If There Is A Question About Application And/Or Operation, Contact:

Custom Equipment, Inc.
2647 Hwy 175
Richfield, WI 53076
U.S.A.
P: +1-262-644-1300
F: +1-262-644-1320
www.hybridlifts.com
Original instructions written in English

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.

**DANGER**

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.

**WARNING**

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

**Fall Protection Notice**

The guardrail system around the perimeter of the platform is the fall protection system for self-propelled elevating work platforms per the American National Standards Institute ANSI/SIA A92.6 Standard. It is prohibited to use an Aerial Work Platform manufactured by Custom Equipment, Inc. with any portion, or all, of the guardrails removed.

Lanyard anchorage points on this type of equipment are not required to conform to the applicable standard. However, if anchorage points for lanyard attachments are required by site authorities, or other regulations, the anchorage points on all equipment manufactured by Custom Equipment, Inc. are recommended to be used for work positioning restraints of personnel only. Lanyard lengths are to be determined by operator/owner to restrict the operator to the confines within the guardrail system.
# TABLE OF CONTENTS

SECTION 1 | SAFETY .......................................................................................................................... 6
  1.1 | SAFETY SYMBOLS .................................................................................................................. 6
  1.2 | GENERAL RULES AND PRECAUTIONS .................................................................................. 6
  1.3 | SAFETY GUIDELINES ............................................................................................................. 7

SECTION 2 | MAINTENANCE ..................................................................................................................... 8
  2.1 | BATTERY MAINTENANCE ......................................................................................................... 8
  2.2 | CHARGING THE BATTERY ........................................................................................................ 8
  2.3 | LUBRICATION .......................................................................................................................... 10
  2.4 | COMPONENTS REQUIRING ADJUSTMENT ............................................................................ 10
  2.5 | EXAMINATION, REPAIR, REPLACEMENT OF LIMITED LIFE COMPONENTS ...................... 10
  2.6 | SAFETY DEVICES AND SYSTEMS REQUIRING CHECKS .................................................... 10

SECTION 3 | MAINTENANCE CHECKLISTS ................................................................................................ 12
  3.1 | PRE-START INSPECTION CHECKLIST .................................................................................... 13
  3.2 | FREQUENT INSPECTION CHECKLIST .................................................................................... 14
  3.3 | PRE-DELIVERY/ANNUAL CHECKLIST ................................................................................... 15

SECTION 4 | TECHNICAL REFERENCES ..................................................................................................... 16
  4.1 | HYDRAULIC SCHEMATIC .......................................................................................................... 18
  4.2 | ELECTRICAL SCHEMATIC ...................................................................................................... 20
  4.3 | LED DRIVE BOARD DIAGNOSTICS-BLUE CONTROLLER ...................................................... 21
  4.4 | LED DRIVE BOARD DIAGNOSTICS-BLACK CONTROLLER .................................................. 22

SECTION 5 | WIRING DIAGRAMS ................................................................................................................. 22
  5.1 | WIRING DIAGRAM .................................................................................................................. 22
  5.2 | LOWER CONTROLS WIRING DIAGRAM ................................................................................. 24
  5.3 | UPPER CONTROLS WIRING DIAGRAM ................................................................................... 27

SECTION 6 | TROUBLE SHOOTING FLOWCHARTS ..................................................................................... 28
  6.1 | MAIN POWER/SAFETY CIRCUIT .............................................................................................. 28
  6.2 | DRIVE CIRCUIT ....................................................................................................................... 31
  6.3 | STEER CIRCUIT ....................................................................................................................... 32
  6.4 | ELEVATE CIRCUIT .................................................................................................................. 35
  6.5 | LOWER CIRCUIT ..................................................................................................................... 37

SECTION 7 | PARTS DIAGRAMS .................................................................................................................. 38

SECTION 8 | WARRANTY ............................................................................................................................ 40

SECTION 9 | INSPECTION AND REPAIR LOG .......................................................................................... 42
INDEX OF FIGURES

FIGURE 1: MAINTENANCE LOCK PIN USE ................................................................. 7
FIGURE 2: MAINTENANCE LOCK PIN STORAGE LOCATION ............................. 7
FIGURE 3: BATTERY MAINTENANCE ................................................................. 8
FIGURE 4: BATTERY CHARGER LED DISPLAY ................................................... 9
1.1 | SAFETY SYMBOLS

**DANGER**

Failure to follow this warning will cause death or personal injury.

**WARNING**

Failure to follow this warning may cause death or personal injury.

**CAUTION**

Failure to follow this warning may cause injury or damage to equipment.

1.2 | GENERAL RULES AND PRECAUTIONS

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 ANSI & OSHA, 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 and OSHA. If you come across a situation that you think might be unsafe, stop the platform and request further information from qualified sources before proceeding.

**WARNING**

Never reach between scissors links or prop up platform unless maintenance pins are in place.

**WARNING**

Maintenance information is for use by trained personnel only.
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.

FIGURE 1: Maintenance Lock Pin use

FIGURE 2: Maintenance Lock Pin storage location

WARNING

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 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.
2.1 | BATTERY MAINTENANCE

This unit is equipped with deep cycle 12-volt batteries. The care and maintenance of your battery has much to do with how well this unit functions. Battery wiring and water level should be checked monthly. Do not overfill. When the cells are too full, fluid will seep out when charging. The solution is at its proper strength when the battery is manufactured. Use distilled water and keep fluid up to proper level. When required, water should be added to battery after charging, unless water level is below the plates.

![Figure 3: Battery Maintenance](image)

2.2 | CHARGING THE BATTERY

This unit is equipped with deep cycle 12-volt batteries. The care and maintenance of your battery has much to do with how well this unit functions. Battery wiring and water level should be checked monthly. Do not overfill. When the cells are too full, fluid will seep out when charging.

![Warning: Lead-Acid Batteries Generate Explosive Gases](image)

**WARNING**

Lead-Acid Batteries Generate Explosive Gases. Keep Sparks and Flame Away from Batteries. Do Not Smoke While Charging.

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 4: Battery Charger LED Display**

<table>
<thead>
<tr>
<th>Power</th>
<th>Battery 1 Status</th>
<th>Battery 2 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Charging</td>
<td>Ready</td>
</tr>
<tr>
<td>Green LED (ON)</td>
<td>Red LED (OFF)</td>
<td>Green LED (OFF)</td>
</tr>
<tr>
<td>Power</td>
<td>Battery 1 Status</td>
<td>Battery 2 Status</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>Charging</td>
<td>Ready</td>
</tr>
<tr>
<td>Green LED (ON)</td>
<td>Red LED (ON)</td>
<td>Green LED (OFF)</td>
</tr>
<tr>
<td>Power</td>
<td>Battery 1 Status</td>
<td>Battery 2 Status</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>Charging</td>
<td>Ready</td>
</tr>
<tr>
<td>Green LED (ON)</td>
<td>Red LED (OFF)</td>
<td>Green LED (OFF)</td>
</tr>
<tr>
<td>Power</td>
<td>Battery 1 Status</td>
<td>Battery 2 Status</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>Charging</td>
<td>Ready</td>
</tr>
<tr>
<td>Green LED (ON)</td>
<td>Red LED (OFF)</td>
<td>Green LED (OFF)</td>
</tr>
<tr>
<td>Power</td>
<td>Battery 1 Status</td>
<td>Battery 2 Status</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>Charging</td>
<td>Ready</td>
</tr>
<tr>
<td>Green LED (ON)</td>
<td>Red LED (FLASHING)</td>
<td>Green LED (OFF)</td>
</tr>
</tbody>
</table>

**WARNING**

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

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.

This display indicates that power is on and that both outputs are delivering D/C current to the batteries.

This display indicates that power is on and that both outputs are finished charging and are in a float maintenance mode.

A flashing red light indicates there is a problem with a battery, such as low voltage or a bad cell.
### 2.3 | LUBRICATION

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Frequency of Lubrication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Wheels</td>
<td>Teflon Spray</td>
<td>Quarterly</td>
</tr>
</tbody>
</table>

### 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

**Setting the Tilt Sensor**

1. Verify that unit is powered (red or green LED illuminated/blinkng).
2. Zero unit (teach unit home/level position).
   - Operate tilt platform until it has reached the desired home position (level).
   - Press and hold the button on top of the module for 5 seconds (both LEDs will be OFF).
   - Red and Green LEDs will now FLASH. User now has 5 seconds to “program”
   - Press and release button 3 times within 5 second period.
   - Red and Green LEDs will turn on solid for 2 seconds, indicating position is being learned

**Voltage Test Points**

Contact technical assistance for more details.
SECTION 3 | MAINTENANCE CHECKLISTS

CAUTION

FAILURE TO PERFORM INSPECTIONS AND PREVENTATIVE MAINTENANCE AT RECOMMENDED INTERVALS MAY RESULT IN THE UNIT BEING OPERATED WITH A DEFECT THAT MAY RESULT IN INJURY OR DEATH OF THE OPERATOR.

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 required and included in this manual:

- Pre-Start (Required before operation at each work shift)
- Frequent (Required at intervals not more than three months)
- 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

**CAUTION**

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

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

<table>
<thead>
<tr>
<th>Y — Yes/Acceptable</th>
<th>N — No/Unacceptable</th>
<th>R — Repaired</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Y</th>
<th>N</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VISUAL INSPECTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check that there are no damaged, dented, or bent structural members.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>There are no loose or missing parts.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Warning and instructional labels are legible and secure. Ensure that load capacity is clearly marked.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check platform rails and safety gate for damage.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Platform and base controls are not missing, damaged, or disconnected.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Electrical cables and wires are not torn, frayed, or disconnected.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Hydraulic hoses are not torn or loose, and there are no leaks. Check that hoses and cables have no worn areas or chafing.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check the hydraulic fluid level with the platform fully lowered.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check the tires for damage.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check that all snap rings are secure in grooves on pivot pins.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>FUNCTIONAL TESTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate closes automatically and latches</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>PLATFORM CONTROLS: Check all switches and push buttons for proper operation.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>• Emergency Stop (Stops all movement)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Up/Down Controls (Elevates, Lowers, Enable button must be pressed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Alarm (Not damaged, sounds for descent, overload)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LED (Lights when overloaded)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BASE CONTROLS: Check all switches and push buttons for proper operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master Power Switch (Disconnects Battery)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wheels: Front and rear wheels rotate freely.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Brakes: Engage and hold when platform is elevated.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>When beginning to elevate, overload light and alarm activate. Then, if not overloaded, allows elevation to continue, and light and alarm stop.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Date: ___________________________  Inspected by: ___________________________
### 3.2 | FREQUENT INSPECTION CHECKLIST

**CAUTION**

**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, WHICHEREver COMES FIRST.**

Model: ___________________ 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.
- 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.

<table>
<thead>
<tr>
<th>Y — Yes/Acceptable</th>
<th>N — No/Unacceptable</th>
<th>R — Repaired</th>
</tr>
</thead>
</table>

**DESCRIPTION**

<table>
<thead>
<tr>
<th>Description</th>
<th>Y</th>
<th>N</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>VISUAL INSPECTIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform all the checks on the Pre-Start Inspection Checklist.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Inspect the condition of hydraulic fluid in reservoir. Oil should have a clear amber color.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Inspect the entire machine for signs of damage, broken welds, loose bolts, or improper repairs. (Check for corrosion, cracking, abrasion, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check that all snap rings are secure in grooves on pivot pins</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check if tires are leaning in or out.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Verify that bubble level is in place.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Verify that maintenance and inspection records are up to date.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>FUNCTIONAL TESTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform all check on Pre-Start inspection checklist.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Functions operate smoothly</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Functions operate over full range of motion</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Emergency lowering — Manual override functions properly</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Check that the platform does not drift down with a full load</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wheels lubricated if needed</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Comments:**

Date: ___________________ Inspected by: ___________________
3.3 | PRE-DELIVERY/ANNUAL 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: ______________________ 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.
- 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.

<table>
<thead>
<tr>
<th>Y — Yes/Acceptable</th>
<th>N — No/Unacceptable</th>
<th>R — Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base</strong></td>
<td><strong>Y</strong></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td>Inspect slide tracks for damage</td>
<td>☐ ☐ ☐</td>
<td>All rails in place/secure</td>
</tr>
<tr>
<td>All frame bolts tight</td>
<td>☐ ☐ ☐</td>
<td>No bent rails</td>
</tr>
<tr>
<td>Pump Secure</td>
<td>☐ ☐ ☐</td>
<td>No broken welds</td>
</tr>
<tr>
<td>DC motor secure</td>
<td>☐ ☐ ☐</td>
<td>Platform power outlet safe/working (if installed)</td>
</tr>
<tr>
<td>Battery Hold Downs Secure</td>
<td>☐ ☐ ☐</td>
<td>Entrance gate closes freely</td>
</tr>
<tr>
<td>Batteries Fully Charged</td>
<td>☐ ☐ ☐</td>
<td>Cables in place/secure</td>
</tr>
<tr>
<td>Counterweights secured</td>
<td>☐ ☐ ☐</td>
<td>Functions:</td>
</tr>
<tr>
<td>Wheels: Grease casters</td>
<td>☐ ☐ ☐</td>
<td>Elevate/Lower Operational</td>
</tr>
<tr>
<td>Wheels: Bolts/Nuts Tight</td>
<td>☐ ☐ ☐</td>
<td>Master Power Switch Breaks Circuits</td>
</tr>
<tr>
<td>Maintenance Locks: Pins storage location</td>
<td>☐ ☐ ☐</td>
<td>Emergency Stop Breaks Circuits</td>
</tr>
<tr>
<td>All Shields/Guards in place</td>
<td>☐ ☐ ☐</td>
<td>Emergency Down Operational</td>
</tr>
<tr>
<td>Hydraulic Oil Level</td>
<td>☐ ☐ ☐</td>
<td>Motion Alarms Functional</td>
</tr>
<tr>
<td>Check all hydraulic hoses for leaks</td>
<td>☐ ☐ ☐</td>
<td>Brakes: Operational</td>
</tr>
<tr>
<td>Check all hydraulic fittings for leaks</td>
<td>☐ ☐ ☐</td>
<td>Bubble Level in Place</td>
</tr>
<tr>
<td><strong>SCISSORS</strong></td>
<td>☐ ☐ ☐</td>
<td>When beginning to elevate, overload light and alarm activate. Then, if not overloaded, allows elevation to continue, and light and alarm stop.</td>
</tr>
<tr>
<td>No Broken Welds</td>
<td>☐ ☐ ☐</td>
<td>When overloaded, platform stops elevating.</td>
</tr>
<tr>
<td>Ret. Rings Secure on Pivots</td>
<td>☐ ☐ ☐</td>
<td>Check battery Voltage: &lt;12.5V, charge.</td>
</tr>
<tr>
<td>No Bent Beam Members</td>
<td>☐ ☐ ☐</td>
<td>Wiring / Other:</td>
</tr>
<tr>
<td>All rollers turn freely</td>
<td>☐ ☐ ☐</td>
<td>Switches Secure</td>
</tr>
<tr>
<td>Decals:</td>
<td>☐ ☐ ☐</td>
<td>Contractor(s) Secure</td>
</tr>
<tr>
<td>Legibility</td>
<td>☐ ☐ ☐</td>
<td>Tight on Terminals (No Loose Wiring)</td>
</tr>
<tr>
<td>Correct capacity noted</td>
<td>☐ ☐ ☐</td>
<td>Operator/Service Manual Included</td>
</tr>
<tr>
<td>Proper placement quantity</td>
<td>☐ ☐ ☐</td>
<td>Battery Charger Secure &amp; Operational</td>
</tr>
<tr>
<td><strong>Comments:</strong></td>
<td>☐ ☐ ☐</td>
<td></td>
</tr>
</tbody>
</table>

Date: __________________________ Inspected by: __________________________
SECTION 4 | TECHNICAL REFERENCES

4.1 | HYDRAULIC SCHEMATIC

---

THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO CUSTOM EQUIPMENT AND IS LOANED IN EXPECTATION THAT IT WILL BE KEPT CONFIDENTIAL AND USED ONLY FOR THE PURPOSE FOR WHICH IT IS LOANED.
4.2 | ELECTRICAL SCHEMATIC

- Battery Charger Interlock
- Lower Control E-Stop
- Upper Control E-Stop
- LED
- Hour Meter
- Tilt Sensor
- Diode
- Tilt Alarm
- UP/DOWN Rocker
- Upper Control E-Stop
- Lower Control E-Stop
- Joystick

- BATTERY CHARGER
- 12V BATTERY
- 110V AC INPUT
- BATTERY CHARGER
- 12V BATTERY

- 20 A Fuse
- Upper Control Lift/Drive Enable
- Joystick
- Right Turn Limit Switch
- Left Turn Limit Switch

- LED - DESCENT ALARM
- TILT SENSOR - TILT ALARM

- Mode/PH LS - Located in base switch activated when scissors is up (NC=Open) switch shown with lift in down position

- MSIZE: LOCATED IN BASE SWITCH ACTIVATED WHEN SCISSORS IS DOWN (NC=OPEN) SWITCH SHOWN WITH LIFT IN DOWN POSITION

- Battery Charger
- 12V Battery
- 110V AC Input

- Brake Switch
- Brake Switch
- Drive Enable

- Right
- Left

- UPR CTL LIFT/DYR ENABLE
- JS DRIVE ENABLE

- BATTERY CHARGER
- 12V BATTERY
- 110V AC INPUT

- Motor Controller
- Brake
- BRAKE COILS

- Scale: 1:1

- This drawing is confidential and proprietary to Custom Equipment and is loaned in expectation that it will be kept confidential and used only for the purpose for which it is loaned.

- ORIGINALLY DRAWN BY: Custom Equipment, Inc.
- Richfield, WI  53076
- PHONE: (262) 644-1300

- Date: 03/19/2015
- Description of Change
- Date
- REV
- By

- Sheet 1 of 1

- Weight: Approx. 0.00 LB.
### 4.3 | LED DRIVE BOARD DIAGNOSTICS—BLUE CONTROLLER

Note: If LED Diagnostics light flashes rapidly for 10 seconds when joystick enable switch is squeezed, before reading error code, use this table.

<table>
<thead>
<tr>
<th>Programmer Display</th>
<th>LED Code</th>
<th>Explanation</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>THERMAL CUTBACK</td>
<td>**</td>
<td>Over-/under-temp. Cutback</td>
<td>Temperature &gt;92° C or &lt;-25°C. Excessive load on vehicle. Electromagnetic brake not releasing properly.</td>
</tr>
<tr>
<td>THROTTLE FAULT 1</td>
<td>***</td>
<td>Pot high or pot low signal out of range</td>
<td>Throttle input wire open or shorted. Throttle pot device. Wrong type selected</td>
</tr>
<tr>
<td>SPD LIMIT POT FAULT</td>
<td>****</td>
<td>Speed limit pot fault</td>
<td>Speed limit pot wire(s) broken or shorted. Broken speed limit pot.</td>
</tr>
<tr>
<td>LOW BATTERY VOLTAGE</td>
<td>*****</td>
<td>Battery voltage too low</td>
<td>Battery voltage &lt;17 volts. Bad connection at battery or controller.</td>
</tr>
<tr>
<td>OVER-VOLTAGE</td>
<td>******</td>
<td>Battery voltage too high</td>
<td>Battery voltage &gt;36 volts. Vehicle operating with charger attached. Intermittent battery connection.</td>
</tr>
<tr>
<td>MAIN OFF FAULT</td>
<td>***</td>
<td>Main cont. Off fault</td>
<td>Main contractor drive failed open.</td>
</tr>
<tr>
<td>MAIN CONT WELDED</td>
<td>** **</td>
<td>Main contractor did not open</td>
<td>Main contractor welded. Main contractor driver fault. Brake coil resistance too high.</td>
</tr>
<tr>
<td>MAIN CONT DNC</td>
<td>** ***</td>
<td>Main contractor did not close</td>
<td>Main contractor stuck open. Main contractor driver fault. Brake coil resistance too high.</td>
</tr>
<tr>
<td>MAIN ON FAULT</td>
<td>** *****</td>
<td>Main cont. Driver On fault</td>
<td>Main contractor driver failed closed.</td>
</tr>
<tr>
<td>PROC/WIRING FAULT</td>
<td>****</td>
<td>HPD fault present &gt; 100 sec.</td>
<td>Maladjusted throttle. Broken throttle pot or throttle mechanism.</td>
</tr>
<tr>
<td>BRAKE ON FAULT</td>
<td>**** **</td>
<td>Brake on fault</td>
<td>Electromagnetic brake driver shorted. Electromagnetic brake coil open.</td>
</tr>
<tr>
<td>PRE-CHARGE FAULT</td>
<td>**** ***</td>
<td>Brake off fault</td>
<td>Controller failure. Low battery voltage.</td>
</tr>
<tr>
<td>BRAKE OFF FAULT</td>
<td>**** ****</td>
<td>Pre-charge fault</td>
<td>Electromagnetic brake driver open. Electromagnetic brake coil shorted.</td>
</tr>
<tr>
<td>HPD</td>
<td>*****</td>
<td>HPD fault</td>
<td>Improper sequence of throttle and KSI, push, or inhibit inputs. Maladjusted throttle pot.</td>
</tr>
<tr>
<td>CURRENT SENSE FAULT</td>
<td>**** **</td>
<td>Current sense voltage fault</td>
<td>Short in motor or in motor wiring. Controller failure.</td>
</tr>
<tr>
<td>HW FAILSAFE</td>
<td>**** **</td>
<td>Motor voltage fault</td>
<td>Motor voltage does not correspond to throttle request. Short in motor or in motor wiring. Controller failure.</td>
</tr>
<tr>
<td>EEPROM FAULT</td>
<td>**** ****</td>
<td>EEPROM fault</td>
<td>EEPROM failure or fault.</td>
</tr>
<tr>
<td>POWER SECTION FAULT</td>
<td>*****</td>
<td>Output section fault</td>
<td>EEPROM failure or fault.</td>
</tr>
</tbody>
</table>
Note: If no rapid flash is displayed and codes are immediately displayed, use this table.

<table>
<thead>
<tr>
<th>Programmer Display</th>
<th>LED Code</th>
<th>Explanation</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVER TEMPERATURE</td>
<td>Fourths</td>
<td>Over-/under-temp. Cutback</td>
<td>Temperature &gt;92º C or &lt;-25ºC. Excessive load on vehicle. Electromagnetic brake not releasing properly or engaged.</td>
</tr>
<tr>
<td>EM-BRAKE SHORT</td>
<td>Two</td>
<td>Electric brake fault</td>
<td>The electric brake mechanism or its wiring is shorted</td>
</tr>
<tr>
<td>EM-BRAKE OPEN</td>
<td>Three</td>
<td>Electric brake fault</td>
<td>The electric brake mechanism or its wiring is open</td>
</tr>
<tr>
<td>QUICK STOP</td>
<td>Three</td>
<td>Quick Stop</td>
<td>Quick stop has enabled</td>
</tr>
<tr>
<td>DEAD BAND START ERROR</td>
<td>Fourths</td>
<td>Joystick is not in center position on start up</td>
<td>The joystick was engaged during vehicle power up, make sure joystick is in center position</td>
</tr>
<tr>
<td>DRIVE MOTOR SHORT</td>
<td>Two</td>
<td>Drive motor fault</td>
<td>The drive motor or its wiring has a short</td>
</tr>
<tr>
<td>DRIVE MOTOR OPEN</td>
<td>Three</td>
<td>Drive motor fault</td>
<td>The drive motor or its wiring is open</td>
</tr>
<tr>
<td>POWER RELAY SHORT</td>
<td>Fourths</td>
<td>Power relay short</td>
<td>The power relay has developed a short</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>THROTTLE FAIL-BAND</td>
<td>Sixths</td>
<td>Pot high or pot low signal out of range</td>
<td>Throttle input wire open or shorted Throttle pot device Wrong type of joystick selected.</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>COMPONENT FAILURE</td>
<td>Sixths</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>BAD SOFTWARE REVISION</td>
<td>Three</td>
<td>Controller error</td>
<td>The software in the controller is incorrect for the programmer being used.</td>
</tr>
<tr>
<td>BAD PWM VOLTAGE</td>
<td>Three</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
<tr>
<td>BAD PWM VOLTAGE</td>
<td>Three</td>
<td>Controller error</td>
<td>An internal component of the controller has failed</td>
</tr>
</tbody>
</table>
5.1 | WIRING DIAGRAM
Part No. WD-HB2

---

**Actuator Controls**

- **Lower Limit Switch**
- **Left Turn**
- **Tilt Sensor**
- **Right Turn Limit Switch**

**Upper Controls**

- **20 Amp Fuse**
- **Hyd Pump**
- **Solenoid**

**Lower Controls**

- **Batt Side Microswitch**
- **Batt Side Brake**
- **Batt Side Drive**

**Charger Lower Controls Sub A8-002**

- **Add Orange Zip Tie Around LH Motor Brake Wires**

---

*This drawing is confidential and proprietary to Custom Equipment and is loaned in expectation that it will be kept confidential and used only for the purpose for which it is loaned.*
**SECTION 5 | WIRING DIAGRAMS**

**MAINTENANCE & TROUBLESHOOTING**

HB-1030/HB-1430

SUPO-611

REV N

---

### SECTION 5 | WIRING DIAGRAMS

#### 5.1 | WIRING DIAGRAM

**Part No. WD-HB2**

**ACTUATOR**

**CONTROLS**

**LOWER LIMIT SWITCH**

**LEFT TURN TILT SENSOR**

**RIGHT TURN LIMIT SWITCH**

**CHARGER**

**LOWER CONTROLS**

**SUB A8-002**

Connect these wires if charger has an interlock feature.

**CHARGE OUTPUT**

**BATTERY**

**UPPER CONTROLS**

**20 AMP FUSE**

**M**

**HYD PUMP +**

**SOLENOID -**

**+ DOWN**

**+ UP**

**RESERVOIR PUMP**

**MODE/PH LIMIT SWITCH**

**BATTERY NC NO**

**GND ELEV/TILT LIMIT SWITCH**

**NC NO**

**BATT.SIDE**

**BRAKE**

**DRIVE**

**MICROSWITCH**

**LOWER CONTROL**

**SUB A8-002**

---

ADD ORANGE ZIP TIE AROUND LH MOTOR BRAKE WIRES.

---

**DATE:**

**REV:**

**DESCRIPTION OF CHANGE:**

**ECO #:**

**DATE:**

**REV BY:**

**ECO #:**

**DATE:**

**REV BY:**

**Custom Equipment, Inc.**

Richfield, WI 53076
Phone: (262)644-1300

---

**WIRING DIAGRAM - HB2**

**SPEC/MATL:** Schematic

**WEIGHT:** APPROX. 0.00 LB.

**DRAWING #: WD-HB2**

**SCALE:** B-SIZE

**DO NOT SCALE DRAWING**

**SHEET 1 OF 4**

---

**HY-BRID LIFTS**

**MAINTENANCE & TROUBLESHOOTING**

HB-1030/HB-1430

23

**SUPO-611**

**REV N**
SECTION 5 | WIRING DIAGRAMS

5.2 | LOWER CONTROLS WIRING DIAGRAM
Part No. SUB A8-002

WIRING DIAGRAM:
- **Motor Control**: Molex connector to motor control.
- **Limit Switches**: Elevation limit switch (located under scissors), mode/phase limit switch (NC), mode/phase limit switch (NO).
- **Switches**: Mode switch (NC), mode switch (NO), interlock switch (black), charge output (black), charge output (red), charger (black), charger (red).
- **Connectors**: 12C connector, 14-conductor male plug.
- **Wires**: Label wires at this end of cable, numbers to match terminal block numbers.
- **Connectors**: Power to motor controller, motor control to motor controller, mode limit switch (NC), mode limit switch (NO).
- **Jumpers**: Jumper on TB 18-19 is only used on units that do not have a charger interlock feature.

**Legend**:
- **A** - Power to motor controller (SUB A8-109)
- **B** - 12C connector, pinout at upper control
- **C** - E-stop 24V+ PWR to upr ctrl, E-stop 24V+ PWR to lwr ctrl
- **D** - Mode limit switch (NC) side, mode limit switch (NO) side, trim unconnected wires to edge of cable sheath

**Note**: This drawing is confidential and proprietary to Custom Equipment and is loaned in expectation that it will be kept confidential and used only for the purpose for which it is loaned.

**Spec/Mat**: Wiring Diagram
**Drawing #:** WD-SUB A8-002
**Date:** 04/22/2015
**ECO #:** 2015-2539

**Dimensions:** 612.0x792.0

**Scale:** 1:1 do not scale drawing

**Weight:** Approx. 0.00 LB.

**Contact:** Custom Equipment, Inc.
Richfield, WI 53076
Phone: (262) 644-1300
SECTION 5 | WIRING DIAGRAMS

5.2 | LOWER CONTROLS WIRING DIAGRAM

Part No. SUB A8-002

141312
111098
7654
321
BATT - (2 PLACES)
BATT + (2 PLACES)

ALL WIRES 18 GA EXCEPT WHERE NOTED

TILT SENSOR

GND
DOWN SOL.
UP SOL.
PUMP SOL.

GREEN
RED
BLACK
WHITE
GREEN
RED
BLACK
WHITE

20 AMP FUSE

CONNECTIONS

24V+ SUB A8-105
PUMP

WHITE

NO
43
HOUR METER

-+ 2 DESCENT OR
MOTION ALARM
BLACK ORANGE BLUE GREEN

1 2 5 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

TILT ALARM
WHITE

LED R4 86
85 87

BROWN WHITE GREEN BLACK RED ORANGE

1 10 2 11 3 12 13 14 15 16 17 18 19 20 21 22

TAN (N.C.)
PINK (N.C.)
TAN
PINK
N.C.
N.C.

TRIM UNCONNECTED WIRES TO EDGE OF CABLE SHEATH

JUMPER ON TB 18-19 IS ONLY USED ON UNITS THAT DO NOT HAVE A CHARGER INTERLOCK FEATURE

CONNECT THESE WIRES TO TB 18-19 IF CHARGER HAS AN INTERLOCK FEATURE

CUSTOM, EQUIPMENT AND IS LOANED IN EXPECTATION THAT IT WILL BE KEPT CONFIDENTIAL AND USED ONLY FOR THE PURPOSE FOR WHICH IT IS LOANED.

WEIGHT: APPROX. 0.00 LB.
5.3 | UPPER CONTROLS WIRING DIAGRAM
Part No. SUB A9-002

JOYSTICK:
- RED - ENABLE IN POWER
- BLUE - STEER POWER
- PURPLE - KSI
- YELLOW - RIGHT TURN
- GREEN - LEFT TURN
- BROWN - POT WIPER
- WHITE W/BLACK STRIPE
- WHITE W/ RED STRIPE

LIFT ENABLE
1 NC
4 NO

DRIVE ENABLE

THROTTLE

THROTTLE
REV

FWD

E-ST0P

LIFT ENABLE

PANEL MOUNT SOCKET
FRONT VIEW (LOOKING AT PINS)

THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY TO CUSTOM, EQUIPMENT AND IS LOANED IN EXPECTATION THAT IT WILL BE KEPT CONFIDENTIAL AND USED ONLY FOR THE PURPOSE FOR WHICH IT IS LOANED.
5.3 | UPPER CONTROLS WIRING DIAGRAM

Part No. SUB A9-002

12C CONN. PINOUT AT CABLE PLUG:
- POT WIPER BLACK 1
- POT HI, SPEED POT BROWN 2
- POT LO PURPLE 3
- HRV/METER, KSI GRAY 4
- RIGHT TURN LIMIT SWITCH BLUE 5
- LEFT TURN LIMIT SWITCH YELLOW 6
- PUMP SOLENOID, PUMP UP WHITE 7
- 24V+ PWR RETURN TO LWR CTL RED 14

12C CONN. PINOUT AT CABLE PLUG:
- POT WIPER BLACK 1
- POT HI, SPEED POT BROWN 2
- POT LO PURPLE 3
- HRV/METER, KSI GRAY 4
- RIGHT TURN LIMIT SWITCH BLUE 5
- LEFT TURN LIMIT SWITCH YELLOW 6
- PUMP SOLENOID, PUMP UP WHITE 7
- 24V+ PWR RETURN TO LWR CTL RED 14

CUSTOM EQUIPMENT, INC.
Richfield, WI 53076
Phone: (262)644-1300

WD, UPR CTL HBLG

SPEC/MATL: Wiring Diagram
WEIGHT: APPROX. 0.00 LB.

DRAWING #: WD-SUB A9-002

C 9 Pin Conn. Number Sequence Correction 07/15/2015 GLH

ORIGINALLY DRAWN BY: DATE:

DECLARATION THAT IT WILL BE KEPT CONFIDENTIAL AND USED ONLY FOR THE PURPOSE FOR WHICH IT IS LOANED.

HY-BRID LIFTS
MAINTENANCE & TROUBLESHOOTING HB-1030/HB-1430
SUPO-611 REV N
6.1 MAIN POWER/SAFETY CIRCUIT

Does the machine have any function: (Drive, Steer Elevate/Lower)

No → Is key switch turned on?

Yes → Are both E-Stop buttons off?

Yes → Are the batteries connected? Check per wiring diagram.

No → Turn key switch on

Reset E-Stop buttons. Pull out at both upper control and lower control locations.

Connect batteries. See wiring diagram & battery connection sequence.

Yes, but some function(s) are not working properly

See Drive Problems Flowchart

See Steer Problems Flowchart

See Elevating & Lowering Problems Flowcharts

Is there a different problem?

Contact CEI for further troubleshooting
SECTION 6 | TROUBLE SHOOTING FLOWCHARTS

Are the batteries fully charged (and filled with water)?

No

(Check voltmeter at lower control or check voltage across battery terminals using voltmeter/multi-meter)
Charge batteries.

If batteries do not take charge

Replace batteries Or Replace charger

(Load test batteries, individually, disconnected from machine)
Place voltmeter across battery terminals where charger is connected. If voltage rises on the battery, the charger is working.

Still no function?

Check for loose wiring connections.
Check for ground connection at pump.
See wiring diagrams. Check for continuity in connections. Use Voltmeter/Multi-meter at 400V setting.

Still no functions?

Contact CEI for further troubleshooting
Consider charger failure (interlock contacts)

Hy-Brid Troubleshooting Flowchart
Revision A: Initial Release 01/14/2010
6.2 | DRIVE CIRCUIT

Does the machine drive? (Elevate, Lower, and Steer OK)

Yes, but not properly

Check connections at both pump and board. See wiring diagrams.

Is there a trouble code displayed?

Refer to trouble code table

Is either or two brakes manually released?

Flip brake handle(s) at rear of machine to engage brakes.

No

Is either of two brake switches damaged or disconnected?

Replace brake switch. Note that brake limit switch tabs are delicate. Use caution not to break off.

Yes

Is drive unit damaged?

Replace drive unit

No

Are all connections to drive control board secure?

Reconnect

No

Are there moisture or corrosion in any connections?

No

Allow to dry for 24 hours and try again.

Board probably will need replacement.

Apply dielectric grease to connectors at main wire harness.

Yes

If resistor is installed, check using Ohmmeter/Multi-meter (400 Ω setting). Resistance across resistor should be approx. 4 Ω

Driving slowly?

Are batteries fully charged?

Is brakes hot?

If resistor is installed, check using Ohmmeter/Multi-meter (400 Ω setting). Resistance across resistor should be approx. 4 Ω

Drives slow when lowered?

Is mode limit switch damaged or blocked with debris?

Yes

Contact CEI for further troubleshooting.

Consider brake damage, broken joystick handle (drive enable), bad hour meter, loose connections in lower and upper control.

Still no drive?

Driving slowly?

Drives fast when elevated?

Does not drive when elevated?

Drives intermittently?

Are brakes hot?

Drive Problems

Drives intermittently?

Check wiring connection integrity. (Lower control terminals 2 &/ or 3; Black wire solder connection in main harness at upper & lower control)

Is there moisture or corrosion in any connections?

Is a drive motor damaged?

Replace drive motor.

Is mode limit switch damaged or blocked with debris?

Clean any debris from pothole arm mechanism

Is mode limit switch damaged or blocked with debris?

Clean any debris from limit switch area.

Check for proper connection inside limit switch. (See wiring diagram).

Replace mode limit switch.

Yes

Contact CEI for further troubleshooting.

Consider board failure or incorrect wiring.

Is mode limit switch damaged or blocked with debris?

Clean any debris from limit switch area.

Check for proper connection inside limit switch. (See wiring diagram).

Replace mode limit switch.

Yes

Contact CEI for further troubleshooting.

Consider board failure or incorrect wiring.

Is machine tilted?

On C models, when tilted, a safety feature is activated to stop elevated lift and drive functions.

Does not drive when elevated?

Contact CEI for further troubleshooting.

Consider board failure or incorrect wiring.

Is there a trouble code displayed?

Refer to trouble code table

No

Is a drive motor damaged?

Replace drive motor.

No

Does the machine drive? (Elevate, Lower, and Steer OK)

Yes, but not properly

Check connections at both pump and board. See wiring diagrams.
Is the machine driving?

- Elevate, lower, and steer OK:
  - Is either or two brakes manually released?
    - Replace brake switch.
      - Note that brake limit switch tabs are delicate. Use caution not to break off.
  - Is either of two brake switches damaged or disconnected?
    - Replace drive unit.
  - Is drive unit damaged?
    - Flip brake handle(s) at rear of machine to engage brakes.
    - Yes: Replace brake switch.
      - Note that brake limit switch tabs are delicate. Use caution not to break off.
    - No: Replace drive unit.
- Driving slowly?
  - Are batteries fully charged?
    - Yes: Yes
      - No: Are all connections to drive control board secure?
        - Yes: Is there moisture or corrosion in any connections?
          - Yes: Replace drive control board.
            - No: Contact CEI for further troubleshooting.
          - No: Still no drive?
            - Yes: Contact CEI for further troubleshooting.
            - No: Are all connections to drive control board secure?
      - No: Are all connections to drive control board secure?
        - Yes: Is there moisture or corrosion in any connections?
          - Yes: Replace drive control board.
            - No: Contact CEI for further troubleshooting.
          - No: Still no drive?
            - Yes: Contact CEI for further troubleshooting.
            - No: Are all connections to drive control board secure?
  - Drives fast when elevated?
  - Drives slow when lowered?
  - Does not drive when elevated?
    - Is mode limit switch damaged or blocked with debris?
      - Yes: Replace drive control board.
        - No: Replace mode limit switch.
      - No: Consider brake damage, broken joystick handle (drive enable), bad hour meter, loose connections in lower and upper control.
    - No: Is mode limit switch damaged or blocked with debris?
      - Yes: Replace drive control board.
        - No: Contact CEI for further troubleshooting.
      - No: Contact CEI for further troubleshooting.
        - Consider board failure or incorrect wiring.
6.3 | STEER CIRCUIT

Does machine steer?
(drive, elevate, lower OK)

No; Steering Not operating properly

Consider damaged main cable, main cable connections at upper and lower control. (Check terminals #17 & #22)

No; Drive, elevate and lower not operating

Check for power connection. See Hy-Brid Troubleshooting. (Power connections at pump, fuse, etc.)

Does machine steer?
(drive, elevate, lower OK)

No; Drive, elevate and lower not operating

Consider steer limit switch adjustment
Check electrical connections at switch. Do a continuity check on switch.

No Left Turn & Right Turn OK?

No Right Turn & Left Turn OK?

Consider relay failure, relay block wiring.

Consider mode limit switch wiring or switch failure (red and/or black wires) Continuity test on switch, voltage test on red/black wires

Check wire connections at actuator. Pull test connections—if failure, crimp on new connector(s)

Check steer actuator for failure. Apply 24V to leads.
### Section 6 | Troubleshooting Flowcharts

- **6.3 | Steer Circuit**

  - **No Left Turn & Right Turn OK?**
    - R1 Failure. Replace Relay.
    - R2, R3, or R4 failure. Listen for clicks, try switching relays around. Replace relay(s).

  - **No Right Turn & Left Turn OK?**
    - Does machine steer? (drive, elevate, lower OK)
      - Check for power connection. See Hy-Brid Troubleshooting. (Power connections at pump, fuse, etc.)
    - No; Drive, elevate and lower not operating consider steer limit switch adjustment.
      - Check electrical connections at switch. Do a continuity check on switch.
      - Replace limit switch and/or readjust.
      - Consider relay failure, relay block wiring.
      - Check steer actuator for failure. Apply 24V to leads. Replace actuator.
    - Consider joystick failure or wiring connection problem. Contact CEI for further troubleshooting.

- **Consider damaged main cable, main cable connections at upper and lower control. (Check terminals #17 & #22)**

- **No; Steering Not operating properly**
  - Check wire connections at actuator. Pull test connections—if failure, crimp on new connector(s).
  - Consider mode limit switch wiring or switch failure (red and/or black wires) Continuity test on switch, voltage test on red/black wires.

---

**Hy-Brid Troubleshooting Flowchart**

- Verify joystick rocker switch working properly.
6.4 | ELEVATE CIRCUIT


Start elevating, then stops? Yes → Are pothole guards blocked? Yes → Replace rocker switch at upper or lower control. → Is power solenoid damaged? No → Are diodes functioning properly? Yes → Replace pump assembly → Is hydraulic fluid low? Yes → With platform lowered, fill pump reservoir to 1” below top of reservoir. → Is enable button working? No → Replace enable button/contact block at upper control. → Are diodes functioning properly? No → Measure resistance across diode—Ohm meter/multi-meter at 40 kΩ setting. With black lead on stripe side and red on other side, should get a resistance reading. Switch leads, no reading. Replace bad diode. → Ascent speed slow or erratic? Yes → Contact CEI for further troubleshooting.

Ascent speed slow or erratic? Yes → Contact manufacturer to arrange replacement.
Elevate Circuit

- Does machine raise/ lower?
- Does pump operate?
  - Check for power connection. See Hy-Brid Troubleshooting
  - Replace pump assembly

- Ascent speed slow or erratic?
  - Is emergency down valve open?
  - Close emergency down valve
  - Is down valve stuck open?
  - Flush valve by simultaneously pressing up switch at base and down switch on platform control for 30 sec.

- Is down valve stuck open?
  - Flush valve by simultaneously pressing up switch at base and down switch on platform control for 30 sec.

- Is up/down switch damaged?
- Contact CEI for further troubleshooting.

- Is battery fully charged?
- Is emergency down valve open?
  - Check integrity of electrical connections. There may be a loose connection or momentary short.
  - Flush down valve by simultaneously pressing up switch at base and down switch on platform control for 30 sec. There may be foreign matter lodged.

- Are any structural members bent?
- Contact manufacturer to arrange replacement.

- Is there a restriction in hydraulic hose?
- Replace hydraulic hose.

- Is enable button damaged?
- Replace rocker switch at upper or lower control.

- Is power solenoid damaged?
- Replace solenoid.

- Are diodes functioning properly?
  - Measure resistance across diode—Ohm meter/multi-meter at 40 kΩ setting. With black lead on stripe side and red on other side, should get a resistance reading. Switch leads, no reading.
  - Replace bad diode.

- Is enable button working?
- Replace enable button/contact block at upper control.

- Is there a restriction in hydraulic hose?
6.5 LOWER CIRCUIT

Does machine raise/lower?

- Yes
- No

Yes, but not properly

Consider filter on hydraulic tank. Check for debris in tank obstructing flow.

Is enable button working?

- Yes
- No

Replace enable button/contact block at upper control.

Descent speed slow?

- Yes
- No

Are batteries fully charged (and filled with water)?

- Yes
- No

Charge batteries.

Will not descend?

- Yes
- No

Has key switch been turned off?

- Yes
- No

Turn key to on position.

Will not descend?

- Yes
- No

Is an E-Stop activated?

- Yes
- No

Pull out emergency stop button at upper and lower controls.

Creeps down?

- Yes
- No

Is emergency down valve open?

- Yes
- No

Foreign matter lodged in up or down valve?

- Yes
- No

Faulty down valve?

- Yes
- No

Electrical problem?

- Yes
- No

Flush down valve by simultaneously pressing up switch at base control and down switch on platform control for 30 sec.

Close emergency down valve.

Faulty down valve?

- Yes
- No

Faulty check valve in pump?

- Yes
- No

Listen carefully near motor when not energized—may be running backwards. Replace pump.

Are batteries fully charged (and filled with water)?

- Yes
- No

Charge batteries.

Is enable button working?

- Yes
- No

Replace enable button/contact block at upper control.

Check for power connection.

See Hy-Brid troubleshooting.

Check power solenoid. See Elevating Problems.

No

Run unit up and then check for oil flow out of return line. Bad cylinder seal if oil is flowing from return line.

Might be able to repair with seal kit; probably need to replace cylinder. If walls inside cylinder are scratched or pitted, cylinder needs replacement.

Nut should only be lightly snug: 30 in.-lb.

Replace coil and lightly tighten nut.

Consider filter on hydraulic tank. Check for debris in tank obstructing flow.

Hy-Brid Troubleshooting Flowchart
Lowering Problems
Revision A: Initial Release 01/14/2010
SECTION 6 | TROUBLE SHOOTING FLOWCHARTS

Hy-Brid Troubleshooting Flowchart
Lowering Problems
Revision A: Initial Release 01/14/2010
CAUTION

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

DANGER

REPLACEMENT OF THE FOLLOWING COMPONENTS WILL AFFECT THE STRENGTH, STABILITY, OR SAFETY FUNCTION OF THE UNIT: BATTERY (ELEC-047), HYDRAULIC CYLINDER (HYDR-007-1 OR HYDR-041-2), DRIVE CONTROL BOARD (ELEC-903), AND ALL STRUCTURAL COMPONENTS.

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

In addition to the decals listed in the Operation and Safety Manual, a partial list of replacement parts. These represent current model revisions. A full parts manual, part# SUPO-682 is available from Hy-Brid Lifts.

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.
<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALARM, SLOW PULSE</td>
<td>ELEC-635</td>
<td>DESCENT/MOTION ALARM</td>
</tr>
<tr>
<td>ALARM, FAST PULSE</td>
<td>ELEC-635-1</td>
<td>TILT ALARM</td>
</tr>
<tr>
<td>ASM, CTL LPR (HB ANSI)</td>
<td>SUB A9-002</td>
<td></td>
</tr>
<tr>
<td>ASM, SCISSOR CYL 2X 10FT</td>
<td>SUB A7-KIT</td>
<td></td>
</tr>
<tr>
<td>ASM, SCISSOR CYL 3X/4X 14/18</td>
<td>SUB A7-1-KIT</td>
<td></td>
</tr>
<tr>
<td>BOARD, DRIVE CTL (HB2)</td>
<td>SUB 903</td>
<td></td>
</tr>
<tr>
<td>BUTTON, PUSH GREEN</td>
<td>ELEC-602-KIT2</td>
<td></td>
</tr>
<tr>
<td>BUTTON, PUSH/PULL RED E-STOP</td>
<td>ELEC-071-KIT</td>
<td></td>
</tr>
<tr>
<td>CHARGER, 24V</td>
<td>ELEC-747</td>
<td></td>
</tr>
<tr>
<td>CONTACT BLOCK, NC</td>
<td>ELEC-072</td>
<td></td>
</tr>
<tr>
<td>CONVERSION KIT, ANSI/CSA HB2</td>
<td>SUB 1023000650-KIT</td>
<td></td>
</tr>
<tr>
<td>CORD, NEMA 515/IEC C13,36</td>
<td>ELEC-639-3</td>
<td></td>
</tr>
<tr>
<td>DECALS, HB-1030, KIT</td>
<td>SUB 112-21-008-50-X</td>
<td></td>
</tr>
<tr>
<td>DECALS, HB-1430, KIT</td>
<td>SUB 112-21-008-55-K</td>
<td></td>
</tr>
<tr>
<td>DRIVE MOTOR BRAKE L, HB, EUC</td>
<td>ELEC-627-3L</td>
<td></td>
</tr>
<tr>
<td>DRIVE MOTOR BRAKE R, HB, EUC</td>
<td>ELEC-627-3R</td>
<td></td>
</tr>
<tr>
<td>DRIVE MOTOR, 24V, ELE, HB, EUC</td>
<td>ELEC-626-3L-KIT</td>
<td></td>
</tr>
<tr>
<td>DRIVE MOTOR, 24V, ELE, HB, EUC</td>
<td>ELEC-626-3R-KIT</td>
<td></td>
</tr>
<tr>
<td>EMERGENCY STOP BUTTON</td>
<td>ELEC-071-KIT</td>
<td></td>
</tr>
<tr>
<td>HYDRAULIC OIL</td>
<td>HYDR-032</td>
<td>Not available as a replacement part. Replace with Flomite #150, Dextron II, Mobil-DTE 2 or equivalent.</td>
</tr>
<tr>
<td>JOYSTICK</td>
<td>ELEC-601</td>
<td></td>
</tr>
<tr>
<td>LWR CONTROLS (ANSI STYLE HB2)</td>
<td>SUB A8-002</td>
<td></td>
</tr>
<tr>
<td>MAIN CABLE ASSEMBLY</td>
<td>SUB A11-4</td>
<td></td>
</tr>
<tr>
<td>MANUAL BOX</td>
<td>HARD-603</td>
<td></td>
</tr>
<tr>
<td>MANUAL, PARTS HB-1030/1430, S2</td>
<td>SUPO-682</td>
<td></td>
</tr>
<tr>
<td>METER HOUR</td>
<td>ELEC-610-2</td>
<td></td>
</tr>
<tr>
<td>ORING, 0.15X12.5</td>
<td>HARD-606-1</td>
<td></td>
</tr>
<tr>
<td>RELAY SPOT, ICE CUBE, 24V DC</td>
<td>ELEC-631</td>
<td></td>
</tr>
<tr>
<td>SENSOR, TILT 1.5 X 2.0 NO</td>
<td>ELEC-629</td>
<td>REQUIRED IN CANADA; OK FOR USA</td>
</tr>
<tr>
<td>SENSOR, TILT 2.0 X 2.0 NO</td>
<td>ELEC-628</td>
<td>USA ONLY; IN CANADA USE ELEC-629</td>
</tr>
<tr>
<td>SWITCH, KEY</td>
<td>ELEC-073F-KIT</td>
<td></td>
</tr>
<tr>
<td>SWITCH, LIMIT, BUTTON MICRO</td>
<td>ELEC-627-4-KIT</td>
<td></td>
</tr>
<tr>
<td>SWITCH, LIMIT, ROT LVR, NO/NC PO</td>
<td>ELEC-123-5</td>
<td></td>
</tr>
<tr>
<td>SWITCH, ROCKER, DPDT</td>
<td>ELEC-133B</td>
<td></td>
</tr>
<tr>
<td>WHL, 10X2, GREY UR</td>
<td>WHEE-604-KIT</td>
<td></td>
</tr>
<tr>
<td>WHL, 10X4 GREY UR KW 1.0</td>
<td>WHEE-600-1</td>
<td></td>
</tr>
<tr>
<td>WHL, 8X2 GREY UR OFFSET</td>
<td>WHEE-611-KIT</td>
<td></td>
</tr>
</tbody>
</table>
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
   b. 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
   c. 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
<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SECTION 9 | INSPECTION AND REPAIR LOG

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>