

Hy-Brid Lifts[®]

MAINTENANCE & TROUBLESHOOTING

Part No. SUPO-646
December 2013

SELF-PROPELLED AERIAL WORK PLATFORM



HB-1230

SERIES I

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no text or other markings on the paper.

The purpose of this Maintenance Manual is to provide qualified service personnel with information for servicing and maintaining Hy-Brid Lifts. All information in this manual must be read and understood before any attempt is made to service this machine.

The operation and safety manual is considered a part of the work platform and contains instructions and operating procedures essential to properly and safely operate the Custom Equipment Hy-Brid Lift. Users must read and understand all information in the Safety and Operations Manual before operation.



THE OPERATION AND SAFETY MANUAL MUST BE READ AND UNDERSTOOD PRIOR TO OPERATING THE MACHINE.

- The user/operator should not accept operating responsibility until the manual has been read and understood as well as having operated the lift under supervision of an experienced and qualified operator.
- Because the manufacturer has no direct control over machine application and operation, proper safety practices are the responsibility of the user and all operating personnel.



ANY MODIFICATION ON THIS MACHINE WITHOUT THE EXPRESS WRITTEN CONSENT OF THE MANUFACTURER IS PROHIBITED.

If there is a question about application and/or operation, contact:

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REVISION LOG

Revision A	December 2013
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SECTION 1 | SAFETY

1.1 | SAFETY SYMBOLS



**FAILURE TO FOLLOW THIS WARNING WILL CAUSE
DEATH OR PERSONAL INJURY.**

“DANGER” indicates an imminently hazardous situation, which, if not avoided, **will** result in death or serious injury.



**FAILURE TO FOLLOW THIS WARNING MAY CAUSE DEATH
OR PERSONAL INJURY.**

“WARNING” indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury



**FAILURE TO FOLLOW THIS WARNING MAY CAUSE
INJURY OR DAMAGE EQUIPMENT**

“CAUTION” indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment

1.2 | GENERAL RULES AND PRECAUTIONS

Custom Equipment, Inc. designed the Hy-Brid Lift self-propelled scissors lift to be safe and reliable. It is intended for elevating personnel, along with their necessary tools and materials to overhead work locations.

An operator of any type of work platform is subject to certain hazards that cannot be protected by mechanical means. It is therefore essential that operators be competent, careful, physically and mentally fit and thoroughly trained in safe operation of this machine.

Although Custom Equipment, Inc. conforms to specified American National Standards Institute ANSI/SIA A92.6 Standard, it is the responsibility of the owner to instruct operators with the safety requirements made not only by Custom Equipment, Inc., but by the various safety boards in your area, as well as additional requirements set forth by ANSI A92.6. If you come across a situation that you think might be unsafe, stop the platform and request further information from qualified sources before proceeding.



MAINTENANCE INFORMATION IS FOR USE BY TRAINED PERSONNEL ONLY



NEVER REACH BETWEEN SCISSORS LINKS OR PROP UP PLATFORM UNLESS MAINTENANCE PINS ARE IN PLACE.

1.3 | SAFETY GUIDELINES

MAINTENANCE LOCK

The maintenance lock must be placed into position whenever the machine is being serviced in the raised or partially raised position. Serious injury and/or death could result if maintenance lock is not used properly.



FAILURE TO COMPLY WITH THE LISTED SAFETY PRECAUTIONS MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY, OR DEATH.

- Never work under an elevated platform until maintenance locks have been engaged.
- Remove all rings, watches, and jewelry when performing any maintenance.
- Do not wear long hair unrestrained or loose fitting clothing and neckties which may become caught on or entangled in equipment.
- Observe and obey all warnings and cautions on machine and in Operation and Safety Manual.
- Keep oil, grease, water, etc. wiped from standing surfaces and handholds.
- Before making any adjustments, lubricating or performing any other maintenance, shut off all power controls.
- Battery should always be disconnected during replacement of electrical components.
- Keep all support equipment and attachments stowed in their proper place.
- Use only approved nonflammable cleaning solvents.
- After maintenance, inspect the machine as described for Pre-delivery.

SECTION 2 | MAINTENANCE

2.1 | BATTERY MAINTENANCE

Battery cycle life will vary significantly depending on the depth of discharge. The deeper the depth of discharge the fewer cycles a battery will deliver. Conversely, the shallower the depth of discharge the more cycles a battery will deliver. To optimize the health of your battery, limit discharge to 80%.

The performance and life of a battery will vary with application, usage, temperature and depth of discharge. AGM batteries tend to deliver higher than their rated capacity (up to 10-15% higher) for -30 cycles until they are “broken in” and settle at their rated capacity.

Operating batteries above 80°F (27°C) will yield runtimes above the rated capacity and operating batteries below 80°F (27°C) will yield runtimes below the rated capacity. Cold temperatures can significantly reduce battery capacity. Although higher temperatures increase the battery capacity they also accelerate corrosion and reduce overall battery life.

2.2 | CHARGING THE BATTERY

This unit is equipped with a two deep cycle 12-volt AGM maintenance-free batteries.

Batteries should be fully charged after each use. Opportunity charging can be done but the batteries should be fully charged at least every other day if they are used daily. Charge in a ventilated area as gases may be released through the pressure relief valve if the batteries are excessively over-charged.

NOTE: The surrounding temperature greatly affects the power reserve within a battery. Example: A battery that is 100% charged at 80° F (27°C) drops to 65% at 32°F (0°C) At 0°F (-18°C), this battery will drop to 40% efficiency.



- ☒ Park the machine on a level surface.
- ☒ Plug charger into AC outlet until charged.
- ☒ Unplug charger.



The charger will not begin charging on severely discharged batteries. This will be evident by the three indicators blinking simultaneously.

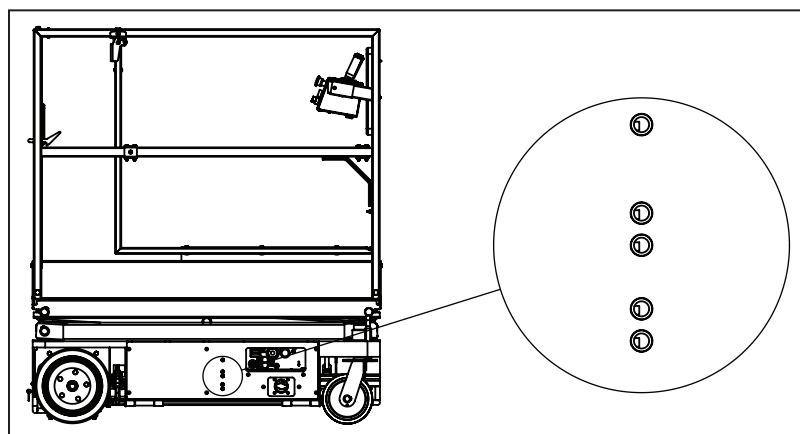


Figure 1: Battery Charger LED Display

**WARNING**

DO NOT OPERATE UNIT WHILE CHARGING. DO NOT DISABLE CHARGER INTERLOCK.

HOW TO READ THE BATTERY DISPLAYS

POWER	BATTERY 1 STATUS		BATTERY 2 STATUS		
	CHARGING	READY	CHARGING	READY	
					This display indicates that the power is on but there is no connection to a battery. The charger must see approximately five (5) volts on a battery to deliver D/C current.
Green LED (ON)	Red LED (OFF)	Green LED (OFF)	Red LED (OFF)	Green LED (OFF)	
POWER	BATTERY 1 STATUS		BATTERY 2 STATUS		
	CHARGING	READY	CHARGING	READY	
					This display indicates that power is on and that both outputs are delivering D/C current to the batteries.
Green LED (ON)	Red LED (ON)	Green LED (OFF)	Red LED (ON)	Green LED (OFF)	
POWER	BATTERY 1 STATUS		BATTERY 2 STATUS		
	CHARGING	READY	CHARGING	READY	
					This display indicates that power is on and that both outputs are finished charging and are in a float maintenance mode.
Green LED (ON)	Red LED (OFF)	Green LED (ON)	Red LED (OFF)	Green LED (ON)	

2.3 | LUBRICATION

There are no components that routinely need lubrication.

2.4 | COMPONENTS REQUIRING ADJUSTMENT

Under normal use, no components should require adjustment. Contact the manufacturer if adjustments are required.

2.5 | EXAMINATION, REPAIR, REPLACEMENT OF LIMITED LIFE COMPONENTS

With proper use, battery maintenance, and regular inspection, there are no limited life components that require routine replacement.

2.6 | SAFETY DEVICES AND SYSTEMS REQUIRING CHECKS

Check safety functions as part of daily inspection. Check that the electromagnetic brakes are holding.

2.7 | STORAGE

After periods of storage, exposure to extremes of ambient conditions-heat, cold, moisture, dust etc., inspect the machine. Refer to the Pre-Delivery/ Frequent Inspection Checklist in the Maintenance Manual.

2.8 | MAJOR ALTERATIONS OR REPAIRS

Any alterations must be approved by the manufacturer. Major repairs, which affect the stability, strength or performance of the machine must also be approved by the manufacturer, recorded, and include machine inspection and testing. Never attach pipe racks, material lifting devices or make any other alteration that is not part of the intended design of the machine.

2.9 | OTHER PROCEDURES

VOLTAGE TEST POINTS

Contact technical assistance for more details.

WIRE CONNECTIONS

When disconnecting or reconnecting any wires, make sure the master power switch is in the OFF position.

SECTION 3 | MAINTENANCE CHECKLISTS

Regular inspection and conscientious maintenance is important to efficient economical operation of this machine. It will help to assure that equipment will perform satisfactorily with a minimum of service and repair. Make checks at the stated intervals or more frequently if required by local operating conditions. The following inspection checklists are included in this manual:

- **Pre-Start** (required before operation at each work shift)
- **Frequent**
- **Pre-Delivery/Annual** (Required at intervals not more than twelve months)

The rated life of the machine is Light Intermittent Duty (typical use 10 years, 40 weeks per year, 20 hours per week, 5 load cycles per hour).

3.1 | PRE-START INSPECTION CHECKLIST



THIS CHECKLIST MUST BE USED AT THE BEGINNING OF EACH SHIFT OR AFTER EVER SIX TO EIGHT HOURS OF USE. FAILURE TO DO SO COULD AFFECT THE SAFETY OF THE OPERATOR.

MODEL NUMBER _____ SERIAL NUMBER _____

- ☒ Keep inspection records up-to-date.
- ☒ Record and report all discrepancies to your supervisor.
- ☒ A dirty machine cannot be properly inspected.

Y — Yes/Acceptable **N** — No/Unacceptable **R** — Repaired

DESCRIPTION	Y	N	R
VISUAL INSPECTIONS			
There are no loose or missing parts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that warning and instructional labels are legible and secure. Ensure that load capacity is clearly marked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the platform rails and safety gate for damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Platform and base controls are not missing, damaged, or disconnected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical cables and wires are not torn, frayed, or disconnected.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydraulic hoses are not torn or loose; there are no leaks; hoses and the cables have no worn areas or chafing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the tires for damage. Check that wheel axle retaining rings and set screw in rear wheel are tight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that all snap rings are secure in grooves on pivot pins.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FUNCTIONAL TESTS			
Gate closes automatically and latches (alignment can be adjusted with screw on toe board or railing if necessary).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Platform Controls:</i> Check all switches and push buttons for proper operation.			
Emergency Stop (Stops all movement)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive & Up/Down Mode Switch (Selects drive/steer or elevate mode)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joystick (Return to neutral, drives forward & reverse, elevates & lowers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive Enable Trigger (Must be activated to drive)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Base Controls:</i> Check all switches and push buttons for proper operation.			
Emergency Stop (Stops all movement)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Key Switch (Selects Platform Control, Ground Control, or Off)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Up/Down Rocker Switch (Elevates, Lowers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alarm (Not damaged, sounds for descent, tile)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Wheels:</i> Front and rear wheels rotate freely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drives in slow speed when elevated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Brakes:</i> Machine stops when joystick released.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pothole guards deploy and lock when platform is elevated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lift does not elevate when pothole guards are blocked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DATE _____ INSPECTED BY _____

3.2 | MONTHLY INSPECTION CHECKLIST



THIS CHECKLIST MUST BE USED MONTHLY OR AFTER EVERY 100 HOURS OF USE. FAILURE TO DO SO COULD AFFECT THE SAFETY OF THE OPERATOR.

MODEL NUMBER _____ SERIAL NUMBER _____

- ☒ Keep inspection records up-to-date.
- ☒ Record and report all discrepancies to your supervisor.
- ☒ A dirty machine cannot be properly inspected.

Y — Yes/Acceptable **N** — No/Unacceptable **R** — Repaired

DESCRIPTION	Y	N	R
Perform all the checks on the Pre-Start Inspection Checklist.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the condition of hydraulic fluid in reservoir. Oil should have a clear amber color.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect the entire machine for signs of damage, broken welds, loose bolts, or improper repairs. (Check for corrosion, cracking, abrasion, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check that all snap rings are secure in grooves on pivot pins.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check if tires are leaning in or out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check electrical motor brushes (every 150 hours)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DATE _____ INSPECTED BY _____

3.3 | PRE-DELIVERY/ANNUAL/FREQUENT INSPECTION CHECKLIST



AERIAL PLATFORMS SHALL BE INSPECTED, SERVICED, AND ADJUSTED TO MANUFACTURER'S REQUIREMENTS BY A QUALIFIED MECHANIC PRIOR TO EACH SALE, LEASE, OR RENTAL; AND EVERY 3 MONTHS OR 150 HOURS, WHICHEVER COMES FIRST.

MODEL NUMBER _____ SERIAL NUMBER _____

- ☒ Check each item listed below.
- ☒ Use proper operating, service, and maintenance manual for specific information and settings
- ☒ If an item is found to be unacceptable make the necessary repairs and check the "repaired" box.
- ☒ When all items are "acceptable", the unit is ready for service.

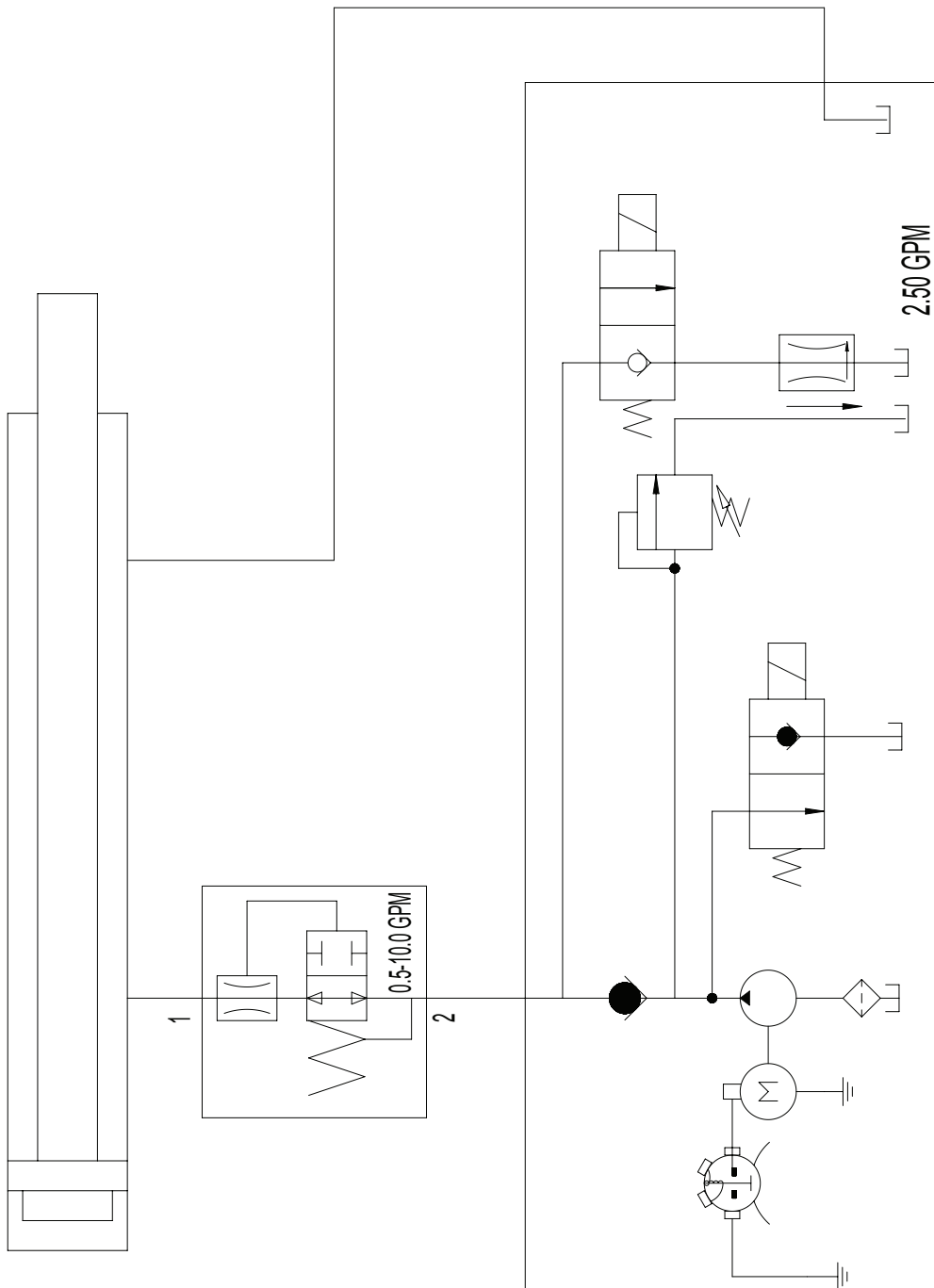
BASE:	Y	N	R
Inspect slide tracks for damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All frame bolts tight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump Secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DC motors secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Covers screwed on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Batteries Fully Charged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WHEELS:	Y	N	R
Snap Rings Secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bolts/Nuts Tight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SCISSORS:	Y	N	R
Broken Welds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bent Beam Members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All rollers Turn Freely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ret. Rings Secure On Pivots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Down Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance Locks:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pins in cabinet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLATFORM:	Y	N	R
Bent rails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken welds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All rails in place/secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
110V outlet safe/working (if applicable)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entrance gate Closes Freely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DECALS:	Y	N	R
Legibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Correct capacity noted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper placement quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EXTENDING PLATFORM:	Y	N	R
Extends freely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cables in place/secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locks in Stowed Position	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locks in Extended Position	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FUNCTIONS:	Y	N	R
All Functions Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Stop Breaks Circuits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slow Speed limit switch Set properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WIRING:	Y	N	R
Switches secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contactor(s) secure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tight on terminals (No loose wiring)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pothole guards deploy when platform elevated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pothole interlock functions correctly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil: Level 1" from top	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brakes: Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all hose for leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all fittings for leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BATTERY CHARGER:	Y	N	R
Secure/Operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tilt sensor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning Horn (if applicable)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hour meter operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Battery indication operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All Shields/Guards in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operator/Service Manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DATE _____ INSPECTED BY _____

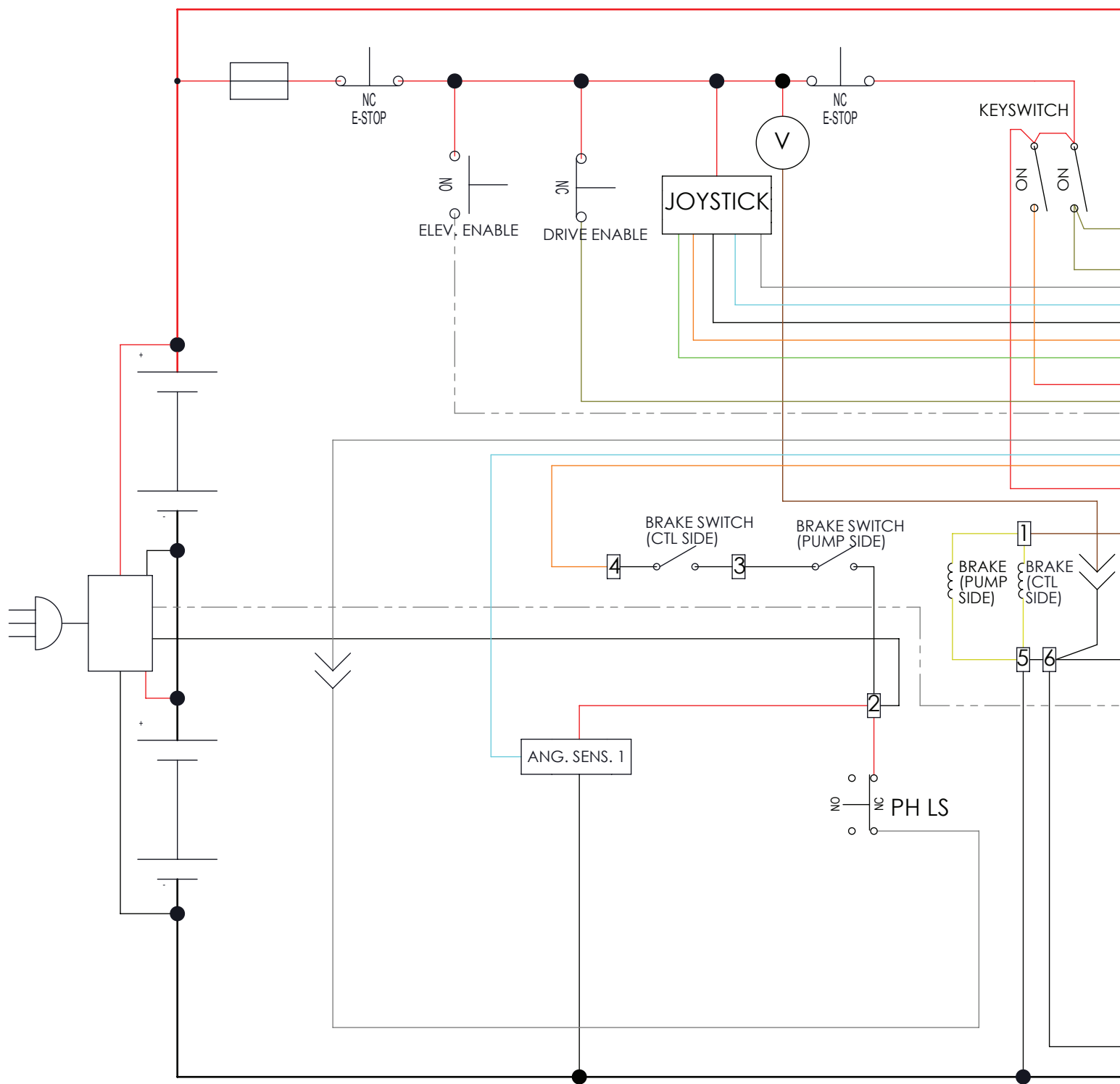
SECTION 4 | TECHNICAL REFERENCES

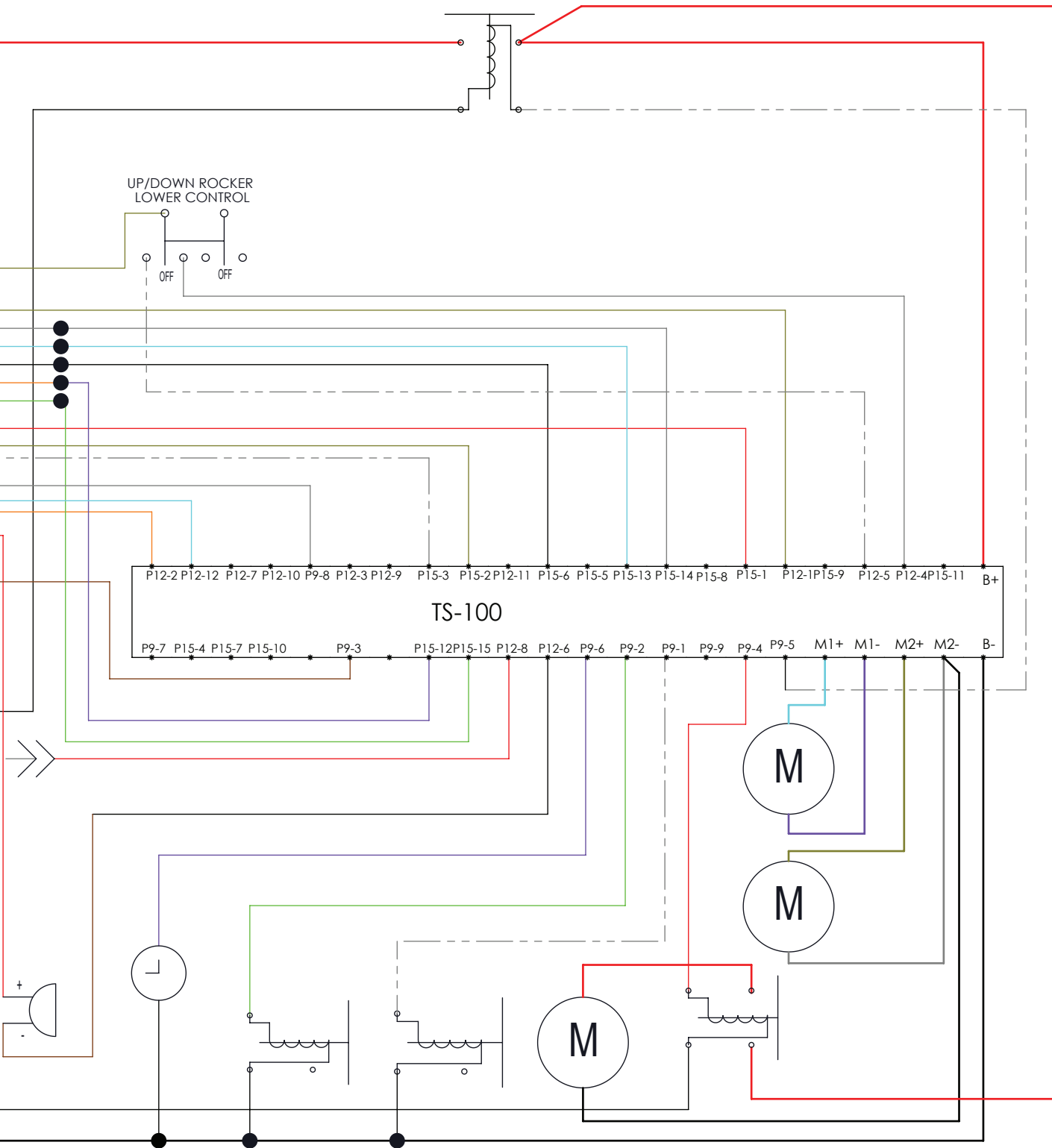
4.1 | HYDRAULIC SCHEMATIC



REV.	DESCRIPTION	DATE	BY
A	INITIAL RELEASE	8/27/2013	DJS
B	CHANGED FLOW CTL FROM 3.5 TO 2.5 [ECO 1739]	11/15/2013	DJS

4.2 | ELECTRICAL SCHEMATIC



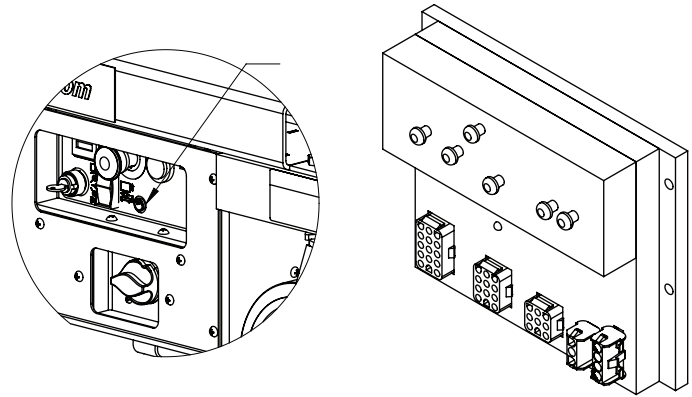


REV.	DESCRIPTION	DATE	BY
D	KEY SWITCH (ECO 1735)	11/12/13	DJS
E	ADDED BATTERY GAUGE & Revised Motor Connections	11/15/2013	

4.3 | CONTROL BOARD DIAGNOSTICS

When using the LED for diagnosis, note that a DUAL FLASH code is indicated. The LED will flash on/off a certain number of times, pause off for a short delay, then flash on/off a second certain number of times, followed by a much longer pause off. The sequence will then repeat.

Example: The LED flash code 3-2 will look like: on/off/on/off/on/off-short-delay/on/off/on/off-long-delay/repeat



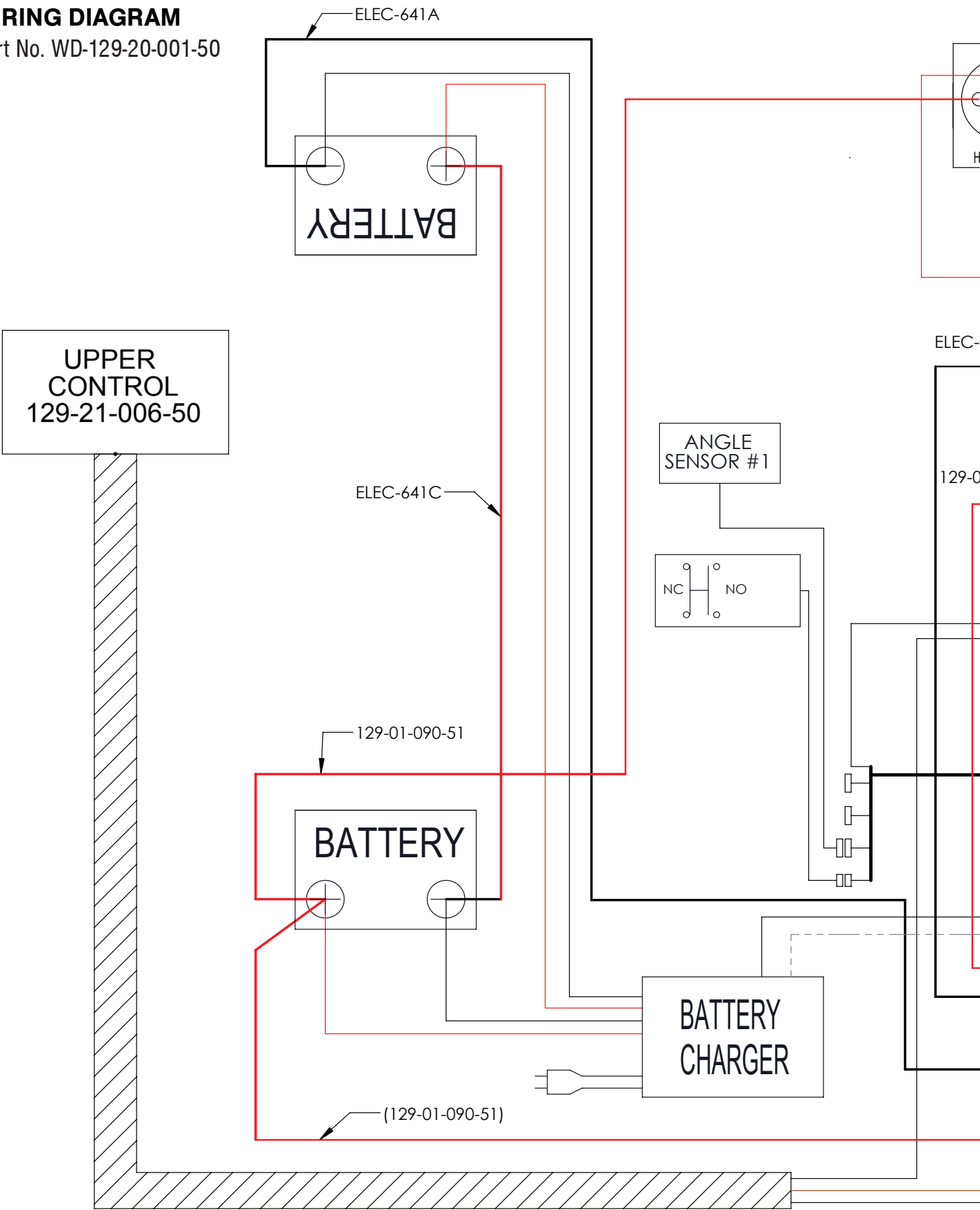
LED CODE	POSSIBLE CAUSE
Fast Flash	1. Control Module is not calibrated, Do not operate unit.
Steady	1. Unit has just been powered on. You may need to wait for initialization, then re-select function. 2. Ready to operate, things should be working normally. 3. A function is selected but the enable trigger is not squeezed.
1-1	1. The control module is not calibrated. Do not use this unit.
2-1	1. The key switch selector switch indicate the mode in which the TS100 must operate. If neither input is active, or if both are active together, the TS100 does not know how to function. 2. Check key switch and wiring to P15-1 and P12-1.
2-2	1. A safety feature is locking functions or a switch has failed. 2. Check that platform is not overloaded, operating on a level surface, and pothole guards deploy. 3. Check that joystick is neutral when powered on. 4. Check that joystick trigger is not closed for too long without selecting a function. 5. Check for failed joystick, selector switches, and up/down switches.
3-x	1. There is a problem with the drive contactor or valve wiring, or with the motor power wiring; disconnect connector P9 to see if the problem is caused by drive contactor or valve wiring (if the fault clears, check for an illegal B+ supply in to P9) 2. Check motor power wiring; with the drive contactor open the B+ power terminals should be at 10V-15V (significantly lower than B+) If the LED is steady at power-on, and the fault (3-5) occurs after a delay when attempting to drive or lift, the motor may be stalled and causing an overload of the TS100 or there is a power wiring error like connecting the B+ cable to a motor stud
3-2	1. Check P9 wiring. One or more signals showing outputs when all should be off.
3-3	1. Check B+ stud connections on controller. Voltage is too high.
3-4	1. There is voltage on safe pre-valve supply when there should not be. 2. Controller may need to be replaced.
3-5	1. The drive brake current is too high. 1. Motor overload. Check for a siezed motor or for power wiring to motors.
4-x	1. There is a problem with battery supply, the height and/or pressure sensors, the supply to them, or the temperature sensor inside the TS100 2. Check battery supply to EMS inputs P15-1 or P12-1 (relative to the B- stud); the battery supply should be between 15V and 32V 3. Check the output from height sensor (P12-12) 4. If the TS100 heatsink is very hot then perhaps the controller has temporarily shut down – if so, platform lowering is still allowed; wait for the controller to cool down
4-2	1. Functions Locked: Board is overheated. Check pump, drive motor wiring. 2. Problem with controller internal voltage. Controller may need to be replaced.
4-3	1. Problem with controller internal voltage. Controller may need to be replaced.

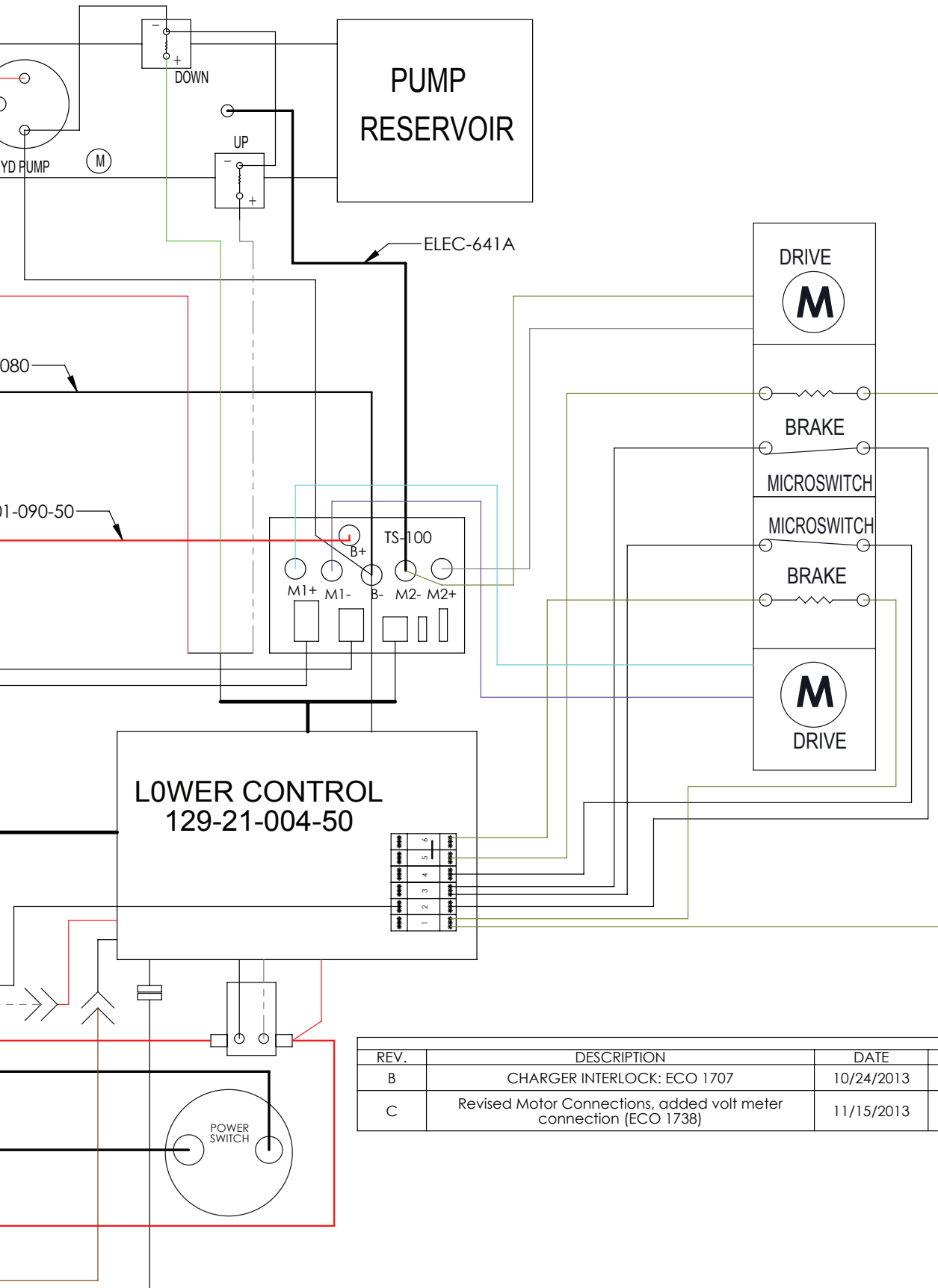
4-4	<ol style="list-style-type: none"> 1. Battery supply is too low or too high. 2. Make sure batteries are fully charged. 3. Do not operate while charging.
4-5	<ol style="list-style-type: none"> 1. Joystick signal problem. 2. Wiring problem-check for short circuits, misconnection, check P15-12 connection.
6-x	<ol style="list-style-type: none"> 1. There is a problem with the height measurements, or the elevation switch disagrees with the height sensor. 2. Check that the output from height sensor (P12-12) is in range (between 0.5V and 4.5V)
6-1	<ol style="list-style-type: none"> 1. Problem with angle sensor or its connections
6-2	<ol style="list-style-type: none"> 1. This feature does not apply on ANSI/CSA models.
6-3	<ol style="list-style-type: none"> 1. Problem with elevation switch or its connections
6-6	<ol style="list-style-type: none"> 1. This feature does not apply on ANSI/CSA models.
7-x	<ol style="list-style-type: none"> 1. There is a problem with the power wiring – the voltage on the B+ stud is too low 2. Check for a short-circuit to the B+ stud
7-1	<ol style="list-style-type: none"> 1. Motor A current too high.
7-2	<ol style="list-style-type: none"> 1. Motor A current too low.
7-3	<ol style="list-style-type: none"> 1. Motor B current too high.
7-4	<ol style="list-style-type: none"> 1. Motor B current too low.
7-5	<ol style="list-style-type: none"> 1. Check drive connections at both drives–short or multiple wiring faults.
7-7	<ol style="list-style-type: none"> 1. Check B+ stud connections on controller. Voltage is too low.

SECTION 5 | WIRING DIAGRAMS

5.1 | WIRING DIAGRAM

Part No. WD-129-20-001-50

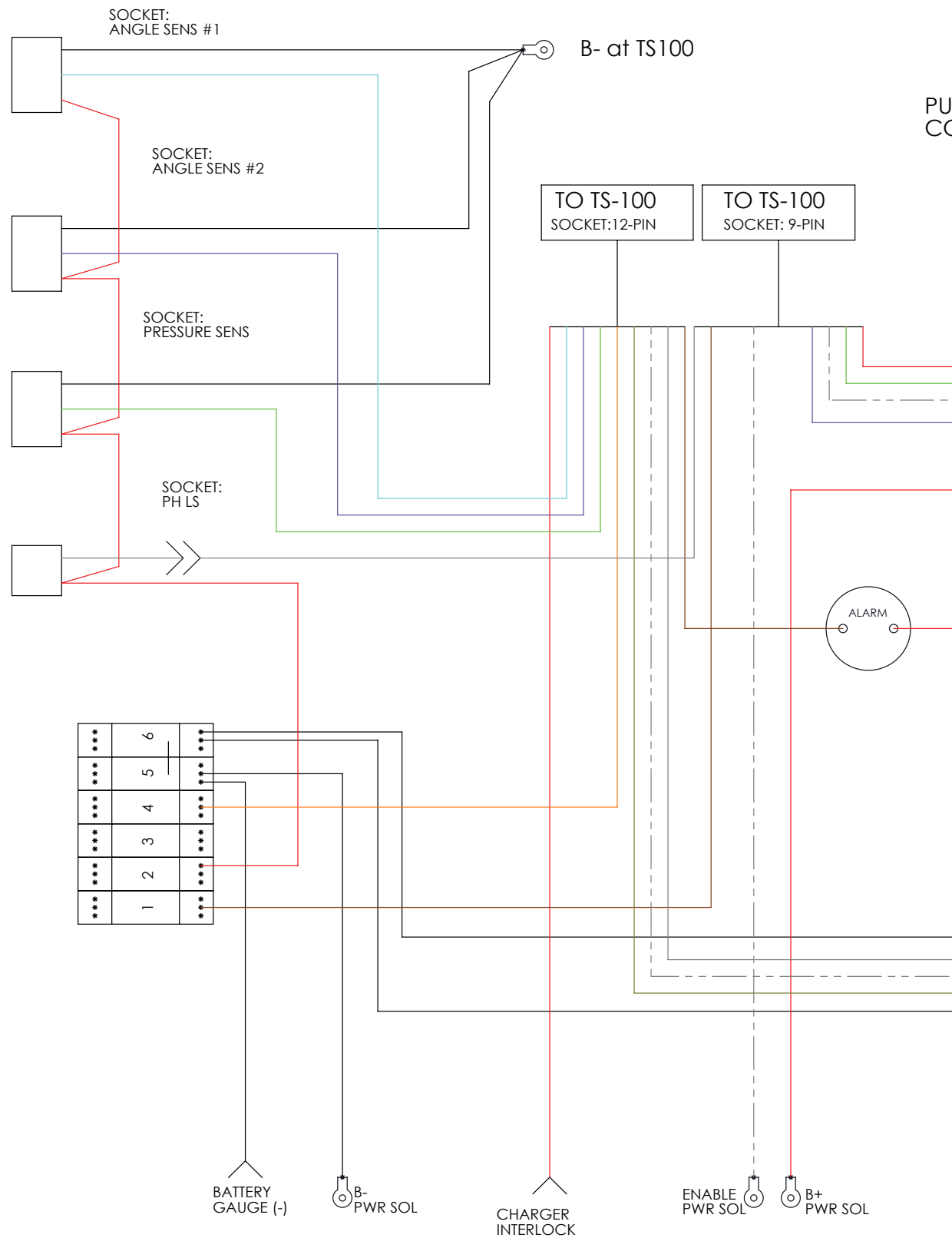




REV.	DESCRIPTION	DATE	BY
B	CHARGER INTERLOCK: ECO 1707	10/24/2013	DJS
C	Revised Motor Connections, added volt meter connection (ECO 1738)	11/15/2013	DJS

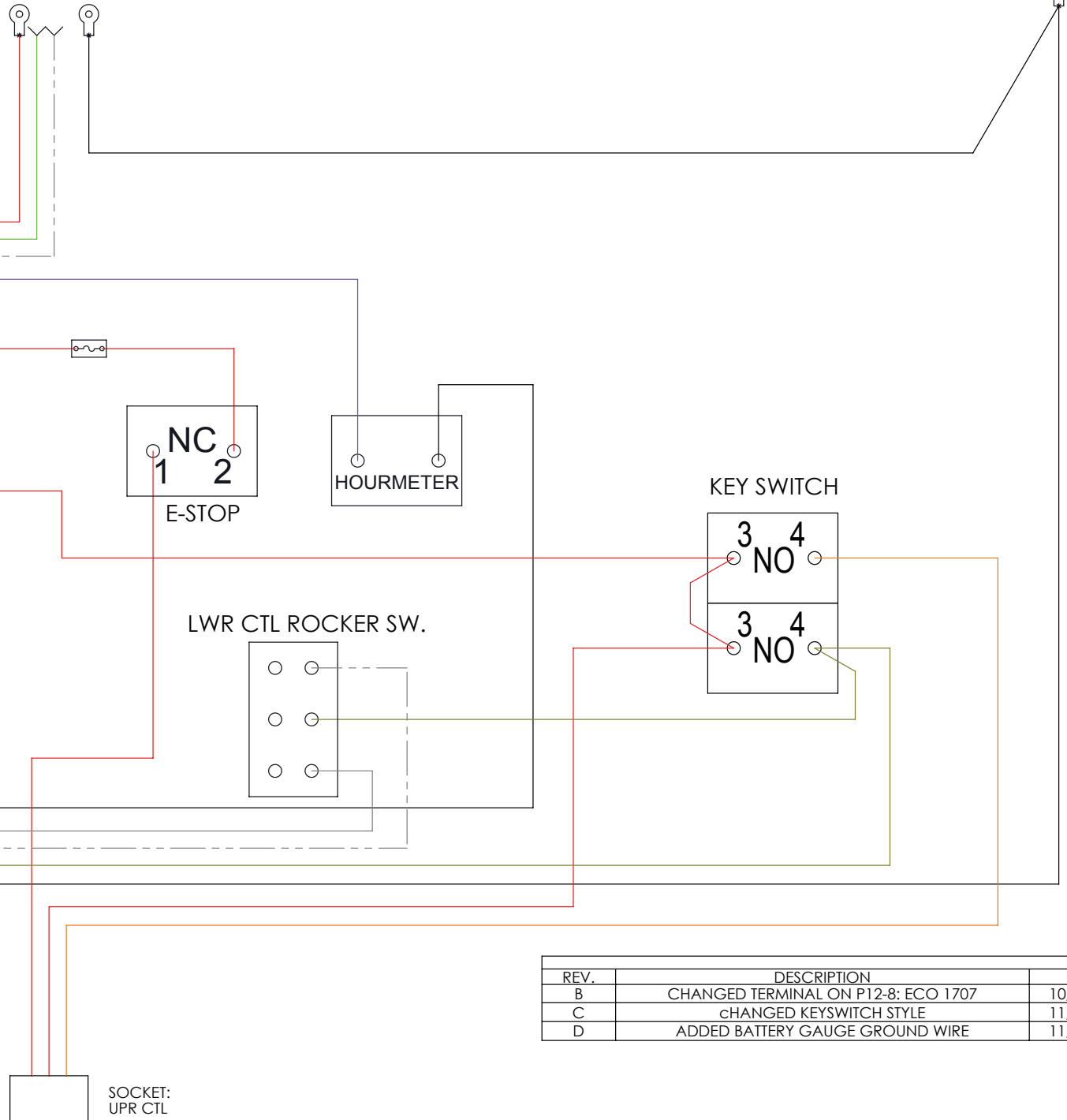
5.2 | LOWER CONTROLS WIRING DIAGRAM

Part No. 129-20-004-50



MP SOL./COIL
ONNECTIONS

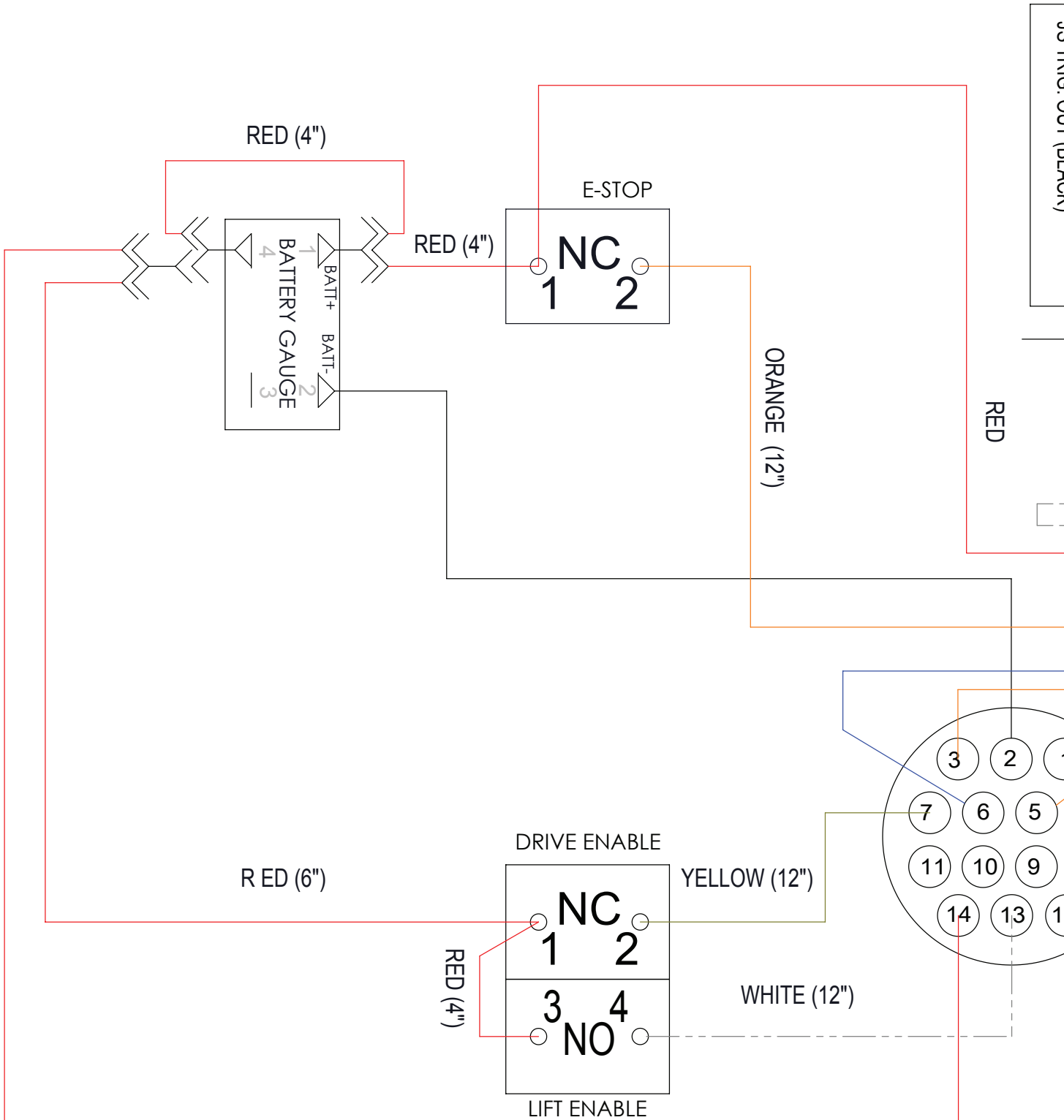
B- at TS100

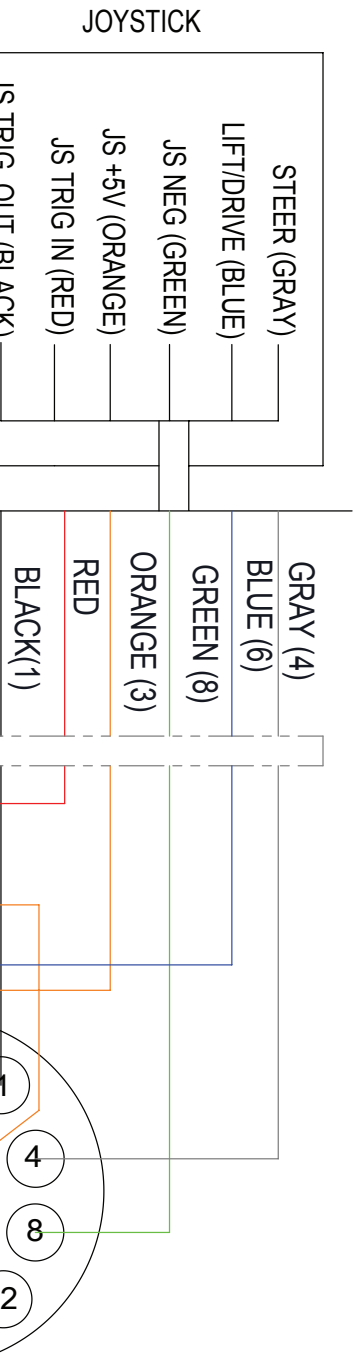


REV.	DESCRIPTION	DATE
B	CHANGED TERMINAL ON P12-8: ECO 1707	10/24/2013
C	CHANGED KEYSWITCH STYLE	11/12/2013
D	ADDED BATTERY GAUGE GROUND WIRE	11/15/2013

5.3 | UPPER CONTROLS WIRING DIAGRAM

Part No. 129-20-006-50

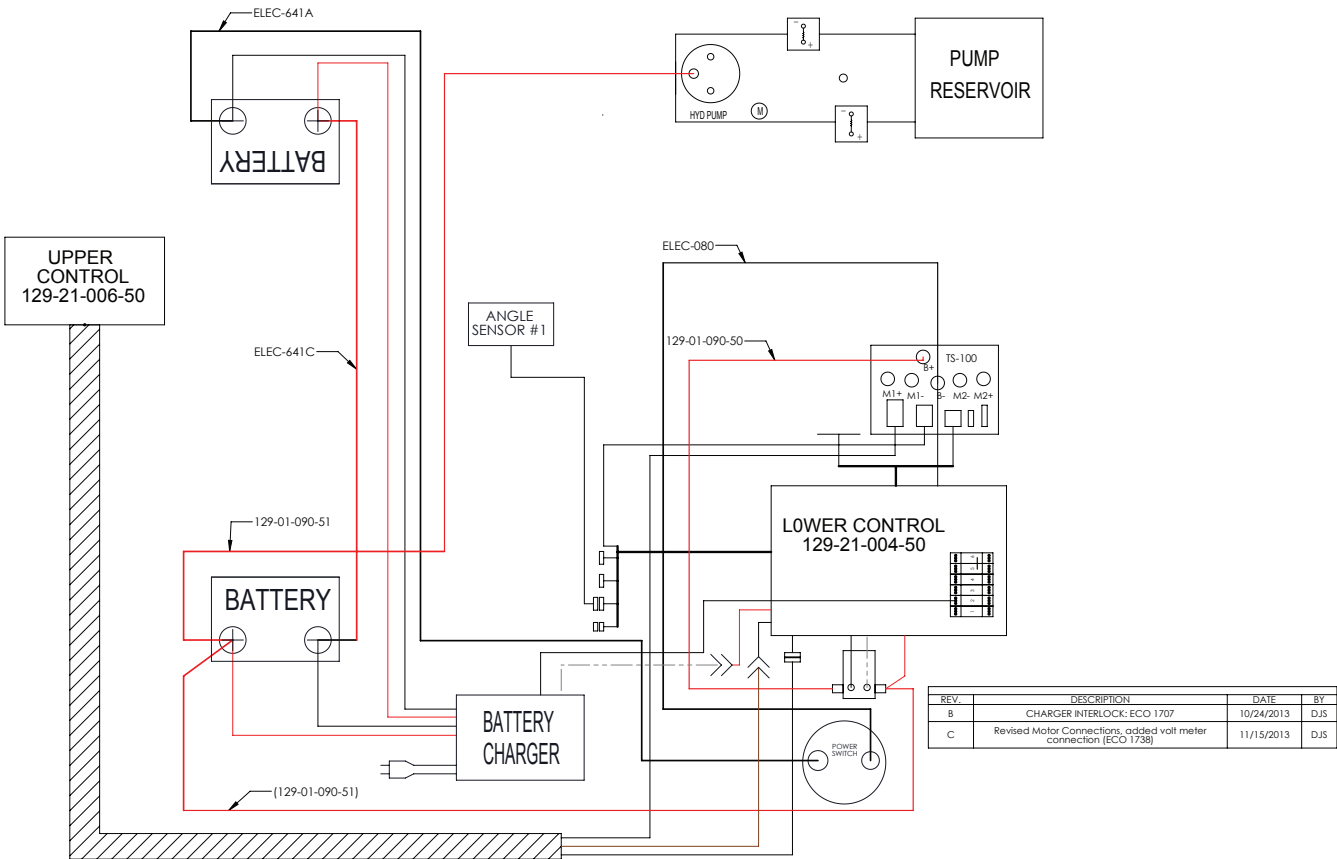
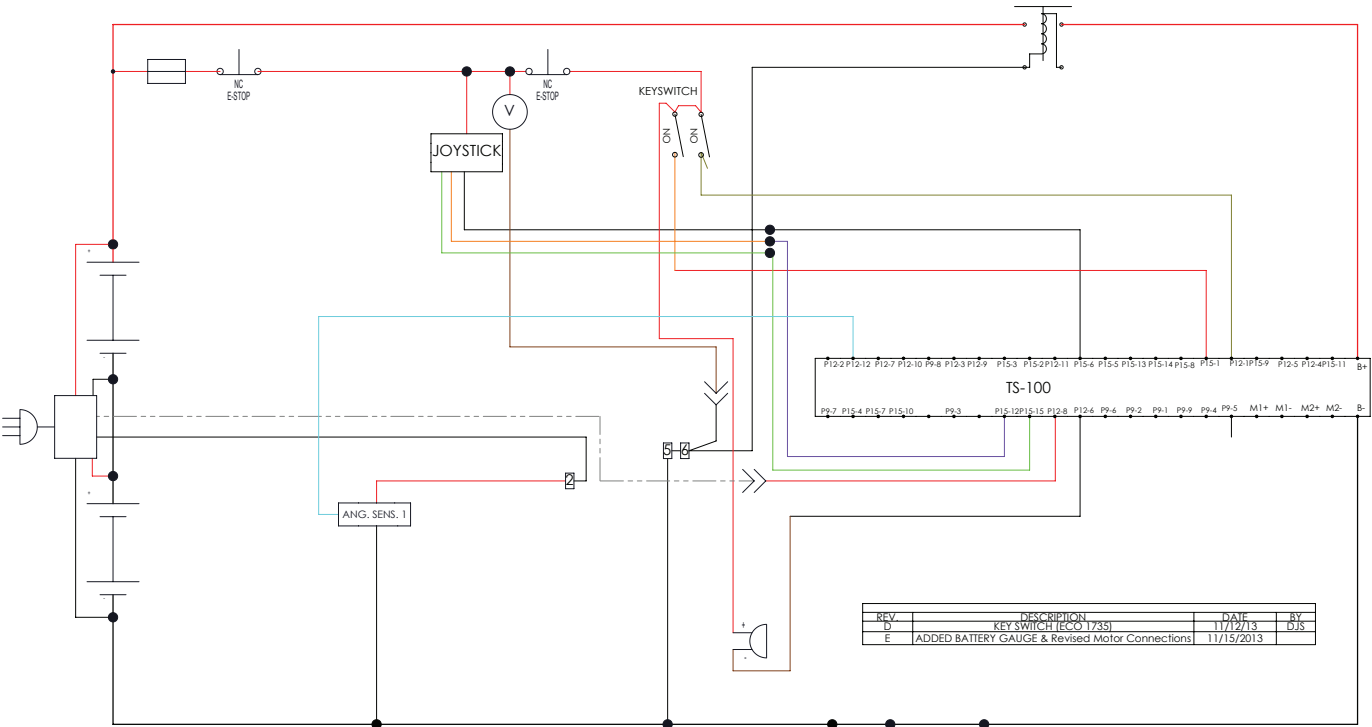




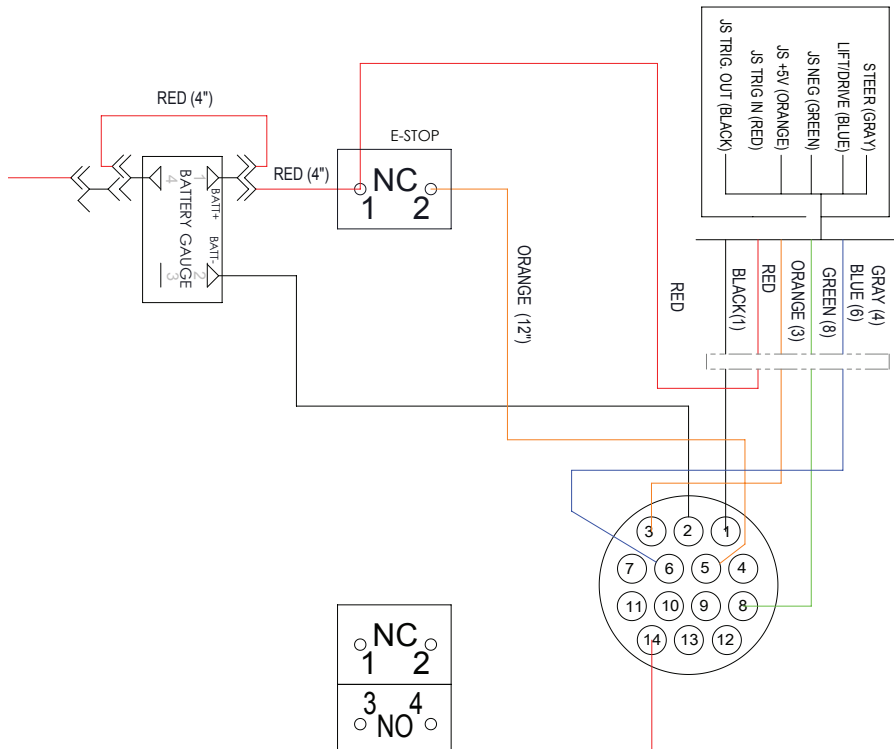
REV.	DESCRIPTION	DATE	BY
A	INITIAL RELEASE	8/19/2013	DJS
B	REVISED CONTACT BLOCKS (ECO 1703)	10/11/2013	DJS
C	ADDED BATTERY GAUGE	11/15/2013	GH

5.4 | MAIN POWER/SAFETY CIRCUIT

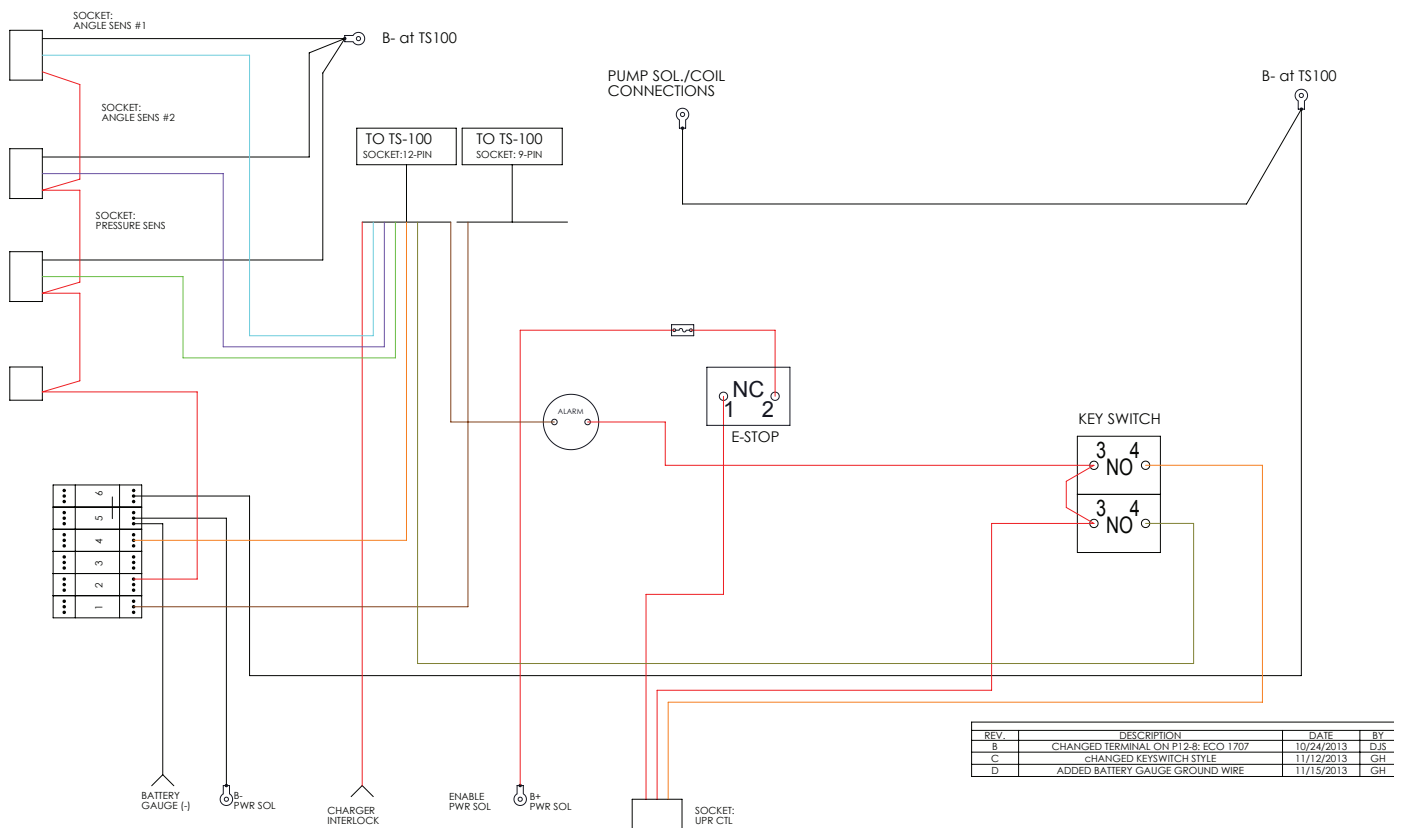
Part Nos. WS-129-20-001-50-PWR, Part No. WD-129-20-001-50-PWR



Part Nos. WD-129-20-004-50-PWR, WD-129-20-004-50-PWR



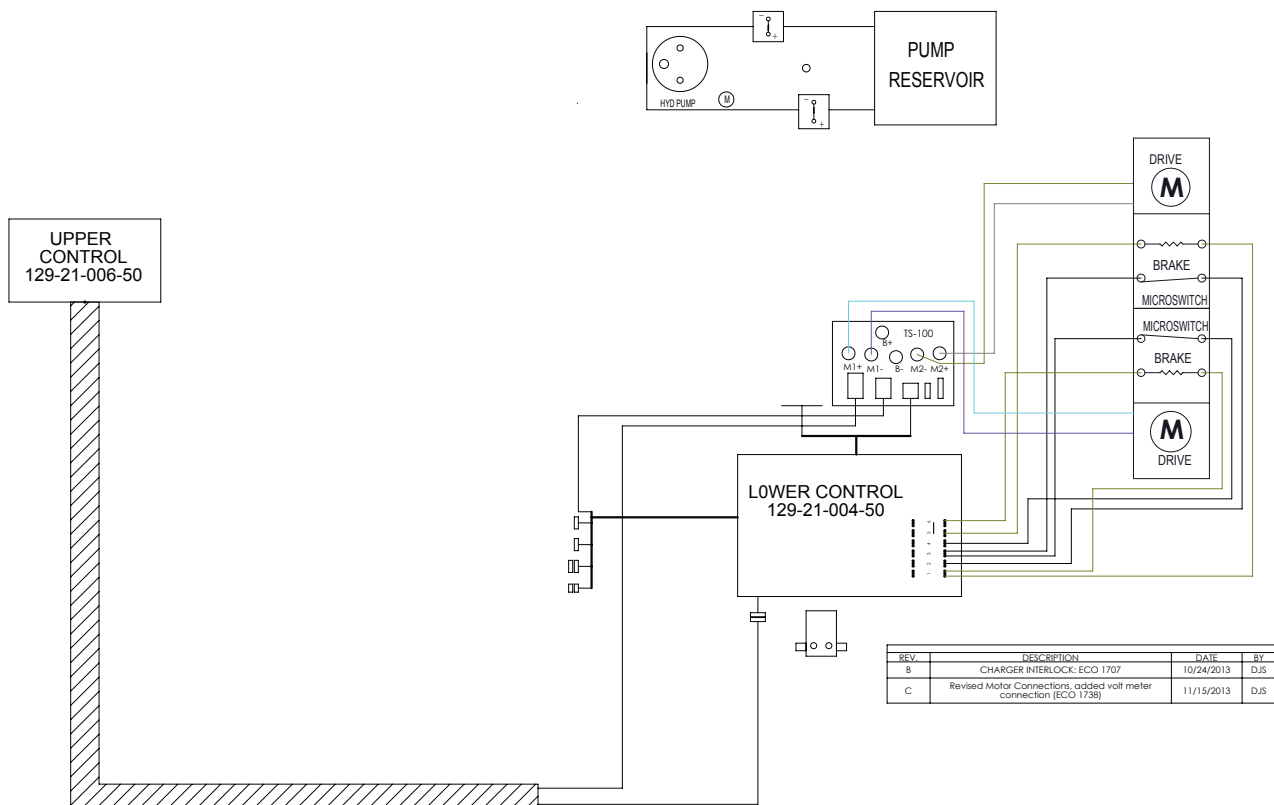
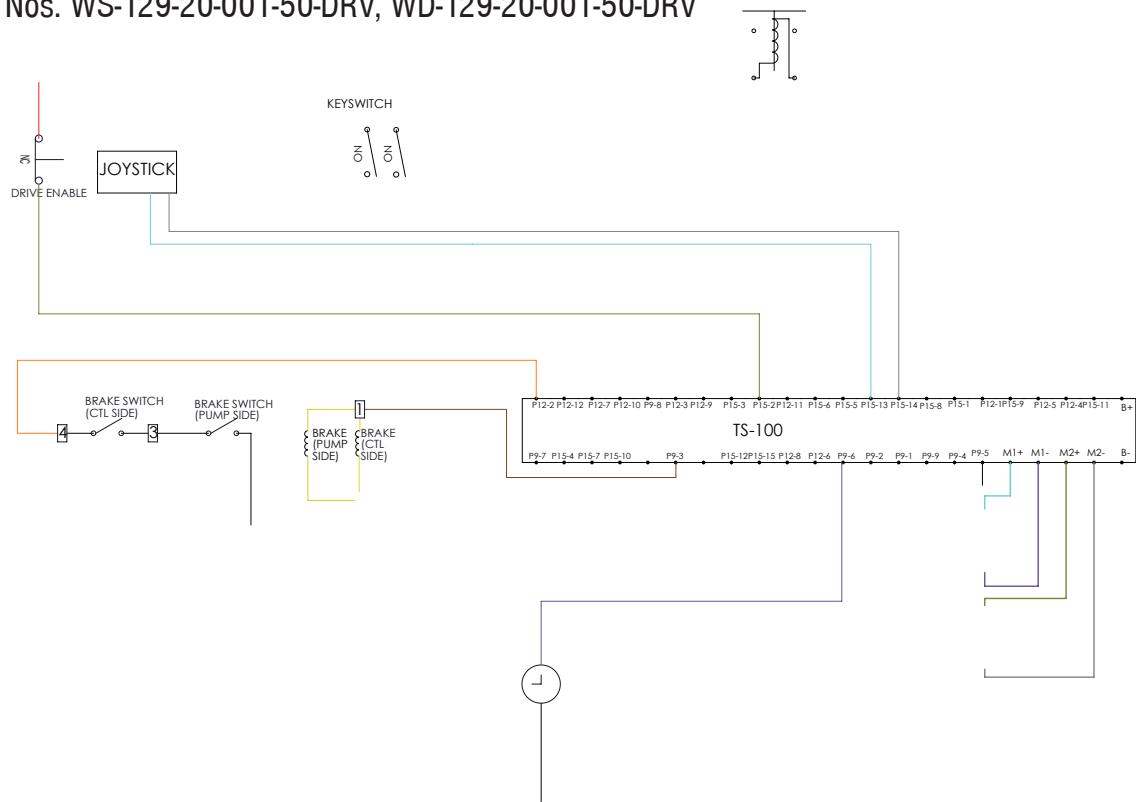
REV.	DESCRIPTION	DATE	BY
A	INITIAL RELEASE	8/19/2013	DJS
B	REVISED CONTACT BLOCKS (ECO 1703)	10/11/2013	DJS
C	ADDED BATTERY GAUGE	11/15/2013	GH



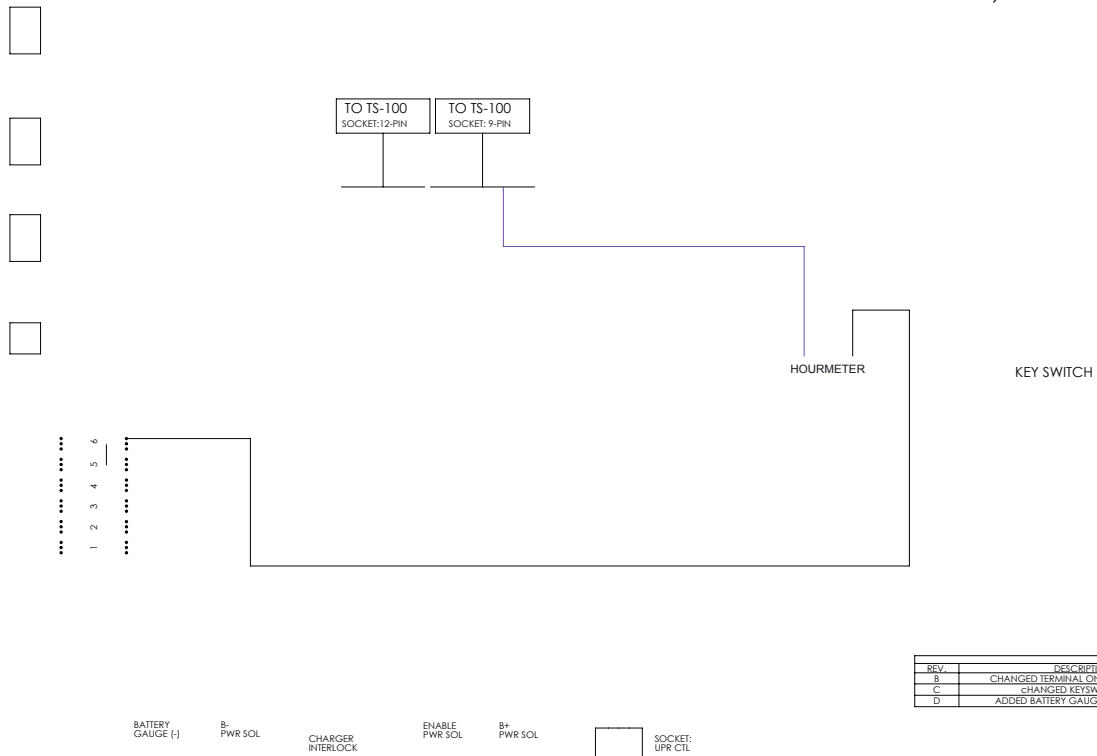
REV.	DESCRIPTION	DATE	BY
B	CHANGED TERMINAL ON P12-B; ECO 1707	10/24/2013	DJS
C	CHANGED KEY SWITCH STYLE	11/12/2013	GH
D	ADDED BATTERY GAUGE GROUND WIRE	11/15/2013	GH

5.5 | DRIVE CIRCUIT

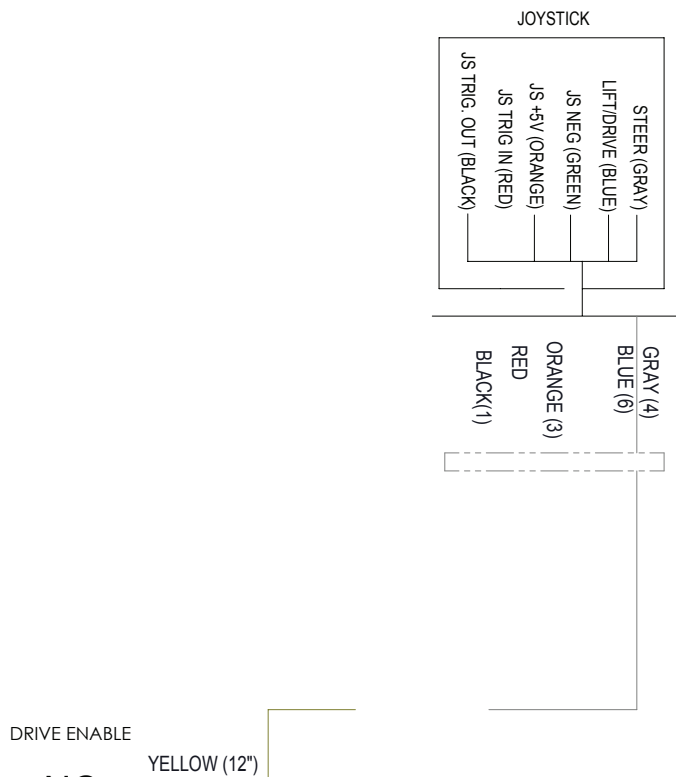
Part Nos. WS-129-20-001-50-DRV, WD-129-20-001-50-DRV



Part Nos. WD-129-20-006-50-DRV, WD-129-20-004-50-DRV

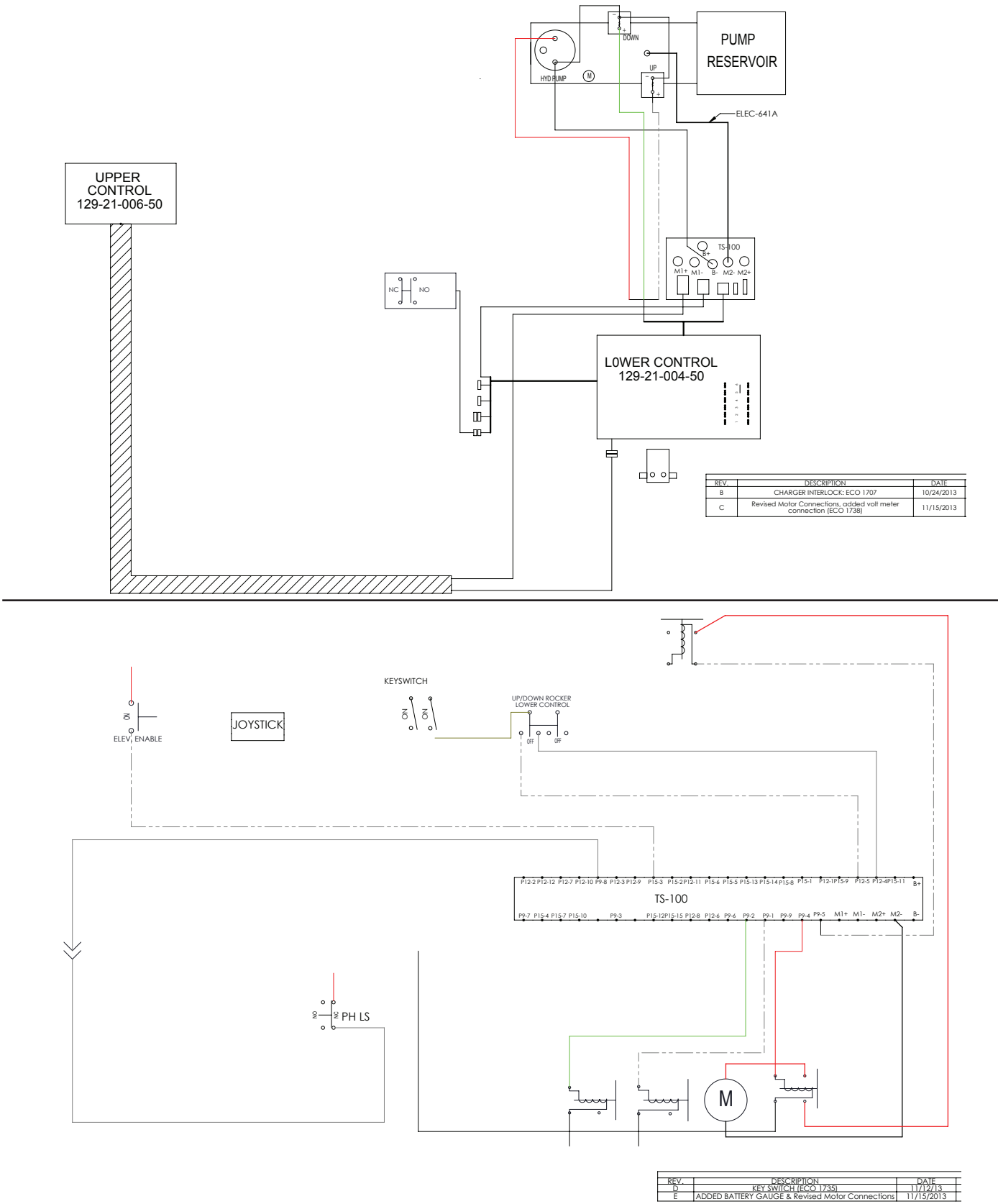


REV.	DESCRIPTION	DATE	BY
B	CHANGED TERMINAL ON P12-B: ECO 1707	10/24/2013	D.B.
C	CHANGED KEYSWITCH STYLE	11/12/2013	GH
D	ADDED BATTERY GAUGE GROUND WIRE	11/15/2013	GH

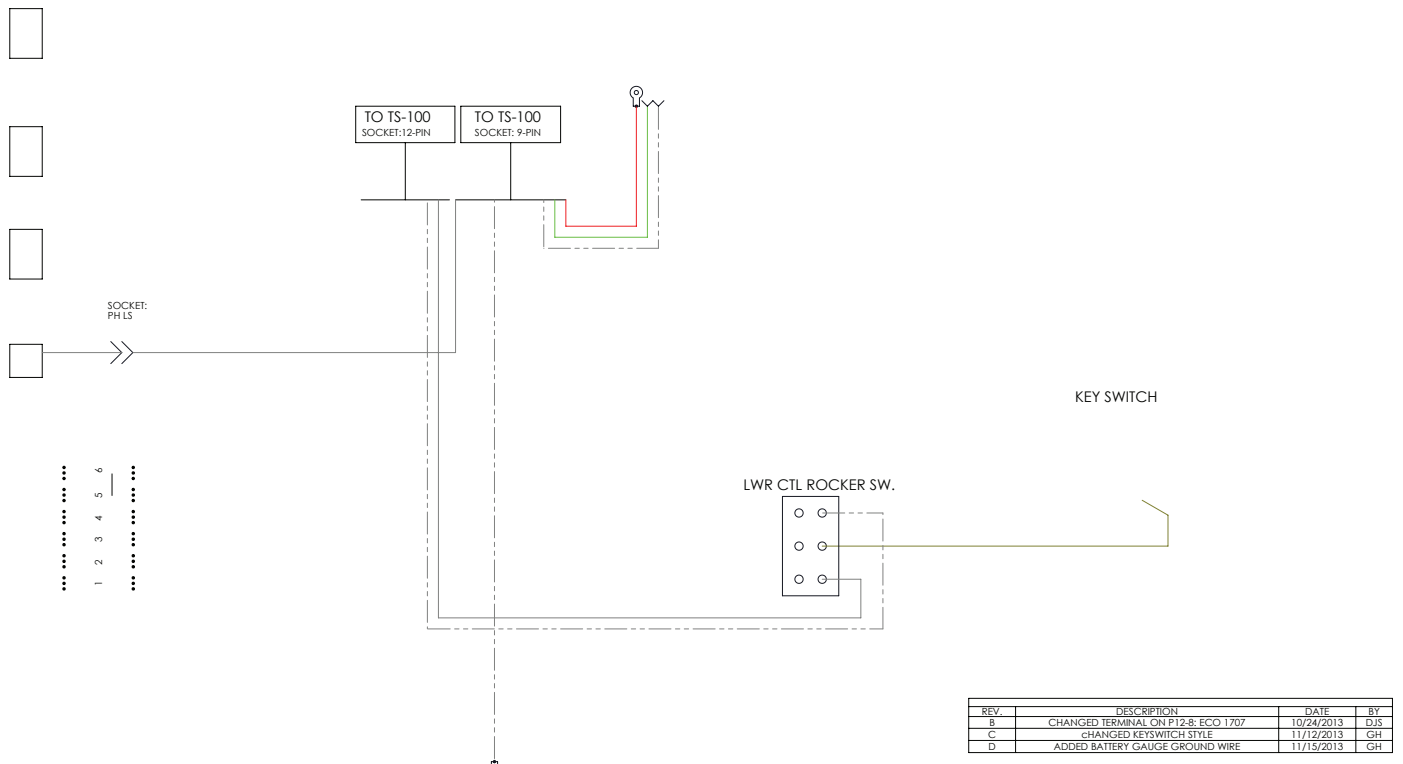
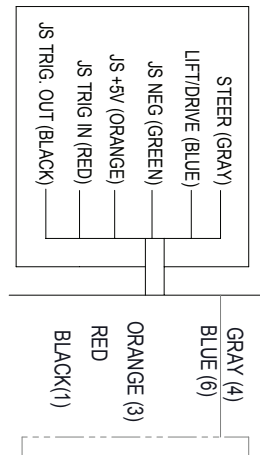


5.6 | ELEVATE/LOWER CIRCUIT

Part Nos. WS-129-20-001-50-ELV, WD-129-20-001-50-ELV



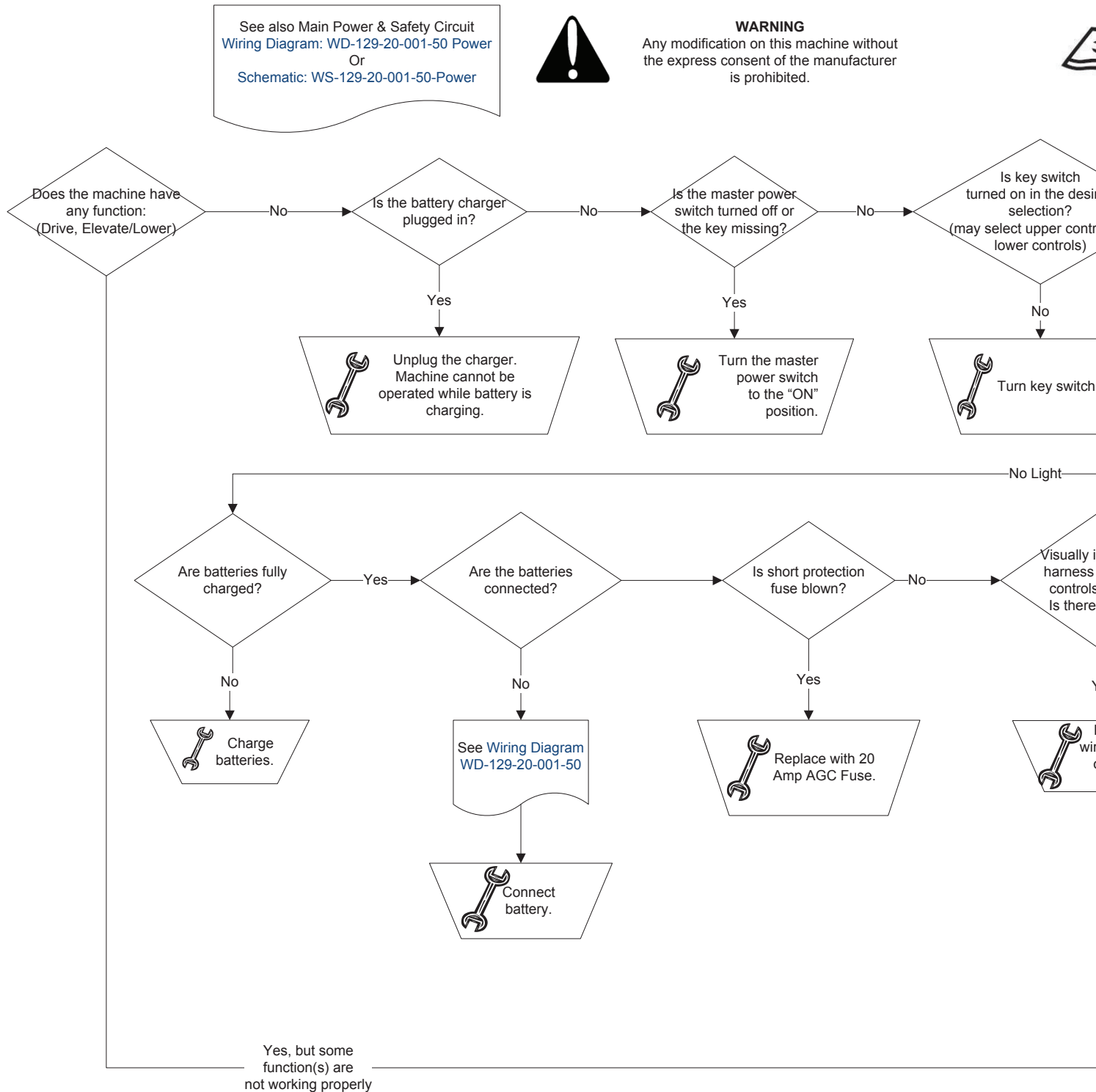
Part Nos. WD-129-20-006-50-ELV, WD-129-20-004-50-ELV



REV	DESCRIPTION	DATE	BY
B	CHANGED TERMINAL ON P12-8: ECO 1707	10/24/2013	DJS
C	CHANGED KEYSWITCH STYLE	11/12/2013	GH
D	ADDED BATTERY GAUGE GROUND WIRE	11/15/2013	GH

SECTION 6 | TROUBLESHOOTING FLOWCHARTS

6.1 | MAIN POWER/SAFETY CIRCUIT



**WARNING**

Failure to comply with safety precautions may result in damage, injury, or death. Refer to Maintenance Manual for complete warnings

Troubleshooting Flowcharts--General Notes:

Inspect parts for visible damage as they are encountered.

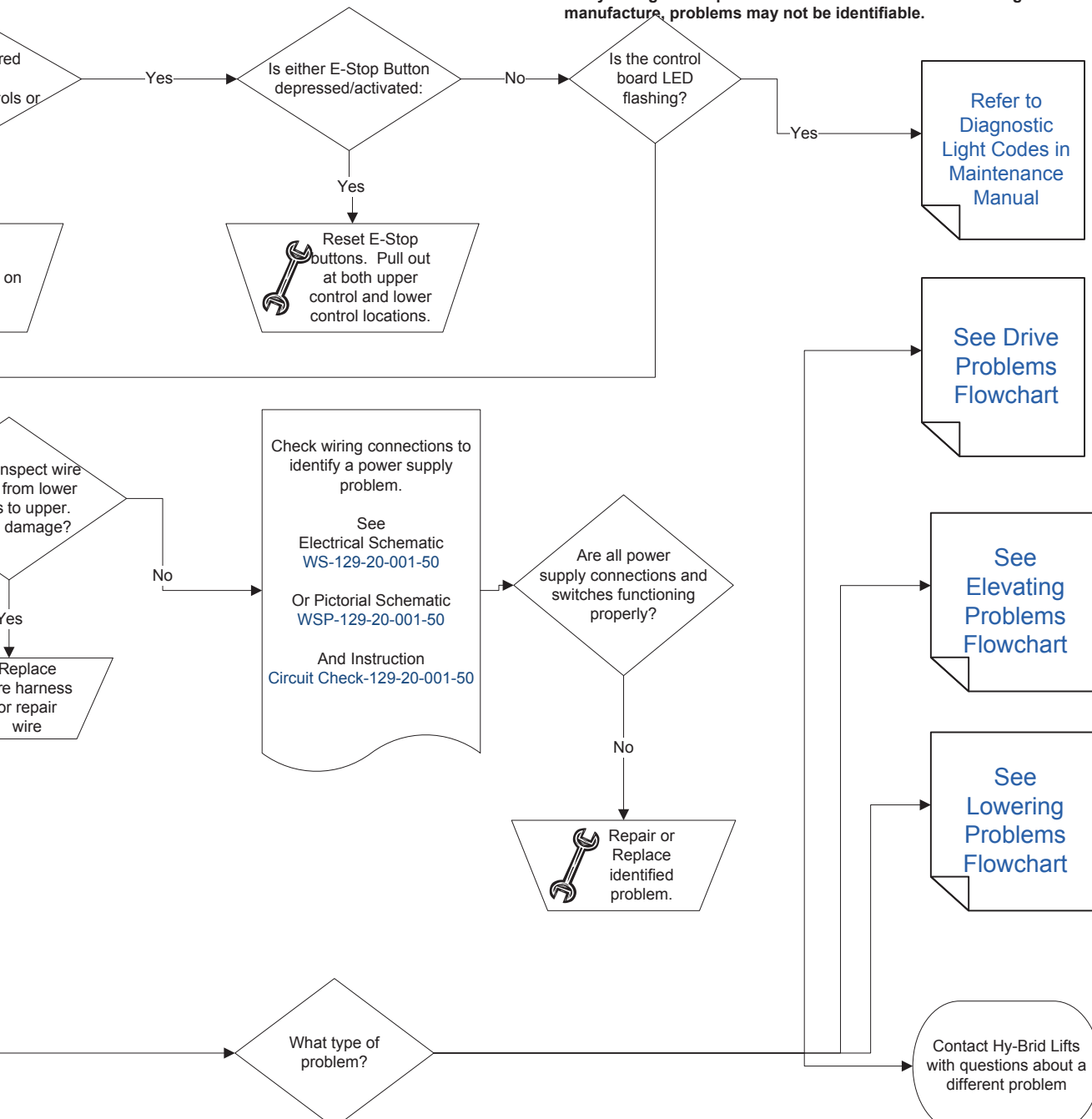
After each step, check if problem has been identified and/or resolved.

If so, make the recommended fix or see a referenced document.

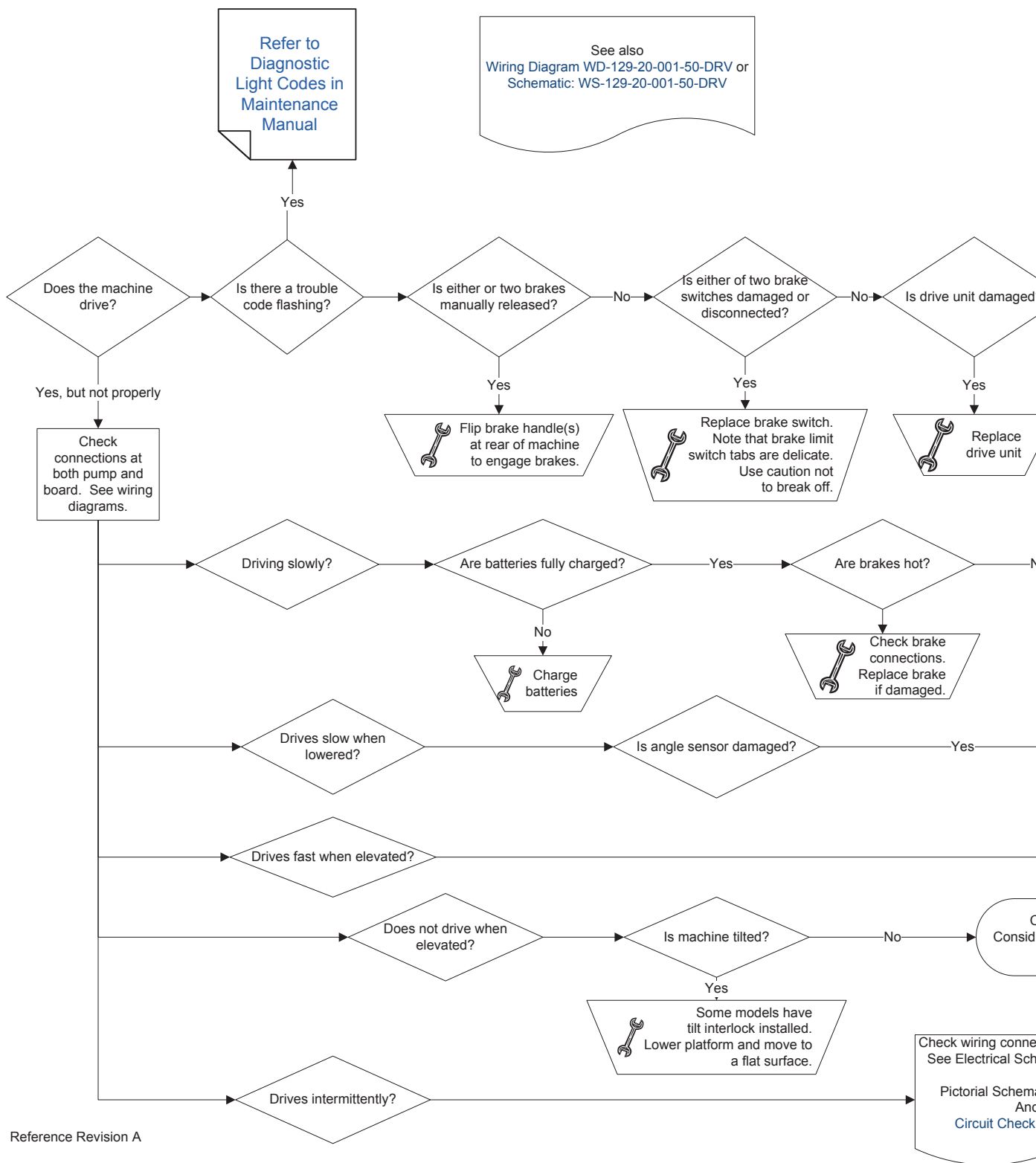
If not, continue troubleshooting.

If a part has been identified as needing replacement, see the [Parts View](#) to identify part number to order.

If any wiring or components have been altered from the original manufacture, problems may not be identifiable.



6.2 | DRIVE CIRCUIT



**WARNING**

Any modification on this machine without the express consent of the manufacturer is prohibited.

**WARNING**

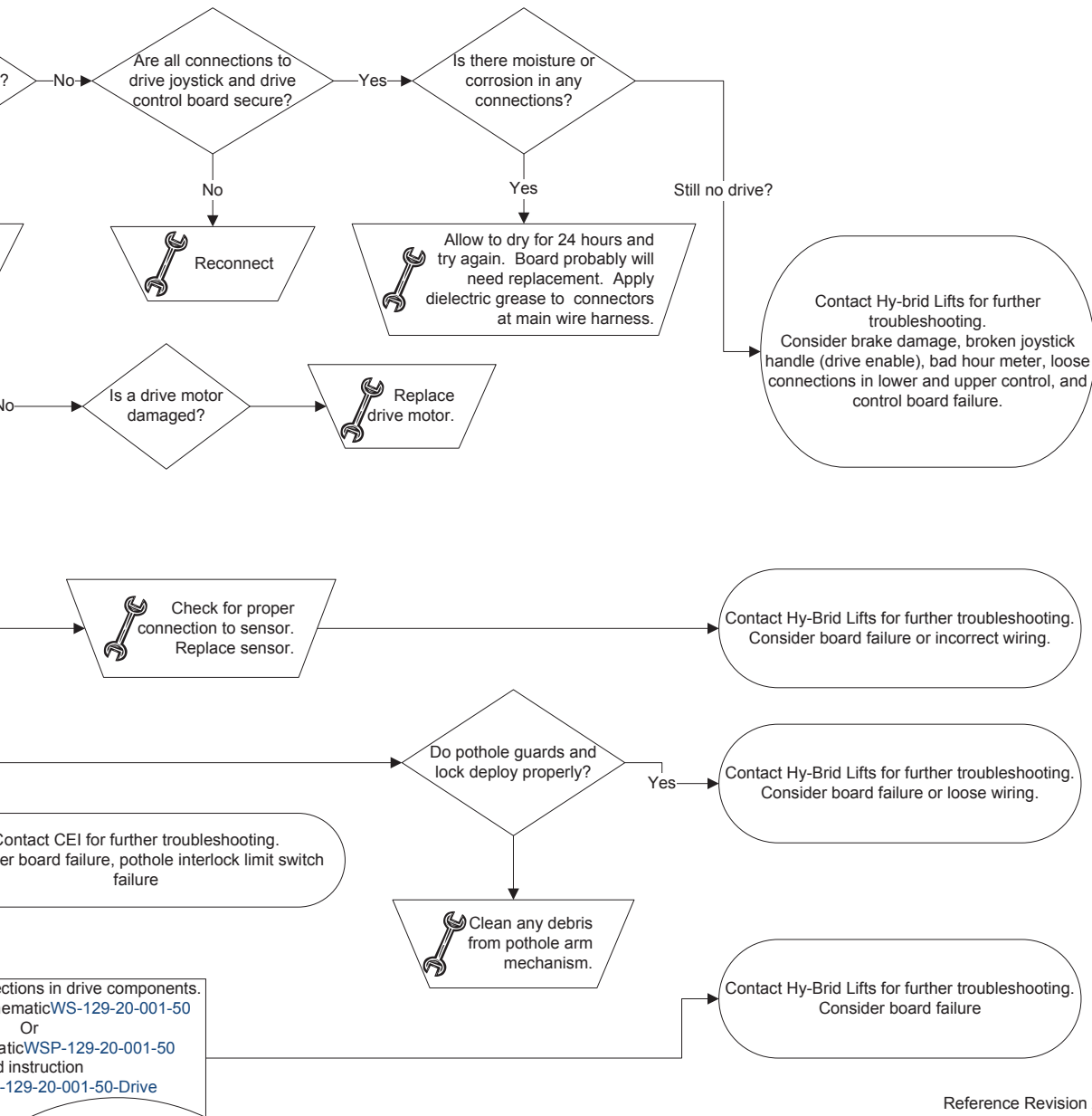
Failure to comply with safety precautions may result in damage, injury, or death. Refer to Maintenance Manual for complete warnings

Troubleshooting Flowcharts--General Notes:

Inspect parts for visible damage as they are encountered. After each step, check if problem has been identified and/or resolved. If so, make the recommended fix or see a referenced document. If not, continue troubleshooting.

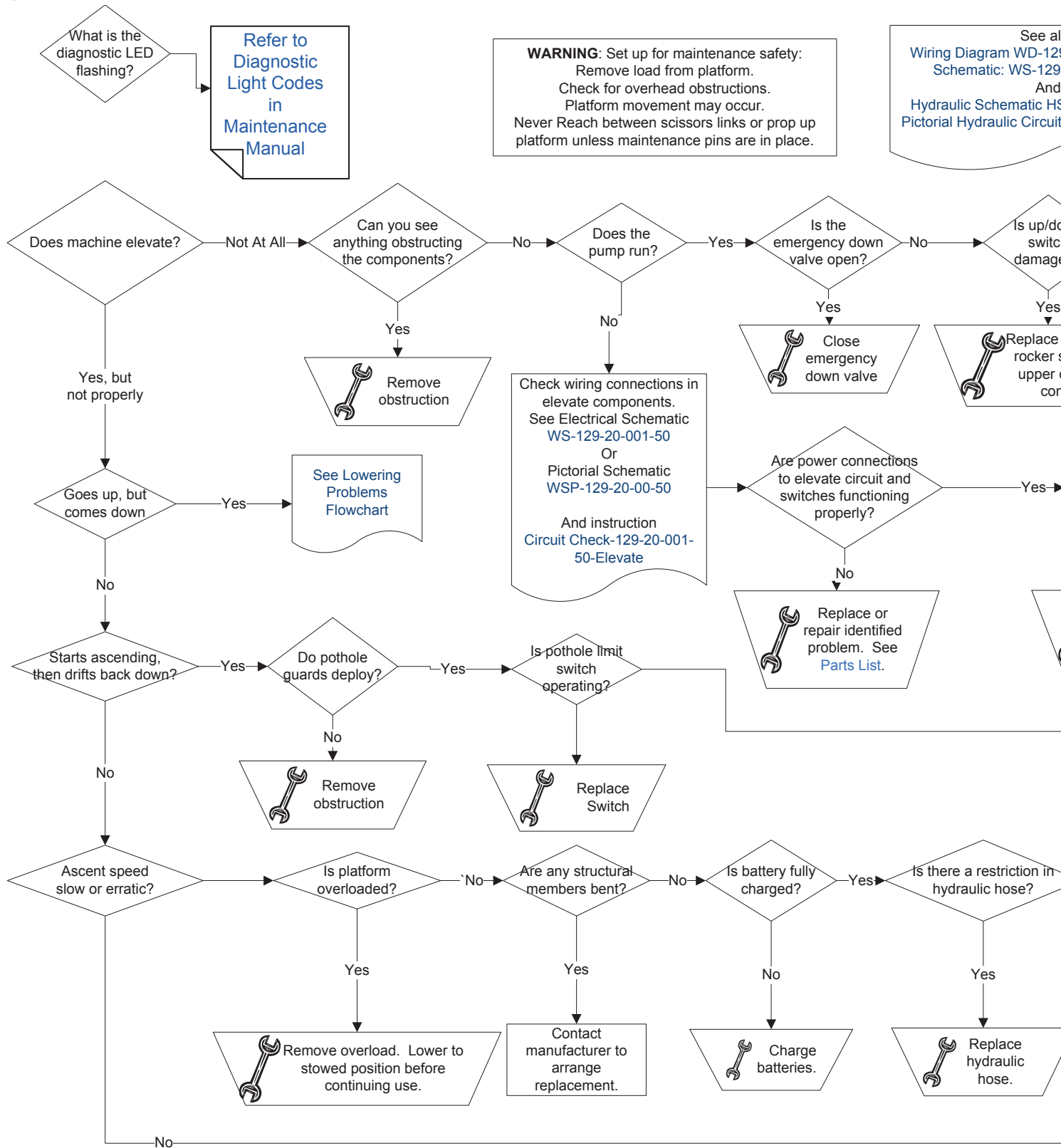
If a part has been identified as needing replacement, see the [Parts View](#) To identify part number to order.

If any wiring or components have been altered from the original manufacture, problems may not be identifiable.



Reference Revision A

6.3 | ELEVATE CIRCUIT



Reference Revision A

so
9-20-001-50-ELV or
-20-001-50-ELV
S-129-20-001-50 Or
HSP-129-20-001-50

**WARNING**

Any modification on this machine without the express consent of the manufacturer is prohibited.

**WARNING**

Failure to comply with safety precautions may result in damage, injury, or death. Refer to Maintenance Manual for complete warnings

Troubleshooting Flowcharts--General Notes:

Inspect parts for visible damage as they are encountered.

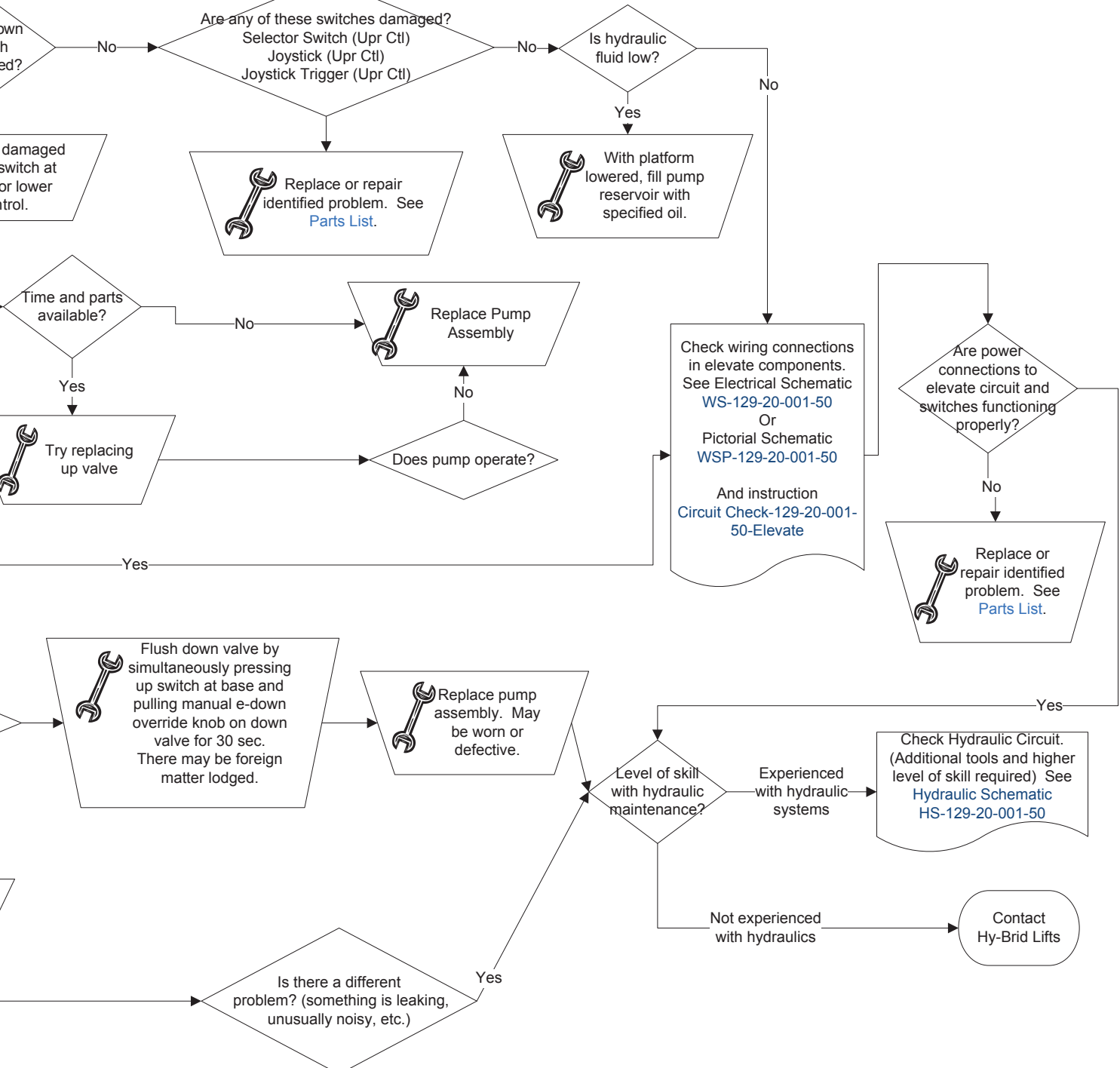
After each step, check if problem has been identified and/or resolved.

If so, make the recommended fix or see a referenced document.

If not, continue troubleshooting.

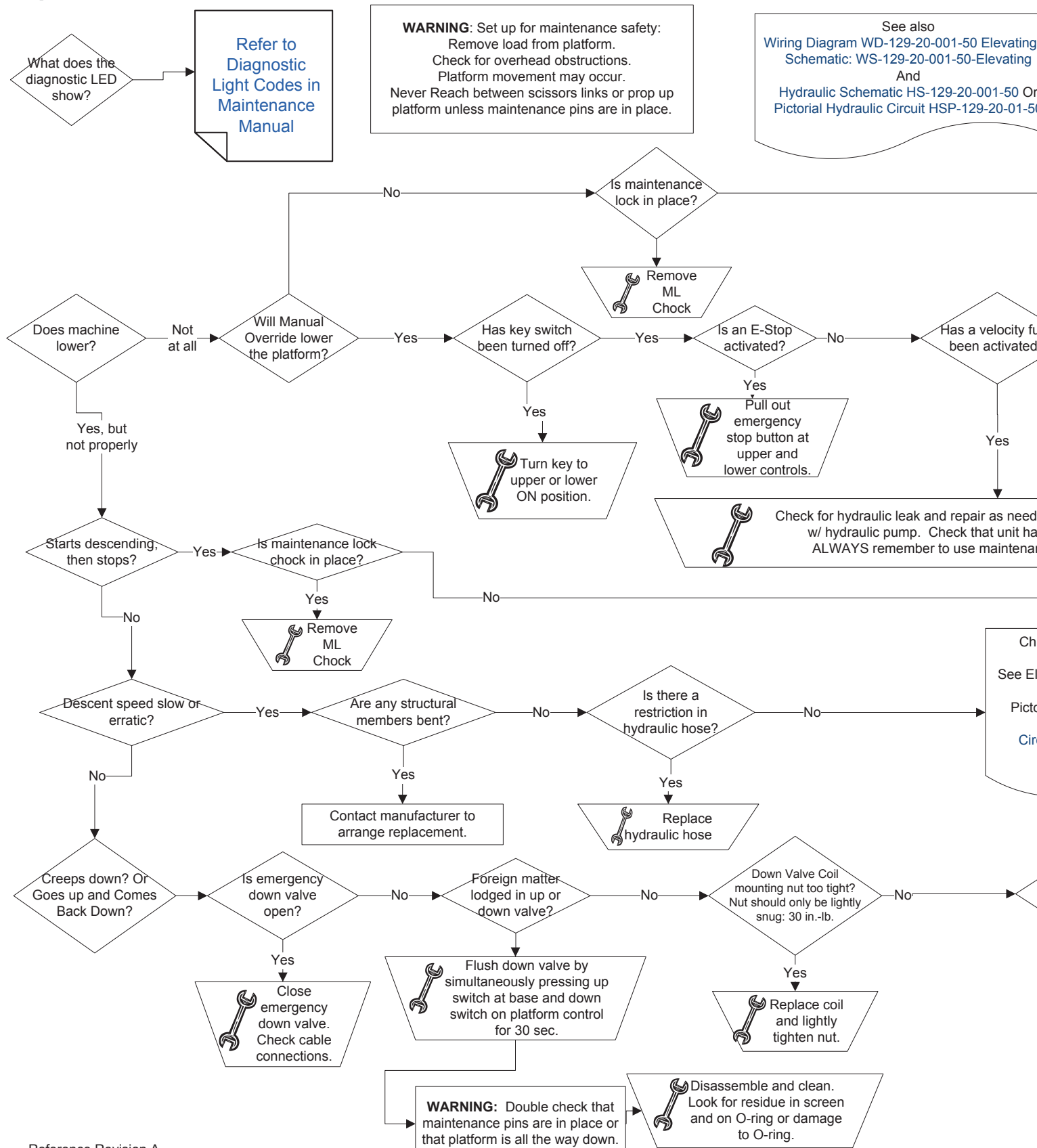
If a part has been identified as needing replacement, see the [Parts View](#) To identify part number to order.

If any wiring or components have been altered from the original manufacture, problems may not be identifiable.



Reference Revision A

6.4 | LOWER CIRCUIT



**WARNING**

Any modification on this machine without the express consent of the manufacturer is prohibited.

**WARNING**

Failure to comply with safety precautions may result in damage, injury, or death. Refer to Maintenance Manual for complete warnings

Troubleshooting Flowcharts--General Notes:

Inspect parts for visible damage as they are encountered.

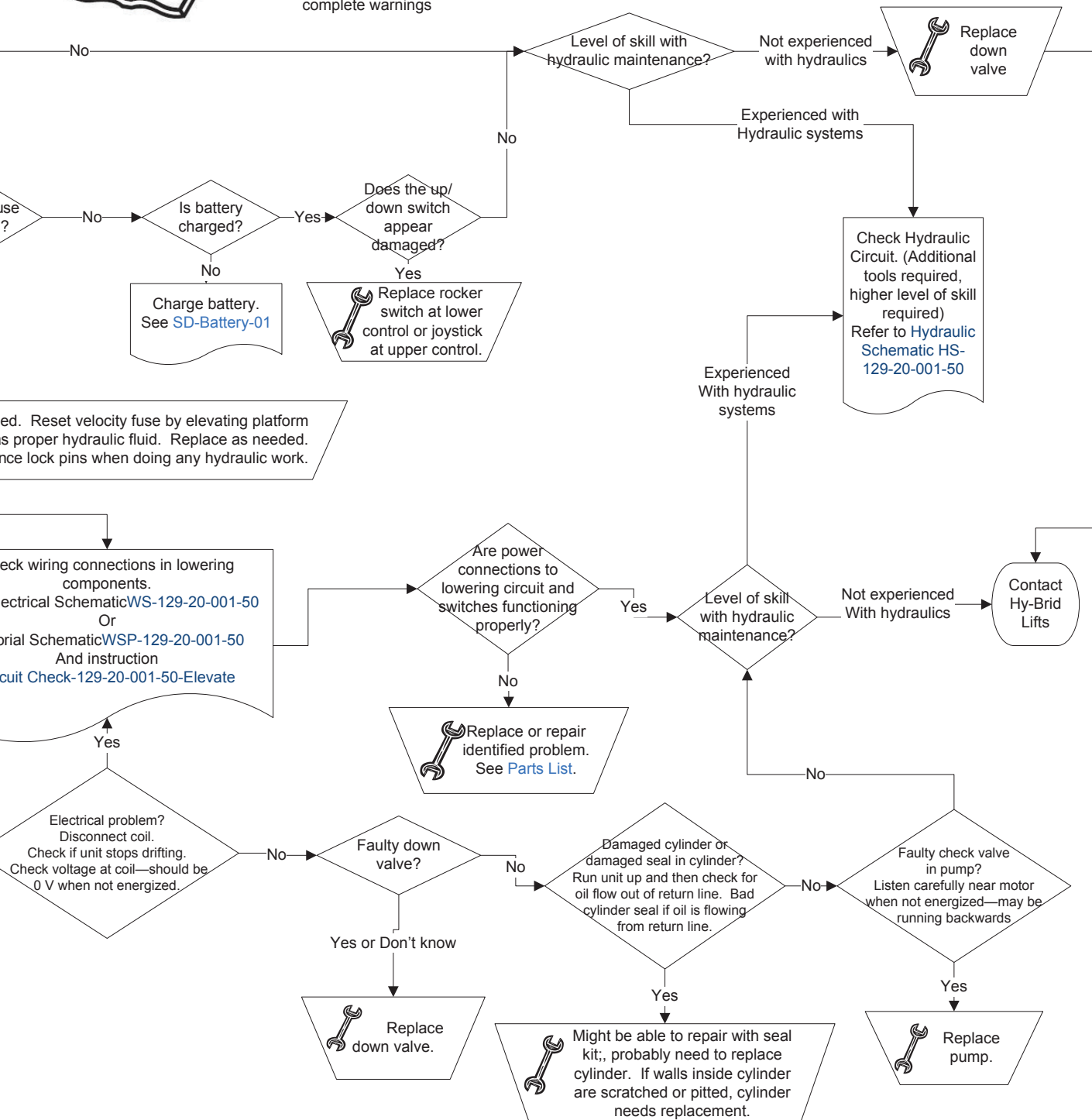
After each step, check if problem has been identified and/or resolved.

If so, make the recommended fix or see a referenced document.

If not, continue troubleshooting.

If a part has been identified as needing replacement, see the [Parts View](#) To identify part number to order.

If any wiring or components have been altered from the original manufacture, problems may not be identifiable.



Reference Revision A

SECTION 7 | PARTS DIAGRAMS

Listed in the following section are diagrams for parts that may be available for replacement and for reference. These represent current model revisions. Refer to our website, www.hybridlifts.com for more complete part listings and earlier revisions. Several parts are model-, serial number-, or manufacture date-specific. Contact your dealer for replacement part availability and pricing.



USE ONLY MANUFACTURER APPROVED REPLACEMENT PARTS. USE OF NON-OEM PARTS WILL VOID WARRANTY.

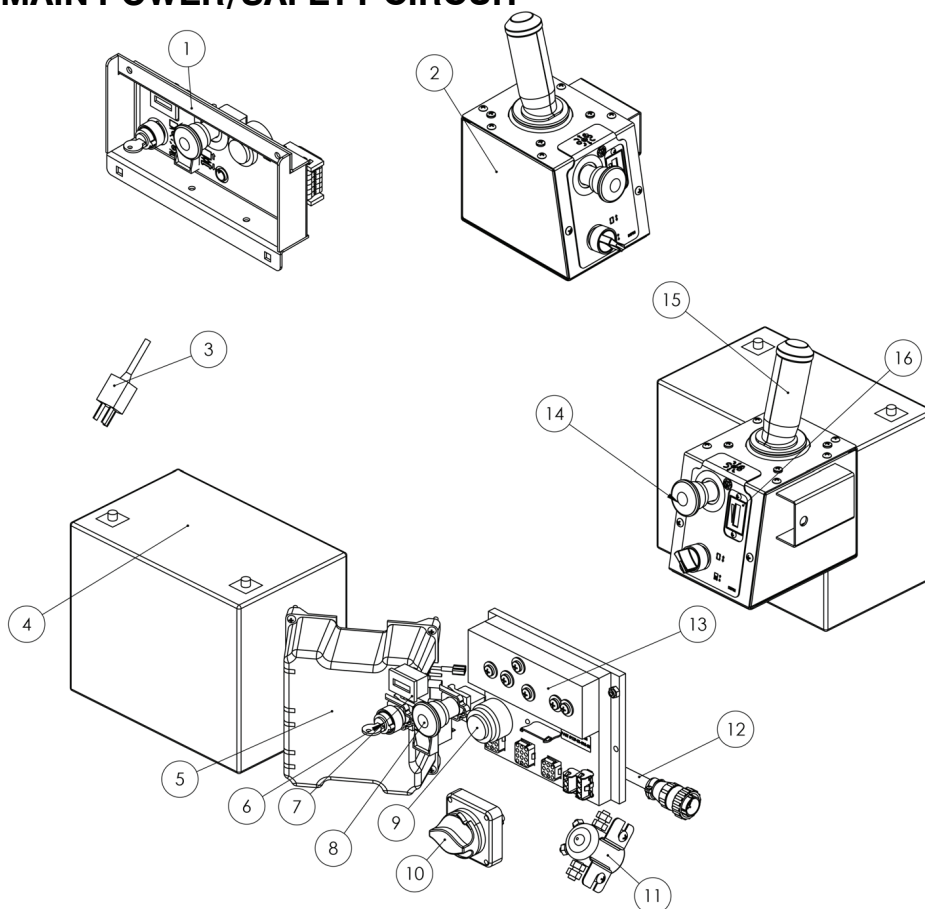
7.1 | SAFETY AND CONTROL DECALS

Refer to the **Hy-Brid Lifts Operation and Safety Manual** for decal part numbers and locations.

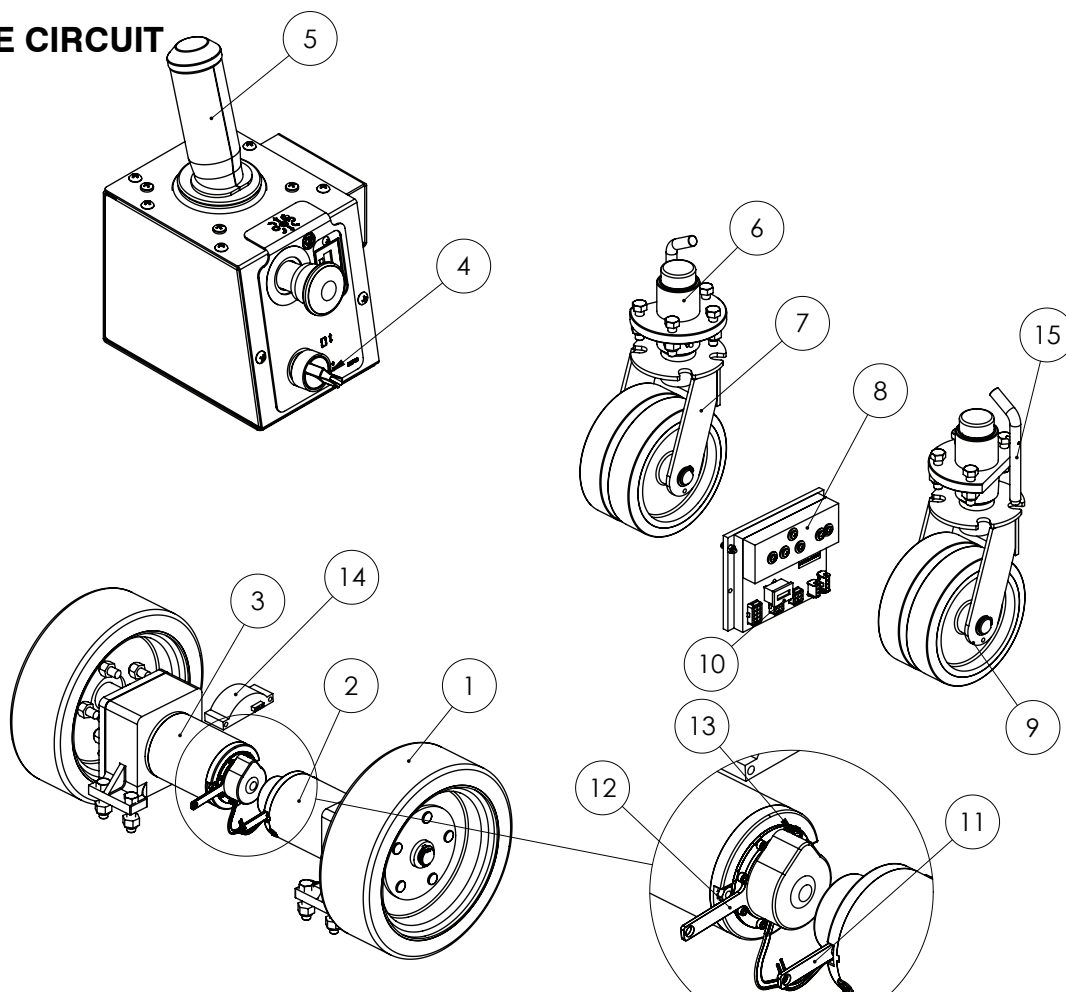


REPLACEMENT OF THE FOLLOWING COMPONENTS WILL AFFECT THE STRENGTH, STABILITY, OR SAFETY FUNCTION OF THE UNIT: BATTERY (ELEC-047-6), HYDRAULIC CYLINDER (HYDR-012 OR HYDR-013), CONTROL BOARD (129-21-010-50), AND ALL STRUCTURAL COMPONENTS.

7.2 | MAIN POWER/SAFETY CIRCUIT



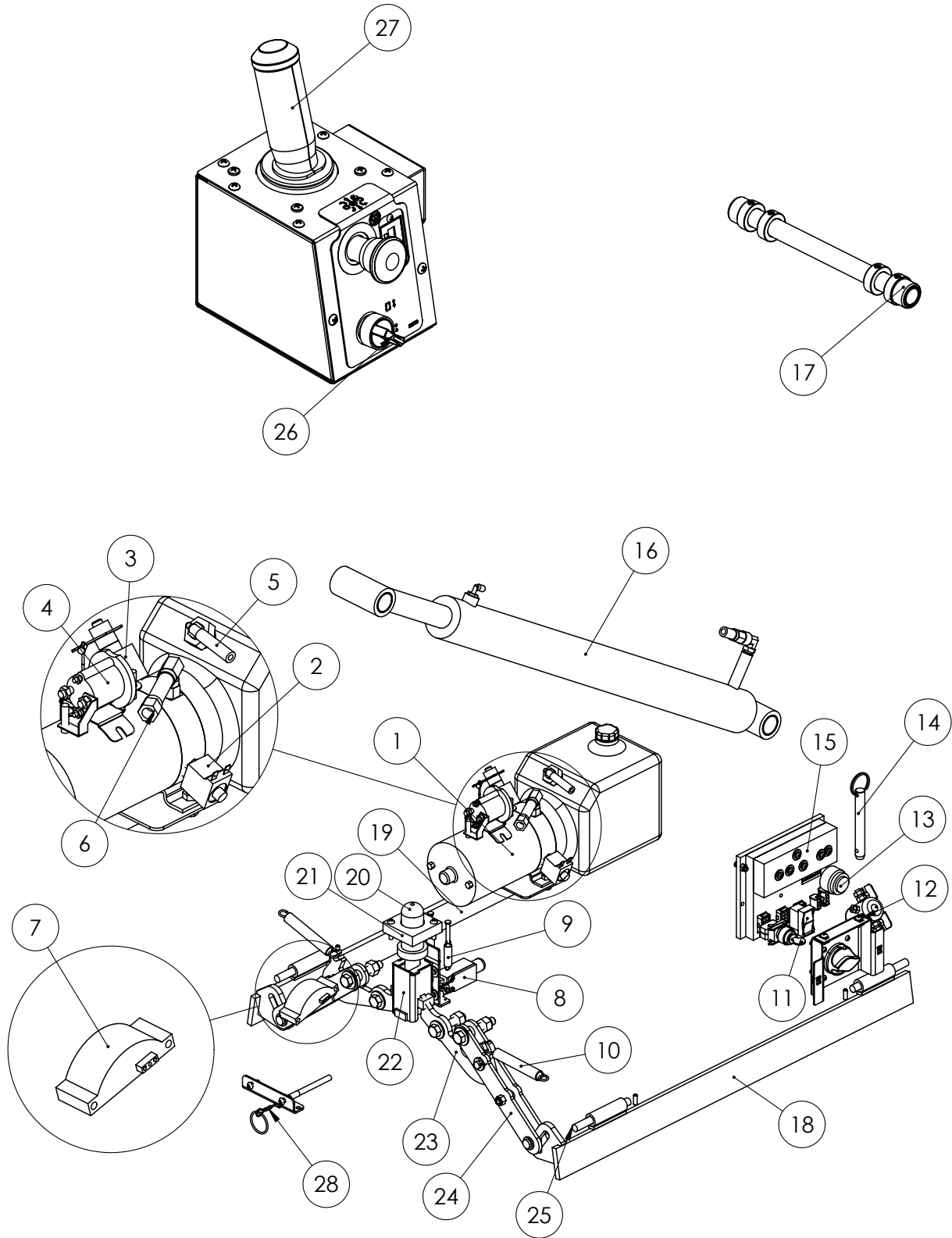
ITEM #	PART #	DESCRIPTION
1	129-21-004-50	Lower Control
2	129-21-006-50	Upper Control
3	ELEC-639-3	Battery Charger Cord
4	ELEC-047-6	Battery
5	ELEC-747	Battery Charger
6	ELEC-073D-KIT	Key Switch
6	ELEC-073EKEY	Spare Keys
7	ELEC-610-2	Hourmeter
8	ELEC-071-KIT	Emergency Stop Switch
9	ELEC-635-4	Alarm
10	ELEC-633-4	Master Power Switch
10	ELEC-633-5	Spare Master Power Knob
11	HYDR-666	Solenoid
11	129-21-007-50	Main Control Cable
13	129-21-010-50	Control Module
14	ELEC-071-KIT	Emergency Stop Switch
(Not Pictured)	129-01-090-50 129-01-90-51 ELEC-641A ELEC-641C	Battery Cables

7.3 | DRIVE CIRCUIT

ITEM #	PART #	DESCRIPTION
1	WHEE-618	Drive Wheel
2	ELEC-626-5L	Drive Motor (Right)
3	ELEC-626-5R	Drive Motor (Left)
4	ELEC-002C-KIT	Drive/Elevate Selector Switch
5	ELEC-606	Joystick
6	WHEE-714-05	Swivel Caster Hub
7	129-01-071-01	Swivel Caster
8	129-21-010-50	Drive Control Board
9	WHEE-706-KIT	Steer Wheel
10	ELEC-610-2	Hour Meter
11	ELEC-627-5L	Brake (Right)
12	ELEC-627-5R	Brake (Left)
13	ELEC-627-5	Brake Switch
14	ELEC-647	Angle Sensor
15	129-01-101-05 129-01-102-03	Caster Lock Pin
(Not called out)	ELEC-627-COVER	Brake Dust Cover
(Not called out)	HARD-021	1" Retaining Ring

7.4 | ELEVATE / LOWER CIRCUIT

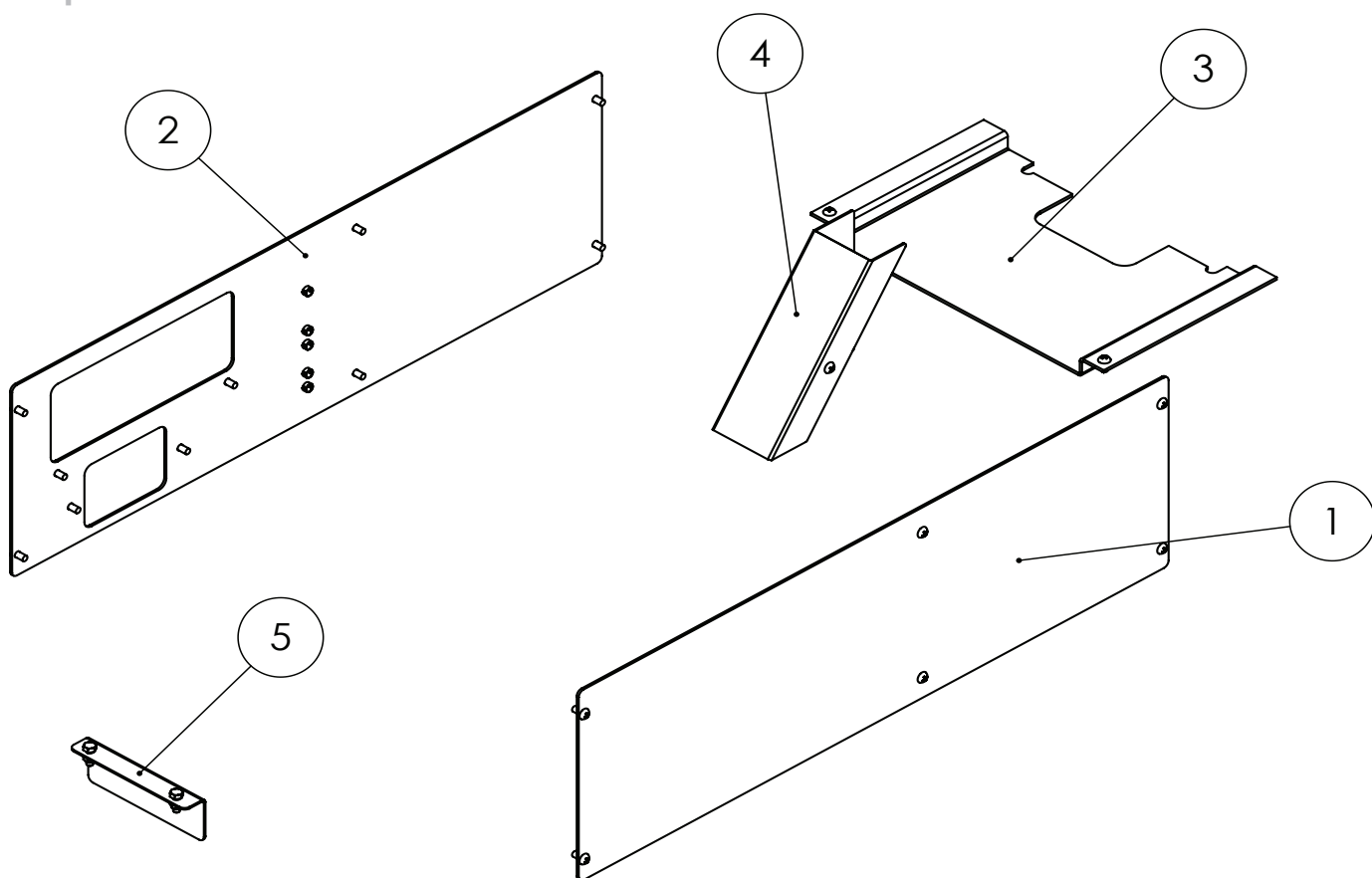
(Continued on next page)



Elevate / Lower Circuit (continued)

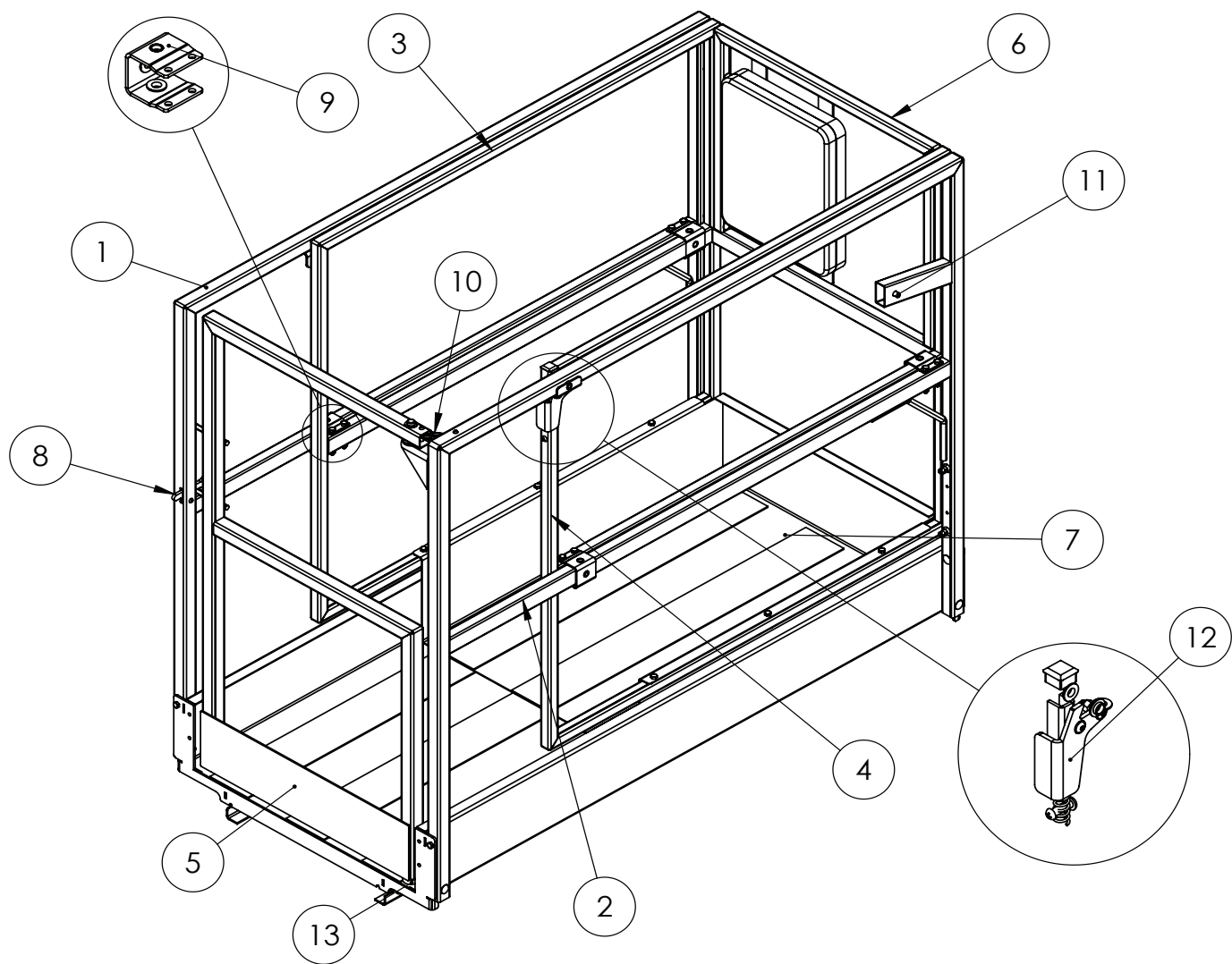
ITEM #	PART #	DESCRIPTION	NOTES
1	HYDR-050-9	Hydraulic Pump	
2	HYDR-665	Up Valve	Cartridge
2	HYDR-664	Up Valve Coil	
3	HYDR-663	Down Valve	Cartridge
3	HYDR-664	Down Valve Coil	
4	HYDR-666-1	Start Solenoid	
5	HYDR-022-3 & HYDR-019	Hydraulic Return Line & Fitting	
6	HYDR-600-12	Hydraulic Hose	
7	ELEC-647	Angle Sensor	
8	ELEC-123-5	Pothole Limit Switch	
9	HARD-703	Pothole Spring	
10	HARD-701	Pothole Spring	
11	ELEC-133B	Up/Down Rocker Switch	
12	HYDR-666	Solenoid	
13	ELEC-635-4	Tilt/Descent Alarm	
14	HARD-691	Maintenance Lock Pin	
15	129-21-010-50	Control Module	
16	129-21-002-90-K	Hydraulic Cylinder	
17	BM-6006-1-KIT	Roller	
18	129-01-037-01	Pothole Bar, Right	
19	129-01-035-01	Pothole Bar, Left	
20	129-01-040-04	Pothole Spring Sleeve	
21	HB-PH-13	Pothole Spring Guide	
22	129-01-045-02	Pothole Lock	
23	129-01-029-02	Pothole Pick-Up Arm	
24	129-01-028-02	Pothole Arm	
25	RND-HB-002-P	Pothole Hinge	
26	ELEC-002C-KIT	Selector Switch	
27	ELEC-606	Joystick	
28	HARD-644-04	Emergency Down Cable	
(Not Pictured)	HYDR-667	Seal Washers, Pressure Valve	
(Not Pictured)	HARD-022	Retaining Ring	1.25"
(Not Pictured)	MISC-007-01-KIT	Beam Bumper	

7.5 | COVERS



ITEM #	PART #	DESCRIPTION	NOTES
1	129-21-001-81-K	Cover, Left	
2	129-21-001-80-K	Cover, Right	
3	129-01-075-01	Cover, Top	
4	129-01-083-01	Cover, Switch	
5	129-05-009-01	Cover, Tube Cap	

7.6 | RAILINGS



ITEM #	PART #	DESCRIPTION	NOTES
1	129-03-051-01	Rail, Left	
2	129-03-050-01	Rail, Right	
3	129-03-053-01	Slide-Out, Left	
4	129-03-052-01	Slide-Out, Right	
5	129-03-054-01	Gate	
6	129-03-055-01	Rail Slide-Out End	
7	129-03-024-01	Slide-Out Floor	
8	1000307601	Gate Latch	
9	LAS-M078-KIT	Slide-Out Channel	
10	HARD-606-2	Gate Spring	
11	HARD-067	Upper Control Fastener	
12	LAS-M092-PC	Slide-Out Lock	
12	1002100692-KIT	Slide Lock Kit	
13	143-04-007-04	Gate Washer	
(Not Called Out)	129-21-003-KIT	Railing Assembly	
(Not Called Out)	SUPO-646	Manual, Maintenance	
(Not Called Out)	SUPO-645	Manual, Operation	
(Not Called Out)	MISC-601	Manual, ANSI Responsibilities	
(Not Called Out)	MISC-600	Manual, Aerial Platform Safety	
(Not Called Out)	HARD-603	Manual Box	
(Not Called Out)	HARD-092	Finishing Plug	1 x 1"
(Not Called Out)	HARD-645	Finishing Plug	11/16" Round

SECTION 8 | WARRANTY

LIMITED WARRANTY

WARRANTY STATEMENT—NORTH AMERICA ONLY

1. LIMITED WARRANTIES

Subject to the terms, conditions and limitations set forth herein, Custom Equipment, Inc. (the “**Company**”) warrants to the first end-user (“**Buyer**”) that:

a. Limited Product Warranty

For a period of 12 months from the date that a new product manufactured by the Company (“**Product**”) is delivered to the Buyer, the Product will (i) conform to the specifications published by the Company for such Product as of the date of delivery; and (ii) be free of any defect in material and/or workmanship under normal use and maintenance; and

b. Extended Structural and Chassis Warranty

For a period of 60 months from the date that the Product is delivered to the Buyer, the chassis and other structural components of such Product will be free from defects in material and/or workmanship under normal use and maintenance.

2. EXCLUSIONS / WHAT IS NOT COVERED

The following items are **NOT** covered under this Limited Warranty:

- Defects in, and damage or loss relating to, any batteries incorporated by the Company into or made a part of the Product. Any such defects, damage or loss shall be exclusively covered by the battery manufacturer's warranty, if any. For more information regarding the battery warranty, the Buyer should contact the battery manufacturer using the contact information shown on the battery;
- Damage or loss resulting from or caused by carrier handling;
- Damage or loss resulting from or caused by normal wear and tear, weathering, lack of use or use with incompatible equipment or software;
- Damage resulting from or caused by improper maintenance, improper handling or storage, improper use, abuse, neglect, operation beyond rated capacity, or operation after discovery of defective or worn parts;
- Any part, component or assembly altered or modified in any way not approved in writing by the Company;
- Damage to any equipment or parts not manufactured by the Company; and
- Acts of God, accidents or any other causes beyond the Company's reasonable control.

3. MAKING A WARRANTY CLAIM

As a prerequisite to making any claim under this Limited Warranty, Buyer must give the Company written notice of any suspected defect promptly after discovery. Such notice shall specifically identify the suspected defect, the original delivery date and complete Buyer identification and location information. The Company will not accept any Product for warranty service without receiving Buyer's written notice and issuing a return goods authorization. If requested by the Company, Buyer shall return the defective Product, or parts, components or assemblies thereof, to the Company, F.O.B. Company's designated location. All returned Products or parts, components or assemblies thereof that are replaced under this Limited Warranty shall become the property of the Company. The Company reserves the right to review Buyer's maintenance and operation records and procedures to determine if the alleged defect(s) were due to any of the items listed in Sections 2 of this Limited Warranty. The Company shall not be liable for any claim under this Limited Warranty if Buyer fails to satisfy the conditions set forth in this Section.

4. EXCLUSIVE WARRANTY REMEDIES

a. Exclusive Repair or Replace Remedy

The Company's sole obligation and Buyer's exclusive remedy with respect to any defect in the Product occurring during the warranty periods set forth in Section 1 of this Limited Warranty shall be for the Company, at its option, to repair or replace (or have one of its designated authorized dealers repair

or replace) the Product or part, component or assembly thereof that contains a defect in materials or workmanship. The Company reserves the right, at its discretion, to use new, re-manufactured or refurbished replacement parts. Notwithstanding anything in this Limited Warranty to the contrary, the Company shall not be obligated to replace the entire Product if a covered defect can be remedied by the repair or replacement of a defective part, component or assembly. The Company shall be responsible for the cost of all parts and labor charges, up to the Maximum Labor Amount determined in accordance with Section 4(b) of this Limited Warranty, necessary to remedy such defect.

b. Labor Charges

If field repairs or parts replacement are necessary on any Product covered by this Limited Warranty, the Company will reimburse its designated authorized dealer for those direct labor costs incurred to perform such field repairs or parts replacement up to the maximum amount specified in the Company's current Field Service Rate (hereinafter, the "FSR") or in any 'Flat Rate Guides' or similar agreement established with the authorized dealer (such maximum amount shall be referred to in this Limited Warranty as the "Maximum Labor Amount"). Current versions of the Company's FSR and Flat Rate Guides are incorporated by reference into this Limited Warranty. For a current copy of the Company's FSR and Flat Rate Guides, Buyer should contact the Company at 1-866-334-0756. Buyer shall be responsible for any costs or fees due to the authorized dealer in excess of the Maximum Labor Amount.

5. **DISCLAIMER OF OTHER EXPRESS AND IMPLIED WARRANTIES**

EXCEPT FOR THE LIMITED WARRANTIES SET FORTH IN SECTION 1 ABOVE, THE COMPANY MAKES NO OTHER REPRESENTATIONS OR WARRANTIES AND HEREBY DISCLAIMS ALL EXPRESS OR IMPLIED REPRESENTATIONS OR WARRANTIES REGARDING THE PRODUCT, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT OF PROPRIETARY OR THIRD-PARTY RIGHTS OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. No employee or representative of the Company or any of its authorized dealers is authorized to modify any term, condition or limitation in this Limited Warranty unless such modification is made in writing and signed by an officer of the Company.

6. **LIMITATION OF LIABILITY**

NOTWITHSTANDING ANYTHING IN THIS WARRANTY TO THE CONTRARY, IN NO EVENT SHALL THE COMPANY OR ANY OF ITS AFFILIATES OR SUBSIDIARIES BE LIABLE TO BUYER FOR ANY INDIRECT, SPECIAL, EXEMPLARY, PUNITIVE OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS, LOST REVENUE, DOWN TIME, LOSS OF BUSINESS OPPORTUNITY OR OTHER ECONOMIC LOSSES), WHETHER IN AN ACTION IN CONTRACT OR TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHERWISE, EVEN IF THE COMPANY HAS BEEN SPECIFICALLY ADVISED OF THE POSSIBILITIES OF SUCH DAMAGES.

Version of 2.1.13

SECTION 9 | ADDITIONAL RESOURCES

The following section lists important documents and information related to your Hy-Brid Lift. For smartphone users, simply scan the QR codes with your smartphone to access the documents on your mobile device. For desktop access, please use the URLs provided (shortened “bit.ly” URLs have been used for your convenience. These URLs will direct you to the specified document on our website).

GENERAL LIFT INFORMATION

FAMILY BROCHURE

<http://bit.ly/18ugpks>



HB-1230 BROCHURE

<http://bit.ly/1eBXvg0>



OPERATIONS MANUAL

<http://bit.ly/16U4Umc>



TECHNICAL REFERENCES

DIAGRAMS

<http://bit.ly/15lWVQx>



DECALS

<http://bit.ly/16lQZrx>



CHECKLISTS

<http://bit.ly/19tsntl>



PARTS DIAGRAMS

MAIN POWER CIRCUIT

<http://bit.ly/19xagBi>



DRIVE CIRCUIT

<http://bit.ly/1aZ3982>



COVERS / OTHER

<http://bit.ly/18RDIRM>



RAILINGS

<http://bit.ly/15P5Vfs>



ELEVATE / LOWER CIRCUIT

<http://bit.ly/16tl41A>



Hy-Brid Lifts™

by Custom Equipment

SELF-PROPELLED AERIAL WORK PLATFORM

MAINTENANCE & TROUBLESHOOTING MANUAL

HB-1230



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Fax: 262-644-1320
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service@customequipmentlifts.com

“Hy-Brid Lifts” is a trademark of Custom Equipment, Inc.
These machines comply with ANSI/SIA A92.6

Revision Date: September 2013

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