	715.4
24	35,711	420.4	562.0	49,400	583.4	778.1	57,733	682.2	909.4
27	46,435	617.3	84.8	64,235	853.4	1138.1	75,069	997.2	1329.8
30	56,753	837.9	1117.4	78,509	1159.4	1545.2	91,751	1354.9	1807.0
33	70,208	1140.3	1520.1	97,121	1576.9	2102.8	113,503	1843.9	2457.5
36	82,651	1464.1	1952.3	114,334	2025.3	2700.9	133,620	2367.6	3156.0

Table 1-4: Torque Specifications for Metric Fasteners, SI Units

Nominal Thread Size	 Grade 8.8			 Grade 10.9			 Grade 12.9		
	Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque	
		K =,15	K =,20		K =,15	K =,20		K =,15	K =,20
mm	N	N-m	N-m	N	N-m	N-m	N	N-m	N-m
3	-	-	-	-	-	-	3660	1.65	2.2
3.5	-	-	-	-	-	-	4932	2.59	3.45
4	-	-	-	-	-	-	6387	3.83	5.11
5	6177	4.63	6.18	8840	6.63	8.84	10330	7.75	10.3
6	8743	7.87	10.5	12512	11.3	15	14623	13.2	17.6
7	12570	13.2	17.6	17990	18.9	25.2	21025	22.1	29.4
8	15921	19.1	25.5	22784	27.3	36.5	26626	32	42.6
10	52230	37.8	50.5	36105	54.1	72.2	42195	63.3	84.4
12	36670	66	88	52475	94.5	125	61328	110	147
14	50025	105	140	71587	150	200	83663	175	234
16	70650	170	226	97732	235	313	114218	274	365
18	86400	233	311	119520	323	430	139680	377	503
20	10250	330	441	152513	458	610	178238	535	713
22	136350	450	600	188618	622	830	220433	727	970
24	158850	570	762	219743	791	1055	256808	925	1233
27	206550	837	115	285728	1157	1543	333923	1352	1803
30	252450	1136	1515	349223	1572	2095	408128	1837	2450
33	312300	1546	2061	432015	2138	2851	504885	2500	3332
36	367650	1985	2647	508582	2746	3662	594368	3210	4279

1-4 DATE CODE IDENTIFICATION ON HOSES

GATES uses an eight digit code: Plant, Month, Day, Year.
i.e.: XX 01 07 01 - means Plant XX January 07 2001.

PARKER uses a 4 digit code indicating Quarter and Year.
i.e.: 2Q01 - means Second Quarter of 2001.

DAYCO stamps month, day and year on each hose.

1-5 SPECIAL TOOLS

The following is a list of special tools which may be required to perform certain maintenance procedures on the machine.

- 0-69 bar (**0-1000 psi**) Hydraulic Pressure Gauge with Adapter Fittings
- 0-207 bar (**0-3000 psi**) Hydraulic Pressure Gauge with Adapter Fittings
- 0-414 bar (**0-6000 psi**) Hydraulic Pressure Gauge with Adapter Fittings
- Small UpRight Connector Field Kit (UpRight P/N 030899-000)
- Large UpRight Connector Field Kit (UpRight P/N 030898-000)
- Inclinometer (UpRight P/N 010199-000-00)
- MOS90 Calibrator (UpRight P/N 057128-000)
- Optimizer with adapter (UpRight P/N 100329-000)
- Flow Meter Kit (UpRight P/N 067040-000)
- Quadrageauge with fitting (UpRight P/N 063971-000)
- 0-25 kg (**0-50 Lbs.**) Chain Tension Scale (UpRight P/N 107078-000)

UPRIGHT LIFT TOOL LIST

- Gland Nut Wrench (UpRight P/N 062521-000)
- Strap Wrench (UpRight P/N 062482-000)
- Tierod Tensioner (2 required) (UpRight P/N 062738-000)
- Tensioner Bracket (2 required) (UpRight P/N 062739-000)

1-6 UPRIGHT CONNECTORS

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

Figure 1-1: UpRight Connector Kits



Small Kit

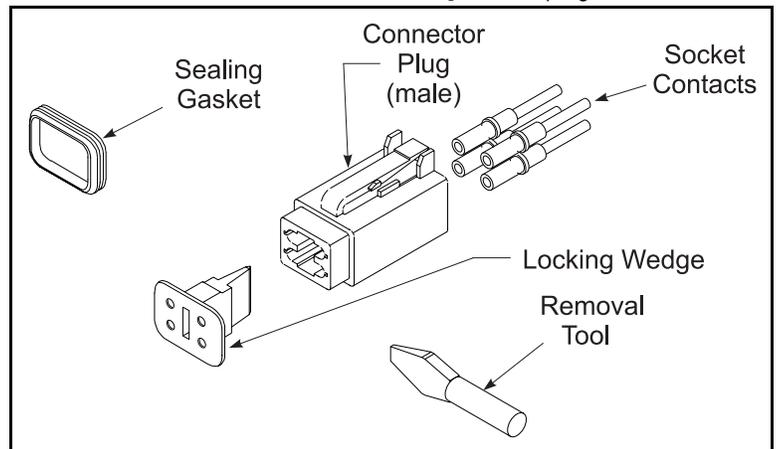


Large Kit

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 Sealing 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.

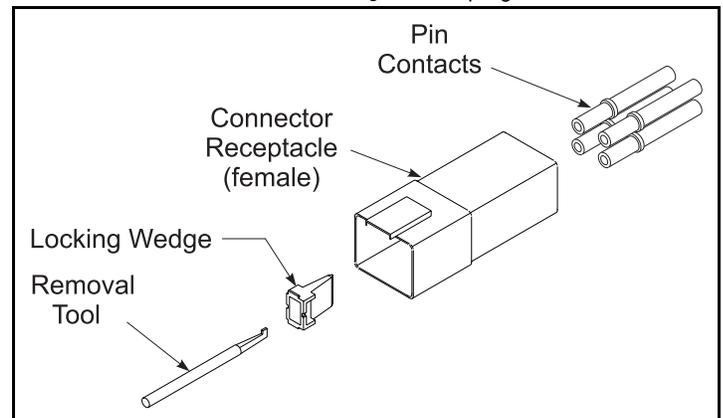
Figure 1-2: UpRight Male Connector



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.

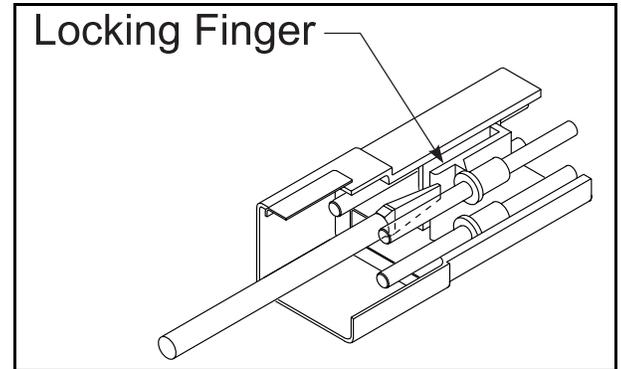
Figure 1-3: UpRight Female Connector



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 1-4: Locking Finger, UpRight Connector



CRIMPING

1. Strip 6 mm ($\frac{1}{4}$ in.) from the wire.

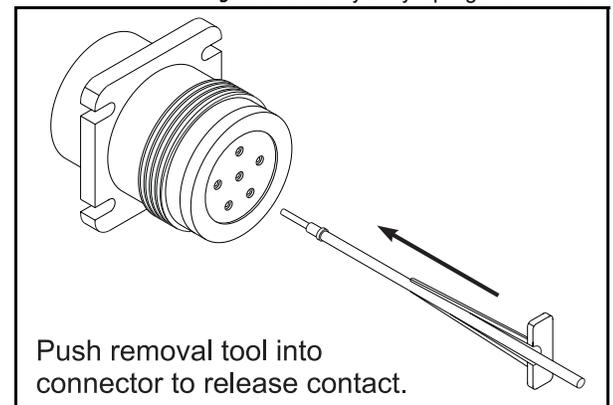
NOTE: Complete crimping instructions are included in each Field Kit.

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.

Figure 1-5: Heavy Duty UpRight Connector



1-7 HYDRAULIC MANIFOLD REPAIR

REMOVAL

Refer to the *Service and Repair* section for model specific information.

1. Disconnect the battery.
2. Tag and disconnect the solenoid valve leads.
3. Tag, disconnect, and plug hydraulic hoses.
4. Remove the bolts that hold the manifold to the mounting bracket.
5. Remove the manifold block.

DISASSEMBLY

NOTE: Mark all components as they are removed so as not to confuse their location during assembly.

1. Remove coils from solenoid valves.
2. Remove valves.
3. Remove fittings, plugs, springs, balls, and orifices.

CLEANING AND INSPECTION

1. Wash the manifold in cleaning solvent to remove built-up contaminants, 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

Refer to the *Service and Repair* section for assembly drawings, and the *Parts Manual* for illustrated parts breakdowns.

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

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

INSTALLATION

Refer to the *Service and Repair* section for model specific information.

1. Attach manifold assembly to mounting plate with bolts.
2. Connect solenoid leads (as previously tagged).
3. Connect hydraulic hoses. Be certain to tighten hoses to manifold.
4. Reconnect the battery.
5. Operate each hydraulic function and check for proper operation and leaks.
6. Adjust valve pressures according to the *Service and Repair* section.

1-8 CYLINDER REPAIR

⚠ WARNING ⚠

Cylinders may be very heavy. Support heavy cylinders before removing pins which secure the cylinder to the machine.

REMOVAL

NOTE: Refer to the *Service and Repair* section for the location of cylinders, and the *Parts Manual* for a list of parts which secure the cylinders.

1. Mark and disconnect hoses and IMMEDIATELY cap the openings to prevent contamination.
2. Remove the cylinder from the machine as described in the *Service and Repair* section.

DISASSEMBLY

1. Remove the head from the cylinder body.
2. Carefully slide the rod assembly out of the cylinder.
3. Remove the seal kit components (wipers, rod seals, o-rings and backup rings) from the head and piston.
4. Inspect parts for scratches, pits or polishing. Check seal grooves and sealing surfaces. Scratches or pits deep enough to catch the fingernail are unacceptable; replace the cylinder. Polishing is a sign of uneven loading. When this occurs, the surface should be checked for roundness. Cylinders not round within 0,18 mm (.007 in.) should be replaced.

ASSEMBLY

Refer to the *Service and Repair* section for seal-kit assembly drawings, and the *Parts Manual* for illustrated parts breakdowns.

NOTE:

- To avoid cutting the seals, do not use sharp edged tools during seal replacement. After installing seals allow at least one hour for the seals to elastically restore to their original shape before assembling the cylinder.
- Torque all hardware to torques according to Table 1-1, "Torque Specifications for Hydraulic Components," on Page 1-3 unless otherwise specified.

1. Lubricate all components with clean hydraulic fluid.
2. Install new seal kit components.
3. Lubricate the rod wiper and seal with hydraulic fluid and slide the head onto the rod.
4. Lubricate the seals on the piston and head.
5. Carefully slide the rod assembly into the cylinder.
6. Secure the head into the cylinder.

INSTALLATION

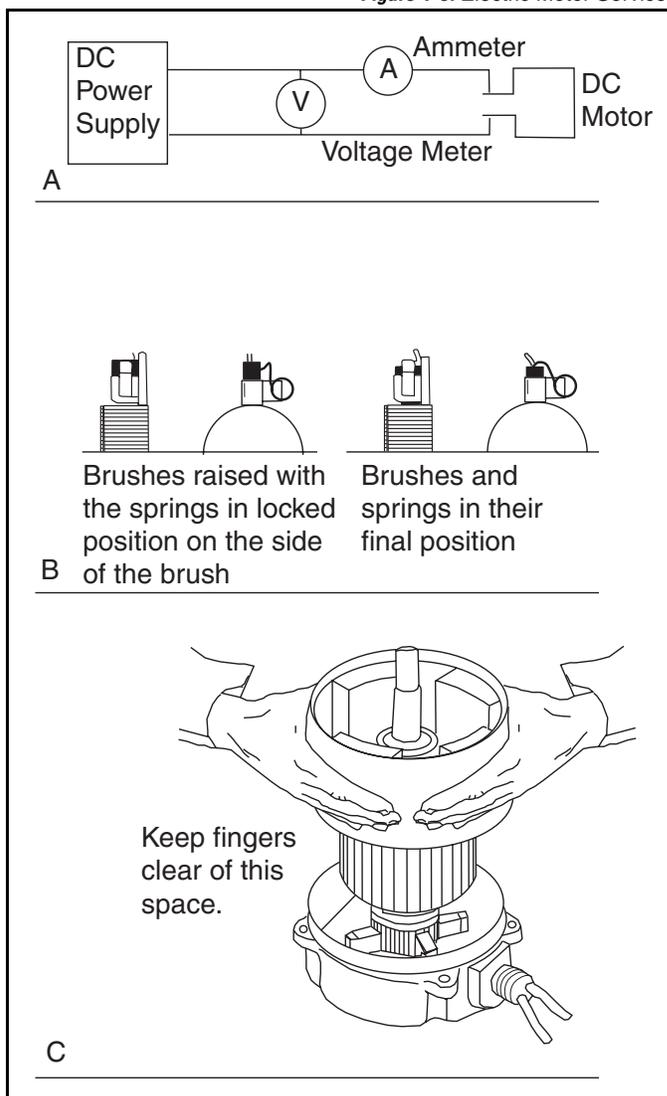
1. Installation is reverse of removal.
2. Carefully remove the elevating assembly support.
3. Slowly cycle the cylinder several times to remove air from the hydraulic system.
4. Check for proper cylinder operation. Check hydraulic connections for leaks.

1-9 ELECTRIC MOTORS

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 A.
 - A. The shaft could be tight for a number of reasons, this check is to determine if the tightness is of a temporary nature only.
 - a. Obtain power to produce the nameplate voltage. **Do not Make a Permanent Connection.**
 - b. First touch the motor leads quickly to the power supply just long enough to observe if the shaft turns.
 - c. 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..
 - d. 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 1-6A. 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 that the original problem is external to the motor.

Figure 1-6: Electric Motor Service



DISASSEMBLY

1. Remove the through bolts.
2. Remove the pulley end cover.
3. Pull the armature out of the assembly in one swift motion.
4. Remove the 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. The armature should be checked for grounds and shorted turns. Re-finish the commutator surface if it is pitted or excessively worn. (This procedure should be performed by a qualified electric motor shop.)
3. Brushes should be checked for wear and to ensure that they are free in the brush holders.

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

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

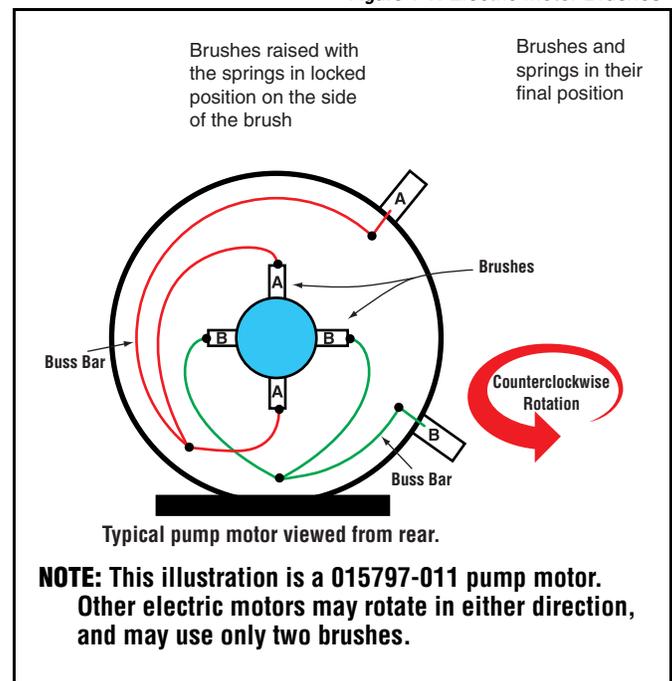
REASSEMBLY

1. Install new brushes and be sure they are free in the holder. Install the brush with the lead wires positioned as when received. Raise all brushes to the locked position. (See Figure 1-7 and **Inspection** Step 3.).
2. Place the commutator cover on a work bench with the brush assembly facing upward.
3. Place the bearing spring into the bearing bore.
4. Take a complete armature assembly, including bearings, and insert the commutator end bearing into the bearing bore.

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

5. Set the brushes into their final position as shown in Figure 1-7.
6. Place the complete stator down over the vertical armature, and into position on the commutator cover.
7. The stator assembly must be placed in a definite relationship with the commutator covers in order to obtain a neutral brush setting. There is a match-mark on both items. These two marks must line up exactly. Rotate until they do.
8. Assemble the pulley end cover in the proper relationship. Insert the mounting bolts and tighten alternately to ensure a good mechanical alignment.
9. Spin the shaft by hand to see if it is free. Be sure motor leads (if used) are not touching together. If the leads are touching, a generator action will give the effect of friction in the motor. A no-load test can now be performed. At the 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 1-7: Electric Motor Brushes



1-10 BATTERY MAINTENANCE

CAUTION

If battery water level is not maintained, batteries will not fully charge, creating a low discharge rate.

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. Thoroughly rinse away any spilled fluid with clean water.

Always replace batteries with UpRight batteries or manufacturer approved replacements.

Before disconnecting the battery negative (-) lead, make sure all switches are OFF. If ON, a spark will occur at the ground terminal which could cause an explosion if hydrogen gas or fuel vapors are present.

- Check battery fluid level daily.
- If electrolyte level is lower than 10 mm (**3/8 in.**) above plates, add distilled water only. DO NOT use tap water with high mineral content. It will shorten battery life. DO NOT overfill. Battery acid expands during charging and can overflow.
- Keep terminals and tops of batteries clean.
- The battery and cables should be inspected regularly for signs of cracks in the case, electrolyte leakage and corrosion of the terminals. Inspect the cables for worn spots or breaks in the insulation and for broken cable terminals.
- Clean batteries whenever there are signs of corrosion at the terminals, or when electrolyte has overflowed during charging. Use a baking soda solution to clean batteries, taking care not to get the solution inside the cells. Rinse thoroughly with clean water.
- Clean battery and cable contact surfaces to a bright metal finish whenever a cable is removed.

BATTERY CHECK

Electric UpRight Aerial Work Platforms use deep cycle batteries. If poor service life is experienced, batteries should be checked for bad cells. Fully charge batteries for 14 hours minimum, ensuring that the charger has completed its cycle (see 'Battery Charging' on page 1-14).

Deep cycle batteries do not have their full potential until they have been through 50 charge/discharge cycles. Normal 5-day weeks, charging batteries every day, equals 50 cycles in ten weeks.

If bad cells are found in any battery in a battery pack more than two years old, all batteries in the pack should be replaced for balance.

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' on page 1-14. After this initial charge, recheck the electrolyte level in all cells and add distilled water as necessary. Then, turn on the charger for an additional eight hours.

SPECIFIC GRAVITY

Check the specific gravity of all cells with a hydrometer. The temperature corrected specific gravity of a fully charged battery 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 complete a discharge/charge cycle before checking.

Table 1-5: Specific Gravity and Battery Voltage

	SPECIFIC GRAVITY		VOLTS DC			
	Each Cell	Per Cell	6V Battery	12V Battery	24V Battery Pack	48V Battery Pack
Fully Charged	1.270	2.10	6.30	12.60	25.20	50.40
Fully Discharged	1.130	1.75	5.25	10.50	21	42

LOAD TESTING BATTERY PACKS

1. Fully charge the battery pack.
2. With the battery pack at rest and under full load, perform steps 3 and 4.
 - a. To put the battery pack under full load,
 - Activate the steering switch to turn the wheels fully in either direction.
 - Continue to hold the steering switch while performing steps 3 and 4.
3. Measure the potential across each battery.
4. Measure the potential across the entire battery pack.
5. Compare the measured results

Any battery that measures 10% lower voltage than the others has a bad cell and should be replaced.

BATTERY CHARGING

CAUTION

Permanent damage will result if the battery is not immediately recharged after discharging.

WARNING

- Charge batteries only in a well ventilated area.
- DO NOT charge batteries when sparks or open flames are present.
- Never leave the connected charger unattended for more than two days.
- Never disconnect the cables from the battery when the charger is operating.
- Keep the charger dry.

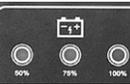
- Charge batteries at the end of each work shift or sooner if the batteries have been discharged.
- Discharging a deep cycle battery to less than 1.75 Volts per cell can cause permanent damage.

NOTE: Do not operate the machine when the battery charger is plugged in.

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

1. Check the battery fluid level. If electrolyte level is lower than 10 mm (3/8 in.) above plates, add distilled water only.
2. Check the charger to determine the AC charging current. If equipped, set the AC voltage selector switch to match the AC power source.
3. Connect an extension cord that meets or exceeds the charger AC current onto the charger plug.
4. Connect the other end of the extension cord to a grounded AC outlet of proper current, voltage and frequency rating.
5. The charger turns on automatically after a short delay. Table 1-6 illustrates charging indicators.

Table 1-6: Battery Charging, UpRight Electric and BiEnergy Machines

Charger Display	AC Charging Current		Charging Indicator	Charger Shutdown
	068574-000	8 Amp - 115 VAC	Ammeter • Charging current is displayed on ammeter. • Current drops off as batteries charge.	<ul style="list-style-type: none"> • Charger shuts off automatically. • Ammeter shows "0" current.
	069112-000	4 Amp - 230 VAC		
	063944-001	7 Amp - 115 VAC	Green Light • ON during charging cycle. • Blinking at charge completion.	<ul style="list-style-type: none"> • Charger automatically shuts down to 1 amp trickle charge. • Green Light continues to blink.
	063948-003	4 Amp - 230 VAC		
	069199-000 & 069199-001 Dual Voltage	8 Amp - 115 VAC 4 Amp - 230 VAC	Three Lights • 0 - 50% charge: First Light -Blinking- Second and Third Light -OFF- • 50% - 75% Charge: First Light -ON- Second Light -Blinking- Third Light -OFF- • 75% - 100% Charge: First and Second Light -ON- Third Light - Blinking- • Charge Complete All Lights -ON-	<ul style="list-style-type: none"> • Charger automatically shuts down to low current after charging is complete and all Lights turn ON. • Charger continues at low current (equalizing charge) for 3-4 hours, then charging current shuts off completely. • Lights remain ON until the AC power supply is disconnected.

BATTERY CHARGER TROUBLESHOOTING

CAUTION

Ensure that battery chargers with voltage selector switches are set on the correct AC line voltage before placing chargers in service to avoid charger failure.

Connect battery leads in correct polarity to avoid charger damage.

WARNING

Remove all power before working on electrical parts to avoid shock.

Shock hazard can exist if AC plugs are wired incorrectly.

The battery charger troubleshooting procedure is outlined in Table 1-7. The table shows various conditions for each charger type with the problem to be investigated. Follow the table from the top down when troubleshooting. If the problem is not resolved after going through the entire table, the charger should be replaced.

NOTE: The majority of chargers returned to UpRight as “failed” test good. Please follow the troubleshooting procedures carefully.

Table 1-7: Battery Charger Troubleshooting

				
Problem	068574-000 (115V) 069112-000 (110/230V)	063944-001 (115V) 063948-003 (110/230V)	069199-000 & 069199-001 (115/230V auto)	Solution
Battery voltage is below 18 Volts (too low to allow the charger to turn on).	<ul style="list-style-type: none"> • Ammeter does not move. • No hum from charger. 	<ul style="list-style-type: none"> • No green Light. • No hum from charger. 	<ul style="list-style-type: none"> • Not Applicable. • Charger turns on even with very low battery voltage. 	Charge batteries to at least 24 Volts with an external charger, then disconnect the external charger and plug in the internal charger.
The charger has been plugged into an AC outlet with different voltage than the AC switch setting on the charger.	<ul style="list-style-type: none"> • Ammeter does not move. • No hum from charger. 	<ul style="list-style-type: none"> • No green Light. • No hum from charger. 	<ul style="list-style-type: none"> • Not Applicable. • Charger automatically adjusts to the incoming AC current. 	063944-001 ONLY <ul style="list-style-type: none"> • Check the fuse inside the switch box - replace if bad. • If the fuse is good, the charger has failed. All Others <ul style="list-style-type: none"> • Check the AC main circuit breaker and reset if necessary. • Set the voltage selector switch to the proper voltage.
Fuse visible on front of charger has failed.	<ul style="list-style-type: none"> • Ammeter does not move. • No hum from charger. 	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • Not Applicable. 	Check for DC output short circuit and replace the fuse.
AC power problem.	<ul style="list-style-type: none"> • Ammeter does not move. • No hum from charger. 	<ul style="list-style-type: none"> • No green Light. • No hum from charger. 	<ul style="list-style-type: none"> • No Lights ON. • No Lights blinking. 	<ul style="list-style-type: none"> • AC outlet is bad. • Extension cord is bad • Plug is bad or wired wrong. • AC wire is broken. Check and repair as necessary.
DC connection to batteries.	<ul style="list-style-type: none"> • Ammeter does not move. • No hum from charger. 	<ul style="list-style-type: none"> • No green Light. • No hum from charger. 	<ul style="list-style-type: none"> • All three Lights blink once. 	Connection to battery; <ul style="list-style-type: none"> • missing. • corroded. • wrong polarity. • DC wire broken. Check and repair as necessary, and check Fuse.
One or more batteries is bad.	<ul style="list-style-type: none"> • Ammeter never shuts off, even after 14 hours of charging. 	<ul style="list-style-type: none"> • Green Light ON but never starts blinking, even after 14 hours of charging. 	<ul style="list-style-type: none"> • Lights one and two are ON or blinking, but all three Lights ON never occurs, even after 14 hours of charging. 	<ul style="list-style-type: none"> • Check water level. • Check for shorted cells. • Replace bad batteries.
AC input voltage too high.	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • All three Lights blink two times. 	Check and correct AC source.
Overheated charger.	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • All three Lights blink three times. 	Move the machine to a cooler area. Allow the machine to cool before connecting to AC source.
High current in DC charging output.	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • Not Applicable. 	<ul style="list-style-type: none"> • All three Lights blink four times. 	<ul style="list-style-type: none"> • Check for shorted DC output wires. • Check for bad batteries.

1-11 FLOOR LOADING

Floor Loading is defined as pressure imposed onto load-bearing surfaces, and can be measured as **Localized Pressure** or **Occupied Pressure**. To calculate Floor Loading, find the Total Weight of the machine.

TOTAL WEIGHT = MACHINE WEIGHT + MAXIMUM PLATFORM CAPACITY.

Refer to the machine specifications or contact UpRight or your UpRight dealer.

LOCALIZED PRESSURE

KG/CM² (PSI)

Localized Pressure is measured in *kilograms per square centimeter (pounds per square inch)*. It is the pressure exerted onto a small area (contact area). Each tire and/or outrigger imposes Localized Pressure which can cause damage to the load-bearing surface.

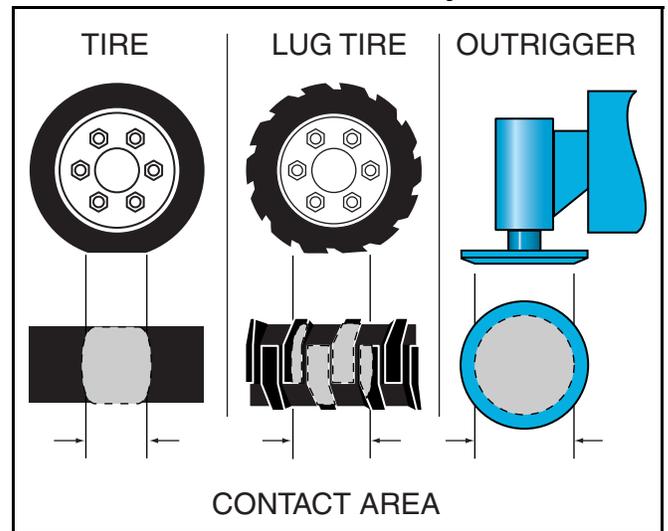
NOTE: The formulas shown here are for vertical lift machines. Applying these formulas to machines with extending platforms will yield average pressures for machines in stowed position. Extending a platform causes increased localized pressure in the direction of extension, and decreased localized pressure at the opposite end.

MEASURE THE CONTACT AREA

Measure the contact area of the contacting surface (tire or outrigger).

The tire contact area can be determined by placing the loaded tire on a clean surface. The tire will leave an imprint from which an area can be determined.

Figure 1-8: Contact Area



CALCULATE THE LOCALIZED PRESSURE

Find the pressure exerted at each contacting surface.

NOTE: The wheel load can usually be found on a label on the machine, or on the serial plate.

If you know the wheel load, use this formula:

LOCALIZED PRESSURE = WHEEL LOAD ÷ CONTACT AREA

If you do not know the wheel load, use this formula:

LOCALIZED PRESSURE = (TOTAL WEIGHT ÷ 4) ÷ CONTACT AREA

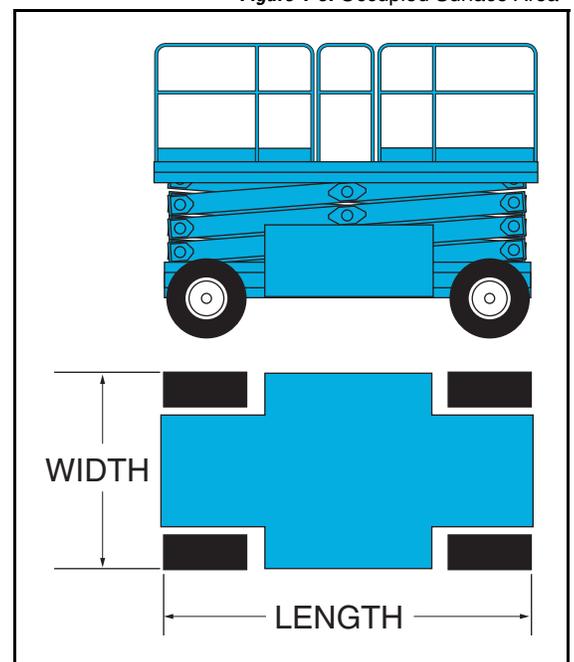
OCCUPIED PRESSURE

BAR (PSF)

Occupied Pressure is measured in *bar (pounds per square foot)*. It is the total pressure imposed onto the work surface over the area of the machine (occupied surface area). This is especially important when the work surface is supported by beams. The Occupied Pressure *must not exceed* the maximum load that the surface can support.

OCCUPIED PRESSURE = TOTAL WEIGHT ÷ (LENGTH X WIDTH)

Figure 1-9: Occupied Surface Area



1-12 HYDRAULIC FLUID

FLUID LEVEL

With the platform fully lowered, check the hydraulic fluid level. If the fluid is NOT in operating range, add hydraulic fluid until the fluid level is in operating range.

- DO NOT fill above operating range.
- DO NOT add fluid when the platform is elevated.

RECOMMENDED HYDRAULIC FLUID

CAUTION

Unless recommended by UpRight, do not mix hydraulic fluids of different brands or types. The required additives and fluid viscosities may vary.

If the use of hydraulic fluids other than listed below is desired please contact UpRight Product Support.

MOBILFLUID 424

- Viscosity Grade: ISO 46 High V.I. (similar to SAE 10W-30).
- Viscosity index: 152.
- Operating Range: -10° C to +96° C (+15° F to +205° F) Reservoir Temperature.
- Ambient Conditions*: Above -10° C (+15° F).

MOBIL DTE 13 M

- Viscosity Grade: ISO 32 High V.I. (similar to SAE 5W-20).
- Viscosity index: 140.
- Operating Range: -18° C to +80° C (-4° F to +176° F) Reservoir Temperature.
- Ambient Conditions*: -18° C to +30° C (-4° F to +86° F).

MOBIL DTE 11 M

- Viscosity Grade: ISO 15.
- Viscosity index: 140.
- Operating Range: -35° C to +45° C (-30° F to +115° F) Reservoir Temperature.
- Ambient Conditions*: -35° C to +20° C (-30° F to +70° F).

MOBIL EAL ENVIROSYN 46 H

For use where a *biodegradable non-toxic hydraulic fluid is required*.

- Viscosity Grade: ISO 46 High V.I. (similar to SAE 10W-20).
- Viscosity Index: 153.
- Operating Range: -14° C to +90° C (+6° F to +195° F) Reservoir Temperature.
- Ambient Conditions*: -14° C to +41° C (+6° F to +105° F).
- Synthetic Ester Base.

The anti-wear quality of hydraulic fluid must meet or exceed API Service Classification GL-3. The chemical stability of the hydraulic fluid must be sufficient for mobile hydraulic system service.

*Ambient Conditions are for reference only and may vary by model. Refer to operating temperature for final determination of correct fluid.

1-13 LONG TERM STORAGE

NOTE: Do not drain the hydraulic system prior to long term storage.

If the machine is to be placed in long term storage, follow these recommended preservation procedures.

PRESERVATION

1. Clean painted surfaces. If paint is damaged, repaint.
2. Fill the hydraulic reservoir to operating level.

IMPORTANT: Do not fill the hydraulic reservoir while the platform is elevated.

3. Coat exposed portions of cylinder rods with a preservative such as multipurpose grease and wrap with a barrier material.
4. Coat all exposed unpainted metal surfaces with preservative.
5. **Internal Combustion Models:** Service the engine according to the manufacturers recommendations.
6. **Electric And BiEnergy Models:** Remove the batteries and place them in alternative service.

SERVICE AND REPAIR

This section contains instructions for the maintenance of the machine. Refer to the General Information section for information relevant to all UpRight work platforms. Referring to the Operator Manual will aid in understanding the operation and function of the various components and systems of the machine, and help in diagnosing and repair of the machine.

⚠ WARNING ⚠

Be sure to read, understand and follow all information in the Operation Section of this manual before attempting to operate or perform service on any UpRight Aerial Work Platform.

⚠ DANGER ⚠

Never perform service on the machine in the elevating assembly area while platform is elevated without first blocking the elevating assembly.

DO NOT stand in elevating assembly area while deploying or storing brace.

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2-1 GENERAL DESCRIPTION

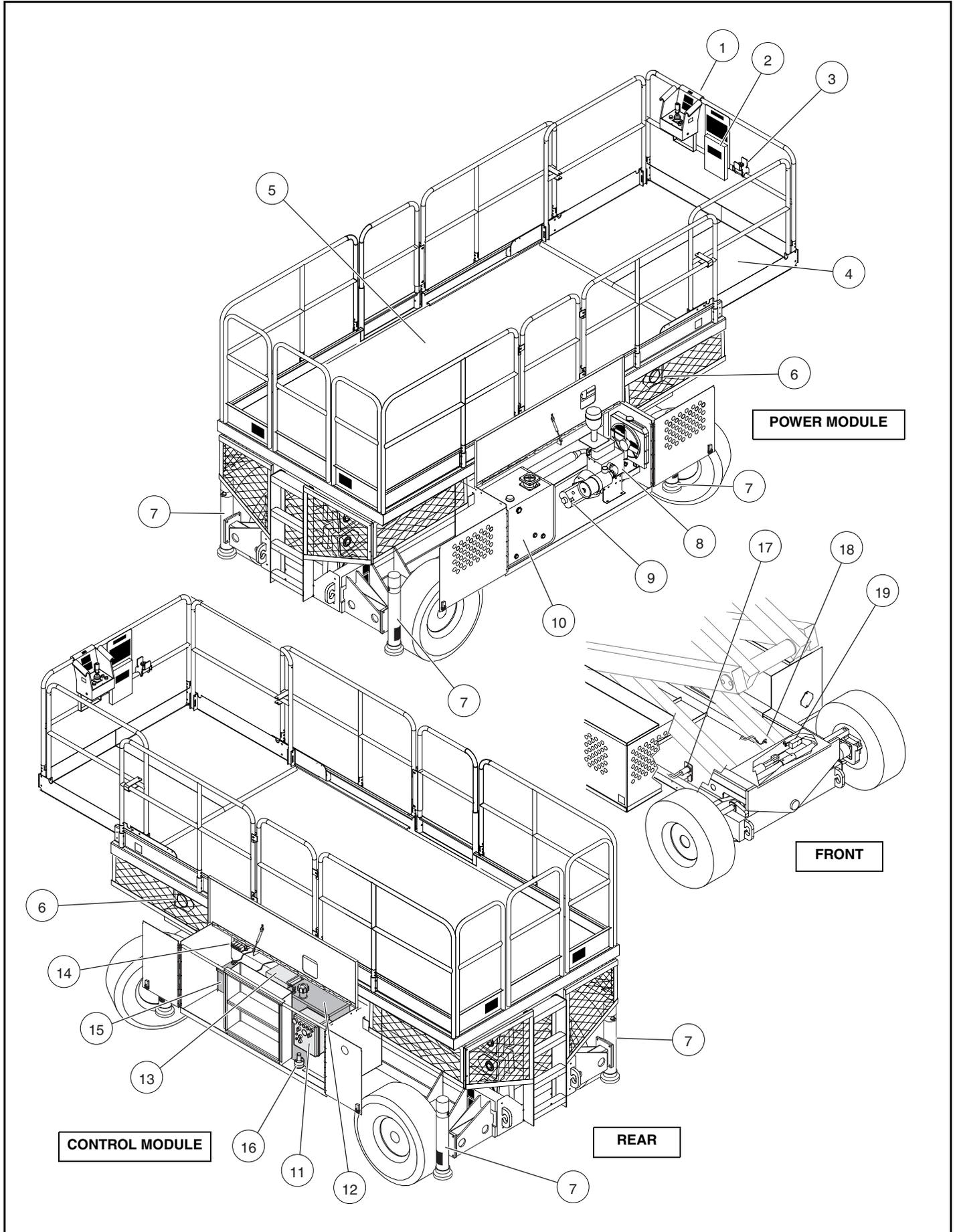
The LX 31, LX 41 and LX 50 Work Platforms with optional outriggers are available in two wheel drive and four wheel drive.

COMPONENT LOCATIONS

Refer to Figure 2-1 to locate the components of the LX Series Work Platforms.

1. Platform Controls
2. Document Case
3. Bubble Level
4. Platform Extension
5. Work Platform
6. Elevating Assembly (behind scissor guard)
7. Outriggers (optional)
8. Engine
9. Hydraulic Pump
10. Hydraulic Reservoir
11. Chassis Controls
12. Fuel Reservoir
13. Hydraulic Manifold
14. Outrigger Control Manifold (optional)
15. Battery
16. Level Sensor
17. Proximity Switch
18. Height Limit Switch
19. Axle Float Switch

Figure 2-1: LX Series Component Location



2-2 PREVENTATIVE MAINTENANCE

The complete inspection consists of periodic visual and operational checks, along with periodic 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.

! WARNING !

Before performing preventative maintenance, familiarize yourself with the operation of the machine.

Always block the elevating assembly whenever it is necessary to enter the elevating assembly to perform maintenance while the platform is elevated.

The preventative maintenance table has been designed for machine service and maintenance repair. Please photocopy the following page and use the table as a checklist when inspecting the machine for service.

PREVENTATIVE MAINTENANCE CHECK LIST

PREVENTATIVE MAINTENANCE 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: _____

COMPONENT	INSPECTION OR SERVICES	INTERVAL	Y	N	R
Battery	Check electrolyte level	6m			
	Check specific gravity	6m			
	Clean exterior	6m			
	Check battery cable condition	Daily			
	Clean terminals	6m			
Engine Oil and Filter	Check level and condition	Daily			
	Check for leaks	Daily			
	Change oil filter	100h			
Engine Fuel System	Check fuel level	Daily			
	Check for leaks	Daily			
	Replace fuel filter	6m			
	Check air cleaner	Daily			
Engine Coolant	Check coolant level (with engine cold)	Daily			
	Replace coolant	3m			
Hydraulic Fluid	Check fluid level	Daily			
	Change filter	6m			
	Drain and replace fluid	2y			
Hydraulic System	Check for leaks	Daily			
	Check hose connections	30d			
	Check hoses for exterior wear	30d			
Emergency Hydraulic System	Operate the emergency lowering valve and check for serviceability	Daily			
Controller	Check Switch 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			
Tires	Check for damage	Daily			
	Check lug nuts (torque to 150 ft. lbs. [203 Nm])	30d			
Hydraulic Pump	Wipe clean	30d			
	Check for leaks at mating surfaces	30d			
	Check for hose fitting leaks	Daily			
	Check mounting bolts for proper torque	30d			

COMPONENT	INSPECTION OR SERVICES	INTERVAL	Y	N	R
Drive Motors	Check for operation and leaks	Daily			
Torque Hubs	Check for leaks	Daily			
	Check oil level	250h/6m			
	Change oil after break-in	50h/30d			
	Change oil	1000h/2y			
Steering System	Check hardware & fittings for proper torque	6m			
	Oil pivot pins	30d			
	Grease king pins	30d			
	Check steering cylinder for leaks	30d			
Elevating Assembly	Inspect for structural cracks	Daily			
	Check pivot points for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check elevating arms for bending	6m			
Chassis	Check hoses for pinch or rubbing points	Daily			
	Check component mounting for proper torque	6m			
	Check welds for cracks	Daily			
Lift Cylinder	Check the cylinder rod for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check seals for leaks	30d			
	Inspect pivot points for wear	30d			
	Check fittings for proper torque	30d			
Axle Cylinder	Check the cylinder rod for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check seals for leaks	30d			
	Inspect pivot points for wear	30d			
	Check fittings for proper torque	30d			
Entire Unit	Check for and repair collision damage	Daily			
	Check fasteners for proper torque	3m			
	Check for corrosion - remove and repaint	6m			
	Lubricate	30d			
Labels	Check for peeling, missing, or unreadable labels & replace	Daily			

2-3 BLOCKING THE ELEVATING ASSEMBLY

⚠ WARNING ⚠

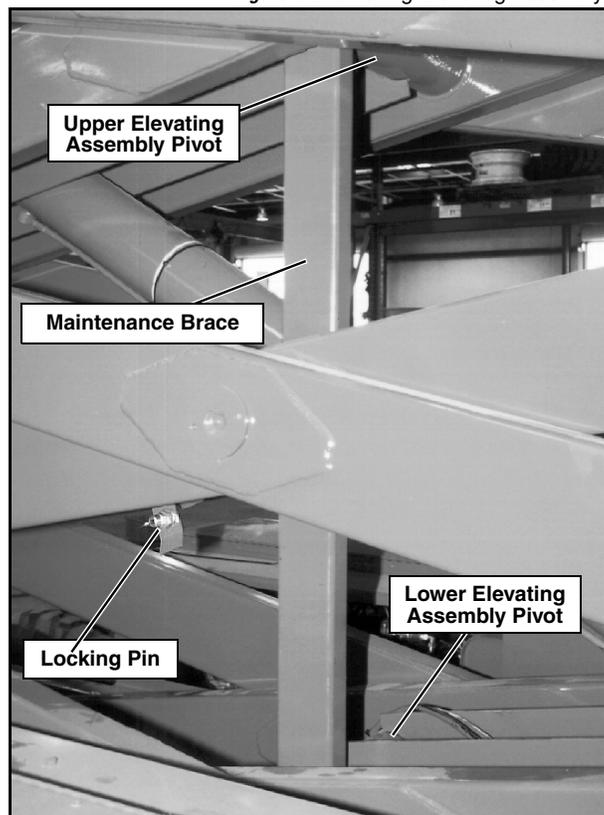
Never perform service on the machine in the elevating assembly area while platform is elevated without first blocking the elevating assembly.

DO NOT stand in elevating assembly area while deploying or storing the brace.

INSTALLATION

1. Place the machine on a firm level surface.
2. Pull the Platform Emergency Stop Switch ON.
3. Turn the Chassis Key Switch to CHASSIS.
4. Start the engine using the Chassis Controls.
5. Press and hold the Throttle Button in and the engine speed will increase.
 - Press the Raise Button and elevate the platform until the maintenance brace can be rotated to the vertical position.
 - Release the Throttle Button
6. From the left side of the machine, disengage the locking pin securing the brace. Rotate the maintenance brace counterclockwise until it is vertical and between the two elevating assembly center pivots.
7. Press and hold the Throttle Button in and the engine speed will increase.
 - Press the Lower Button and gradually lower the platform until the brace is supporting the platform.
 - Release the Throttle Button

Figure 2-2: Blocking Elevating Assembly



REMOVAL

1. Using the Chassis Controls, gradually elevate the platform until the maintenance brace clears the two elevating assembly center pivots.
2. Rotate maintenance brace clockwise until the locking pin engages.
3. Press the Lower Button to completely lower the platform.

2-4 LUBRICATION

Refer to “Preventative Maintenance Check List” on page 2-7 for lubrication intervals and Figure 2-3 for location of items that require lubrication service. Refer to the appropriate sections for lubrication information on the steering linkage, torque hubs, hydraulic fluid and filter, and engine oil and filter.

GREASE FITTINGS

Grease fittings at;

- the pivot points on the elevating assembly and
- the top and bottom of the steering pivots next to the front wheels.

Wipe each grease fitting before and after applying grease. Using multipurpose grease in a grease gun. Pump the grease into the fitting until grease just begins to appear at the edges of the pivot and wipe off any excess grease.

STEERING LINKAGE

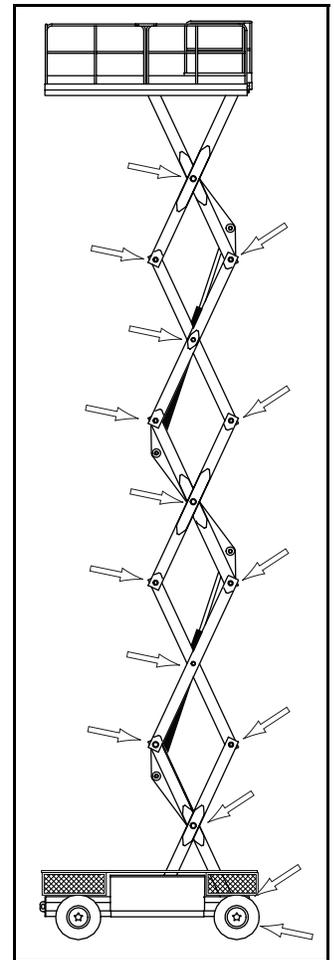
Apply one or two drops of penetrating oil to each pivot and king pin bearing.

TORQUE HUBS

NOTE: Change oil in torque hubs after the first 50 hours of operation. Change every 1000 hours thereafter.

1. Remove the torque hub from the rear drive assembly (refer to “Hydraulic Brakes, Drive Motors, And Hubs” on page 2-26).
2. Remove the drain plug from underside of the torque hub.
3. Drain the oil from the unit.
4. Replace the drain plug.
5. Remove the fill plug from the top side of the torque hub.
6. Fill the unit with 90 weight gear oil.
7. Replace the fill plug.

Figure 2-3: Lubrication Chart



HYDRAULIC FLUID RESERVOIR AND FILTER

Figure 2-4: Hydraulic Fluid Reservoir & Filter

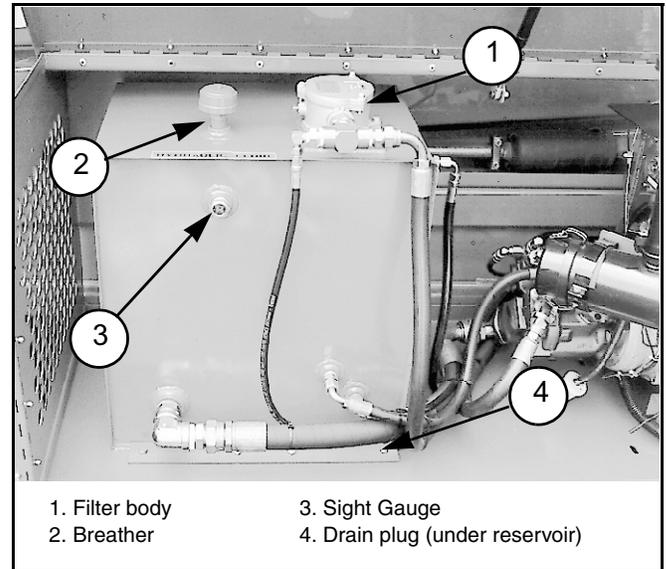
FLUID LEVEL

With the platform fully lowered, the fluid should be visible in the sight gauge. If the fluid is *NOT* visible, fill the reservoir until the fluid can be seen.

- *DO NOT* fill above the sight gauge.
- *DO NOT* fill when the platform is elevated.

FLUID AND FILTER REPLACEMENT

1. Operate the machine for 10-15 minutes to bring the hydraulic fluid up to normal operating temperature.
2. Provide a suitable container to catch the drained fluid. The hydraulic reservoir has a capacity of 45,5 l (**12.0 U.S. gal.**).
3. Remove the drain plug and allow all fluid to drain into the container. Dispose of used fluid properly.
4. Reinstall the drain plug.
5. Remove the three screws from the filter body cover and open the filter body.
6. Lift the filter element from the filter body. Dispose of used filters properly.
7. Insert the replacement filter element into the filter body and press into position.
8. Replace the filter body cover and screws.
9. Fill the hydraulic fluid reservoir to the level of the sight gauge with the appropriate hydraulic fluid (refer to "Specifications" in the *Operator Manual*).



CAUTION

The hydraulic fluid may be hot enough to cause burns. Wear safety gloves and safety glasses when handling hot fluid.

ENGINE OIL & FILTER

Figure 2-5: Engine Oil and Filter

1. Provide a suitable container to catch the drained oil.
2. Place the container under the oil pan and remove the drain plug.
3. When the drain plug is removed, unscrew the filler cap to speed up draining the oil.
4. After all of the oil has been drained, replace the drain plug. Dispose of used oil properly.
5. Remove the filter using an oil filter wrench. Dispose of used filters properly.
6. Replace with a new filter, refer to the *Parts Manual* for part number. Tighten the filter by hand.

NOTE: Lubricate the filter seal with clean engine oil prior to assembly.

7. Fill the engine with motor oil per Table 2-1.
8. Replace the filler cap.

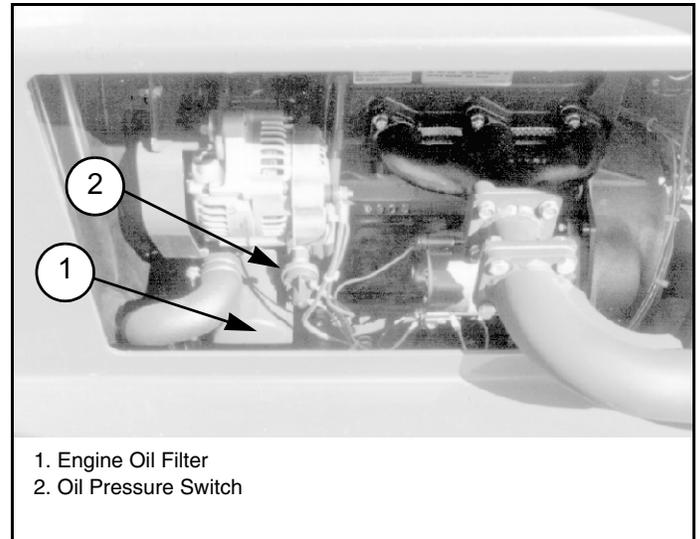


Table 2-1: Engine Oil

Engine	Capacity	Temp	Oil
Diesel	5,1 l [5.4 US qt.]	All	10w-30

2-5 SETTING HYDRAULIC PRESSURES

NOTE: Follow *Pump Setup* procedure whenever the pump has been replaced, or when testing performance to isolate possible failure. Refer to Figure 2-6 for flow meter setup.

PUMP SETUP

1. Remove the pump output line and cap it.
 2. Install the flow meter input line to pump output.
 3. Remove the reservoir return line and cap it.
 4. Install the flow meter output line to the reservoir.
 5. Remove the sense line from the pump.
 6. Install the flow meter sense line to the pump.
 7. Remove the caps on the Standby and Max Pressure adjustment screws.
 8. Press and hold the Throttle Button to rev up the engine.
9. Close the Simulated Load Flow Control Valve by turning it fully clockwise.
 10. Turn the Standby Pressure adjustment screw fully clockwise.
 11. Adjust Max Pressure to 207 bar (**3000 PSI**) (clockwise to increase, counterclockwise to decrease).
 12. Turn the Standby Pressure adjustment screw counterclockwise until gauge reads 14 bar (**200 PSI**).
 13. Replace the caps on the Standby and Max Pressure adjustment screws.
 14. Open the Simulated Load Flow Control Valve by turning fully counterclockwise.
 15. Open the Simulated Load Pressure Relief Valve by turning it fully counterclockwise.
 16. Loosen the large locknut on the Horsepower Limiter Valve and turn the adjustment screw counterclockwise two full turns.
 17. Increase the Simulated Load Pressure Relief Valve by turning it clockwise until the gauge reads 105 bar (**1500 PSI**).
 18. Turn the Horsepower Limiter adjustment screw clockwise until the Flow Meter reads 45 lpm (**12 GPM**).
 19. Tighten the large locknut on the Horsepower Limiter Valve.
 20. Loosen the small locknut on the Horsepower Limiter Valve and turn the adjustment screw counterclockwise two full turns.
 21. Increase the Simulated Load Pressure Relief Valve by turning it clockwise until the gauge reads 172 bar (**2500 PSI**).
 22. Turn the Horsepower Limiter Valve adjustment screw clockwise until the flow meter reads 26,5 lpm (**7 GPM**).
 23. Tighten the small locknut on the Horsepower Limiter Valve
 24. Replace the hoses.

Figure 2-6: Flow Meter Setup

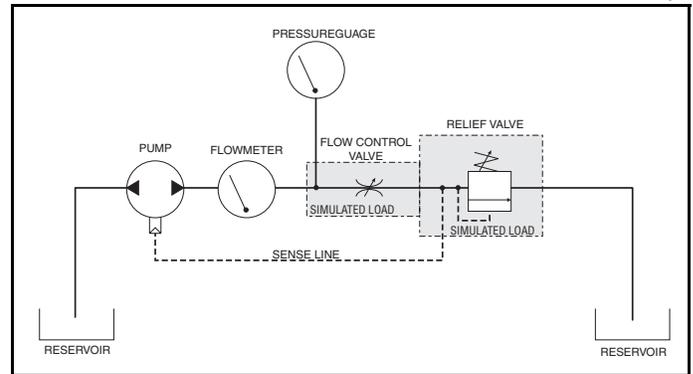
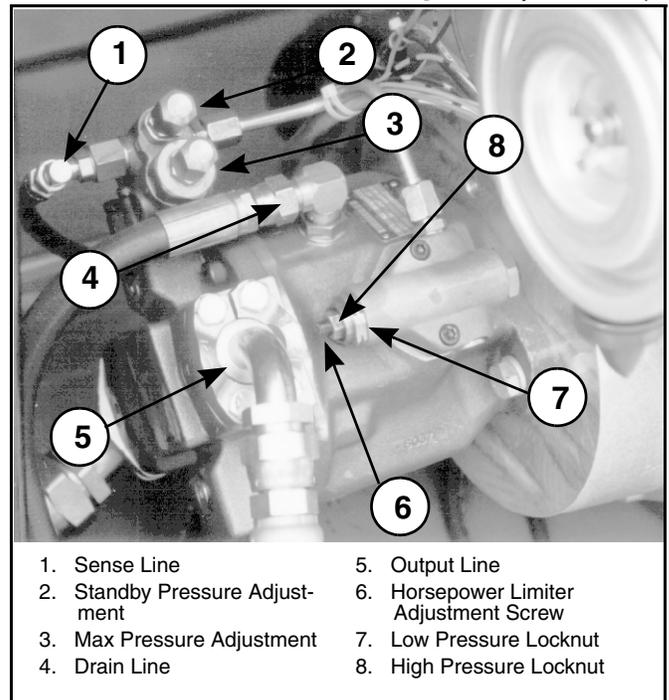


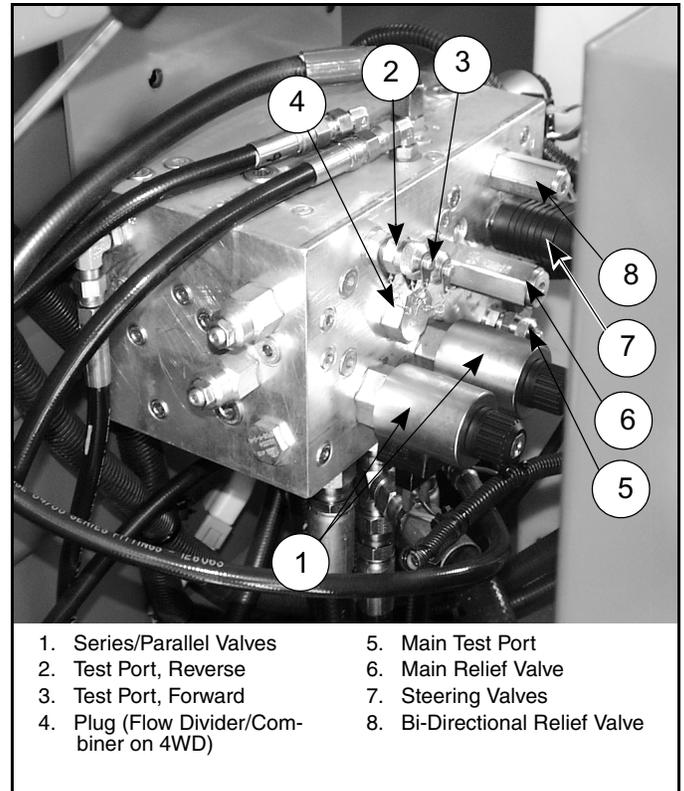
Figure 2-7: Hydraulic Pump



LIFT RELIEF VALVE

1. Operate the hydraulic system 10-15 minutes to warm the fluid.
2. Remove the cap or loosen the locknut on the Lift Relief Valve.
3. Turn the Lift Relief Valve adjustment screw counterclockwise two full turns.
4. Place the rated load on the platform (refer to "Specifications" in the *Operator Manual*).
5. Press the Throttle Button, and the Raise Button to elevate the platform.
6. Slowly turn the Lift Relief Valve adjustment screw clockwise until the platform begins to elevate.
7. Replace the cap, or tighten the locknut on the Lift Relief Valve, and remove the load from the platform

Figure 2-8: Valve Manifold



COUNTERBALANCE VALVES

1. Operate the hydraulic system 10-15 minutes to warm the fluid.
2. Elevate the front (4WD only), and rear wheels to allow them to spin freely, and place on jackstands suitable to support the weight of the machine.
3. Remove the Green/White wire from the wire terminal in the Control Panel Assembly.
4. Install a pressure gauge at the Forward Drive Pressure Test Port.
 - 2WD: 0-83 bar (**0-1200 PSI**)
 - 4WD: 0-124 bar (**1800 PSI**)
5. Loosen the locknut on the Reverse Counterbalance Valve, move the Control Handle to FORWARD, and adjust the valve until the gauge reads 55 bar (**800 PSI**). Tighten the locknut.
 - clockwise to decrease
 - counter clockwise to increase
6. Install a 0-454 kg. (**0-1000 PSI**) pressure gauge at the Reverse Drive Pressure Test Port.
7. Loosen the locknut on the Forward Counterbalance Valve, move the Control Handle to REVERSE, and adjust the valve until the gauge reads 55 bar (**800 PSI**). Tighten the locknut.
 - clockwise to decrease
 - counter clockwise to increase
8. Recheck the pressures and adjust as necessary.
9. Remove the gauge and replace the cap. Connect the Green/White wire to the wire terminal in the Control Panel Assembly.
10. Lower the machine off of the jackstands.

STEERING RELIEF VALVES

1. Operate the hydraulic system 10-15 minutes to warm the fluid.
2. Install a 0-207 bar (**0-3000 PSI**) gauge at the Main Pressure Test Port.
3. Loosen the locknut or remove the cap on the Left Steer Relief Valve.
4. Turn the adjustment screw two full turns counterclockwise.
5. Press the Steering Switch to the left and hold until the system bypasses.
6. Turn the Steering Relief Valve adjustment screw clockwise until the gauge reads 103 bar (**1500 PSI**).
7. Tighten the locknut or replace the cap on Left Steering Relief Valve.
8. Repeat the process for the Right Steering Relief Valve

BIDIRECTIONAL RELIEF VALVES

NOTE: Check or reset Drive Motor Relief Valves only if you suspect that one of the Rear wheels is not turning due to premature bypass. This condition is rare and Bidirectional Relief Valves should not be reset as part of normal maintenance.

1. Operate the hydraulic system 10-15 minutes to warm the fluid.
2. Remove the cap and install a pressure gauge at the Main Pressure Test Port.
 - 2WD: 0-207 bar (**0-3000 PSI**)
 - 4WD: 0-124 bar (**0-1800 PSI**)
3. Remove the Bidirectional Relief Valve from under the rear drive motor and exchange with the Lift Relief Valve.
4. Remove the cap from the Bidirectional Relief Valve and turn the adjustment screw two full turns counterclockwise.
5. Press the Throttle Button and the Raise Button to elevate the platform to full height and hold until system bypasses.
6. Turn the adjustment screw clockwise until the pressure reaches;
 - 2WD: 0-207 bar (**0-3000 PSI**).
 - 4WD: 0-124 bar (**0-1800 PSI**).
7. Replace the cap and return the Bidirectional Relief Valve and the Lift Valve to their original positions.
8. Repeat if necessary for the other Bidirectional Relief Valve.
9. Remove the gauge and replace the Test Port Cap.

2-6 SWITCH ADJUSTMENTS

PROPORTIONAL CONTROL ADJUSTMENT

When required by the following procedure, lay out a 6 m (20 ft.) course, on a firm level surface, free from potholes or other obstructions. Mark a starting line and finish line that is visible from the platform of the machine.

Potentiometers are sealed to protect sensitive adjustments from vibrations, or from tampering. Remove sealant prior to adjustment, and replace after.

Use a small screwdriver or special adjustment tool to set adjustment pots. Pots can be easily damaged.

Pots have 15 turns of adjustment, more than one turn will often be required to complete the adjustment. If pots have been previously set, reset by turning no more than turn at a time. If they have not been previously set, preset to about mid range and start from there.

- Turn pot clockwise (CW) to increase settings.
- Turn pot counterclockwise (CCW) to decrease settings.
- Adjust pots only in sequence as outlined in this procedure.

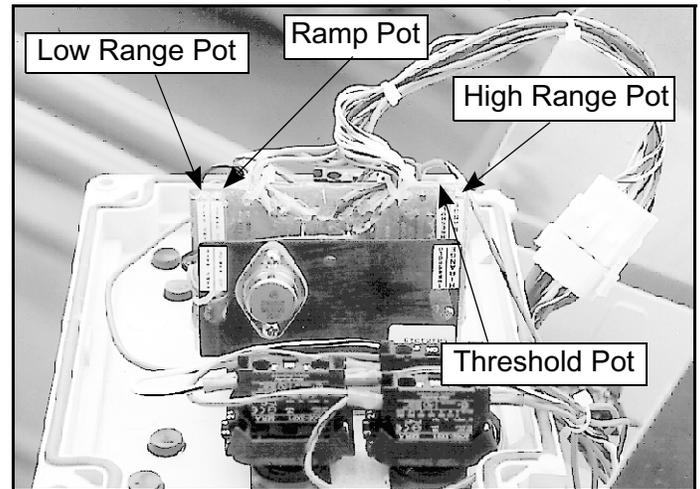


Figure 2-9: Proportional Controller

PROCEDURE

Refer to Table 2-2 for trimpot adjustments.

1. Lower the machine fully to insure that controller is in high speed range.
2. Turn the Ramp Trimpot fully counterclockwise until a click is heard with each revolution.
3. Move the Control Handle slightly forward, just enough to illuminate the red LED on the printed circuit board

NOTE: Do not steer the wheels during the speed test, ensure that the front wheels are straight prior to this operation. Allow the machine to rise to full speed, and mark the time from the second that the front wheels cross the starting line, until the second that the front wheels cross the finish line.

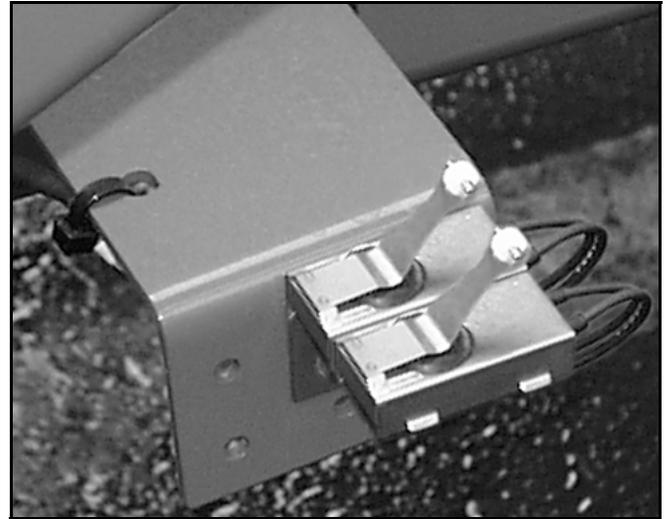
4. Adjust the Threshold Trimpot so that the machine just begins to move.
5. Move the Control Handle fully forward and drive the machine over the 6 m (20 ft.) course.
6. Adjust the Hi Trimpot to the proper high speed.
7. Elevate the platform enough to put the machine into low speed range.
8. Move the Control Handle fully forward and drive the machine over the 6 m (20 ft.) course.
9. Adjust the Lo Trimpot to the proper low speed.
10. Lower the machine fully and turn the Ramp Trimpot 8 to 10 turns clockwise. Adjust for smooth acceleration.
11. Recheck speeds to insure proper adjustment. Reset as necessary.

Table 2-2: Trimpot Adjustment

Trimpot	Seconds to travel 6 meter (20 ft.)	
	LX31/41	LX50
LO (creep speed)	41 ±3	41 ±3
HI (high speed)	5 ±1	5.5 ±1

PROXIMITY SWITCH - SERIAL NUMBER 4022-4274

Figure 2-10: Proximity Switch, Serial Number 4022-4274



The Proximity Switches are located near the front right corner of the chassis under the elevating assembly. Their function is determined by the location of the lower elevating assembly tube.

PROXIMITY SWITCH FUNCTION

The Proximity Switch controls the machine operation. There are two switches that perform the same function. If one switch fails, the other acts as a backup.

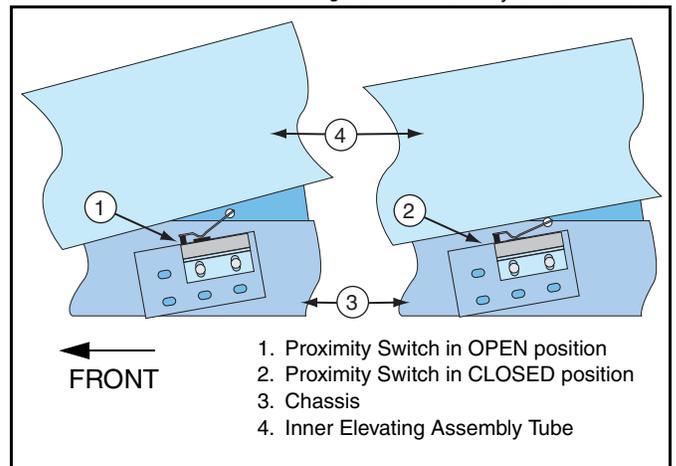
When Elevated:

- The switches are open.
- The Level Sensor is enabled.
- Power to the High Speed Circuit is cut, preventing the machine from travel faster than 0,8 km/h (**0.5 mph**).

When Completely Lowered:

- The switches are closed.
- Power is supplied to the High Speed Circuit, allowing the machine to travel up to 3,2 km/h (**2.0 mph**) when the Platform Controls Drive Speed Switch is set to HI SPEED.

Figure 2-11: Proximity Switch Position



TEST THE PROXIMITY SWITCH

1. Place the machine on a firm, level surface.
2. Use an inclinometer to ensure that the chassis is level from front to rear and side to side.
3. Deploy the maintenance brace (see "Blocking The Elevating Assembly" on page 2-8).
4. Disconnect the switch leads and connect a multimeter to the switch.
 - The switch contacts should be OPEN (no continuity).
 - Push the lever down to close the switch contacts. If there is no continuity, the switch is defective.
5. Connect the switch leads, store the maintenance brace and lower the work platform.
6. Elevate the work platform not more than 1 m (**3 ft.**).
7. With the Platform/Chassis switch on CHASSIS, push the Tilt Sensor base to test the alarm circuit.
 - If the alarm does not sound, the switch is out of adjustment.
8. Turn the Drive Speed Switch to HI SPEED and attempt to drive the machine.
 - If the machine will drive faster than 0,8 km/h (**0.5 mph**), the switch is out of adjustment.
9. Lower the work platform completely.

REMOVAL AND INSTALLATION

⚠ WARNING ⚠

*Never perform service while the platform is elevated without first blocking the elevating assembly.
DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.*

1. Place the machine on a firm, level surface.
2. Use an inclinometer to ensure that the chassis is level from front to rear and side to side.
3. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
4. Disconnect the switch leads.
5. Remove the defective switch and install a new one.
6. Connect the switch leads.
7. Store the maintenance brace and lower the platform.
8. Adjust the Proximity Switch.

PROXIMITY SWITCH ADJUSTMENT, SERIAL NUMBER 4022-4274

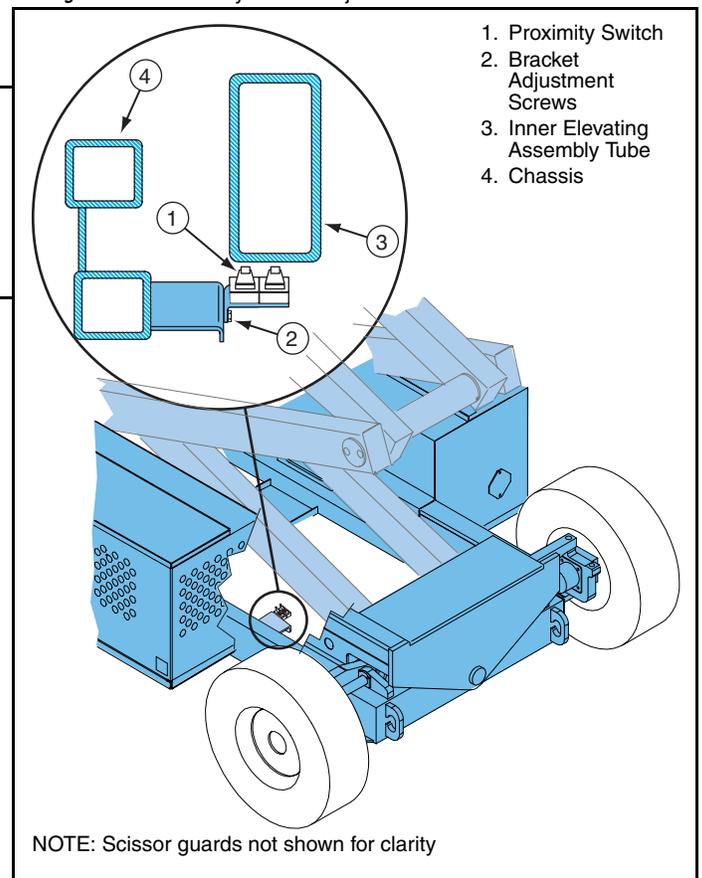
⚠ WARNING ⚠

Never perform service while the platform is elevated without first blocking the elevating assembly.

DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.

1. Place the machine on a firm, level surface.
2. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
3. Disconnect the switch leads and connect a multimeter or continuity tester to the switch.
4. Place a reference mark on the switch bracket to establish its position.
5. Store the maintenance brace and fully lower the platform.
6. Measure and record the distance from the top of the chassis to the base of the work platform.
7. Elevate the work platform until the Proximity Switch is OPEN (no continuity).
8. Measure the distance from the top of the chassis to the base of the work platform and compare with Step 4.
 - If the platform elevated 50 - 60 cm (1.75 - 2 ft.), no adjustment is necessary. Otherwise, continue.
9. Deploy the maintenance brace. Loosen the bracket adjustment screws and move the switch up to increase or down to decrease the platform height. Tighten the adjustment screws.
10. Repeat Step 5 through Step 8.

Figure 2-12: Proximity Switch Adjustment - Serial Number 4022-4274



PROXIMITY SWITCH - SERIAL NUMBER 4275-CURRENT

Refer to Figure 2-13.

The Proximity Switch is located near the front right corner of the chassis under the elevating assembly. Its function is determined by the location of the lower elevating assembly tube.

PROXIMITY SWITCH FUNCTION

A red LED at the rear of the switch should be ON when the elevating assembly tube is next to the switch (the platform is lowered). The Proximity Switch controls the machine operation based upon the proximity of the lower elevating assembly tube to the Proximity Switch.

When Elevating:

- The Level Sensor is enabled.
- Power to the High Speed Circuit is cut, preventing the machine from travel faster than 0,8 km/h (0.5 mph).

When Completely Lowered:

- Power is supplied to the High Speed Circuit, allowing the machine to travel up to 3,2 km/h (2.0 mph) when the Platform Controls Drive Speed Switch is set to HI SPEED.

TEST THE PROXIMITY SWITCH



Never perform service while the platform is elevated without first blocking the elevating assembly. DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.

1. Place the machine on a firm, level surface.
2. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
3. Disconnect the switch leads and connect a multimeter to the switch.
 - The switch contacts should be OPEN (no continuity).
 - Place a piece of metal near the face of the switch. This should close the switch contacts. If there is no continuity, the switch is defective.
4. Connect the switch leads, store the maintenance brace and lower the work platform.
5. With the work platform fully lowered, look at the Proximity Switch.
 - When the Platform Controls key Switch is ON, the red LED at the rear of the Proximity Switch is ON.
 - If the red LED is OFF, the Proximity Switch is out of adjustment.
6. Elevate the work platform not more than 1 m (3 ft.).
 - The red LED should turn OFF when the machine reaches 50 - 60 cm (1.75 - 2 ft.). If it remains ON, the switch is out of adjustment.

TEST HIGH SPEED CIRCUIT

1. Elevate the platform 76 cm (2.5 ft.).
2. Turn the Drive Speed Switch to HI SPEED and attempt to drive the machine.
 - If the machine will drive faster than 0,8 km/h (0.5 mph), the switch is out of adjustment or defective.

REMOVAL AND INSTALLATION

! WARNING !

*Never perform service while the platform is elevated without first blocking the elevating assembly.
DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.*

1. Place the machine on a firm, level surface.
2. Use an inclinometer to ensure that the chassis is level from front to rear and side to side.
3. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
4. Disconnect the switch leads.
5. Remove the defective switch and install a new one.
6. Adjust the switch to elevating assembly tube clearance (see “Proximity Switch Clearance Adjustment - Serial Number 4275-Current” on page 2-19).
7. Connect the switch leads.
8. Store the maintenance brace and lower the platform.
9. Adjust the Proximity Switch height (see “Proximity Switch Height Adjustment - Serial Number 4275-Current” on page 2-20).

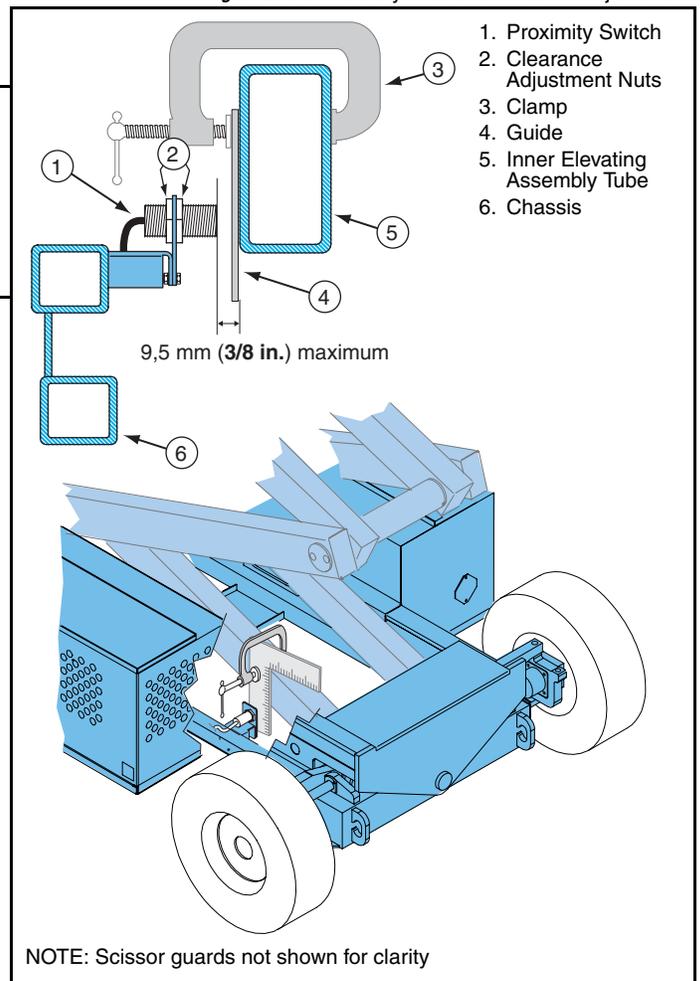
PROXIMITY SWITCH CLEARANCE ADJUSTMENT - SERIAL NUMBER 4275-CURRENT

! WARNING !

*Never perform service while the platform is elevated without first blocking the elevating assembly.
DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.*

1. Place the machine on a firm, level surface.
2. Use an Inclinometer to ensure that the chassis is level from front to rear and side to side.
3. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
4. Use a clamp to attach a straight guide to the elevating assembly tube.
5. Measure the distance from the face of the Proximity Switch to the side of the guide that faces the elevating assembly tube.
6. Turn the adjusting nuts to set the clearance to 9,5 mm (**0.375 in.**) maximum.
7. Remove the clamp and guide and repeat the test (see “Test the Proximity Switch” on page 2-18).

Figure 2-13: Proximity Switch Clearance Adjustment



PROXIMITY SWITCH HEIGHT ADJUSTMENT - SERIAL NUMBER 4275-CURRENT

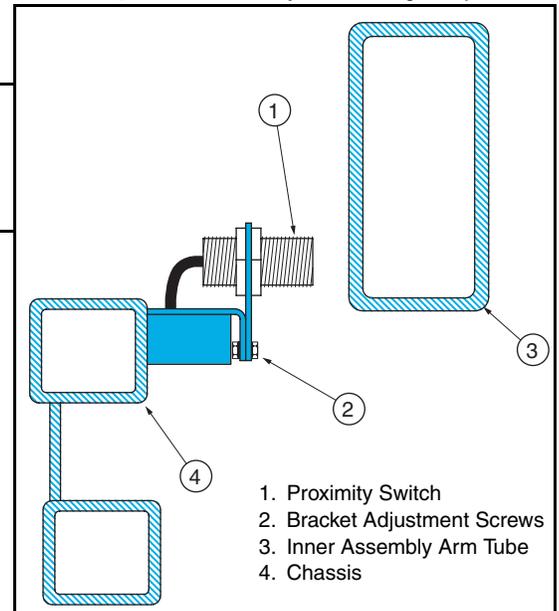
Figure 2-14: Proximity Switch Height Adjustment

⚠ WARNING ⚠

Never perform service while the platform is elevated without first blocking the elevating assembly.

DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.

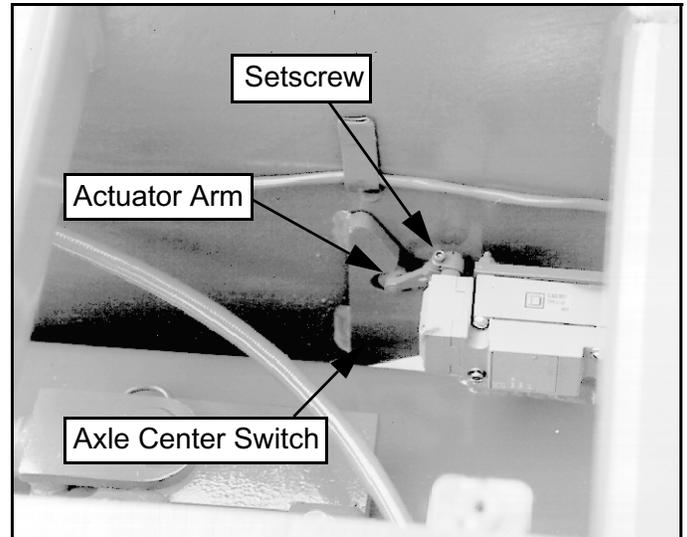
1. Place the machine on a firm, level surface.
2. Use an inclinometer to ensure that the chassis is level from front to rear and side to side.
3. Measure and record the distance from the top of the chassis to the base of the work platform.
4. Elevate the platform until the red LED at the rear of the Proximity Switch turns OFF.
5. Measure the distance from the top of the chassis to the base of the work platform and compare with Step 3.
 - If the platform elevated 50 - 60 cm (1.75 - 2 ft.), no adjustment is necessary. Otherwise, continue.
6. Deploy the maintenance brace (see "Blocking The Elevating Assembly" on page 2-8).
7. Place a reference mark on the bracket to establish its position.
8. Loosen the bracket adjustment screws and move the switch up to increase or down to decrease platform height. Tighten the adjustment screws.
9. Store the maintenance brace and fully lower the platform.
10. Repeat Step 4 and Step 5.



AXLE CENTER SWITCH

1. Place the machine on a firm level surface with the front and rear axles parallel (on the same plane). Verify this using an inclinometer.
2. Loosen the setscrew on the lever of the limit Switch. It should immediately spring to center. Tighten the setscrew.
3. Test the switch function.
 - Place a 5 cm (2 in.) block in front of the right front wheel and drive the machine onto the block. The front axle will articulate off of center.
 - Elevate the work platform until the Height Limit Switch opens (about 3 m [10 ft.]).
 - Attempt to drive the machine. It should not drive.
 - Re-test with the block under the left front wheel.

Figure 2-15: Axle Center Switch



LEVEL SENSOR

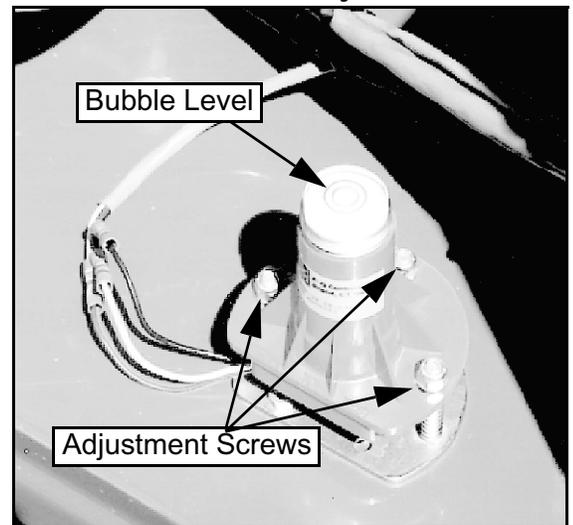
The Level Sensor has three wires;

- red-power in (12v),
- black-ground,
- white-power out (12v).

To verify the sensor is working properly there is one red LED under the sensor. When the LED is ON, the sensor is out of level, turning OFF the power to the white wire.

1. Check tires for proper pressure.
2. Place the machine on a firm level surface.
3. Use an inclinometer to ensure that the front and rear of the Chassis are level.
4. Open the Control Module door to gain access to the Level Sensor.
5. Adjust the three leveling locknuts until the bubble is centered in the circle on the attached bubble level.
6. Elevate the platform until the red LED on the Proximity Switch turns OFF (about 3m [10 ft.]
7. Push the level sensor base to test the alarm circuit. The red LED under the Level Sensor should turn ON and the alarm should sound.

Figure 2-16: Level Sensor



EIGHT METER CUTOUT AND HEIGHT LIMIT SWITCH

⚠ WARNING ⚠

Never perform service while the platform is elevated without first blocking the elevating assembly.
DO NOT stand in the elevating assembly area while deploying or storing the maintenance brace.

Serial Number 4022-4274

All models within this serial number range have an Eight Meter Cutout Switch and a Height Limit Switch.

Serial Number 4275-Current

Machines within this serial number range do not have an Eight Meter Cutout Switch. Only the LX50 has a Height Limit Switch.

TEST THE MERCURY SWITCH

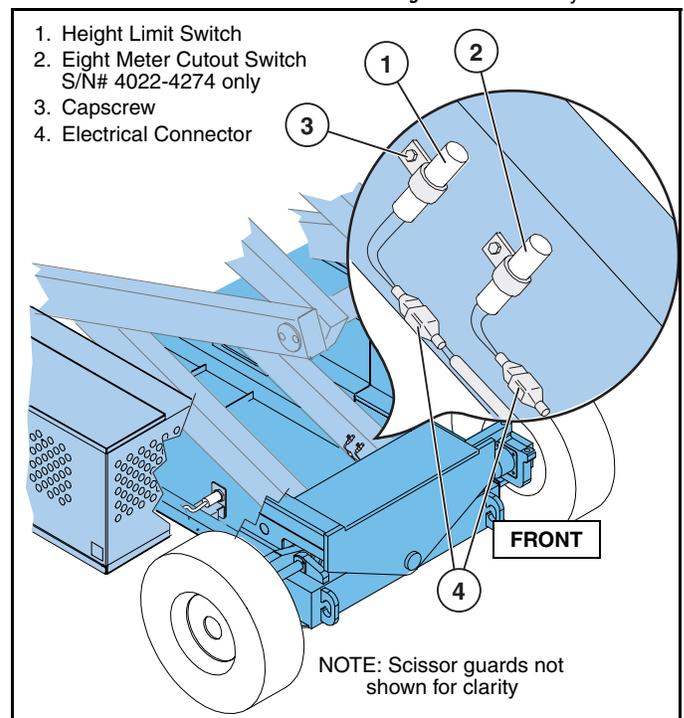
1. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
2. Place a reference mark alongside the switch to establish its position.
3. Disconnect the electrical connector.
4. Install a continuity tester to the mercury switch.
5. Loosen the capscrew and rotate the switch clockwise until it opens. The continuity tester light should turn OFF when the switch opens.
 - If the continuity tester light remains ON, replace the switch.
 - If the continuity tester light turns OFF, adjust the switch (see “Adjust the Mercury Switch” on page 2-23).
6. Return the switch to its original position and tighten the cap screw.

REMOVAL AND INSTALLATION

Refer to Figure 2-17 for the location of the mercury switch.

1. Deploy the maintenance brace (see “Blocking The Elevating Assembly” on page 2-8).
2. Place a reference mark alongside the switch to establish its position.
3. Disconnect the electrical connector.
4. Remove the capscrew from the switch bracket, and remove the switch.
5. Install the new switch, align it with the reference mark and tighten the capscrew.
6. Connect the electrical connector.

Figure 2-17: Mercury Switches



ADJUST THE MERCURY SWITCH

A tape measure capable of measuring the height of the machine is required to adjust the operation of the mercury switch.

1. Place the machine on a firm, level surface.
2. Use adhesive tape to attach the tab of a tape measure to the front edge of the platform. Ensure that the locking device on the tape measure is disengaged and extend the tape measure to the surface.

Eight Meter Cutout Switch (Serial Number 4022-4274)

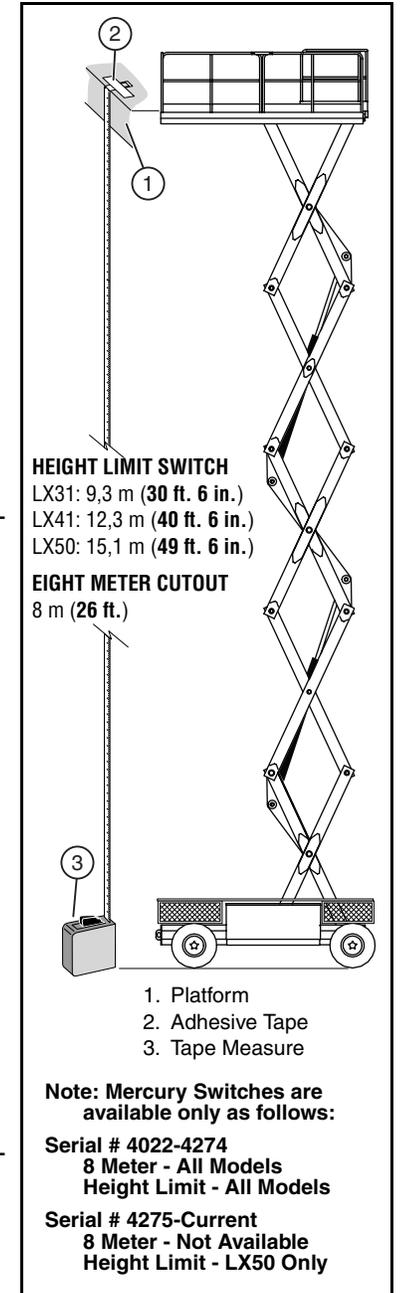
The Eight Meter Cutout Switch is a mercury switch that disables drive function when the platform reaches 8 m (26 ft.).

- A. Deploy the maintenance brace (see "Blocking The Elevating Assembly" on page 2-8).
- B. Place a reference mark alongside the Eight Meter Cutout Switch to establish its position.
- C. Disconnect the electrical connector and connect a multimeter or continuity tester.
- D. Elevate the platform until the switch is OPEN (no continuity). The tape measure should un-roll as the platform elevates.
- E. Measure the distance from the platform deck to the surface.
 - If the distance is correct, skip to Step I.
 - If the distance is other than 8 m (26 ft.), the switch is out of adjustment. Lower the platform until the maintenance brace is properly set and continue.
- F. Loosen the capscrew and rotate the switch slightly;
 - clockwise to OPEN.
 - counter-clockwise to CLOSE.
- G. Tighten the capscrew and return to Step D.
- H. Lower the platform until the maintenance brace is properly set. Disconnect the test equipment and connect the electrical connector.
- I. Store the maintenance brace and fully lower the platform.

Height Limit Switch

- A. Fully elevate the platform. The tape measure should un-roll as the platform elevates.
- B. Measure the distance from the platform deck to the surface. The correct height is illustrated in Figure 2-18.
 - If the distance is more, the switch is out of adjustment or not functioning.
 - If the distance is less, the switch is out of adjustment.
- C. Deploy the maintenance brace (see "Blocking The Elevating Assembly" on page 2-8).
- D. Place a reference mark alongside the Height Limit Switch to establish its position.
- E. Loosen the capscrew and adjust as follows:
 - If the distance is **more than** Figure 2-18, rotate the switch slightly clockwise and tighten the capscrew.
 - If the distance is **less than** Figure 2-18, rotate the switch slightly counter clockwise and tighten the capscrew.
- F. Fully elevate the platform. *Do not* return the maintenance brace to the stored position at this time.
- G. Measure the distance from the platform deck to the surface (see Figure 2-18).
 - If the distance is correct, store the maintenance brace and fully lower the platform.
 - If the distance is not correct, lower the platform until the maintenance brace is properly set and repeat Step E.

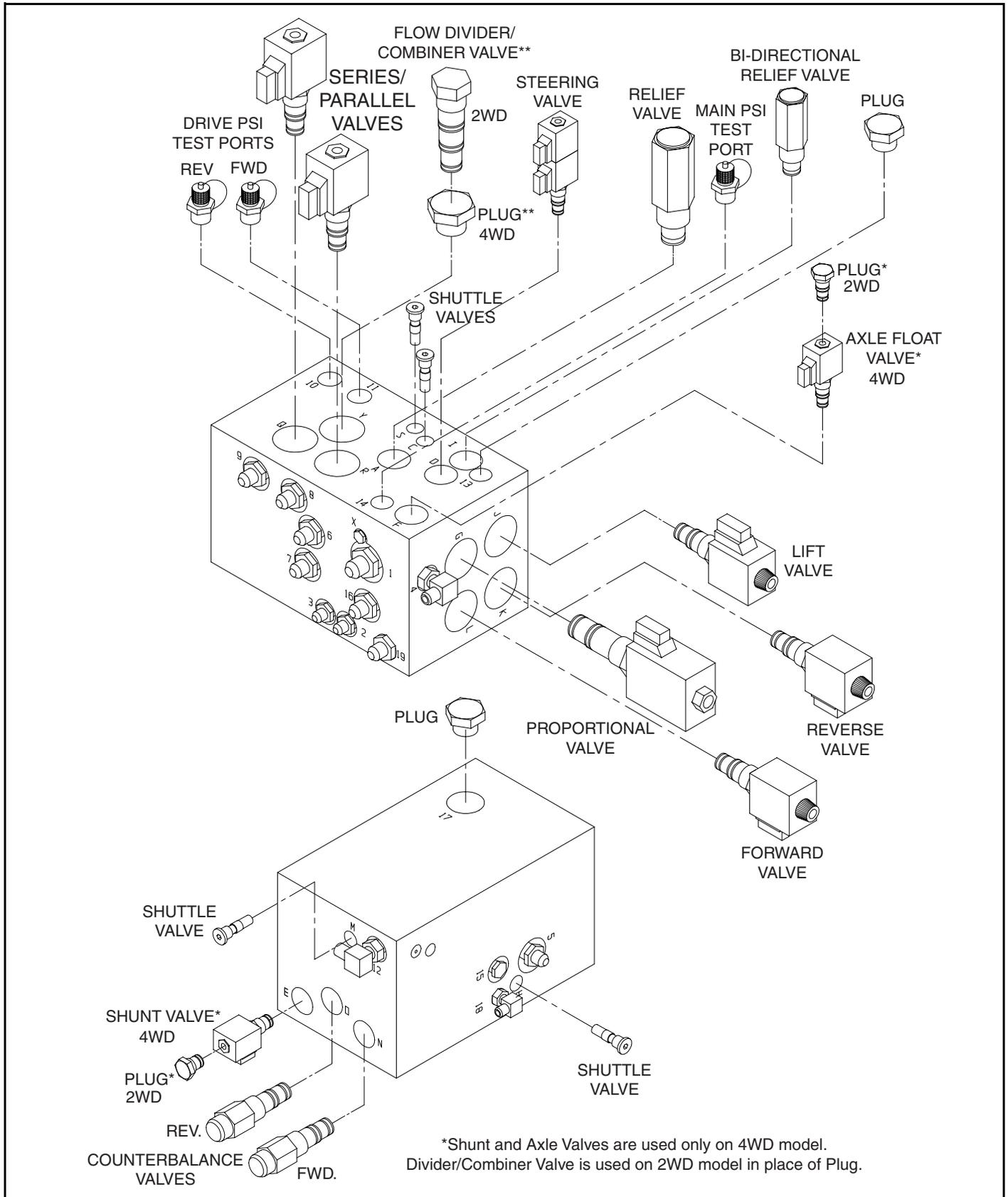
Figure 2-18: Mercury Switch Adjustment



2-7 HYDRAULIC MANIFOLD

Though it is not necessary to remove the manifold to perform all maintenance procedures, a determination should be made prior to beginning as to whether or not the manifold should be removed before maintenance procedures begin. Refer to the General Information Section for remove and replace instructions.

Figure 2-19: Hydraulic Manifold, Exploded View (4WD Shown)



2-8 HYDRAULIC PUMP

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

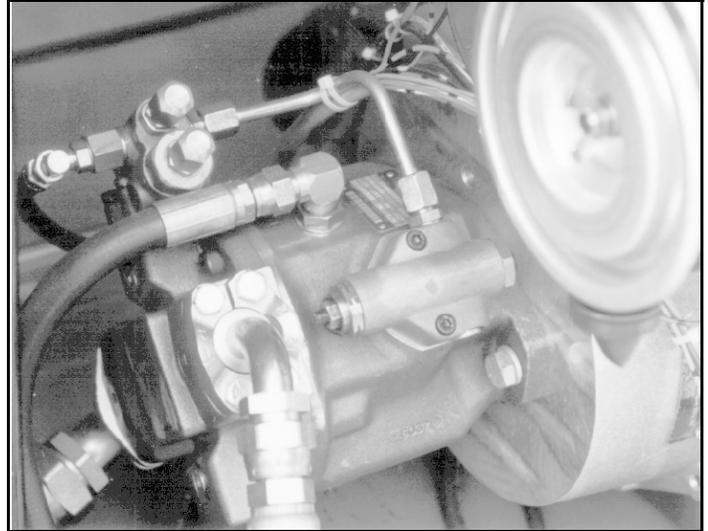
REMOVAL

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

INSTALLATION

1. Torque each capscrew a little at a time until both capscrews are torqued to 27 N-m (20 ft. lbs.).
2. Unplug and reconnect the hydraulic hoses.
3. Fill the pump completely with clean hydraulic fluid by pouring it into the drain line cavity.
4. Check the fluid level in the hydraulic reservoir before operating the machine.
5. Set Standby and Max pressures, and Horsepower Limiter Nodes as outlined under *Pump Setup* in “Setting Hydraulic Pressures” on page 2-12.

Figure 2-20: Hydraulic Pump



2-9 HYDRAULIC BRAKES, DRIVE MOTORS, AND HUBS

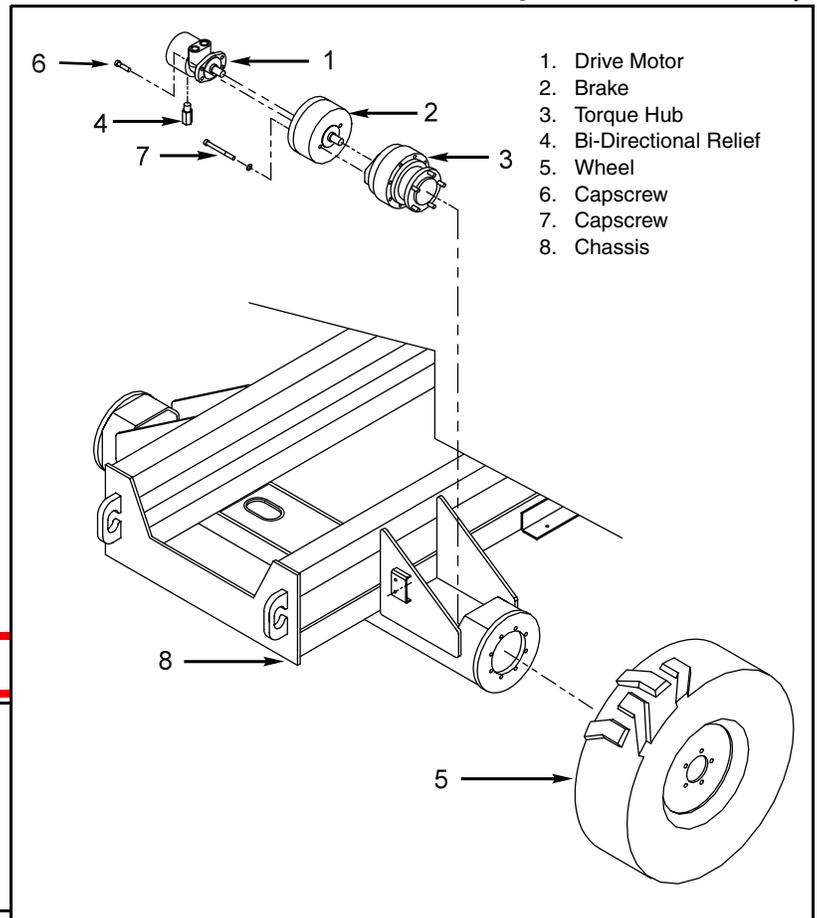
REAR AXLE REMOVAL

1. Place the machine on a firm level surface and block the wheels to prevent the machine from rolling.
2. Loosen the wheel lug bolts on the drive motor to be removed.
3. Raise the rear of the machine using a 2-ton jack.
4. Position two 1-ton jack stands under the rear axle to prevent the machine from falling if the jack fails.
5. Remove the wheel lug bolts and wheel.
6. Tag and disconnect the hose assemblies from the drive motor and brake.

CAUTION

Clean all fittings before disconnecting the hose assemblies. Plug all port holes and hose assemblies IMMEDIATELY to prevent contamination from dust and debris.

Figure 2-21: Rear Axle Assembly



NOTE: When disassembling, retain gaskets between components, they may be reused if undamaged.

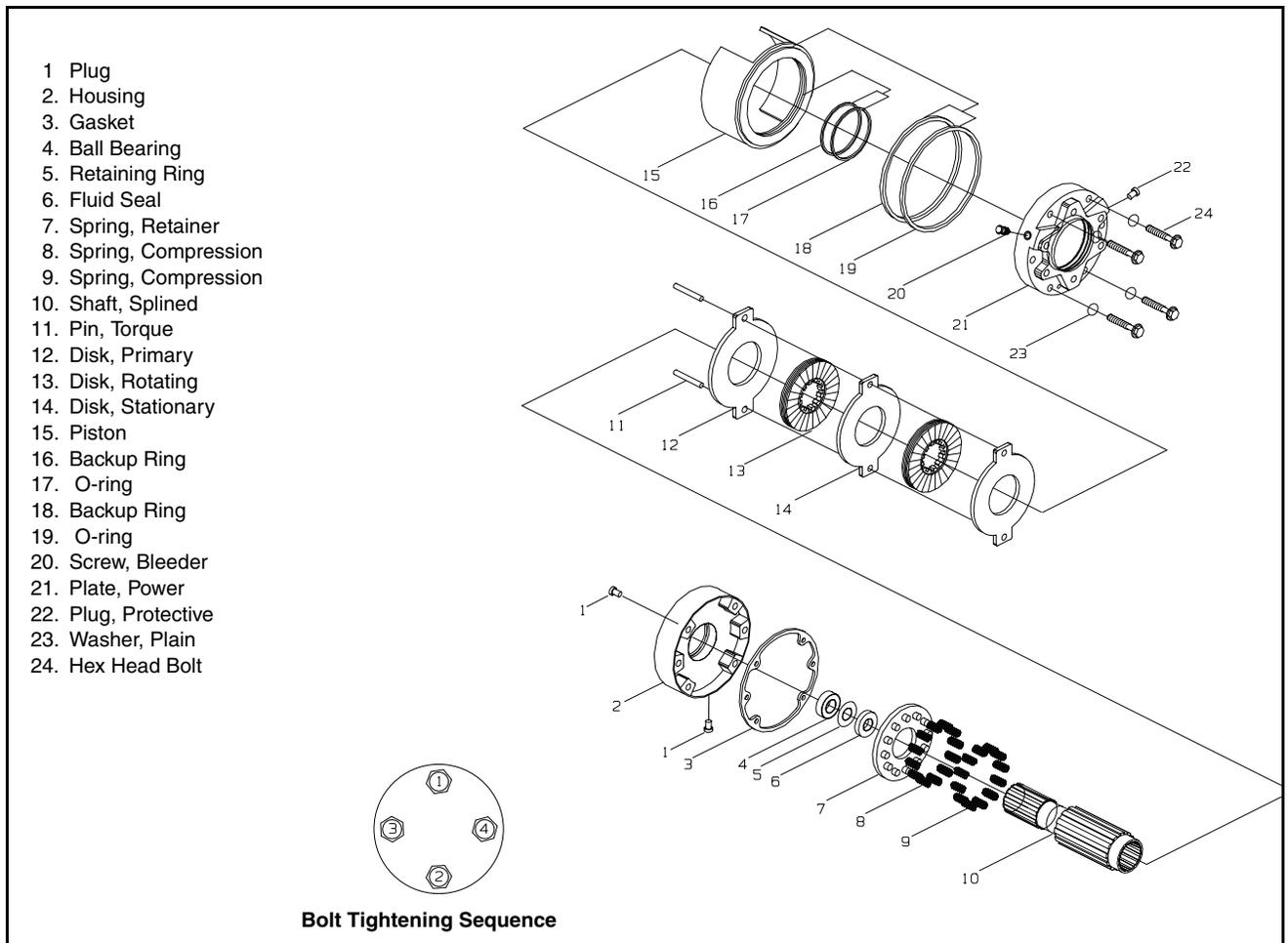
7. Remove the four capscrews holding the motor to the brake. Remove the motor.
8. Remove the two socket head through bolts connecting the brake and the torque hub. Remove the brake.
9. Remove the eight capscrews connecting the torque hub to the rear axle. Remove the torque hub.

INSTALLATION

1. Install the torque hub to the rear axle. Align the holes and install the eight capscrews.
 - Tighten the capscrews.
2. Coat the output shaft of the brake with high pressure molybdenum grease and install the brake into the torque hub. Align the holes and install the two socket head through bolts.
 - Tighten the through bolts.
3. Coat the output shaft of the drive motor with high pressure molybdenum grease and install into the brake. Align the holes and install the four capscrews.
 - Tighten the capscrews.
4. Reinstall the hose assemblies to the drive motor and brake.
5. Reinstall the wheel and wheel nuts onto the torque hub. Torque the wheel nuts to 203 N-m (150 ft. lbs.).
6. Remove the jack stands. Lower the jack and remove.
7. Operate the drive system to check for leaks. If the brake was serviced, bleed out the air using the bleed valve located on the brake housing.

SEAL REPLACEMENT, BRAKES

Figure 2-22: Brake Assembly



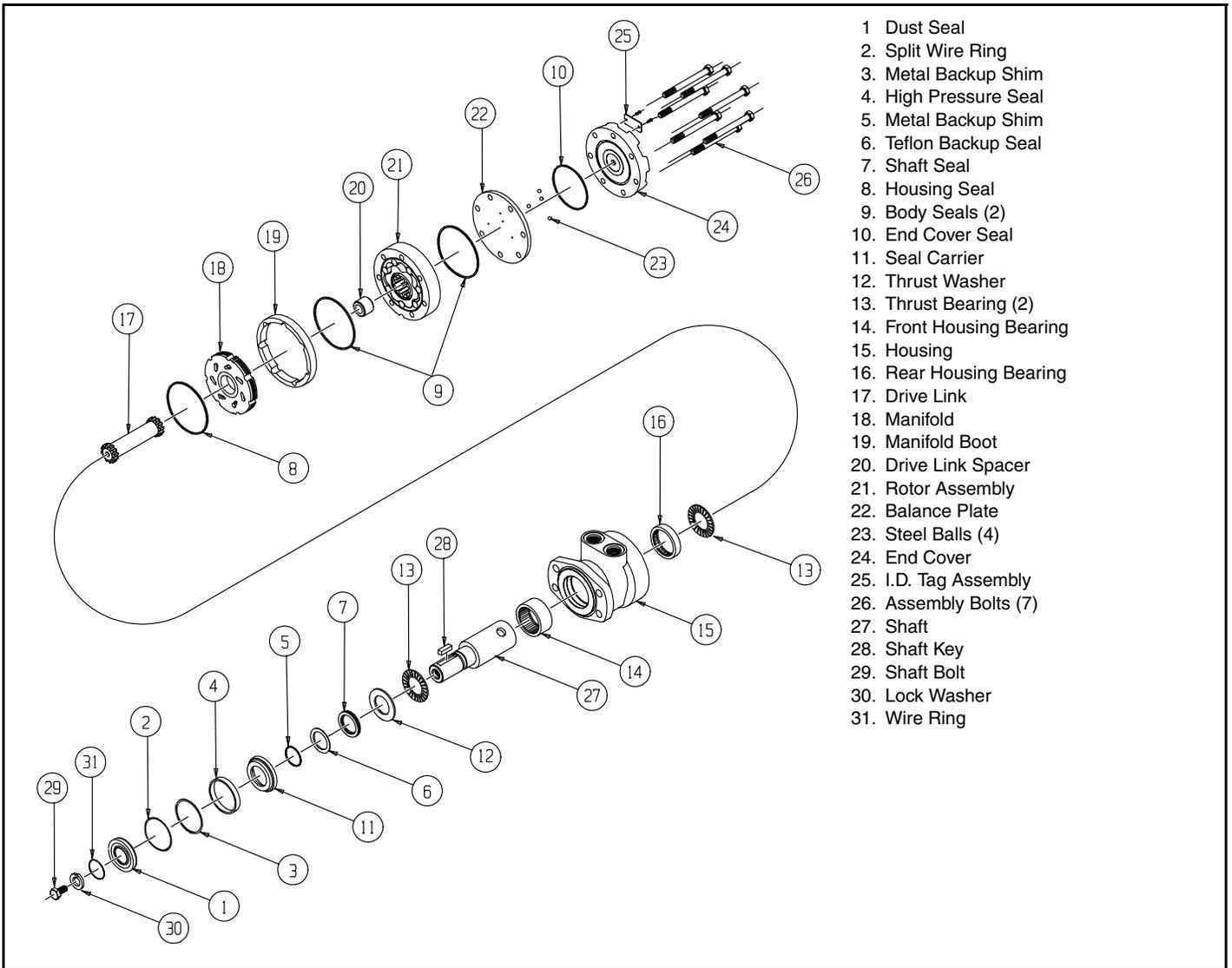
- 1 Plug
2. Housing
3. Gasket
4. Ball Bearing
5. Retaining Ring
6. Fluid Seal
7. Spring, Retainer
8. Spring, Compression
9. Spring, Compression
10. Shaft, Splined
11. Pin, Torque
12. Disk, Primary
13. Disk, Rotating
14. Disk, Stationary
15. Piston
16. Backup Ring
17. O-ring
18. Backup Ring
19. O-ring
20. Screw, Bleeder
21. Plate, Power
22. Plug, Protective
23. Washer, Plain
24. Hex Head Bolt

Bolt Tightening Sequence

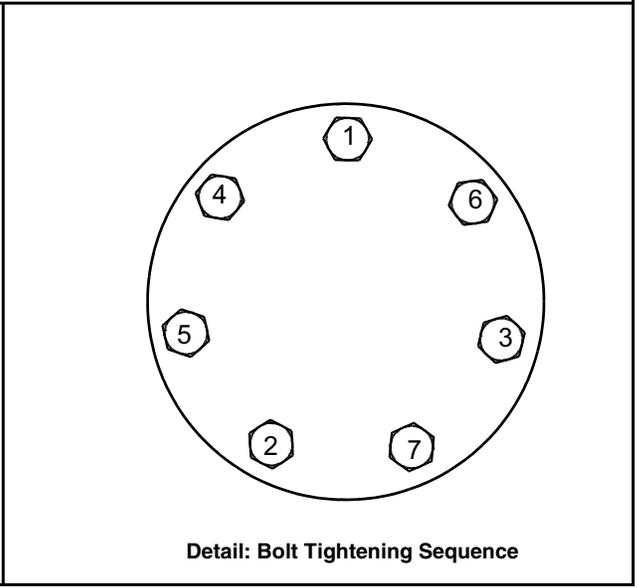
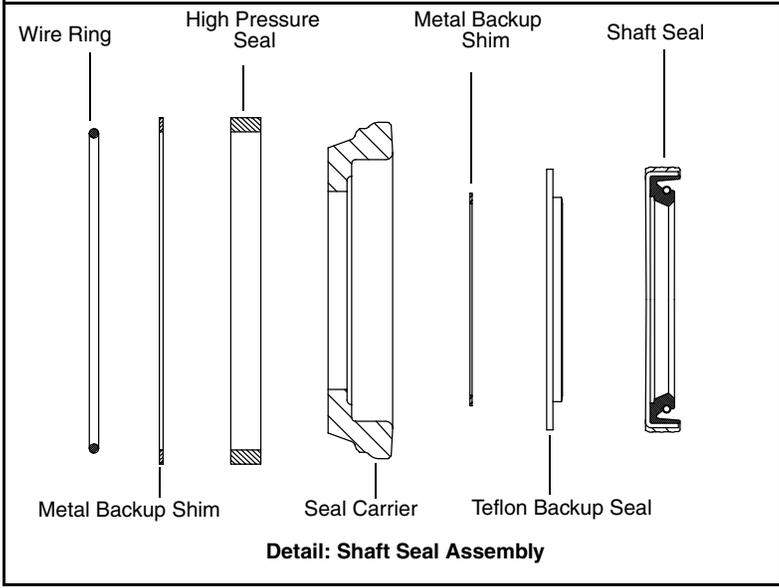
1. With shaft protrusion downward, remove the bolts [24] from the brake assembly.
2. Remove the power plate [21], from the housing [2].
3. Remove and discard the gasket [3].
4. Remove the piston [15] from the power plate [21] by introducing low pressure air [1 bar [**15 PSI**]] into the hydraulic inlet. Make sure the piston is pointed away from anyone.
5. Remove and discard O-rings [17 & 19] and backup rings [16 & 18] from the inner and outer diameter grooves of the piston.
6. Clean the piston [15] and the power plate [21] with solvent. Inspect the sealing surfaces of the piston and power plate. Inspect the seal grooves in the piston. Replace these parts if they are damaged or scratched deeply. Lubricate the piston and power plate with clean hydraulic fluid.
7. Lubricate the backup rings [16 & 18] and O-rings [17 & 19] and install into the seal grooves in the piston.
8. Install the piston into the power plate using a shop press. Be careful not to damage the seals during assembly. Center the cutouts in the piston with the torque pin holes in the power plate. Press the piston to a depth no less than flush, but not exceeding 0,3 cm [**0.120 in.**] below the surface of the power plate at the cutouts in the piston. This depth is critical, the brake will not hold if it is exceeded.
9. Install the gasket [3].
10. Install the power plate/piston assembly to the housing [2] using bolts [24]. Following the bolt tightening sequence in Figure 2-22, tighten the bolts to press the two assemblies together. Torque the bolts to 68 to 81 N-m (**50 to 60 ft. lbs.**).

SEAL REPLACEMENT, REAR MOTOR

Figure 2-23: Rear Drive Motor Assembly



- 1 Dust Seal
- 2 Split Wire Ring
- 3 Metal Backup Shim
- 4 High Pressure Seal
- 5 Metal Backup Shim
- 6 Teflon Backup Seal
- 7 Shaft Seal
- 8 Housing Seal
- 9 Body Seals (2)
- 10 End Cover Seal
- 11 Seal Carrier
- 12 Thrust Washer
- 13 Thrust Bearing (2)
- 14 Front Housing Bearing
- 15 Housing
- 16 Rear Housing Bearing
- 17 Drive Link
- 18 Manifold
- 19 Manifold Boot
- 20 Drive Link Spacer
- 21 Rotor Assembly
- 22 Balance Plate
- 23 Steel Balls (4)
- 24 End Cover
- 25 I.D. Tag Assembly
- 26 Assembly Bolts (7)
- 27 Shaft
- 28 Shaft Key
- 29 Shaft Bolt
- 30 Lock Washer
- 31 Wire Ring



REAR MOTOR DISASSEMBLY/ASSEMBLY

1. Remove all shaft related components from the shaft [27], (i.e. keys, wire rings, nuts). To aid in reassembly of the motor, make a "V" shaped set of lines from the end cover [24] to the housing using either paint or a marker. With the shaft facing down, secure the motor in a vise by clamping onto the housing [15].
2. Loosen and remove the seven bolts [26] holding the motor assembly together. Remove the end cover [24] and end cover seal [10]. Discard the seal. Remove the balance plate [22] taking care not to drop the four steel balls [23] located in the four holes in the balance plate. Remove the rotor assembly [21], manifold boot [19], manifold [18], drive link spacer [20] (*some motors do not use spacer*), drive link [17] and thrust bearing [13]. Remove the body seals [9] from the rotor assembly and the housing seal [8] from the housing [15]. *Compare the old housing seal [8] to the two housing seals included in the kit to determine which one to use, then discard the old seals.*
3. Gently tap the shaft [27] upward from the housing [15] and remove it through the rear of the housing and set aside. Remove the housing from the vise and turn it over. Pry the dust seal [1] from the housing. Push the seal carrier [11], thrust washer [12] and thrust bearing [13] down until they make contact with the roller bearing [14] located in the housing bore.
4. Remove the wire ring [2], steel backup shim [3], and high pressure seal [4] from the inner bore groove with a small screwdriver. *Compare the old high pressure seal [4] to the two high pressure seals included in the kit to determine which one to use.* Lift out the seal carrier [11], thrust washer [12] and thrust bearing [13] from the housing bore. Using a small screwdriver, carefully pry the shaft seal [7], teflon backup seal [6] and metal backup shim [5] from the seal carrier and discard. Set the seal carrier, thrust washer and thrust bearing aside. *If a new thrust washer seal [12] and seal carrier [11] is included in kit, the old items may be discarded.*
5. At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (observe all safety guidelines). All new seals should be lightly coated in clean oil prior to installation.
6. Place the shaft [27] on a clean, flat surface with the output end facing up. Place the thrust bearing [13], then the thrust washer [12] on shaft. Lightly coat the seal area of shaft with clean oil and place the plastic installation sleeve with the shaft seal [7] down onto the shaft, covering all splines, keyways and wire ring grooves. Slide the shaft seal down onto the shaft making sure that the lip on seal faces down (see Figure 2-20 for correct seal orientation) until it contacts the thrust washer. Remove the plastic installation sleeve. Carefully install the teflon backup seal [6] onto the shaft with the flat side up and the seal lip facing the shaft seal [7]. Place the metal backup shim [5] onto the shaft and against the teflon backup seal. Place the seal carrier [11] onto the shaft [large end down] and carefully press the seal carrier down onto the seal assembly using an arbor press and sleeve to compress the seals into the carrier.
7. With the pilot side facing up, place the housing [15] on spacers to raise the housing approximately 0,6 cm (**0.25 in.**) above work surface (spacers should allow the shaft to contact the work surface). Place the shaft/seal carrier assembly into the housing. Install the high pressure seal [4] into the groove in the housing. Install the metal backup shim [3] against the high pressure seal in the groove in the housing bore by squeezing the shim between thumb and forefinger to bow the shim. While maintaining a bow in the shim, start the shim into the groove and use a small screwdriver to push the shim into groove. Install the wire ring [2] into the groove making sure that the ends are butted.
8. While holding the shaft in the housing, place the housing/shaft assembly in a vise with the shaft end down. Making sure that end of the drive link [17] with the crowned splines goes into the shaft end, install the drive link into shaft and tap lightly to seat the seal carrier assembly against the wire ring [2]. Place the thrust bearing [13] over drive link. If the seal carrier [27] is properly seated against wire ring, the thrust bearing will be flush with the rear surface of the housing.
9. Install the housing seal [8] into the groove in the housing [15]. Place the manifold [18] onto the housing [15] (the side with only seven holes faces the housing). Install the manifold boot [19] over the manifold and align the bolt holes. Place the body seals [9] into the grooves in both sides of the rotor [21]. Place the rotor onto the manifold with the side of rotor with a chamfer in the splines facing the manifold.
10. Install the balance plate [22] onto the rotor [21] making sure the side with holes for the steel balls [23] faces up. Install the four steel balls into the holes in the balance plate. Install the end cover seal [10] into the groove in the end cover [24] and place the end cover onto the balance plate. Install the seven assembly bolts [26] and pre-torque to 13 N-m (**10 ft.lbs.**) Using the bolt torque sequence shown in Figure 2-23, final torque all bolts to 67,8 N-m (**50 ft.lbs.**).
11. Remove the motor from the vise and place it on the work surface with the shaft [27] facing up. Making sure that lip on the seal faces up, place the dust seal [1] over shaft. Using a sleeve and a hammer, carefully drive the dust seal into place.

FRONT AXLE 4WD

REMOVAL

1. Place the machine on a firm level surface and block the wheels to prevent the machine from rolling.
2. Loosen the wheel lug bolts on the motor to be removed.
3. Raise the front of the machine using a 2-ton jack.
4. Position two 1-ton jack stands under the front axle to prevent the machine from falling if the jack fails.
5. Remove the wheel nuts and wheel.
6. Tag and disconnect the hose assemblies.
7. Remove the screw and nut from the end of the steering link. Swing the connecting link clear of the steering link.
8. Remove the "E" ring from the steering link pin.
9. Lift the connecting link off of the steering link pin.
10. Swing the trunnion assembly around to gain access to the inside.
11. Remove the four nuts from inside the trunnion and remove the drive motor/hub assembly.

CAUTION

ONLY use a wheel puller to remove the hub. Using any other method of removal may damage the drive motor housing and void the warranty.

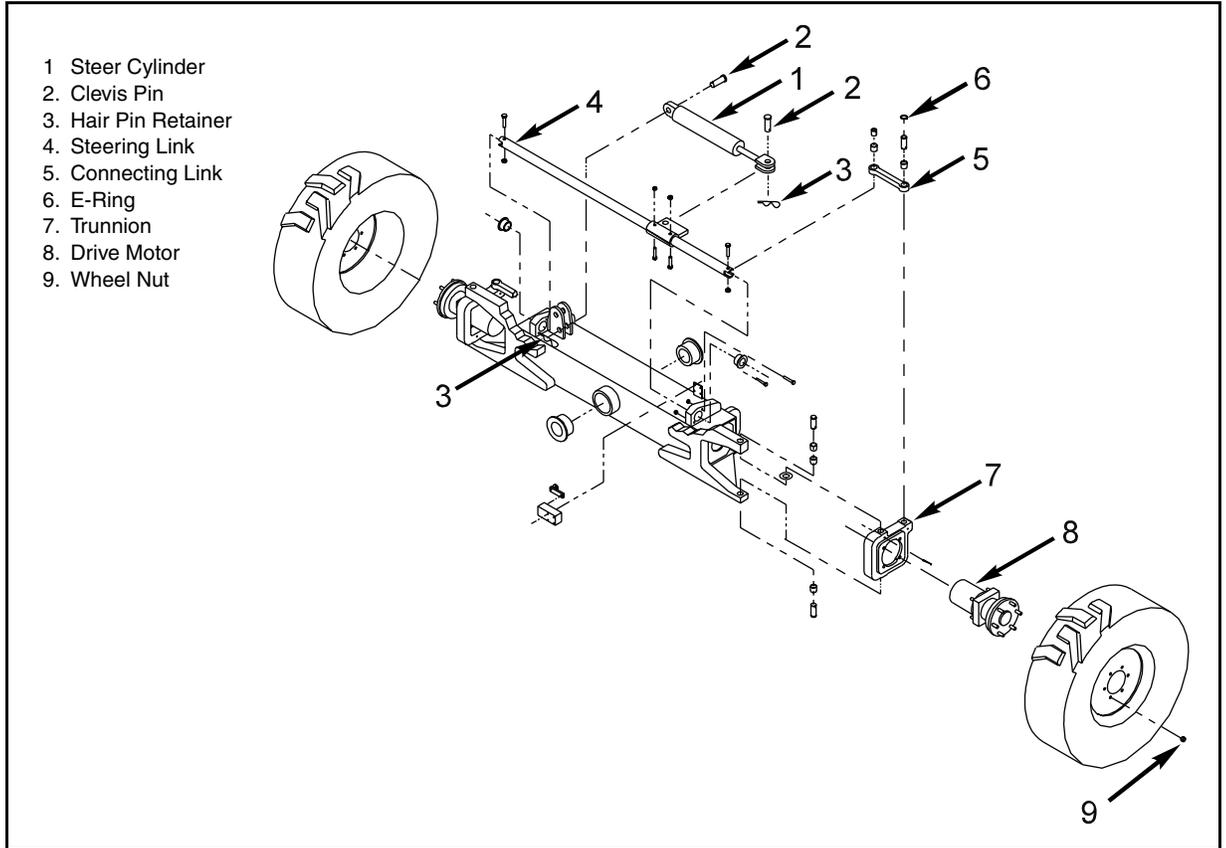
Clean all fittings before disconnecting the hose assemblies.

Plug all port holes and hose assemblies IMMEDIATELY to prevent contamination from dust and debris.

INSTALLATION

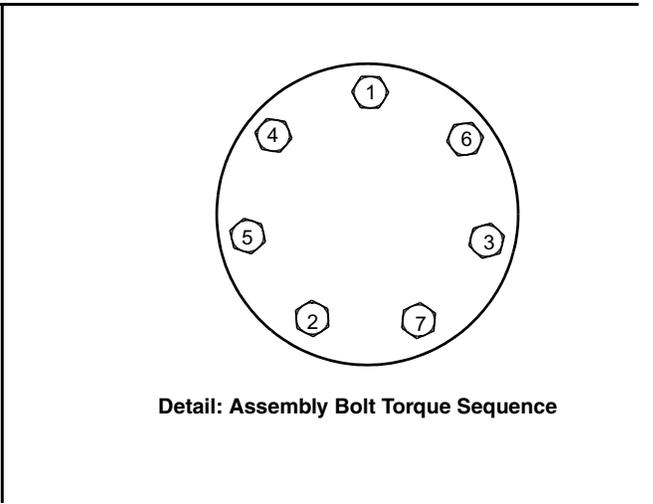
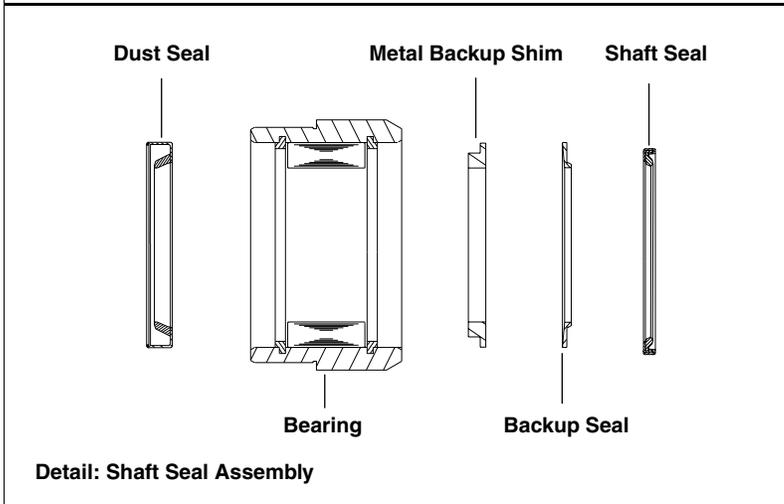
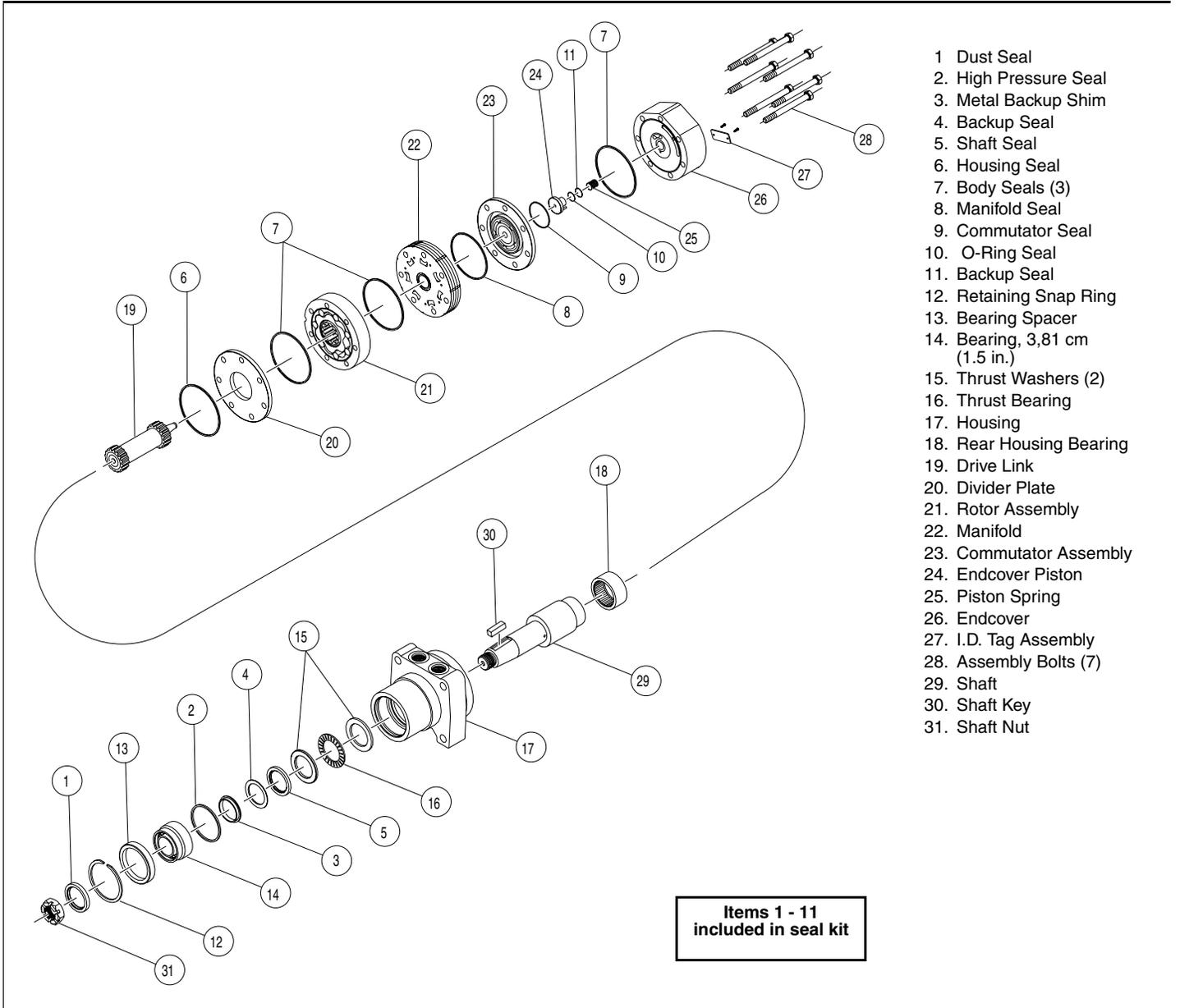
1. Position the drive motor/hub assembly into the steering trunnion and secure with the four nuts, tighten.
2. Install the connecting link onto the steering link pin and secure with the "E" ring.
3. Swing the connecting link toward the steering link, and align the holes. Install the screw and nut, tighten.
4. Install the hose assemblies.
5. Install the wheel and wheel nuts onto the hub. Torque the wheel nuts to 203 N-m (**150 ft. lbs.**).
6. Remove the jack stands used to block the wheels. Lower the jack and remove.
7. Operate the drive system to check for leaks.
Operate the drive system to check for leaks.

Figure 2-24: Front Axle Assembly, 4WD



SEAL REPLACEMENT, FRONT MOTOR

Figure 2-25: Front Drive Motor Assembly



FRONT MOTOR DISASSEMBLY/ASSEMBLY

1. To aid in reassembly of the motor, make a "V" shaped set of lines from the endcover [26] to the housing [17] using either paint or a marker. With the shaft facing down, secure the motor in a vise by clamping onto the housing.
2. Loosen and remove the seven bolts [28] holding the motor assembly together. Remove the endcover [26] carefully as the piston [24] and spring [25] may fall out. If the piston does not come out, carefully pry it out of the endcover and set aside. Remove the o-ring seal [10] and white backup seal [11] from the endcover and discard the seals. Remove the spring [25] and set aside.
3. Lift the commutator container and commutator [23] from the motor and set aside. Place the commutator on a flat, clean surface with the seal [9] facing up. Place the tip of a small screwdriver on the seal and gently tap until the opposite side of the seal lifts from the groove. Remove and discard the seal.
4. Remove the manifold [22], rotor assembly [21] and divider plate [20] being careful not to allow rollers to drop from the rotor assembly. Remove all seals [6-8] from the components and discard. Remove the drive link [19] and set aside.
5. Remove all shaft related components from the shaft [29] (i.e. keys, wire rings, nuts, etc.). Secure the motor in a vise by clamping onto the housing. Remove the retaining ring [12] from the groove in the housing pilot [17]. Remove the spacer [13] from the housing. Remove the shaft [29] from the housing, then remove the bearing [14], thrust bearing [16] and two thrust washers [15] from the shaft.
6. Being careful not to drop any rollers from the bearing [14], pry out the shaft seal [5], backup seal [4], and dust seal [1] from the bearing assembly. **(Note: The metal backup ring [3] may or may not come out of the bearing. It is not necessary to remove the metal backup ring from the bearing to service the motor.)** Remove the high pressure seal [2] from the groove in the housing pilot. Discard the shaft seal [5], backup seal [4] and high pressure seal [2].
7. At this point, all parts should be cleaned in an oil-based solvent and dried using compressed air (observe all safety guidelines). All new seals should be lightly coated with clean oil prior to installation.
8. Install the high pressure seal [2] into the groove in the housing pilot [17]. Place the shaft [29] on a clean, flat surface with the output end facing up. Place a thrust washer [15], thrust bearing [16] and second thrust washer over the shaft. Using a plastic installation sleeve, place the shaft seal [5] over the shaft making sure that the lip on the seal faces down (see *Detail: Shaft Seal Assembly* in Figure 2-25). Repeat the process for the backup seal [4], making sure that the lip on the seal faces down. If the metal backup ring [3] came out of the bearing [14], place it over the shaft [29] making sure that the large O.D. side faces down. Lightly grease the bearing if needed. Place the bearing over the shaft making sure that the large O.D. side faces down. Using an arbor press, carefully press the bearing down to press the seal assembly [3-5] into the bearing.
9. Place the shaft [29] assembly into the housing [17]. Install the dust seal [1] over the shaft with the lip facing up (see *Detail: Shaft Seal Assembly* in Figure 2-25) and carefully press the seal down to seat it into the bearing [14]. Place the bearing spacer [13] over the shaft. Install the retaining ring [12] into the groove in the housing pilot. **(NOTE: It may be necessary to lightly tap the retaining ring [12] and bearing spacer [13] to allow the retaining ring to seat properly.)** Replace all shaft related components (i.e. keys, wire rings, nuts, etc.).
10. Install the drive link [19] into the end of the shaft with the tapered end facing up. Place the rear housing seal [6] into the groove in the housing [17]. Place the body seals [7] into the grooves in both sides of the rotor [21]. Place the rotor into the housing with the chamfer in the splines facing the housing. Place the manifold [22] over the rotor with the seal groove side up. Install the manifold seal [8].
11. Install the commutator seal [9] into the commutator [23] with the metal side facing up. Use finger pressure to press the seal down flush with the surface of the commutator. Place the commutator container into the manifold [22] and then place the commutator onto the protruding end of the drive link [19], making sure that the seal side faces up.
12. Install the remaining body seals [7] into the groove in the face of the endcover [26]. Install the piston spring [25] into the endcover, then the white backup seal [11], followed by the o-ring seal [10]. Lining up the alignment pin with the hole in the end cover, press the piston [24] into the endcover. While holding the piston in the endcover, lower the endcover assembly onto the motor. Check to make sure that the endcover ports are in their original position.
13. Install the seven assembly bolts [28] and pre-torque to 13 N-m (10 ft. lbs.). Final torque all bolts to 67,8 N-m (50 ft. lbs.). Follow the bolt torque sequence shown in Figure 2-25.

2-10 AXLE FLOAT CYLINDER (4WD ONLY)

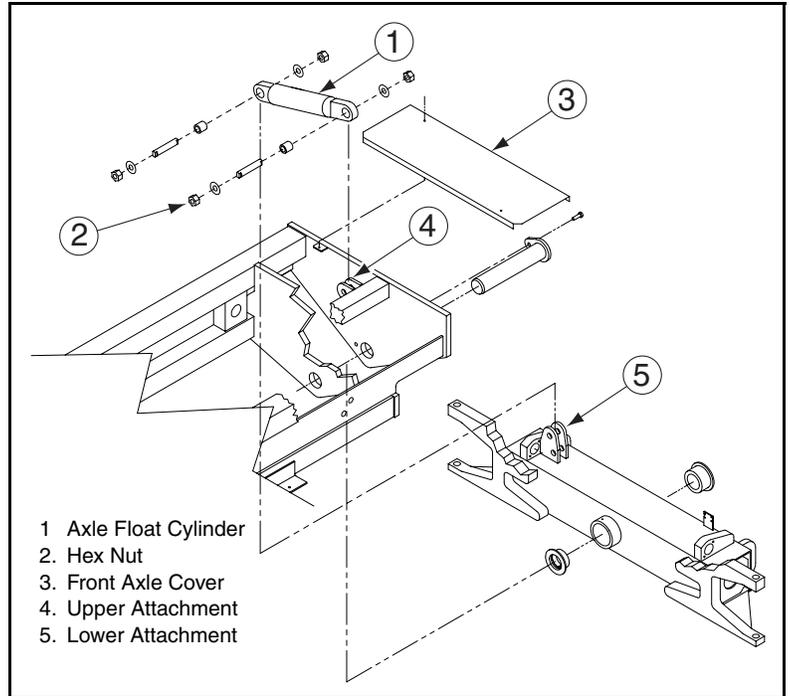
Figure 2-26: Floating Axle Assembly

REMOVAL

Refer to Figure 2-26.

NOTE: Be sure platform is fully lowered and that machine is on a firm level surface.

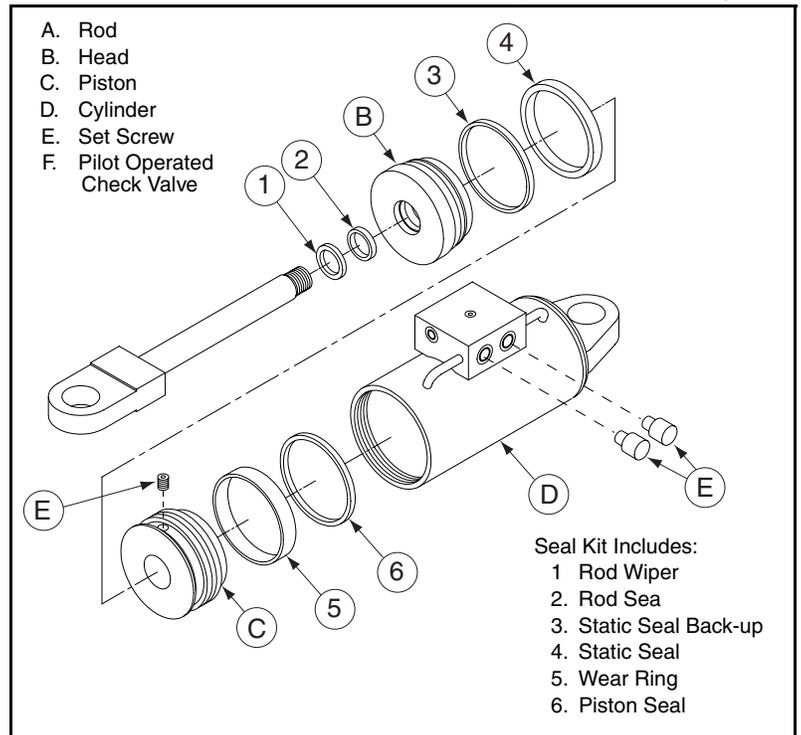
1. Lift the chassis with a 2-ton jack, and place 1-ton jackstands underneath the left and right frame members just behind the articulating axle assembly. Lower the jack. The weight of the front of the chassis should *now* be supported by the jackstands, and the front wheels should *still* be allowed to touch the ground.
2. Remove the four screws from the front axle cover and remove the cover.
3. Remove and cap the hoses.
4. Remove the hex nuts from the cylinder pins at both ends and remove the pins.
5. Remove the cylinder from of the chassis.



SEAL REPLACEMENT

Refer to "Cylinder Repair" in the General Information section, and Figure 2-27.

Figure 2-27: Axle Float Cylinder



INSTALLATION

1. Remove the pilot operated check valves and completely fill both ends of cylinder with hydraulic fluid. Replace the pilot operated check valves.
2. Attach both ends of the cylinder to the upper and lower attachments with cylinder pins.
3. Install the hex nuts onto the cylinder pins and tighten.
4. Remove the jackstands from under the chassis.
5. Operate the machine over rough terrain and check for proper function and leaks.

TEST AXLE LOCK FUNCTION

The axle float cylinder should lock the front axle into a fixed position when the work platform is elevated.

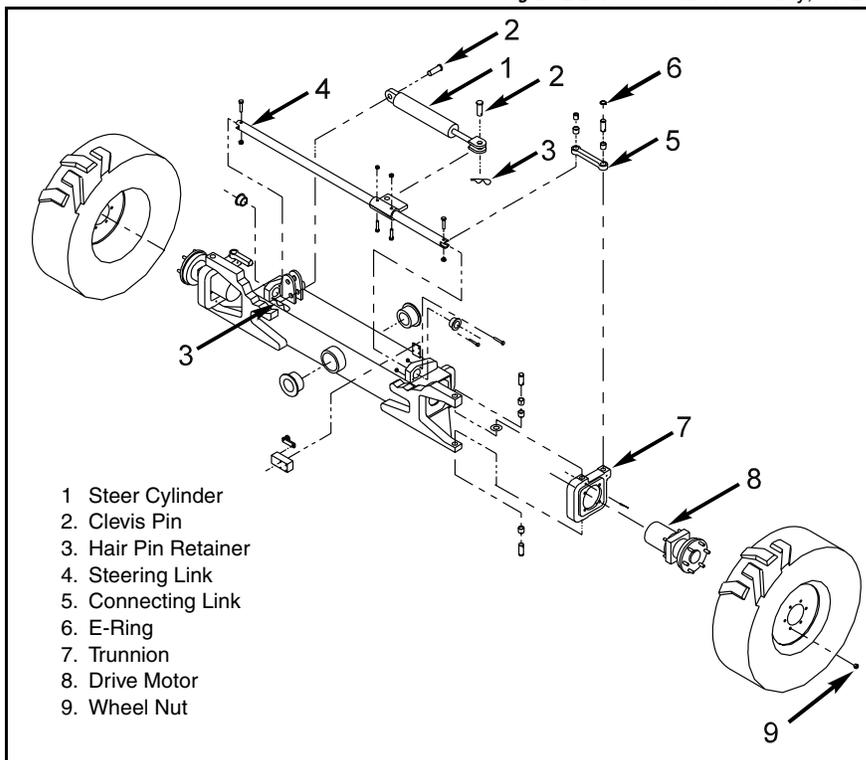
1. Move the machine to a firm, level surface.
2. Drive a front wheel onto a block approximately 10 cm (4 in.) high.
 - The front axle should pivot.
3. Elevate the platform to 3 m (10 ft.).
4. Turn the machine OFF.
5. Place a 2-ton jack under the frame member just behind the wheel that is on the block.
6. Lift the machine just enough to raise the wheel above the block.
7. Remove the block and lower the machine, and remove the jack.
 - The wheel should remain elevated (axle locked).
8. Start the machine.
9. Lower the platform completely.
10. Drive the machine.
11. The axle should release, allowing the wheel to lower to the surface.

2-11 STEERING CYLINDER

REMOVAL

1. Remove the two capscrews holding the front axle cover in place (4WD only).
2. Remove and cap the hoses. Mark them for reference.
3. Remove the hair pin retainers from the clevis pins at each end of the cylinder.
4. Remove the clevis pins.
5. Remove the cylinder from the chassis.

Figure 2-28: Front Axle Assembly, 4WD



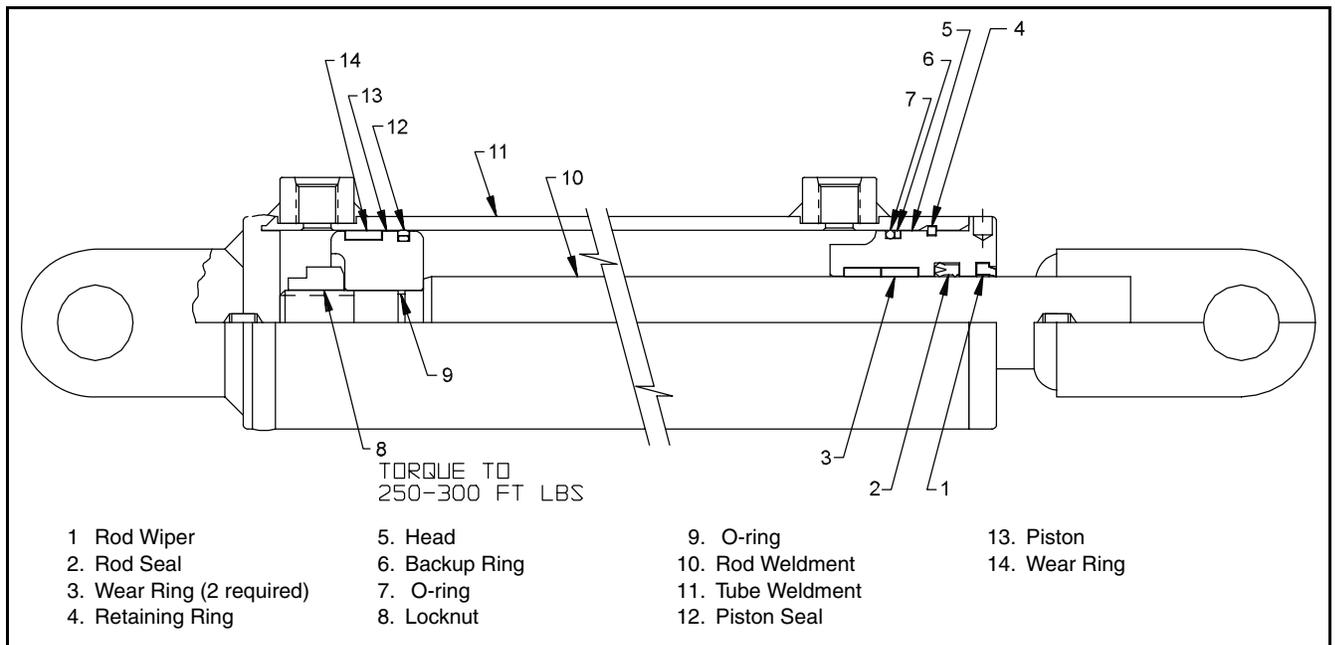
SEAL REPLACEMENT

Refer to "Cylinder Repair" in the General Information section, and Figure 2-29.

INSTALLATION

1. Align the ends of the cylinder with the mounts on the chassis.
 2. Install the clevis pins.
 3. Install the hair pin retainers into the clevis pins at each end of the cylinder.
 4. Install the hoses, noting their orientation markings from disassembly.
- Install the front axle cover and the two capscrews holding it in place and tighten (4WD only).

Figure 2-29: Steering Cylinder Cross Section



2-12 LIFT CYLINDERS

REMOVAL

1. Elevate and block the elevating assembly (See Figure 2-2).
2. Open emergency lowering valve to be sure all pressure is out of the lift cylinder.
3. Remove and cap both hoses and fittings.
4. Remove the down valve and cable assembly.
5. Support the lift cylinder with a suitable lifting device to prevent falling.
6. Remove the retaining bolts from the upper and lower pivot pins.
7. Drive out the pivot pins, upper one first, then the lower one.
8. Hoist the cylinder out of the elevating assembly from the front. **DO NOT sling the cylinder by the rod end pivot, this will cause the cylinder to extend when hoisted.**

SEAL REPLACEMENT

Refer to "Cylinder Repair" in the General Information section, and Figure 2-31.

INSTALLATION

NOTE: Before installing the cylinder, check the pins and bearings for excessive wear. Replace if necessary.

1. Using a suitable lifting device, lower the cylinder into the elevating assembly from the front. **DO NOT sling the cylinder by the rod end pivot, this will cause the cylinder to extend when hoisted.**
2. Align the pivots and install the pivot pins, lower one first, then the upper one.
3. Install the retaining bolts into the pivot pins.
4. Install the down valve and cable assembly. Adjust the cable to stop on the collar of the cable jacket, before the down valve reaches the full extent of its pull. The down valve may leak if the cable is allowed to pull the spool of the valve beyond its limit.
5. Install the hoses.
6. Lift and lower the machine for several cycles to work out the air. Check for leaks, repair as necessary.

Figure 2-30: Lift Cylinder Cross Section - Serial Number 4022 to 4129

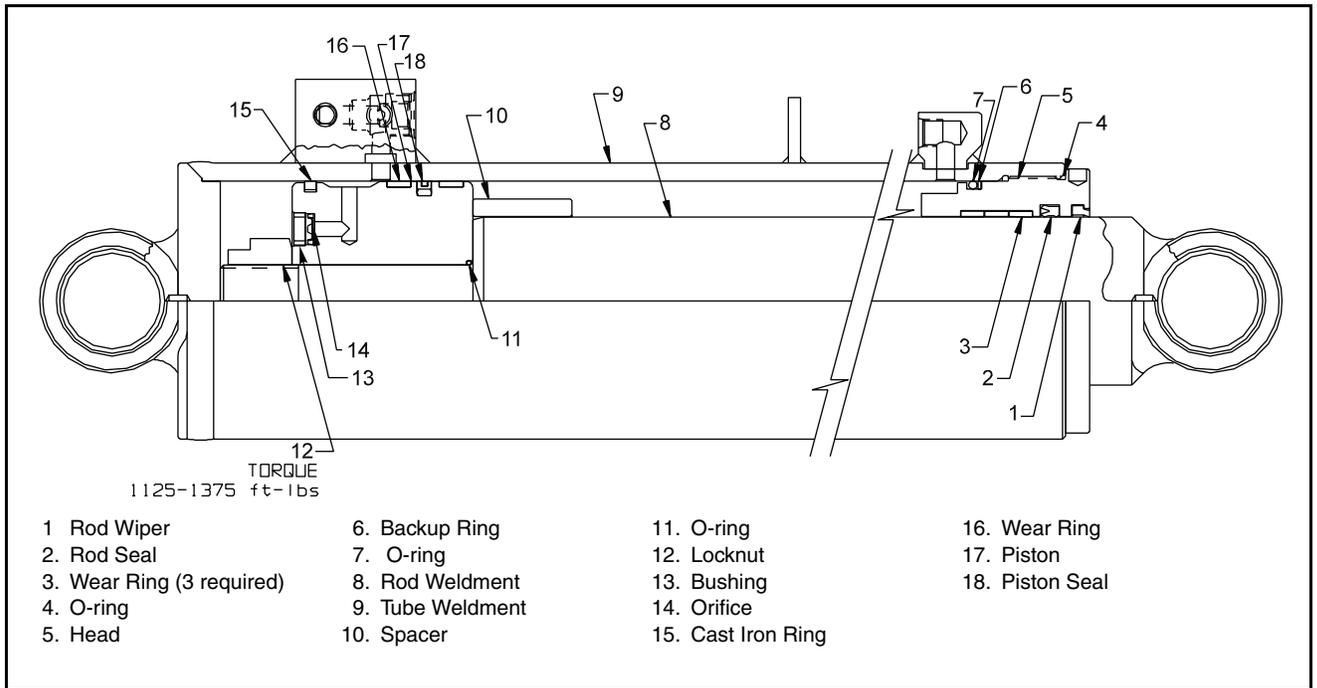
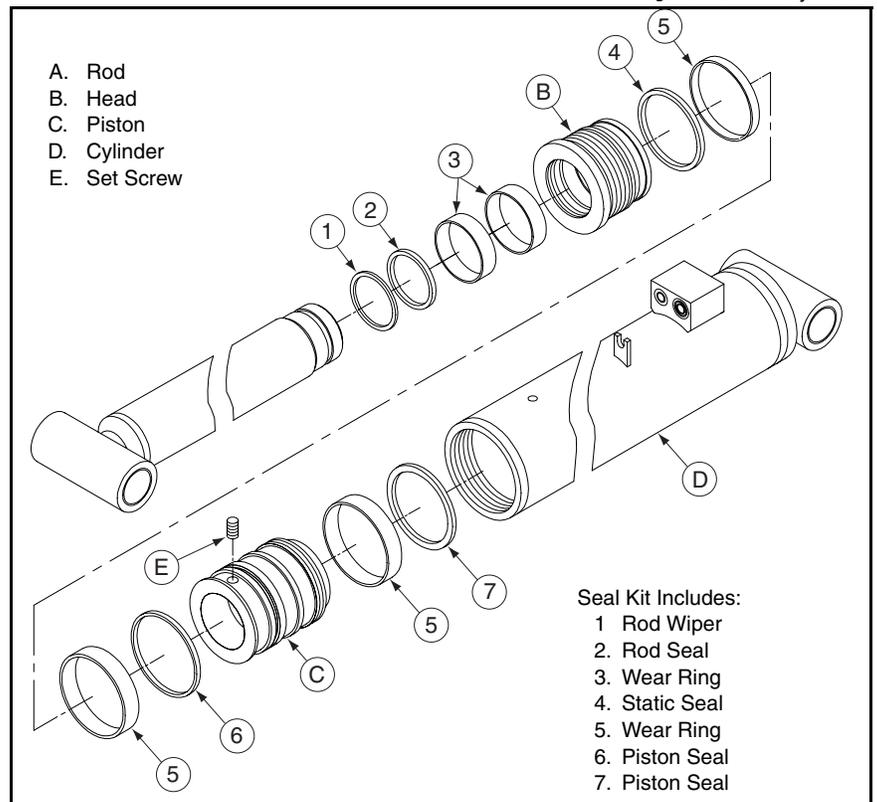


Figure 2-31: Lift Cylinder



2-13 OUTRIGGER CYLINDER (OPTIONAL)

REMOVAL

Refer to Figure 2-32.

1. Remove the plug from the top of the outrigger cylinder.
2. Disconnect the wires from the pressure Switch and the ball Switch. Tag them for identification during reassembly.
3. Unscrew the strain relief and pull the wires out of the top of the cylinder.
4. Remove and cap the hoses. Tag them for identification during reassembly.
5. Remove the four capscrews, nuts, and washers holding the outrigger cylinder to the outrigger support weldment.
6. Remove the outrigger cylinder.

SEAL REPLACEMENT

Refer to "Cylinder Repair" in the General Information section, and Figure 2-33.

INSTALLATION

1. Install the outrigger cylinder to the outrigger support weldment using the four capscrews, nuts, and washers; tighten.
2. Install the hoses exactly as disassembled.
3. Thread the wires for the pressure Switch and the ball Switch through the strain relief.
4. Reattach the wires to the Switches exactly as disassembled.
5. Tighten strain relief.
6. Install plug to top of outrigger cylinder.

Figure 2-32: Outrigger Cylinder Installation

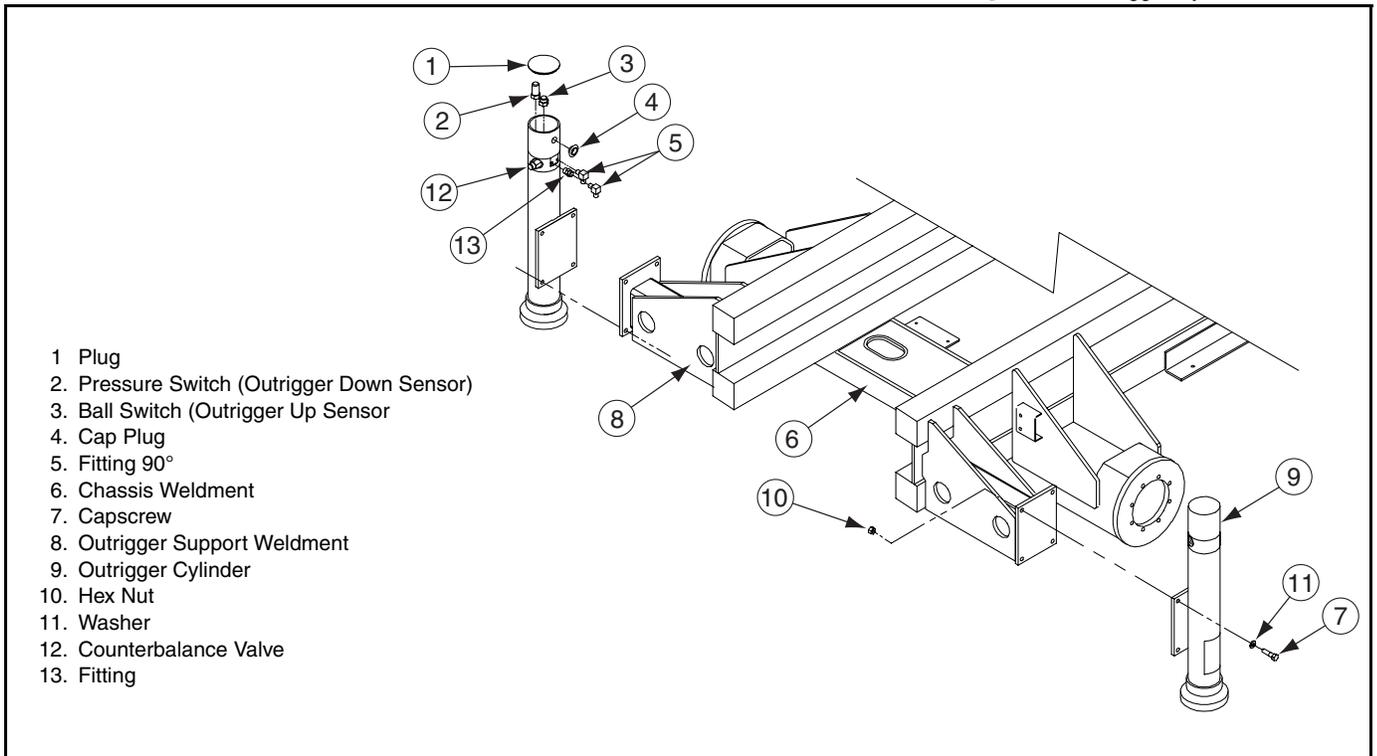
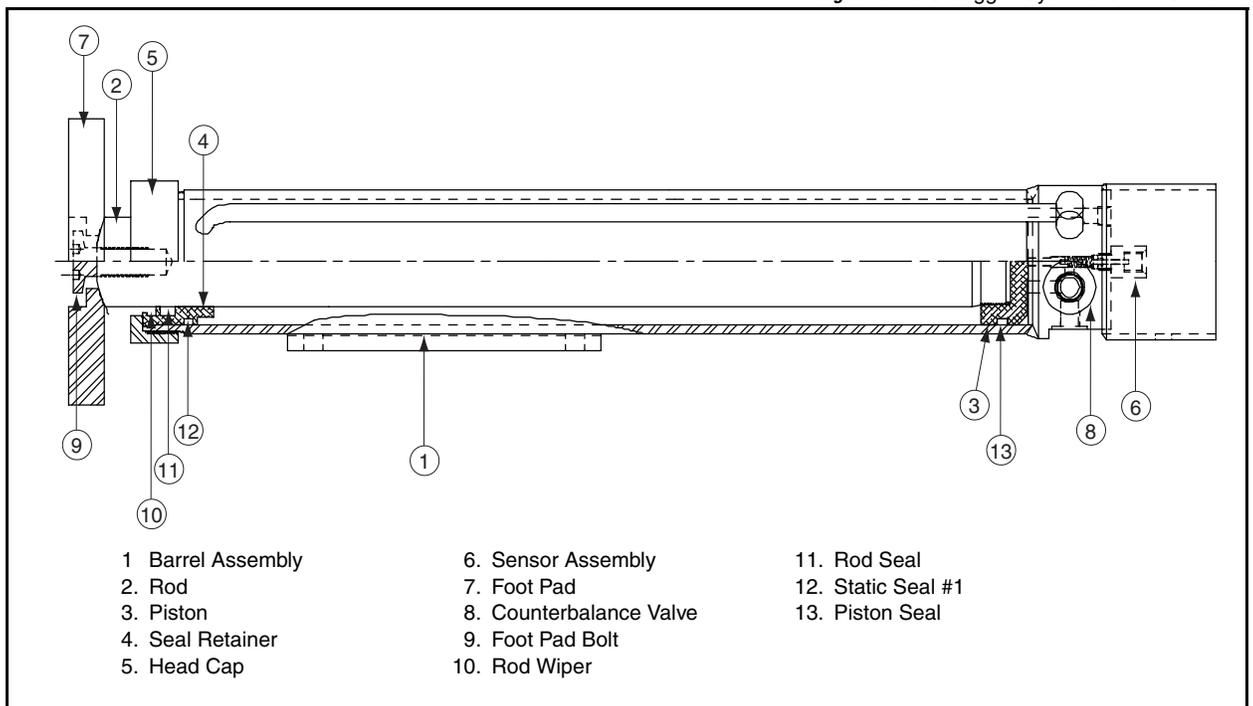


Figure 2-33: Outrigger Cylinder Cross Section



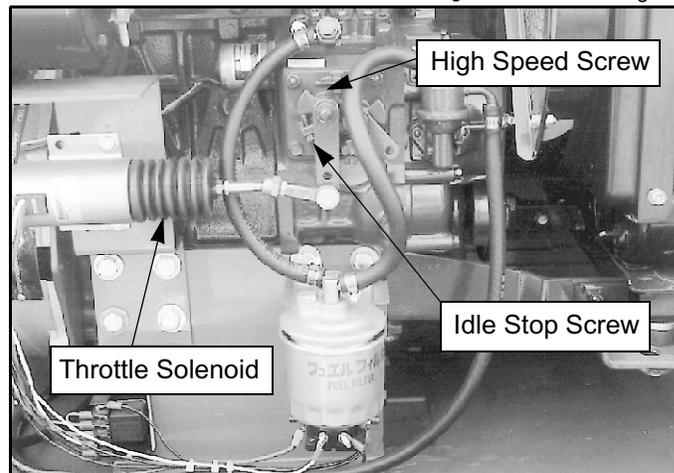
2-14 ENGINE ADJUSTMENTS

Use the following procedures to set engine speeds for diesel engines. For complete service information on Kubota engines, consult the Kubota Work Shop Manual for your engine.

Figure 2-34: Diesel Engine

IDLE SPEED

1. Warm up the engine for 20 minutes.
2. Allow the engine speed to slow to complete idle.
3. Adjust the idle stop screw until the RPM reaches 1350 ± 50 .
4. Apply one drop of sealant to protect the adjustment from vibration.



HIGH SPEED

1. Warm up the engine for 20 minutes.
2. Press the throttle button to put the engine in high speed.
3. Adjust the high speed screw until the RPM reaches 3000 ± 50 .
4. Apply one drop of sealant to protect the adjustment from vibration.

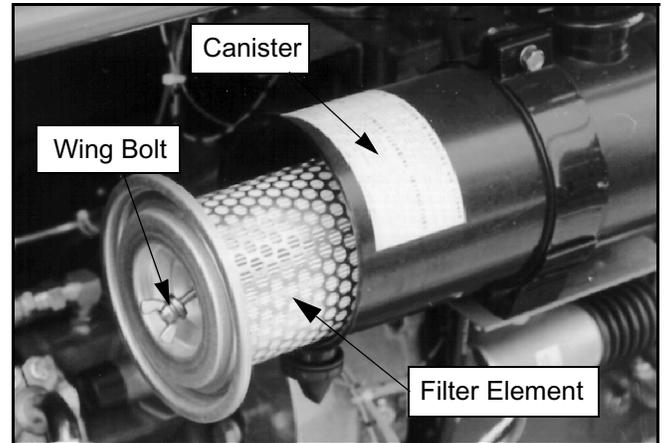
FILTER REPLACEMENT

IMPORTANT: The engine should be OFF when replacing filter elements.

Use the following procedures for replacing the engine air and fuel filters. Refer to "Lubrication" on page 2-9 for hydraulic and engine oil filter replacement procedures.

AIR FILTER ELEMENT

1. Remove the wingbolt from the filter canister.
2. Remove and replace the filter element.
3. Replace the wingbolt, tighten.

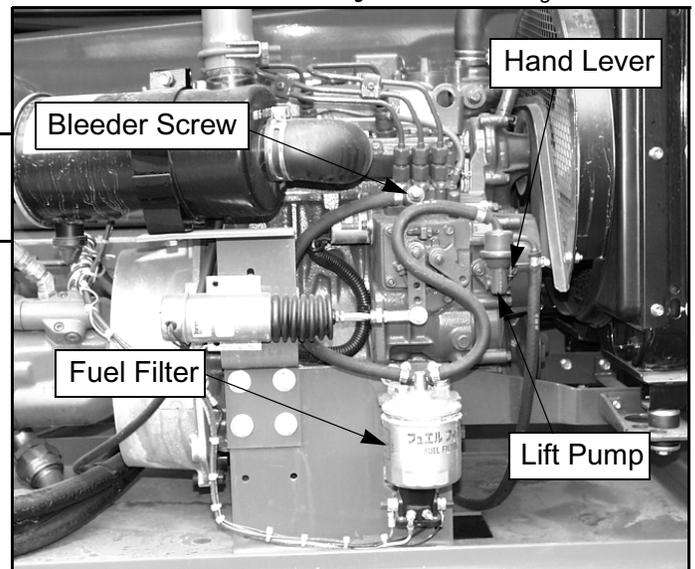


FUEL FILTER

CAUTION

Always wear protective eye-wear when performing maintenance on fuel system components.

1. Provide a suitable container to catch spilled fuel, place under the fuel filter assembly.
2. Clean the area around the filter.
3. Use a filter wrench to unscrew the fuel filter.
4. Remove and replace the filter.
5. Loosen the bleeder screw on the injector pump.
6. Operate the lift pump hand lever to pump fuel through the filter and up to the injector pump. Continue to pump until all of the air is bled from the system.
7. Tighten the bleeder screw.



NOTES:

TROUBLESHOOTING

INTRODUCTION

This section contains troubleshooting Truth Tables for the LX 31, LX41 and LX50 Work Platforms powered by internal combustion engines.

Careful inspection and accurate analysis of the symptoms listed in the Troubleshooting Guide will localize the trouble more quickly than any other method. This manual cannot cover all possible problems that may occur. If a specific problem is not covered in this manual, call our toll free number for service assistance.

Referring to the Operator Manual and the Schematics section will aid in understanding the operation and function of the various components and systems of the Work Platform and help in diagnosing and repair of the machine.

⚠ WARNING ⚠

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

When performing any service which requires the platform to be raised, the Elevating Assembly must be blocked.

Disconnect the battery when replacing or testing the continuity of any electrical component.

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3-1 TECHNICAL SUPPORT

Technical Support is available by telephone or FAX.

**UPRIGHT
USA** Tel: 1-800-926-5438
FAX: 1-559-662-4785

**UPRIGHT
EUROPE** Tel: +353-1-620-9300
FAX: +353-1-620-9301

3-2 GENERAL PROCEDURE

Thoroughly study hydraulic and electronic schematics in **the Schematics section**. Check for loose connections and short circuits. Check/repair/replace each component in the Truth Table which is listed under each machine function which does not operate properly.

Determine whether the problem is mechanical (interference), electrical or hydraulic. Some functions require power at more than one solenoid.

Use the charts on the following pages to help determine the cause of a fault in your UpRight work platform

NOTE: Spike protection diodes at components have been left out of the charts to eliminate confusion.

3-3 TROUBLESHOOTING PROCEDURES

1. Verify your problem.
 - Do a full function test from both platform controls and chassis controls and note all functions that are not operating correctly.
2. Narrow the possible causes of the malfunction.
 - Use the troubleshooting guide to determine which components are common to all circuits that are not functioning correctly.
3. Identify the problem component.
 - Test components that are common to all circuits that are not functioning correctly. Remember to check wires and terminals between suspect components. Be sure to check connections to battery negative.
4. Repair or replace component found to be faulty.
5. Verify that repair is complete.
 - Do a full function test from both platform and chassis controls to verify that all functions are operating correctly and machine is performing to specified values

3-4 ADJUSTMENT PROCEDURES

- Hydraulic settings must be checked whenever a component is repaired or replaced.
- Connect a pressure meter of appropriate range to the test port located on the hydraulic manifold.
- Correct pressure settings are listed in the hydraulic schematic.

3-5 CHECKING PUMP PRESSURES

- Remove hose from pump port, and connect pressure tester.

NOTES:

3-6 ELECTRICAL TRUTH TABLES

DIESEL MODELS

COMPONENT		FUNCTION	MOTOR START & RUN	UPPER CONTROL FUNCTIONS	LOWER CONTROL FUNCTIONS	RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	DOWN ALARM	TILT ALARM
ALM1	Alarm					X							X	X
ALT	Alternator		X											
BAT	Battery		X				X							
CB1	Circuit Breaker		X		X	X	X	X	X					
CB2	Circuit Breaker, Emergency Stop				X	X	X	X	X					
*CB3	Circuit Breaker				X									
*CB4	Circuit Breaker							X	X					
*CB5	Circuit Breaker							X	X	X				
*CB6	Circuit Breaker													
*CB7	Circuit Breaker							X	X	X				
*CB8	Circuit Breaker		X	X	X	X	X	X	X	X				
CB9	Circuit Breaker		X	X	X	X	X	X	X	X				
*CB10	Circuit Breaker		X	X										
*CB13	Circuit Breaker													
*CB14	Circuit Breaker													
CB15	Circuit Breaker				X									
D1	Diode		X											
D2,3	Diodes							X	X	X				
D4	Diode			X										
*D5-40,53	Diodes							Spike Protection						
DIST	Distributor		X											
FP	Fuel Pump		X											
J1	Jumper, Axle Float Setting				X									
J2	Jumper, 8 Meter Limit Setting					X		X	X	X				
J3	Jumper, Outrigger Setting					X		X	X	X				
J4	Jumper, Outrigger Setting					X		X	X	X				
L1	LED, Drive Enable													
L3	LED, Forward													
L4	LED, Reverse													
L5	LED, Drive													
L6	LED, Up													
L7	LED, Torque													
L8	LED, Axle Float													
L9	LED, Down													
L10	LED, Steer Right													
L11	LED, Steer Left													
L12	LED, Throttle													
L13	LED, Glow Plug													
PCB1	Circuit Board, Upper Controller			X		X		X	X					
PS1	Oil Pressure Switch		X											
*R1	Relay, Series Parallel							X	X	X				
*R2	Relay, Axle Float				X									
*R3	Relay, Down Alarm												X	
*R4	Relay, Steer Right										X			
*R5	Relay, Steer Left											X		
*R6	Relay, Throttle							X	X	X				
*R7	Relay, Up					X	X							
*R8	Relay, Glow		X	X	X	X	X	X	X	X				
*R10	Relay, Reverse								X					
*R11	Relay, Forward							X						
*R13	Relay, Platform Down					X	X							
*R14	Relay, Lift Cutout					X								
*R15	Relay, Drive Cutout							X	X	X				
*R16	Relay, PWM Cutout				X									
*R17-18	Relays, Drive							X	X	X				
*R19-20	Relays, Drive/Lift					X	X	X	X	X				
*R21	Relay, Power		X	X	X	X	X	X	X	X	X	X	X	X

COMPONENT		FUNCTION	MOTOR START & RUN	UPPER CONTROL FUNCTIONS	LOWER CONTROL FUNCTIONS	RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	DOWN ALARM	TILT ALARM
R22	Relay, Throttle		X											
R23	Relay, Glow Plug		X											
R30	Relay, Upper Control Power			X										
*R32	Relay, Start			X	X									
RES1	Resistor, Glow Plugs		X											
RES3	Resistor, Forward LED	Provides power to corresponding LED												
RES4	Resistor, Reverse LED													
RES5	Resistor, Drive LED													
RES6	Resistor, Up LED													
RES7	Resistor, Torque LED													
RES8	Resistor, Axle Float LED													
RES9	Resistor, Down LED													
RES10	Resistor, Steer Right LED													
RES11	Resistor, Steer Left LED													
RES12	Resistor, Throttle LED													
RES13	Resistor, Glow Plug LED													
S1	Switch, Micro			X		X	X	X	X					
S2	Switch, Reverse Micro			X			X		X					
S3	Switch, Forward Micro				X		X	X						
S4	Switch, Micro Interlock			X		X	X	X			X	X		
S5	Switch, Steering Micro			X							X	X		
S6	Switch, Drive			X		X	X	X	X					
S7	Switch, Lift			X		X	X	X	X					
S8	Switch, Torque			X				X	X	X				
S9	Switch, Ignition		X											
S10	Switch, Glow		X											
S11	Switch, Emergency Stop		X											
S14	Switch, Starter		X											
S15	Switch, Glow		X											
S16	Switch, Engine Stop		X											
S17	Switch, Down				X		X							
S18	Switch, Lift				X	X								
S19	Switch, Throttle		X											
S20	Switch, Emergency Stop		X											
S21	Switch, Chassis/Platform			X	X									
S22-23	Switches, Platform Down									X				X
S24	Switch, Up Limit					X								
**S25	Switch, Axle Float							X	X	X				
SEN1	Sensor, Tilt					X				X				X
SOL1	Solenoid, Throttle		X											
SOL5	Solenoid, Kubota Run		X											
SOL6	Solenoid, Proportional					X		X	X					
SOL7	Solenoid, Forward							X						
SOL8	Solenoid, Reverse								X					
SOL9	Solenoid, Up					X								
**SOL10	Solenoid, Shunt							X	X	X				
SOL11	Solenoid, Series/Parallel							X	X	X				
**SOL12	Solenoid, Axle Float							X	X	X				
SOL13	Solenoid, Down						X							
SOL14	Solenoid, Steer Right										X			
SOL15	Solenoid, Steer Left											X		
SOL17	Solenoid, Series/Parallel							X	X	X				
STR	Starter		X											

* On Printed Circuit Board - not serviceable.
 ** For Four Wheel drive models only.

OUTRIGGER OPTION

COMPONENT		FUNCTION	DEPLOY OUTRIGGERS	RETRACT OUTRIGGERS
CB11	Circuit Breaker		X	X
J3	Jumper, Outrigger Setting			
J4	Jumper, Outrigger Setting			
L14,16,18,20	LED, Outrigger Extend		X	
L15,17,19,21	LED, Outrigger Retract			X
PS2-5	Pressure Switches, Outrigger		X	
R24	Relay, Outrigger Extend (Right-Front)		X	
R25	Relay, Outrigger Retract (Right-Front)			X
R26	Relay, Outrigger Extend (Left-Front)		X	
R27	Relay, Outrigger Retract (Left-Front)			X
R28	Relay, Outrigger Extend (Right-Rear)		X	
R29	Relay, Outrigger Retract (Right-Rear)			X
R30	Relay, Outrigger Extend (Left-Rear)		X	
R31	Relay, Outrigger Retract (Left-Rear)			X
R32	Relay, Outrigger Power		X	X
*R33	Relay, Outrigger Pressure Switch Override			X
**R34	Relay, Override 2			
S27-30	Switches, Drive Interlock			X
S51	Switch, Outrigger Extend/Retract (Left-Front)		X	X
S52	Switch, Outrigger Extend/Retract (Left-Rear)		X	X
S53	Switch, Outrigger Extend/Retract (Right-Rear)		X	X
S54	Switch, Outrigger Extend/Retract (Right-Front)		X	X
SOL20	Solenoid, Outrigger Extend (Left-Front)		X	
SOL21	Solenoid, Outrigger Retract (Left-Front)			X
SOL22	Solenoid, Outrigger Extend (Right-Front)		X	
SOL23	Solenoid, Outrigger Retract (Right-Front)			X
SOL24	Solenoid, Outrigger Extend (Left-Rear)		X	
SOL25	Solenoid, Outrigger Retract (Left-Rear)			X
SOL26	Solenoid, Outrigger Extend (Right-Rear)		X	
SOL27	Solenoid, Outrigger Retract (Right-Rear)			X

3-7 HYDRAULIC TRUTH TABLES**TWO WHEEL DRIVE MODELS**

FUNCTION		RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	BRAKES
COMPONENT									
CP1	Cavity Plug			X	X	X			
CP2	Cavity Plug	X		X	X	X	X	X	X
CV1	Check Valve			X	X	X			
CYL1	Cylinder, Steering						X	X	
CYL2,3	Cylinders, Lift	X	X						
CYL4,5	Cylinders, Brake			X	X	X			X
MOT1,2	Motors, Rear Drive			X	X	X			
ORF1	Orifice, Steering						X	X	
ORF2,3	Orifices, Down		X						
ORF4	Orifice, Brake								X
P1	Pump, Hydraulic	X		X	X	X	X	X	X
P2	Pump, Brake Release								X
RV1	Relief Valve, Steering						X	X	
RV3	Relief Valve, Lift	X							
RV4,5	Relief Valves, Bi-Directional			X	X	X			
SV1	Shuttle Valve, Sense Line						X	X	
SV2	Shuttle Valve, Sense Line	X		X	X	X	X	X	
SV3	Shuttle Valve, Drive			X	X				
SV4	Shuttle Valve, Sense Line	X		X	X	X	X	X	
V1	Valve, Steering						X	X	
V2	Valve, Emergency Down		X						
V3	Valve, Proportional	X		X	X	X			
V4	Valve, Lift	X							
V5	Valve, Forward			X		X			
V6	Valve, Reverse				X	X			
V7	Valve, Reverse Counterbalance				X				
V8	Valve, Forward Counterbalance			X					
V9,10	Valves, Series/Parallel			X	X	X			
V11	Valve, Flow Divider			X	X	X			
V12,13	Valves, Down		X						
V14,15	Valves, Velocity Fuse		X						

FOUR WHEEL DRIVE MODELS

COMPONENT		FUNCTION	RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	BRAKES
CP1	Cavity Plug				X	X	X			
CV1	Check Valve				X	X	X			
CYL1	Cylinder, Steering							X	X	
CYL2,3	Cylinder, Lift		X	X						
CYL4,5	Cylinders, Brake				X	X	X			
CYL6	Cylinder, Axle Float				X	X				
MOT1,2	Motors, Rear Drive				X	X	X			
MOT3,4	Motors, Front Drive				X	X	X			
ORF1	Orifice, Steering							X	X	
ORF2,3	Orifice, Down			X						
ORF4	Orifice, Brake									X
P1	Pump, Hydraulic		X		X	X	X	X	X	X
P2	Pump, Brake Release									X
RV1	Relief Valve, Steering							X	X	
RV3	Relief Valve, Lift		X							
RV4,5	Relief Valve, Bi-Directional				X	X	X			
SV1	Shuttle Valve, Sense Line							X	X	
SV2	Shuttle Valve, Sense Line		X		X	X	X	X	X	X
SV3	Shuttle Valve, Drive				X	X	X			X
SV4	Shuttle Valve, Sense Line		X		X	X	X	X	X	X
V1	Valve, Steering							X	X	
V2	Valve, Emergency Down			X						
V3	Valve, Proportional		X		X	X	X	X	X	
V4	Valve, Axle Float				X	X				
V5	Valve, Forward				X		X			
V6	Valve, Reverse					X				
V7	Valve, Reverse Counterbalance					X				
V8	Valve, Forward Counterbalance				X					
V9,10	Valves, Series/Parallel				X	X	X			
V11	Valve, Shunt				X	X	X			
V12,13	Valves, Down			X						
V14,15	Valves, Velocity Fuse			X						
V16	Valve, Lift		X							

TWO WHEEL DRIVE MODELS W/ OUTRIGGERS

COMPONENT		FUNCTION	RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	BRAKES	DEPLOY OUTRIGGERS
CP1	Cavity Plug				X	X	X	X	X		
CP2	Cavity Plug		X		X	X	X	X	X	X	
CV1	Check Valve				X	X	X				
CV3-6	Check Valves, Outrigger Sense Line										X
CYL1	Cylinder, Steering							X	X		
CYL2,3	Cylinders, Lift		X	X							
CYL4,5	Cylinders, Brake				X	X	X			X	
CYL6-9	Cylinders, Outrigger										X
MOT1,2	Motors, Rear Drive				X	X	X				
ORF1	Orifice, Steering							X	X		
ORF2,3	Orifice, Down			X							
ORF4	Orifice, Brake									X	
ORF5	Orifice, Outrigger										X
P1	Pump, Hydraulic		X		X	X	X	X	X	X	
P2	Pump, Brake Release									X	
RV1	Relief Valve, Steering							X	X		
RV3	Relief Valve, Lift		X	X							
RV4,5	Relief Valve, Bi-Directional				X	X	X				
SV1	Shuttle Valve, Sense Line							X	X		
SV2	Shuttle Valve, Sense Line		X		X	X	X	X	X		
SV3	Shuttle Valve, Drive				X	X					
SV4	Shuttle Valve, Sense Line		X		X	X	X	X	X		
V1	Valve, Steering							X	X		
V2	Valve, Emergency Down		X	X							
V3	Valve, Proportional		X		X	X	X				
V4	Valve, Lift		X								
V5	Valve, Forward				X		X				
V6	Valve, Reverse					X	X				
V7	Valve, Reverse Counterbalance					X					
V8	Valve, Forward Counterbalance				X						
V9,10	Valves, Series/Parallel				X	X	X				
V11	Valve, Flow Divider				X	X	X				
V12,13	Valves, Down			X							
V14,15	Valves, Velocity Fuse			X							
V19-22	Valve, Outrigger (Left Hand, Front)										X

FOUR WHEEL DRIVE MODELS W/ OUTRIGGERS

COMPONENT		FUNCTION	RAISE PLATFORM	LOWER PLATFORM	DRIVE FORWARD	DRIVE REVERSE	HIGH/LOW SPEED	STEER RIGHT	STEER LEFT	BRAKES	DEPLOY OUTRIGGERS
CV1	Check Valve				X	X	X				
CV3-6	Check Valves, Outrigger Sense Line										X
CP1	Cavity Plug				X	X	X				
CYL1	Cylinder, Steering							X	X		
CYL2,3	Cylinders, Lift	X	X								
CYL4,5	Cylinders, Brake				X	X	X				
CYL6-9	Cylinders, Outrigger										X
CYL10	Cylinder, Axle Float				X	X					
MOT1,2	Motors, Rear Drive				X	X	X				
MOT3,4	Motors, Front Drive				X	X	X				
ORF1	Orifice, Steering							X	X		
ORF2,3	Orifices, Down		X								
ORF4	Orifice, Brake									X	
ORF5	Orifice, Outrigger										X
P1	Pump, Hydraulic	X			X	X	X	X	X	X	
P2	Pump, Brake Release									X	
RV1	Relief Valve, Steering							X	X		
RV3	Relief Valve, Lift	X									
RV4,5	Relief Valves, Bi-Directional				X	X	X				
RV6-13	Relief Valves, Outrigger										X
SV1	Shuttle Valve, Sense Line							X	X		
SV2	Shuttle Valve, Sense Line	X			X	X	X	X	X	X	
SV3	Shuttle Valve, Drive				X	X	X			X	
SV4	Shuttle Valve, Sense Line	X			X	X	X	X	X	X	
V1	Valve, Steering							X	X		
V2	Valve, Emergency Down	X	X								
V3	Valve, Proportional	X			X	X	X	X	X		
V4	Valve, Lift	X									
V5	Valve, Forward				X		X				
V6	Valve, Reverse					X					
V7	Valve, Reverse Counterbalance					X					
V8	Valve, Forward Counterbalance				X						
V9,10	Valves, Series/Parallel				X	X	X				
V11	Valve, Shunt				X	X	X				
V12,13	Valves, Down		X								
V14,15	Valves, Velocity Fuse		X								
V19-22	Valves, Outrigger										X
V23	Valve, Axle Float				X	X					

Section 4

SCHEMATICS

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

The diagrams are to be used in conjunction with the *Troubleshooting Truth Tables* in **Section 3**. 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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4-1 LX31/41 TWO WHEEL DRIVE, DIESEL - ELECTRIC SCHEMATICS

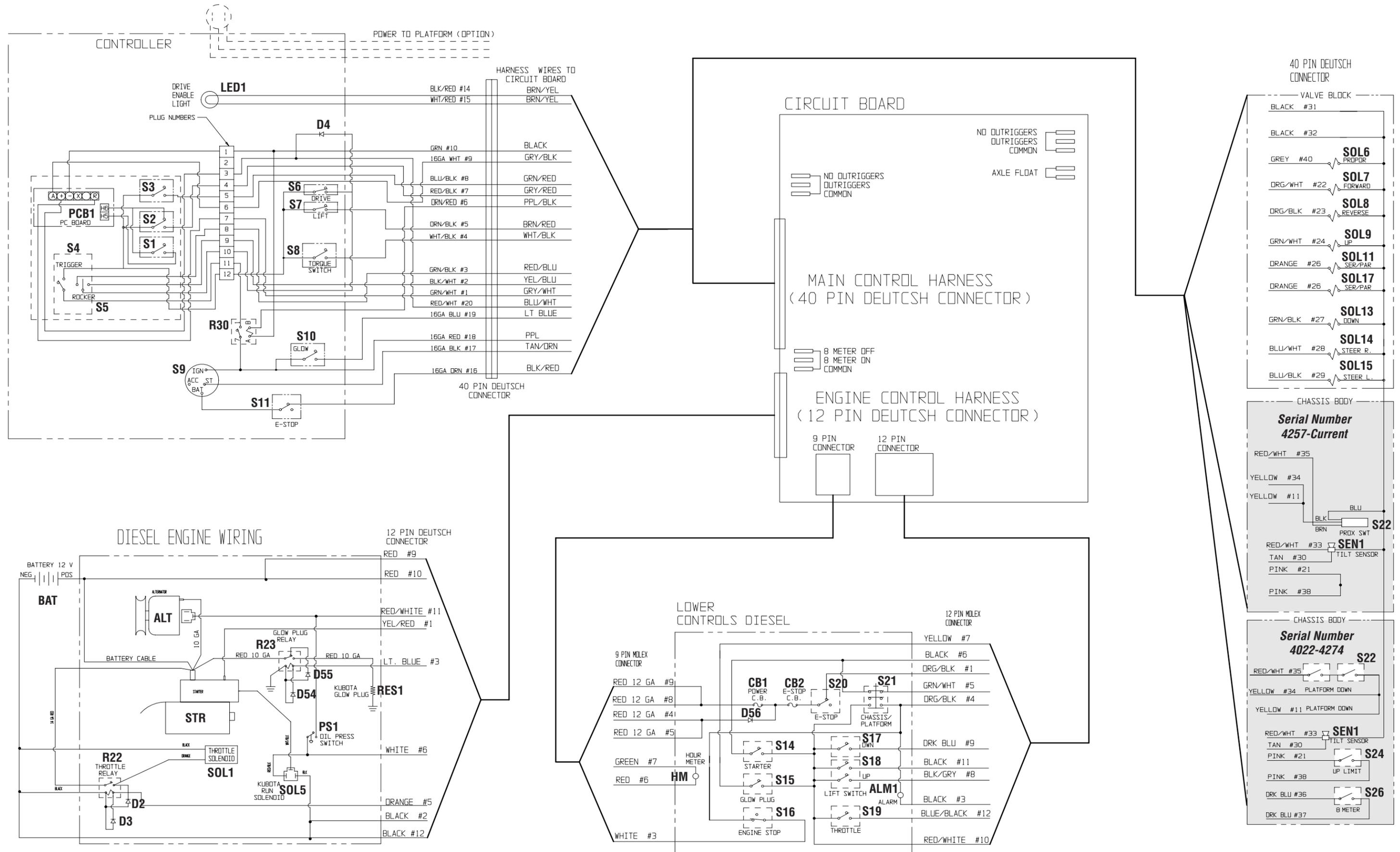
Legend: Electric Schematic 067535-051

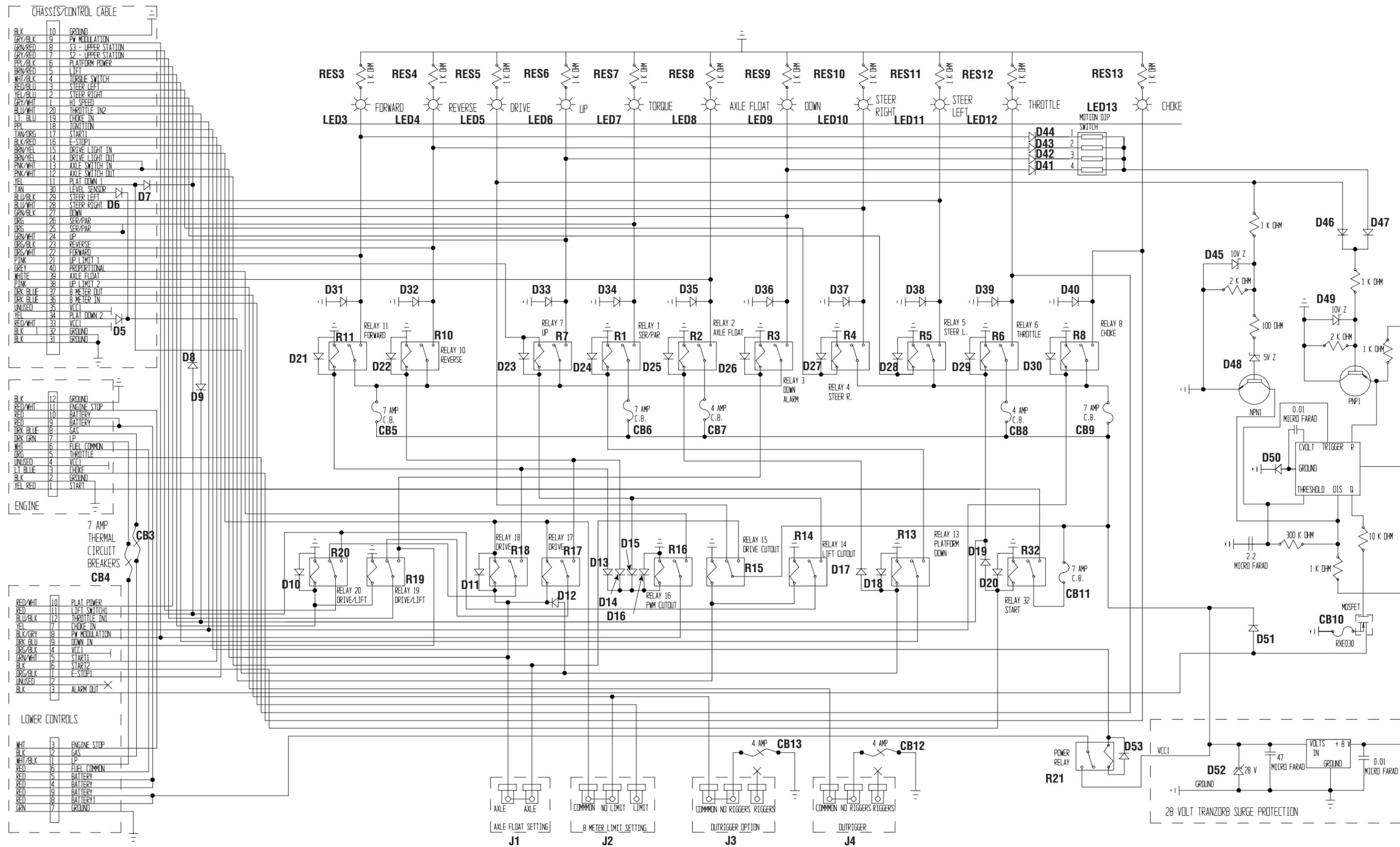
DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm	Provides warning sound when slope of machine exceeds 3° side-to-side, or fore and aft and also when deck is lowering	Chassis Body
ALT	Alternator	Maintains current during operation	Power Module
BAT	Battery	Provides power for starting engine	Power Module
CB1	Circuit Breaker, Power	Supplies power to all function solenoids	Lower Controls
CB2	Circuit Breaker, Emergency Stop	Supplies power to Upper Control ignition switch	Lower Controls
CB3	Self resetting Circuit Breaker	Supplies power to Lower Controls	Circuit Board
CB4	Self resetting Circuit Breaker	Supplies power to LP gas	Circuit Board
CB5	Self resetting Circuit Breaker	Supplies power to Relay R11	Circuit Board
CB6	Self resetting Circuit Breaker	Supplies power to Relay R1	Circuit Board
CB7	Self resetting Circuit Breaker	Supplies power to Relay R2	Circuit Board
CB8	Self resetting Circuit Breaker	Supplies power to Relay R6	Circuit Board
CB9	Self resetting Circuit Breaker	Supplies power to Relay R8	Circuit Board
CB10	Self resetting Circuit Breaker	Overcurrent protection	Circuit Board
CB11	Self resetting Circuit Breaker	Supplies power to Relay R32	Circuit Board
CB12	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
CB13	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
D2	Diode	Spike protection	Power Module
D3	Diode	Spike protection	Power Module
D4	Diode	Spike protection	Upper Controls
D5	Diode	Spike protection	Lower Controls
D6	Diode	Spike protection	Lower Controls
D7	Diode	Spike protection	Lower Controls
D8	Diode	Spike protection	Control Module
D9	Diode	Spike protection	Control Module
D10	Diode	Spike protection	On Relay R20
D11	Diode	Spike protection	On Relay R18
D12	Diode	Spike protection	On Relay R17
D13-16	Diode	Spike protection	On Relay R16
D17	Diode	Spike protection	
D18	Diode	Spike protection	On Relay R13
D19	Diode	Spike protection	
D20	Diode	Spike protection	On Relay R32
D21	Diode	Spike protection	On Relay R11
D22	Diode	Spike protection	On Relay R10
D23	Diode	Spike protection	On Relay R7
D24	Diode	Spike protection	On Relay R1
D25	Diode	Spike protection	On Relay R2
D26	Diode	Spike protection	On Relay R3
D27	Diode	Spike protection	On Relay R4
D28	Diode	Spike protection	On Relay R5

DESIGNATION	NAME	FUNCTION	LOCATION
D29	Diode	Spike protection	On Relay R6
D30	Diode	Spike protection	On Relay R8
D31	Diode	Spike protection	On Relay R11
D32	Diode	Spike protection	On Relay R10
D33	Diode	Spike protection	On Relay R7
D34	Diode	Spike protection	On Relay R1
D35	Diode	Spike protection	On Relay R2
D36	Diode	Spike protection	On Relay R3
D37	Diode	Spike protection	On Relay R4
D38	Diode	Spike protection	On Relay R5
D39	Diode	Spike protection	On Relay R6
D40	Diode	Spike protection	On Relay R8
D41-44	Diodes	Spike protection	On Motion Dip Switch
D45	Diode, 10V	Spike protection	Control Module
D46	Diode	Spike protection for Alarm	Control Module
D47	Diode	Spike protection for Alarm	Control Module
D48	Diode, 5V	Spike protection for Alarm	Control Module
D49	Diode, 10V	Spike protection for Alarm	Control Module
D50	Diode	Spike protection for Alarm	Control Module
D51	Diode	Spike protection for Alarm	Control Module
D52	Diode, 28V	Spike protection	Control Module
D53	Diode	Spike protection	On Relay R21
D54	Diode	Spike protection	On Relay R23
D55	Diode	Spike protection	On Relay R23
D56	Diode	Supplies power to Lower Controls	Lower Controls
HM	Hour Meter	Counts hours machine is operated	Lower Controls
J1	Jumper, Axle Float setting	Axle Float Settings	Lower Controls
J2	Jumper, 8 meter limit setting	8 meter cutout settings (Euro)	Lower Controls
J3	Jumper, Outrigger setting	Outrigger functions	Lower Controls
J4	Jumper, Outrigger setting	Outrigger functions	Lower Controls
LED1	Drive Enable LED	Indicates Drive Enable	Upper Controls
LED3	Forward LED	Indicates Forward functions being used	Circuit Board
LED4	Reverse LED	Indicates Reverse functions being used	Circuit Board
LED5	Drive LED	Indicates Drive functions being used	Circuit Board
LED6	Up LED	Indicates Up functions being used	Circuit Board
LED7	Torque LED	Indicates Torque functions being used	Circuit Board
LED8	Axle Float LED		
LED9	Down LED	Indicates Down functions being used	Circuit Board
LED10	Steer Right LED	Indicate Steer Right functions being used	Circuit Board
LED11	Steer Left LED	Indicates Steer Left functions being used	Circuit Board
LED12	Throttle LED	Indicates Throttle functions being used	Circuit Board
LED13	Choke LED	Indicates Choke functions being used	Circuit Board
PCB1	Printed Circuit Board (Controller)	Processes all input from Upper Controller	Upper Controls
PS1	Oil Pressure Switch	Cuts power to engine when oil pressure falls to dangerous levels	Power Module

DESIGNATION	NAME	FUNCTION	LOCATION
R1	Series/Parallel Relay	Switches power to Series/Parallel Solenoids	Control Module
R2	Axle Float Relay	Switches power to Axle Float Solenoid	Control Module
R3	Down Alarm Relay	Switches power to Down Alarm	Control Module
R4	Steer Right Relay	Switches power to Steer Right Solenoid	Control Module
R5	Steer Left Relay	Switches power to Steer Left Solenoid	Control Module
R6	Throttle Relay	Switches power to Throttle Solenoid	Control Module
R7	Up Relay	Switches power to Lift Solenoid	Control Module
R8	Choke Relay	Switches power to Choke Solenoid	Control Module
R10	Reverse Relay	Switches power to Reverse Solenoid	Control Module
R11	Forward Relay	Switches power to Forward Solenoid	Control Module
R13	Platform Down Relay	Cuts power to Series/Parallel Relay when Platform is elevated, selecting high torque mode	Control Module
R14	Lift Cutout Relay	Cuts power to Lift Relay	Control Module
R15	Drive Cutout Relay	Cuts power to Drive and Lift Relays when not energized by level sensor	Control Module
R16	PWM Cutout	Enables Proportional Controls	Control Module
R17, 18	Drive Relays	Cuts power to Forward and Reverse Relays when Cutout Relay is not energized and platform is elevated	Control Module
R19, 20	Drive/Lift Relays	Directs power from Forward and Reverse Switches to either Forward/Reverse or Up/Down Relays	Control Module
R21	Power Relay	Switches power to all Solenoids and engine	Control Module
R22	Throttle Relay	Switches power to Throttle Solenoid	Power Module
R23	Glow Plug Relay	Provides power to Glow Plug	Power Module
R30	Upper Control Power Relay	Cuts power to Upper Controls when Lower Controls are enabled	Upper Controls
R32	Start Relay	Provides power to Starter	Control Module
RES1	Glow Plug	Helps start engine when cold	Power Module
RES3	Forward Resistor	Provides power to Forward LED, LED3	Circuit Board
RES4	Reverse Resistor	Provides power to Reverse LED, LED4	Circuit Board
RES5	Drive Resistor	Provides power to Drive LED, LED5	Circuit Board
RES6	Up Resistor	Provides power to Up LED, LED6	Circuit Board
RES7	Torque Resistor	Provides power to Torque LED, LED7	Circuit Board
RES8	Axle float Resistor	Provides power to Axle Float LED, LED8	Circuit Board
RES9	Down Resistor	Provides power to Down LED, LED9	Circuit Board
RES10	Steer Right Resistor	Provides power to Steer Right LED, LED10	Circuit Board
RES11	Steer Left Resistor	Provides power to Steer Left LED, LED11	Circuit Board
RES12	Throttle Resistor	Provides power to Throttle LED, LED12	Circuit Board
RES13	Choke Resistor	Provides power to Choke LED, LED13	Circuit Board
SEN1	Sensor, Tilt	Provides power to cut-out Relay when machine is level	Chassis Body
S1	Micro Switch	Supplies power to Controller	Upper Controls, Joystick
S2	Reverse Micro Switch	Supplies power to Drive/Lift Relay, Forward/Up contacts	Upper Controls, Joystick
S3	Forward Micro Switch	Supplies power to Drive/Lift Relay, Reverse/Down contacts	Upper Controls, Joystick

DESIGNATION	NAME	FUNCTION	LOCATION	
S4	Interlock Micro Switch	Interrupts power to controls when not engaged	Upper Controls, Joystick Handle	
S5	Steering Micro Switch	Supplies power to Steer Left and Steer Right Relays	Upper Controls, Joystick Handle	
S6, S7	Drive/Lift Switch	Supplies power to Steering Micro Switch (drive) or to Drive/Lift Relay	Upper Controls	
S8	Torque Switch	Supplies power to Series/Parallel Relay	Upper Controls	
S9	Ignition Switch	Supplies power to Upper Controls, Engine, and Starter Motor Solenoid	Upper Controls	
S10	Glow Plug Switch	Supplies power to Glow Plug Relay	Upper Controls	
S11	Emergency Stop Switch	Cuts power to Upper Controls and Engine	Upper Controls	
S14	Starter Switch	Supplies power to Starter Motor	Lower Controls	
S15	Glow Plug Switch	Supplies power to Glow Plug Relay	Lower Controls	
S16	Engine Stop Switch	Cuts power to Ignition Module and Fuel Shut-off Solenoid	Lower Controls	
S17	Down Switch	Supplies power to Down Relay	Lower Controls	
S18	Lift Switch	Supplies power to Up Relay	Lower Controls	
S19	Throttle Switch	Supplies power to Throttle Relay	Lower Controls	
S20	Emergency Stop Switch	Cuts power to Lower Controls and Engine	Lower Controls	
S21	Chassis/Platform Switch	Supplies power to either Upper or Lower Controls	Lower Controls	
S22	Proximity (Platform Down) Switch	High/Low speed cutout and Outrigger lockout	Chassis Body	
S24	Serial Number 4022-4274 S26	Up Limit Switch	Restricts Lift Cylinder from fully extending	Bottom Elevating Assembly Tube
S26	Serial Number 4022-4274 S26	8 Meter Cutout Switch	Disables drive function if platform height exceeds 8 meters	Bottom Elevating Assembly Tube
SOL1	Throttle Solenoid	Controls Engine Throttle	Power Module	
SOL5	Engine Run Solenoid	Controls Engine Electrical	Power Module	
SOL6	Proportional Solenoid	Controls Proportional Valve	Valve Manifold	
SOL7	Forward Solenoid	Controls Forward Valve	Valve Manifold	
SOL8	Reverse Solenoid	Controls Reverse Valve	Valve Manifold	
SOL9	Up Solenoid	Controls Lift Valve	Valve Manifold	
SOL11	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold	
SOL13	Down Solenoid	Controls Down Solenoid	Valve Manifold	
SOL14	Steer Right Solenoid	Controls Steer Right Valve	Valve Manifold	
SOL15	Steer Left Solenoid	Controls Steer Left Valve	Valve Manifold	
SOL17	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold	
STR	Starter	Starts Engine	Power Module	





4-2 LX31/41 FOUR WHEEL DRIVE, DIESEL - ELECTRIC SCHEMATICS

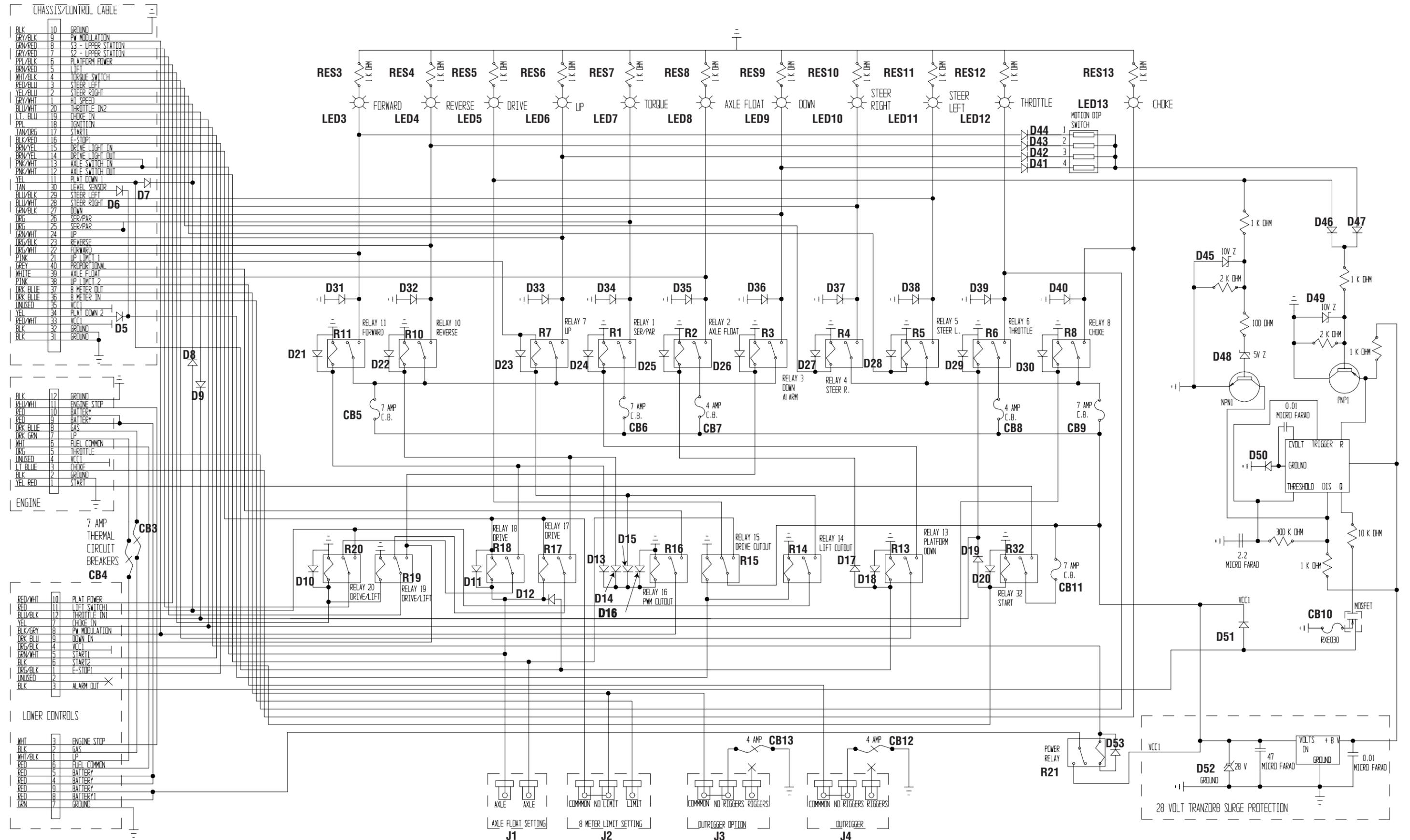
Legend: Electric Schematic 067535-053

DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm	Provides warning sound when slope of machine exceeds 3° side-to-side, or fore and aft and also when deck is lowering	Chassis Body
ALT	Alternator	Maintains current during operation	Power Module
BAT	Battery	Provides power for starting engine	Power Module
CB1	Circuit Breaker, Power	Supplies power to all function solenoids	Lower Controls
CB2	Circuit Breaker, Emergency Stop	Supplies power to Upper Control ignition switch	Lower Controls
CB3	Self resetting Circuit Breaker	Supplies power to Lower Controls	Circuit Board
CB4	Self resetting Circuit Breaker	Supplies power to LP gas	Circuit Board
CB5	Self resetting Circuit Breaker	Supplies power to Relay R11	Circuit Board
CB6	Self resetting Circuit Breaker	Supplies power to Relay R1	Circuit Board
CB7	Self resetting Circuit Breaker	Supplies power to Relay R2	Circuit Board
CB8	Self resetting Circuit Breaker	Supplies power to Relay R6	Circuit Board
CB9	Self resetting Circuit Breaker	Supplies power to Relay R8	Circuit Board
CB10	Self resetting Circuit Breaker	Overcurrent protection	Circuit Board
CB11	Self resetting Circuit Breaker	Supplies power to Relay R32	Circuit Board
CB12	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
CB13	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
D1	Diode	Spike protection	Power Module
D2	Diode	Spike protection	Power Module
D3	Diode	Spike protection	Power Module
D4	Diode	Spike protection	Upper Controls
D5	Diode	Spike protection	Lower Controls
D6	Diode	Spike protection	Lower Controls
D7	Diode	Spike protection	Lower Controls
D8	Diode	Spike protection	Control Module
D9	Diode	Spike protection	Control Module
D10	Diode	Spike protection	On Relay R20
D11	Diode	Spike protection	On Relay R18
D12	Diode	Spike protection	On Relay R17
D13-16	Diode	Spike protection	On Relay R16
D17	Diode	Spike protection	
D18	Diode	Spike protection	On Relay R13
D19	Diode	Spike protection	
D20	Diode	Spike protection	On Relay R32
D21	Diode	Spike protection	On Relay R11
D22	Diode	Spike protection	On Relay R10
D23	Diode	Spike protection	On Relay R7
D24	Diode	Spike protection	On Relay R1
D25	Diode	Spike protection	On Relay R2
D26	Diode	Spike protection	On Relay R3
D27	Diode	Spike protection	On Relay R4

DESIGNATION	NAME	FUNCTION	LOCATION
D28	Diode	Spike protection	On Relay R5
D29	Diode	Spike protection	On Relay R6
D30	Diode	Spike protection	On Relay R8
D31	Diode	Spike protection	On Relay R11
D32	Diode	Spike protection	On Relay R10
D33	Diode	Spike protection	On Relay R7
D34	Diode	Spike protection	On Relay R1
D35	Diode	Spike protection	On Relay R2
D36	Diode	Spike protection	On Relay R3
D37	Diode	Spike protection	On Relay R4
D38	Diode	Spike protection	On Relay R5
D39	Diode	Spike protection	On Relay R6
D40	Diode	Spike protection	On Relay R8
D41-44	Diodes	Spike protection	On Motion Dip Switch
D45	Diode, 10V	Spike protection	Control Module
D46	Diode	Spike protection for Alarm	Control Module
D47	Diode	Spike protection for Alarm	Control Module
D48	Diode, 5V	Spike protection for Alarm	Control Module
D49	Diode, 10V	Spike protection for Alarm	Control Module
D50	Diode	Spike protection for Alarm	Control Module
D51	Diode	Spike protection for Alarm	Control Module
D52	Diode, 28V	Spike protection	Control Module
D53	Diode	Spike protection	On Relay R21
D54	Diode	Spike protection	On Relay R23
D55	Diode	Spike protection	On Relay R23
D56	Diode	Supplies power to Lower Controls	Lower Controls
HM	Hour Meter	Counts hours machine is operated	Lower Controls
J1	Jumper, Axle Float setting	Axle Float Settings	Lower Controls
J2	Jumper, 8 meter limit setting	8 meter cutout settings (Euro)	Lower Controls
J3	Jumper, Outrigger setting	Outrigger functions	Lower Controls
J4	Jumper, Outrigger setting	Outrigger functions	Lower Controls
LED1	Drive Enable LED	Indicates Drive Enable	Upper Controls
LED3	Forward LED	Indicates Forward functions being used	Circuit Board
LED4	Reverse LED	Indicates Reverse functions being used	Circuit Board
LED5	Drive LED	Indicates Drive functions being used	Circuit Board
LED6	Up LED	Indicates Up functions being used	Circuit Board
LED7	Torque LED	Indicates Torque functions being used	Circuit Board
LED8	Axle Float LED		Circuit Board
LED9	Down LED	Indicates Down functions being used	Circuit Board
LED10	Steer Right LED	Indicate Steer Right functions being used	Circuit Board
LED11	Steer Left LED	Indicates Steer Left functions being used	Circuit Board
LED12	Throttle LED	Indicates Throttle functions being used	Circuit Board
LED13	Choke LED	Indicates Choke functions being used	Circuit Board
PCB1	Printed Circuit Board (Controller)	Processes all input from Upper Controller	Upper Controls

DESIGNATION	NAME	FUNCTION	LOCATION
PS1	Oil Pressure Switch	Cuts power to engine when oil pressure falls to dangerous levels	Power Module
R1	Series/Parallel Relay	Switches power to Series/Parallel Solenoids	Control Module
R2	Axle Float Relay	Switches power to Axle Float Solenoid	Control Module
R3	Down Alarm Relay	Switches power to Down Alarm	Control Module
R4	Steer Right Relay	Switches power to Steer Right Solenoid	Control Module
R5	Steer Left Relay	Switches power to Steer Left Solenoid	Control Module
R6	Throttle Relay	Switches power to Throttle Solenoid	Control Module
R7	Up Relay	Switches power to Lift Solenoid	Control Module
R8	Choke Relay	Switches power to Choke Solenoid	Control Module
R10	Reverse Relay	Switches power to Reverse Solenoid	Control Module
R11	Forward Relay	Switches power to Forward Solenoid	Control Module
R13	Platform Down Relay	Cuts power to Series/Parallel Relay when Platform is elevated, selecting high torque mode	Control Module
R14	Lift Cutout Relay	Cuts power to Lift Relay	Control Module
R15	Drive Cutout Relay	Cuts power to Drive and Lift Relays when not energized by level sensor	Control Module
R16	PWM Cutout	Enables Proportional Controls	Control Module
R17, 18	Drive Relays	Cuts power to Forward and Reverse Relays when Cutout Relay is not energized and platform is elevated	Control Module
R19, 20	Drive/Lift Relays	Directs power from Forward and Reverse Switches to either Forward/Reverse or Up/Down Relays	Control Module
R21	Power Relay	Switches power to all Solenoids and engine	Control Module
R22	Throttle Relay	Switches power to Throttle Solenoid	Power Module
R23	Glow Plug Relay	Provides power to Glow Plug	Power Module
R30	Upper Control Power Relay	Cuts power to Upper Controls when Lower Controls are enabled	Upper Controls
R32	Start Relay	Provides power to Starter	Control Module
RES1	Glow Plug	Helps start engine when cold	Power Module
RES3	Forward Resistor	Provides power to Forward LED, LED3	Circuit Board
RES4	Reverse Resistor	Provides power to Reverse LED, LED4	Circuit Board
RES5	Drive Resistor	Provides power to Drive LED, LED5	Circuit Board
RES6	Up Resistor	Provides power to Up LED, LED6	Circuit Board
RES7	Torque Resistor	Provides power to Torque LED, LED7	Circuit Board
RES8	Axle float Resistor	Provides power to Axle Float LED, LED8	Circuit Board
RES9	Down Resistor	Provides power to Down LED, LED9	Circuit Board
RES10	Steer Right Resistor	Provides power to Steer Right LED, LED10	Circuit Board
RES11	Steer Left Resistor	Provides power to Steer Left LED, LED11	Circuit Board
RES12	Throttle Resistor	Provides power to Throttle LED, LED12	Circuit Board
RES13	Choke Resistor	Provides power to Choke LED, LED13	Circuit Board
SEN1	Sensor, Tilt	Provides power to cut-out Relay when machine is level	Chassis Body
S1	Micro Switch	Supplies power to Controller	Upper Controls, Joystick

DESIGNATION	NAME	FUNCTION	LOCATION
S2	Reverse Micro Switch	Supplies power to Drive/Lift Relay, Forward/Up contacts	Upper Controls, Joystick
S3	Forward Micro Switch	Supplies power to Drive/Lift Relay, Reverse/Down contacts	Upper Controls, Joystick
S4	Interlock Micro Switch	Interrupts power to controls when not engaged	Upper Controls, Joystick Handle
S5	Steering Micro Switch	Supplies power to Steer Left and Steer Right Relays	Upper Controls, Joystick Handle
S6, S7	Drive/Lift Switch	Supplies power to Steering Micro Switch (drive) or to Drive/Lift Relay	Upper Controls
S8	Torque Switch	Supplies power to Series/Parallel Relay	Upper Controls
S9	Ignition Switch	Supplies power to Upper Controls, Engine, and Starter Motor Solenoid	Upper Controls
S10	Glow Plug Switch	Supplies power to Glow Plug Relay	Upper Controls
S11	Emergency Stop Switch	Cuts power to Upper Controls and Engine	Upper Controls
S14	Starter Switch	Supplies power to Starter Motor	Lower Controls
S15	Glow Plug Switch	Supplies power to Glow Plug Relay	Lower Controls
S16	Engine Stop Switch	Cuts power to Ignition Module and Fuel Shut-off Solenoid	Lower Controls
S17	Down Switch	Supplies power to Down Relay	Lower Controls
S18	Lift Switch	Supplies power to Up Relay	Lower Controls
S19	Throttle Switch	Supplies power to Throttle Relay	Lower Controls
S20	Emergency Stop Switch	Cuts power to Lower Controls and Engine	Lower Controls
S21	Chassis/Platform Switch	Supplies power to either Upper or Lower Controls	Lower Controls
S22	Proximity (Platform Down) Switch	High/Low speed cutout and Outrigger lockout	Chassis Body
S24	Serial Number 4022-4274 Up Limit Switch	Restricts Lift Cylinder from fully extending	Bottom Elevating Assembly Tube
S25	Axle Float Switch	Supplies power to Axle Float Solenoid	Lower Controls
S26	Serial Number 4022-4274 8 Meter Cutout Switch	Disables drive function if platform height exceeds 8 meters	Bottom Elevating Assembly Tube
SOL1	Throttle Solenoid	Controls Engine Throttle	Power Module
SOL5	Engine Run Solenoid	Controls Engine Electrical	Power Module
SOL6	Proportional Solenoid	Controls Proportional Valve	Valve Manifold
SOL7	Forward Solenoid	Controls Forward Valve	Valve Manifold
SOL8	Reverse Solenoid	Controls Reverse Valve	Valve Manifold
SOL9	Up Solenoid	Controls Lift Valve	Valve Manifold
SOL10	Shunt Solenoid	Controls Shunt Valve	Valve Manifold
SOL11	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold
SOL13	Down Solenoid	Controls Down Solenoid	Valve Manifold
SOL14	Steer Right Solenoid	Controls Steer Right Valve	Valve Manifold
SOL15	Steer Left Solenoid	Controls Steer Left Valve	Valve Manifold
SOL17	Axle Float	Controls Axle Float Valve	Valve Manifold
STR	Starter	Starts Engine	Power Module



4-3 LX50 Two Wheel Drive, Diesel - Electric Schematics

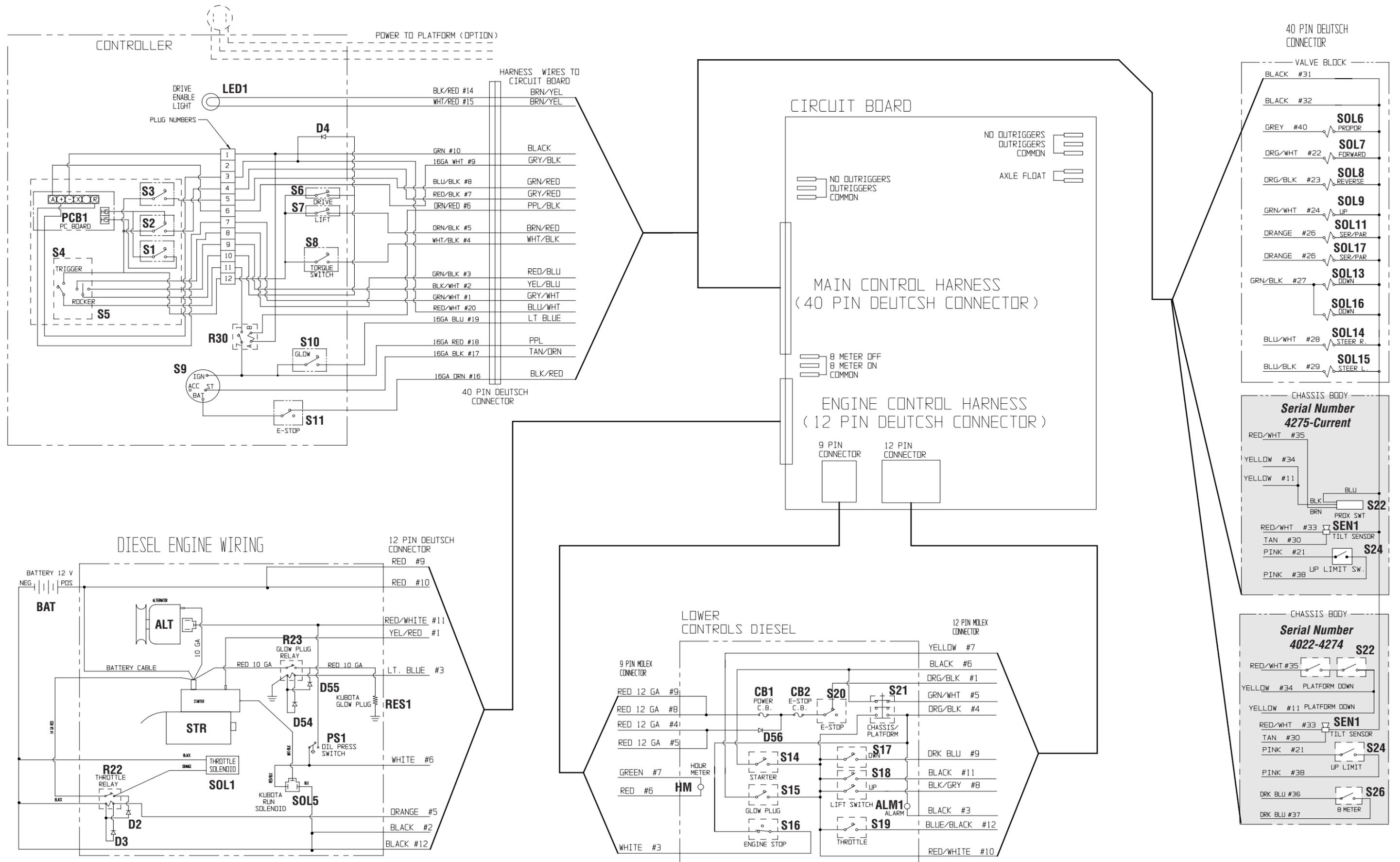
Legend: Electric Schematic 067535-055

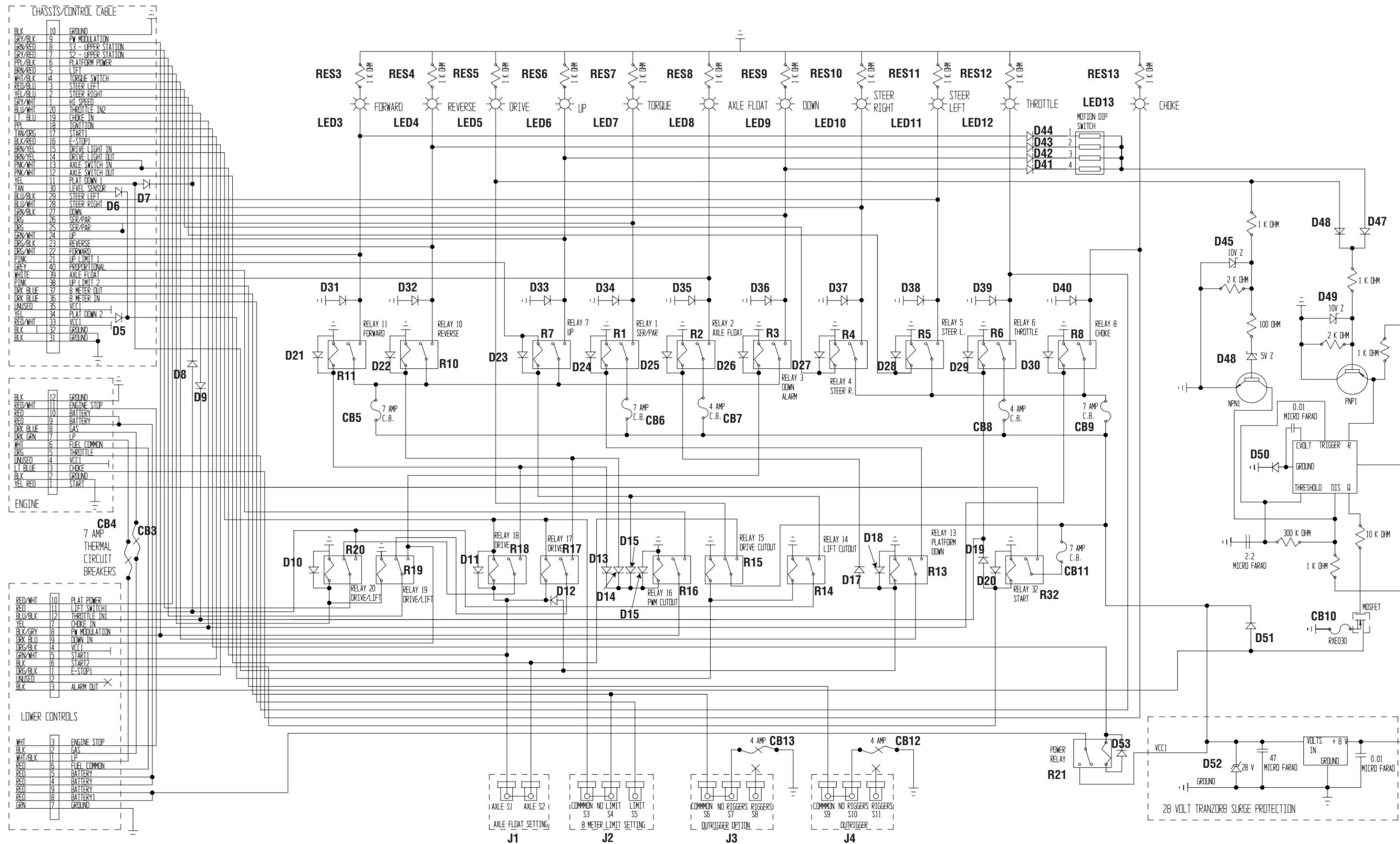
DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm	Provides warning sound when slope of machine exceeds 3° side-to-side, or fore and aft and also when deck is lowering	Chassis Body
ALT	Alternator	Maintains current during operation	Power Module
BAT	Battery	Provides power for starting engine	Power Module
CB1	Circuit Breaker, Power	Supplies power to all function solenoids	Lower Controls
CB2	Circuit Breaker, Emergency Stop	Supplies power to Upper Control ignition switch	Lower Controls
CB3	Self resetting Circuit Breaker	Supplies power to Lower Controls	Circuit Board
CB4	Self resetting Circuit Breaker	Supplies power to LP gas	Circuit Board
CB5	Self resetting Circuit Breaker	Supplies power to Relay R11	Circuit Board
CB6	Self resetting Circuit Breaker	Supplies power to Relay R1	Circuit Board
CB7	Self resetting Circuit Breaker	Supplies power to Relay R2	Circuit Board
CB8	Self resetting Circuit Breaker	Supplies power to Relay R6	Circuit Board
CB9	Self resetting Circuit Breaker	Supplies power to Relay R8	Circuit Board
CB10	Self resetting Circuit Breaker	Overcurrent protection	Circuit Board
CB11	Self resetting Circuit Breaker	Supplies power to Relay R32	Circuit Board
CB12	Self resetting Circuit Breaker	Supplies power to Outrigger option Switches S33-35	Circuit Board
CB13	Self resetting Circuit Breaker	Supplies power to Outrigger option Switches S30-32	Circuit Board
D2	Diode	Spike protection	Power Module
D3	Diode	Spike protection	Power Module
D4	Diode	Spike protection	Upper Controls
D5	Diode	Spike protection	Lower Controls
D6	Diode	Spike protection	Lower Controls
D7	Diode	Spike protection	Lower Controls
D8	Diode	Spike protection	Control Module
D9	Diode	Spike protection	Control Module
D10	Diode	Spike protection	On Relay R20
D11	Diode	Spike protection	On Relay R18
D12	Diode	Spike protection	On Relay R17
D13-16	Diode	Spike protection	On Relay R16
D17	Diode	Spike protection	
D18	Diode	Spike protection	On Relay R13
D19	Diode	Spike protection	
D20	Diode	Spike protection	On Relay R32
D21	Diode	Spike protection	On Relay R11
D22	Diode	Spike protection	On Relay R10
D23	Diode	Spike protection	On Relay R7
D24	Diode	Spike protection	On Relay R1
D25	Diode	Spike protection	On Relay R2
D26	Diode	Spike protection	On Relay R3
D27	Diode	Spike protection	On Relay R4
D28	Diode	Spike protection	On Relay R5

DESIGNATION	NAME	FUNCTION	LOCATION
D29	Diode	Spike protection	On Relay R6
D30	Diode	Spike protection	On Relay R8
D31	Diode	Spike protection	On Relay R11
D32	Diode	Spike protection	On Relay R10
D33	Diode	Spike protection	On Relay R7
D34	Diode	Spike protection	On Relay R1
D35	Diode	Spike protection	On Relay R2
D36	Diode	Spike protection	On Relay R3
D37	Diode	Spike protection	On Relay R4
D38	Diode	Spike protection	On Relay R5
D39	Diode	Spike protection	On Relay R6
D40	Diode	Spike protection	On Relay R8
D41-44	Diodes	Spike protection	On Motion Dip Switch
D45	Diode, 10V	Spike protection	Control Module
D46	Diode	Spike protection for Alarm	Control Module
D47	Diode	Spike protection for Alarm	Control Module
D48	Diode, 5V	Spike protection for Alarm	Control Module
D49	Diode, 10V	Spike protection for Alarm	Control Module
D50	Diode	Spike protection for Alarm	Control Module
D51	Diode	Spike protection for Alarm	Control Module
D52	Diode, 28V	Spike protection	Control Module
D53	Diode	Spike protection	On Relay R21
D54	Diode	Spike protection	On Relay R23
D55	Diode	Spike protection	On Relay R23
D56	Diode	Supplies power to Lower Controls	Lower Controls
HM	Hour Meter	Counts hours machine is operated	Lower Controls
J1	Jumper, Axle Float setting	Axle Float Settings	Lower Controls
J2	Jumper, 8 meter limit setting	8 meter cutout settings (Euro)	Lower Controls
J3	Jumper, Outrigger setting	Outrigger functions	Lower Controls
J4	Jumper, Outrigger setting	Outrigger functions	Lower Controls
LED1	Drive Enable LED	Indicates Drive Enable	Upper Controls
LED3	Forward LED	Indicates Forward functions being used	Circuit Board
LED4	Reverse LED	Indicates Reverse functions being used	Circuit Board
LED5	Drive LED	Indicates Drive functions being used	Circuit Board
LED6	Up LED	Indicates Up functions being used	Circuit Board
LED7	Torque LED	Indicates Torque functions being used	Circuit Board
LED8	Axle Float LED	Not used	
LED9	Down LED	Indicates Down functions being used	Circuit Board
LED10	Steer Right LED	Indicate Steer Right functions being used	Circuit Board
LED11	Steer Left LED	Indicates Steer Left functions being used	Circuit Board
LED12	Throttle LED	Indicates Throttle functions being used	Circuit Board
LED13	Choke LED	Indicates Choke functions being used	Circuit Board
PCB1	Printed Circuit Board (Controller)	Processes all input from Upper Controller	Upper Controls
PS1	Oil Pressure Switch	Cuts power to engine when oil pressure falls to dangerous levels	Power Module

DESIGNATION	NAME	FUNCTION	LOCATION
R1	Series/Parallel Relay	Switches power to Series/Parallel Solenoids	Control Module
R2	Axle Float Relay	Switches power to Axle Float Solenoid	Control Module
R3	Down Alarm Relay	Switches power to Down Alarm	Control Module
R4	Steer Right Relay	Switches power to Steer Right Solenoid	Control Module
R5	Steer Left Relay	Switches power to Steer Left Solenoid	Control Module
R6	Throttle Relay	Switches power to Throttle Solenoid	Control Module
R7	Up Relay	Switches power to Lift Solenoid	Control Module
R8	Choke Relay	Switches power to Choke Solenoid	Control Module
R10	Reverse Relay	Switches power to Reverse Solenoid	Control Module
R11	Forward Relay	Switches power to Forward Solenoid	Control Module
R13	Platform Down Relay	Cuts power to Series/Parallel Relay when Platform is elevated, selecting high torque mode	Control Module
R14	Lift Cutout Relay	Cuts power to Lift Relay	Control Module
R15	Drive Cutout Relay	Cuts power to Drive and Lift Relays when not energized by level sensor	Control Module
R16	PWM Cutout	Enables Proportional Controls	Control Module
R17, 18	Drive Relays	Cuts power to Forward and Reverse Relays when Cutout Relay is not energized and platform is elevated	Control Module
R19, 20	Drive/Lift Relays	Directs power from Forward and Reverse Switches to either forward/reverse or up/down Relays	Control Module
R21	Power Relay	Switches power to all Solenoids and engine	Control Module
R22	Throttle Relay	Switches power to Throttle Solenoid	Power Module
R23	Glow Plug Relay	Provides power to Glow Plug	Power Module
R30	Upper Control Power Relay	Cuts power to Upper Controls when Lower Controls are enabled	Upper Controls
R32	Start Relay	Provides power to Starter	Control Module
RES1	Glow Plug	Helps start engine when cold	Power Module
RES3	Forward Resistor	Provides power to Forward LED, LED3	Circuit Board
RES4	Reverse Resistor	Provides power to Reverse LED, LED4	Circuit Board
RES5	Drive Resistor	Provides power to Drive LED, LED5	Circuit Board
RES6	Up Resistor	Provides power to Up LED, LED6	Circuit Board
RES7	Torque Resistor	Provides power to Torque LED, LED7	Circuit Board
RES8	Axle float Resistor	Not used	Circuit Board
RES9	Down Resistor	Provides power to Down LED, LED9	Circuit Board
RES10	Steer Right Resistor	Provides power to Steer Right LED, LED10	Circuit Board
RES11	Steer Left Resistor	Provides power to Steer Left LED, LED11	Circuit Board
RES12	Throttle Resistor	Provides power to Throttle LED, LED12	Circuit Board
RES13	Choke Resistor	Provides power to Choke LED, LED13	Circuit Board
SEN1R	Sensor, Tilt	Provides power to cut-out Relay when machine is level	Chassis Body
S1	Micro Switch	Supplies power to Controller	Upper Controls, Joystick
S2	Reverse Micro Switch	Supplies power to Drive/Lift Relay, Forward/Up contacts	Upper Controls, Joystick
S3	Forward Micro Switch	Supplies power to Drive/Lift Relay, Reverse/Down contacts	Upper Controls, Joystick

DESIGNATION	NAME	FUNCTION	LOCATION
S4	Interlock Micro Switch	Interrupts power to controls when not engaged	Upper Controls, Joystick Handle
S5	Steering Micro Switch	Supplies power to Steer Left and Steer Right Relays	Upper Controls, Joystick Handle
S6, S7	Drive/Lift Switch	Supplies power to Steering Micro Switch (drive) or to Drive/Lift Relay	Upper Controls
S8	Torque Switch	Supplies power to Series/Parallel Relay	Upper Controls
S9	Ignition Switch	Supplies power to Upper Controls, Engine, and Starter Motor Solenoid	Upper Controls
S10	Glow Plug Switch	Supplies power to Glow Plug Relay	Upper Controls
S11	Emergency Stop Switch	Cuts power to Upper Controls and Engine	Upper Controls
S14	Starter Switch	Supplies power to Starter Motor	Lower Controls
S15	Choke Switch	Supplies power to Choke Relay	Lower Controls
S16	Engine Stop Switch	Cuts power to Ignition Module and Fuel Shut-off Solenoid	Lower Controls
S17	Down Switch	Supplies power to Down Relay	Lower Controls
S18	Lift Switch	Supplies power to Up Relay	Lower Controls
S19	Throttle Switch	Supplies power to Throttle Relay	Lower Controls
S20	Emergency Stop Switch	Cuts power to Lower Controls and Engine	Lower Controls
S21	Chassis/Platform Switch	Supplies power to either Upper or Lower Controls	Lower Controls
S22	Proximity (Platform Down) Switch	High/Low speed cutout and Outrigger lockout	Chassis Body
S24	Up Limit Switch	Restricts Lift Cylinder from fully extending	Bottom Elevating Assembly Tube
S26	8 Meter Cutout Switch	Disables drive function if platform height exceeds 8 meters	Bottom Elevating Assembly Tube
SOL1	Throttle Solenoid	Controls Engine Throttle	Power Module
SOL5	Engine Run Solenoid	Controls Engine Electrical	Power Module
SOL6	Proportional Solenoid	Controls Proportional Valve	Valve Manifold
SOL7	Forward Solenoid	Controls Forward Valve	Valve Manifold
SOL8	Reverse Solenoid	Controls Reverse Valve	Valve Manifold
SOL9	Up Solenoid	Controls Lift Valve	Valve Manifold
SOL11	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold
SOL13	Down Solenoid	Controls Down Solenoid	Valve Manifold
SOL14	Steer Right Solenoid	Controls Steer Right Valve	Valve Manifold
SOL15	Steer Left Solenoid	Controls Steer Left Valve	Valve Manifold
SOL16	Down Solenoid	Controls Down Solenoid	Valve Manifold
SOL17	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold
STR	Starter	Starts Engine	Power Module





4-4 LX50 FOUR WHEEL DRIVE, DIESEL - ELECTRIC SCHEMATICS

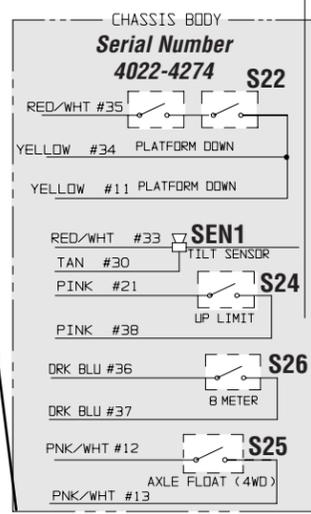
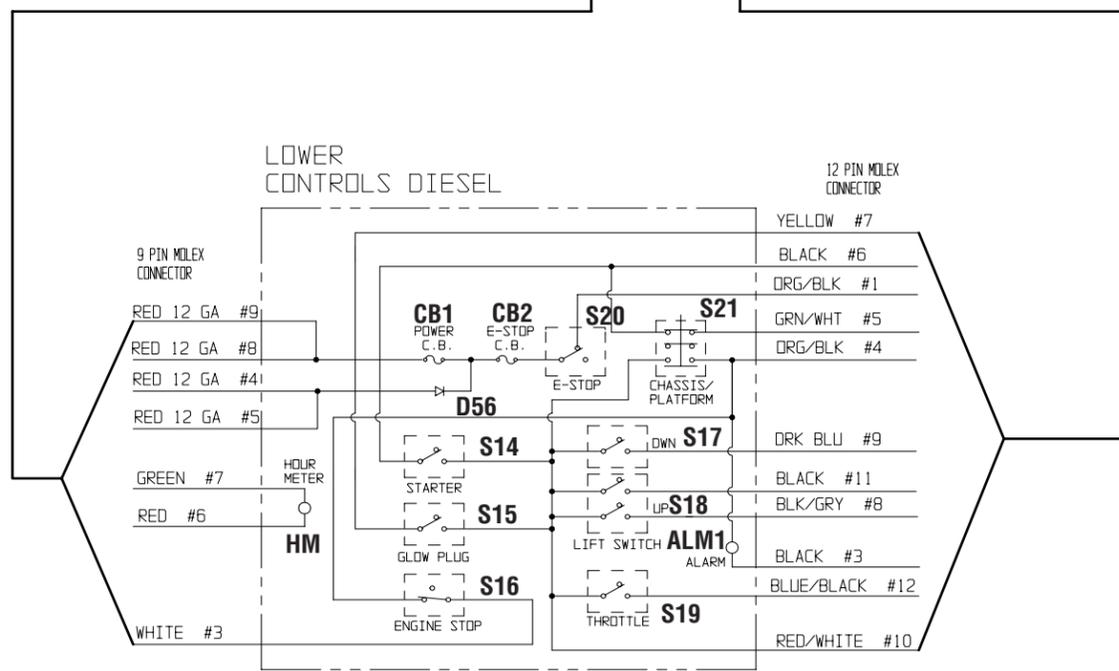
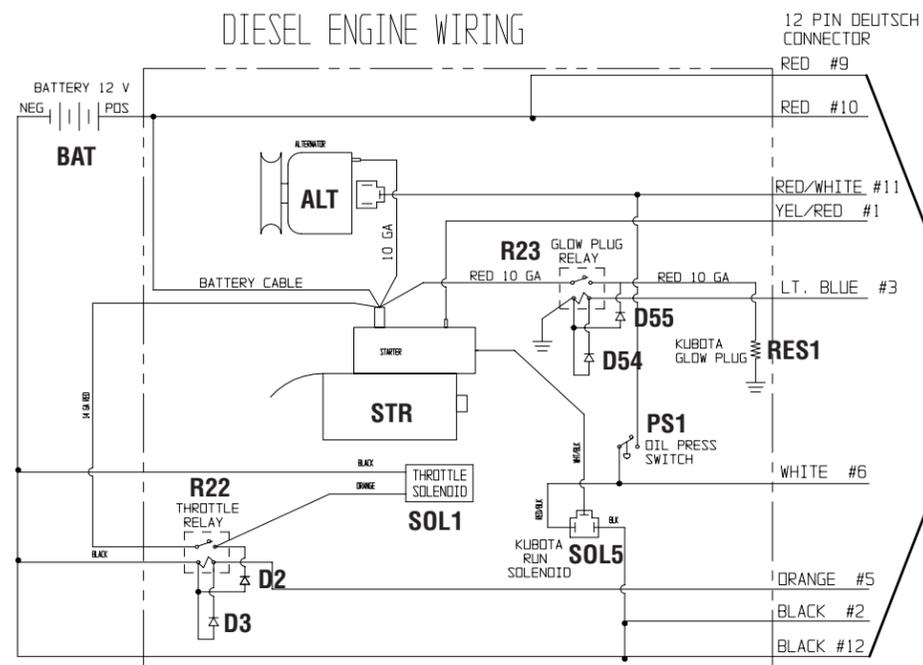
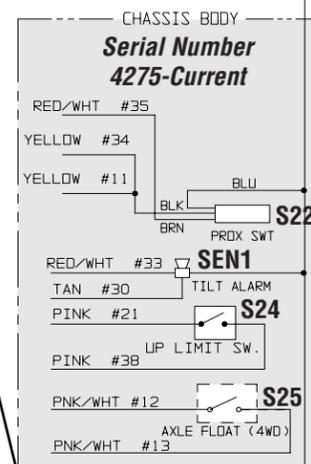
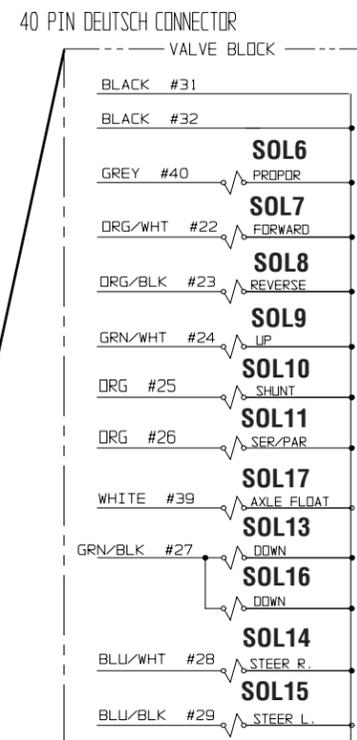
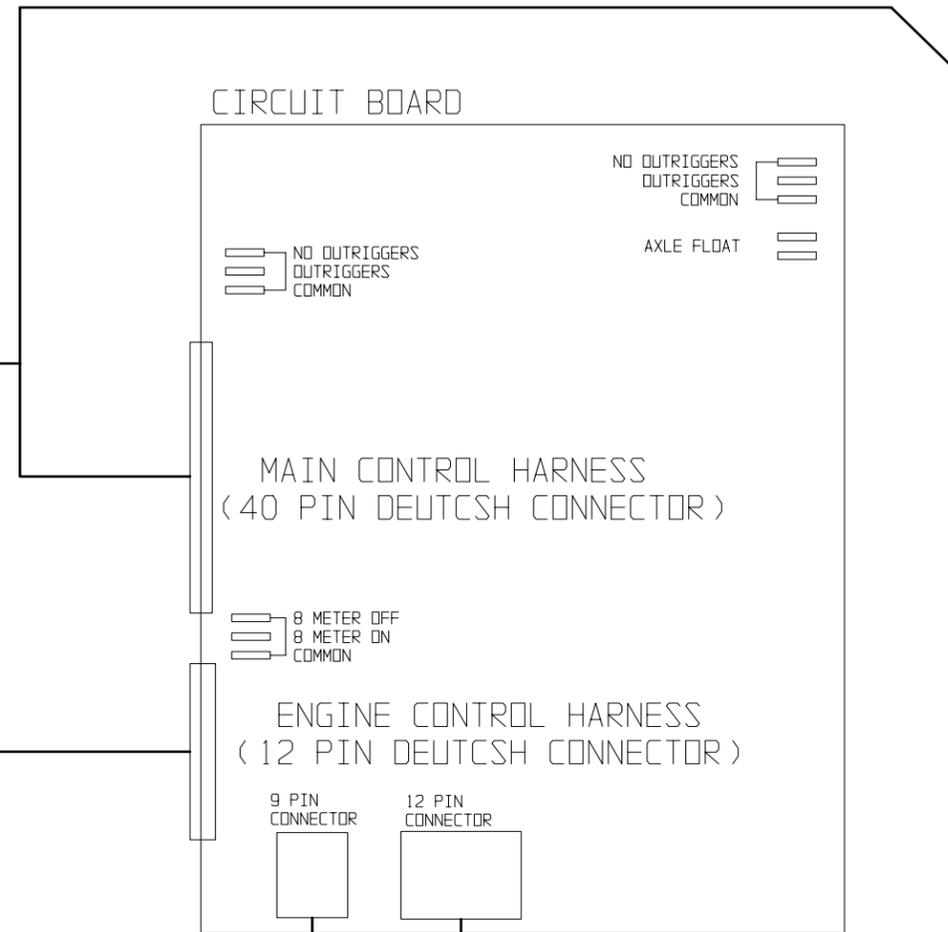
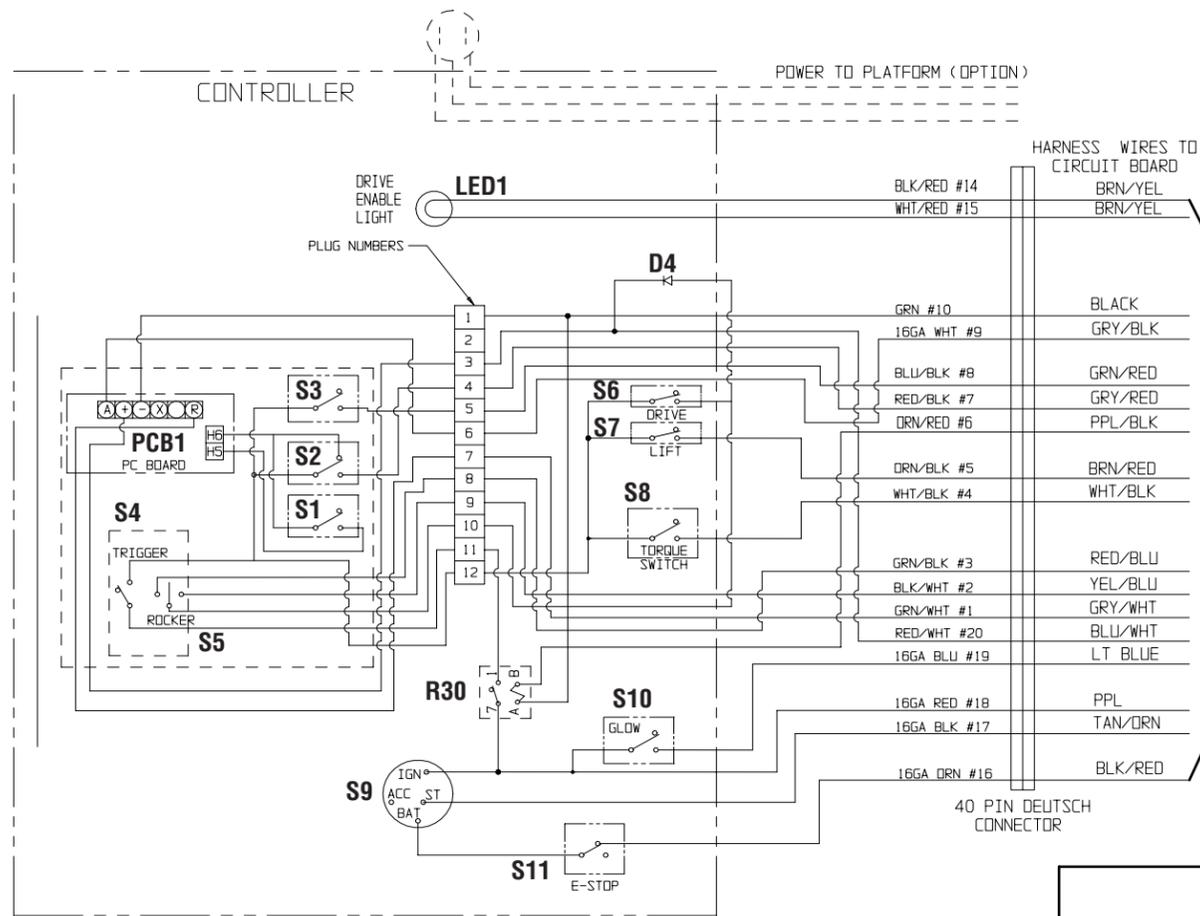
Legend: Electric Schematic 067535-057

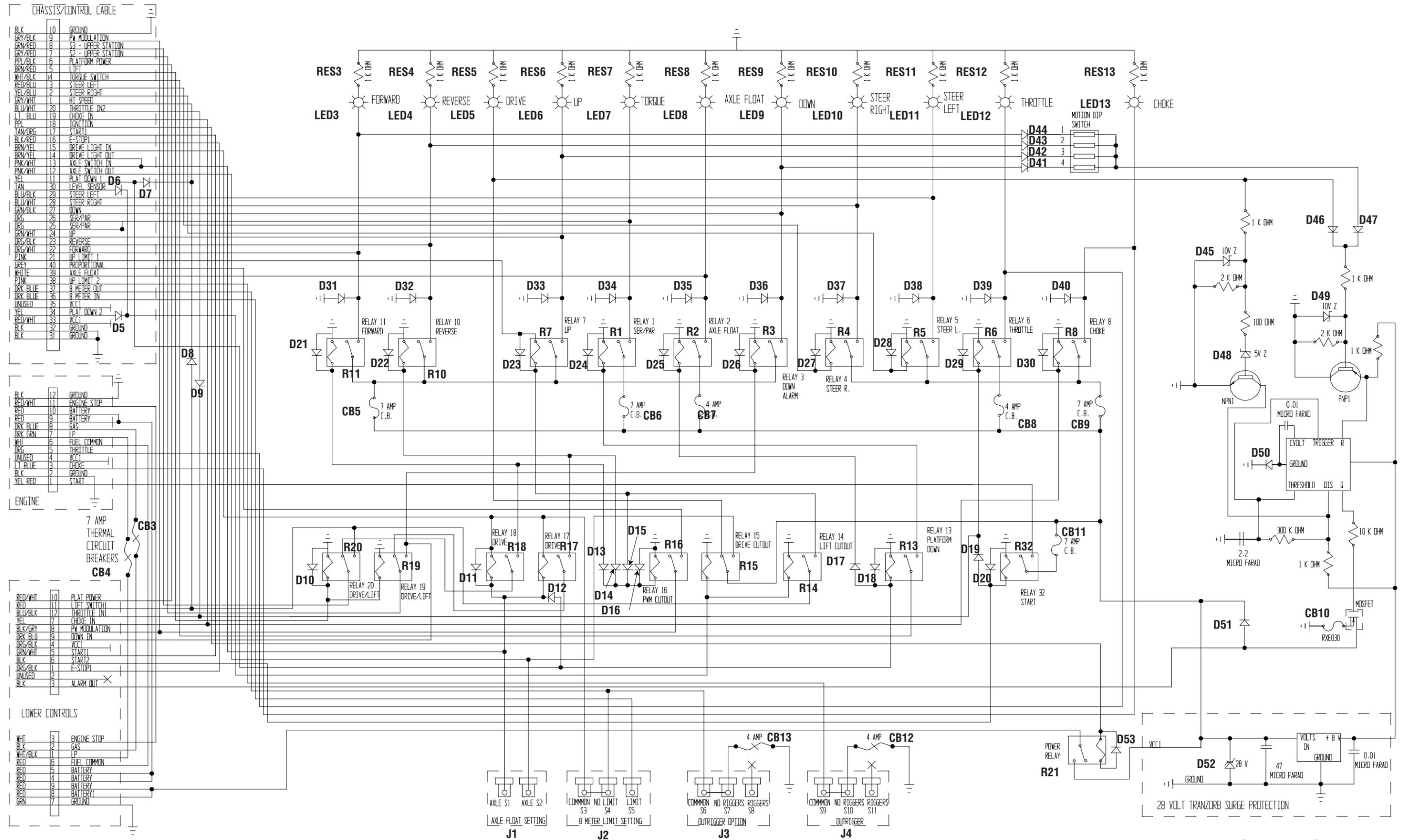
DESIGNATION	NAME	FUNCTION	LOCATION
ALM1	Alarm	Provides warning sound when slope of machine exceeds 3° side-to-side, or fore and aft and also when deck is lowering	Chassis Body
ALT	Alternator	Maintains current during operation	Power Module
BAT	Battery	Provides power for starting engine	Power Module
CB1	Circuit Breaker, Power	Supplies power to all function solenoids	Lower Controls
CB2	Circuit Breaker, Emergency Stop	Supplies power to Upper Control ignition switch	Lower Controls
CB3	Self resetting Circuit Breaker	Supplies power to Lower Controls	Circuit Board
CB4	Self resetting Circuit Breaker	Supplies power to LP gas	Circuit Board
CB5	Self resetting Circuit Breaker	Supplies power to Relay R11	Circuit Board
CB6	Self resetting Circuit Breaker	Supplies power to Relay R1	Circuit Board
CB7	Self resetting Circuit Breaker	Supplies power to Relay R2	Circuit Board
CB8	Self resetting Circuit Breaker	Supplies power to Relay R6	Circuit Board
CB9	Self resetting Circuit Breaker	Supplies power to Relay R8	Circuit Board
CB10	Self resetting Circuit Breaker	Overcurrent protection	Circuit Board
CB11	Self resetting Circuit Breaker	Supplies power to Relay R32	Circuit Board
CB12	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
CB13	Self resetting Circuit Breaker	Supplies power to Outrigger	Circuit Board
D2	Diode	Spike protection	Power Module
D3	Diode	Spike protection	Power Module
D4	Diode	Spike protection	Upper Controls
D5	Diode	Spike protection	Lower Controls
D6	Diode	Spike protection	Lower Controls
D7	Diode	Spike protection	Lower Controls
D8	Diode	Spike protection	Control Module
D9	Diode	Spike protection	Control Module
D10	Diode	Spike protection	On Relay R20
D11	Diode	Spike protection	On Relay R18
D12	Diode	Spike protection	On Relay R17
D13-16	Diode	Spike protection	On Relay R16
D17	Diode	Spike protection	
D18	Diode	Spike protection	On Relay R13
D19	Diode	Spike protection	
D20	Diode	Spike protection	On Relay R32
D21	Diode	Spike protection	On Relay R11
D22	Diode	Spike protection	On Relay R10
D23	Diode	Spike protection	On Relay R7
D24	Diode	Spike protection	On Relay R1
D25	Diode	Spike protection	On Relay R2
D26	Diode	Spike protection	On Relay R3
D27	Diode	Spike protection	On Relay R4
D28	Diode	Spike protection	On Relay R5

DESIGNATION	NAME	FUNCTION	LOCATION
D29	Diode	Spike protection	On Relay R6
D30	Diode	Spike protection	On Relay R8
D31	Diode	Spike protection	On Relay R11
D32	Diode	Spike protection	On Relay R10
D33	Diode	Spike protection	On Relay R7
D34	Diode	Spike protection	On Relay R1
D35	Diode	Spike protection	On Relay R2
D36	Diode	Spike protection	On Relay R3
D37	Diode	Spike protection	On Relay R4
D38	Diode	Spike protection	On Relay R5
D39	Diode	Spike protection	On Relay R6
D40	Diode	Spike protection	On Relay R8
D41-44	Diodes	Spike protection	On Motion Dip Switch
D45	Diode, 10V	Spike protection	Control Module
D46	Diode	Spike protection for Alarm	Control Module
D47	Diode	Spike protection for Alarm	Control Module
D48	Diode, 5V	Spike protection for Alarm	Control Module
D49	Diode, 10V	Spike protection for Alarm	Control Module
D50	Diode	Spike protection for Alarm	Control Module
D51	Diode	Spike protection for Alarm	Control Module
D52	Diode, 28V	Spike protection	Control Module
D53	Diode	Spike protection	On Relay R21
D54	Diode	Spike protection	On Relay R23
D55	Diode	Spike protection	On Relay R23
D56	Diode	Supplies power to Lower Controls	Lower Controls
HM	Hour Meter	Counts hours machine is operated	Lower Controls
J1	Jumper, Axle Float setting	Axle Float Settings	Lower Controls
J2	Jumper, 8 meter limit setting	8 meter cutout settings (Euro)	Lower Controls
J3	Jumper, Outrigger setting	Outrigger functions	Lower Controls
J4	Jumper, Outrigger setting	Outrigger functions	Lower Controls
LED1	Drive Enable LED	Indicates Drive Enable	Upper Controls
LED3	Forward LED	Indicates Forward functions being used	Circuit Board
LED4	Reverse LED	Indicates Reverse functions being used	Circuit Board
LED5	Drive LED	Indicates Drive functions being used	Circuit Board
LED6	Up LED	Indicates Up functions being used	Circuit Board
LED7	Torque LED	Indicates Torque functions being used	Circuit Board
LED8	Axle Float LED	Not used	
LED9	Down LED	Indicates Down functions being used	Circuit Board
LED10	Steer Right LED	Indicate Steer Right functions being used	Circuit Board
LED11	Steer Left LED	Indicates Steer Left functions being used	Circuit Board
LED12	Throttle LED	Indicates Throttle functions being used	Circuit Board
LED13	Choke LED	Indicates Choke functions being used	Circuit Board
PCB1	Printed Circuit Board (Controller)	Processes all input from Upper Controller	Upper Controls
PS1	Oil Pressure Switch	Cuts power to engine when oil pressure falls to dangerous levels	Power Module

DESIGNATION	NAME	FUNCTION	LOCATION
R1	Series/Parallel Relay	Switches power to Series/Parallel Solenoids	Control Module
R2	Axle Float Relay	Switches power to Axle Float Solenoid	Control Module
R3	Down Alarm Relay	Switches power to Down Alarm	Control Module
R4	Steer Right Relay	Switches power to Steer Right Solenoid	Control Module
R5	Steer Left Relay	Switches power to Steer Left Solenoid	Control Module
R6	Throttle Relay	Switches power to Throttle Solenoid	Control Module
R7	Up Relay	Switches power to Lift Solenoid	Control Module
R8	Choke Relay	Switches power to Choke Solenoid	Control Module
R10	Reverse Relay	Switches power to Reverse Solenoid	Control Module
R11	Forward Relay	Switches power to Forward Solenoid	Control Module
R13	Platform Down Relay	Cuts power to Series/Parallel Relay when Platform is elevated, selecting high torque mode	Control Module
R14	Lift Cutout Relay	Cuts power to Lift Relay	Control Module
R15	Drive Cutout Relay	Cuts power to Drive and Lift Relays when not energized by level sensor	Control Module
R16	PWM Cutout	Enables Proportional Controls	Control Module
R17, 18	Drive Relays	Cuts power to Forward and Reverse Relays when Cutout Relay is not energized and platform is elevated	Control Module
R19, 20	Drive/Lift Relays	Directs power from Forward and Reverse Switches to either forward/reverse or up/down Relays	Control Module
R21	Power Relay	Switches power to all Solenoids and engine	Control Module
R22	Throttle Relay	Switches power to Throttle Solenoid	Power Module
R23	Glow Plug Relay	Provides power to Glow Plug	Power Module
R30	Upper Control Power Relay	Cuts power to Upper Controls when Lower Controls are enabled	Upper Controls
R32	Start Relay	Provides power to Starter	Control Module
RES1	Glow Plug	Helps start engine when cold	Power Module
RES3	Forward Resistor	Provides power to Forward LED, LED3	Circuit Board
RES4	Reverse Resistor	Provides power to Reverse LED, LED4	Circuit Board
RES5	Drive Resistor	Provides power to Drive LED, LED5	Circuit Board
RES6	Up Resistor	Provides power to Up LED, LED6	Circuit Board
RES7	Torque Resistor	Provides power to Torque LED, LED7	Circuit Board
RES8	Axle float Resistor	Not used	Circuit Board
RES9	Down Resistor	Provides power to Down LED, LED9	Circuit Board
RES10	Steer Right Resistor	Provides power to Steer Right LED, LED10	Circuit Board
RES11	Steer Left Resistor	Provides power to Steer Left LED, LED11	Circuit Board
RES12	Throttle Resistor	Provides power to Throttle LED, LED12	Circuit Board
RES13	Choke Resistor	Provides power to Choke LED, LED13	Circuit Board
SEN1	Sensor, Tilt	Provides power to cut-out Relay when machine is level	Chassis Body
S1	Micro Switch	Supplies power to Controller	Upper Controls, Joystick
S2	Reverse Micro Switch	Supplies power to Drive/Lift Relay, Forward/Up contacts	Upper Controls, Joystick
S3	Forward Micro Switch	Supplies power to Drive/Lift Relay, Reverse/Down contacts	Upper Controls, Joystick

DESIGNATION	NAME	FUNCTION	LOCATION
S4	Interlock Micro Switch	Interrupts power to controls when not engaged	Upper Controls, Joystick Handle
S5	Steering Micro Switch	Supplies power to Steer Left and Steer Right Relays	Upper Controls, Joystick Handle
S6, S7	Drive/Lift Switch	Supplies power to Steering Micro Switch (drive) or to Drive/Lift Relay	Upper Controls
S8	Torque Switch	Supplies power to Series/Parallel Relay	Upper Controls
S9	Ignition Switch	Supplies power to Upper Controls, Engine, and Starter Motor Solenoid	Upper Controls
S10	Glow Plug Switch	Supplies power to Glow Plug Relay	Upper Controls
S11	Emergency Stop Switch	Cuts power to Upper Controls and Engine	Upper Controls
S12	Gas Switch	Supplies power to Fuel Pump and Shut-off Valve	Lower Controls
S13	Propane Switch	Supplies power to LP Valve	Lower Controls
S14	Starter Switch	Supplies power to Starter Motor	Lower Controls
S15	Choke Switch	Supplies power to Choke Relay	Lower Controls
S16	Engine Stop Switch	Cuts power to Ignition Module and Fuel Shut-off Solenoid	Lower Controls
S17	Down Switch	Supplies power to Down Relay	Lower Controls
S18	Lift Switch	Supplies power to Up Relay	Lower Controls
S19	Throttle Switch	Supplies power to Throttle Relay	Lower Controls
S20	Emergency Stop Switch	Cuts power to Lower Controls and Engine	Lower Controls
S21	Chassis/Platform Switch	Supplies power to either Upper or Lower Controls	Lower Controls
S22	Proximity (Platform Down) Switch	High/Low speed cutout and Outrigger lockout	Chassis Body
S24	Up Limit Switch	Restricts Lift Cylinder from fully extending	Bottom Elevating Assembly Tube
S25	Axle Float Switch	Supplies power to Axle Float Solenoid	Lower Controls
S26 Serial Number 4022-4274	8 Meter Cutout Switch	Disables drive function if platform height exceeds 8 meters	Bottom Elevating Assembly Tube
SOL1	Throttle Solenoid	Controls Engine Throttle	Power Module
SOL5	Choke Solenoid	Controls Engine choke	Power Module
SOL6	Proportional Solenoid	Controls Proportional Valve	Valve Manifold
SOL7	Forward Solenoid	Controls Forward Valve	Valve Manifold
SOL8	Reverse Solenoid	Controls Reverse Valve	Valve Manifold
SOL9	Up Solenoid	Controls Lift Valve	Valve Manifold
SOL10	Shunt Solenoid	Controls Shunt Valve	Valve Manifold
SOL11	Series/Parallel Solenoid	Controls Series/Parallel Valve	Valve Manifold
SOL13	Down Solenoid	Controls Down Solenoid	Valve Manifold
SOL14	Steer Right Solenoid	Controls Steer Right Valve	Valve Manifold
SOL15	Steer Left Solenoid	Controls Steer Left Valve	Valve Manifold
SOL16	Down Solenoid	Controls Down Solenoid	Valve Manifold
SOL17	Axle Float	Controls Axle Float Valve	Valve Manifold
STR	Starter	Starts Engine	Power Module



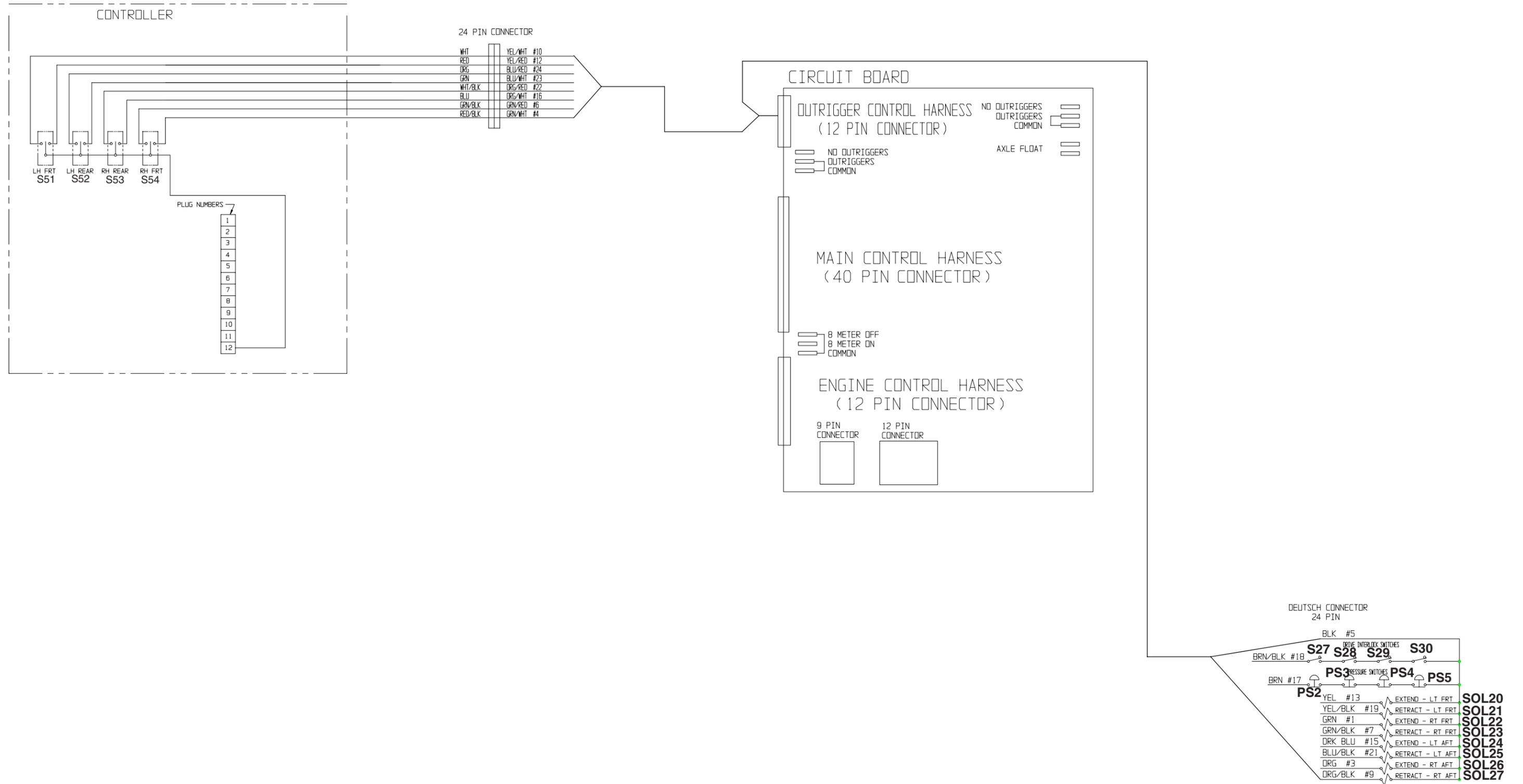


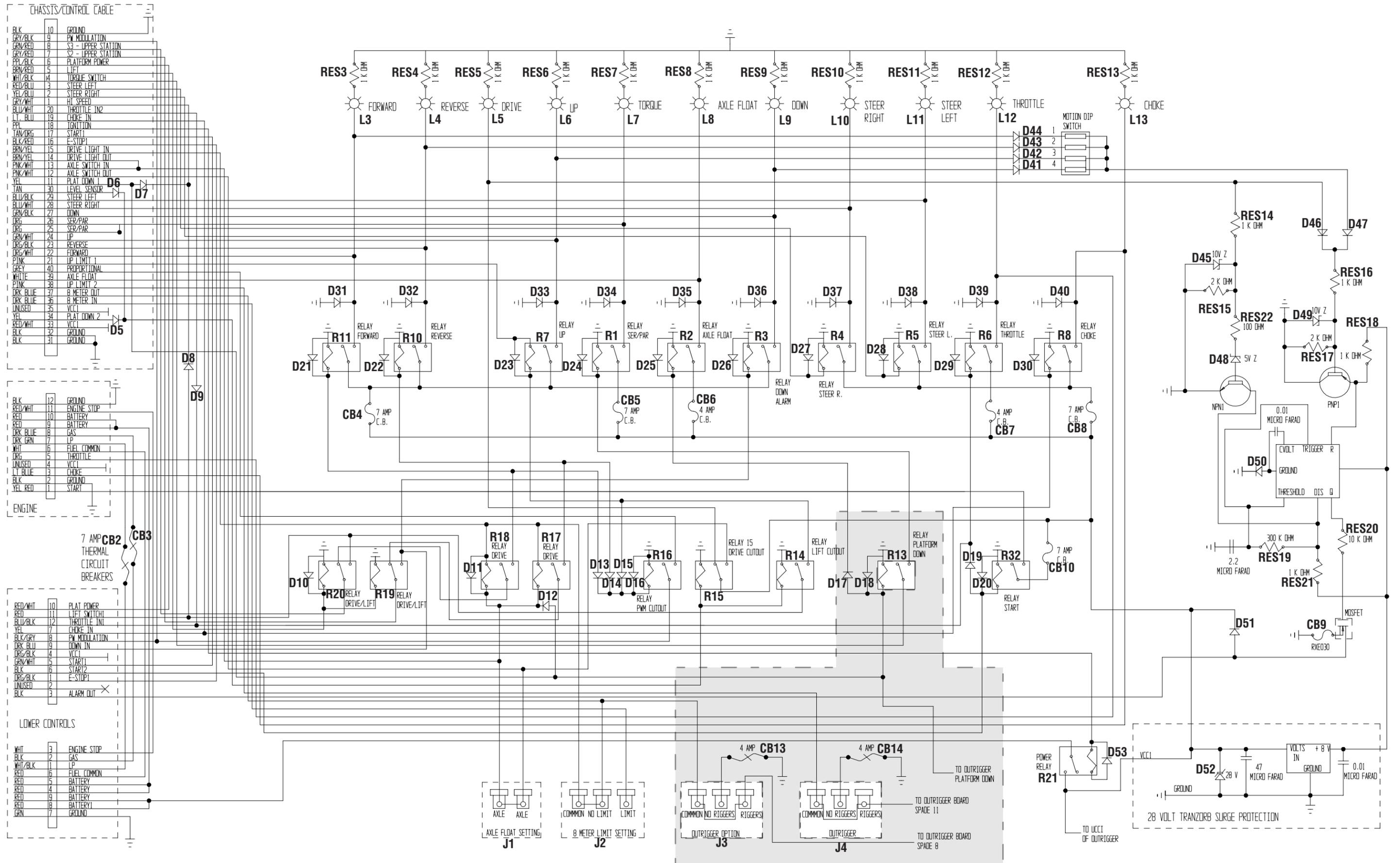
4-5 LX31/41/50 OUTRIGGER OPTION - ELECTRIC SCHEMATICS

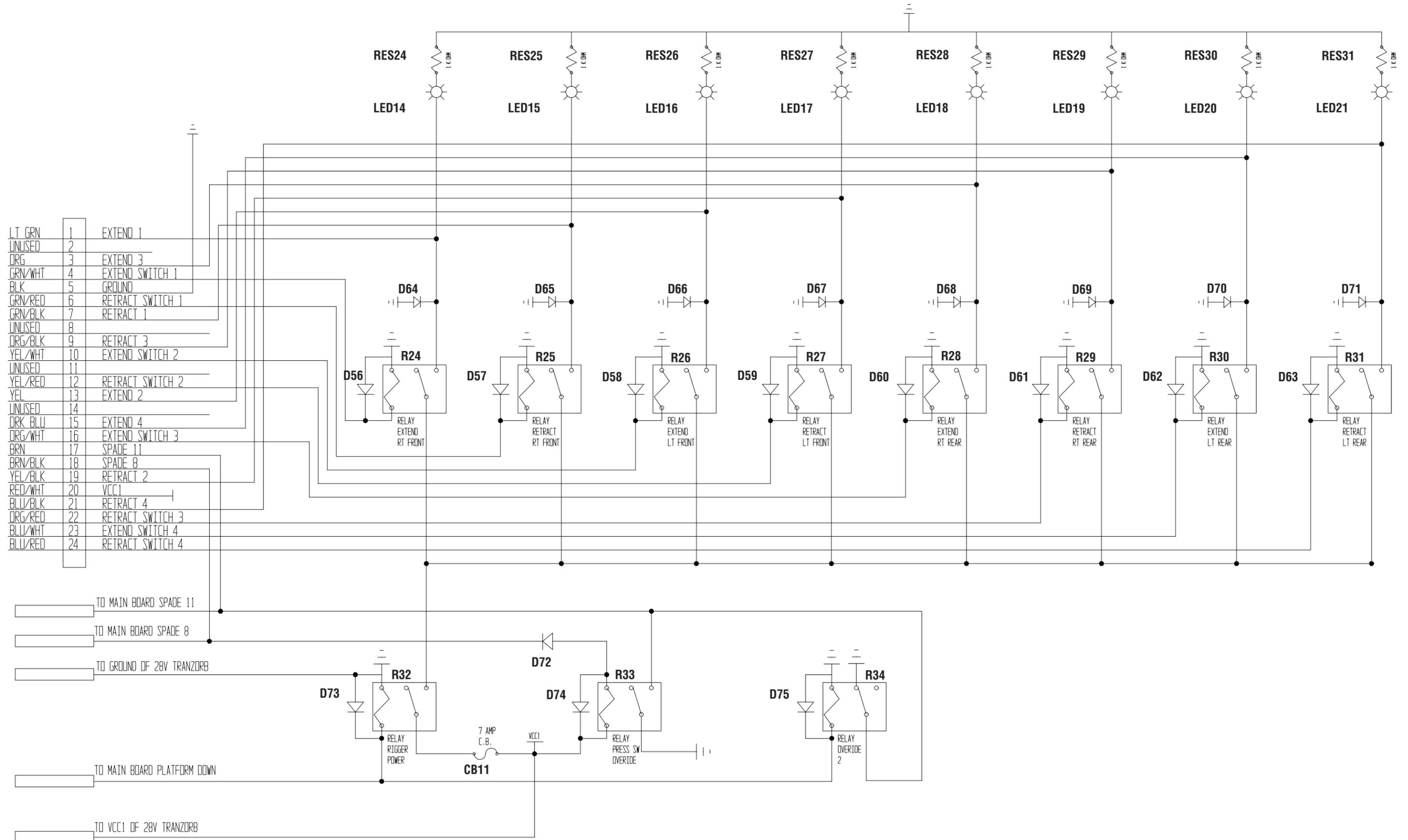
Legend: Electric Schematic

DESIGNATION	NAME	FUNCTION	LOCATION
CB11	Circuit Breaker	Supplies power to Override Relays	Circuit Board
BAT	Battery	Provides power for starting engine	Power Module
CB1	Circuit Breaker, Power	Supplies power to all function solenoids	Lower Controls
D56-D75	Diodes	Spike protection for for Outrigger relays	Circuit Board
J3	Jumper, Outrigger setting	Outrigger functions	Lower Controls
J4	Jumper, Outrigger setting	Outrigger functions	Lower Controls
LED14	R.H. front Outrigger Extend LED	Indicates Right Hand front Outrigger Extend function in use	Circuit Board
LED15	R.H. front Outrigger Retract LED	Indicates Right Hand front Outrigger Retract function in use	Circuit Board
LED16	L.H. front Outrigger Extend LED	Indicates Left Hand front Outrigger Extend function in use	Circuit Board
LED17	L.H. front Outrigger Retract LED	Indicates Left Hand front Outrigger Retract function in use	Circuit Board
LED18	R.H. rear Outrigger Extend LED	Indicates Right Hand rear Outrigger Extend function in use	Circuit Board
LED19	R.H. rear Outrigger Retract LED	Indicates Right Hand rear Outrigger Retract function in use	Circuit Board
LED20	L.H. rear Outrigger Extend LED	Indicates Left Hand rear Outrigger Extend function in use	Circuit Board
LED21	L.H. rear Outrigger Retract LED	Indicates Left Hand rear Outrigger Retract function in use	Circuit Board
PS2-PS5	Outrigger Pressure Switches	Completes ground circuit to Up Relay when Outriggers are loaded	Outrigger Cylinders
R13	Platform Down Relay	Cuts power to Series/Parallel Relay when Platform is elevated, selecting high torque mode	Control Module
R24	Right front Outrigger Extend Relay	Switches power to Outrigger Solenoid SOL22	Circuit

DESIGNATION	NAME	FUNCTION	LOCATION
R25	Right front Outrigger Retract Relay	Switches power to Outrigger Solenoid SOL23	Circuit Board
R26	Left front Outrigger Extend Relay	Switches power to Outrigger Solenoid SOL20	Circuit Board
R27	Left front Outrigger Retract Relay	Switches power to Outrigger Solenoid SOL21	Circuit Board
R28	Right rear Outrigger Extend Relay	Switches power to Outrigger Solenoid SOL26	Circuit Board
R29	Right rear Outrigger Retract Relay	Switches power to Outrigger Solenoid SOL27	Circuit Board
R30	Left rear Outrigger Extend Relay	Switches power to Outrigger Solenoid SOL24	Circuit Board
R31	Left rear Outrigger Retract Relay	Switches power to Outrigger Solenoid SOL25	Circuit Board
R32	Outrigger Power Relay	Supplies power to Outrigger Extend/Retract Relays	Circuit Board
R33	Pressure Switch Override Relay	Completes ground circuit to Up Relay when Outriggers are retracted	Circuit Board
R34	Override Relay		Circuit Board
S27-S30	Drive Interlock Switches	Completes ground circuit to Drive Relay when all Outriggers are retracted	Outrigger Cylinders
S52-S54	Outrigger Extend/Retract Switches	Supplies power to Outrigger Extend/Retract Relays	Upper Controls
SOL20	Outrigger Extend Solenoid, LH front	Controls Extend Valve	Outrigger Valve Manifold
SOL22	Outrigger Extend Solenoid, RH front	Controls Extend Valve	Outrigger Valve Manifold
SOL23	Outrigger Retract Solenoid, RH front	Controls Retract Valve	Outrigger Valve Manifold
SOL24	Outrigger Extend Solenoid, LH rear	Controls Extend Valve	Outrigger Valve Manifold
SOL25	Outrigger Retract Solenoid, LH rear	Controls Retract Valve	Outrigger Valve Manifold
SOL26	Outrigger Extend Solenoid, RH rear	Controls Extend Valve	Outrigger Valve Manifold
SOL27	Outrigger Retract Solenoid, RH rear	Controls Retract Valve	Outrigger Valve Manifold







4-6 LX31/41 Two Wheel Drive - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-010

DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold
CP2	Cavity Plug	Used with two-wheel drive axle	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer front wheels	Front Axle Assembly
CYL3	Lift Cylinder	Actuates Scissor Linkage to elevate Platform	Scissor Assembly
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly
MOT1, 2	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder
ORF2	Down Orifice	Limits the descent speed of the platform	Lift Cylinder
ORF3	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold
RV2	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold
RV3, 4	Bi-Directional Relief Valves	Allows oil flow to bypass drive motors when turning on tight radius	Underneath each rear Drive Motor
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold

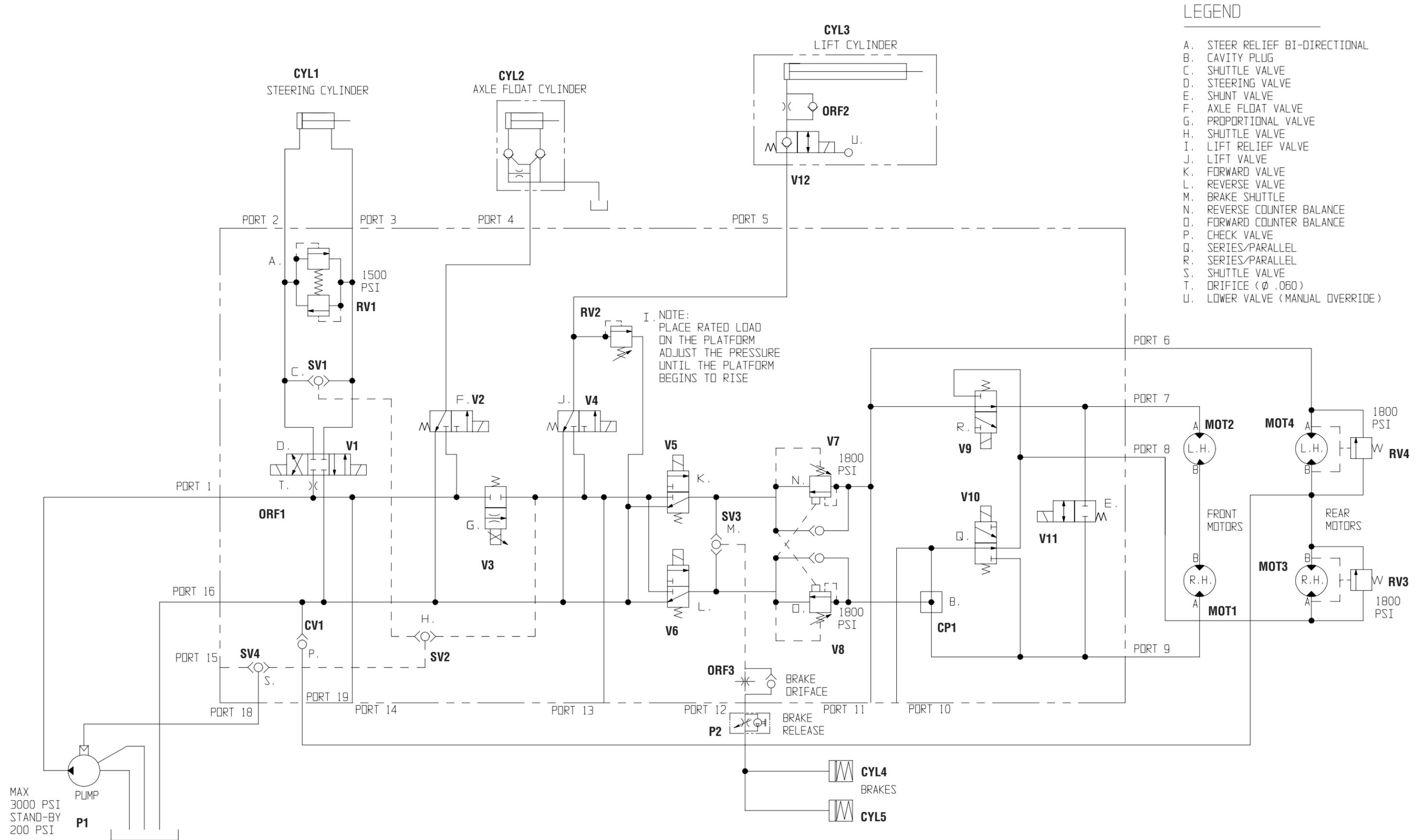
DESIGNATION	NAME	FUNCTION	LOCATION
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents run-away on slopes	Valve Manifold
V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents run-away on slopes	Valve Manifold
V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
V12	Down Valve	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder

4-7 LX31/41 FOUR WHEEL DRIVE - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-011

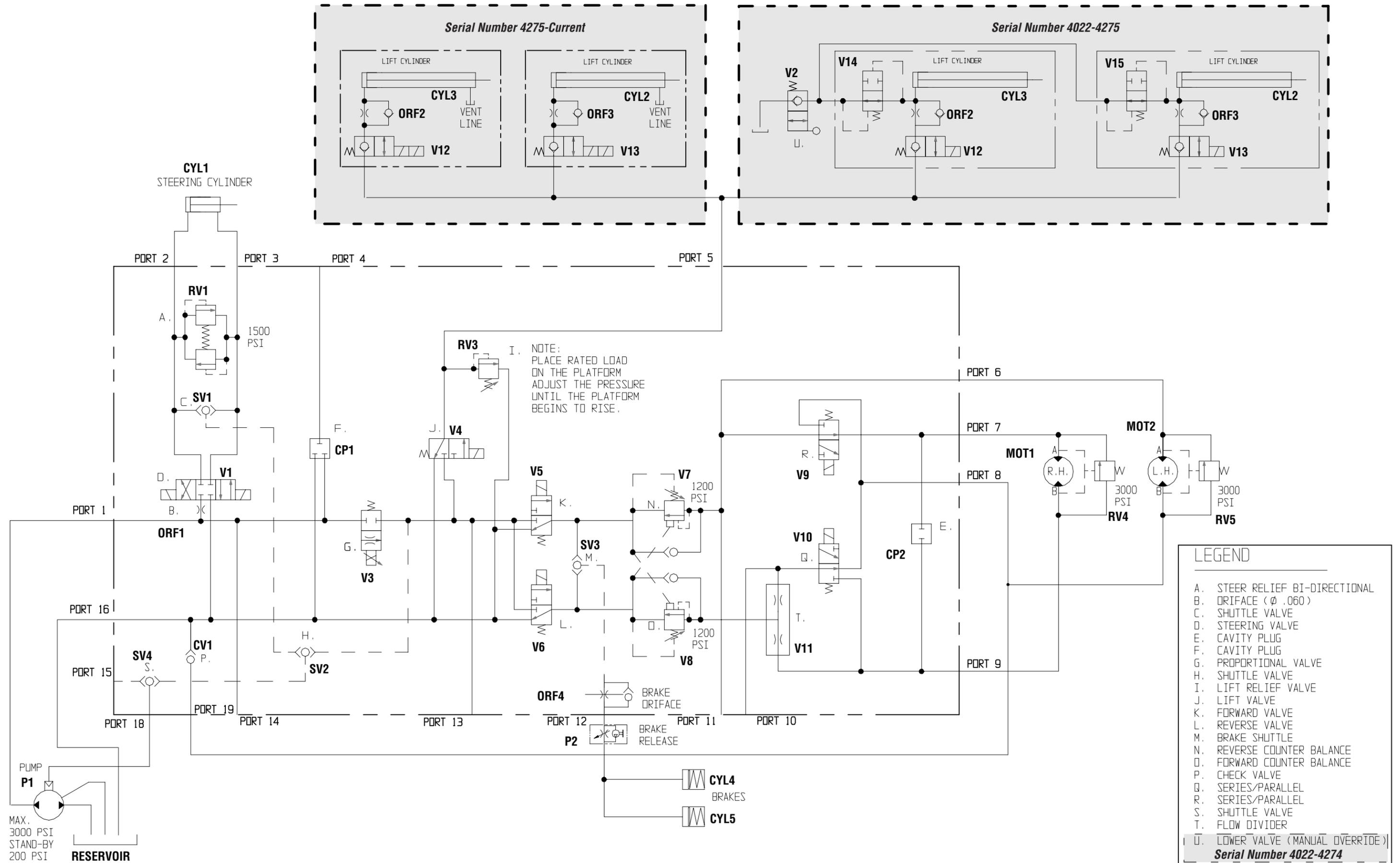
DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold
CP2	Cavity Plug	Used with two-wheel drive axle	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer front wheels	Front Axle Assembly
CYL2	Axle Float Cylinder	Locks Front Axle when Platform is elevated	Front Axle Assembly
CYL3	Lift Cylinder	Actuates Scissor Linkage to elevate Platform	Scissor Assembly
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly
MOT1, 2	Front Drive Motors	Drives Front Wheels	Front Axle Assembly
MOT3, 4	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder
ORF2	Down Orifice	Limits the descent speed of the platform	Lift Cylinder
ORF3	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold
RV2	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold
RV3, 4	Bi-Directional Relief Valve	Allows oil flow to bypass drive motors when turning on tight radius	Underneath each rear Drive Motor
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder

DESIGNATION	NAME	FUNCTION	LOCATION
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
V2	Axle Float Valve	Allows pilot pressure to release Check Valves on Axle Float Cylinder	Valve Manifold
V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents runaway on slopes	Valve Manifold
V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents runaway on slopes	Valve Manifold
V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
V12	Down Valve	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder



4-8 LX50 Two Wheel Drive - HYDRAULIC SCHEMATICS**Legend:** Hydraulic Schematic 067534-014

DESIGNATION	NAME	FUNCTION	LOCATION	DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold	V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold	V2	Emergency Down Valve	Allows Platform to be lowered in the event of system malfunction or power loss	Rear of Elevating Assembly
CP2	Cavity Plug	Used with two-wheel drive axle	Valve Manifold	V3			
CYL1	Steering Cylinder	Actuates Steering Linkage to steer front wheels	Front Axle Assembly	V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
CYL2, 3	Lift Cylinders	Actuates Scissor Linkage to elevate Platform	Scissor Assembly	V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly	V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
MOT1, 2	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly	V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents run-away on slopes	Valve Manifold
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder	V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents run-away on slopes	Valve Manifold
ORF2, 3	Down Orifices	Limits the descent speed of the platform	Lift Cylinder	V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
ORF4	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold	V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module	V12, V13	Down Valves	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of Cylinder when Deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly	V14, V15	Velocity Fuse Valves	Protects against uncontrolled descent of Platform if hose breaks	Inside Lift Cylinders
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold	V14, V15			
RV3	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold				
RV4, 5	Bi-Directional Relief Valves	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each Rear Drive Motor				
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder				
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold				
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release Brakes	Not Serviceable				
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold				

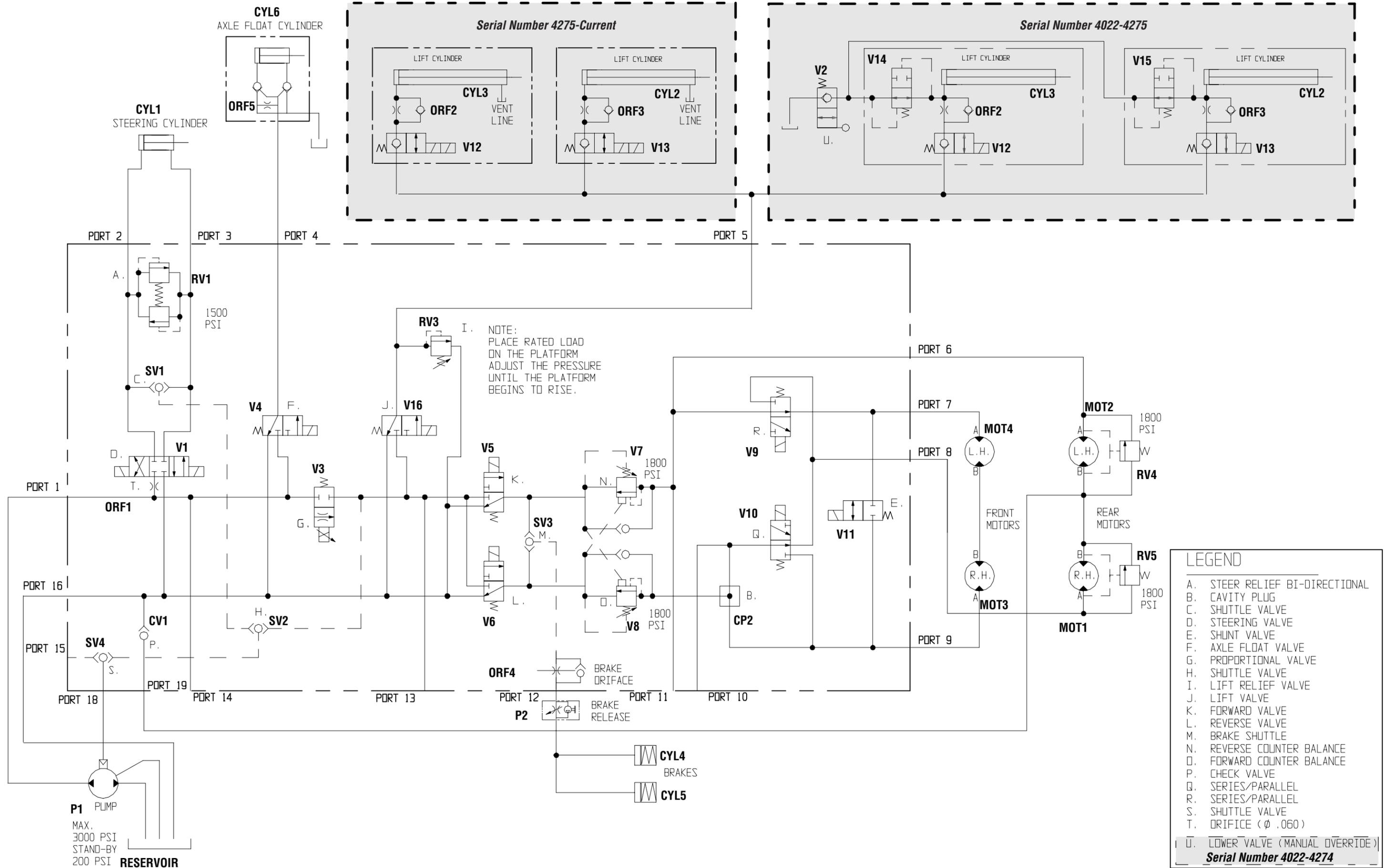


4-9 LX50 FOUR WHEEL DRIVE - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-015

DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Provides logic for two-wheel drive	Valve Manifold
CP2	Cavity Plug	Eliminates oil flow to tank	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer Front Wheels	Front Axle Assembly
CYL2, 3	Lift Cylinders	Actuates Scissor Linkage to elevate Platform	Scissor Assembly
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly
CYL6	Axle Float Cylinder	Locks Front Axle when Platform is elevated	Front Axle Assembly
MOT1, 2	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly
MOT3, 4	Front Drive Motors	Drives Front Wheels	Front Axle Assembly
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder
ORF2, 3	Down Orifices	Limits the descent speed of the platform	Lift Cylinder
ORF4	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold
RV3	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold
RV4, 5	Bi-Directional Relief Valves	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each Rear Drive Motor
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release Brakes	Not Serviceable
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold

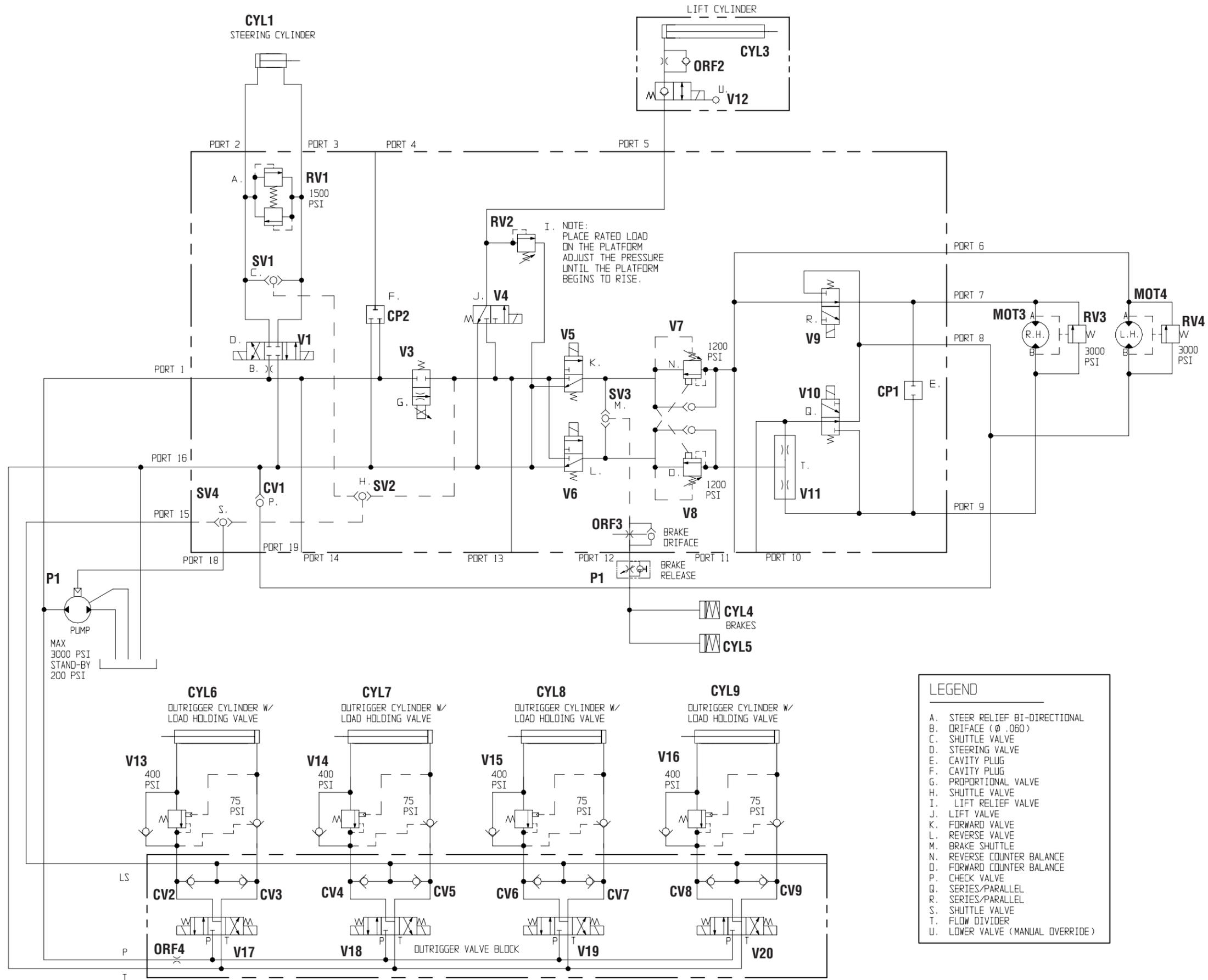
DESIGNATION	NAME	FUNCTION	LOCATION
V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
V2 Serial Number 4022-4274	Emergency Down Valve	Allows Platform to be lowered in the event of system malfunction or power loss	Rear of Elevating Assembly
V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
V4	Axle Float Valve	Allows pilot pressure to release Check Valves on Axle Float Cylinder	Valve Manifold
V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents runaway on slopes	Valve Manifold
V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents runaway on slopes	Valve Manifold
V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
V11	Shunt Valve	Bypasses oil flow from front Drive Motors when in High Speed Mode, allowing greater pressure from Rear Motors	Valve Manifold
V12, V13	Down Valves	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of Cylinder when Deck is lowering. Can be manually actuated for emergency lowering.	Base of Lift Cylinders
V14, V15 Serial Number 4022-4274	Velocity Fuse Valves	Protects against uncontrolled descent of Platform if hose breaks	Inside Lift Cylinders
V16	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold



4-10 LX31/41 Two Wheel Drive with Outrigger Option - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-012

DESIGNATION	NAME	FUNCTION	LOCATION	DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold	SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
CV2-9	Outrigger Sense Line Check Valves	Allows oil to flow to Load Sense Line only	Outrigger Valve Manifold	V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold	V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
CP2	Cavity Plug	Used with two-wheel drive axle	Valve Manifold	V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer Front Wheels	Front Axle Assembly	V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
CYL3	Lift Cylinder	Actuates Scissor Linkage to elevate Platform	Scissor Assembly	V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly	V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents runaway on slopes	Valve Manifold
CYL6-9	Outrigger Cylinders	Extend and retract to level Chassis	assembly, aft of each wheel	V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents runaway on slopes	Valve Manifold
MOT3, 4	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly	V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder	V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
ORF2	Down Orifice	Limits the descent speed of the platform	Lift Cylinder	V12	Down Valve	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder
ORF3	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold	V13-V16	Outrigger Counterbalance Valves	Lock Outrigger Cylinders	On Outrigger Cylinders
ORF4	Outrigger Orifice	Regulates speed of outrigger operation	Outrigger Valve Manifold	V17	Left Hand Front Outrigger Valve	Controls oil to LHF Outrigger Cylinder	Outrigger Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module	V18	Right Hand Front Outrigger Valve	Controls oil to RHF Outrigger Cylinder	Outrigger Valve Manifold
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly	V19	Left Hand Rear Outrigger Valve	Controls oil to LHR Outrigger Cylinder	Outrigger Valve Manifold
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold	V20	Right Hand Rear Outrigger Valve	Controls oil to RHR Outrigger Cylinder	Outrigger Valve Manifold
RV2	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold				
RV3, 4	Bi-Directional Relief Valve	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each rear Drive Motor				
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder				
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold				
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable				



4-11 LX31/41 FOUR WHEEL DRIVE WITH OUTRIGGER OPTION - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-013

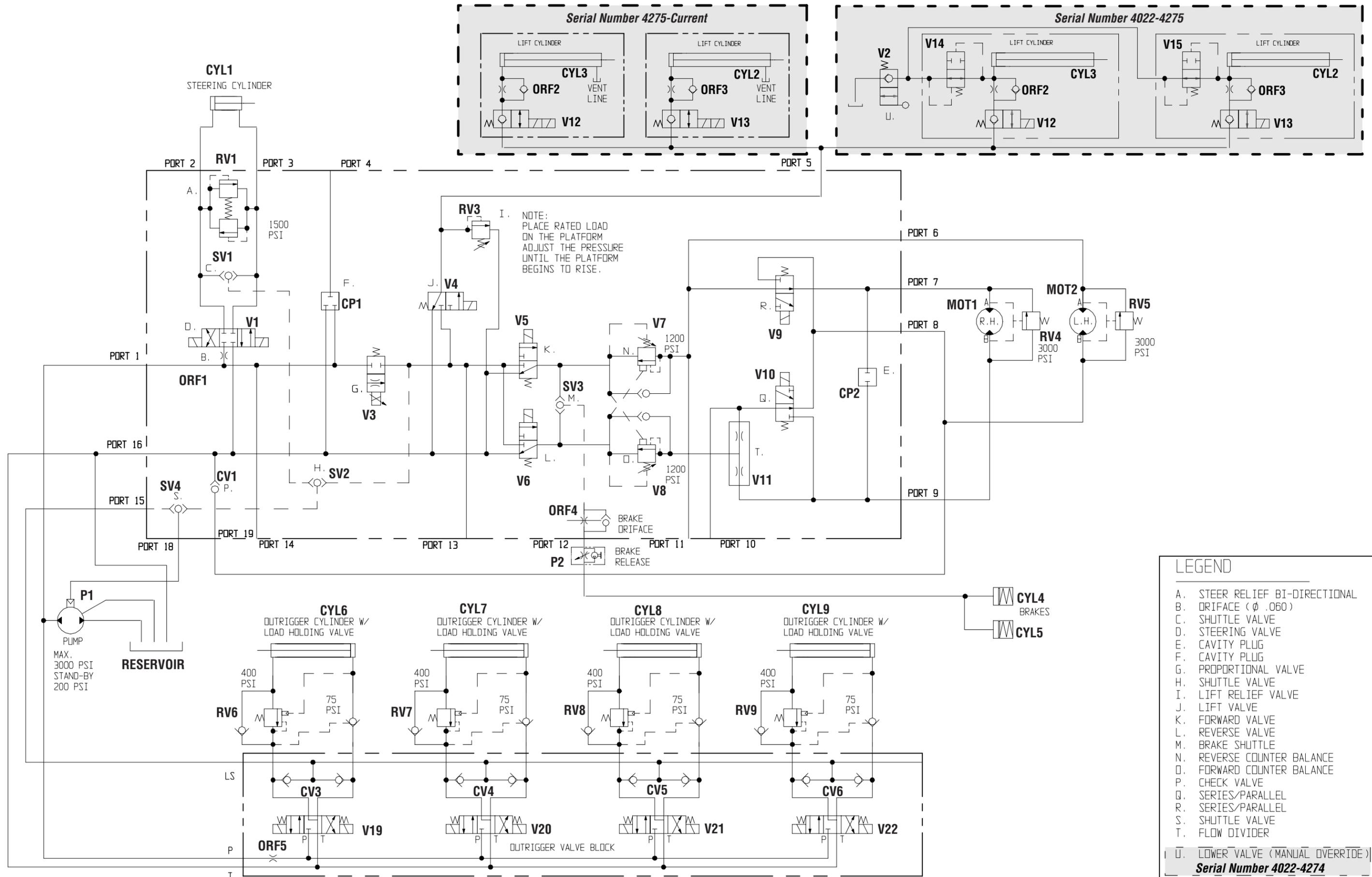
DESIGNATION	NAME	FUNCTION	LOCATION	DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold	SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable
CV2-9	Outrigger Sense Line Check Valves	Allows oil to flow to Load Sense Line only	Outrigger Valve Manifold	SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold	V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer Front Wheels	Front Axle Assembly	V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
CYL2	Axle Float Cylinder	Locks Front Axle when Platform is elevated	Front Axle Assembly	V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
CYL3	Lift Cylinder	Actuates Scissor Linkage to elevate Platform	Scissor Assembly	V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly	V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
CYL6-9	Outrigger Cylinders	Extend and retract to level Chassis	Chassis assembly, aft of each wheel	V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents run-away on slopes	Valve Manifold
MOT1, 2	Front Drive Motors	Drives Front Wheels	Front Axle Assembly	V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents run-away on slopes	Valve Manifold
MOT3, 4	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly	V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder	V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
ORF2	Down Orifice	Limits the descent speed of the platform	Lift Cylinder	V12	Down Valve	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder
ORF3	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold	V13-V20	Outrigger Counterbalance Valves	Lock Outrigger Cylinders	On Outrigger Cylinders
ORF4	Outrigger Orifice	Regulates speed of outrigger operation	Outrigger Valve Manifold	V21	Left Hand Front Outrigger Valve	Controls oil to LHF Outrigger Cylinder	Outrigger Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module	V22	Right Hand Front Outrigger Valve	Controls oil to RHF Outrigger Cylinder	Outrigger Valve Manifold
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly	V23	Left Hand Rear Outrigger Valve	Controls oil to LHR Outrigger Cylinder	Outrigger Valve Manifold
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold	V24	Right Hand Rear Outrigger Valve	Controls oil to RHR Outrigger Cylinder	Outrigger Valve Manifold
RV2	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold				
RV3, 4	Bi-Directional Relief Valve	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each rear Drive Motor				
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder				
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold				

4-12 LX50 Two Wheel Drive with Outrigger Option - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-016

DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold
CV3-6	Outrigger Sense Line Check Valves	Allows oil to flow to Load Sense Line only	Outrigger Valve Manifold
CP1	Cavity Plug	Provides logic for two-wheel drive	Valve Manifold
CP2	Cavity Plug	Used with two-wheel drive axle	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer Front Wheels	Front Axle Assembly
CYL2, 3	Lift Cylinders	Actuates Scissor Linkage to elevate Platform	Scissor Assembly
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly
CYL6-9	Outrigger Cylinders	Extend and retract to level Chassis	Chassis assembly, aft of each wheel
MOT1, 2	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder
ORF2, 3	Down Orifice	Limits the descent speed of the Platform	Lift Cylinder
ORF4	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold
ORF5	Outrigger Orifice	Limits flow of oil to Outriggers	Outrigger Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold
RV3	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold
RV4, 5	Bi-Directional Relief Valve	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each rear Drive Motor
RV6-13	Outrigger Relief Valves	Provides overpressure protection to Outrigger Valves	Outrigger Valve Manifold
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold

DESIGNATION	NAME	FUNCTION	LOCATION
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
V2 Serial Number 4022-4274	Emergency Down Valve	Allows Platform to be lowered in the event of system malfunction or power loss	Rear of Elevating Assembly
V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents run-away on slopes	Valve Manifold
V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents run-away on slopes	Valve Manifold
V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
V11	Flow Divider Valve	Equalizes oil flow from front and rear Drive Motor when in parallel configuration	Valve Manifold
V12, V13	Down Valves	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder
V14, V15 Serial Number 4022-4274	Velocity Fuse Valves	Protects against uncontrolled descent of Platform if hose breaks	Inside Lift Cylinders
V19 - V22	Outrigger Valves	Operates Outrigger Cylinders	On Outrigger Cylinders

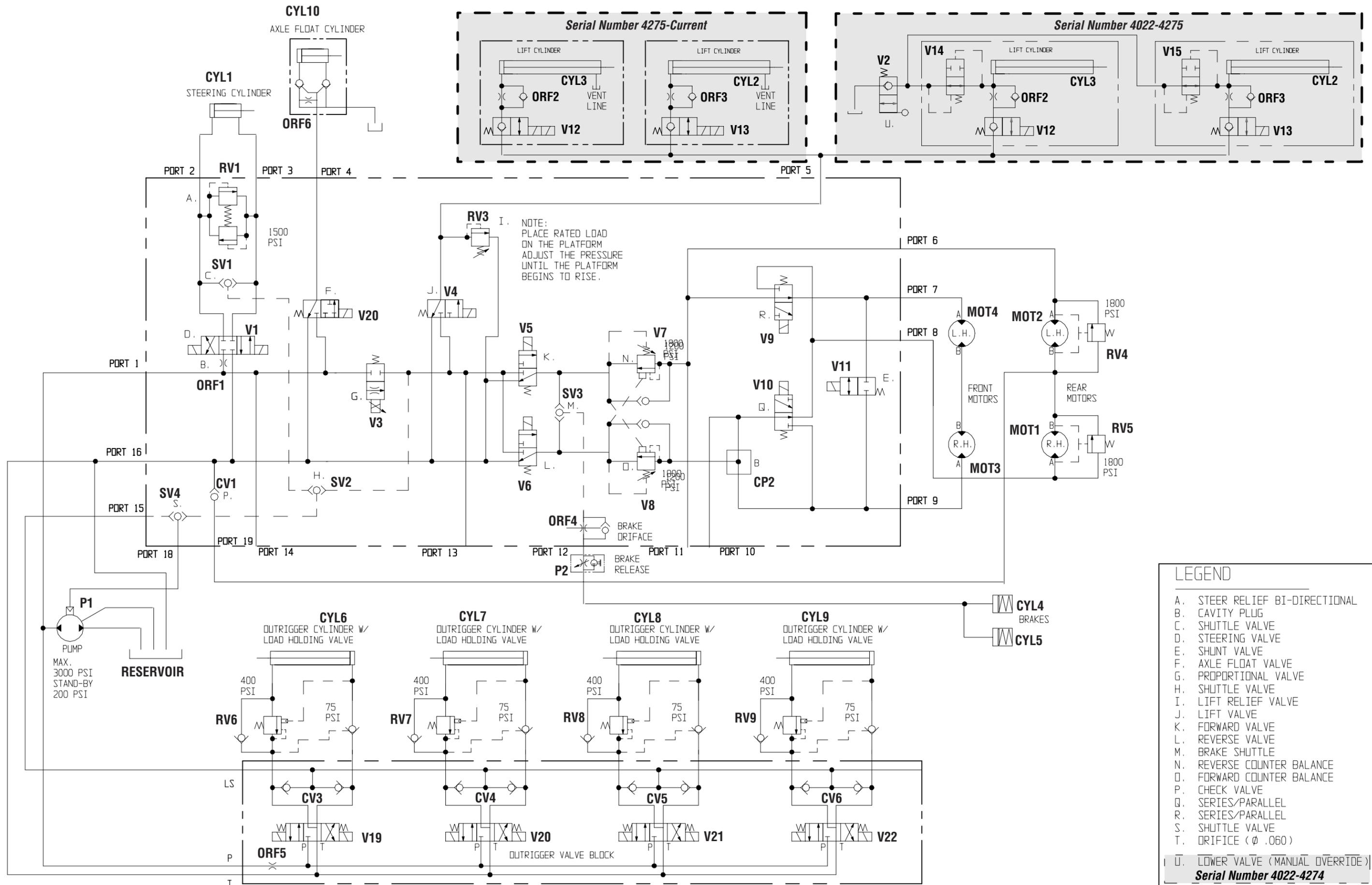


4-13 LX50 FOUR WHEEL DRIVE WITH OUTRIGGER OPTION - HYDRAULIC SCHEMATICS

Legend: Hydraulic Schematic 067534-017

DESIGNATION	NAME	FUNCTION	LOCATION
CV1	Check Valve	Allows make-up oil to drive motors	Valve Manifold
CV3-6	Outrigger Sense Line Check Valves	Allows oil to flow to Load Sense Line only	Outrigger Valve Manifold
CP2	Cavity Plug	Eliminates oil flow to Tank	Valve Manifold
CYL1	Steering Cylinder	Actuates Steering Linkage to steer Front Wheels	Front Axle Assembly
CYL2, 3	Lift Cylinders	Actuates Scissor Linkage to elevate Platform	Scissor Assembly
CYL4, 5	Brake Cylinders	Parking Brakes, spring applied, hydraulic release	Rear Axle Assembly
CYL6-9	Outrigger Cylinders	Extend and retract to level Chassis	Chassis assembly, aft of each wheel
MOT1, 2	Front Drive Motors	Drives Front Wheels	Front Axle Assembly
MOT3, 4	Rear Drive Motors	Drives Rear Wheels	Rear Axle Assembly
ORF1	Steering Orifice	Limits the oil flow to the Steering Cylinder	Steering Cylinder
ORF2, 3	Down Orifice	Limits the descent speed of the platform	Lift Cylinder
ORF4	Brake Orifice	Allows Brakes to release quickly and apply slowly	Valve Manifold
ORF5	Outrigger Orifice	Limits flow of oil to outriggers	Outrigger Valve Manifold
P1	Hydraulic Pump	Provides fluid power for hydraulic power	Power Module
P2	Brake Release Pump	Used to release brakes when machine is towed	Rear Axle Assembly
RV1	Bi-Directional Steering Relief Valve	Provides overpressure protection for steering components	Valve Manifold
RV3	Lift Relief Valve	Limits maximum load of Elevating Assembly	Valve Manifold
RV4, 5	Bi-Directional Relief Valves	Allows oil flow to bypass Drive Motors when turning on tight radius	Underneath each Rear Drive Motor
RV6-13	Outrigger Relief Valves	Provides overpressure protection to Outrigger Valves	Outrigger Valve Manifold
SV1	Sense Line Shuttle Valve	Allows pilot pressure to pump Sense Line from Steering	Steering Cylinder
SV2	Shuttle Valve	Allows for load sense to pump	Valve Manifold
SV3	Drive Shuttle Valve	Allows oil pressure from drive to release brakes	Not Serviceable

DESIGNATION	NAME	FUNCTION	LOCATION
SV4	Shuttle Valve	Allows for Load Sense to Pump	Valve Manifold
V1	Steering Valve	Controls oil flow to Steering Cylinder, CYL1	Valve Manifold
V2 Serial Number 4022-4274	Emergency Down Valve	Allows Platform to be lowered in the event of system malfunction or power loss	Rear of Elevating Assembly
V3	Proportional Valve	Regulates oil flow to Lift and Drive functions	Valve Manifold
V4	Lift Valve	Allows oil flow to Lift Cylinder, CYL3	Valve Manifold
V5	Forward Valve	Allows oil to flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V6	Reverse Valve	Allows oil flow to drive system in forward, allows return oil flow from drive system in reverse	Valve Manifold
V7	Reverse Counterbalance Valve	Provides dynamic braking for machine in forward and prevents run-away on slopes	Valve Manifold
V8	Forward Counterbalance Valve	Provides dynamic braking for machine in reverse and prevents run-away on slopes	Valve Manifold
V9, V10	Series/Parallel Valves	Directs oil flow to Drive Motors in either series (for higher speed) or parallel (for higher torque) configuration	Valve Manifold
V11	Shunt Valve	Bypasses oil flow from front Drive Motors when in High Speed mode, allowing greater pressure from Rear Motors	Valve Manifold
V12, V13	Down Valve	Holds oil in Lift Cylinder when deck is elevated. Allows oil to flow out of Cylinder when deck is lowering. Can be manually actuated for emergency lowering	Base of Lift Cylinder
V14, V15 Serial Number 4022-4274	Velocity Fuse Valves	Protects against uncontrolled descent of Platform if hose breaks	Inside Lift Cylinders
V19, V22	Outrigger Valves	Operates Outrigger Cylinders	On Outrigger Cylinders
V23	Axle Float Valve	Allows pilot pressure to release Check Valves on Axle Float Cylinder	Valve Manifold



NOTES:

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