SERVICE MANUAL (ANSI/CSA)

ROUGH TERRAIN SCISSORS

MODEL SJ6832 RTE

167574AC December 2015

SKYJACK

This manual is based on Serial Number:

SJ6832RTE 37 300 001 & Above

Please refer to the website (www.skyjack.com) for older Serial Numbers.

Skyjack Service Center
3451 Swenson Ave. St. Charles,
Illinois, 60174 USA
Phone: 630-262-0005
Toll Free: 1-800-275-9522
Fax: 630-262-0006
Email: service@skyjack.com

Parts (North America)
Toll Free: 1-800-965-4626
Toll Free Fax: 1-888-782-4825
E-mail: parts@skyjack.com

Skyjack Australia Pty Ltd.
4 Coates Place
Wetherill Park
New South Wales 2164
Australia
Tel: +61 (0) 28786 3200
Fax: +61(0) 28786 3222

Parts & Service (Europe)
Unit 1 Maes Y Clawdd
Maesbury Road Industrial Estate
Oswestry, Shropshire SY10 8NN UK
Phone: +44-1691-676-235
Fax: +44-1691-676-238
E-mail: info@skyjackeurope.co.uk

Skyjack Brasil
Alameda Júpiter, 710
Loteamento American Park Empresarial
Indaiatuba, SP, Brasil 13347-653
Tel: +55 19 3936 0132

SERVICE AND MAINTENANCE

Table of Contents

The Safety Alert Symbol identifies important safety messages on aerial platforms, safety signs in manuals or elsewhere. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

This Safety Alert Symbol means attention!

Be alert! Your safety is involved.

DANGER

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

WARNING

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

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

IMPORTANT indicates a procedure) essential for safe operation and which, if not followed, may result in a malfunction or damage to the aerial platform.

Section 1
SCHEDULED MAINTENANCE

Table of Contents

Operator's Responsibility for Maintenance

Service and Maintenance

Tables

Service and Maintenance Inspections

Operator's Responsibility for Maintenance

SKYJACK is continuously improving and expanding product features on its equipment; therefore, specifications and dimensions are subject to change without notice.

Aerial Platform Definition

A mobile device that has an adjustable position platform supported from ground level by a structure.

Purpose of Equipment

The SKYJACK Rough Terrain Compact Electric Series Aerial platform are designed to transport and raise personnel, tools and materials to overhead work areas.

Use of Equipment

The Aerial platform is a highly maneuverable, mobile work station. Work platform elevation and elevated driving must only be done on a firm, level surface. It can be driven over uneven terrain only when the platform is fully lowered.

Product Manuals

The **Operating Manual** is considered a fundamental part of the Aerial platform. It is a very important way to communicate necessary safety information to users and operators. A complete and legible copy of this manual must be kept in the provided weather-resistant storage compartment on the Aerial platform at all times.

The **Service Manual** provides the customer with the servicing and maintenance procedures essential for the promotion of proper machine operation for its intended purpose.

All information in this manual should be read and understood before any attempt is made to service the machine. This manual may be revised after printing, so for the very latest issue go to the company's website at: www.skyjack.com.

Service Policy and Warranty

SKYJACK warrants each new SJRT Compact Series work platform to be free of defective parts and workmanship for the first 24 months. Any defective part will be replaced or repaired by your local SKYJACK dealer at no charge for parts or labor. Contact the SKYJACK Service Department for warranty statement extensions or exclusions

Operator Safety Reminders, Warnings, and Precautions

Operator safety is SKYJACK's priority. The operator should comply with all applicable safety-related reminders, warnings and precautions found in the Operating Manual. It should be read and understood completely before operating the Aerial platform.

Maintenance and Inspection Schedule

The actual operating environment of the work platform governs the use of the maintenance schedule. The inspection points covered in Table 1.2 Maintenance and Inspection Checklist, indicates the areas of the Aerial platform to be maintained or inspected and at what intervals the maintenance and inspections are to be performed.

Owner's Annual Inspection Record

It is the responsibility of the owner to arrange quarterly and annual inspections of the Aerial platform. Table 1.1 Owner's Annual Inspection Record is to be used for recording the date of the inspection, owner's name, and the person responsible for the inspection of the work platform.

Replacement Parts

Use only original replacement parts. Parts such as batteries, wheels, railings, etc. with weight and dimensions different from original parts will affect stability of the work platform and must not be used without manufacturer's consent.

Use only original filled tires for models which must be so equipped. Consult factory.

All replacement tires must be of the same size and load rating as original equipment to maintain safety and stability of the work platform. Consult factory.

WARNING

Any unit that is damaged or not operating properly must be immediately tagged and removed from service until proper repairs are completed.

Maintenance and Service Safety Tips

- Maintenance and repairs should only be performed by personnel who are trained and qualified to service this aerial platform.
- All maintenance and service procedures should be performed in a well lighted and well ventilated area.
- Anyone operating or servicing this aerial platform must read and completely understand all operating instructions and safety hazards in this manual and the operator's manual.
- All tools, supports and lifting equipment to be used must be of proper rated load and in good working order before any service work begins. Work area should be kept clean and free of debris to avoid contaminating components while servicing.
- All service personnel must be familiar with employer and governmental regulations that apply to servicing this type of equipment.
- Keep sparks and flames away from all flammable or combustible materials.
- Properly dispose of all waste material such as lubricants, rags, and old parts according to the local law provisions in the country of operation.
- Before attempting any repair work, turn Battery Disconnect Switch to the OFF position.

Preventive maintenance is the easiest and least expensive type of maintenance.

Hydraulic System & Component Maintenance and Repair

The following points should be kept in mind when working on the hydraulic system or any component:

WARNING

Escaping fluid from a hydraulic pressure leak can damage your eyes, penetrate the skin and cause serious injury. Use proper personal protection at all times.

1. Any structure has limits of strength and durability. To prevent failure of structural parts of hydraulic components, relief valves which limit pressure to safe operating values are included in the hydraulic circuits.
2. Tolerance of working parts in the hydraulic system is very close. Even small amounts of dirt or foreign materials in the system can cause wear or damage to components, as well as general faulty operation of the hydraulic system. Every precaution must be taken to assure absolute cleanliness of the hydraulic oil.
3. Whenever there is a hydraulic system failure which gives reason to believe that there are metal particles or foreign materials in the system, drain and flush the entire system and replace the filter cartridges. A complete change of oil must be made under these circumstances.
4. Whenever the hydraulic system is drained, check the magnets in the hydraulic reservoir for metal particles. If metal particles are present, flush the entire system and add a new change of oil. The presence of metal particles also may indicate the possibility of imminent component failure. A very small amount of fine particles is normal.
5. All containers and funnels used in handling hydraulic oil must be absolutely clean. Use a funnel when necessary for filling the hydraulic oil reservoir, and fill the reservoir only through the filter opening. The use of cloth to strain the oil should be avoided to prevent lint from getting into the system.
6. When removing any hydraulic component, be sure to cap and tag all hydraulic lines involved. Also, plug the ports of the removed components.

NOTE: *Samples of hydraulic oil should be drawn from the reservoir and tested annually. These samples should be taken when the oil is warmed through normal operation of the system. The sample should be analyzed by a qualified lubrication specialist to determine if it is suitable for continued use. Oil change intervals will depend on the care used in keeping the oil clean, and the operating conditions. Dirt and/or moisture contamination will dictate that the oil should be changed more often. Under normal use and operating conditions, the hydraulic oil should be changed every two years. Refer to Table 1.2 of this manual.*

7. All hydraulic components must be disassembled in spotlessly clean surroundings. During disassembly, pay particular attention to the identification of parts to assure proper reassembly. Clean all metal parts in a clean mineral oil solvent. Be sure to thoroughly clean all internal passages. After the parts have been dried thoroughly, lay them on a clean, lint-free surface for inspection.

8. Replace all O-rings and seals when overhauling any component. Lubricate all parts with clean hydraulic oil before reassembly. Use small amounts of petroleum jelly to hold O-rings in place during assembly.

9. Be sure to replace any lost hydraulic oil when completing the installation of the repaired component, and bleed any air from the system when required.

10. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the oil to leak out or air to be drawn into the system. Air in the system can cause damage to the components and noisy or erratic system operation.

Maintenance Hints

Three simple maintenance procedures have the greatest effect on the hydraulic system performance, efficiency, and life:

1. **Change filters annually.** The filters will need to be changed more often depending on the operating conditions. Dirty, dusty, high moisture environments may cause the hydraulic system to be contaminated more quickly.

2. **Maintain a sufficient quantity of clean hydraulic oil** of the proper type and viscosity in the hydraulic reservoir.

3. **Keep all connections tight.**

Service and Maintenance

About this Section

This section contains the maintenance and inspection schedule that is to be performed. Instructions for specific procedures are found in Section 5.

Service Bulletins

Before performing any scheduled maintenance inspection procedure, check for any service bulletins related to service and maintenance of this aerial platform at: www.skyjack.com.

Maintenance and Inspection

Death or injury can result if the aerial platform is not kept in good working order. Inspection and maintenance should be performed by competent personnel who are trained and qualified on maintenance of this aerial platform.

WARNING

Risk of death, serious injury or substantial machine damage. Always perform each procedure as described at the scheduled interval.

NOTE: *Preventive maintenance is the easiest and least expensive type of maintenance.*

Unless otherwise specified, perform each maintenance procedure with the aerial platform in the following configuration:

- Parked on a flat and level surface.
- Battery disconnected by turning the main power disconnect switch to the OFF position.

Repair any damaged or malfunction components before operating aerial platform.

Keep records on all inspections.

Maintenance and Inspection

The Maintenance and Inspection Checklist on the next page consists of four inspection types that must be performed to keep an aerial platform in a safe, working order. Inspection schedule interval is described below:

Inspection Type		Interval
PDI	B	Perform PDI prior to each delivery.
Frequent	B	Perform Frequent Inspection every 3 months or 150 hours.
Annual	C	Perform Scheduled Maintenance Inspections every year.
Additional	*	Perform at time-sensitive maintenance intervals.

Make copies of the Maintenance and Inspection Checklist to be use for each inspection.

Follow These Steps:

- Check the schedule on the checklist for the type of inspection to be performed.
- Place a mark in the appropriate box after each inspection procedure is completed.
- Use the Maintenance and Inspection Checklist and step-by-step procedures starting on page 12 to perform these inspections.
- If any inspection receives a fail, tag-out and remove the aerial platform from service. If any aerial platform component has been repaired, an inspection must be performed again before removing the tag. Place a mark in the repair column.

Inspection Schedule Legend

P = Pass

F = Fail

R = Repaired

N/A = Not applicable

Table 1.1 Owner's Annual Inspection Record

	Model Number: _____ Serial Number:_____								
*	20__	20__	20__	20__	20__	20__	20__	20__	20__
**									

1000AB

This decal is located on the scissor assembly. It must be completed after an annual inspection has been completed. Do not use the aerial platform if an inspection has not been recorded in the last 13 months.

	Pictorial	Description
*		**Inspection Date**
**		**Inspector Signature**

Pre-Delivery/Maintenance Inspection Checklist

Vertical Mast, SJIII, & Rough Terrain

Serial Number: _____ Product Owner: _____

Model: _____

Hourmeter Reading: _____ Product User: _____

Date/Time: _____

Use this form for Pre-Delivery Inspections (PDI) prior to each rental, lease or sale, or as a guide for all Frequent Inspections and Annual Inspections. Refer to the applicable Operating and Service Manuals for inspection details (eg. Visual Inspection and Function Tests, Torque Specs., Engine Oil, Chain Inspection Intervals, etc.).

Inspection Type Schedule	
❑ PDI	B
❑ Frequent	B
❑ Annual	B + C

B - Perform PDI prior to each delivery or Frequent Inspections every 3 months or 150 hrs. For further details refer to Service & Operating Manuals.

C - Perform Scheduled Maintenance Inspections every year. For further details refer to Service & Operating Manuals.

P - Pass
F - Fail
R - Repaired
N/A - Not Applicable

Check the appropriate box as each item is inspected. If an item is found to be not acceptable, please describe the issue in the comments box provided.

Items for Inspection		P	F	R	N/A
Refer to skyjack.com for the latest service bulletins.	B				
Ensure Annual Inspection has been completed within the last 13 months.	B				
Manuals & Required Documents. In storage box, in good condition & legible.	B				
Labels. In place, secure & legible.	B				
Limit Switches. Secured & no obstructions or damage.	B				
Main Power Disconnect Switch. Cables secure & in working order.	B				
Battery/ Hydraulic Tray. Latch is secure, & no missing parts.	B				
Battery Charger. Secure, & no damage.	B				
Battery. No damage, tight connections, fluid levels correct. Clean terminals and cable ends.	B				
Manifolds. Tight fittings and hoses & no damage or leaks. Tight wire connections & no missing parts.	B, C				
Motor Controller. Secure & no damage. No loose connections.	B				
Electrical Panel. Secure & no damage. Tight wire connections and fasteners.	B				
Hydraulic Tank. Filler cap secure & no damage or leaks.	B				
Hydraulic Oil. Level at, or slightly above top mark.	B, C				
Hydraulic Components & Hoses. Secure & no damage or leaks.	B				
Base Weldment. No deformation or cracks.	B				
Base Control Switches. Switches to neutral position & no damage.	B				
Free-wheeling Valve Knob. Secure & no damage or missing parts.	B				
Ladder. Secure & no damage.	B				
AC Power to Platform (Plug Cord Receptacle). No obstructions, dirt or damage.	B				
Pothole Protection Device. Check both sides for obstructions, dirt, or damage.	B				
Brakes. Secure & no damage or leaks.	B, C				
Steer Cylinder Assembly. Secure & no damage, leaks or missing parts.	B				
Wheel/Tire Assembly. Check all tires for damage, wear & proper alignment. Lug nuts torqued as recommended.	B				
Axles. Secure & no missing parts. Tight fittings and hoses & no leaks.	B				
Tie Rod. End studs locked & no damage.	B				
Tilt (Load) Sensor. Secure & no damage.	B				
Emergency Lowering Access Rod. Secure & no damage.	B				
Engine Tray. No damage or missing parts.	B				

Items for Inspection		P	F	R	N/A
Engine Control Console. Secure & no damage.	B				
Engine Air Filter. No damage or missing parts.	B, C				
Engine Oil. Level between "L" and "H". Ensure oil change interval has not been exceeded.	B				
Radiator. Secure & no damage or missing parts. Check coolant level.	B, C				
Muffler and Exhaust. Secure & no damage.	B				
Fuel Shut-off Valve. No damage or missing parts.	B				
Fuel Tank. Filler cap is secure & no damage.	B				
Fuel Leaks. Tight fittings and hoses & no damage or leaks.	B				
Propane Tank. Straps fastened to brackets & coupler tight.	B				
Propane Tank Leaks. No leaks (refer to service manual for procedure).	B				
Scissor Assembly. No deformation/damage. Pins secure. Cables & wires routed with no damage.	B				
Mast Assembly. No damage or deformation.	B				
Mast Chains & Control Cables. No damage or missing parts.	B				
Rollers. Secure & no obstructions, dirt, or damage/wear.	B				
Wear Pads. No damage/wear or missing parts. Fasteners tightened.	B				
Scissor Bumpers. Secure & no damage.	B				
Sliders. Secure & no obstructions, dirt, or damage/wear.	B				
Maintenance Support. Secure & no damage.	B				
Lift Cylinder(s). No damage or missing parts. Tight fittings and hoses & no leaks.	B				
Scissor Pins. No damage/wear or missing parts.	B				
Platform Control Console. Switches to neutral position & secure. No missing parts.	B				
Raillings and Gate/Chain. Secure & no damage or missing parts.	B				
Lanyard Attachment Anchorage. Attachment rings secure & no damage.	B				
AC Outlet. No obstructions, dirt, or damage.	B				
Powered Extension Control Console. Switches to neutral position & secure. No missing parts.	B				
Extension Deck. Secure & no damage or missing parts. Check fluid level (if applicable).	B				
Outriggers. No damage or missing parts.	B				
Scissor Guards. Secure & no damage.	B				
Greasing Points. No obstructions, dirt, or damage.	B, C				
Function Tests (Refer to your corresponding Serial #'s Operating Manual for information on running these tests.)		❑ PASS ❑ FAIL			

Comments:

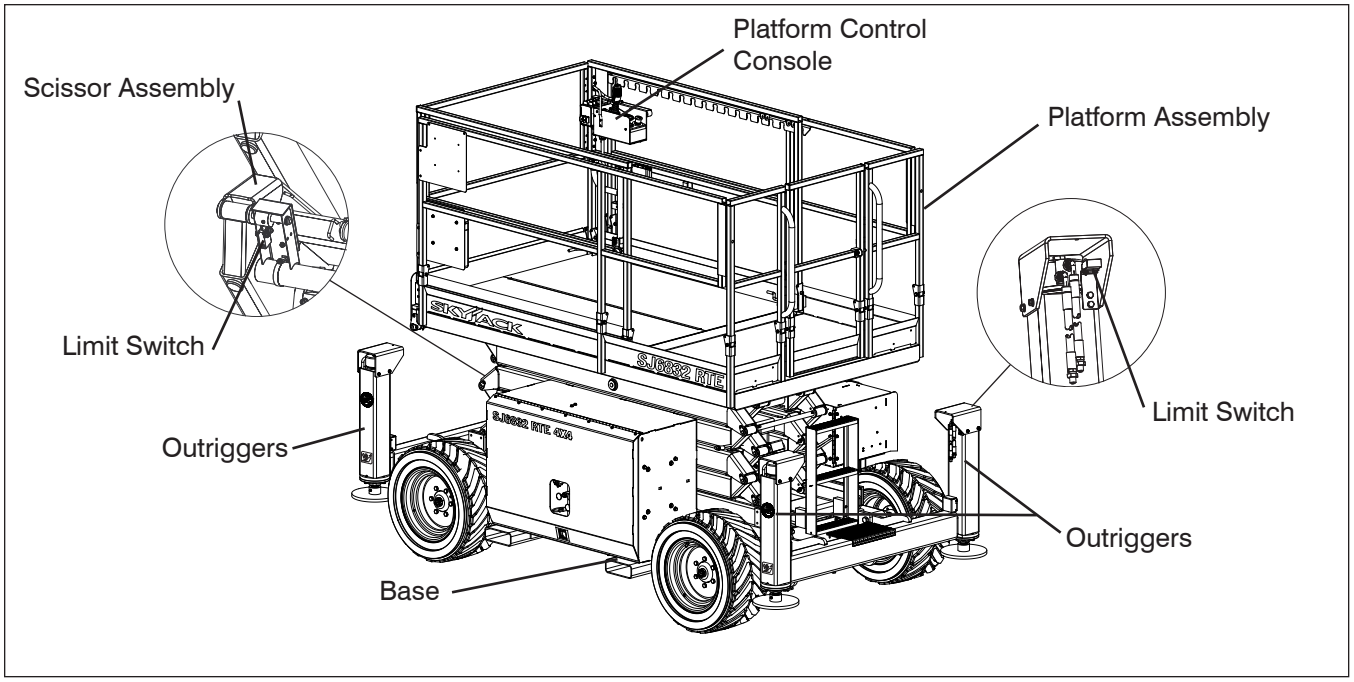
The undersigned confirms that all areas listed have been inspected, and any and all discrepancies have been brought to the attention of the owner. Furthermore, the undersigned confirms that all discrepancies have been corrected prior to using this machine.

Owner: _____ / _____ / _____
Print Name Signature Date (DD/MM/YY)

User: _____ / _____ / _____
Print Name Signature Date (DD/MM/YY)

Note: Visit skyjack.com for a printable copy of this form.

167830AA



1.1 Scheduled Maintenance Inspections

Begin the scheduled maintenance inspections by checking each item in sequence for the conditions listed in this section.

WARNING

To avoid injury, do not operate an aerial platform until all malfunctions have been corrected.

WARNING

To avoid possible injury, ensure aerial platform power is off during your visual and daily maintenance inspections.

Electrical

Maintaining the electrical components is essential to good performance and service life of the aerial platform

Inspect the following areas for chafed, corroded and loose wires:

- base to platform cables and wiring harness
- battery/electrical compartment
- hydraulic/electrical wiring harnesses

Hydraulic

Maintaining the hydraulic components is essential to good performance and service life of the aerial platform.

Perform a visual inspection around the following areas:

- hydraulic tank filter, fittings, hoses, emergency power unit (if equipped) and base surfaces
- hydraulic compartment fittings, hoses, main pump, and filter
- all hydraulic cylinders
- all hydraulic manifolds
- the underside of the base
- ground area under the aerial platform
- outriggers

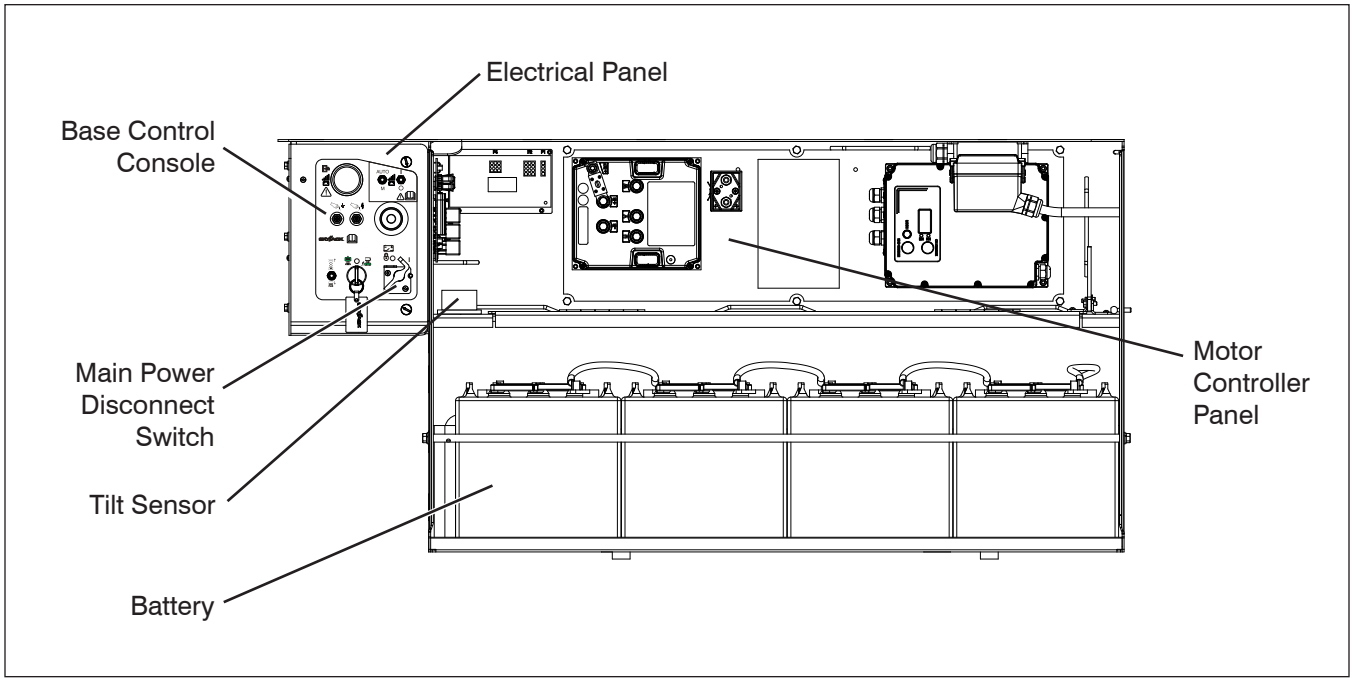
1.1-1 Manuals (B)

Ensure a copy of the operating manual and any other important documents are enclosed in the manual storage box.

- Check to be sure manual storage box is present and in good condition.
- Ensure manuals are legible and in good condition.
- Always return manuals to the manual storage box after use.

1.1-2 Labels (B)

Refer to the labels section in the operating manual and determine that all labels are in place and are legible.



1.1-3 Limit Switches (B)

Detecting limit switch malfunction is essential to safe aerial platform operation. Ensure limit switches are properly secured with no signs of visible damage and movement is not obstructed.

Visually inspect all limit switch located inside the scissor arms and the outrigger assemblies for the following:

- broken or missing actuator arm
- missing fasteners
- loose wiring

1.1-4 Battery/Electrical Compartment

- Ensure compartment latch is secure and in proper working order.

- **Main Power Disconnect Switch (B)**
  - Turn main power disconnect switch to ◯ off position.
  - Ensure all cables are secure and switch is in proper working condition.

- **Base Control Switches (B)**
  - Ensure there are no signs of visible damage and all switches are in their neutral positions.

- **Battery (B)**

Proper battery condition is essential to good performance and operational safety. Improper fluid levels or damaged cables and connections can result in component damage and hazardous conditions.

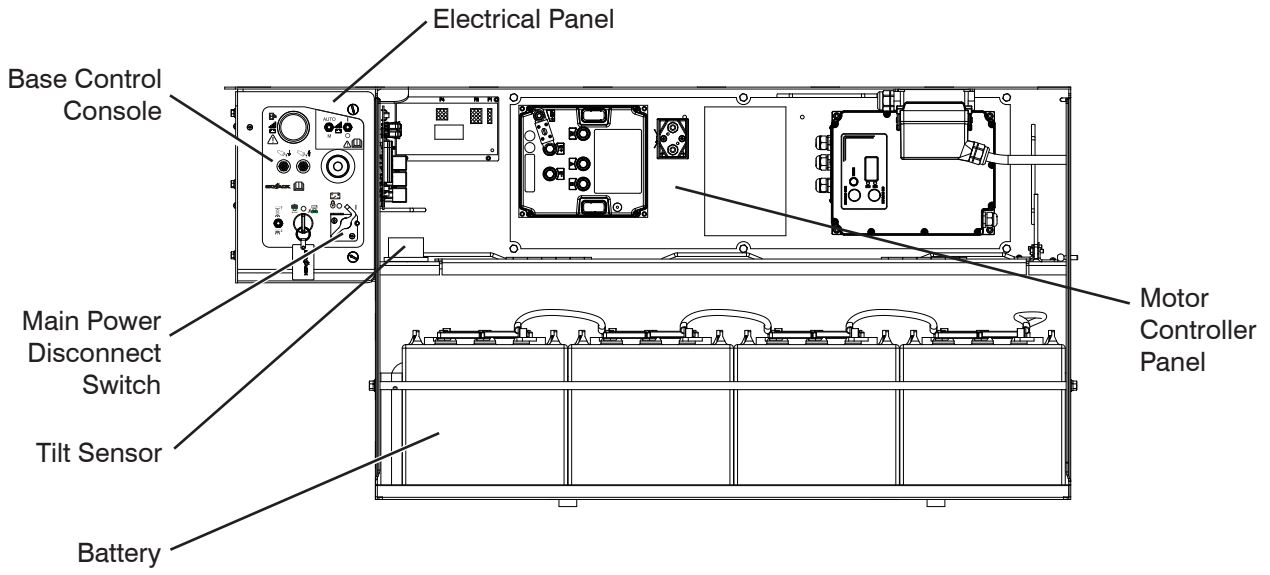
WARNING

Explosion hazard. Keep flames and sparks away. Do not smoke near batteries.

WARNING

Battery acid is extremely corrosive – Wear proper eye and facial protection as well as appropriate protective clothing. If contact occurs, immediately flush with cold water and seek medical attention.

1. Check battery case for damage.
2. **B – Frequent Inspection**
   Clean battery terminals and cable ends thoroughly with a terminal cleaning tool or wire brush.
3. Ensure all battery connections are tight.



4. If applicable, check battery fluid level.

   B – Frequent Inspection
   If plates are not covered by at least 1/2 in. (13 mm) of solution, add distilled or demineralized water.

5. **B – Frequent Inspection**
   Replace battery if damaged or incapable of holding a lasting charge.

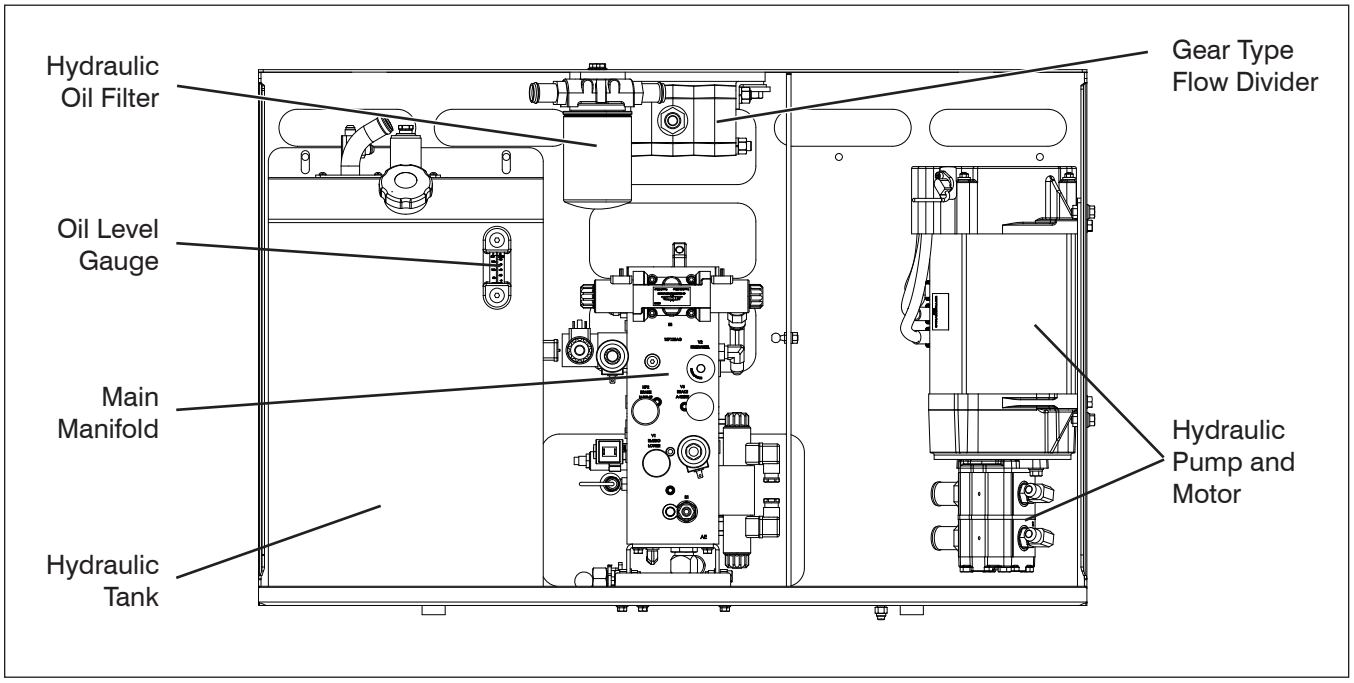
WARNING

Use original or manufacturer-approved parts and components for the aerial platform.

- **Tilt Sensor (B)**
  - Ensure tilt sensor is properly secured and there is no visible damage.

- **Motor Controller Panel (B)**
  - Ensure motor controller panel is properly secured and there is no visible damage.
  - Ensure there are no loose wire connections or missing fasteners.

- **Electrical Panel (B)**
  - Ensure panel is properly secured and there is no visible damage.
  - Ensure there are no loose wire connections or missing fasteners.



1.1-5 Motor/Hydraulic Compartment

- Ensure compartment latch is secure and in proper working order.

- **Hydraulic Tank (B)**
  - Ensure hydraulic filler cap is secure.
  - Ensure tank shows no visible damage and no evidence of hydraulic leakage.

- **Hydraulic Oil (B,C)**
  - Ensure platform is fully lowered, and outriggers retracted, and then visually inspect the sight gauge located on the side of the hydraulic oil tank. Check oil level against label that indicates minimum and maximum oil levels.

C – Annual Inspection

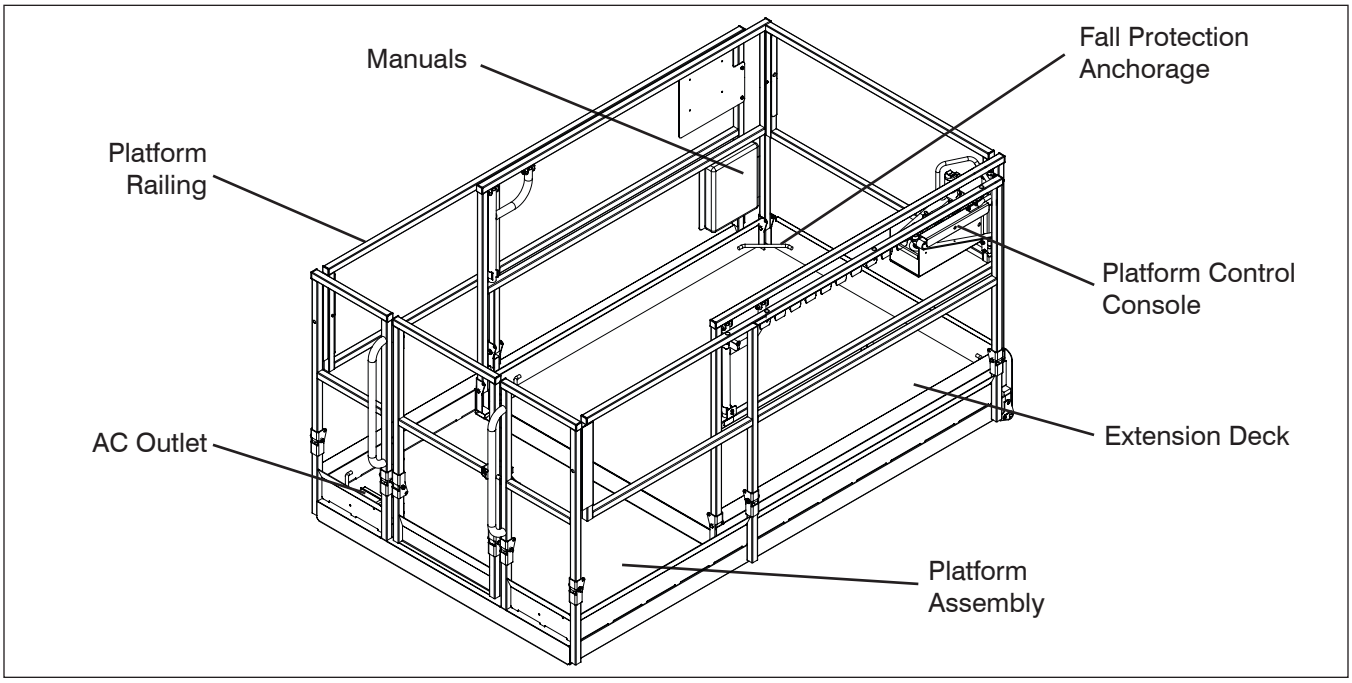
- Refer to Section 1 - Hydraulic System & Component Maintenance and Repair.

- **Hydraulic Return Filter (B)**
  - Ensure filter element is secure.
  - Ensure there are no signs of leakage or visible damage.

- **Hydraulic Pump & Motor (B)**
  - Ensure there are no loose or missing parts and there is no visible damage.
  - Ensure all bolts are properly tightened.
  - Ensure all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.

- **Main Manifold (B,C)**
  - Ensure all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.
  - Ensure there are no loose wire connections or missing fasteners.

- **Gear Type Flow Divider (B)**
  - Ensure there are no loose or missing parts and there is no visible damage.



1.1-6 Platform Assembly

WARNING

Ensure that you maintain three points of contact to mount/dismount platform.

1. Use the ladder of aerial platform to access platform.
2. Close the gate.
   - Ensure there are no loose or missing parts and there is no visible damage.
   - Ensure all fasteners are securely in place.
   - Ensure all railings are properly positioned and secured.
   - Ensure gate is in good working order.

- **Fall Protection Anchorage (B)**
  - Ensure attachment rings are secure and have no visible damage.

- **AC Outlet on Platform (B)**
  - Ensure outlet has no visible damage and free from dirt or obstructions.

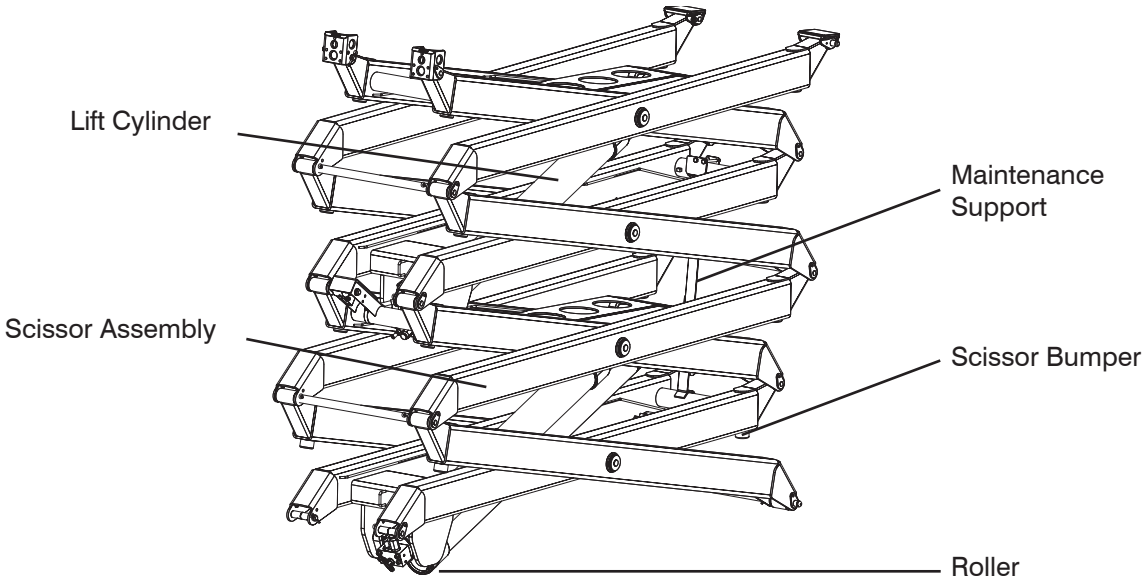
- **Platform Control Console (B)**
  - Ensure all switches and controller are returned to neutral and are properly secured.
  - Ensure there are no loose or missing parts and there is no visible damage.

WARNING

Ensure that you maintain three points of contact to mount/dismount platform.

3. Use the ladder to dismount from platform.

- **Extension Deck (If Equipped) (B)**
  - Ensure assembly is securely attached to the bottom of the platform.
  - Ensure there are no loose or missing parts and there is no visible damage or leaks.



1.1-7 Lifting Mechanism

- **Sliders (B)**
  - Ensure sliders are secure and there is no visible damage.
  - Ensure sliders' path of travel are free from dirt and obstructions.

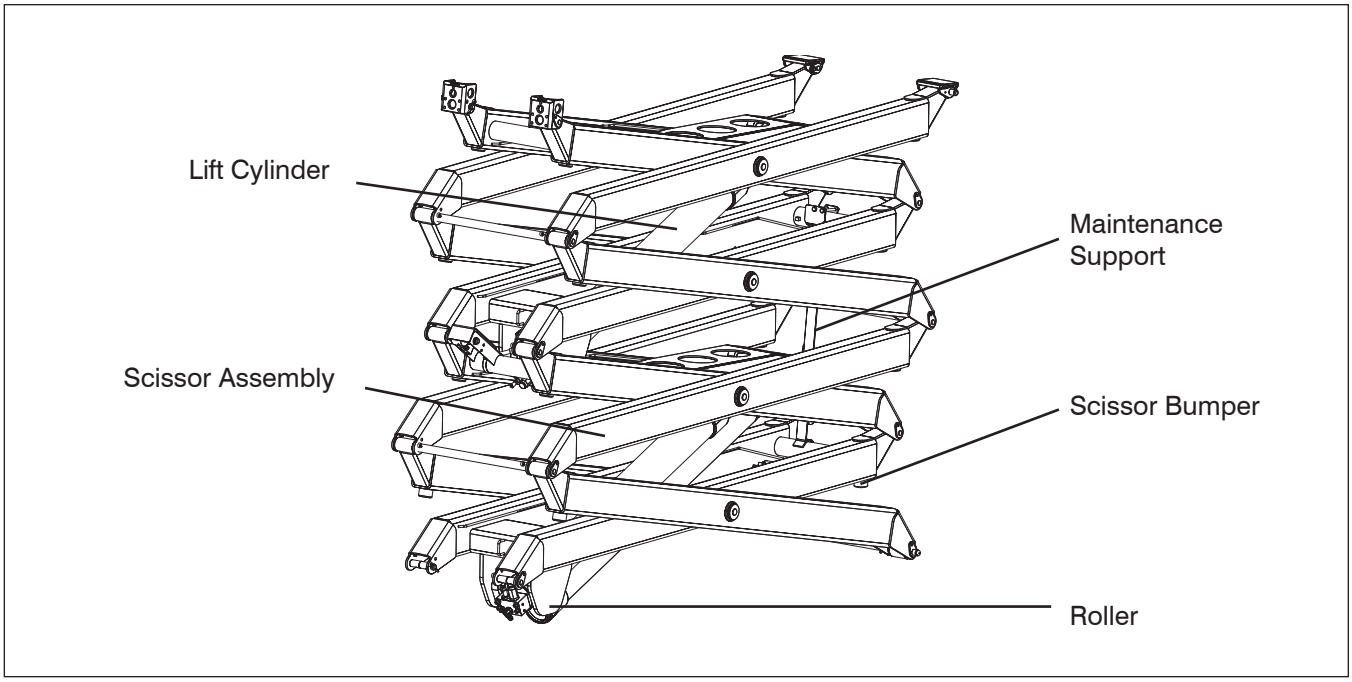
1. Raise the platform until there is adequate clearance to swing down the maintenance support.

- **Maintenance Support (B)**
  - Ensure maintenance support is properly secured and shows no visible damage.

- **Scissor Assembly (B)**
  - Ensure scissor assembly shows no visible damage and no signs of deformation in weldments.
  - Ensure all pins are properly secured.
  - Ensure cables and wires are properly routed and shows no signs of wear and/or physical damage.

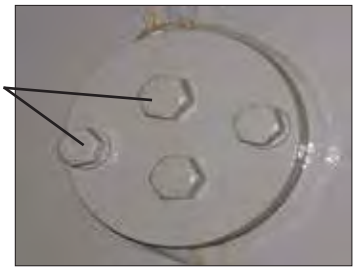
- **Scissor Bumpers (B)**
  - Ensure bumpers are secure and shows no sign of visible damage.

- **Scissor Pin Inspection (B)**
  - Complete a structural inspection of the scissor pin connections, looking for indicators of pin and/or scissor arm damage. These indicators include, but are not limited to:
  - Noise coming from binding/seized pins
  - Rust forming near pin joint
  - Cracks in welds or in surrounding metal
  - Evidence of metal dust or shavings from wearing components
  - Broken/missing pin retainer bolts
  - Broken/missing pin retainers
  - Rotated pin
  - Elongation/enlargement of pin hole



Examples of pivot pin connections with no damage:

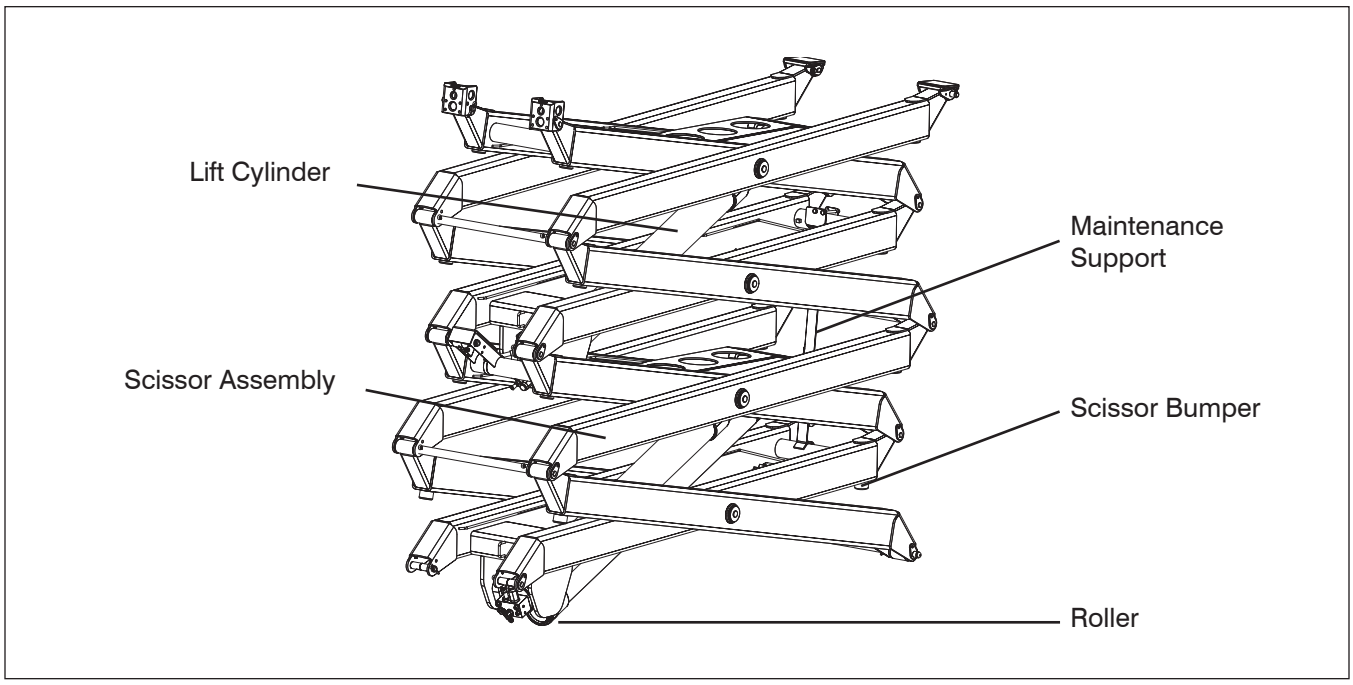
- No rust
- Pin has not rotated
- Area is clear of dust/metal shavings
- Pin retainer/retainer bolts are in place



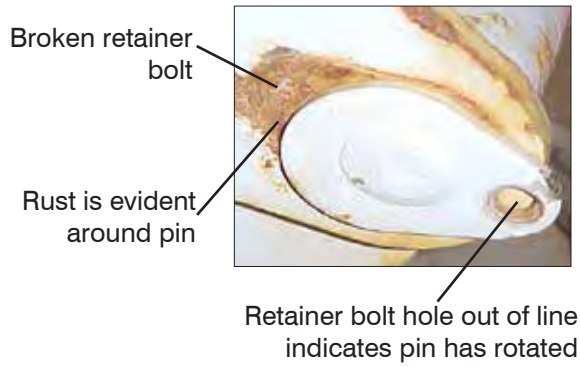
Center pin pivot – Outer

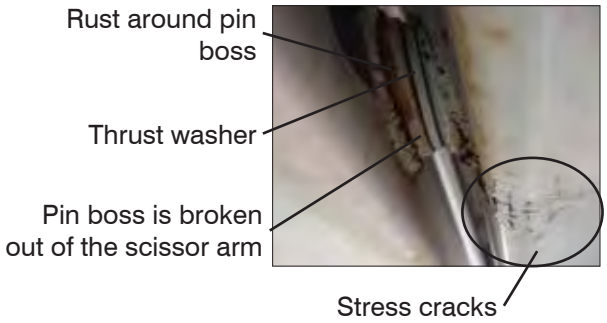
Center pin pivot – Middle

Center pin pivot – Inner



Examples of damaged pin connections:





Scissor end pin connections showing symptoms of damage must be inspected after removing the applicable pins and bushings. The scissor bore should also be inspected at this time for any signs of damage, specifically elongation or ovality of the hole. Provided there is no structural damage to the scissor arms, the pins and bushings can be replaced with new components.

WARNING

Any units showing the above listed and/ or depicted signs of damage should be immediately removed from service and repaired by a qualified technician.

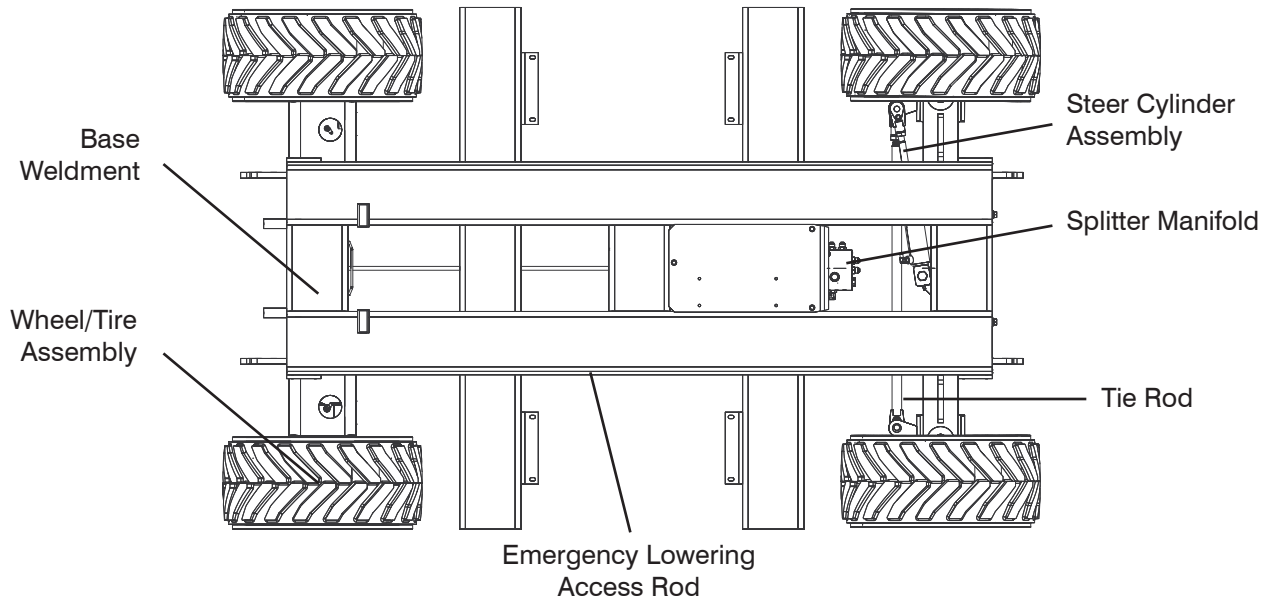
Any units with structural damage to any pin connection or scissor arm must be **immediately removed from service** and repaired by a qualified technician. Contact Skyjack Service for direction on how to repair the unit.

- **Lift Cylinder(s) (B)**
  - Ensure each lift cylinder is properly secured, there are no loose or missing parts and there is no evidence of damage.
  - Ensure all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.

2. Raise the platform until there is adequate clearance to swing up the maintenance support into storage bracket.

3. Fully lower the platform.

Overhead View



1.1-8 Base

- **Base Weldment (B)**
  - Ensure there are no visible cracks in welds or structure and there are no signs of deformation.

- **Wheel/Tire Assembly (B)**
  The aerial platform is either equipped with air tires or foam-filled tires. Tire and/or wheel failure could result in an aerial platform tipover. Component damage may also result if problems are not discovered and repaired in a timely fashion.

WARNING

An over-inflated tire can explode and may cause death or serious injury.

WARNING

Air filled tires may not permitted on some machines. Refer to Table 2.1 Specifications and Features.

  - Check all tire treads and sidewalls for cuts, cracks, punctures and unusual wear.
  - Check each wheel for damage and cracked welds.
  - Check each lug nut for proper torque to ensure none are loose.

B – Frequent Inspection

  - For proper torque information refer to Table 2.5 Torque Specifications.

To maximize stability, it is essential to maintain proper pressure in all air-filled tires.

  - Check each tire with an air pressure gauge and add air as needed.

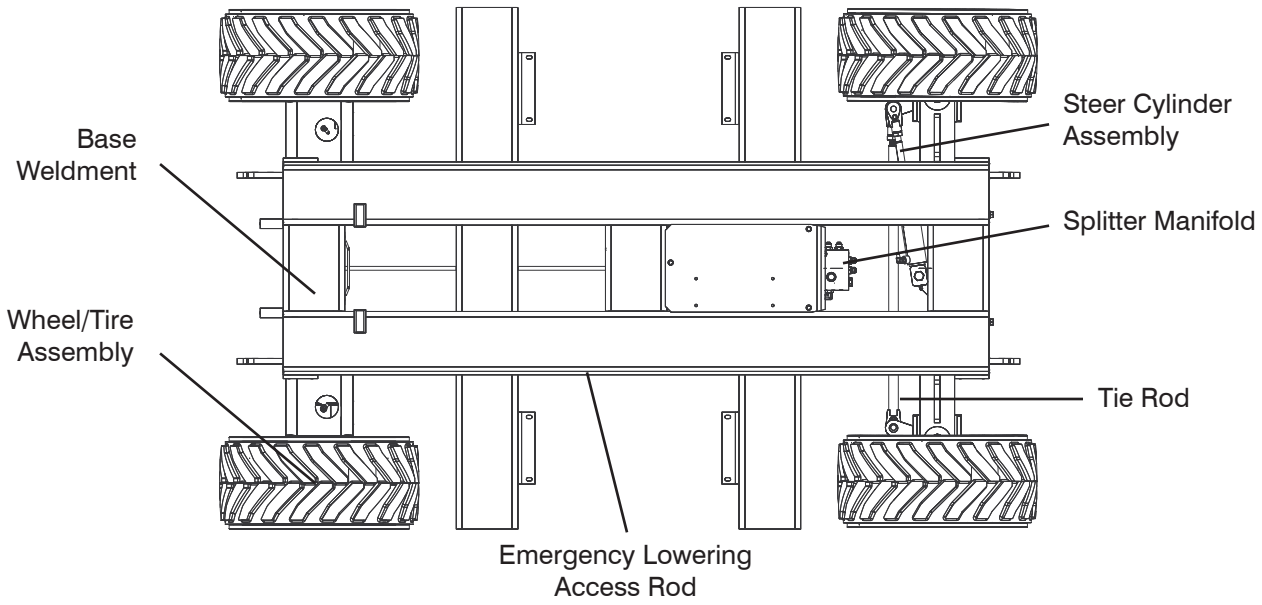
Refer to Table 2.1 Specifications and Features for wheel/tire specifications.

WARNING

Do not use tires other than those specified for this machine. Do not mix different types of tires. Tires other than those specified can adversely affect stability. Failure to operate with matched, approved tires in good condition can result in death or serious injury. Replace tires with the exact, Skyjack-approved types only.

- **Axles (B)**
  - Ensure axles are properly secured, there are no loose or missing parts, all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.

Overhead View



- **Steer Cylinder Assembly (B)**
  - Ensure steer cylinder assembly is properly secured, there are no loose or missing parts, all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.

- **Splitter Manifold (B,C)**
  - Ensure all fittings and hoses are properly tightened and there is no evidence of hydraulic leakage.
  - Ensure there are no loose wire connections or missing fasteners.

- **Tie Rod (B)**
  - Ensure there are no loose or missing parts, tie rod end studs are locked and there is no visible damage.

- **Ladder (B)**
  - Ensure there are no loose or missing parts and there is no visible damage.

- **Outriggers (If Equipped) (B)**
  - Ensure there are no loose or missing parts and there is no visible damage.

- **Emergency Lowering Access Rod (B)**
  - Ensure rod is properly secured and there is no visible damage.

1.2 Function Tests

Function tests are designed to discover any malfunctions before aerial platform is put into service. The operator must understand and follow step-by-step instructions to test all aerial platform functions.

WARNING

Never use a malfunctioning aerial platform. If malfunctions are discovered, aerial platform must be tagged and placed out of service. Repairs to aerial platform may only be made by a qualified service technician.

After repairs are completed, operator must perform a pre-operation inspection and a series of function tests again before putting aerial platform into service.

Prior to performing function tests, be sure to read and understand the Start Operation section of the operating manual.

For function test that are to be run, please refer to the operating manual that corresponds to the correct serial number. Found there will be detailed instructions for which tests to perform, as well as how to properly and successfully perform them.

Section 2
MAINTENANCE TABLES AND DIAGRAMS

Table of Contents

Tables

Table 2.1 Specifications and Features

Model		6832RTE	
Weight*	No Outriggers	7900 lb.	3585 kg
	With Outriggers	8860 lb.	4020 kg
Width		68”	1.73 m
Length	No Outriggers	106.6”	2.71 m
	With Outriggers	131.4”	3.34 m
Platform Size		56” x 99”	1.4 m x 2.5 m
Height	Working	38 ft.	11.7 m
	Platform Elevated	32 ft.	9.8 m
	Platform Lowered	8.25 ft.	2.52 m
	Drive	32 ft.	9.8 m
Speed	Normal Drive	4 mph	6.3 km/h
	Elevated Drive	0.39 mph	0.63 km/h
	Lift (Rated Load)	39 sec	
	Lower (Rated Load)	36 sec	
Tires	Foam-filled	OTR Outrigger - 26 x 12	
	Air-filled	N/A	
Gradeability (Torque Equivalent To)		45%	

1120AA_ANSI

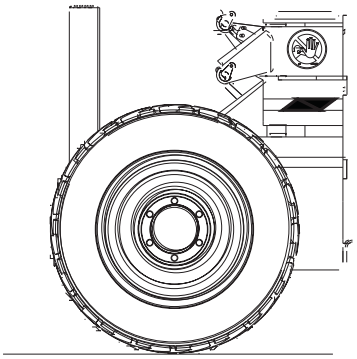
*** Weights are approximate; refer to serial nameplate for specific weight.**

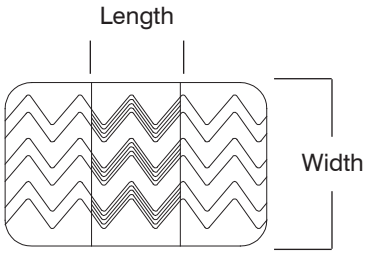
Floor Loading Pressure

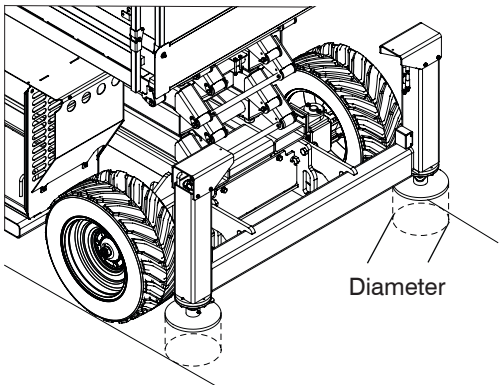
Locally Concentrated Pressure (LCP):

Foot Print Area = Tread Contact Area
$= \pi r^2$

$$LCP = \frac{\text{Maximum Wheel Load}}{\text{Foot Print Area}}$$



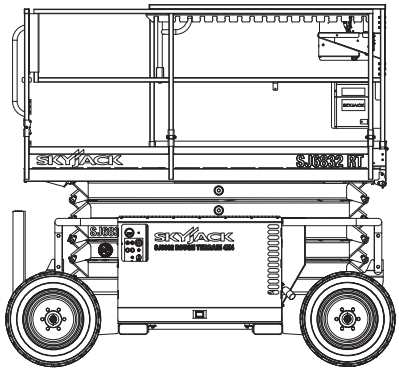


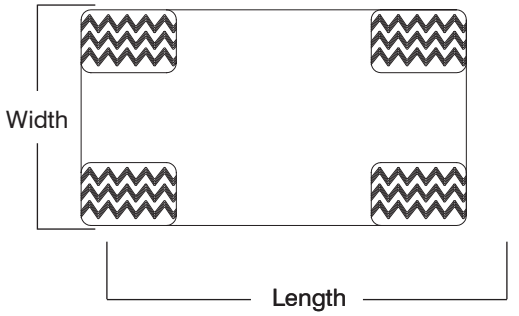


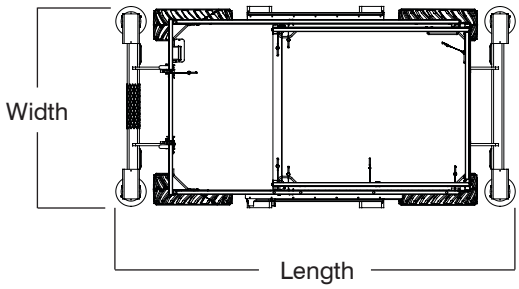
Overall Uniform Pressure (OUP):

Base Area = Length x Width

$$OUP = \frac{\text{Weight of Aerial Platform + Capacity}}{\text{Base Area}}$$







WARNING

Do not use tires other than those specified for this machine. Do not mix different types of tires. Tires other than those specified can adversely affect stability. Failure to operate with matched, approved tires in good condition can result in death or serious injury. Replace tires with the exact, Skyjack-approved types only.

Table 2.2 Floor Loading Pressure

MODEL		Gross Aerial Platform Weight		Total Aerial Platform Load					
				Wheel/Outrigger Pad		LCP**		OUP**	
		lb.	kg	lb.	kg	psi	kPa	psf	kg/m^2
6832RTE on Tires	min*	8900	4040	3560	1615	188	1295	175	855
	max*	10270	4660	4110	1865	190	1315	200	990
6832RTE on Outrigger Pads	min*	9850	4470	3940	1790	50	350	160	770
	max*	10270	4660	4110	1865	55	365	165	800

1122AA_ANSI

* **min -** Total aerial platform weight with no options + full capacity
max - aerial platform weight + all options + full capacity

** **LCP – Locally Concentrated Pressure** is a measure of how hard the aerial platform tire tread presses on the areas in direct contact with the floor. The floor covering (tile, carpet, etc.) must be able to withstand more than the indicated values above.

OUP – Overall Uniform Pressure is a measure of the average load the aerial platform imparts on the whole surface directly underneath it. The structure of the operating surface (beams, etc.) must be able to withstand more than the indicated values above.

NOTE:

The **LCP** or **OUP** that an individual surface can withstand varies from structure to structure and is generally determined by the engineer or architect for that particular structure.

Table 2.3 Maximum Platform Capacities (Evenly Distributed)

MODEL		Total			Extension			Maximum Wind Speed	Tilt Cutout Setting (Degrees)
		Capacity		Number of Occupants	Capacity		Number of Occupants		
6832RTE	One Extension Platform	1000 lb.	453 kg	4	300 lb.	136 kg	1	12.5 m/s	2.5 x 4.5

1121AA_ANSI

NOTE:

Occupants and materials are not to exceed rated load.
Refer to capacity label for additional information and for models equipped with options.

Table 2.4 Fluids Table

HydraulicOil			
Model	**Capacity (Liters)**	**Capacity (US Gallons)**	**Oil Type**
SJ68XXRT	86.88	22.95	ATF Dexron III
			Shell Naturelle HF-E 32 (Bio oil)

60662AB

Table 2.5 Torque Specifications

Cartridge						
Torque	Size					
	8	38	58	10	12	16
Lb-ft (max)	20			25	35	50
Lb-in (max)	240			300	420	600
Nm (max)	27.12			33.9	47.46	67.8

Coils	
Torque	Size
	All coils
Lb-ft (max)	4 to 5
Lb-in (max)	48 to 60
Nm (max)	5.42 to 6.78

SAE Plugs								
Torque	Size							
	2	4	5	6	8	10	12	16
Lb-ft (max)	3	10	15		25		30	35
Lb-in (max)	36	120	180		300		360	420
Nm (max)	4.07	13.56	20.34		33.9		40.68	47.46

Bolts		
Type of Bolt	Torque (ft-lb)	Torque (Nm)
Directional valve mounting bolts	2.33 (28-32 in-lb)	3.16 - 3.61
Wheel mounting bolts	90	122
Wheel motor castle nut (front)	350	474.54
Wheel motor castle nut (back)	350	474.54
Center drive sprocket mounting bolts	110 - 115 (242 Loctite)	149 -156
Hydraulic drive motor mounting bolts	120 (242 Loctite)	162
Positive battery post cable/fuse nut	7.5 (90 in-lb)	10.2

Newton-meter = Nm	Foot-Pound Force = ft-lb	Inch-Pound Force = in-lb

60664AB

Table 2.6 Torque Specifications for Fasteners (Imperial)

IMPERIAL BOLT TORQUE CHART							
Size	Torque Type	SAE 2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
4-40	(in-lb)	(5)	(4)	(8)	(6)	(12)	(9)
	Nm	0.6	0.5	0.9	0.7	1.4	1.0
4-48	(in-lb)	(6)	(5)	(9)	(7)	(13)	(10)
	Nm	0.7	0.6	1.0	0.8	1.5	1.1
6-32	(in-lb)	(10)	(8)	(16)	(12)	(23)	(17)
	Nm	1.1	0.9	1.8	1.4	2.6	1.9
6-40	(in-lb)	(12)	(9)	(18)	(13)	(25)	(19)
	Nm	1.4	1.0	2.0	1.5	2.8	2.1
8-32	(in-lb)	(19)	(14)	(30)	(22)	(41)	(31)
	Nm	2.1	1.6	3.4	2.5	4.6	3.5
8-36	(in-lb)	(20)	(15)	(31)	(23)	(43)	(32)
	Nm	2.3	1.7	3.5	2.6	4.9	3.6
10-24	(in-lb)	(27)	(21)	(43)	(32)	(60)	(45)
	Nm	3.1	2.4	4.9	3.6	6.8	5.1
10-32	(in-lb)	(31)	(23)	(49)	(36)	(68)	(51)
	Nm	3.5	2.6	5.5	4.1	7.7	5.8
1/4-20	(in-lb) / ft-lb	(66)	(50)	8	(75)	12	9
	Nm	7.5	5.6	11	8.5	16	12
1/4-28	(in-lb) / ft-lb	(76)	(56)	10	(86)	14	10
	Nm	8.6	6.3	14	9.7	19	14
5/16-18	ft-lb	11	8	17	13	25	18
	Nm	15	11	23	18	34	24
5/16-24	ft-lb	12	9	19	14	25	20
	Nm	16	12	26	19	34	27
3/8-16	ft-lb	20	15	30	23	45	35
	Nm	27	20	41	31	61	47
3/8-24	ft-lb	23	17	35	25	50	35
	Nm	31	23	47	34	68	47
7/16-14	ft-lb	32	24	50	35	70	55
	Nm	43	33	68	47	95	75
7/16-20	ft-lb	36	27	55	40	80	60
	Nm	49	37	75	54	108	81
1/2-13	ft-lb	50	35	75	55	110	80
	Nm	68	47	102	75	149	108
1/2-20	ft-lb	55	40	90	65	120	90
	Nm	75	54	122	88	163	122

IMPERIAL BOLT TORQUE CHART							
Size	Torque Type	SAE 2		SAE 5		SAE 8	
		Dry	Lubed	Dry	Lubed	Dry	Lubed
9/16-12	ft-lb	70	55	110	80	150	110
	Nm	95	75	149	108	203	149
9/16-18	ft-lb	80	60	120	90	170	130
	Nm	108	81	163	122	230	176
5/8-11	ft-lb	100	75	150	110	220	170
	Nm	136	102	203	149	298	230
5/8-18	ft-lb	110	85	180	130	240	180
	Nm	149	115	244	176	325	244
3/4-10	ft-lb	175	130	260	200	380	280
	Nm	237	176	353	271	515	380
3/4-16	ft-lb	200	150	300	220	420	320
	Nm	271	203	407	298	569	434
7/8-9	ft-lb	170	125	430	320	600	460
	Nm	230	169	583	434	813	624
7/8-14	ft-lb	180	140	470	360	660	500
	Nm	244	190	637	488	895	678
1-8	ft-lb	250	190	640	480	900	680
	Nm	339	258	868	651	1220	922
1-12	ft-lb	270	210	710	530	1000	740
	Nm	366	285	963	719	1356	1003
1-14	ft-lb	280	210	730	540	1020	760
	Nm	380	285	990	732	1383	1030
1 1/8-7	ft-lb	350	270	800	600	1280	960
	Nm	475	366	1085	813	1735	1302
1 1/8-12	ft-lb	400	300	880	660	1440	1080
	Nm	542	407	1193	895	1952	1464
1 1/4-7	ft-lb	500	380	1120	840	1820	1360
	Nm	678	515	1519	1139	2468	1844
1 1/4-12	ft-lb	550	420	1240	920	2000	1500
	Nm	746	569	1681	1247	2712	2034
1 3/8-6	ft-lb	670	490	1460	1100	2380	1780
	Nm	908	664	1979	1491	3227	2413
1 3/8-12	ft-lb	750	560	1680	1260	2720	2040
	Nm	1017	759	2278	1708	3688	2766
1 1/2-6	ft-lb	870	650	1940	1460	3160	2360
	Nm	1180	881	2630	1979	4284	3200
1 1/2-12	ft-lb	980	730	2200	1640	3560	2660
	Nm	1329	990	2983	2224	4827	3606

Inch-Pound Force = in-lb Foot-Pound Force = ft-lb Newton-Meter = Nm

NOTE: Lubed includes lubricants such as lubrizing, oil, grease or uncured Loctite.

Table 2.7 Torque Specifications for Fasteners (Metric)

METRIC BOLT TORQUE CHART					
Size	Torque Units	8.8		10.9	
		Dry	Lubed	Dry	Lubed
M5 x 0.80	(in-lb)	(54)	(41)	(78)	(59)
	Nm	6.1	4.6	8.8	6.7
M6 x 1.00	(in-lb)	(92)	(69)	(133)	(99)
	Nm	10.4	7.8	15	11.2
M7 x 1.00	(in-lb)	(156)	(116)	(222)	(167)
	Nm	17.6	13.1	25.1	18.9
M8 x 1.25	(in-lb)	(225)	(169)	(333)	(242)
	Nm	25.4	19.1	37.6	27.3
M10 x 1.50	ft-lb	37	28	53	40
	Nm	50	38	72	54
M12 x 1.75	ft-lb	65	49	93	69
	Nm	88	66	126	94
M14 x 2.00	ft-lb	104	78	148	111
	Nm	141	106	201	150
M16 x 2.00	ft-lb	161	121	230	172
	Nm	218	164	312	233
M18 x 2.50	ft-lb	222	167	318	238
	Nm	301	226	431	323
M20 x 2.50	ft-lb	314	235	449	337
	Nm	426	319	609	457
M22 x 2.50	ft-lb	428	321	613	460
	Nm	580	435	831	624
M24 x 3.00	ft-lb	543	407	776	582
	Nm	736	552	1052	789
M27 x 3.00	ft-lb	796	597	1139	854
	Nm	1079	809	1544	1158
M30 x 3.50	ft-lb	1079	809	1543	1158
	Nm	1463	1097	2092	1570
M33 x 3.50	ft-lb	1468	1101	2101	1576
	Nm	1990	1493	2849	2137
M36 x 4.00	ft-lb	1886	1415	2699	2024
	Nm	2557	1918	3659	2744
Inch-Pound Force = in-lb		Foot-Pound Force = ft-lb		Newton-Meter = Nm	

NOTE: Lubed includes lubricants such as lubrizing, oil, grease or uncured Loctite.

Table 2.8 Torque Specifications for Hydraulic Couplings & Hoses

HYDRAULIC COUPLING TORQUE CHART O-Ring Port Connectors				
SAE Size	Steel Ports		Non-ferrous Ports	
	ft-lb	Nm	ft-lb	Nm
4	14-16	20-22	9-10	12-13
6	24-26	33-35	15-16	20-21
8	50-60	68-78	30-36	41-47
10	72-80	98-110	43-48	60-66
12	125-135	170-183	75-81	102-110
16	200-220	270-300	120-132	162-180
20	210-280	285-380	126-168	171-228
24	270-360	370-490	162-216	222-294
32	-	-	-	-

HOSE END TORQUE CHART for JIC									
Size		Steel				Brass			
Dash	Frac.	ft-lb		Nm		ft-lb		Nm	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
-4	1/4"	10	11	13	15	5	6	6.75	9
-6	3/8"	17	19	23	26	12	15	17	20
-8	1/2"	34	38	47	52	20	24	27.66	33
-10	5/8"	50	56	69	76	34	40	46.33	55
-12	3/4"	70	78	96	106	53	60	72.33	82
-16	1"	94	104	127	141	74	82	100.5	111
-20	1 1/4"	124	138	169	188	75	83	101.5	113
-24	1 1/2	156	173	212	235	79	87	107	118
-32	2"	219	243	296	329	158	175	214	237

HOSE END TORQUE CHART for Flat-Face O-Ring Seal (Steel)					
Size		Torque Specification			
Dash	Frac.	ft-lb		Nm	
		Min.	Max.	Min.	Max.
-4	1/4"	10	12	14	16
-6	3/8"	18	20	24	27
-8	1/2"	32	40	43	54
-10	5/8"	46	56	60	75
-12	3/4"	65	80	90	110
-14	1"	65	80	90	110
-16	1 1/4"	92	105	125	240
-20	1 1/2	125	140	170	190
-24	2"	150	180	200	245

Notes

Section 3
SYSTEM COMPONENT IDENTIFICATION AND SCHEMATICS

Table of Contents

Charts

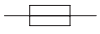
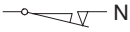
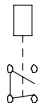
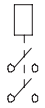
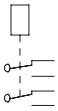
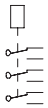
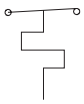
Parts List

Diagrams and Schematics

3.1. Hydraulic Symbol Chart

LINE CROSSING	VARIABLE DISPLACEMENT PUMP	SHUTTLE VALV	VELOCITY FUSE
LINE JOINED	HAND PUMP	ACCUMULATOR, GAS CHARGED	SINGLE ACTING CYLINDER
HYDRAULIC TANK	RELIEF VALVE	CUSHION CYLINDER	DOUBLE ACTING CYLINDER
HYDRAULIC FILTER WITH BYPASS	PRESSURE REDUCING VALVE	PRESSURE SWITCH	DOUBLE ACTING DOUBLE RODDED
ELECTRIC MOTOR	FIXED ORIFICE	MOTION CONTROL VALVE	SPRING APPLIED HYDRAULIC RELEASED BRAKE
ENGINE	ADJUSTABLE FLOW CONTROL	FLOW DIVIDER COMBINER	BRAKE CYLINDER
FIXED DISPLACEMENT PUMP	CHECK VALVE	COUNTER BALANCE VALVE	ROTARY ACTUATOR
THREE POSITION FOUR WAY PROPORTIONAL	OIL COOLER	VALVE COIL	BI DIRECTIONAL HYDRAULIC MOTOR
SERIES PARALLEL HYDRAULIC MOTOR	TWO POSITION TWO WAY NORMALLY CLOSED	TWO POSITION THREE WAY	THREE POSITION FOUR WAY CLOSED CENTER OPEN PORT
TWO POSITION TWO WAY NORMALLY OPEN	TWO POSITION THREE WAY	THREE POSITION FOUR WAY CLOSED CENTER CLOSED PORT	THREE POSITION FOUR WAY PROPORTIONAL
PRESSURE TRANSDUCER	MAIN LINES Solid	PILOT LINES Dashed	VARIABLE DISPLACEMENT HYDRAULIC MOTOR
SERVO	QUICK DISCONNECT		

3.2. Electrical Symbol Chart

 WIRE CROSSING	 HOURMETER	 KEY SWITCH	 ANGLE TRANSDUCER
 WIRES JOINED	 LIGHT	 FOOT SWITCH	 PRESSURE TRANSDUCER
 BATTERY	 HYDRAULIC VALVE COIL	 TOGGLE SWITCH	 LIMIT SWITCH N.O.
 GROUND	 PROPORTIONAL HYDRAULIC VALVE COIL	 PUSH BUTTON	 LIMIT SWITCH N.O. HELD CLOSED
 FUSE	 ELECTRIC MOTOR	 ROTARY SWITCH	 LIMIT SWITCH N.C.
 CIRCUIT BREAKER	 HORN	 LIMIT SWITCH	 LIMIT SWITCH N.C. HELD OPEN
 BATTERY CHARGE INDICATOR	 EMERGENCY STOP BUTTON	 CAM OPERATED LIMIT SWITCH	 SILICON CONTROLLED RECTIFIER
 CAPACITOR	 RESISTOR	 TILT SWITCH	 PROXIMITY SWITCH
 POTENTIOMETER	 LEVEL SENSOR	 SINGLE POLE SINGLE THROWN RELAY	 PNP TRANSISTOR
 SINGLE POLE DOUBLE THROW RELAY	 DOUBLE POLE SINGLE THROW RELAY	 DOUBLE POLE DOUBLE THROW RELAY	 NPN TRANSISTOR
 TRIPLE POLE DOUBLE THROW RELAY	 DIODE	 TRANSISTOR	 PRESSURE/ VACUUM SWITCH
 TEMPERATURE SWITCH			

3.3 AC Cord Color Code

AC Cord Color Code
(Battery Charger & Platform AC Outlet)

Standard Definition	NEC Colors	IEC Colors
Protective Ground/ Protective Earth	Green	Green-Yellow
Neutral	White	Blue
Line, Single Phase	Black	Black or Brown or Grey

Note: Standard colors referenced from IEC 60445:2010, Annex A:Table A.1

3.4 Hydraulic Schematic Parts List

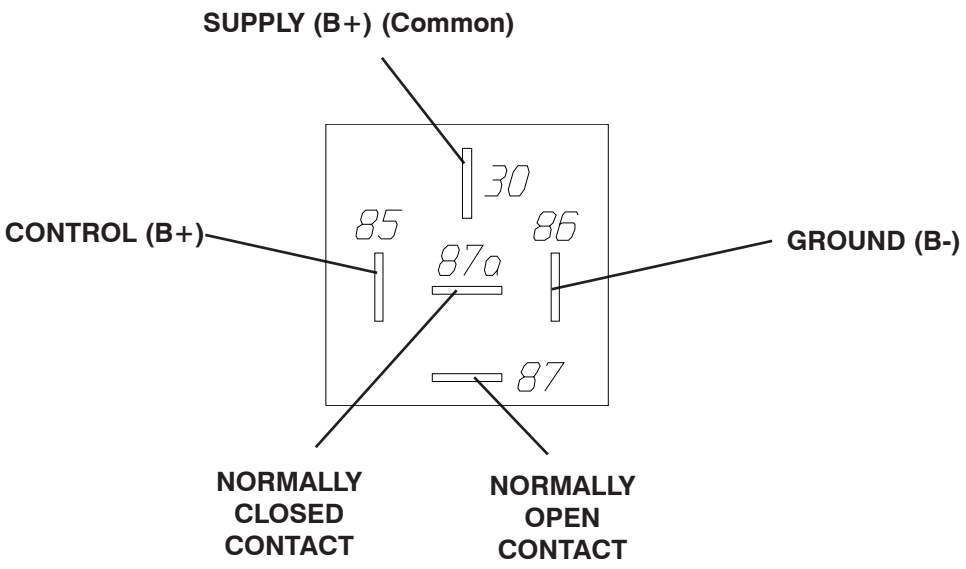
Index No.	Skyjack Part No.	Qty.	Description
2H-13	103655	1	VALVE, Control (lowering)
2H-13-1	107269	1	VALVE, Holding (lower cylinder)
2H-13-2	107269	1	VALVE, Holding (upper cylinder)
2H-17C	103655	1	VALVE, Holding (outrigger)
2H-20B	111937	1	VALVE, Control (high speed)
2H-21A	114365	1	VALVE, Dump (large pump)
2H-21A-1	103656	1	VALVE, Dump (small pump)
3H-14A	106273	1	VALVE, Control (lift)
3H-30	103623	1	VALVE, Control (brake)
4H-15	139256	1	VALVE, Control (reverse drive)
4H-15A	128318	1	VALVE, Control (parallel reverse drive)
4H-16	139256	1	VALVE, Control (forward drive)
4H-16A	128318	1	VALVE, Control (parallel forward drive)
4H-20A	139351	1	VALVE, Control (series/parallel)
4H-23	153336	1	VALVE, Control (right steer)
4H-24	153336	1	VALVE, Control (left steer)
4H-71	153336	1	VALVE, Control (front left outrigger retract)
4H-72	153336	1	VALVE, Control (front right outrigger retract)
4H-73	153336	1	VALVE, Control (rear right outrigger retract)
4H-74	153336	1	VALVE, Control (rear left outrigger retract)
4H-75	153336	1	VALVE, Control (front left outrigger extend)
4H-76	153336	1	VALVE, Control (front right outrigger extend)
4H-77	153336	1	VALVE, Control (rear right outrigger extend)
4H-78	153336	1	VALVE, Control (rear left outrigger extend)
C1	120989	1	CYLINDER, Lift (lower)
C2	120989	1	CYLINDER, Lift (upper)
C7	135896	1	CYLINDER, Steer
C8	107752	1	CYLINDER, Cushion
C9	132694	1	CYLINDER, Outrigger (front left)
C10	132694	1	CYLINDER, Outrigger (front right)
C11	132694	1	CYLINDER, Outrigger (rear right)
C12	132694	1	CYLINDER, Outrigger (rear left)
CB1	137181	1	VALVE, Counterbalance (main)
CB2	137181	1	VALVE, Counterbalance (parallel)
CV1	104624	1	VALVE, Check
CV2	104624	1	VALVE, Check
CV3	104624	1	VALVE, Pilot check
CV4	104624	1	VALVE, Pilot check
CV5	104624	1	VALVE, Pilot check
CV6	104624	1	VALVE, Pilot check
CV7	104115	1	VALVE, Pilot check
CV8	104115	1	VALVE, Pilot check
CV9	104115	1	VALVE, Pilot check
CV10	104115	1	VALVE, Pilot check
F1	136405	1	FILTER, Hydraulic
FD1	137185	1	VALVE, Flow divider
HP2	110652	1	PUMP, Hand (brake)

Parts list continued on following page.

3.4 Hydraulic Schematic Parts List (Continued)

Index No.	Skyjack Part No.	Qty.	Description
			Parts list continued from previous page.
MI	137479	1	MOTOR, Wheel (front left)
M2	137479	1	MOTOR, Wheel (front right)
M3	137480	1	MOTOR, Wheel (rear right)
M4	137480	1	MOTOR, Wheel (rear left)
MB1	137125	1	BLOCK, Manifold (main)
MB3	106688	1	BLOCK, Manifold (lower holding valve)
MB4	108778	1	BLOCK, Manifold (upper holding valve)
MB5	139830	1	BLOCK, Manifold (sandwich)
MB6	139450	1	BLOCK, Manifold (splitter)
MB8	111970	1	BLOCK, Manifold (outrigger)
O1	105281	1	ORIFICE, 0.067 diameter (holding valve)
O2	137509	1	ORIFICE, 0.089 diameter (lowering)
O3	137509	1	ORIFICE, 0.089 diameter (lowering)
O4	139679	1	ORIFICE, 0.055 diameter (steering)
O5	137508	1	ORIFICE, 0.028 diameter (brake)
P1	114201	1	PUMP, Dual hydraulic (0.671/ 0.366)
R1	104534	1	VALVE, Relief (system)
R2	104534	1	VALVE, Relief (lift)
R3	106557	1	VALVE, Relief (lift cylinder)
R4	106557	1	VALVE, Relief (lift cylinder)
R5	139683	1	VALVE, Relief (drive)
V1	107271	1	VALVE, Pull (emergency lowering)
V2	137182	1	VALVE, Freewheel
V6	113752	1	VALVE, Auto reset (brake)

3.5 Electrical Parts List



Index No.	Skyjack Part No.	Qty.	Description
09CR	127035	1	RELAY, 12 Volt (40 Amp) (Lift/drive)
09CR2	127131	1	RELAY, 12 Volt (40 Amp) (Outrigger enable)
09CR3	127131	1	RELAY, 12 Volt (40 Amp) (Outrigger enable proof)
10BCR	127035	1	RELAY, 12 Volt (40 Amp) (Power on)
10CR1	127035	1	RELAY, 12 Volt (40 Amp) (Turn on)
10CR2	127035	1	RELAY, 12 Volt (40 Amp)
10CR3	127035	1	RELAY, 12 Volt (40 Amp) (Generator off)
10ECR	127035	1	RELAY, 12 Volt (40 Amp) (Base enable)
14CR	127035	1	RELAY, 12 Volt (40 Amp) (Lift enable)
14ECR	127035	1	RELAY, 12 Volt (40 Amp) (Base lift)
17DCR	127131	1	RELAY, 12 Volt (40 Amp) (Outrigger lift disable)
20CR	127035	1	RELAY, 12 Volt (40 Amp) (Series/Parallel drive)
20ACR1	127035	1	RELAY, 12 Volt (40 Amp) (Series/Parallel)
20ACR2	127035	1	RELAY, 12 Volt (40 Amp) (Series/Parallel)
28CR	127035	1	RELAY, 12 Volt (40 Amp) (Auxiliary tilt)
28ACR	127035	1	RELAY, 12 Volt (40 Amp) (Drive disable)
28BCR	127035	1	RELAY, 12 Volt (40 Amp) (Function enable)
30CR	127035	1	RELAY, 12 Volt (40 Amp) (Dry steer)
35CR	127035	1	RELAY, 12 Volt (40 Amp) (Elevation/High speed cutout)
61CR	127131	1	RELAY, 12 Volt (40 Amp) (Outrigger drive enable)
65CR	127131	1	RELAY, 12 Volt (40 Amp) (Outrigger lift enable)
106CR	127035	1	RELAY, 12 Volt (40 Amp) (Generator running)
2H-13	104410	1	COIL, 12 Volt (Lowering valve)
2H-13-1	104410	1	COIL, 12 Volt (Lower lift cylinder holding valve)
2H-13-2	103613	1	COIL, 12 Volt (Upper lift cylinder holding valve)
2H-17C	103613	1	COIL, 12 Volt (Holding outrigger valve)
2H-20B	139830	1	SOLENOID, Sandwich valve (High speed valve)

3.5 Electrical Parts List (Continued)

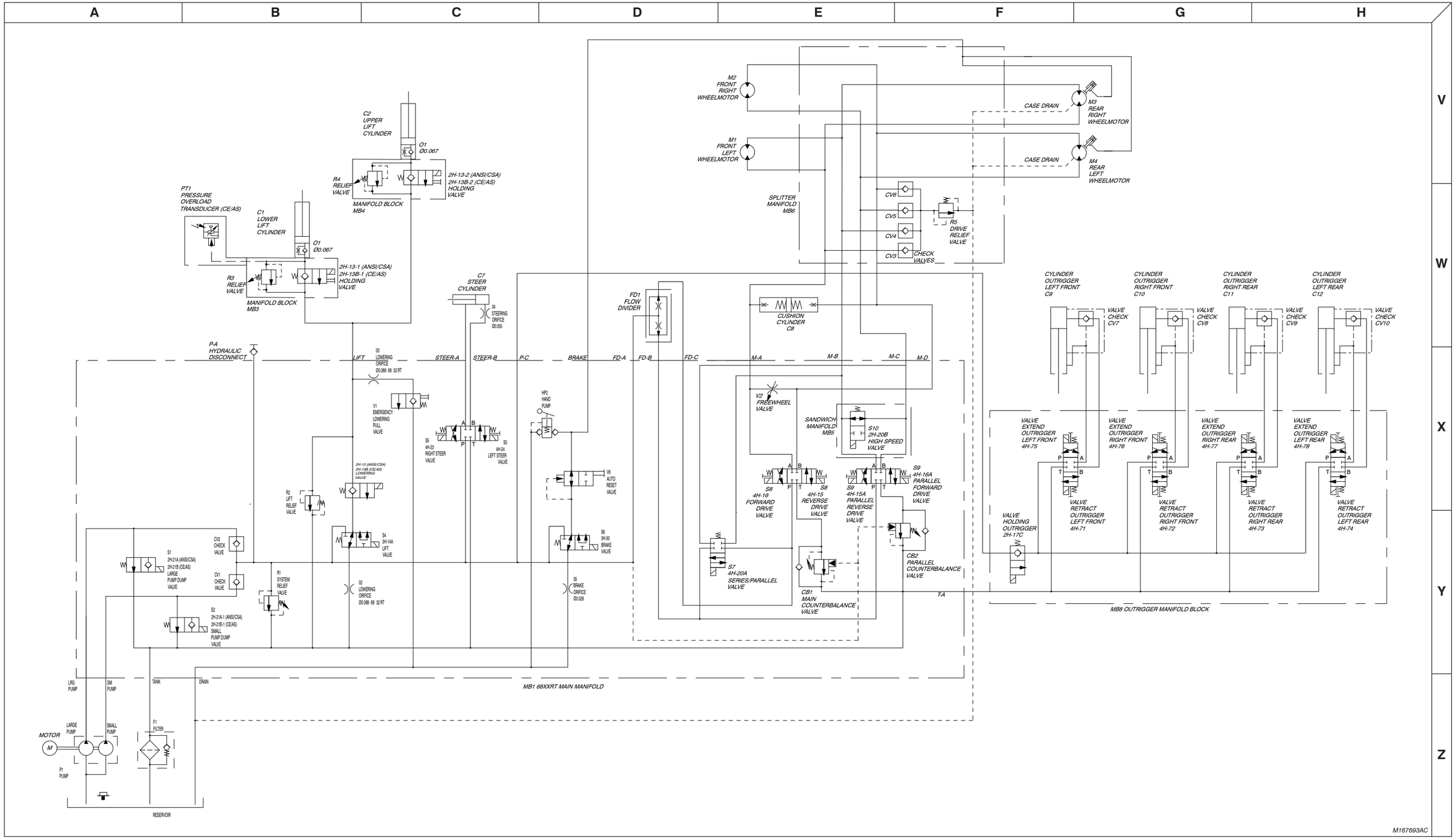
Index No.	Skyjack Part No.	Qty.	Description
2H-28C-1	103613	1	COIL, 12 Volt (Small pump dump valve)
3H-14A	106272	1	COIL, 12 Volt (Lift valve)
3H-30	103613	1	COIL, 12 Volt (Brake valve)
4H-15	128321	1	COIL, 12 Volt (Reverse drive valve)
4H-15A	128321	1	COIL, 12 Volt (Parallel reverse drive valve)
4H-16	128321	1	COIL, 12 Volt (Forward drive valve)
4H-16A	128321	1	COIL, 12 Volt (Parallel forward drive valve)
4H-20A	137513	1	COIL, 12 Volt (Series/Parallel drive)
4H-23	1153337	1	COIL, 12 Volt (Right steer valve)
4H-24	153337	1	COIL, 12 Volt (Left steer valve)
4H-71	153337	1	COIL, 12 Volt (Front left outrigger retract)
4H-72	153337	1	COIL, 12 Volt (Front right outrigger retract)
4H-73	153337	1	COIL, 12 Volt (Rear right outrigger retract)
4H-74	153337	1	COIL, 12 Volt (Rear left outrigger retract)
4H-75	153337	1	COIL, 12 Volt (Front left outrigger extend)
4H-76	153337	1	COIL, 12 Volt (Front right outrigger extend)
4H-77	153337	1	COIL, 12 Volt (Rear right outrigger extend)
4H-78	153337	1	COIL, 12 Volt (Rear left outrigger extend)
B1	103295	8	BATTERY, 6 Volt (Wet) (Standard)
	166514	8	BATTERY, 6 Volt (Dry) (Optional)
BP-29	103056	1	BEEPER (7.5 – 16 VDC)
CB1	137919	1	CIRCUIT BREAKER (25 Amp)
CB3	137919	1	CIRCUIT BREAKER (25 Amp)
CRD1	167351	1	CONTROL CABLE ASSEMBLY (Control box)
CRD2	167365	1	CONTROL CABLE ASSEMBLY (Scissor arm)
CRD3	167285	1	CONTROL CABLE ASSEMBLY (Electrical panel)
DXX	102921	AR	DIODE
F4	138094	1	FUSE (125 Amp) (Inverter option)
FL-22	121476	1	FLASHING LIGHT
FL-29	103743	1	FLASHER
H1	146652	1	HORN, 12 Volt
LED-2	137785	1	LIGHT, Power on (Base controls)
L1CR	166517	1	RELAY, 120V (20 Amp)
LS5	122010	1	LIMIT SWITCH (High speed cutout)
LS61	138060	1	LIMIT SWITCH (Front left outrigger up)
LS62	138060	1	LIMIT SWITCH (Front right outrigger retracted)
LS63	138060	1	LIMIT SWITCH (Rear right outrigger retracted)
LS64	138060	1	LIMIT SWITCH (Rear left outrigger retracted)
LS65	138059	1	LIMIT SWITCH (Front left outrigger extended)
LS66	138059	1	LIMIT SWITCH (Front right outrigger extended)
LS67	138059	1	LIMIT SWITCH (Rear right outrigger extended)
LS68	138059	1	LIMIT SWITCH (Rear left outrigger extended)
OCM1	132804	1	MODULE, Outrigger auto-level control
OL1	133133	1	LIGHT, Indicator 12V amber (Outrigger)
S1	119726	1	SWITCH, Main power disconnect
S2	102853	1	SWIITCH, Toggle (Up/down) (base control)
S3	116382	1	SWITCH, Toggle (Lift/Off/Drive) (Control box)

3.5 Electrical Parts List (Continued)

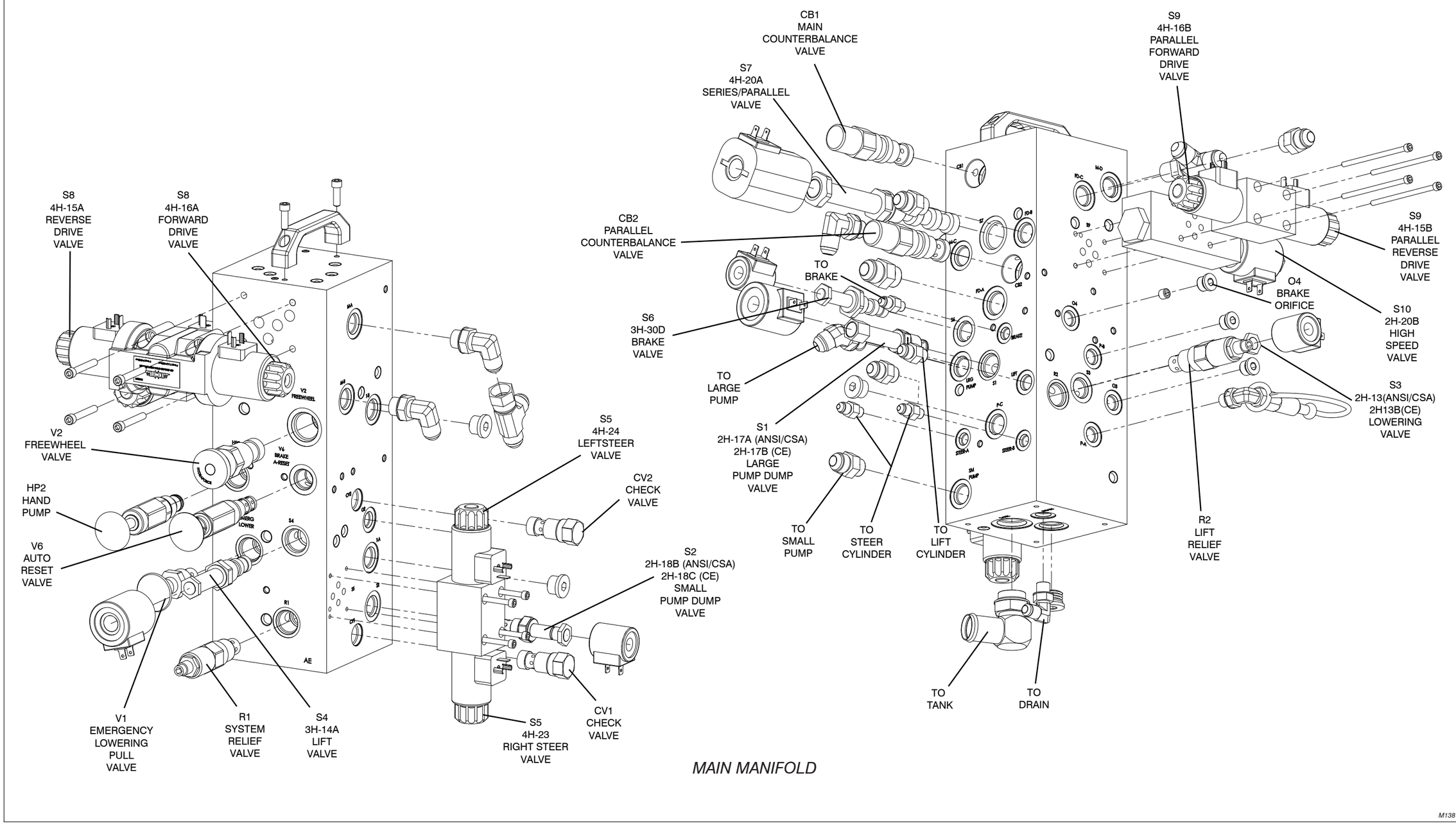
Index No.	Skyjack Part No.	Qty.	Description
S4	-	1	SWITCH ASSEMBLY (Emergency stop) (Control box)
	147051	1	• SWITCH HEAD, Emergency Stop (Red)
	137791	1	• SWITCH BASE ASSEMBLY
	137785	1	• • SWITCH, LED block (Red)
	137783	2	• • BLOCK, N.C. Contact
	137781	1	• • LATCH
S6	-	1	SWITCH ASSEMBLY (Emergency Stop) (Base controls)
	137795	1	• SWITCH HEAD, Emergency Stop (Red)
	137791	1	• SWITCH BASE ASSEMBLY (NC/LED, Red)
	137785	1	• • SWITCH, LED block (Red)
	137783	2	• • BLOCK, N.C. Contact
	137781	1	• • LATCH
S7	159111	1	JOYSTICK (Drive/steer)
S8	-	1	SWITCH ASSEMBLY (Horn) (Control box)
	147058	1	• SWITCH HEAD, Pushbutton (Black)
	137786	1	• SWITCH BASE ASSEMBLY
	137782	1	• • BLOCK, N.O. Spring contact
	137781	1	• • LATCH
S9A	102853	1	SWITCH, Outrigger Enable
S9B	127132	1	SWITCH, Outrigger enable
S10	133762	1	SWITCH, Key 3-Way (Platform/Idle/Base) (Base controls)
S11	115574	1	SWITCH, Toggle (Generator on-auto) (Control box)
S12	144266	1	SWITCH, Toggle (Generator on/off) (Base controls)
S13	115747	1	SWITCH, Toggle (Generator auto/manual) (Base controls)
S16	115574	1	SWITCH, Toggle (Torque/throttle) (Control box)
S20	102853	1	SWITCH, Toggle (Front left outrigger up/down)
S20A	127132	1	SWITCH, Front left outrigger rocker
S21	102853	1	SWITCH, Toggle (Front right outrigger up/down)
S21A	127132	1	SWITCH, Front right outrigger rocker
S22	102853	1	SWITCH, Toggle (Rear right outrigger up/down)
S22A	127132	1	SWITCH, Rear right outrigger rocker
S23	102853	1	SWITCH, Toggle (Rear left outrigger up/down)
S23A	127132	1	SWITCH, Rear left outrigger rocker
S24	102853	1	SWITCH, Auto-level outrigger
TS1	146661	1	TILT SWITCH
TT	167234	1	DISPLAY, Hour/error
V	167415	1	VOLTMETER (Control box)

Notes

3.6 Hydraulic Schematic



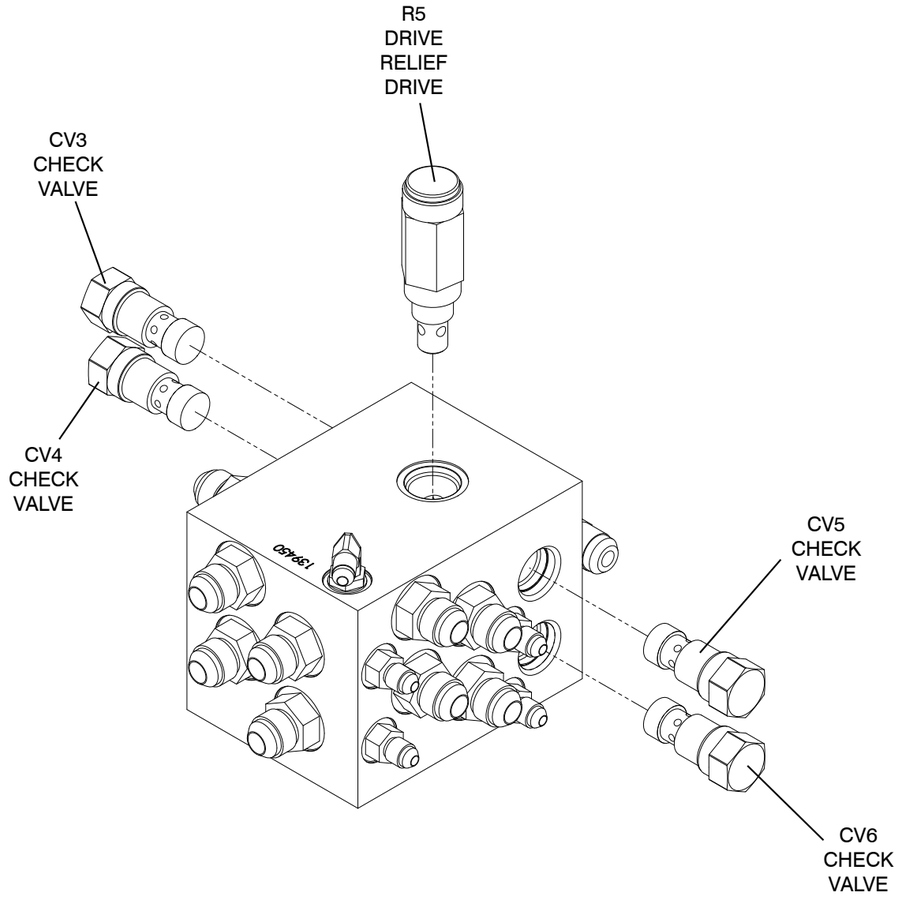
3.7 Main Manifold Component and Port Identification



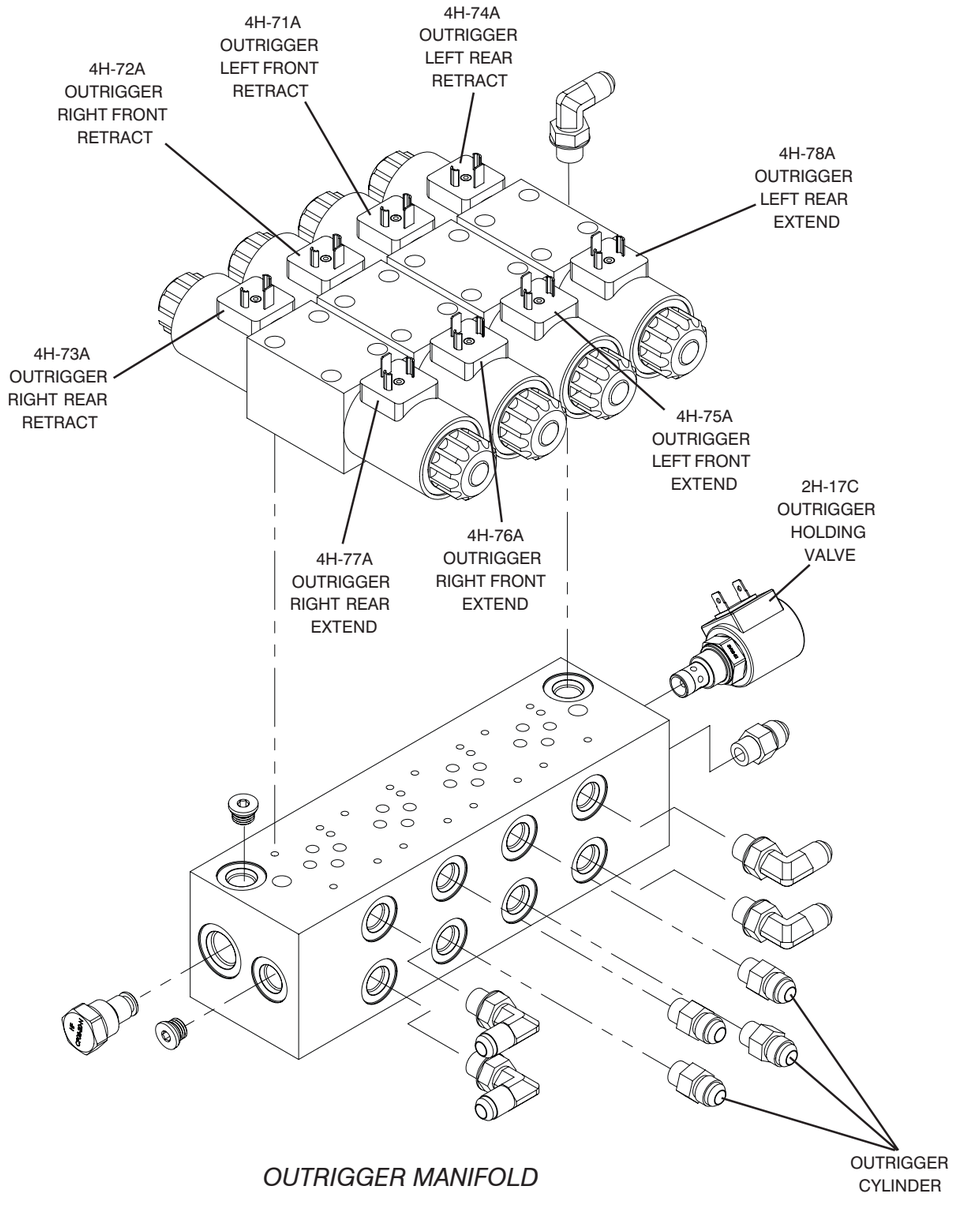
MAIN MANIFOLD

M138189AP_3C

3.8 Splitter and Outrigger Manifolds Component and Port Identification



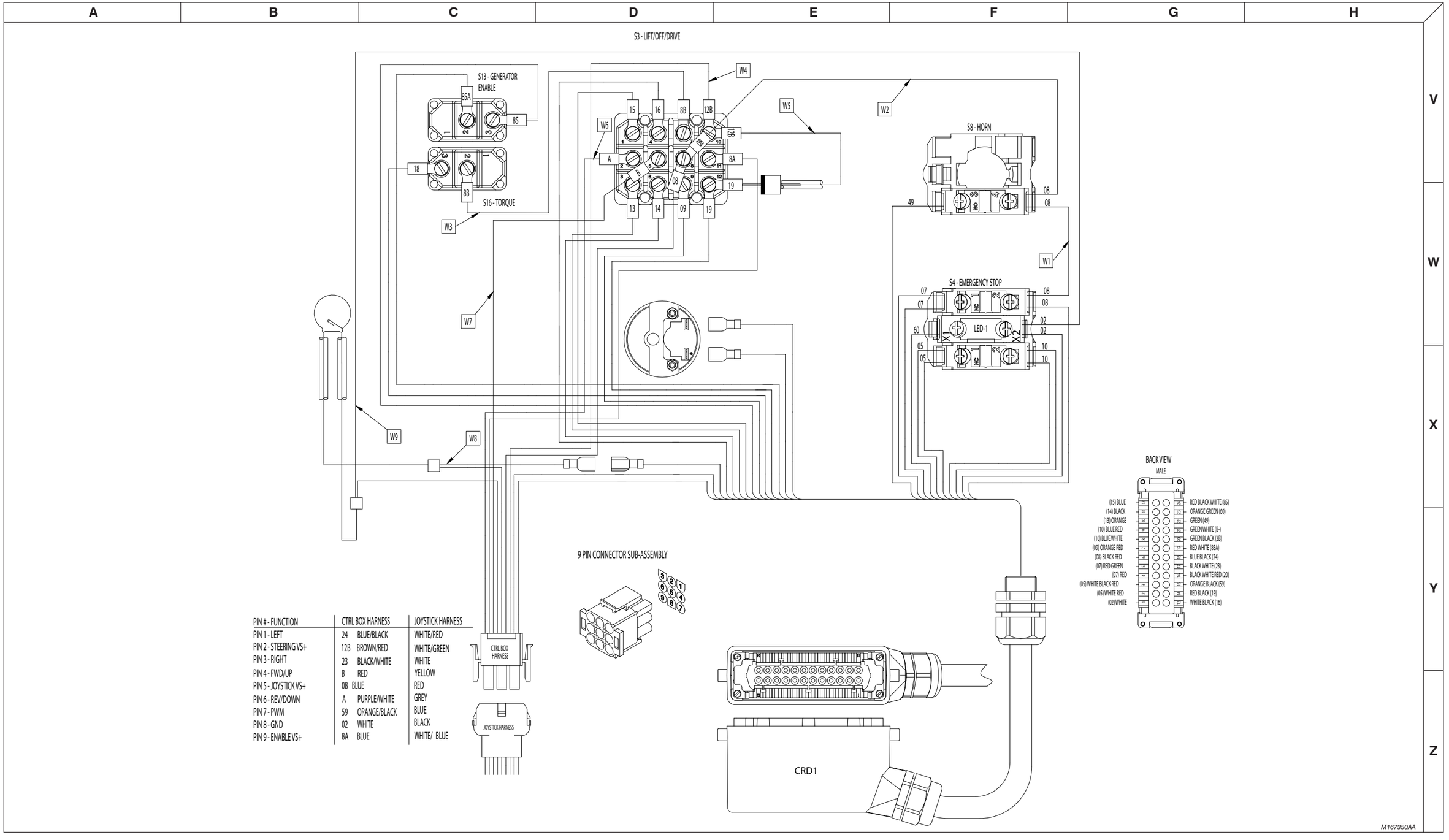
SPLITTER MANIFOLD



OUTRIGGER MANIFOLD

M138075AE, M138045AB_1

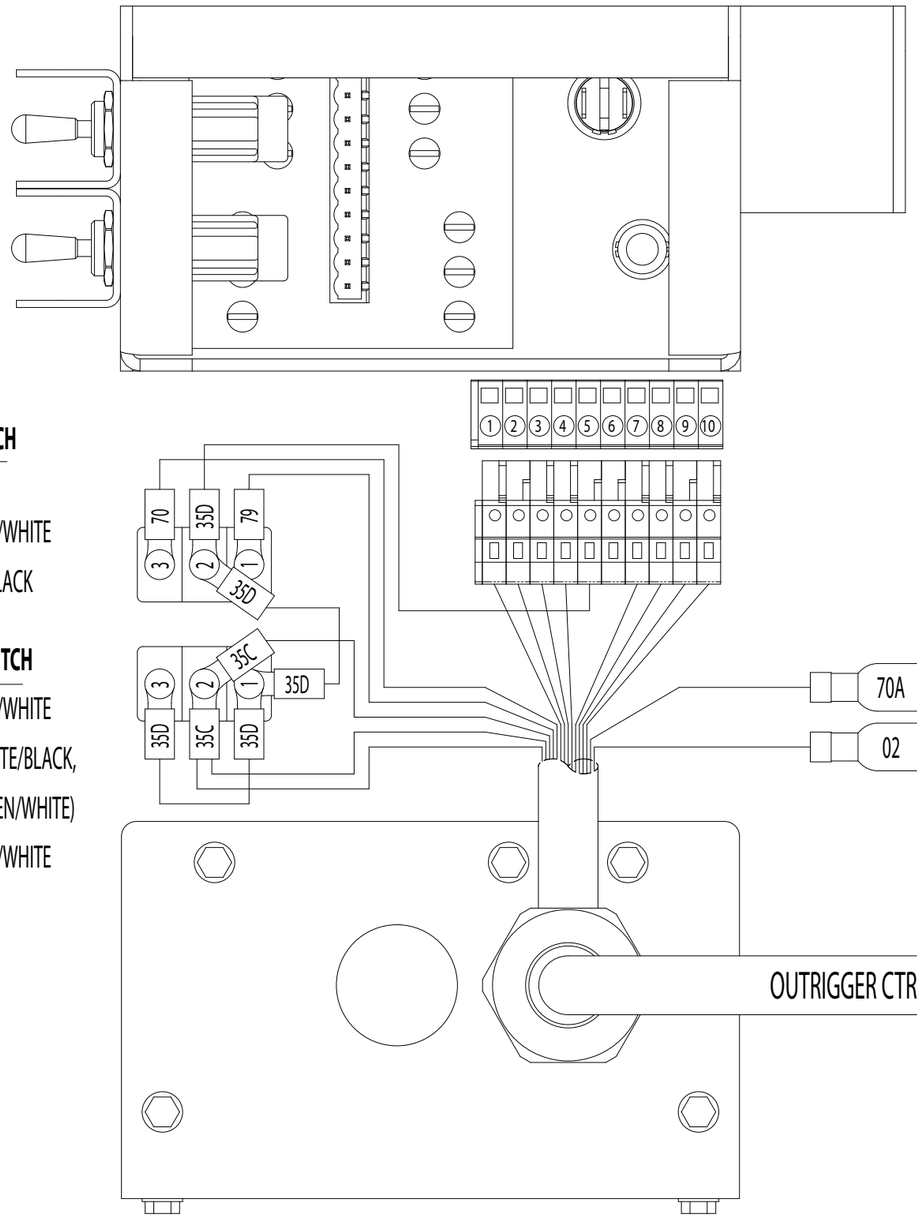
3.9 Control Box Wiring Diagram



PIN # - FUNCTION	CTRL BOX HARNESS		JOYSTICK HARNESS
PIN 1 - LEFT	24	BLUE/BLACK	WHITE/RED
PIN 2 - STEERING VS+	12B	BROWN/RED	WHITE/GREEN
PIN 3 - RIGHT	23	BLACK/WHITE	WHITE
PIN 4 - FWD/UP	B	RED	YELLOW
PIN 5 - JOYSTICK VS+	08	BLUE	RED
PIN 6 - REV/DOWN	A	PURPLE/WHITE	GREY
PIN 7 - PWM	59	ORANGE/BLACK	BLUE
PIN 8 - GND	02	WHITE	BLACK
PIN 9 - ENABLE VS+	8A	BLUE	WHITE/ BLUE

M167350AA

3.10 Outrigger Control Box Wiring Diagram



AUTO OUTR SWITCH

PIN 1 - 79 GREEN

PIN 2 - 35D PURPLE/WHITE

PIN 3 - 70 GREEN/BLACK

OUTR ENABLE SWITCH

PIN 1 - 35D PURPLE/WHITE

PIN 2 - 35C x 3 (WHITE/BLACK, BLUE/WHITE & GREEN/WHITE)

PIN 3 - 35D PURPLE/WHITE

TEN PIN CONNECTOR PLUG

PIN 1 - 74 BLACK

PIN 2 - 73 BLUE

PIN 3 - 78 BLACK/WHITE

PIN 4 - 77 BLUE/BLACK

PIN 5 - 35D PURPLE/WHITE

PIN 6 - N/U

PIN 7 - 71 ORANGE

PIN 8 - 72 RED

PIN 9 - 75 ORANGE/BLACK

PIN 10 - 76 RED/BLACK

OUTR LIGHT

70A RED/WHITE

02 WHITE

TO ELECTRIC PANEL

PIN 1 - 02 WHITE

PIN 2 - 35C WHITE/BLACK

PIN 3 - 70 GREEN/BLACK

PIN 4 - 70A RED/WHITE

PIN 5 - 71 ORANGE

PIN 6 - 72 RED

PIN 7 - 73 BLUE

PIN 8 - 74 BLACK

PIN 9 - 75 ORANGE/BLACK

PIN 10 - 76 RED/BLACK

PIN 11 - 77 BLUE/BLACK

PIN 12 - 78 BLACK/WHITE

PIN 13 - 79 GREEN

PIN 14 - 35C BLUE/WHITE

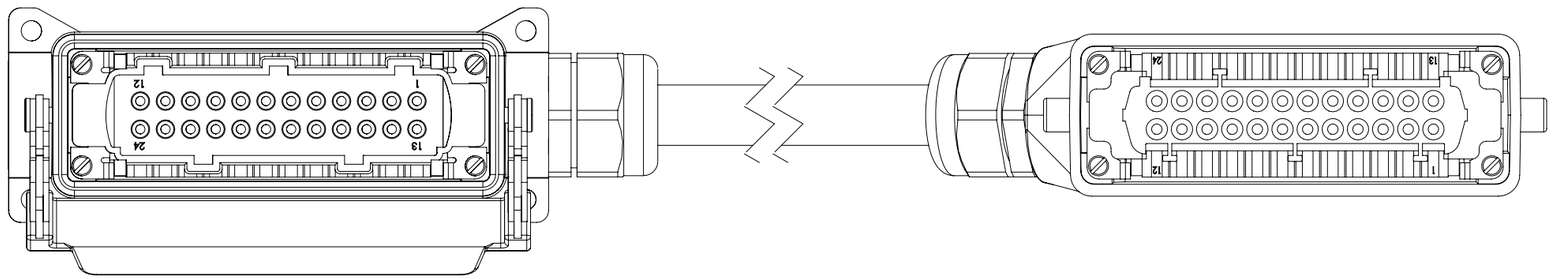
PIN 15 - 35C GREEN/WHITE

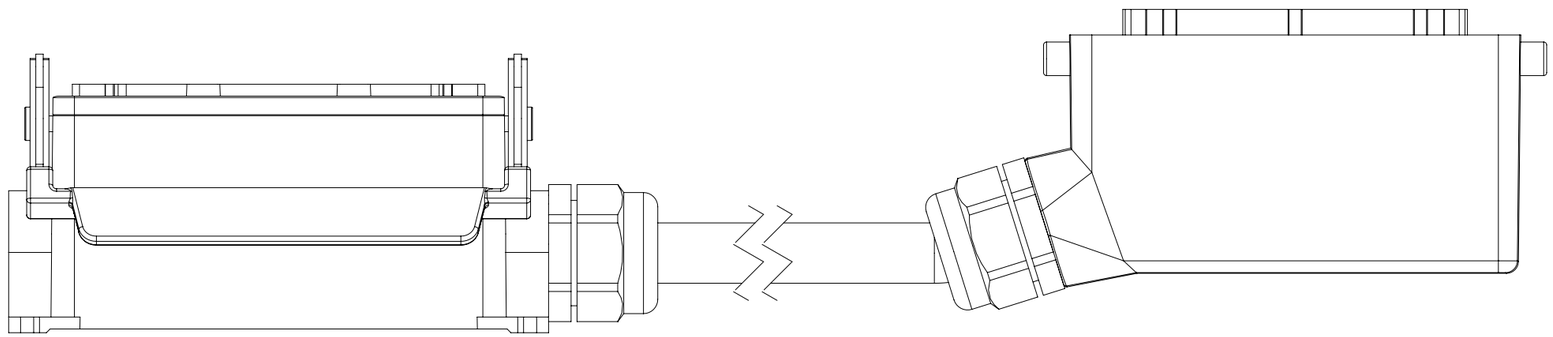
M129300AB3

3.11 Scissor Arm Control Cable Wiring Diagram

A	B	C	D	E	F	G	H

INSERT ORIENTATION
FRONT VIEW





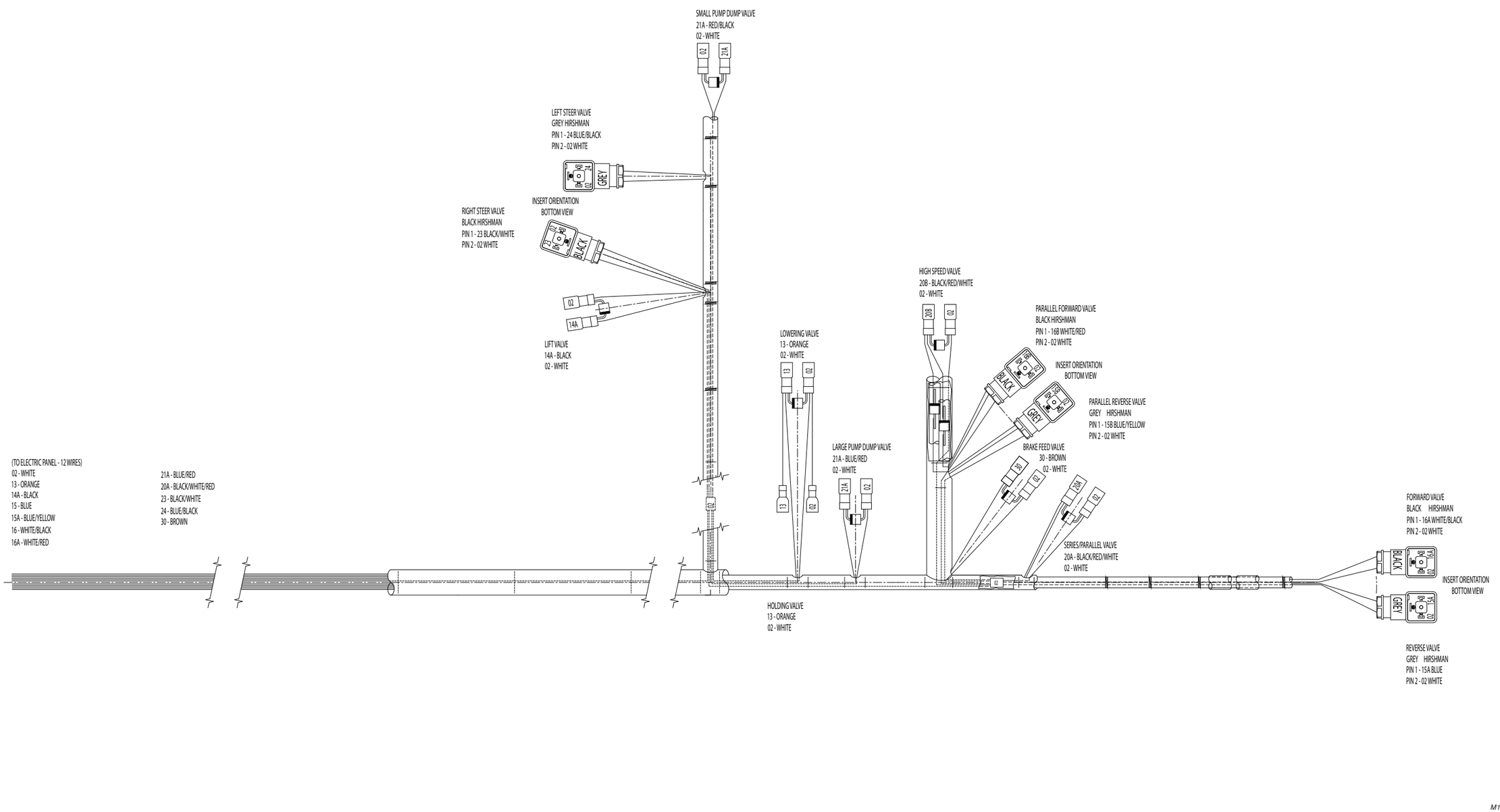
INSERT 1-24

PIN 1 - WHITE (02)
PIN 2 - WHITE RED (05)
PIN 3 - WHITE BLACK RED (05)
PIN 4 - RED (07)
PIN 5 - RED GREEN (07)
PIN 6 - BLACK RED (08)
PIN 7 - ORANGE RED (09)
PIN 8 - BLUE WHITE (10)
PIN 9 - BLUE RED (10)
PIN 10 - ORANGE (13)
PIN 11 - BLACK (14)
PIN 12 - BLUE (15)
PIN 13 - WHITE BLACK (16)
PIN 14 - RED BLACK (19)
PIN 15 - ORANGE BLACK (59)
PIN 16 - BLACK WHITE RED (20)
PIN 17 - BLACK WHITE (23)
PIN 18 - BLUE BLACK (24)
PIN 19 - RED WHITE (85A)
PIN 20 - GREEN BLACK (3B)
PIN 21 - GREEN WHITE (B-)
PIN 22 - GREEN (49)
PIN 23 - ORANGE GREEN (60)
PIN 24 - RED BLACK WHITE (85)

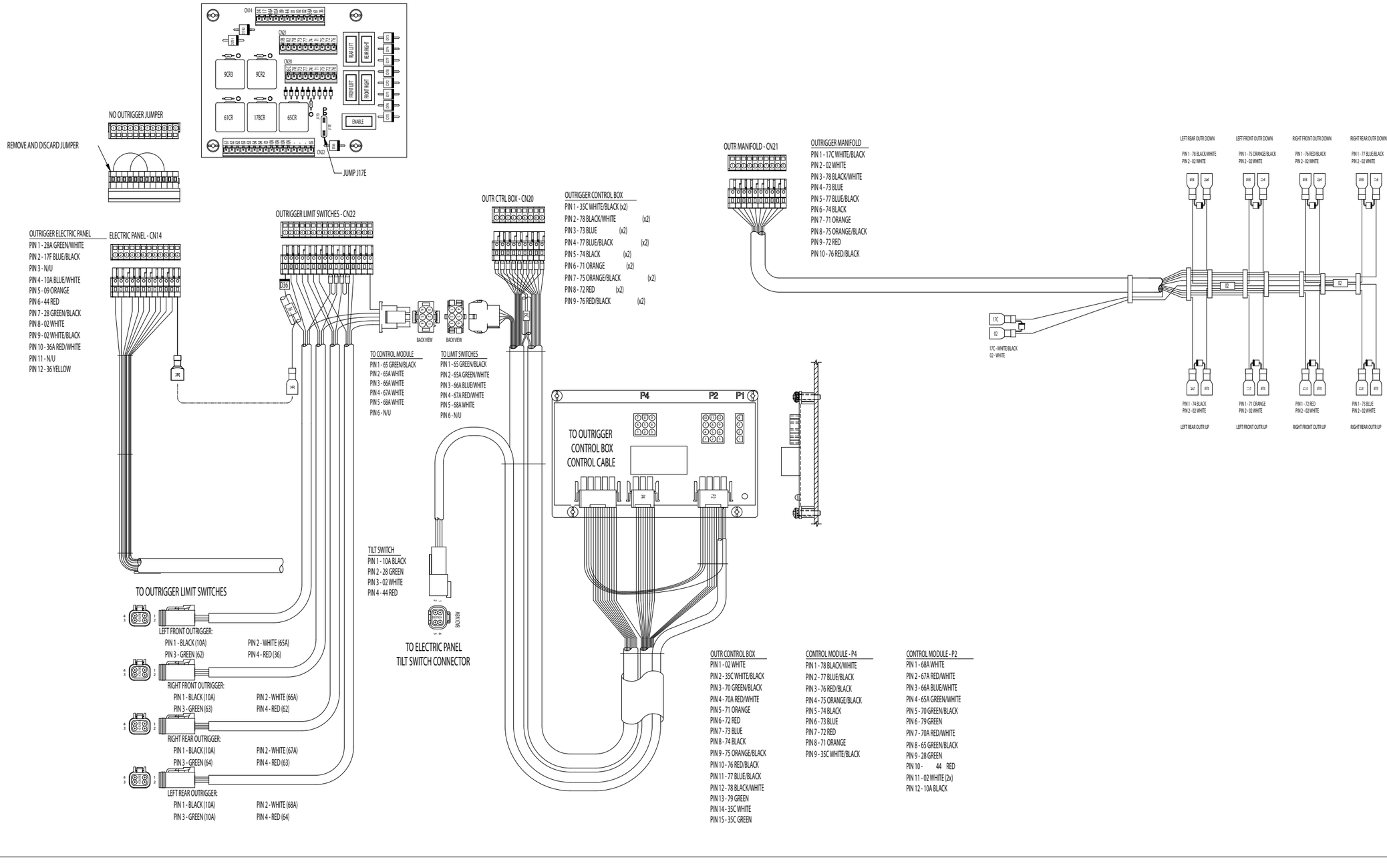
V	W	X	Y	Z

M167365AA_1

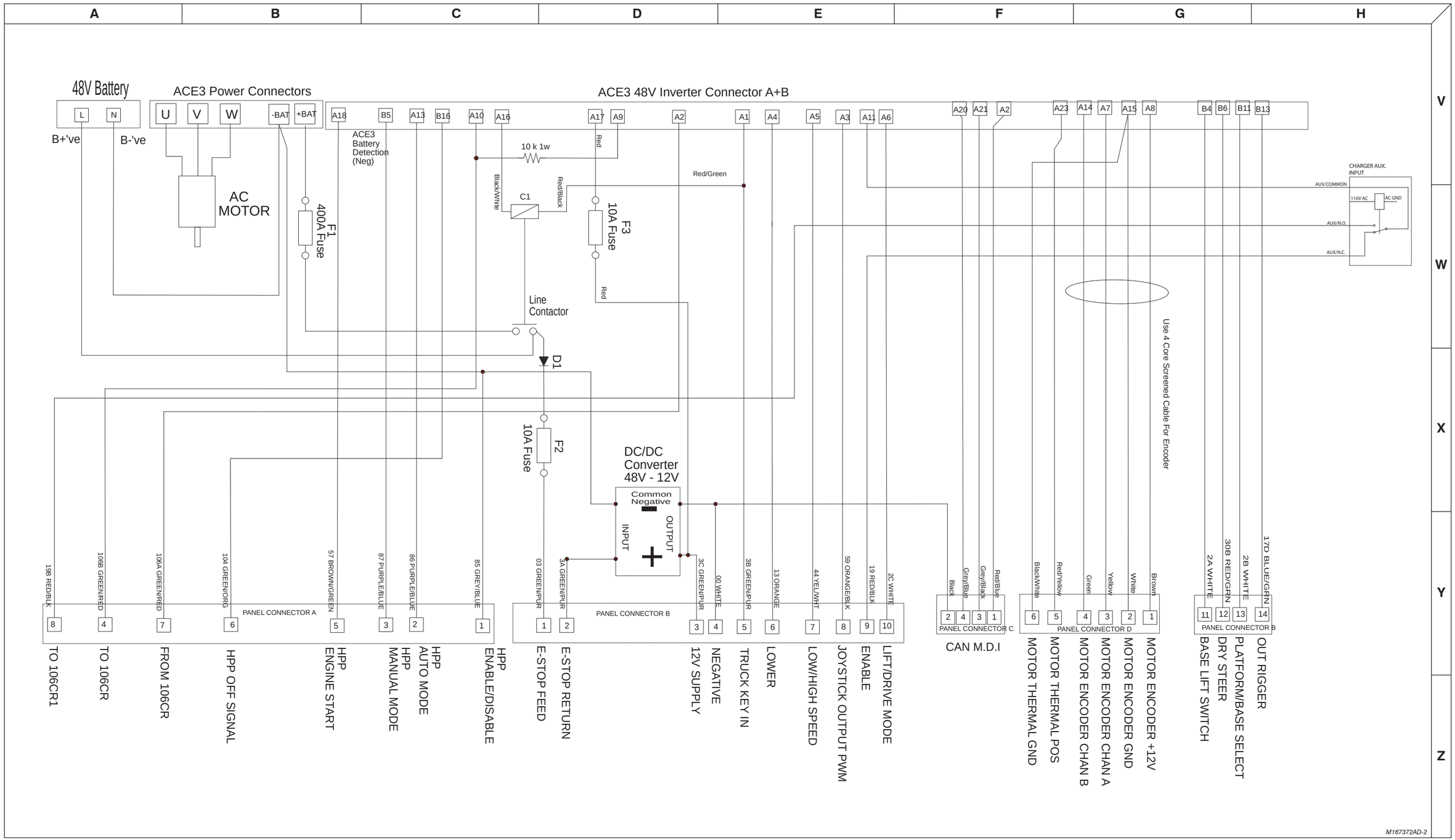
3.12 Main Manifold Harness Wiring Diagram



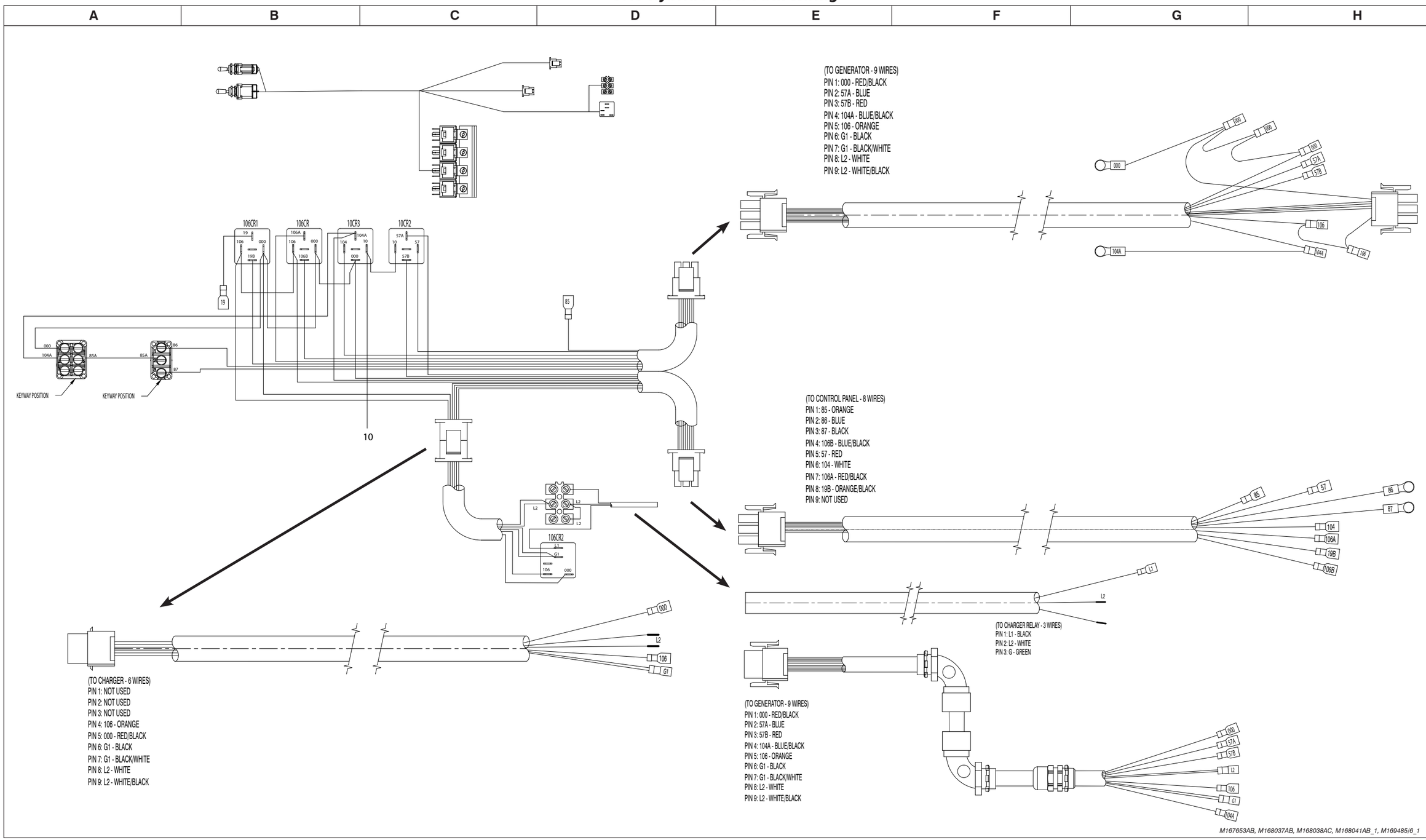
3.13 Outrigger Harness Wiring Diagram



3.14 Motor Controller Electrical Schematic



3.15 Hybrid Power Pack Wiring



3.16a Electrical Panel Wiring Diagram – S/N 37300235 & above

Serial Number Breakdown Reference Chart	
Model	Serial Number
SJ68RTE	37300235 & above

09CR
LIFT/DRIVE RELAY
PIN 30 – 02
PIN 85 – 02
PIN 86 – 09
PIN 87 – N/U
PIN 87a –

10CR1
TURN–ON RELAY
PIN 30 – 3A
PIN 85 – 02
PIN 86 – 10
PIN 87 –
PIN 87a – N/U

10BCR
POWER ON RELAY
PIN 30 – 3D
PIN 85 – 02
PIN 86 – 10B
PIN 87 – 10A
PIN 87a – N/U

10ECR
BASE ENABLE RELAY
PIN 30 – 02
PIN 85 – 02
PIN 86 – 10E
PIN 87 –
PIN 87a – N/U

14CR
LIFT ENABLE RELAY
PIN 30 – 36A
PIN 85 – 02
PIN 86 – 14
PIN 87 – 14A
PIN 87a – N/U

14ECR
BASE LIFT RELAY
PIN 30 – 02
PIN 85 – 02
PIN 86 – 14E
PIN 87 –
PIN 87a – N/U

20CR
SERIES/PARALLEL RELAY
PIN 30 – 44
PIN 85 – 02
PIN 86 –
PIN 87 – 20A
PIN 87a – N/U

20ACR1
SERIES/PARALLEL RELAY
PIN 30 – 15
PIN 85 – 02
PIN 86 – 20A
PIN 87 –
PIN 87a – N/U

20ACR2
SERIES/PARALLEL RELAY
PIN 30 – 16
PIN 85 – 02
PIN 86 – 20A
PIN 87 –
PIN 87a – N/U

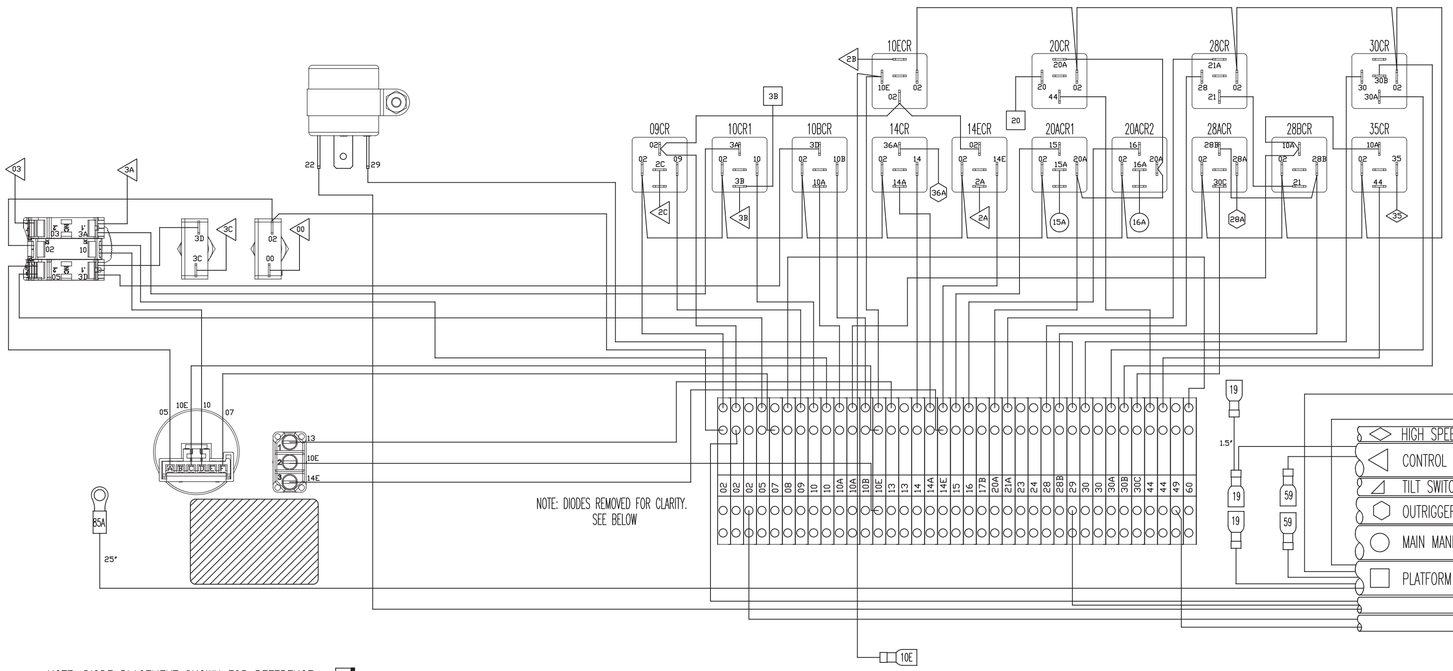
28CR
AUX. TILT RELAY
PIN 30 – 21
PIN 85 – 02
PIN 86 – 28
PIN 87 – 21A
PIN 87a – N/U

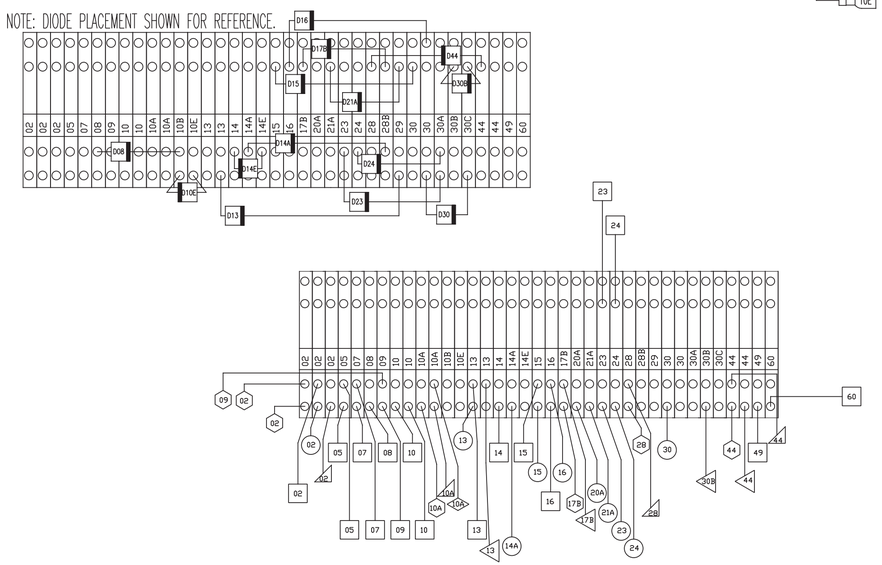
28ACR
DRIVE ENABLE RELAY
PIN 30 – 28B
PIN 85 – 02
PIN 86 –
PIN 87 – 30C
PIN 87a – N/U

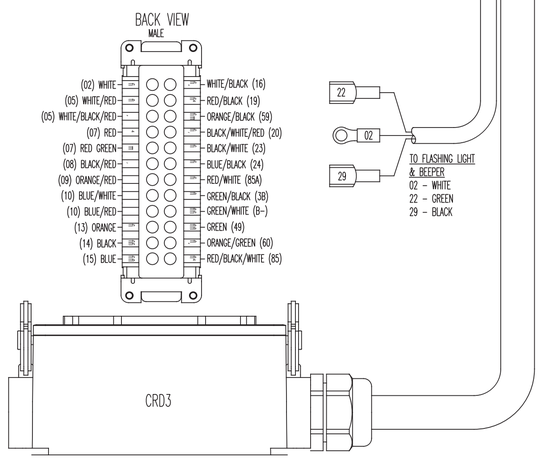
28BCR
FUNCTION ENABLLE RELAY
PIN 30 – 10A
PIN 85 – 02
PIN 86 – 28B
PIN 87 – 21
PIN 87a – N/U

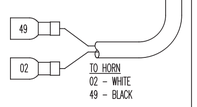
30CR
DRY STEER RELAY
PIN 30 – 30A
PIN 85 – 02
PIN 86 – 30
PIN 87 – N/U
PIN 87a – 30B

35CR
HIGH SPEED CUTOUT RELAY
PIN 30 – 10A
PIN 85 – 02
PIN 86 –
PIN 87 – 44
PIN 87a – N/U









3.16b Electrical Panel Wiring Diagram – S/N 37 300 234 & below

Serial Number Breakdown Reference Chart	
Model	Serial Number
SJ68RTE	37 300 234 & below

09CR
LIFT/DRIVE RELAY
PIN 30 - 02
PIN 85 - 02
PIN 86 - 09
PIN 87 - N/U
PIN 87a -

10CR1
TURN-ON RELAY
PIN 30 - 3A
PIN 85 - 02
PIN 86 - 10
PIN 87 -
PIN 87a - N/U

10BCR
POWER ON RELAY
PIN 30 - 3D
PIN 85 - 02
PIN 86 - 10B
PIN 87 - 10A
PIN 87a - N/U

10ECR
BASE ENABLE RELAY
PIN 30 - 02
PIN 85 - 02
PIN 86 - 10E
PIN 87 -
PIN 87a - N/U

14CR
LIFT ENABLE RELAY
PIN 30 - 36A
PIN 85 - 02
PIN 86 - 14
PIN 87 - 14A
PIN 87a - N/U

14ECR
BASE LIFT RELAY
PIN 30 - 02
PIN 85 - 02
PIN 86 - 14E
PIN 87 -
PIN 87a - N/U

20CR
SERIES/PARALLEL RELAY
PIN 30 - 44
PIN 85 - 02
PIN 86 -
PIN 87 - 20A
PIN 87a - N/U

20ACR1
SERIES/PARALLEL RELAY
PIN 30 - 15
PIN 85 - 02
PIN 86 - 20A
PIN 87 -
PIN 87a - N/U

20ACR2
SERIES/PARALLEL RELAY
PIN 30 - 16
PIN 85 - 02
PIN 86 - 20A
PIN 87 -
PIN 87a - N/U

28CR
AUX. TILT RELAY
PIN 30 - 21
PIN 85 - 02
PIN 86 - 28
PIN 87 - 21A
PIN 87a - N/U

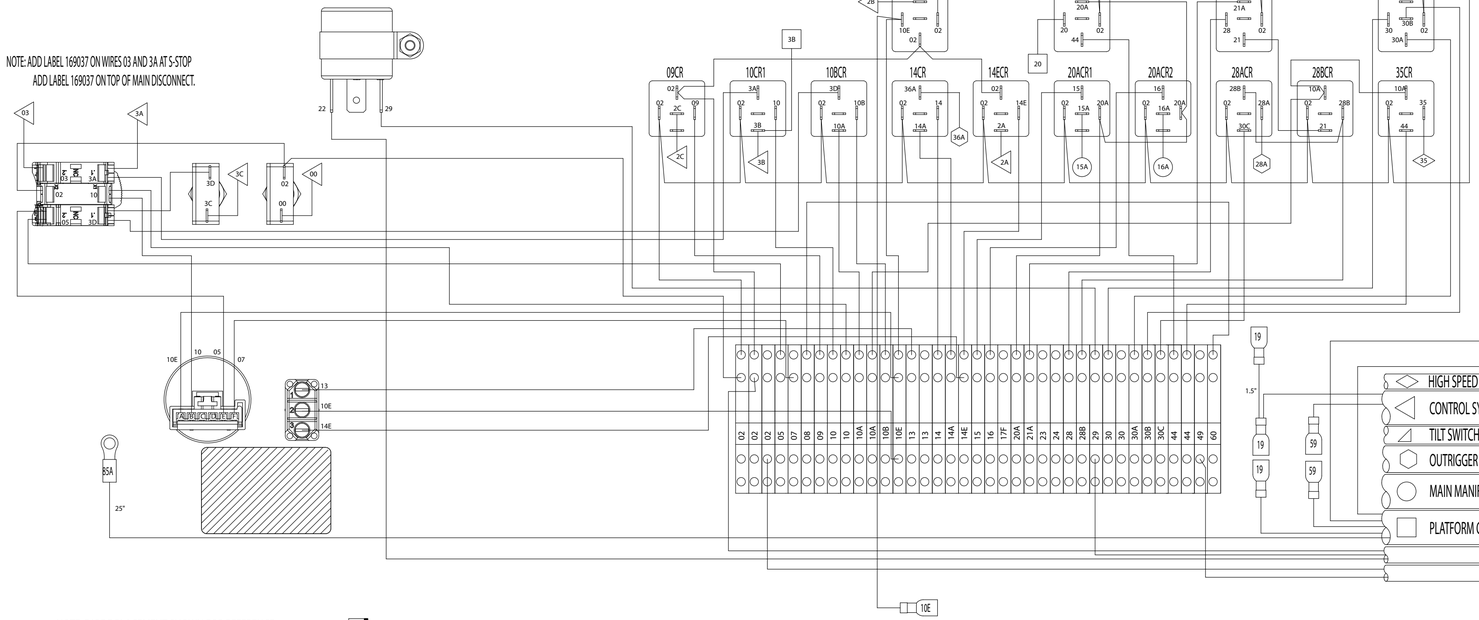
28ACR
DRIVE ENABLE RELAY
PIN 30 - 28B
PIN 85 - 02
PIN 86 -
PIN 87 - 30C
PIN 87a - N/U

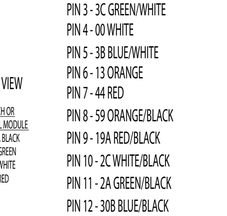
28BCR
FUNCTION ENABLE RELAY
PIN 30 - 10A
PIN 85 - 02
PIN 86 - 28B
PIN 87 - 21
PIN 87a - N/U

30CR
DRY STEER RELAY
PIN 30 - 30A
PIN 85 - 02
PIN 86 - 30
PIN 87 - N/U
PIN 87a - 30B

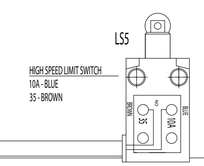
35CR
HIGH SPEED CUTOUT RELAY
PIN 30 - 10A
PIN 85 - 02
PIN 86 -
PIN 87 - 44
PIN 87a - N/U

NOTE: ADD LABEL 169037 ON WIRES 03 AND 3A AT S-STOP
ADD LABEL 169037 ON TOP OF MAIN DISCONNECT.



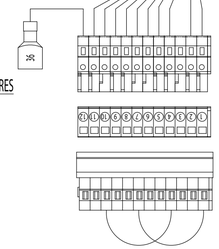


MOTOR CONTROL SYSTEM - 15 WIRES
15 PIN CONNECTOR PLUG
PIN 1 - 03 BLACK/WHITE
PIN 2 - 3A RED/WHITE
PIN 3 - 3C GREEN/WHITE
PIN 4 - 00 WHITE
PIN 5 - 3B BLUE/WHITE
PIN 6 - 13 ORANGE
PIN 7 - 44 RED
PIN 8 - 59 ORANGE/BLACK
PIN 9 - 19A RED/BLACK
PIN 10 - 2C WHITE/BLACK
PIN 11 - 2A GREEN/BLACK
PIN 12 - 30B BLUE/BLACK
PIN 13 - 2B BLUE
PIN 14 - 17B GREEN
PIN 15 - N/U



MAIN MANIFOLD HARNESS

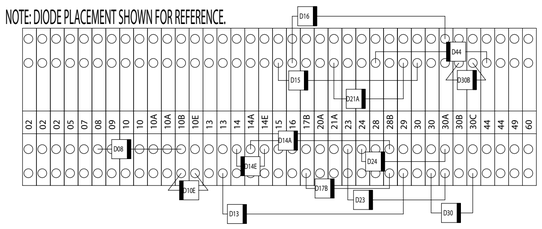
02 -	WHITE	21A -	BLUE/RED
13 -	ORANGE	20A -	BLACK/WHITE/RED
14A -	BLACK	23 -	BLACK/WHITE
15 -	BLUE	24 -	BLUE/BLACK
15A -	BLUE/YELLOW	30 -	BROWN
16 -	WHITE/BLACK		
16A -	WHITE/RED		

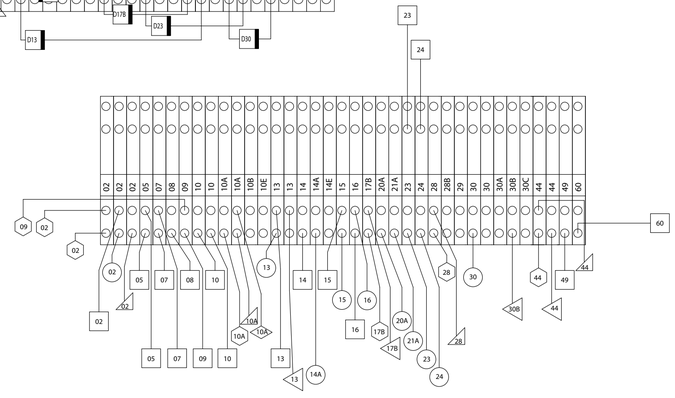


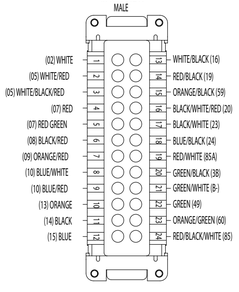
OUTRIGGER ELECTRIC PANEL - 15 WIRES
12 PIN CONNECTOR PLUG
PIN 1 - 28A GREEN/WHITE
PIN 2 - 17B BLUE/BLACK
PIN 3 - N/U
PIN 4 - 10A BLUE/WHITE
PIN 5 - 09 ORANGE
PIN 6 - 44 RED
PIN 7 - 28 GREEN/BLACK
PIN 8 - 02 WHITE
PIN 9 - 02 WHITE/BLACK
PIN 10 - 36A RED/WHITE
PIN 11 - N/U
PIN 12 - 36 YELLOW

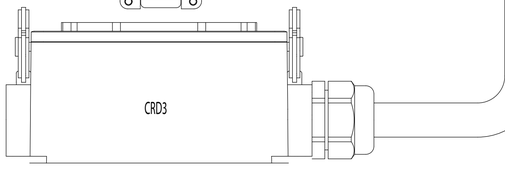
NO OUTRIGGER JUMPER PLUG
PIN 1 & 7 - BLACK
PIN 4 & 10 - BLACK

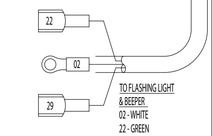
NOTE: DIODE PLACEMENT SHOWN FOR REFERENCE.







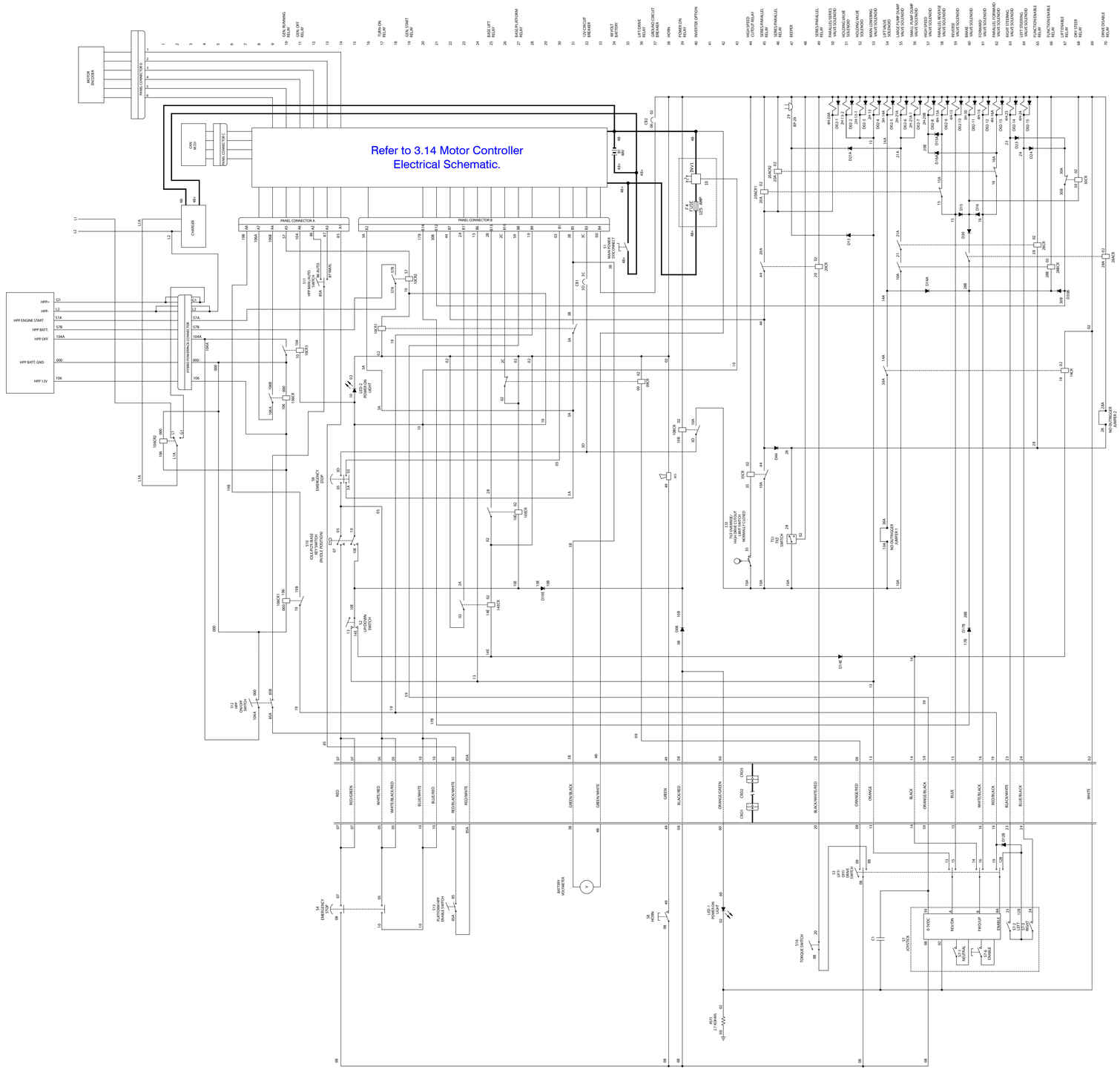




M167300AD

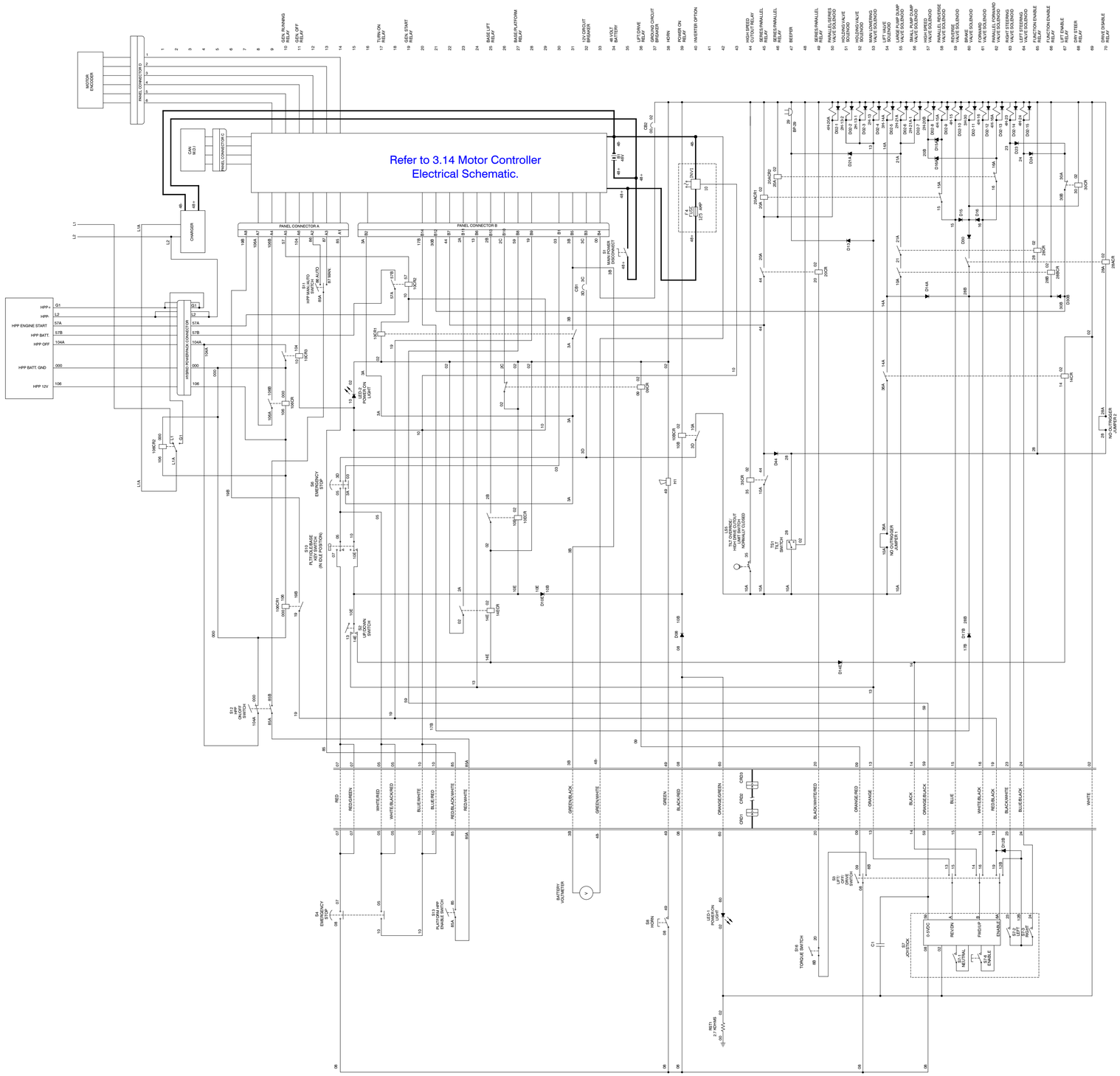
3.17a Electrical Schematic – No Options – S/N 37300235 & above

Serial Number Breakdown Reference Chart	
Model	Serial Number
SJ68RTE	37300235 & above



3.17b Electrical Schematic – No Options – S/N 37300234 & below

Serial Number Breakdown Reference Chart	
Model	**Serial Number**
SJ68RTE	37300234 & below



3.18a Electrical Schematic – All Options – S/N 37300235 & above

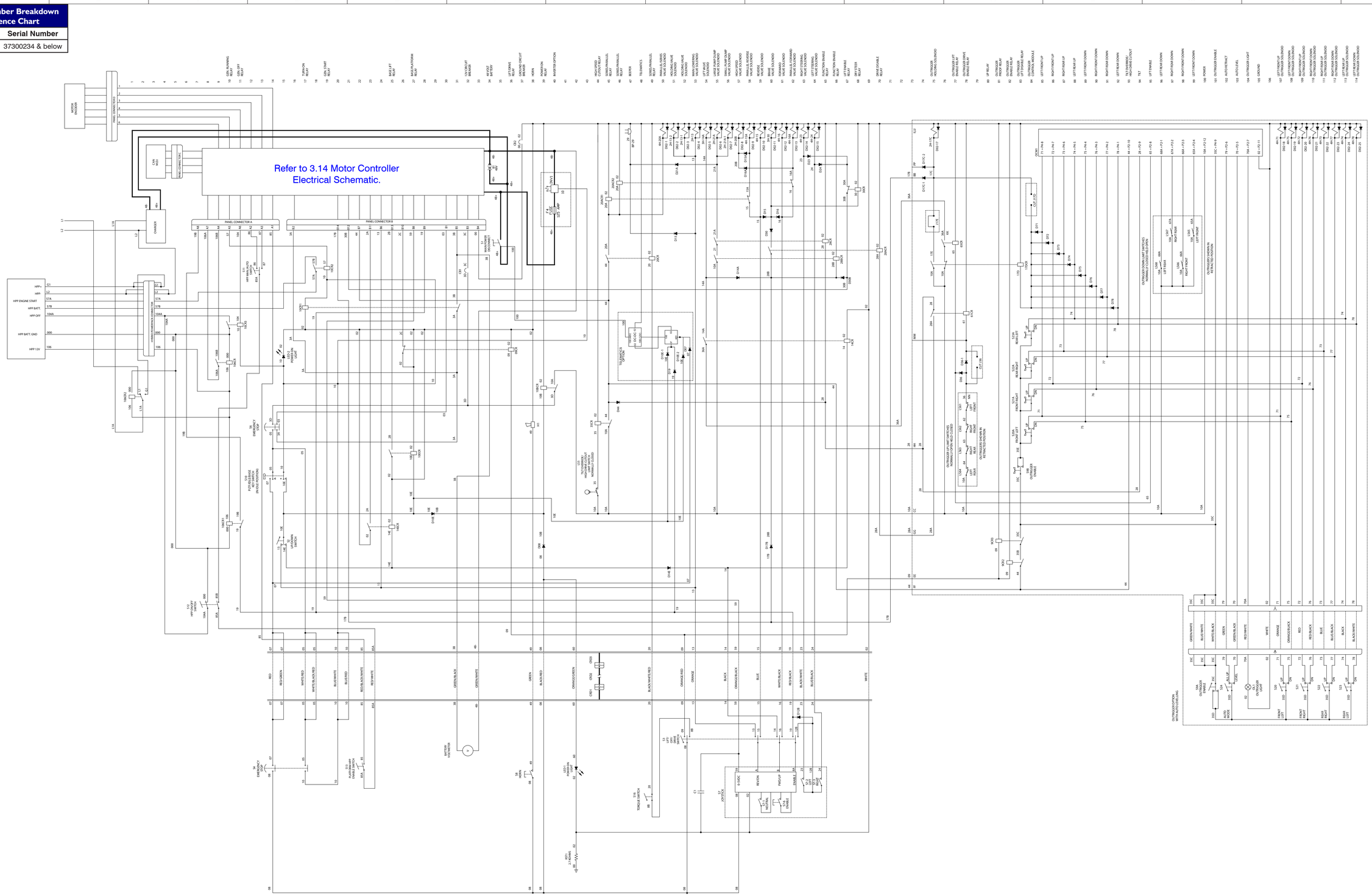
Serial Number Breakdown Reference Chart	
Model	Serial Number
SJ68RTE	37300235 & above

Refer to 3.14 Motor Controller Electrical Schematic.

3.18b Electrical Schematic – All Options – S/N 37300234 & below

Serial Number Breakdown Reference Chart	
Model	Serial Number
SJ68RTE	37300234 & below

Refer to 3.14 Motor Controller Electrical Schematic.



Section 4
TROUBLESHOOTING INFORMATION

Table of Contents

4

Table of Contents (Continued)

Hydraulic System

Introduction

The following pages contain a table of Troubleshooting Information for locating and correcting most service trouble which can develop. Careful and accurate analysis of the systems listed in the table of Troubleshooting Information will localize the trouble more quickly than any other method. This manual cannot cover all possible troubles and deficiencies that may occur. If a specific trouble is not listed, isolate the major component in which the trouble occurs, isolate whether the problem is electrical or hydraulic, and then isolate and correct the specific problem.

The content of this section is separated into probable cause and remedy. The information preceded by a number represents the probable cause. The following line, noted by a dash represents the remedy to the probable cause directly above it. See example below for clarification.

1. Probable Cause
   - Remedy

Electrical System

4.1-1 All Controls Inoperative

1. Battery disconnected or discharged.
   - Reconnect battery. Recharge if discharged.
2. Loose or dirty battery cables.
   - Clean and tighten battery cables.
3. Open or defective main power disconnect switch S1.
   - Close switch. Replace if defective.
4. Loose or broken wire #48+ from motor controller to main contactor C1.
   - Check continuity. Replace if defective.
5. Loose or broken wire #48+ from motor contactor C1 to diode D1.
   - Check continuity. Replace if defective.
6. Open or defective diode D1.
   - Check diode. Replace if defective.
7. Loose or broken wire #48+ from diode D1 to fuse F2.
   - Check continuity. Replace if defective.
8. Defective fuse F2 (10 amp).
   - Check fuse. Replace if defective.
9. Loose or broken wire #03 from fuse F2 to base emergency stop switch S6.
   - Check continuity. Replace if defective.
10. Defective base emergency stop switch S6.
    - Check switch. Replace if defective.
11. Loose or broken wire #3A from base emergency stop switch S6 to DC/DC converter.
    - Check continuity. Replace if defective.
12. Defective DC/DC converter.
    - Check for input. 48 volts between wire #3A and Battery- . Check for output. 12 volts between wire #3C and #00. Replace if defective.
13. Loose or broken wire #3C from DC/DC converter to fuse F3.
    - Check continuity. Replace if defective.
14. Defective fuse F3 (10 amp).
    - Check fuse. Replace if defective.
15. Loose or broken wire #3C from fuse F3 to motor controller pin #A17.
    - Check continuity. Replace if defective.
16. Loose or broken wire #3C from DC/DC converter to circuit breaker CB1.
    - Check continuity. Replace if defective.
17. Tripped or defective circuit breaker CB1.
    - Reset breaker. Check for defective wiring. Replace breaker if defective.
18. Loose or broken wire #3D from breaker CB1 to base emergency stop switch S6.
    - Check continuity. Replace if defective.
19. Defective base emergency stop switch S6.
    - Check switch. Replace if defective.
20. Loose or broken wire #5 from base emergency stop switch S6 to base terminal block TB-1.
    - Check continuity. Replace if defective.
21. Loose or broken wire #5 from base terminal block TB-1 to key switch S10.
    - Check continuity. Replace if defective.
22. Loose or broken wire #5 from base terminal block TB-1 to platform emergency stop switch S4.
    - Check continuity. Replace if defective.
23. Defective platform emergency stop switch S4.
    - Check switch. Replace if defective.
24. Loose or broken wire #10 from platform emergency stop switch S4 to base terminal block TB-1.
    - Check continuity. Replace if defective.
25. Loose or broken wire #10 from base terminal block TB-1 to relay 10CR1.
    - Check continuity. Replace if defective.
26. Loose or broken wire #02 from base terminal block TB-1 to relay 10CR1.

Electrical System (Continued)

- Check continuity. Replace if defective.

27. Loose or broken wire #3A from base emergency stop switch S6 to relay 10CR1.
    - Check continuity. Replace if defective.
28. Defective power on relay 10CR1.
    - Check relay. Replace if defective.
29. Loose or broken wire #3B from relay 10CR1 to motor controller pin #A1.
    - Check continuity. Replace if defective.
30. Loose or broken wire #3B from motor controller pin #A1 to contactor C1.
    - Check continuity. Replace if defective.
31. No negative output from motor controller pin #A16 to contactor C1.
    - Check continuity. Replace if defective.
32. Defective contactor C1.
    - Check contactor. Replace if defective.
33. Defective main fuse F1 (400Amp).
    - Check fuse. Replace if defective.

4.1-2 No Power To Platform

1. Open or defective key switch S10.
    - Check switch. Replace if defective.
2. Loose or broken wire #07 from key switch S10 to base terminal block TB-1.
    - Check continuity. Replace if defective.
3. Loose or broken wire #07 from base terminal block TB-1 to platform emergency stop switch S4.
    - Check continuity. Replace if defective.
4. Open or defective platform emergency stop switch S4.
    - Check switch. Replace if defective.

4.1-3 All Functions Inoperative from The Platform

1. Open or defective emergency stop switch S4.
    - Check switch. Replace if defective.
2. Loose or broken wire #08 from platform emergency stop switch S4 to base terminal block TB-1.
    - Check continuity. Replace if defective.
3. Open diode D08 at base terminal block TB-1.
    - Check diode. Replace if defective.
4. Loose or broken wire #10B from base terminal block TB-1 to relay 10BCR.
    - Check continuity. Replace if defective.
5. Loose or broken wire #02 from base terminal block TB-1 to relay 10BCR.
    - Check continuity. Replace if defective.
6. Loose or broken wire #3D from base emergency stop switch S6 to relay 10BCR.
    - Check continuity. Replace if defective.
7. Defective power on relay 10BCR.
    - Check relay. Replace if defective.
8. Loose or broken wire #10A from relay 10BCR to base terminal block TB-1.
    - Check continuity. Replace if defective.

4.1-4 Drive and Steer Inoperative (Machines without outriggers option)

1. Lift/Drive select switch S3 in lift position.
    - Turn switch to Drive position.
2. Defective contacts on lift/drive select switch between wire #8A and wire #12B.
    - Check continuity through contact. Replace if defective.

Electrical System (Continued)

3. Loose or broken wire #08 or #02 from platform emergency stop switch S4 to joystick controller S7.
   - Check continuity. Replace if defective.
4. Defective joystick controller enable switch S7-6.
   - Check switch. Replace if defective.
5. Defective joystick controller neutral switch S7-1.
   - Check switch. Replace if defective.
6. Loose or broken wire #12B from lift/drive switch S3 to steer switches S7-2 and S7-3.
   - Check continuity. Replace if defective.
7. Open diode D12B.
   - Check diode. Replace if defective.
8. Loose or broken wire #10A from base terminal block to tilt switch TS1.
   - Check continuity. Replace if defective.
9. Defective tilt switch TS1.
   - Check tilt switch. Replace if defective.
10. Loose or broken wire #28 from tilt switch TS1 to terminal block TB1.
    - Check continuity. Replace if defective.
11. Loose or broken wire #28 from base terminal TB1 to outrigger connector CN14 at pin #7.
    - Check continuity. Replace if defective.
12. Loose or broken jumper wire from #28 to # 28A on outrigger connector CN14 between pin #1 and pin #7.
    - Check continuity. Replace if defective.
13. Loose or broken wire #28A from outrigger connector CN14 at pin #1 to base terminal block TB1.
    - Check continuity. Replace if defective.
14. No output or broken wire #59 from joystick card to motor controller pin #A3. (Drive only)
    - Check continuity. Replace if defective.

4.1-5 Drive and Steer Inoperative (Machines with outriggers option)

1. Outriggers not fully retracted
   - Fully retract outrigger cylinders
2. Lift/Drive select switch S3 in lift position.
   - Turn switch to Drive position.
3. Defective contacts on lift/drive select switch between wire #8A and wire #12B.
   - Check continuity through contact. Replace if defective.
4. Loose or broken wire #08 or #02 from platform emergency stop switch S4 to joystick controller S7.
   - Check continuity. Replace if defective.
5. Defective joystick controller enable switch S7-6.
   - Check switch. Replace if defective.
6. Defective joystick controller neutral switch S7-1.
   - Check switch. Replace if defective.
7. Loose or broken wire #12B from lift/drive switch S3 to steer switches S7-2 and S7-3.
   - Check continuity. Replace if defective.
8. Open diode D12B.
   - Check diode. Replace if defective.
9. Loose or broken wire #10A from base terminal block TB1 to outrigger control module OCM1 at pin #P2-12.
   - Check continuity. Replace if defective.
10. Loose or broken wire #28 from outrigger control module OCM1 at pin #P2-9 to outrigger connector CN14 at pin #7.
    - Check continuity. Replace if defective.

Electrical System (Continued)

11. Left rear outrigger limit switch LS64 is out of adjustment or defective.
    - Check continuity through switch. Adjust switch if out of adjustment. Replace if defective.
12. Right rear outrigger limit switch LS63 is out of adjustment or defective.
    - Check continuity through switch. Adjust switch if out of adjustment. Replace if defective.
13. Right front outrigger limit switch LS62 is out of adjustment or defective.
    - Check continuity through switch. Adjust switch if out of adjustment. Replace if defective.
14. Left front outrigger limit switch LS61 is out of adjustment or defective.
    - Check continuity through switch. Adjust switch if out of adjustment. Replace if defective.
15. Defective drive enable relay 61CR.
    - Check relay. Replace if defective.

4.1-6 Brakes Does not Release

1. Loose or broken wire #30 from base terminal block TB1 to brake valve coil 3H-30.
    - Check continuity. Replace if defective.
2. Defective brake valve coil 3H-30.
    - Check continuity through coil. Replace if defective.
3. Loose or broken wire #02 from brake valve 3H-30 to base terminal block TB1.
    - Check continuity. Replace if defective.

4.1-7 Steer Right Inoperative

1. Defective steer right switch S7-3 in controller S7.
    - Check switch. Replace if defective.
2. Loose or broken wire #23 from steer right switch S7-3 to base terminal block TB1.
    - Check continuity. Replace if defective.
3. Loose or broken wire #23 from base terminal block TB1 to steer right valve coil 4H-23.
    - Check continuity. Replace if defective.
4. Defective steer right valve coil 4H-23.
    - Check coil. Replace if defective.
5. Loose or broken wire #02 from steer right valve coil 4H-23 to base terminal block TB1.
    - Check continuity. Replace if defective.
6. Open diode D23.
    - Check diode. Replace if defective.
7. Loose or broken wire #30A from base terminal block TB1 to relay 30CR.
    - Check continuity. Replace if defective.
8. Defective steer enable relay 30CR.
    - Check relay. Replace if defective.
9. Loose or broken wire #30B from relay 30CR to base terminal block TB1.
    - Check continuity. Replace if defective.
10. Loose or broken wire #30B from base terminal block TB1 to motor controller pin #B6.
    - Check continuity. Replace if defective.

4.1-8 Steer Left Inoperative

1. Defective steer left switch S7-2 in controller S7.
    - Check switch. Replace if defective.
2. Loose or broken wire #24 from steer left switch S7-2 to base terminal block TB1.
    - Check continuity. Replace if defective.
3. Loose or broken wire #24 from base terminal block TB1 to steer left valve coil 4H-24.
    - Check continuity. Replace if defective.
4. Defective steer left valve coil 4H-24.
    - Check coil. Replace if defective.

Electrical System (Continued)

5. Loose or broken wire #02 from steer left valve coil 4H-24 to base terminal block TB1.
   - Check continuity. Replace if defective.
6. Open diode D24.
   - Check diode. Replace if defective.
7. Loose or broken wire #30A from base terminal block TB1 to relay 30CR.
   - Check continuity. Replace if defective.
8. Defective steer enable relay 30CR.
   - Check relay. Replace if defective.
9. Loose or broken wire #30B from relay 30CR to base terminal block TB1.
   - Check continuity. Replace if defective.
10. Loose or broken wire #30B from base terminal block TB1 to motor controller pin #B6.
   - Check continuity. Replace if defective.

4.1-9 Reverse Drive Inoperative

1. Defective contacts on lift/drive select switch between wire #A and wire #15.
   - Check continuity through contact. Replace if defective.
2. Defective controller S7.
   - Check controller. Replace if defective.
3. No output or broken wire #A from joystick card to contacts on Lift/Drive select switch between wire #A and wire #15.
   - Check continuity. Replace if defective.
4. Loose or broken wire #15 from Lift/Drive select switch S3 to reverse valve coil 4H-15.
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from reverse valve coil 4H-15 to base terminal block TB1.
   - Check continuity. Replace if defective.
6. Loose or broken wire #15 from base terminal block TB1 to relay 20ACR1 (In parallel drive only).
   - Check continuity. Replace if defective.
7. Defective relay 20ACR1 (in parallel drive only).
   - Check relay. Replace if defective.
8. Loose or broken wire #15A from relay 20ACR1 to parallel reverse valve coil 4H-15A (in parallel drive only).
   - Check continuity. Replace if defective.
9. Loose or broken wire #02 from base terminal block TB1 to parallel reverse valve coil 4H-15A (in parallel drive only).
   - Check continuity. Replace if defective.
10. Defective parallel reverse valve coil 4H-15A (in parallel drive only).
   - Check coil. Replace if defective.
11. Open diode D15, D15A or D30.
   - Check diodes. Replace if defective.

4.1-10 Forward Drive Inoperative

1. Defective contacts on lift/drive select switch between wire #A and wire #16.
   - Check continuity through contact. Replace if defective.
2. Defective controller S7.
   - Check controller. Replace if defective.
3. No output or broken wire #B from joystick card to contacts on Lift/Drive select switch between wire #B and wire #16.
   - Check continuity. Replace if defective.
4. Loose or broken wire #16 from Lift/Drive select switch S3 to forward valve coil 4H-16.
   - Check continuity. Replace if defective.

Electrical System (Continued)

5. Loose or broken wire #02 from forward valve coil 4H-16 to base terminal block TB1.
   - Check continuity. Replace if defective.
6. Loose or broken wire #16 from base terminal block TB1 to relay 20ACR2 (In parallel drive only).
   - Check continuity. Replace if defective.
7. Defective relay 20ACR2 (in parallel drive only).
   - Check relay. Replace if defective.
8. Loose or broken wire #16A from relay 20ACR2 to parallel forward valve coil 4H-16A (in parallel drive only).
   - Check continuity. Replace if defective.
9. Loose or broken wire #02 from base terminal block TB1 to parallel forward valve coil 4H-16A (in parallel drive only).
   - Check continuity. Replace if defective.
10. Defective parallel forward valve coil 4H-16A (in parallel drive only).
   - Check coil. Replace if defective.
11. Open diode D16, D16A or D30.
   - Check diodes. Replace if defective.

4.1-11 High Drive Speed Inoperative

NOTE

When battery charge state reaches 25% the machine goes into limp mode. Ensure proper charge on batteries.

1. Lift/Drive select switch S3 in lift position.
   - Turn switch to Drive position.
2. Loose or broken wire #08 from platform emergency stop switch S4 to lift/drive select switch S3.
   - Check continuity. Replace if defective.
3. Defective contacts on lift/drive select switch between wire #08 and wire #8B.
   - Check continuity through contact. Replace if defective.
4. Loose or broken wire #8B from Lift/Drive select switch S3 to torque switch S16.
   - Check continuity. Replace if defective.
5. Torque switch S16 is in High torque position or is defective.
   - Select low torque. Check switch. Replace if defective.
6. Loose or broken wire #20 from torque switch S16 to relay 20CR.
   - Check continuity. Replace if defective.
7. Loose or broken wire #02 from relay 20CR to base terminal block TB1.
   - Check continuity. Replace if defective.

8. Loose or broken wire #10A from base terminal block to high drive/tilt override limit switch LS5.
   - Check continuity. Replace if defective.
9. Incorrectly set or defective high drive/tilt override limit switch LS5.
   - Adjust switch. Replace if defective.
10. Loose or broken wire #35 from high drive/tilt override limit switch LS5 to relay 35CR.
   - Check continuity. Replace if defective.
11. Loose or broken wire #02 from relay 35CR to base terminal block.
   - Check continuity. Replace if defective.
12. Defective relay 35CR.
   - Check relay. Replace if defective.
13. Loose or broken wire #10A from base terminal block TB1 to relay 35CR.
   - Check continuity. Replace if defective.
14. Loose or broken wire #44 from relay 35CR to base terminal block TB1.

Electrical System (Continued)

- Check continuity. Replace if defective.

15. Loose or broken wire #44 from base terminal block TB1 to motor controller pin #A5.
    - Check continuity. Replace if defective.
16. Loose or broken wire #44 from base terminal block TB1 to relay 20CR.
    - Check continuity. Replace if defective.
17. Defective relay 20CR.
    - Check relay. Replace if defective.
18. Loose or broken wire #20A from relay 20CR to relay 20ACR1.
    - Check continuity. Replace if defective.
19. Loose or broken wire #20A from relay 20ACR1 to relay 20ACR2.
    - Check continuity. Replace if defective.
20. Loose or broken wire #20A from relay 20ACR2 to base terminal block TB1.
    - Check continuity. Replace if defective.
21. Loose or broken wire #20A from base terminal block to series/parallel valve coil 4H-20A.
    - Check continuity. Replace if defective.
22. Loose or broken wire #02 from series/parallel valve coil 4H-20A to base terminal block TB1.
    - Check continuity. Replace if defective.
23. Defective series/parallel valve coil 4H-20A.
    - Check coil. Replace if defective.
24. Loose or broken wire #02 from relay 20ACR1 to base terminal block TB1 (reverse drive only).
    - Check continuity. Replace if defective.
25. Defective relay 20ACR1 (reverse drive only).
    - Check relay. Replace if defective.
26. Loose or broken wire #02 from relay 20ACR2 to base terminal block TB1 (forward drive only).
    - Check continuity. Replace if defective.
27. Defective relay 20ACR2 (forward drive only).
    - Check relay. Replace if defective.

4.1-12 Up Circuit Inoperative from Platform

1. Lift/Drive select switch S3 in drive position.
    - Select lift on lift/drive select switch.
2. Defective contact on lift/drive select switch S3 between wire #B and wire #14.
    - Check continuity through contact. Replace if defective.
3. No output or broken wire #B from joystick card to contacts on Lift/Drive select switch between wire #B and wire #14.
    - Check continuity. Replace if defective.
4. Loose or broken wire #14 from contact on lift/drive select switch S3 to base terminal block TB1.
    - Check continuity. Replace if defective.

4.1-13 Up Circuit Inoperative from Base Control Console

1. Loose or broken wire #10E from base terminal block TB1 to base/up/down switch S2.
    - Check continuity. Replace if defective.
2. Loose or broken wire #14E from base/up/down switch S2 to base terminal block TB1.
    - Check continuity. Replace if defective.
3. Defective base/up/down switch S2.
    - Check switch. Replace if defective.
4. Open diode D14E.
    - Check diode. Replace if defective.
5. Loose or broken wire #14E from base terminal block to relay 14ECR.
    - Check continuity. Replace if defective.

Electrical System (Continued)

6. Loose or broken wire #02 from relay 14ECR to base terminal block. (two places)
   - Check continuity. Replace if defective.
7. Defective relay 14ECR.
   - Check relay. Replace if defective.
8. Loose or broken wire #2A from relay 14ECR to motor controller pin #B4.
   - Check continuity. Replace if defective.
9. Loose or broken wire #10E from base terminal block to relay 10ECR.
   - Check continuity. Replace if defective.
10. Loose or broken wire #02 from relay 10ECR to base terminal block. (two places)
   - Check continuity. Replace if defective.
11. Defective relay 10ECR.
   - Check relay. Replace if defective.
12. Loose or broken wire #2B from relay 10ECR to motor controller pin #B11.
   - Check continuity. Replace if defective.

4.1-14 Up Circuit Inoperative from Platform or Base Control Console (without Outriggers)

1. Loose or broken wire #14 from base terminal block TB1 to up relay 14CR.
   - Check continuity. Replace if defective.
2. Loose or broken wire #10A from base terminal block TB1 to outrigger connector CN14 at pin #4.
   - Check continuity. Replace if defective.
3. Loose or broken jumper wire from #10A to # 36A on outrigger connector CN14 between pin #4 and pin #10.
   - Check continuity. Replace if defective.
4. Loose or broken wire #36A from outrigger connector CN14 at pin #10 to base terminal block TB1.
   - Check continuity. Replace if defective.
5. Loose or broken wire #36A from base terminal block TB1 to up relay 14CR.
   - Check continuity. Replace if defective.
6. Loose or broken wire #02 from relay 14CR to base terminal block.
   - Check continuity. Replace if defective.
7. Defective relay 14CR.
   - Check relay. Replace if defective.
8. Loose or broken wire #14A from up relay 14CR to base terminal block TB1.
   - Check continuity. Replace if defective.
9. Loose or broken wire #14A from base terminal block TB1 to lift valve coil 3H-14A.
   - Check continuity. Replace if defective.
10. Loose or broken wire #02 from lift valve coil 3H-14A to base terminal block TB1.
   - Check continuity. Replace if defective.
11. Defective lift valve coil 3H-14A.
   - Check coil. Replace if defective.
12. Defective diode D14A.
   - Check diode. Replace if defective.
13. Loose or broken wire #28B from base terminal block TB1 to enable relay 28BCR.
   - Check continuity. Replace if defective.
14. Loose or broken wire #02 from relay 28BCR to base terminal block.
   - Check continuity. Replace if defective.
15. Defective relay 28BCR.
   - Check relay. Replace if defective.
16. Loose or broken wire #10A from base terminal block TB1 to enable relay 28BCR.
   - Check continuity. Replace if defective.

Electrical System (Continued)

17. Loose or broken wire #21 from enable relay 28BCR to enable relay 28CR.
    - Check continuity. Replace if defective.
18. No output on wire #28 from tilt switch to base terminal block TB1.
    - Check tilt switch. Reset if required. Replace if defective.
19. Loose or broken wire #28 from base terminal block TB1 to enable relay 28CR.
    - Check continuity. Replace if defective.
20. Loose or broken wire #02 from relay 28CR to base terminal block.
    - Check continuity. Replace if defective.
21. Defective relay 28CR.
    - Check relay. Replace if defective.
22. Loose or broken wire #21A from enable relay 28CR to base terminal block TB1.
    - Check continuity. Replace if defective.
23. Loose or broken wire #21A from base terminal block TB1 to dump valve coils 2H-21A and 2H-21A-1.
    - Check continuity. Replace if defective.
24. Loose or broken wire #02 from dump valve coils 2H-21A and 2H-21A-1 to base terminal block TB1.
    - Check continuity. Replace if defective.
25. Defective dump valve coils 2H-21A and 2H-21A-1.
    - Check coil. Replace if defective.

4.1-15 Platform does not Lift from Platform or Base Control Console with Outriggers Retracted (Lift Operates Correctly with Outriggers Extended)

1. Outriggers not fully retracted.
    - Fully retract outrigger cylinders.
2. Loose or broken wire #10A from base terminal block TB1 to pin #4 on connector CN14 at the outrigger board.
    - Check continuity. Replace if defective.
3. Loose or broken wire #10A from outrigger board to outrigger limit switch LS64.
    - Check continuity. Replace if defective.
4. Defective outrigger limit switch LS64.
    - Check switch. Replace if defective.
5. Loose or broken wire #64 from outrigger limit switch LS64 to outrigger board.
    - Check continuity. Replace if defective.
6. Loose or broken wire #64 from outrigger board to outrigger limit switch LS63.
    - Check continuity. Replace if defective.
7. Defective outrigger limit switch LS63.
    - Check continuity. Replace if defective.
8. Loose or broken wire #63 from outrigger limit switch LS63 to outrigger board.
    - Check continuity. Replace if defective.
9. Loose or broken wire #63 from outrigger board to outrigger limit switch LS62.
    - Check continuity. Replace if defective.
10. Defective Limit Switch LS62.
    - Check switch. Replace if defective.
11. Loose or broken wire #62 from outrigger limit switch LS62 to outrigger board.
    - Check continuity. Replace if defective.
12. Loose or broken wire #62 from outrigger board to outrigger limit switch LS61.
    - Check continuity. Replace if defective.
13. Defective outrigger limit switch LS61.
    - Check switch. Replace if defective.
14. Loose or broken wire #36 from outrigger limit switch LS61 to outrigger board.
    - Check continuity. Replace if defective.
15. Open diode D36 on outrigger board.

Electrical System (Continued)

- Check diode. Replace if defective.

16. Open diode D36-1 at pin #1 on CN22 on outrigger board.
    - Check diode. Replace if defective.

4.1-16 Platform does not Lift from Platform or Base Control Console with Outriggers Extended

1. Outriggers not extended enough.
    - Extend outriggers to take weight off tires (refer to operator section).
2. Loose or broken wire #10A from base terminal block TB1 to pin #4 on connector CN14 at the outrigger board.
    - Check continuity. Replace if defective.
3. Loose or broken wire #10A from outrigger board to outrigger limit switch LS68.
    - Check continuity. Replace if defective.
4. Defective outrigger limit switch LS68.
    - Check switch. Replace if defective.
5. Loose or broken wire #68A from outrigger limit switch LS68 to outrigger board.
    - Check continuity. Replace if defective.
6. Loose or broken wire #10A from outrigger board to outrigger limit switch LS67.
    - Check continuity. Replace if defective.
7. Defective outrigger limit switch LS67.
    - Check switch. Replace if defective.
8. Loose or broken wire #67A from outrigger limit switch LS67 to outrigger board.
    - Check continuity. Replace if defective.
9. Loose or broken wire #10A from outrigger board to outrigger limit switch LS66.
    - Check continuity. Replace if defective.
10. Defective outrigger limit switch LS66.
    - Check switch. Replace if defective.
11. Loose or broken wire #66A from outrigger limit switch LS66 to outrigger board.
    - Check continuity. Replace if defective.
12. Loose or broken wire #10A from outrigger board to outrigger limit switch LS65.
    - Check continuity. Replace if defective.
13. Defective outrigger limit switch LS65.
    - Check switch. Replace if defective.
14. Loose or broken wire #65A from outrigger limit switch LS65 to outrigger board.
    - Check continuity. Replace if defective.
15. Check for power on wire #65 at outrigger control module at pin P2-8.
    - If no voltage present, proceed to outrigger control module troubleshooting.
16. Loose or broken wire #65 from outrigger control module at pin P2-8 to outrigger board.
    - Check continuity. Replace if defective.
17. Check for power on wire #36A at pin 10 connector CN14 at the outrigger board.
    - If no voltage present, check relay 65CR on the outrigger board.

4.1-17 Platform does not Lift from Platform or Base Control Console with

Outriggers Extended or Retracted

1. Defective lift enable relay 65CR.
    - Check relay. Replace if defective.
2. Defective lift disable relay 17DCR.
    - Check relay. Replace if defective.

Electrical System (Continued)

3. Loose or broken wire #14 from base terminal block TB1 to outrigger connector.
   - Check continuity. Replace if defective.
4. Loose or broken wire #02 from base terminal block TB1 to outrigger connector.
   - Check continuity. Replace if defective.
5. Defective up relay 14CR.
   - Check relay. Replace if defective.
6. Loose or broken wire #36A from pin#10 on connector CN14 to up relay 14CR.
   - Check continuity. Replace if defective.
7. Loose or broken wire #14A from up relay 14CR to base terminal block TB1.
   - Check continuity. Replace if defective.

4.1-18 Down Circuit Inoperative from Platform

1. Lift/Drive select switch S3 in drive position.
   - Select lift on lift/drive select switch.
2. Defective contact on lift/drive select switch S3 between wire #A and wire #13.
   - Check continuity through contact. Replace if defective.
3. No output or broken wire #A from joystick card to contacts on Lift/Drive select switch between wire #A and wire #13.
   - Check continuity. Replace if defective.
4. Loose or broken wire #13 from contact on lift/drive select switch S3 to base terminal block TB1.
   - Check continuity. Replace if defective.
5. Loose or broken wire #13 from base terminal block TB1 to lowering valve 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check continuity. Replace if defective.
6. Loose or broken wire #02 from base terminal block TB1 to lowering valve 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check continuity. Replace if defective.
7. Defective lowering valve coil 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check Coil. Replace if defective.

4.1-19 Down Circuit Inoperative from Base

1. Loose or broken wire #10E from base terminal block TB1 to base up/down switch S2.
   - Check continuity. Replace if defective.
2. Loose or broken wire #13 from base up/down switch S2 to base terminal block TB1.
   - Check continuity. Replace if defective.
3. Defective base up/down switch S2.
   - Check switch. Replace if defective.
4. Loose or broken wire #13 from base terminal block TB1 to lowering valve 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from base terminal block TB1 to lowering valve 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check continuity. Replace if defective.
6. Defective lowering valve coil 2H-13 or holding valve 2H-13-1 and 2H-13-2.
   - Check Coil. Replace if defective.

Electrical System (Continued)

4.1-20 All Outriggers Inoperative (Auto-Level and Manual)

WARNING

Scissors lift must be below high speed limit switch for outriggers to function.

NOTE

For the outriggers to function the upper control box must be in the lift position and the scissor stack stowed or fully retracted.

1. Loose or broken wire # 44 from base terminal block TB1 to pin #6 on connector CN14 on outrigger board.
   - Check for continuity. Replace if defective.
2. No power at wire #9 at pin #5 on connector CN14 on outrigger board.
   - If no power is present check for continuity on wire #9 back to the main terminal block TB1.Replace if defective.
3. Defective relay 9CR2 or 9CR3 on outrigger board.
   - Check relays. Replace if defective.
4. Open diode D17C-1 on outrigger board.
   - Check diode. Replace if defective.
5. Defective relay 17DCR on outrigger board.
   - Check relay. Replace if defective.
6. Open or defective fuse jumper J17E on outrigger board.
   - Check fuse. Replace if defective.
7. Loose or broken wire # 17A from pin #2 on connector CN14 on outrigger board to terminal block TB1.
   - Check for continuity. Replace if defective.
8. Loose or broken wire #17C at pin #1 or wire #02 at pin #2 on connector CN21 on outrigger board to outrigge holding valve coil 2H-17C.
   - Check for continuity. Replace if defective.
9. Defective outrigger holding valve coil 2H-17C.
   - Check coil. Replace if defective.
10. Loose or broken wire #17C from outrigger board connector CN14 pin 2 to motor controller pin #B13.
   - Check continuity. Replace if defective.

4.1-21 All Outriggers Inoperative (Auto-Level and Manual from Platform Controls)

1. Loose or broken wires #35C at pin #1 on connector CN20 on outrigger board through outrigger cables and plugs to the outrigger enable switch S9A in the control box.
   - Check for continuity. Replace if defective.
2. Loose or broken wire #35D from outrigger enable switch S9A to pin #5 on the outrigger control console plug.
   - Check for continuity. Replace if defective.
3. Defective outrigger enable switch S9A.
   - Check switch. Replace if defective.

4.1-22 All Outriggers Inoperative (Base Controls only)

1. Defective outrigger enable switch S9B.
   - Check switch. Replace if defective.

Electrical System (Continued)

4.1-23 All Outriggers Inoperative (Auto Level only)

A: Led Power Indicator Light at Outrigger Control Module (OCM1) Not On (Constant)

1. Loose or broken wire #10A at pin #1 of the tilt switch connector to pin P2-12 on the outrigger control module OCM1.
   - Check for continuity. Replace if defective.
2. Loose or broken wire #10A at pin #1 of the tilt switch connector to base terminal block TB1.
   - Check for continuity. Replace if defective.
3. Loose or broken wire # 02 at pin #3 of the tilt switch connector to pin P2-11 on the outrigger control module OCM1.
   - Check for continuity. Replace if defective.
4. Loose or broken wire #02 at pin #3 of the tilt switch connector to base terminal block TB1.
   - Check for continuity. Replace if defective.
5. Defective outrigger control module OCM1.
   - Replace.

Electrical System (Continued)

4.1-24 All Outriggers Inoperative (Auto Level only)

B: Led Power Indicator Light at Outrigger Control Module (OCM1) Flashing

Flash Code	Probable Cause	Remedy
1/1	1. Outriggers are all up and machine is tilted.	1. Level the machine.
1/2	1. Machine is elevated. 2. Loose or broken wire # 35.	1. Lower the scissor stack below high speed limit switch. 2. Check for input voltage on wire #35 at pin P2-10 of the outrigger control module (OCM1). Replace if defective.
2/2	1. At least one outrigger is not fully retracted. 2. Defective outrigger rod limit switch (LS61, LS62, LS63, LS64) or wiring. 3. Defective diode (D36) on outrigger board.	1. Fully retract all outriggers. 2. Replace defective or damaged switch(es) or wiring. 3. Check for continuity. Replace if defective.
2/1	1. Outriggers are all down and the machine is not fully level.	1. Move machine to less sloped terrain if it will not lift.
5/5	1. Power on wire #70 or #79 at power on. 2. Power on wire #70 or #79 when manually operating outriggers.	1. Check for power on wire #70 or #79 at pin P2-5 or P2-6 of the outrigger control module. Replace defective component. 2. Check for power on wire #70 or #79 while manually operating an outrigger.
5/2	1. Low or no voltage on wire #35c. 2. Loose or broken wire on #35c.	1. Check battery and charging system to ensure minimum 9 volts. 2. Check for input voltage on wire #35c at pin P4-9 of outrigger control module (OCM1).
7/1	1. Excessive vibration. 2. Defective outrigger control module.	1. Outrigger control module cannot read tilt sensor. 2. Replace.
6/6	1. Outriggers are being manually controlled.	1. Indicates function activated. No repair necessary.
7/8	1. Error occured while self diagnosing the hardware fail safe.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
5/1	1. Low input voltage to outrigger control module.	1. Check for minimum 9 volts between wire #02 at pin P2-11 and wire #10A at pin P2-12 at outrigger control module.
7/7	1. Startup error occurred while self diagnosing.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
7/5	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
7/2	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
8/1	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
8/2	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
8/3	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
8/4	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
8/5	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.
7/6	1. Internal failure of OCM1.	1. Turn off power to reset the outrigger control module. Turn power back on and see if the code has cleared. If problem persists, replace outrigger control module.

60416AB

Electrical System (Continued)

4.1-25 Left Front Outrigger Inoperative Manually

1. Defective left front outrigger switch S20 at platform control console or S20A at base control console.
   - Check switch. Replace if defective.
2. Loose or broken wire #71(up) from outrigger control console to pin #6 (up) on connector CN20 at outrigger board, or wire #75 (down) to pin #7 (down).
   - Check continuity. Replace if defective.
3. Open diode D71 (up) or D75 (down) on outrigger board.
   - Check diode. Replace if defective.
4. Loose or broken wire #71(up) at pin #7 (up) or pin #75 (down) at pin #8 (down) on connector CN21 at outrigger board to valve coil 4H71 (up) or 4H75 (down).
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from valve coil 4H71 (up) or 4H75 (down) to pin #2 on connector CN21 at the outrigger board.
   - Check continuity. Replace if defective.

4.1-26 Right Front Outrigger Inoperative Manually

1. Defective right front outrigger switch S21 at platform control console or S21A at base control console.
   - Check switch. Replace if defective.
2. Loose or broken wire #72 (up) from outrigger control console to pin #8 (up) on connector CN20 at outrigger board, or wire #76 (down) to pin #9 (down).
   - Check continuity. Replace if defective.
3. Open diode D72 (up) or D76 (down) on outrigger board.
   - Check diode. Replace if defective.
4. Loose or broken wire #72 (up) at pin #9 (up) or wire #76 (down) at pin #10 (down) on connector CN21 at outrigger board to valve coil 4H72 (up) or 4H76 (down).
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from valve coil 4H72 (up) or 4H76 (down) to pin #2 on connector CN21 at the outrigger board.
   - Check continuity. Replace if defective.

4.1-27 Right Rear Outriggers Inoperative Manually

1. Defective right rear outrigger switch S22 at platform control console or S22A at base control console.
   - Check switch. Replace if defective.
2. Loose or broken wire #73(up) from outrigger control console to pin #3 (up) on connector CN20 at outrigger board, or wire #77 (down) to pin #4 (down).
   - Check continuity. Replace if defective.
3. Open diode D73 (up) or D77 (down) on outrigger board.
   - Check diode. Replace if defective.
4. Loose or broken wire #73(up) at pin #4 (up) or wire #77 (down) at pin #5 (down) on connector CN21 at outrigger board to valve coil 4H73 (up) or 4H77 (down).
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from valve coil 4H73 (up) or 4H77 (down) to pin #2 on connector CN21 at the outrigger board.
   - Check continuity. Replace if defective.

Electrical System (Continued)

4.1-28 Left Rear Outriggers Inoperative Manually

1. Defective left rear outrigger switch S23 at platform control console or S23A at base control console.
   - Check switch. Replace if defective.
2. Loose or broken wire #74 (up) from outrigger control console to pin #5 (up) on connector CN20 at outrigger board, or #78 (down) from pin #2 (down).
   - Check continuity. Replace if defective.
3. Open diode D74 (up) or D78 (down) on outrigger board.
   - Check diode. Replace if defective.
4. Loose or broken wire #74(up) at pin #6 (up) or wire #78 (down) at pin #3 (down) on connector CN21 at outrigger board to valve coil 4H74 (up) or 4H78 (down).
   - Check continuity. Replace if defective.
5. Loose or broken wire #02 from valve coil 4H74 (up) or 4H78 (down) to pin #2 on connector CN21 at the outrigger board.
   - Check continuity. Replace if defective.

4.1-29 Individual Outrigger Functions Inoperative (Auto Level)

1. Loose or broken wire #71 #75 (depending on function not working) at outrigger control module plug P4 pins 18.
   - Check connections of outrigger functions not working (refer to Section 5 for pin reference chart). Replace if defective.
2. No output from outrigger control module OCM1 at plug P4 pins 18.
   - Turn off power to reset the outrigger control module. Turn power back on and retest. If problem persists, replace outrigger control module.

4.1-30 Auto Level Inoperative

1. Loose or broken wire #35D from outrigger enable switch S9A to auto mode outrigger switch S24.
   - Check continuity. Replace if defective.
2. Defective auto mode outrigger switch S24.
   - Check switch. Replace if defective.
3. Loose or broken wire #10A at pin #P212 on outrigger control module OCM1.
   - Check for power at P212. If no voltage present, check continuity of wire. Replace if defective.
4. Loose or broken wire #44 at pin #P210 on outrigger control module OCM1.
   - Check for power at P210. If no voltage present, check continuity of wire. Replace if defective.
5. Loose or broken wire #02 at pin #P211 on outrigger control module OCM1.
   - Check for ground at P211. If no ground present, check continuity of wire. Replace if defective.
6. Loose or broken wire #70 from auto mode outrigger switch S24 to pin #P25 on outrigger control module OCM1.
   - Check continuity. Replace if defective.
7. For additional information, refer to sections 4 & 5 Outrigger Control Module Troubleshooting.

4.1-31 Auto All Up Inoperative (Retract)

1. Loose or broken wire #35D from outrigger enable switch S9A to auto mode outrigger switch S24.
   - Check continuity. Replace if defective.
2. Defective auto mode outrigger switch S24.
   - Check switch. Replace if defective.
3. Loose or broken wire #10A at pin #P212 on outrigger control module OCM1.
   - Check for power at P212. If no voltage present, check continuity of wire. Replace if defective.

Electrical System (Continued)

4. Loose or broken wire #44 at pin #P212 on outrigger control module OCM1.
   - Check for power at P210. If no voltage present, check continuity of wire. Replace if defective.
5. Loose or broken wire #02 at pin #P2-11 on outrigger control module OCM1.
   - Check for ground at P211. If no ground present, check continuity of wire. Replace if defective.
6. Loose or broken wire #79 from auto mode outrigger switch S24 to pin #P26 on outrigger control module OCM1.
   - Check continuity. Replace if defective.
7. For additional information, refer to section 5 Outrigger Control Module.

Hybrid Power Pack (Gasoline)

4.1-32 Hybrid Power Pack does not Start (Manual mode)

1. Base HPP switch S12 in the off position.
   - Turn switch to manual position.
2. Platform HPP enable switch S13 in the off position.
   - Turn switch to manual position.
3. Base HPP Manual/Auto switch S11 in the auto position.
   - Turn switch to manual position.
4. No battery negative output on wire #85 from DC/DC converter to platform HPP switch S13.
   - Check continuity. Replace if defective.
5. Defective platform HPP switch S13.
   - Check switch. Replace if defective.
6. Loose or broken wire #85A from switch S13 to base HPP switch S12.
   - Check continuity. Replace if defective.
7. Defective base HPP switch S12.
   - Check switch. Replace if defective.
8. Loose or broken wire #85B from switch S12 to base Manual/Auto switch S11.
   - Check continuity. Replace if defective.
9. Defective base Manual/Auto switch S11.
   - Check switch. Replace if defective.
10. Loose or broken wire #87 from Manual/Auto switch S11 to motor controller pin #B5.
    - Check continuity. Replace if defective.
11. No negative output on wire #57 from motor controller pin #A18 to relay 10CR2.
    - Check continuity. Replace if defective.
12. Loose or broken wire #10 from base terminal block TB1 to relay 10CR2.
    - Check continuity. Replace if defective.
13. Defective relay 10CR2.
    - Check relay. Replace if defective.
14. Loose or broken wire #57A from relay 10CR2 to HPP panel.
    - Check continuity. Replace if defective.
15. Discharged or defective HPP battery.
    - Check for 12 volts on wire #57B at relay 10CR2. If low voltage present use pull start on HPP. Replace if defective.
16. Defective HPP stop switch located on front panel.
    - Check switch. Replace if defective.
17. Defective HPP circuit breaker located on front panel.
    - Check circuit breaker. Replace if defective.
18. Fuel shut off located on back of HPP in the off position.
    - Turn to the ON position.
19. No fuel.
    - Check fuel level. Add as required.

Electrical System (Continued)

4.1-33 Hybrid Power Pack does not Start (Auto mode)

NOTE

HPP auto mode engages when the battery charge state drops to 50% of charge.
HPP auto mode disengages when the battery charge state reaches to 90% of charge.

1. No negative input on wire #86 from Manual/Auto switch S11 to motor controller pin #A13.
   - Check continuity. Replace if defective.
2. Defective base Manual/Auto switch S11.
   - Check switch. Replace if defective.
3. See above troubleshooting (Manual mode) for further troubleshooting.

4.1-34 Hybrid Power Pack does not Shut Off (Auto mode)

NOTE

Aerial Platform must be powered up for shut down in Auto mode to work.

1. No negative output on wire #104 from motor controller pin #B16 to relay 10CR3.
   - Check continuity. Replace if defective.
2. Loose or broken wire #10 from base terminal block TB1 to relay 10CR3.
   - Check continuity. Replace if defective.
3. Defective relay 10CR3.
   - Check relay. Replace if defective.
4. Loose or broken wire #104A from relay 10CR3 to HPP panel.
   - Check continuity. Replace if defective.
5. Loose or broken wire #000 from relay 10CR3 to HPP panel.
   - Check continuity. Replace if defective.

4.1-35 Hybrid Power Pack does not Shut Off

1. Negative input or short to motor controller from wire #86 pin #A13 or wire #87 pin #B5.
   - Clear short. Repair wiring as necessary.

Hydraulic System

4.2-1 All Functions Inoperative

1. Hydraulic oil level low.
   - Refill tank to proper level.
2. Defective pump P1.
   - Check pump. Repair or replace if defective.
3. Broken motor to pump coupler.
   - Check coupler. Replace if defective.
4. Relief valve R1 open.
   - Check valve. Replace if defective.

4.2-2 All Functions Sluggish

1. Small pump dump valve 2H-21A-1 or large pump dump valve 2H-21A stuck open.
   - Check valves. Repair or replace if defective.
2. Worn or defective small pump or large pump section of pump P1.
   - Check pump. Repair or replace if defective.
3. Check valve CV1 or CV2 stuck open.
   - Check valves. Clean or replace if defective.

4.2-3 Steering Inoperative

1. Stuck or defective steer right valve 4H-23 or steer left valve 4H-24.
   - Check valves. Replace if defective.
2. Plugged steer orifice O4.
   - Clean or replace orifice.
3. Steer cylinder C7 damaged or bypassing internally.
   - Check cylinder. Repair or replace if defective.

4.2-5 Drive Inoperative

1. Stuck or defective drive reverse valve 4H-15 or drive forward valve 4H-16.
   - Check valves. Repair or replace if defective.
2. Defective drive relief valve R5.
   - Check valve. Replace if defective.
3. Stuck o defective main counterbalance valve CB1.
   - Check valve. Repair or replace if defective.
4. Defective drive motor M1, M2, M3 or M4.
   - Check motor. Repair or replace if defective.
5. Free wheeling valve V2 open or defective.
   - Close valve. Repair or replace if defective.
6. Stuck or defective high speed valve 2H-20B.
   - Check valve. Repair or replace if defective.
7. Cushion cylinder C8 bypassing internally.
   - Check cylinder. Repair or replace if defective.

4.2-6 Drive Sluggish

1. Stuck open or defective valve CV3, CV4, CV5, or CV6.
   - Check valve. Replace if defective.
2. Drive relief valve R5 set too low.
   - Refer to Section 5 of this manual for setup procedure.
3. Defective flow divider FD1.
   - Check flow divider. Replace if defective.

Hydraulic System (Continued)

4.2-7 Reverse Drive Inoperative

1. Stuck or defective drive valve 4H-15.
   - Check valve. Repair or replace if defective.

4.2-8 Forward Drive Inoperative

1. Stuck or defective drive valve 4H-16.
   - Check valve. Repair or replace if defective.

4.2-9 Drive Inoperative When in Low Speed Drive

1. Stuck or defective parallel counterbalance valve CB2.
   - Check valve. Replace if defective.
2. Stuck or defective parallel forward drive valve 4H-16B or parallel reverse valve 4H-15B.
   - Check valve. Replace if defective.

4.2-10 Drive Inoperative When in High Speed Drive

1. Stuck or defective series/parallel valve 4H-20A.
   - Check valve. Replace if defective.
2. Stuck or defective main counterbalance valve CB1.
   - Check valve. Replace if defective.

4.2-11 Brakes Does not Release

1. Stuck or defective brake valve 3H-30.
   - Check valve. Repair or replace if defective.
2. Stuck or defective auto reset valve V6.
   - Check valve. Repair or replace if defective.

4.2-12 Up Circuit Inoperative

1. Stuck or defective lift valve 3H-14A.
   - Check valve. Repair or replace if defective.
2. Incorrectly set or defective lift relief valve R2.
   - Adjust valve. Replace if defective.
3. Stuck or defective lowering valve 2H-13.
   - Check valve. Repair or replace if defective.
4. Stuck or defective manual lowering valve V1.
   - Check valve. Repair or replace if defective.
5. Open manual override on holding valve 2H13-1 or 2H13-2.
   - Depress and turn manual override clockwise to close. Replace if defective.
6. Stuck holding valve 2H13-1 or 2H13-2.
   - Check valves. Repair or replace if defective.

4.2-13 Down Circuit Inoperative

1. Stuck or defective lowering valve 2H-13.
   - Check valve. Repair or replace if defective.
2. Stuck holding valve 2H13-1 or 2H13-2.
   - Check valves. Repair or replace if defective.
3. Plugged lowering orifice O1.
   - Clean or replace orifice.

Hydraulic System (Continued)

4.2-14 All Outriggers Inoperative

1. Stuck or defective outrigger holding valve 2H-17C.
   - Check valve. Repair or replace if defective.

4.2-15 Left Front Outriggers Inoperative

1. Stuck or defective retract valve 4H-71 or extend valve 4H-75.
   - Clean valve. Replace if defective.
2. Stuck or defective check valve CV7.
   - Check valve. Replace if defective.
3. Bypassing outrigger cylinder C9.
   - Repack cylinder. Replace if defective.

4.2-16 Right Front Outriggers Inoperative

1. Stuck or defective retract valve 4H-72 or extend valve 4H-76.
   - Clean valve. Replace if defective.
2. Stuck or defective check valve CV8.
   - Check valve. Replace if defective.
3. Bypassing outrigger cylinder C10.
   - Repack cylinder. Replace if defective

4.2-17 Right Rear Outriggers Inoperative

1. Stuck or defective retract valve 4H-73 or extend valve 4H-77.
   - Clean valve. Replace if defective.
2. Stuck or defective check valve CV9.
   - Check valve. Replace if defective.
3. Bypassing outrigger cylinder C11.
   - Repack cylinder. Replace if defective.

4.2-18 Left Rear Outriggers Inoperative

1. Stuck or defective retract valve 4H-74 or extend valve 4H-78.
   - Clean valve. Replace if defective.
2. Stuck or defective check valve CV10.
   - Check valve. Replace if defective.
3. Bypassing outrigger cylinder C12.
   - Repack cylinder. Replace if defective

4.2-19 Outriggers Drift In

1. Defective check valve left front CV7, right front CV8, right rear CV9 or left rear CV10.
   - Clean valve. Replace if defective.
2. Outriggers cylinder bypassing left front C9, right front C10, right rear C11 or left rear C12.
   - Repack cylinder. Replace if defective.

Section 5
PROCEDURES

Table of Contents

5

General

The following information is provided to assist you in the use and application of servicing and maintenance procedures contained in this chapter.

Safety and Workmanship

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

Hydraulic System

All service and repairs to the hydraulic system or hydraulic components must be done in a clean work environment. Refer to Section 1 - Hydraulic System & Component Maintenance and Repair.

Base

5.1-1 Winching and Towing Procedures and Parking Brake System

This section provides the operator with procedures about towing and winching and on how to manually release the parking brake.

WARNING

Ensure platform is fully lowered before winching or towing. Sudden motion could cause the aerial platform to become unstable. Death or serious injury could result.

WARNING

In emergency situations where machine functions are not available and lowering is impeded by an obstacle, the utmost care must be taken to move the machine far enough to clear the obstacle. In such cases operation must be extremely smooth with no sudden movements and must not exceed a speed of 2/sec.When pushing, towing or winching, do not exceed 2 mph (3.2 km/h).

Do not push, tow or winch vehicle on to a slope, or brake the towing vehicle rapidly. Do not pull the aerial platform down an incline towards a winch.

To Release the Free-Wheeling Valve

1. Make sure that the aerial platform is on level ground. Chock or block the wheels to keep aerial platform from rolling.

Diagram 5.1-1. Free-Wheeling Valve

2. **Free-Wheeling Valve** – Turning the valve knob counterclockwise (item 1) to a fully opened position allows fluid to flow through the wheel motors, thus providing free-wheeling.

WARNING

The free-wheeling valve must be closed tightly (clockwise) for normal operation.

To Release the Parking Brakes Manually

WARNING

Do not manually disengage the parking brakes if the aerial platform is on a slope.

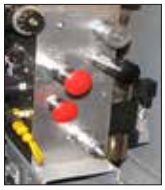


Diagram 5.1-2. Disc Brakes System

Parking Brakes – The brakes must be manually disengaged for pushing, towing or winching.

1. Make sure that the aerial platform is on level ground. Chock or block the wheels to keep aerial platform from rolling.
2. Turn main power disconnect switch to off position.
3. Locate brake hand pump and brake auto reset valve at main manifold in hydraulic/fuel cabinet.
4. Push in brake auto reset valve (item 1).
5. Grasp the red hand pump (item 2) and rapidly depress until firm resistance is felt. The brakes are now released.
6. Remove the wheel chocks or blocks, then push, tow or winch the aerial platform to the desired location.

WARNING

The parking brake MUST be re-engaged immediately after reaching the desired location.

7. Position the machine on a firm and level surface.
8. Chock or block the wheels to prevent the aerial platform from rolling.
9. Re-engage the parking brakes by pulling out the black brake valve plunger.

5.1-2 Wheel Bolt/Nut Inspection and Torquing Procedure

It is necessary to check the torque on all wheel nuts and wheel bolts at pre-delivery, after 8 hours of operation and at weekly intervals using the following procedure:

1. Confirm that each wheel fastener is torqued to 90±5 ft-lb. All fasteners must be torqued using the tightening sequence below.

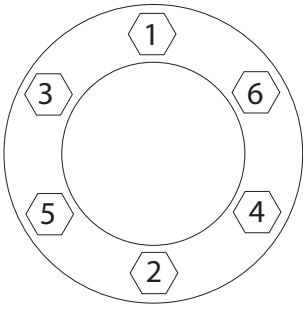


Diagram 5.1-3. Wheel Torque Sequence

2. Again, confirm that each wheel fastener is torqued to the specified tolerance. Re-torque as necessary until all fasteners are properly torqued.

5.1-3 Wheel Reinstallation and Torquing Procedure

When a Wheel/Tire Assembly has been removed or replaced, it will be necessary to follow the procedure below to ensure proper installation:

1. Inspect wheel fastener threads for damage and defects. Replace if defective.

2. Clean the mounting surfaces of hub and the wheel rim of debris, rust, excess paint, etc.

3. Mount wheel on the hub, centering mounting holes on the wheel studs or bolt holes. Use appropriate lifting device as required.

4. Install wheel nuts or wheel bolts and hand tighten to center the rim.

5. Tighten nuts or bolts to approximately 50 lbf•ft torque using the tightening sequence in Diagram 5.1-3.

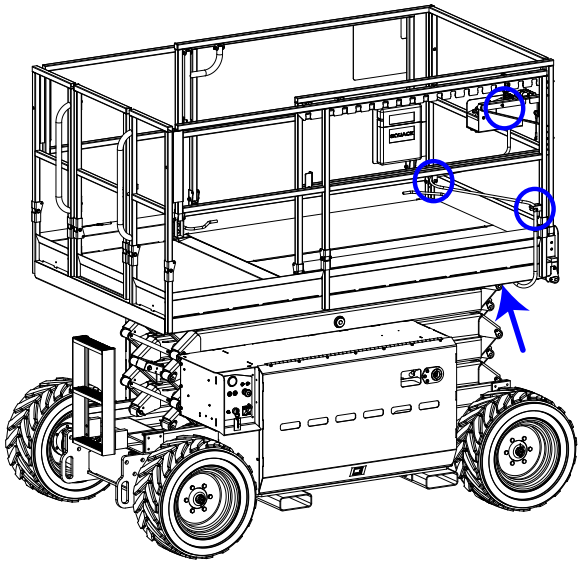
6. Tighten to 90 ft-lb using the same sequence.

7. Repeat the torque sequence to confirm that none have changed from 90 lbf•ft. If any are found below 90 lbf•ft, repeat complete sequence until there is no change in torque values. If possible, drive the machine prior to checking torques.

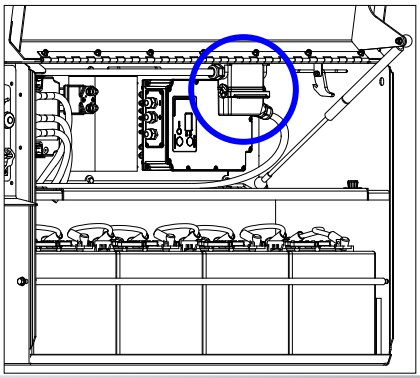
8. Check torque values after 8 hours of operation and then at weekly intervals.

5.1-4 Reconnecting the Platform Control Box for Use from the Ground

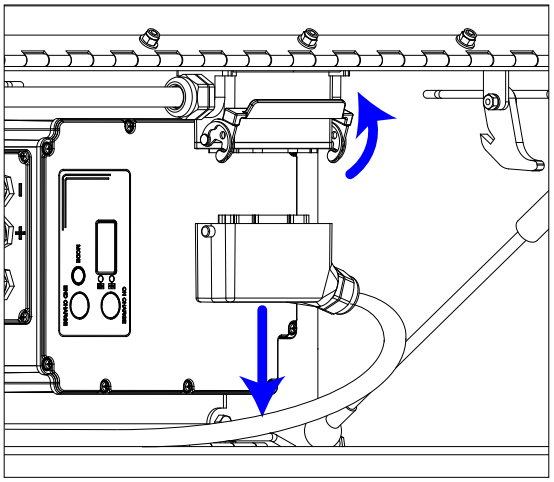
1. To facilitate servicing the aerial platform, the platform control box may be removed from the platform, and reconnected inside the electrical cabinet, to allow functions to be accessed from the ground.
2. From the platform, remove the quick release pins (x3) securing the platform control box to the control box mount and cable guides.
3. Disconnect the control box cable from the scissor control cable (swing down the small latch on the side of the connector and pull the connectors apart). The connectors are located near the front right corner of the platform on the underside.



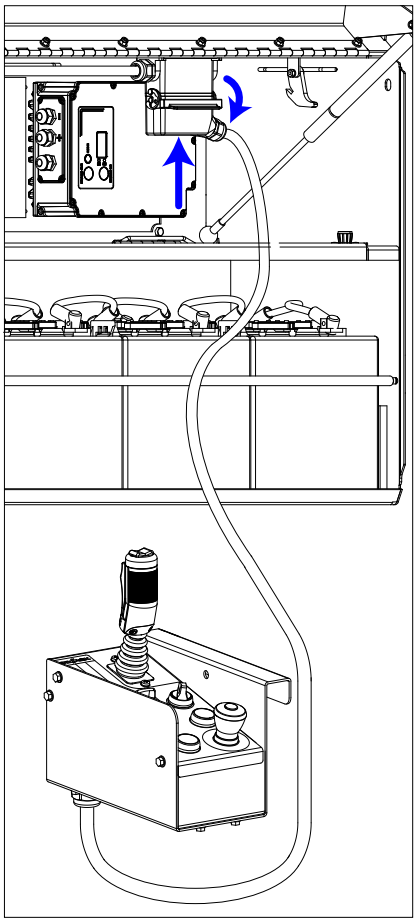
4. Bring the control box down from the platform to the ground.
5. Locate the control cable connectors inside the electrical cabinet.



6. Disconnect the existing control cable connector by lifting up the latch on the side, and pulling the connectors apart.



7. Plug the control box control cable connector in its place. Push down the latch to lock them together.

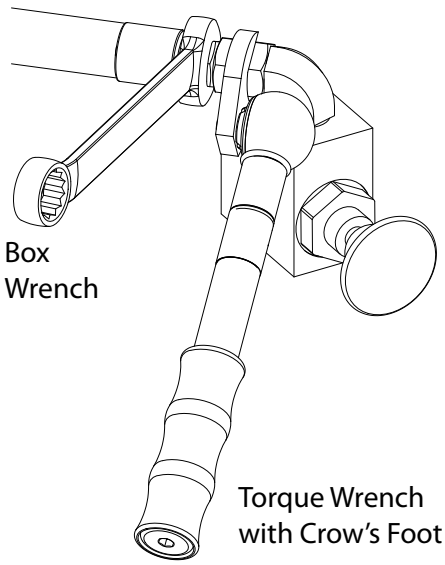


8. The control box functions may now be accessed from the base.

5.1-5 Tightening and Torque Recommendations for Hydraulic Couplings and Hoses

General Work Practices

1. All components must be free of damage or contamination. O-rings cannot be reused anytime the component has been installed beyond finger tight. Clean or replace components, as required.
2. Over-tightening a coupling may result in overstressing and/or cracking, and may lead to leaking or failure.
3. When tightening hose couplings, ensure the hose does not twist on the adapter. Twisting will shorten hose life and scar the sealing surfaces of swivel type couplings (JIC, 45°, etc.), which can create leaks.
4. When tightening hose couplings, use a torque wrench (with crow's foot) on the hose end hex swivel nut, and a standard box wrench on the hose end stem hex to hold the hose from twisting.



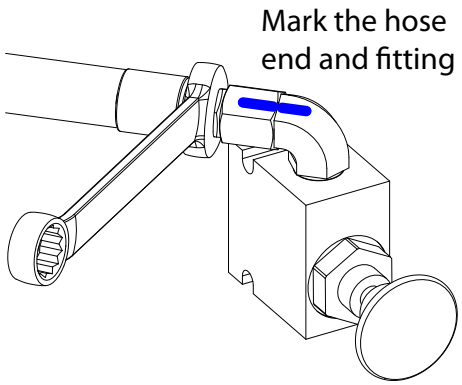
5. Lubricate all o-ring surfaces with suitable hydraulic oil prior to installation in the flange head and o-ring seal grooves. This will minimize the possibility of damage to the O-ring when installed.
6. Install any 45° and 90° hydraulic hose ends first, then align direction and tighten. Adjust the swivel nut on the straight hose end before tightening to create the desired flow.

Using a Torque Wrench

1. This method is applicable for JIC (37°) and FFOR (Flat Face O-Ring) hose ends and fittings, wherever the components are accessible with torque wrench / crow's foot tools.
2. Align the hose end or fitting to the mating component.
3. Install the nut two or three turns by hand to assure proper alignment. Jiggle the hose while tightening to ensure the faces contact fully.
4. Using a properly calibrated torque wrench, tighten the coupling using a smooth, even motion until an indication (audible click) is heard and felt. Do NOT over tighten. For recommended torque values, refer to Table 2.8 Torque Specifications for Hydraulic Couplings & Hoses.
5. Apply a drop of torque seal to the connection.

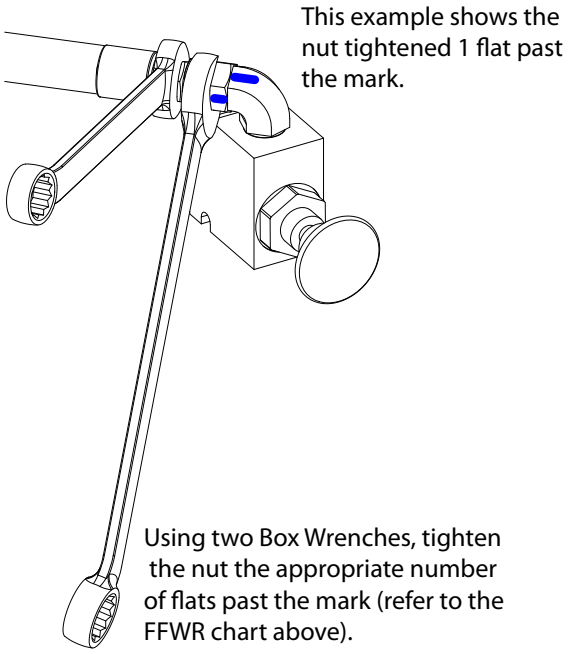
Using the Flats From Wrench Resistance Method

1. This method is applicable for JIC (37°) and FFOR (Flat Face O-Ring) hose ends only, wherever the components are inaccessible with torque wrench/ crow's foot tools, or when a properly calibrated torque wrench is not available.
2. Align the hose end or fitting to the mating component.
3. Install the swivel hose end nut hand tight to the fitting to assure proper alignment. Jiggle the hose while tightening to ensure the faces contact fully.
4. Tighten the nut using a box wrench until minor resistance is felt.
5. Note the position of the nut relative to the fitting with a marking device (i.e. paint marker).



6. Referencing the chart below, use a second box wrench to tighten the nut the appropriate number of flats past the mark. Do NOT over tighten.

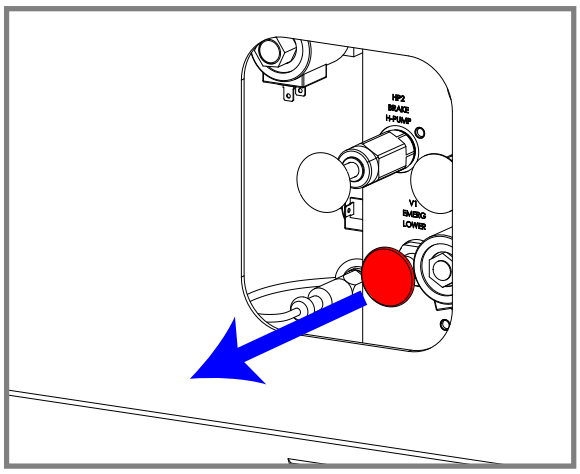
FLATS FROM WRENCH RESISTANCE CHART for JIC Hose Ends			
Size		FFWR	
Dash	Frac. (in.)	37° Tube Nut	Swivel Nut
-4	1/4"	2	1.5
-5	5/16"	2	2
-6	3/8"	1.5	1.5
-8	1/2"	1.5	1.25
-10	5/8"	1.5	-
-12	3/4"	1.25	-
-16	1"	1	-
-20	1 1/4"	1	-
-24	1 1/2	1	-
-32	2"	1	-



7. Apply a drop of torque seal to the connection.

5.1-6 Checking the Holding Valve

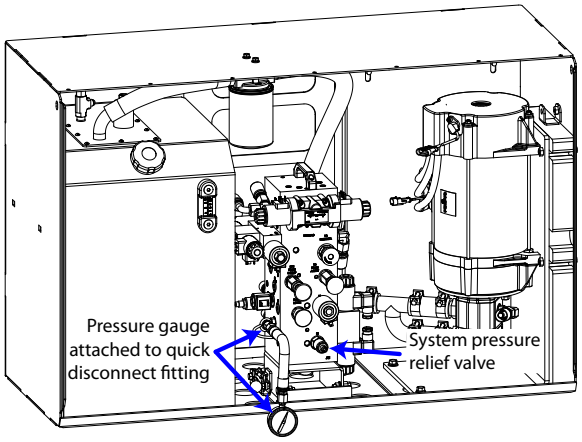
1. Raise the platform to an approximate height of 13 ft (4 m).
2. Locate the emergency lowering valve in the cutout on the front of the tank side cabinet.
3. Pull the knob, and hold it. If the platform does not lower with the knob pulled out, the holding valves are in good working condition. If however the platform lowers, the holding valves must be replaced.



5.1-7 System Pressure Setting

Checking the Pressure

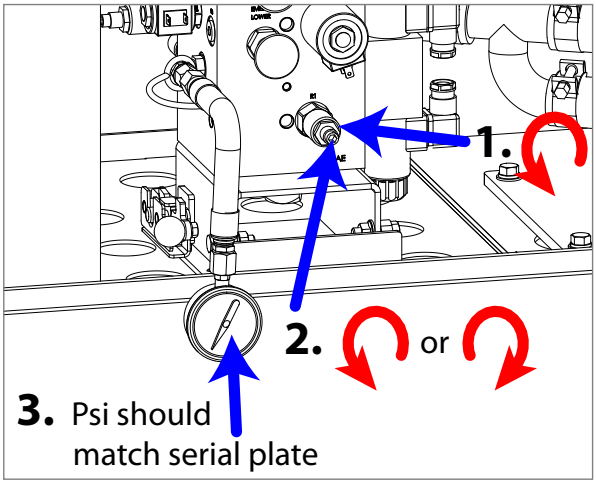
1. Bring the control box down from the platform to the ground so it will be accessible while working (refer to 5.1-4).
2. Refer to the aerial platform's serial plate for the correct system pressure for the unit.
3. Connect a pressure gauge to the quick disconnect fitting located on the lift side of the main manifold in the tank side cabinet.



4. With the engine on, use the control box joystick to steer fully left or right to produce pressure. Read the pressure on the gauge.
5. If the pressure shown on the gauge matches that on the serial plate, no further action is needed. However, if it does not match that on the serial plate, proceed to the next step.

Adjusting the Pressure

6. Continuing from step 5 above, loosen the jam nut (counterclockwise) on the system pressure relief valve.
7. Still steering fully left or right to create pressure, turn the system relief valve adjustment screw clockwise to raise the pressure, or counterclockwise the lower the pressure, until it matches the value given on the serial plate.

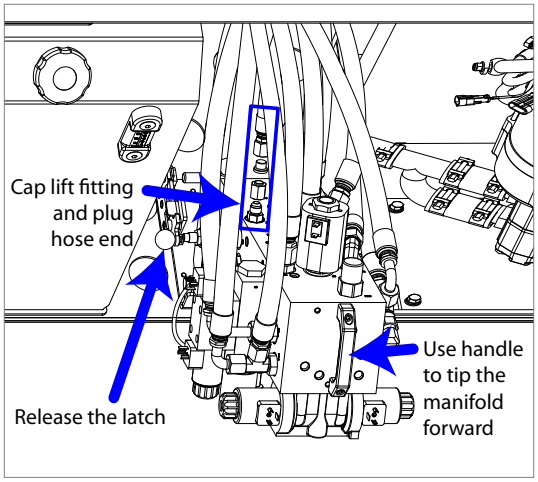


9. Tighten the jam nut and apply a dab of torque seal where the jam nut and adjuster screw meet.
10. Remove the pressure gauge and reconnect the control box to the platform.

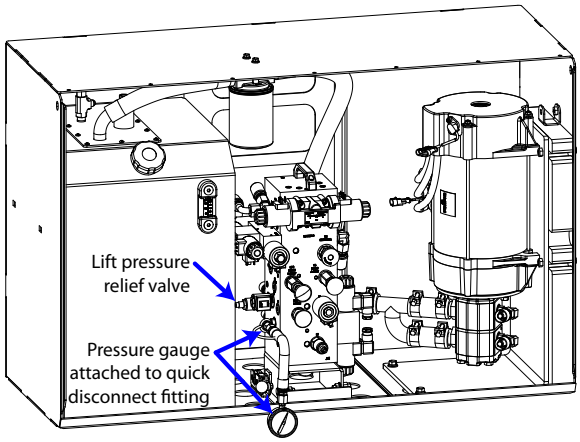
5.1-8 Lift Pressure Setting

Checking the Pressure

1. Bring the control box down from the platform to the ground so it will be accessible while working (refer to 5.1-4).
2. Refer to the aerial platform's serial plate for the correct lift pressure for the unit.
3. The lift manifold hose and port is located on the rear side of the main manifold in the tank side cabinet. To access it, release the latch beside the manifold, then using the handle, tip the manifold forward.
4. With an oil pan and rag handy, disconnect the hose, capping off or plugging both the hose and the fitting on the manifold.



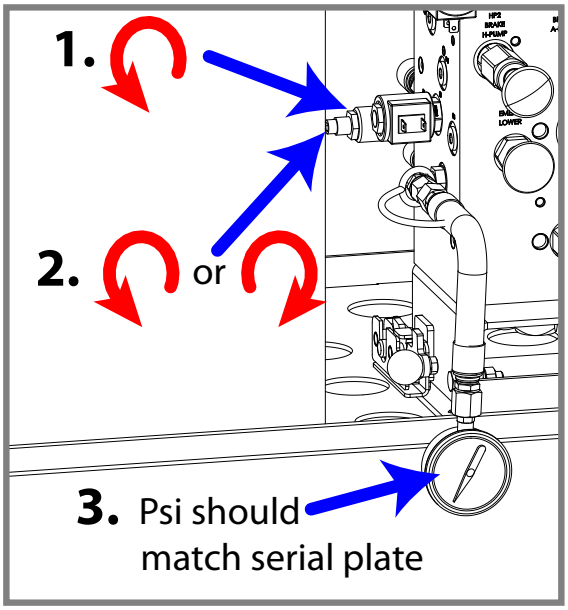
5. Connect a pressure gauge to the quick disconnect fitting located on the top of the main manifold.



6. To create pressure, with the engine on and the lift/off/lower switch in the lift position, tilt the joystick forward, as though trying to raise the platform. Read the pressure on the gauge.
7. If the pressure shown on the gauge matches that on the serial plate, no further action is needed. However, if it does not match that on the serial plate, proceed to the next step.

Adjusting the Pressure

8. Continuing from step 6 above, loosen the jam nut (counterclockwise) on the lift pressure relief valve.
9. With the joystick still forward as though attempting to raise the platform, turn the lift relief valve adjustment screw clockwise to raise the pressure, or counterclockwise the lower the pressure, until it matches the value given on the serial plate.

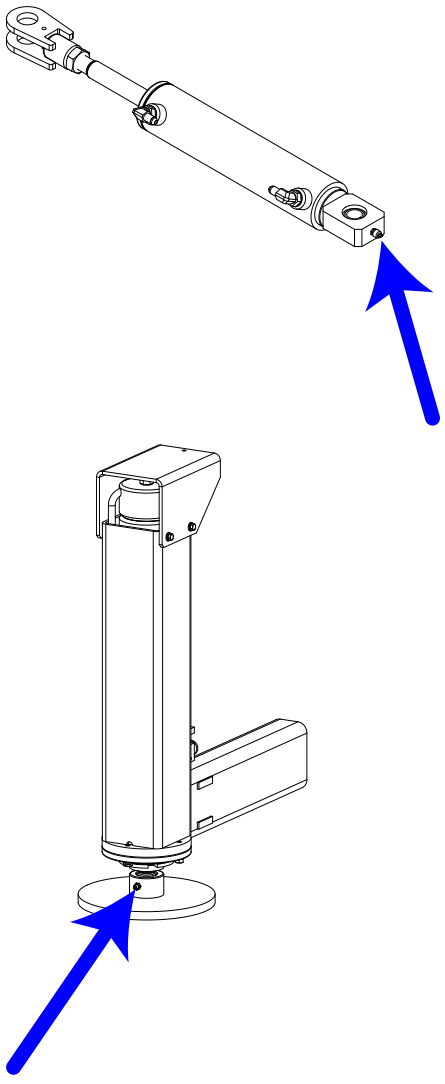


9. Tighten the jam nut and apply a dab of torque seal where the jam nut and adjuster screw meet.
10. Reconnect the lift hose to the main manifold lift port (refer to 5.1-5).
11. Remove the pressure gauge and reconnect the control box to the platform.

5.1-9 Grease Points

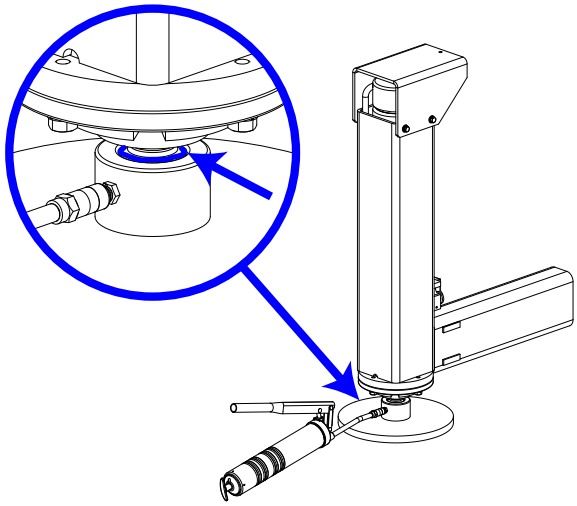
Grease Fitting Locations

1. There are either 1 or 5 grease fittings on the 6826RTE / 6832RTE, depending on options. They are located:
   - On the stationary end of the steer cylinder (1 fitting per unit).
   - On each outrigger foot (1 fitting per outrigger, if equipped, 4 per unit).



Applying Grease

1. Remove the cap from the grease fitting.
2. Using a clean rag, wipe off any dirt or debris from the grease fitting.
3. Connect a grease gun to the grease fitting, and pump until a small amount of grease can be seen coming out around the joint or bearing.
4. Disconnect the grease gun.
5. Wipe off any excess grease from around the joint or bearing, and from the grease fitting.
6. Replace the grease fitting cap.



5.1-10 Electronic Tilt Switch Setup Procedure

Machines that are not equipped with outriggers have an electronic tilt switch located inside the engine compartment. During operation, the switch monitors machine tilt front to back, and side to side. Aerial platform tilt is measured relative to a learned *zero* position.

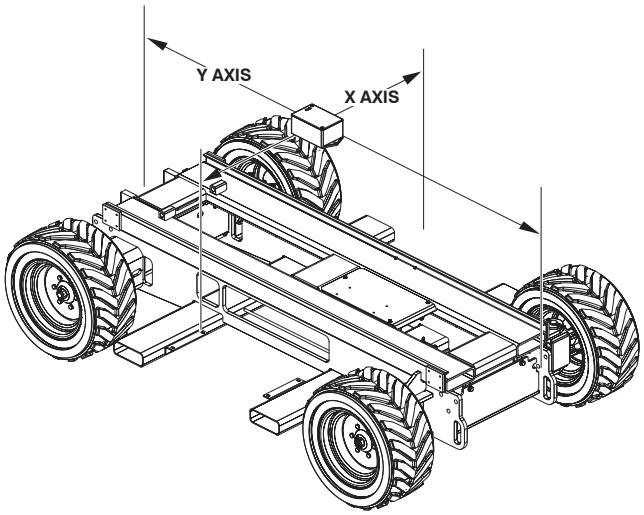
The zero position is calibrated using the following set-up procedure, based on the position of the machine with the platform leveled and fully lowered.

Two LED indicator lights on the top of the switch show operating conditions.

Tilt Switch Replacement

Follow this procedure to install and program a new zero position in a replacement tilt switch.

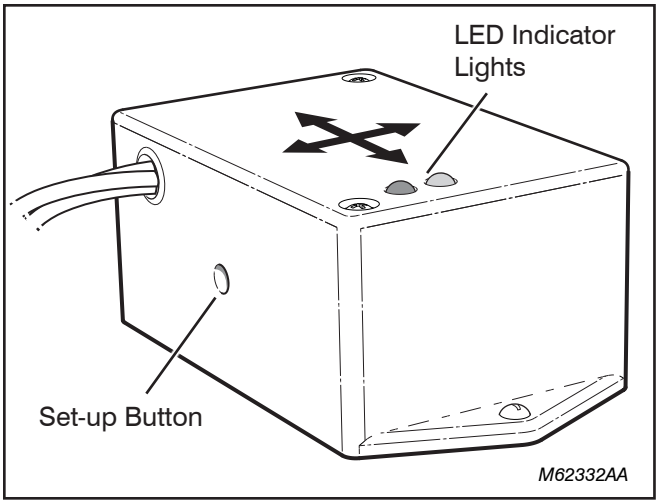
NOTE: *Make sure part number of old and new tilt switch are the same.*



1. Park aerial platform on a firm level surface.
2. Fully lower the platform.
3. Chock or block wheels to keep the aerial platform from rolling forward or backward.
4. Push in emergency stop buttons and turn main power disconnect switch off.
5. Disconnect tilt switch from 4 pin connector.
6. Remove old tilt switch from mount.
7. Install the new switch in the same orientation as the old switch. Connect switch plug to 4 pin connector.

NOTE: *The tilt switch circuit is only powered when controls are powered up.*

8. Turn main power disconnect switch on.
9. Select Off–Lift–Drive key switch to *Lift* position or *Drive* position.
10. Pull out all emergency stop buttons.
11. Verify switch is powered. The red and green LED indicator lights should be flashing.
12. On the back side of the switch, press and release the Set-up button 3 times.



13. The red LED then flashes for 4 seconds during a *stabilization* period.
14. Both LEDs then flash for 1 second, indicating the switch is learning the new *zero* position.
15. When both LEDs are on continuously, it indicates the switch has learned the new zero position.
16. The green LED then flashes and the red LED stays on for 2 seconds indicating the switch is verifying the new zero position.

17. The green LED stays on continuously indicating the switch is ready for normal operation.
18. Turn main power disconnect switch off.
19. Push in all emergency stop buttons.
20. Remove wheel chocks.

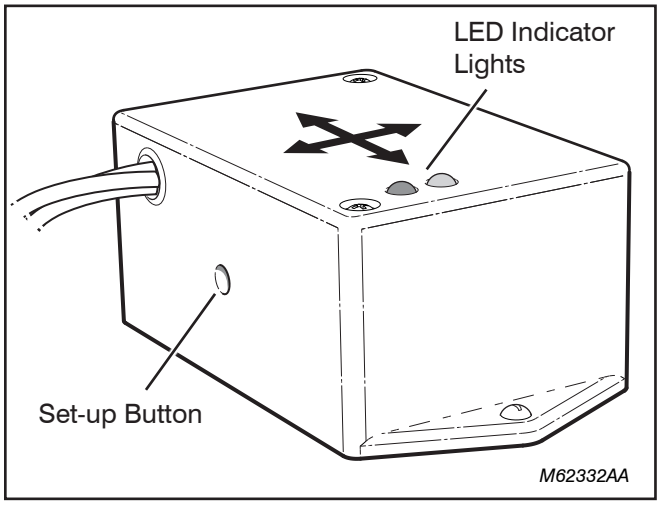
Reprogramming Existing Tilt Switch

Follow this procedure to reprogram an existing tilt switch. Reprogramming the switch records a new *zero* position.

1. Park aerial platform on a firm level surface.
2. Fully lower the platform. Reprogramming the switch learns
3. Chock or block wheels to keep the aerial platform from rolling forward or backward.

NOTE: *The tilt switch circuit is only powered when controls are powered up.*

4. Turn main power disconnect switch on.
5. Select Off–Lift–Drive key switch to *Lift* position or *Drive* position.
6. Pull out all emergency stop buttons.
7. Verify switch is powered. The red and green LED indicator lights should be flashing.
8. On the back side of the switch, press and hold the Set-up button for 3 seconds.



9. Both LEDs turn off, then begin flashing for a 5 second period.
10. During this 5 second period, press and release the Set-up button 3 times.
11. The red LED then flashes for 4 seconds during a *stabilization* period.
12. Both LEDs then flash for 1 second indicating the switch is learning the new *zero* position. When both LEDs are on continuously, it indicates the switch learned the new zero position.
13. The green LED then flashes and the red LED stays on for 2 seconds indicating the switch is verifying the new zero position.
14. The green LED stays on continuously indicating the switch is ready for normal operation.

NOTE: *If the Set-up button is not pressed 3 times during Step 10, the switch exits the program mode and returns to normal operation using the previous zero point.*

15. Turn main power disconnect switch off.
16. Push in all emergency stop buttons.
17. Remove wheel chocks.

Tilt Switch Operation

The following describes LED operation with the system powered.

Green LED on	The green LED on continuously indicates normal operation. Both tilt axes are within the specified degrees of the learned zero position. The green LED flashing indicates the aerial platform is moving in or out of tilt angle limits. The time delay has not occurred yet.
Red LED on	The red LED is on continuously when the tilt angle on one or more axes is off more than the allowable degrees from the zero position.
Green and Red LEDs on	Both LEDs on continuously indicates a fault in the system is detected. The switch does not function. After a period of 5 seconds or on power up, the switch attempts to return to normal operation. If the fault is still detected, both LEDs remain on.

Electrical Cabinet

5.2-1 Motor Controller Panel Pin Interface

Connector B

Pin 1 - 48 volt output from line contactor to E stop switch. (Fused 10 amp)
- Test between pin 1 and battery negative.

Pin 2 - 48 volt input from E stop switch to DC/DC convertor.
- Test between pin 2 and battery negative.

Pin 3 - 12 volt output to CB1 circuit breaker.
12 volt input to motor controller pin A17. (Fused 10 amp)
- Test between pin 3 and battery negative.

Pin 4 - 00/ battery negative to CB2 circuit breaker.
- Test for continuity between pin 4 and battery negative.

Pin 5 - 48 volt input on wire 3B to motor controller and line contactor when key on selected.
- Test between pin 5 and battery negative with key on.

Pin 6 - 12 volt input on wire 13 when lower function selected. (Pump/motor not required)
- Test between pin 6 and 02 wire while selecting lower function.

Pin 7 - 12 volt input on wire 44. High speed enable. (0 volts above height limit switch)
- Test between pin 7 and 02 wire.

Pin 8 - Accelerator input. Signal on wire 59 from joystick controller. 0 – 5 volts.
- Test between pin 8 and 02 wire.

Pin 9 - 12 volt input on wire 19. Enable switch. (Without Hybrid Power Pack running)
- Test between pin 9 and 02 wire.

Pin 10 - Lift/ Drive Mode input. 2C active= Drive mode.
- Test for continuity between pin 10 and battery negative while in drive mode.

Pin 11 - Base Lift input. 2A active= Base lift mode.
- Test for continuity between pin 11 and battery negative while lifting from base controls.

Pin 12 - Dry Steer Mode input. 12 volt input on wire 30B.
- Test between pin 12 and battery negative while activating dry steer.

Pin 13 - Platform/ Base select input. 2B active= Base mode.
- Test for continuity between pin 13 and battery negative while in base mode.

Pin 14 - 12 volt input on wire 17B. Outrigger Enable signal.
- Test between pin 14 and 02 wire.

5.2-1 Motor Controller Panel Pin Interface – Hybrid Power Pack (Gasoline)

Connector A

Pin 1 - HPP Enable. Battery negative output to wire 85.
- Test for continuity between pin 1 and battery negative.

Pin 2 - HPP Auto mode. Battery negative input on wire 86.
- Test for continuity between pin 2 and battery negative.

Pin 3 - HPP Manual mode. Battery negative input on wire 87.
- Test for continuity between pin 3 and battery negative.

Pin 4 - HPP run proofing loop input from wire 106B. Looped through relay 106CR.
- Test for continuity between pin 4 and pin 7 with HPP running.

Pin 5 - Battery negative supply to HPP start relay 10CR1 on wire 57. (Set active to 4 seconds)
- Test for continuity between pin 5 and battery negative.

Pin 6 - Battery negative supply to HPP stop relay 10CR3 on wire 104.
- Test for continuity between pin 6 and battery negative.

Pin 7 - HPP run proofing loop input from wire 106A. Looped through relay 106CR.
- Test for continuity between pin 7 and pin 4 with HPP running.

Pin 8 - 12 volt input on wire 19B Enable switch. (With Hybrid Power Pack running)
- Test between pin 9 and 02 wire.

Hybrid Power Pack Connector

Wire 106 - 12 volt output to run relay 106CR.

Wire 000 - HPP battery negative.

Wire 104A - HPP shut down when connected to wire 000.
Through relay 10C3R or switch S12.

Wire 57B - 12 volt output from HPP to HPP start relay 10CR1.

Wire 57A - 12 volt output from HPP start relay 10CR1 to HPP starter.

Wire L2 - External VAC input.

Wire G1 - External VAC input.

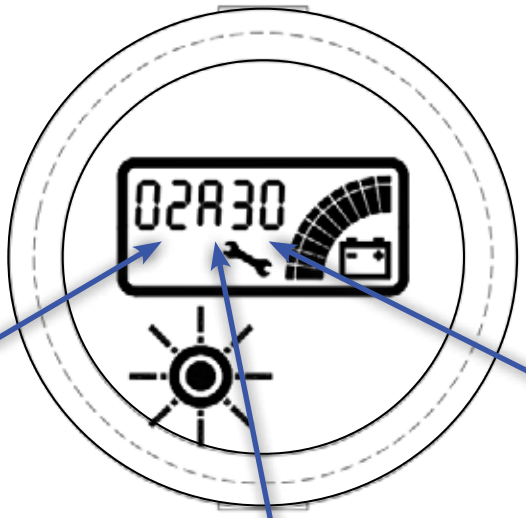
5.2-2 ZAPI MDI CAN Display – Motor Controller Master Flash Codes

The ZAPI MDI CAN (Multi-function Digital Indicator) is connected to the motor controller via CAN-BUS. If an alarm occurs, it displays the motor controller alarm with a corresponding code. The Red LED flashes and the Wrench symbol is displayed.

When the MDI CAN is powered up, it displays general information, the software revision of the MDI display, followed by the software revision of the motor controller, and finally total machine hours. If the Turtle icon appears on power up, this indicates Creep Mode is enabled. The system goes into Creep Mode when battery charge is low.

Decoding the Alarms Displayed on the MDI-CAN

The format of the string shown on the display below is XXAYY, where XX and AYY represent the alarmed node and the alarmed code respectively.



The First two digits represent the Node of the Controller where the Alarm is present.

The Final two digits represent Alarm Code (see Table).

The Third digit represents which Sub Node the Alarm is present.
This could be A or B:
A – represents an Alarm on Sub Node
0 – is the Master Processor
B – represents and Alarm on Sub Node
1 – is the Slave Processor

With the Controller Alarm Codes on the MDI-CAN display referenced against the Controller Master Codes Table (refer to Section 5.2-2a) and the Controller Slave Codes Table (refer to Section 5.2-2b), the operator can solve the fault and correct the error. The codes tables contain the flash codes, the probable cause and the recommended remedy. If the Alarm information suggests a serious problem that can not be addressed by the codes tables, contact Skyjack Service Department.

5.2-2a MDI-CAN Controller Master Codes

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A01	WARNING SLAVE	Error in slave	Check slave code for fault information
05A08	WATCHDOG	ACE3 Controller logic selfcheck	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A10	WRONG RAM MEM.	ACE3 Controller memory selfcheck	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A12	CONTROLLER MISM.	Wrong software signature	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A13	EEPROM KO	Eeprom failure	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A14	PARAM RESTORE	Parameters mismatched	This warning appears when the controller restored the default values. **Troubleshooting:** If a CLEAR EEPROM was made before the last keyon-recycle, this warning just means that the EEPROM was correctly cleared. A travel demand or a pump request cancel's the alarm. Use the following steps if demand did not clear code: 1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A15	M/S PAR CHK MISM	Parameters checksum mismatch between master and slave	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A16	PARAM TRANSFER	An error occurred while transferring parameters from master to slave	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A17	LOGIC FAILURE#3	ACE3 Internal check- High voltage (Overload)	1. Check battery voltage 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A19	LOGIC FAILURE#1	ACE3 Internal check- Low voltage	**Cause:** This fault is displayed when the controller detects an under voltage condition. Under voltage threshold is 16V in the 48V controller. Troubleshooting of fault displayed at startup or in standby: - Key input signal down-going pulses (below under voltage threshold) due to external loads, like DC/DC converters starting-up, relays or contactor switching, solenoids energizing / de-energizing. - If no voltage transient is detected on the supply line and the alarm is present every time the key is switched ON, the failure is probably in the controller hardware, so it is necessary to replace the ACE3. **Troubleshooting of fault displayed during motor driving:** - If the alarm happens during traction acceleration or driving hydraulic functions, check battery charge condition, power cable connection.

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A24	VKEY OFF SHORTED	Undervoltage/overvoltage detection circuit damaged	1. Check battery voltage 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A25	MOT. PHASE SH. XX	Motor phases shortcircuit	1. Check AC Motor cables 2. Replace AC Motor
05A27	INIT VMN LOW	Self check of Power components and Motor	**Cause:** Before switching the Line Contactor on, the software checks the power bridge voltage without driving it. The software expects the voltage to be at a “steady state” value. If it is too low, this alarm occurs. **Troubleshooting:** Check - Motor power cables connections - Motor voltage leakage to machine frame through cables - If the motor connections are OK, the problem is inside the controller. Replace ACE3.
05A28	INIT VMN HIGH	Self check of Power components and Motor	**Cause:** Before switching the Line Contactor on, the software checks the power bridge voltage without driving it. The software expects the voltage to be at a “steady state” value. If it is too high, this alarm occurs. **Troubleshooting:** Check - Internal Motor power cables connections - Motor voltage leakage to machine frame through motor - If the motor connections are OK, the problem is inside the controller. Replace ACE3.
05A29	IQ MISMATCHED	Motor control algorithm check	1. Cycle keyswitch In code persists 2. Factory reset (Clear Eeprom)
05A30	VMN LOW	Self check of Power components and Motor	**Cause 1:** Start up test. Before switching on the Line Contactor, the software checks the power bridge: It turns on alternatingly the high side Power Mosfets and expects the phases voltage to increase towards the rail capacitor value. If the phases voltage is less than 66% of the rail capacitor voltage, this alarm occurs. **Cause 2:** Motor running test. When the motor is running, power bridge is ON, the motor voltage feedback is tested; if it is lower than the commanded value (a window of values are considered) fault status is entered. **Troubleshooting:** 1. If the problem occurs at start up (the line contactor does not close at all) check: - Ohm motor internal connections - Check external motor connections - Check for motor cables short to chassis If motor connections are ok, it is a fault internal to the ACE3. Replace ACE3. 2. If the alarm occurs during motor running, check: - Motor connections - Make sure motor windings/ motor cables do not have leakage to chassis - Make sure line contactor closes properly and is making good contact. If no problem is found in the connections/ cables or line contactor, it is a fault internal to the ACE3. Replace ACE3.

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A31	VMN HIGH	Self check of Power components and Motor	**Cause 1**: Before switching the Line Contactor on, the software checks the power bridge: it turns on alternatingly the Low side Power Mosfets and expects the phases voltage to decrease down to -BATT. If the phases voltage is higher than 10% of nominal battery voltage, this alarm occurs. **Cause 2**: This alarm may occur also when the start up diagnosis is overcome, and so the Line Contactor is closed. In this condition, the phases' voltages are expected to be lower than 1/2 battery voltage. If it is higher than that value, fault status is entered. **Troubleshooting:** - If the problem occurs at start up (the Line Contactor does not close at all), check: - Motor internal connections (ohm internal connections continuity) - Motor power cables connections - If the motor connection are OK, the problem is inside the controller, replace ACE3. - If the problem occurs after closing the Line Contactor (the Line Contactor closed and then opens back again), check: - Motor connections - Make sure motor phases windings/cables do not have leakages towards chassis - If no problems are found on the motor/ cables, the problem is inside the controller, Replace ACE3.
05A32	HW FAULT EV	Internal ACE3 Controller check	1. Cycle keyswitch 2. Replace ACE3
05A33	HW FAULT EB	Internal ACE3 Controller check	1. Cycle keyswitch 2. Replace ACE3
05A34	HW FAULT	Internal ACE3 Controller check	1. Cycle keyswitch If fault persists 2. **Cause:** Hardware problem in the logic card circuit for Motor Control driver management. **Troubleshooting:** This type of fault is not related to external components, so, when it is present it is necessary to replace the ACE3.
05A35	POSITIVE LC OPEN	Contactor coil wires not connected	Make sure coil wires on line contactor are connected. Check for 48 volts at coil wires. Replace line contactor.
05A36	POWER MISMATCH	ACE3 self test	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A37	CONTACTOR CLOSED	Main Contactor tips welded	Check line contactor contacts. Clean contacts. Replace line contactor.
05A38	CONTACTOR OPEN	Main Contactor tips damaged	The main contactor coil has been commanded by the controller, but the contactor does not close. **Troubleshooting:** - It could be a problem of the contacts in the Line Contactor that are not working (does not pull-in), try replacing the Line Contactor. - If the contactors of Line Contactor are working correctly than the problem is in the controller, replace ACE3.

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A39	FIELD ORIENT. KO	ACE3 Motor algorithm test	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A40	EB. DRIV.SHRT.	The hybrid relay driver is shorted.	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A41	WRONG SET BAT.	ACE3 rejects the battery voltage reading	At start-up, the controller checks the battery voltage and verify it is within a window around the nominal value. **Troubleshooting:** - Check that the controller SET BATTERY parameter value matches the battery nominal voltage. - Check that TESTER MENU / BATTERY VOLTAGE parameter shows same value as the battery voltage measured with a voltmeter. If it does not match, then do an “ADJUST BATTERY” function.
05A42	EB. DRIV.OPEN	The hybrid relay driver is not able to close.	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A43	EB. COIL OPEN	Hybrid coil is not connected.	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A44	COIL SHOR. EVAUX	Relay coil is shorted	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A45	DRV. SHOR. EV	Internal ACE3 Controller check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A46	CONT. DRV. EV	Internal ACE3 Controller check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A50	LC COIL OPEN	Contactor coil test	Make sure coil wires on line contactor are connected correctly. Replace line contactor.
05A51	TILLER OPEN	No operator input, machine in standby	Warning when the joystick is released, after a fixed period of time of standby (30 seconds) the main contactor opens. **Troubleshooting:** At the next function request the warning will disappear.
05A53	STBY I HIGH	Internal ACE3 Controller check	1. Cycle keyswitch (If code remains see next) **Cause:** The current transducer or the current feedback circuit is damaged in the Controller **Troubleshooting:** This type of fault is not related to external components so, when it is present, it is necessary to replace the ACE3.
05A55	OPEN COIL EV. XX	EVxx coil is not connected	Check wiring to relays from ACE3 Pins A18, B16. Refer to Hybrid Power Pack Troubleshooting in Section 4.
05A56	THROTTLE PROG.	Wrong Joystick profile	1. Factory reset (Clear Eeprom)
05A60	CAPACITOR CHARGE	Startup test	1. Check battery voltage 2. Check battery and motor cables
05A61	THERMIC SENS. KO	ACE3 Controller	**Cause:** The output of the controller thermal sensor is out of range. **Troubleshooting:** This type of fault is not related to external components; replace the ACE3.

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A62	TH. PROTECTION	ACE3 High temp alarm, if high temp is not real proceed to remedy	**Cause:** This alarm occurs when the temperature of the base plate is higher than 85°. Then the maximum current decreases proportionally with the temperature increases from 85° up to 105°. At 105° the Current is limited to 0 Amps. **Troubleshooting:** It is necessary to improve the controller cooling. In case of thermal dissipation realised with the controller base plate installed on chassis it is important the thickness of frame and the planarity and roughness of its surface. If the alarm is signalled when the controller is cold, the possible reasons are a thermal sensor failure or a failure in the logic card. In this case, it is necessary to replace the ACE3.
05A65	MOTOR TEMPERAT.	Motor temp high.	This warning occurs when the temperature sensor has overtaken the threshold of 150°. **Troubleshooting:** Check the thermal sensor inside the motor (use the MOTOR TEMPERATURE reading in the TESTER menu); check the sensor ohmic value and the sensor wiring. If the sensor is OK, improve the cooling of the motor. If the warning is present when the motor is cool, then the problem is inside the controller. Replace ACE3.
05A68	SENS MOT TEMP KO	Motor temp sensor fault	**Cause:** The output of the motor thermal sensor is out of range. **Troubleshooting:** Check the sensor ohm value (at 20C the Sensor should read approx 600 Ohms) and the sensor wiring. If the sensor is OK, then the problem is inside the controller Replace ACE3.
05A69	CRANKING FAILED	Hybrid Power Pack cranking procedure failed	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A70	GEN SWITCH FAULT	Hybrid Power Pack ON request and AUTO request active at the same time	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A71	GEN. OFF FAILED	Hybrid Power Pack shutdown procedure failed	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A72	GEN. FAILURE	Unrequested OFF state	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A73	PEB-PEVP NOT OK	Check of Positive feed for relays on wire #3C	Check ACE3 PIN A17 and fuse F3 for 12V.
05A74	DRIVER SHORTED	Internal ACE3 Controller check	Make sure coil wires on line contactor are connected securely. Check for 48 volts at coil wires. Make sure harness to coil is not shorted. Replace ACE3.
05A75	CONTACTOR DRIVER	Internal ACE3 Controller check	Make sure coil wires on line contactor are connected securely. Check for 48 volts at coil wires. Make sure harness to coil is not shorted. Replace ACE3.
05A76	MC COIL SHOR.	Check the Line Contactor coil	This code is displayed when the coil of the line contactor is shorted or the wiring to the coil is shorted. Check coil and wiring. If error code remains it is an internal fault in the controller. Replace ACE3.

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A77	VDC LINK OVERV.	ACE3 thinks Batt voltage is too high	**Cause:** This fault is displayed when the controller detects an over voltage condition. Over voltage threshold is 65V in the 48V controller. **Troubleshooting of fault displayed at start-up or in standby:** - Check the connection of power cables to the battery terminal, positive and negative, to Line Contactor and to controller +Batt and –Batt, which must be torqued in the range of 9.5 to 11 ft/lb (13Nm to 15Nm.) - If no voltage transient is detected on the supply line and the alarm is present every time the key is switched ON, the failure is probably in the controller hardware, so it is necessary to replace the ACE3. **Troubleshooting of fault displayed during motor driving:.** If the alarm happens during release braking, check line contactor contact, battery power cable connection.
05A78	VACC NOT OK	Incorrect signal from Joystick	Re-program VACC. If condition is still present check joystick input wire #59 to controller pin #A3.
05A79	INCORRECT START	Wrong input sequence	1. Moving Joystick, before Enable switch selected. Make sure enable is pulled on joystick before any movement. 2. Joystick out of range. (Potentiometer not centered) -Check VACC calibration.
05A81	COIL SHOR. EB.	Short circuit on the Hybrid Power Pack coil	Refer to Hybrid Power Pack troubleshooting in Section 4.
05A82	ENCODER ERROR	Motor feedback sensor fault	**Cause:** This fault is signaled in following conditions: the frequency supplied to the motor is higher than 40 Hz and the signal feedback from the encoder has a jump higher than 40 Hz in few tens mSec. This condition is related to a malfunctioning of the encoder. **Troubleshooting:** - Check both the electric and the mechanical encoder functionality, the wires connections. - Check the encoder mechanical installation, if the encoder slips inside its compartment raising this alarm condition. - Also the electromagnetic noise on the sensor bearing can be a cause for the alarm. In these cases try to replace the encoder. - If the problem is still present after replacing the encoder, the failure is in the controller. Replace ACE3.
05A83	STALL ROTOR	Motor not turning	The traction rotor is stuck or the encoder signal is not correctly received by the controller. Check to make sure motor cables are connected. **Troubleshooting:** Please check if the sign of FREQUENCY and ENCODER on the tester menu are the same and different than zero during a traction request.
05A85	VACC OUT RANGE	Joystick signal out of range	Re-program VACC. If condition is still present check joystick input wire #59 to controller pin #A3.
05A89	POWERMOS SHORTED	Internal ACE3 Controller check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A90	VDC OFF SHORTED	Internal ACE3 Controller check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3

5.2-2a MDI-CAN Controller Master Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05A91	PEV NOT OK	Test on positive supply to relays	Check Pin #B1 for 12 volts at controller.
05A92	CURRENT GAIN	Internal ACE3 Controller check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05A94		Hour difference betwen controller and MDI is greater than 10 hours	It stops the machine for 2 minutes, then the MDI is updated with controller hours.
05A96	ANALOG INPUT	Analog to digital failure	**Cause:** This alarm occurs when the A/D conversion of the analog inputs gives frozen value, on all of the converted signals, for more than 400msec. The goal of this diagnosis is to detect a failure of the A/D converter or a problem in the code flow that omits the refreshing of the analog signal conversion. **Troubleshooting:** If the problem occurs permanently it is necessary to Replace ACE3.
05A97	WRONG SLAVE VER.	Wrong slave software version	Factory reset, (Clear Eeprom)
05A98	TORQUE PROFILE	Wrong settings	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
16A06	NO COMMUNICATION	Communication problem with Traction Controller.	1. Check the connections between MDI-CAN and controller. 2. Replace MDI.

5.2-2b MDI-CAN Controller Slave Codes

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05B08	WATCHDOG	ACE3 Controller logic selfcheck	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B10	WRONG RAM MEM.	ACE3 Controller memeory selfcheck	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B12	CONTROLLER MISM.	Wrong software signature	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B13	EEPROM KO	Eeprom failure	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B14	PARAM RESTORE	Parameters mismatched	This warning appears when the controller restored the default values. **Troubleshooting:** If a CLEAR EEPROM was made before the last keyon-recycle, this warning just means that the EEPROM was correctly cleared. A travel demand or a pump request cancel's the alarm. Use the following steps if demand did not clear code: 1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B19	LOGIC FAILURE#1	ACE3 Internal check- Low voltage	**Cause:** This fault is displayed when the controller detects an under voltage condition. Under voltage threshold is 16V in the 48V controller. Troubleshooting of fault displayed at startup or in standby: - Key input signal down-going pulses (below under voltage threshold) due to external loads, like DC/DC converters starting-up, relays or contactor switching, solenoids energizing / de-energizing. - If no voltage transient is detected on the supply line and the alarm is present every time the key is switched ON, the failure is probably in the controller hardware, so it is necessary to replace the ACE3. **Troubleshooting of fault displayed during motor driving:** - If the alarm happens during traction acceleration or driving hydraulic functions, check battery charge condition, power cable connection.
05B20	OUT MISMATCH XX	ACE3 Internal check	This is a safety related test. Slave µC has detected that the Master µC is driving traction motor in a wrong way (not correspondant to the status of operator commands). 1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B21	SP MISMATCH XX	ACE3 Internal check	This is a safety related test. The Master µC has detected a Slave µC wrong setpoint. 1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B22	INPUT MISMATCH	ACE3 Internal check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3

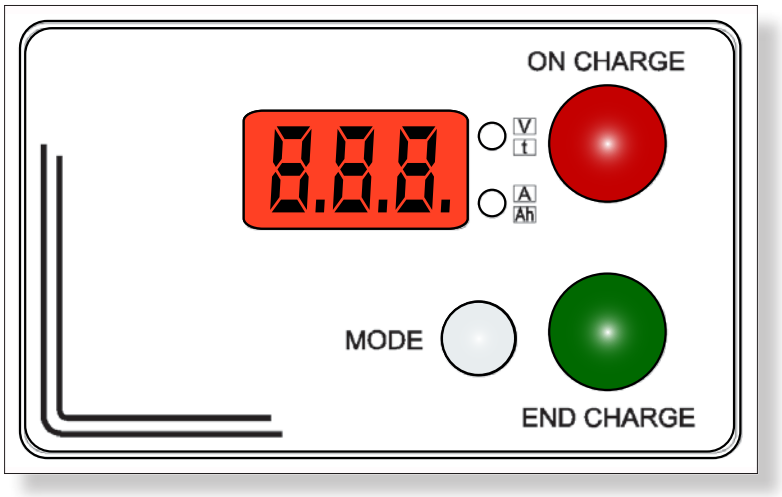
5.2-2a MDI-CAN Controller Slave Codes (Continued)

Flash Code	Displayed on MDI	Probabable Cause	Remedy
05B23	W.SET. TG-EB XX	Wrong MC/EB setpoint detected	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B67	NO CAN MSG.	ACE3 Internal check	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3
05B77	VDC LINK OVERV.	ACE3 thinks Batt voltage is too high	**Cause:** This fault is displayed when the controller detects an over voltage condition. Over voltage threshold is 65V in the 48V controller. Troubleshooting of fault displayed at start-up or in standby: - Check the connection of power cables to the battery terminal, positive and negative, to Line Contactor and to controller +Batt and –Batt, which must be torqued in the range of 9.5 to 11 ft/lb (13Nm to 15Nm.) - If no voltage transient is detected on the supply line and the alarm is present every time the key is switched ON, the failure is probably in the controller hardware, so it is necessary to replace the ACE3. **Troubleshooting of fault displayed during motor driving:** If the alarm happens during release braking, check line contactor contact, battery power cable connection.
05B96	ANALOG INPUT	Analog to digital failure	**Cause:** This alarm occurs when the A/D conversion of the analog inputs gives frozen value, on all of the converted signals, for more than 400msec. The goal of this diagnosis is to detect a failure of the A/D converter or a problem in the code flow that omits the refreshing of the analog signal conversion. **Troubleshooting:** If the problem occurs permanently it is necessary to Replace ACE3.
05B99	CTRAP THRESHOLD	This fault is displayed when the controller detects a wrong value in the feedback for overcurrent protection circuit.	1. Cycle keyswitch 2. Factory reset (Clear Eeprom) 3. Replace ACE3

5.2-3 ZIVAN SG3 Battery Charger and Fault Codes

ZIVAN SG3 is an on-board battery charger that is attached to the motor controller panel. Visually, it displays a string of digital characters in the format of **AXX** representing charger fault codes to alarm the operator of any error related to the battery charger, the microprocessor, and their related components.

SG3 Digital Instrument Visualization



When the display powers up, it shows the following parameters on the display:

- **Battery Voltage** (two-tone red upper LED)
- **Current** provided by the charger (two-tone red lower LED)
- **Time** in hours lacking to the end of charge (two-tone green upper LED)
- **Ah** supplied (two-tone green lower LED)

By pressing the MODE button, the parameters' sequence is blocked and it will be kept as the last value displayed. By pressing the MODE button again the sequence of the parameters restarts.

Big LED Indicators

Color	Description
Red	Constant or Max current phase (IUIa)
Blinking red (4s ON – 1s OFF)	Voltage control phase (IUIa)
Red and blinking green (4s ON – 1s OFF)	Overcharging phase (IUIa)
Red and green alternated	Wait phase (for equalization) (IUIa)
Green	End charge
Blinking green (4s ON – 1s OFF)	Equalization pulse and floating
Green and red blinking together	Connection with CanConSolle or S/S HW-SW

SG3 Charger Setup

1. Turn Charger OFF by unplugging it.
2. While holding white Mode Button turn Charger ON by plugging it in.
3. Using Mode Button Calibrate Charger:
   Pressing the Mode Button quickly will change the setting value.
   Pressing the Mode Button and holding will change to the next setting.

	Lead Acid Battery	AGM Battery
Setting 1	9	9
Setting 2	BA1	BA2
Setting 3	230	281

4. Once all three settings are correct, press and hold the Mode Button (the screen will go blank after 2 seconds, then charger cycle starts).
5. Cycle Charger OFF for 5 seconds then back ON to charge machine.

Decoding SG3 Charger Alarms

When an alarm situation stopping the charge occurs, the digital display shows one of the information found on the table below. The format of the string shown on the display is **AXX**, where <A> signifies Alarm and <**XX**>represents the 2-digit alarm code respectively. With the Alarm Codes on the display referenced against the Charger Fault Codes Table (refer to Section 5.2-3a), the operator can solve the fault and correct the error. If the Alarm information suggests a serious problem that can not be addressed by the codes tables, contact local ZAPI Service Centre.

5.2-3a SG3 Charger Fault Codes

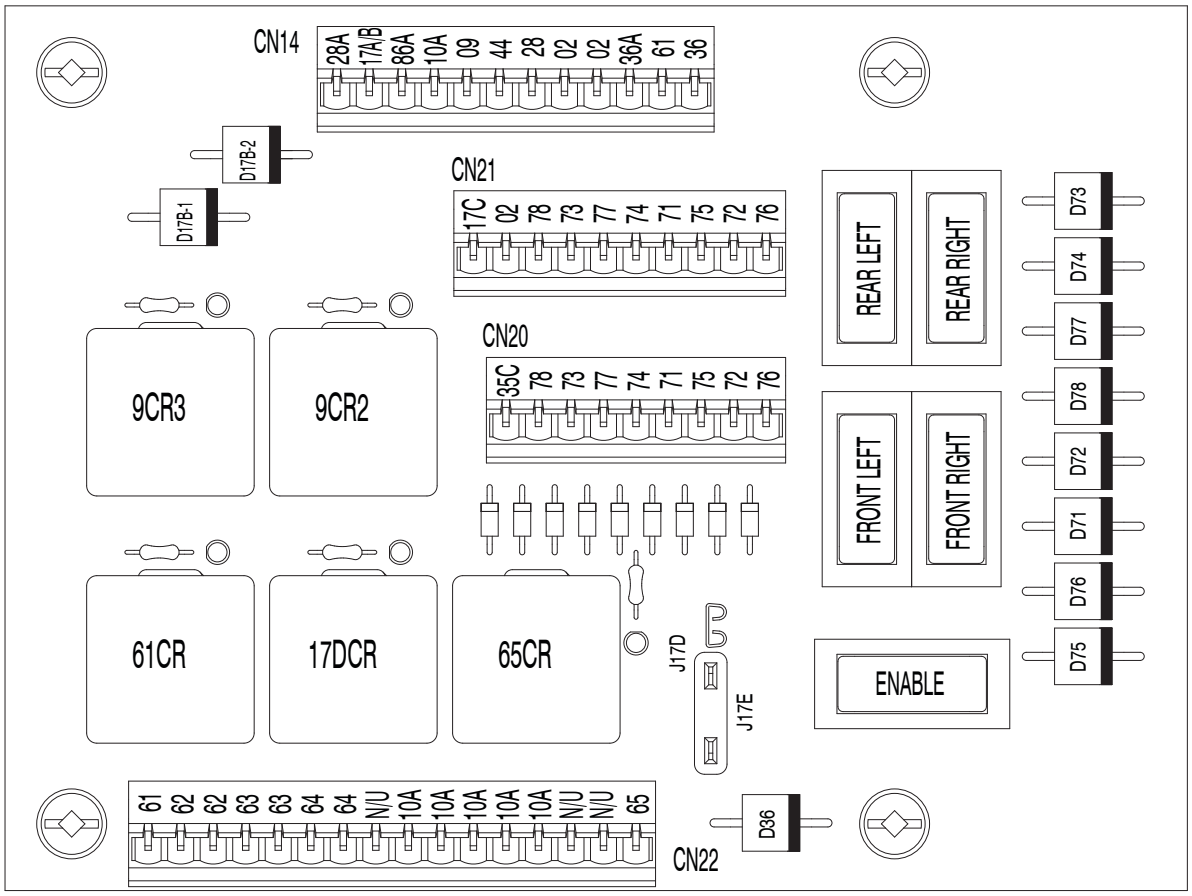
Code	ZIVAN String	Alarm Description	Troubleshooting
A01	LOGIC FAILURE #1	Blocking alarm. This error occurs whenever the battery current exceeds the current setpoint plus a given safety limit for more than 10 seconds, which means that the current is out of control.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A03	WATCHDOG	Blocking alarm. This error occurs whenever the microprocessor of the logic board fails to complete properly its internal tasks within a certain period of time, typically because it has encountered an unpredictable state.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A07	OVERCURRENT	Temporary alarm. This error occurs whenever the charger detects an anomalous current absorption in the primary section. When this happens, the charger stops and waits for the primary current for drop below a safety threshold. After that, the charger waits for another 2.5 seconds (the fan will restart in 1.5 seconds), then it clears the alarm and tries to resume the charge from the point it was interrupted.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A08	HIGH TEMP	Blocking alarm. This error occurs whenever the internal temperature of the battery charger, in the power components section, is too high.	Tempoary Alarm, the charger will resume once the internal temperature returns to a safe working level.
A09	MISMATCH VOLTAGE	Temporary alarm. Our chargers are provided with a special 2-channels battery voltage reading system. This error occurs whenever the readings from the two channels differ from each other exceedingly, meaning that for some reason the charger no longer has a correct voltage reading. This alarm has a blocking behaviour in order to protect the battery from being charged improperly. When this alarm clears, the charger resumes the charge from the point it was interrupted.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.

5.2-3a SG3 Charger Fault Codes (Continued)

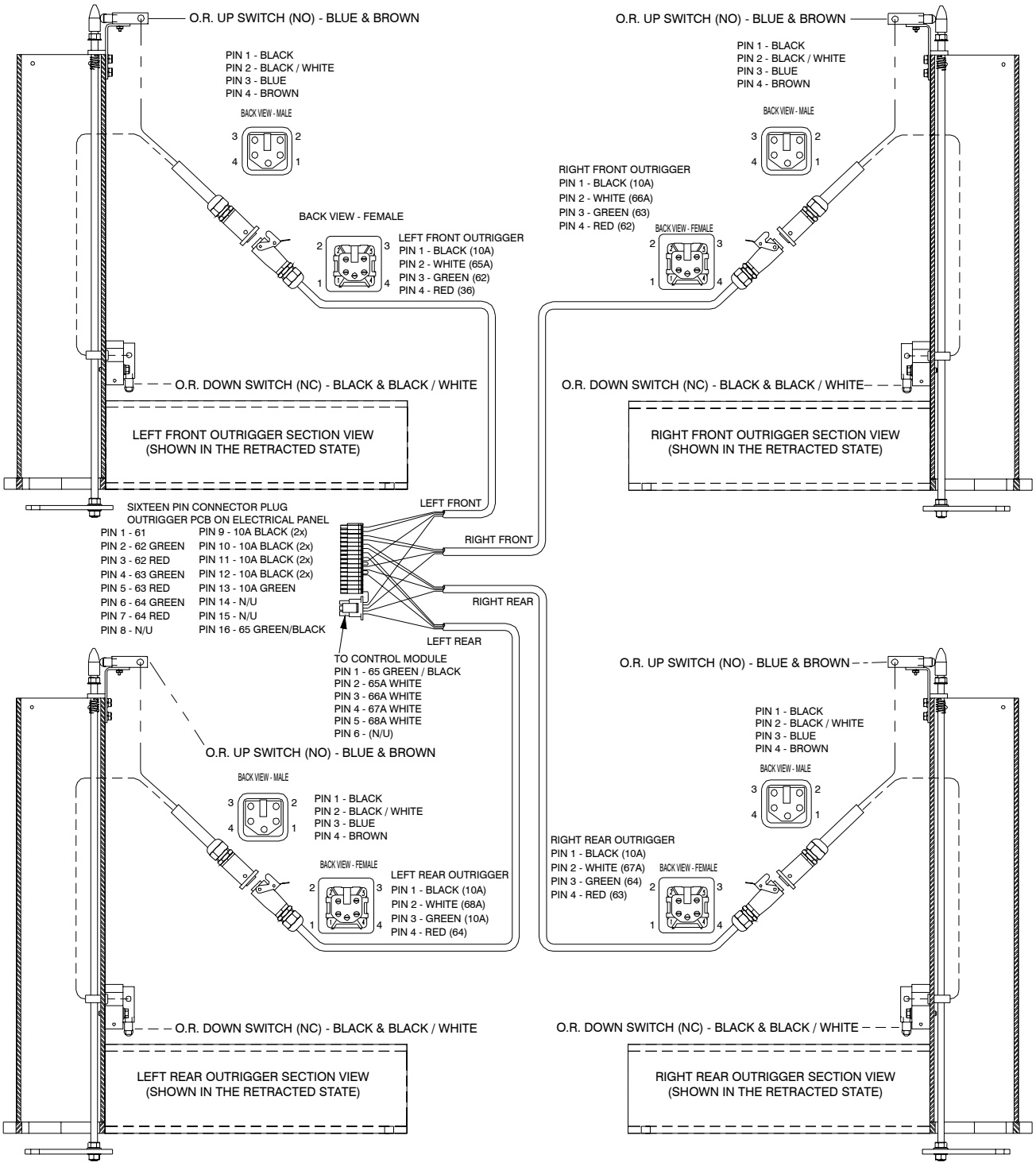
Code	ZIVAN String	Alarm Description	Troubleshooting
A10	TIMEOUT	Blocking alarm. This error occurs when the charger reaches the phase 1 timeout. This time is calculated as the total charging time (which in its turn depends on the programmed capacity).	Check SG3 is correctly programmed for the battery which is connected. Turn off and On the charger to see if the problem clears. If the problem remains, check the specific gravity of each battery cell. Replace SG3.
A16	LOGIC FAILIURE #2	Temporary alarm. This error reports a problem in the voltage levels of the power supply, which is typically caused by a hole in the mains voltage. During this alarm the charger stops and, similarly to the A07 alarm, waits for 2.5 seconds and then tries to resume the charge from the point it was interrupted.	Wait for the charger to try the restarting procedure. If the problem persists, check that the input power cord is properly working and make sure that the mains voltage is correct.
A17	FLASH CHECKSUM	Blocking alarm. This error occurs when the microprocessor detects a corruption in its internal flash memory. This is done through a checksum algorithm that is able to understand (with some limitations) if the microprocessor is running the same exact program that was originally programmed or not.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A18	EEPROM CHECKSUM	Blocking alarm. This error occurs whenever there microprocessor detects communications problem with the external EEPROM memory. When this alarm is shown in ZnCanConsole, it is also followed by a number or an acronym that is used by Zivan to understand how the alarm was generated.	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3
A23	POWER FAIL #1	Output Current Sensing Circuit not functioning correctly	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A24	WRONG MAINS INPUT	The mains input voltage is outside of the allowable working range	Check Mains input voltage.
A25	SHORT OUTPUT	Blocking alarm. This alarm occurs when the charger detects a significant current and a low voltage (< 1.05 V/cell) for 10 consecutive seconds. In this case the charger stops.	The output of the charger has probably a short circuit. Check for short circuits in the connection cable and make sure that the connectors are not in touch with metallic parts. If the problem persists, the charger may be damaged. Change the SG3.
A26	WRONG MARKER EEP	Flash memory corrupted	Try to turn off and turn on the charger. If the problem persists, the problem may be in the Charger. Change the SG3.
A27	NO MAINS	Mains input to the charger is not correct	Check Mains input voltage.
A28	LOW TEMP	Chargers internal temperature is below -30C	Tempoary Alarm, the charger will resume once the internal temperature returns to a safe working level.
A29	CLOCK BATTERY OFF	Non- blocking alarm. This error occurs whenever the Year indication of the Clock Calendar is zero. This happens when the button cell battery in the logic board is discharged or removed, or there are communications problem between the microprocessor and the Clock Calendar. The control algorithm or this alarm is performed only once at the turn on of the charger. If the display is present, this alarm will be shown in the data roll, after the charged amperehours (or eventually the number of slave devices, if there are any). The battery supplied with the charger has an expected service life of 5 years.	Internal battery needs to be replaced, contact local Zapi Service Centre.

Outriggers

5.3-1 Auto-Leveling Outrigger PC Board Layout



5.3-2 Outrigger Mechanical Limit Switch Wiring Diagram



5.2-3 Auto-Leveling Outrigger Settings and Error Codes

Reading the Codes:

In order to read the fault codes, a sequence of pauses and flashes can be seen on the LED mounted on the outrigger control module. The codes are continuously displayed by the LED until the fault is cleared, the outrigger control module is reset and no longer detects the fault, or idle timeout becomes active.
The sequence is as follows:

1. Half second flashes followed by half second pauses indicate the first digit.
2. A 2.5 second pause.
3. Half second flashes followed by half second pauses indicate the second digit
4. A 5 second pause.

Repeat steps 1–4

Since the outrigger control module only reports one error, only one code can be read from the LED per instance. If the error is cleared and another error is present, it will then be presented.

LED ERROR CODES

EVERYTHING OK	ON
VEHICLE TILTED	1/1
OUTRIGGERS CANNOT BE MOVED !	1/2
OUTRIGGERS NOT HOME	2/2
NOT FULLY LEVEL	2/1
RELEASE OUTRIGGER DEMAND !	5/5
CHECK OUTRIGGER SUPPLY (P4-9)	5/2
CANNOT LEVEL : BAD TILT SENSOR	7/1
OUTRIGGERS MANUALLY CONTROLLED !	6/6
TESTING HWFS	7/8
B+ SUPPLY TOO LOW	5/1
STARTUP !	7/7
FAULT : BAD SLAVE MICRO	7/5
FAULT : BAD TILT SENSOR	7/1
FAULT : BAD HWFS	7/2
FAULT : P2-5 FAULTY	8/1
FAULT : P2-6 FAULTY	8/2
FAULT : P2-8 STUCK ON	8/3
FAULT : P2-8 ALWAYS ON	8/4
FAULT : P2-8 ALWAYS OFF	8/5
FAULT : HWFS STALLED !	7/6

60402AA

5.3-4 Auto-Leveling Outrigger Error Code Breakdown

RELEASE OUTRIGGER DEMAND!	5/5

Check inputs on P2 pins 5 & 6 - the “auto-level” or “auto-retract” input is active at power-on or when it is not allowed to carry out the function.

OUTRIGGERS CANNOT BE MOVED!	1/2

Check input on P2 pin 10 – “auto-level” or “auto-retract” has been requested but the platform is elevated.

NOT FULLY LEVEL	2/1

The outrigger legs are all down (touching the ground) but the platform is not fully level.

OUTRIGGERS NOT HOME	2/2

The outrigger legs are not all down (touching the ground) and also are not all home (fully retracted).

B+ SUPPLY TOO LOW	5/1
CHECK OUTRIGGER SUPPLY (P4-9)	5/2

Check that the battery voltage is not too low.

VEHICLE TILTED	1/1

These is not a true fault – move the vehicle to level ground!

TESTING HWFS	7/8
STARTUP!	7/7

These are not true faults unless they do not clear – the start-up tests should only occur for a short time.

OUTRIGGERS MANUALLY CONTROLLED!	6/6

This is not a true fault – the outriggers are being manually operated (one or more outrigger legs on P4 pins 1-8 is high, when the outrigger control module is not active.

CANNOT LEVEL (BAD TILT SENSOR)	7/1
FAULT: BAD TILT SENSOR	7/1
FAULT: BAD HWFS	7/2
FAULT: BAD SLAVE MICRO	7/5
FAULT: HWFS STALLED!	7/6
FAULT: P2-5 FAULTY	8/1
FAULT: P2-6 FAULTY	8/2
FAULT: P2-8 STUCK ON	8/3
FAULT: P2-8 ALWAYS ON	8/4
FAULT: P2-8 ALWAYS OFF	8/5

60412AB

These are internal faults. If the fault persists after the power has been reset, the outrigger control module may need to be replaced.

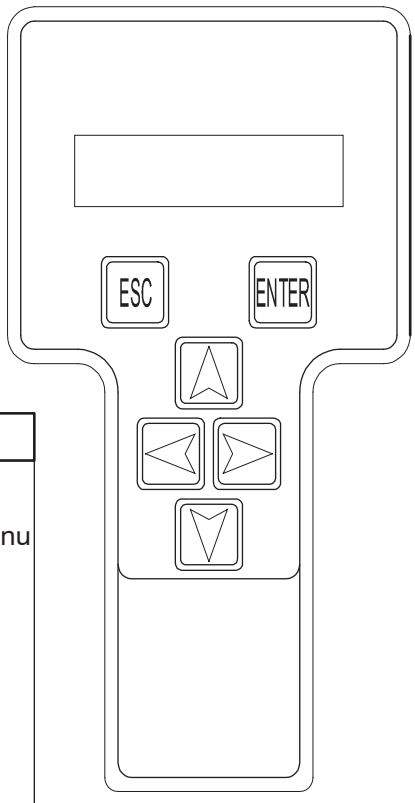
5.3-5 Hand Held Calibration/Diagnostic Tool Key Functions

WARNING

Only trained and authorized personnel shall be permitted to service an aerial platform.

WARNING

Read all instructions closely before attempting each phase of this procedure.



M62172AA

SYMBOL	KEY FUNCTIONS
ESC ENTER	**ESC/ENTER BUTTONS** To move back and forth between menu and sub-menu
◁ ▷	**LEFT/RIGHT BUTTONS** Select menus and setting to be adjusted
△ ▽	**UP/DOWN BUTTONS** Adjust setting values

Outrigger Settings

Model	6826RTE
O.R. Settings	7

5.3-6 Outrigger Control Module Instructions

When EZcal hand-held device is connected to the OCM1 control module, a two line displays shows various menus and settings. At any time the top line of the display describes the currently selected menu and the bottom line shows the currently selected item in that menu.

Six buttons on **EZcal** allow easy navigation through the menus:

- ← and → change the selected item (the bottom line display)
- ENTER enters the selected new menu when available (top line display changes)
- ↑ and ↓ adjusts the selected item when available
- ESC exits the current menu back to the previous menu

TOP LEVEL MENU OPTIONS

HELP	Select this menu to see a description of current OCM1 status
DIAGNOSTICS	Select this menu to see switch input status & logged data
ACCESS LEVEL	Select this menu & enter correct code to enable adjustments and calibrations
ADJUSTMENTS	Select this menu to see and adjust OCM1 settings NOTE: this menu provides for adjustments which might be needed for different work activities
SETUPS	Select this menu to carry out initial set-up of the OCM1 NOTE: this menu provides for set-ups which are needed to configure the OCM1 for a particular vehicle

HELP MENU OPTIONS

(help message)	A message displays current OCM1 status, indicating if everything is OK or if there is an error code (see LED Error Codes – Table 5.3)

DIAGNOSTIC MENU OPTIONS

SYSTEM	Select this menu to see general OCM1 system information
SWITCHES	Select this menu to see switch input status
OUTPUTS	Select this menu to see OCM1 output status
LOG	Select this menu to see logged information

DIAGNOSTIC / SYSTEM MENU OPTIONS

OUTRIGGERS	Displays various status during the auto-level function
TILT	Displays vehicle tilt in X and Y orientations measured by integral sensor
TILTED	Displays whether vehicle is tilted (YES or NO)
BATTERY	Displays battery supply voltage (on P2-12)

DIAGNOSTIC / SWITCHES MENU OPTIONS

LR/P2-1	High when the left rear outrigger is in contact with the ground
RR/P2-2	High when the right rear outrigger is in contact with the ground
RF/P2-3	High when the right front outrigger is in contact with the ground
LF/P2-4	High when the left front outrigger is in contact with the ground
EXTEND/P2-5	High to activate the auto-level function
RETRACT/P2-6	High to activate the auto-retract function
ELEV/P2-10	High when the scissor stack is stowed (elevated input indicates that the vehicle is stowed).

DIAGNOSTIC / OUTPUTS MENU OPTIONS

LAMP/P2-7	Displays state of outrigger control box light
STABLE/P2-8	Displays state of stable (all legs touching the ground) output
TILT/P2-9	Displays state of tilt
LRe/P4-1	Displays state of left rear outrigger extend valve
RRe/P4-2	Displays state of right rear outrigger extend valve
RFe/P4-3	Displays state of right front outrigger extend valve
LFe/P4-4	Displays state of left front outrigger extend valve
LRr/P4-5	Displays state of left rear outrigger retract valve
RRr/P4-6	Displays state of right rear outrigger retract valve
RFr/P4-7	Displays state of right front outrigger retract valve
LFr/P4-8	Displays state of left front outrigger retract valve
P4-9 MON	Displays the voltage to the outrigger valve (can only be seen when operating in auto-level or retract)

DIAGNOSTIC / LOG MENU OPTIONS

MAX.BATTERY	Displays maximum recorded battery supply voltage
OCM1 version	Displays part number and software version of GP106
EZcal version	Displays software version of EZcal

ACCESS LEVEL MENU OPTIONS

CODE xxxx	ACCESS LEVEL 3 (allows viewing only) ACCESS LEVEL 2 (allows setup on OCM1)

ADJUSTMENTS MENU OPTIONS (factory set – not adjustable)

Xtilt TRIP	Displays the tilt trip point in the X orientation
Ytilt TRIP	Displays the tilt trip point in the Y orientation
TILT ENTRY	Displays the tilt delay time
TILT EXIT	Displays the tilt delay time
Xlevel TRIP	Displays the tilt trip point in the X orientation during the auto-level function
Ylevel TRIP	Displays the tilt trip point in the Y orientation which applies during the auto-level function

MACHINE SETUP MENU OPTIONS (factory set – not adjustable)

DEFAULTS	Allows all adjustments & machine settings to be set to defaults WARNING: all GP106 settings will be changed; use with caution!
CALIBRATE LEVEL	Allows levelling of the integral tilt sensor of the GP106, when the vehicle is positioned on level ground (see Appendix Four)
TILT MODE	Allows configuration of the GP106 tilt output (P2-9): 1 – output turns on to light lamp when tilted 2 – output turns off to cutout functions when tilted 3 – output turns off to cutout functions when tilted AND elevated
TILT FILTER	Displays the filter applied to the tilt measurements during the auto-level function (used to minimize the effect of vehicle vibrations on the tilt measurement)
Xlevel TARGET	Displays the tilt in the X orientation at which the auto-level function will complete.
Ylevel TARGET	Displays the tilt in the Y orientation at which the auto-level function will complete.
tilt SLACK	Displays the amount of vehicle tilt exceeding the Xtilt TARGET and/or Ytilt TARGET in which the auto-level function does not attempt to level EXAMPLE: Xtilt TARGET=0.3°, Ytilt TARGET=0.7°, tilt SLACK=0.5° If machine is tilted to 1.0° in the X and Y orientations, the auto-level function will attempt to level the X orientation (0.3+0.5<1.0) but does not attempt to level the Y orientation (0.7+0.5>1.0) RANGE: 0.0° to 1.0°, default 0.3°

IMPORTANT

Each phase must be completed before the next phase can be carried out.
All phases must be completed before the aerial platform can be operated.
Always follow the instructions of the Calibration instrument.

1. Ensure aerial platform is parked on a firm and level surface.

2. Elevate the scissors high enough to lay a level across the base tubes. Ensure there is no debris on the base and the level sits flat. Do not elevate aerial platform higher than the high speed/tilt override limit switch.

3. Manually operate the outriggers and level the machine in 4 places: left side, right side, front and rear. All 4 outriggers must be firmly placed and all 4 tires are off the ground.

4. Double check that the aerial platform is level at all 4 points.

5. Connect the EZcal tool to the P1 connector on the **CONTROL MODULE**.

6. The display will show **Help: Press Enter**.
   By using Left/Right buttons, select the **Access Level (3)** from the menu and press the **ENTER** button.

7. The display will show **Access Level: Code (0000)**.
   By using the Up/Down buttons, enter the Access Level Code (1 ➔1 ➔ 2 ➔ 2) followed by pressing the **ENTER** button.

8. The display will show **Access Level 2**.
   By using Left/Right buttons, select the **Setups** from the menu and press the **ENTER** button.

9. The display will show **Setups: Change Defaults**.
   Select the **Change Defaults** from the menu and press the **ENTER** button.

10. The display will show **Defaults, 0 = Custom**.
    By using Up/Down buttons, select the Defaults: Code Setting for your Model (For Default Code Refer to Table 5-3) from the menu and press the **ENTER** button and followed by **ESCAPE** button.

11. The display will show **Setups Change Defaults**.
    By using Left/Right buttons, select the **Calibrate Level** from the menu and press the **ENTER**.

12. The display will show **Calibrate Level: Yes: Enter, No: ESC**.
    Select the **Yes** from the menu by press the **ENTER** button.

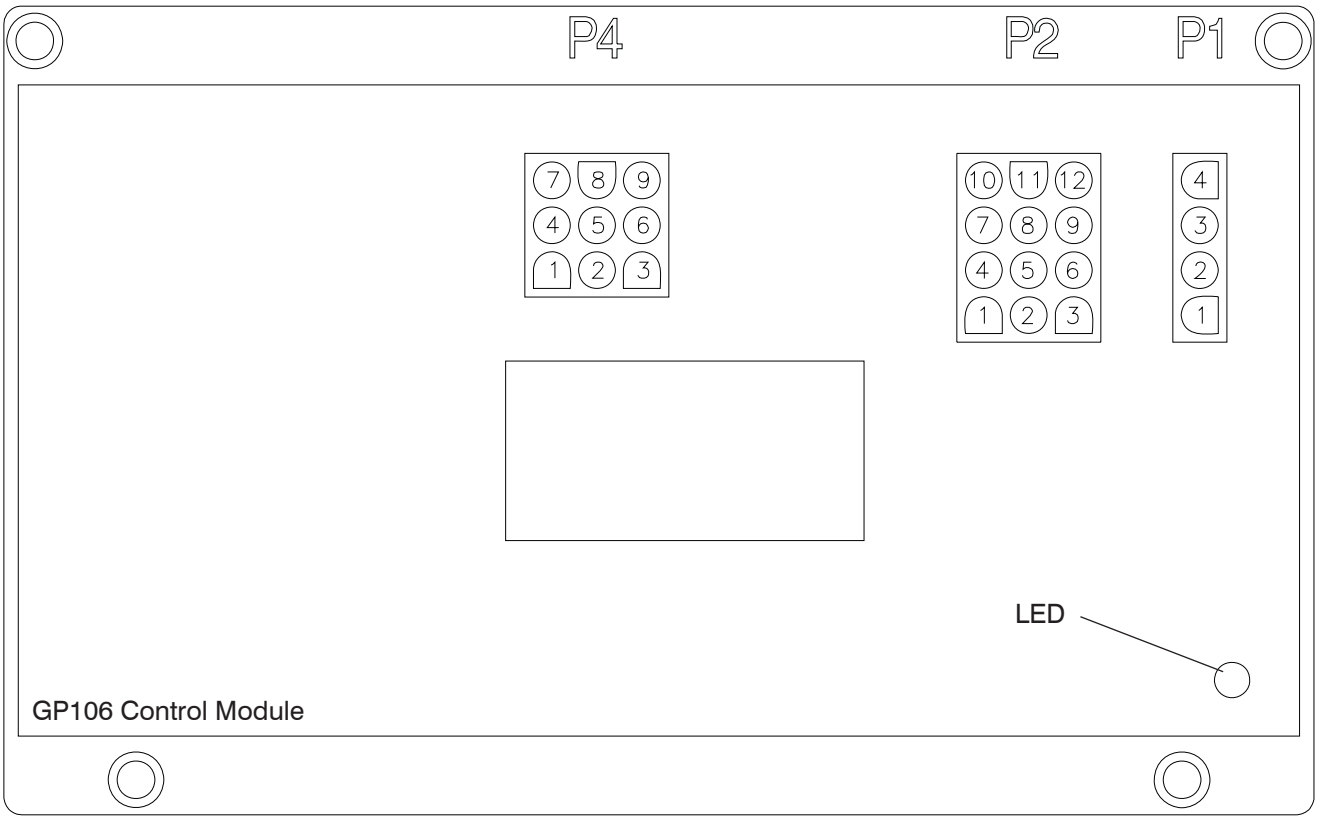
13. The display will show **Calibrate Level: Tilt 0.0 , 0.0'**.
    Select the **ESCAPE** from the menu once.

14. The display will show **Setups Calibrate Level**.
    Select the **ESCAPE** from the menu once again.

15. The Calibration procedure is complete, unplug and remove the EZ-Cal.

16. Close the hydraulic/electric cabinet.

5.3-7 Auto-Leveling Outrigger Control Module Pin Reference Chart



PLUG	PIN #	WIRE # AND COLOUR	WIRE FUNCTION
P1	The Calibration Connection		
P2	1	68A White	Input indicating that the LEFT REAR outrigger is in contact with the ground
P2	2	67A Red/White	Input indicating that the RIGHT REAR outrigger is in contact with the ground
P2	3	66A Blue/White	Input indicating that the RIGHT FRONT outrigger is in contact with the ground
P2	4	65A Green/White	Input indicating that the LEFT FRONT outrigger is in contact with the ground
P2	5	70 Green/Black	Input for AUTO-LEVEL function to extend the outriggers to level the machine
P2	6	79 Green	Input for AUTO-RETRACT function to retract the outriggers until the switch is released
P2	7	70A Red/White	Outrigger Light on Outrigger Control Box
P2	8	65 Green/Black	STABLE output to indicate that all outriggers are in contact with the ground
P2	9	28 Green	TILT output to indicate that the machine is level (ANSI/CSA only)
P2	10	44 Green	Tilt override / High Drive Cutout
P2	11	02 White	Negative Input
P2	12	10A Black	Main Power Input
P4	1	78 Black/White	Output used to extend the LEFT REAR outrigger
P4	2	77 Blue/Black	Output used to extend the RIGHT REAR outrigger
P4	3	76 Red/Black	Output used to extend the RIGHT FRONT outrigger
P4	4	75 Orange/Black	Output used to extend the LEFT FRONT outrigger
P4	5	74 Black	Output used to retract the LEFT REAR outrigger
P4	6	73 Blue	Output used to retract the RIGHT REAR outrigger
P4	7	72 Red	Output used to retract the RIGHT FRONT outrigger
P4	8	71 Orange	Output used to retract the LEFT FRONT outrigger
P4	9	35C White/Black	Power input for outriggers

60401AC

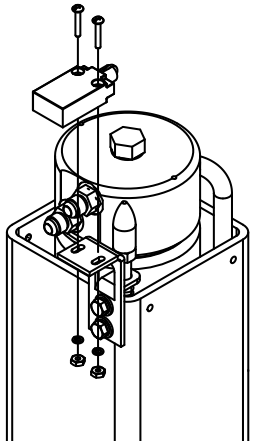
5.3-8 Outrigger Upper Limit Switch (LS61, LS62, LS63, LS64) Replacement and Adjustment

Machine Preparation

1. Ensure the aerial platform is parked on a firm level surface.
2. Fully retract the outriggers.
3. Turn the main power disconnect switch to the OFF position.
4. Chock or block the wheels to keep the aerial platform from rolling forward or backward.

Limit Switch Removal

1. Remove the bolts and washers (x4) securing the upper limit switch/hose cover. Set aside the hardware and cover for reinstallation later.
2. Remove the washers, bolts, and nuts (x2) securing the limit switch to the bracket. Set aside for reinstallation later.



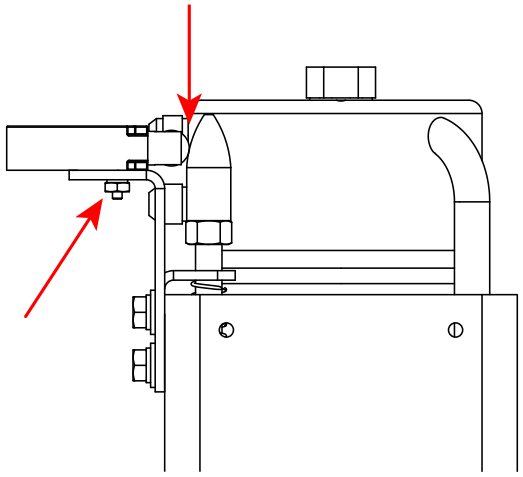
3. Remove the limit switch cable from the split loom tubing, cutting tie wraps and tape as needed to free it.
4. Disconnect the connector, and remove the limit switch wires and ferrules, retaining the connector for reuse later. Discard the old limit switch and cable.

Limit Switch Replacement

1. Mount the new limit switch **(138060)** loosely on the bracket, using the hardware removed previously.
2. Starting from the top, place the new limit switch cable in the split loom.
3. Adjust the cable in the split loom as needed, and close the split loom by wrapping electrical tape around it at regular intervals. Tie wrap the split loom to the hoses.
4. Cut off any unneeded length from the cable, and strip the end to exposed the wires beneath.
5. Strip the ends from each wire and crimp a ferrule to each wire end.
6. Insert the wires into the connector end removed previously (refer to 3.13 Outrigger Harness Wiring Diagram). Reconnect the connector.

Limit Switch Adjustment

1. With the outriggers retracted, slide the limit switch on the bracket until the plunger is depressed against the actuator rod cap. Apply a small amount of Loctite to the bolts, and tighten the bolts and nuts.



Limit Switch Testing

1. Turn main power disconnect switch to the ON position, and start the engine.
2. With the outriggers fully retracted, the unit should be operable. With the outriggers extended more than halfway, the unit should not be operable.

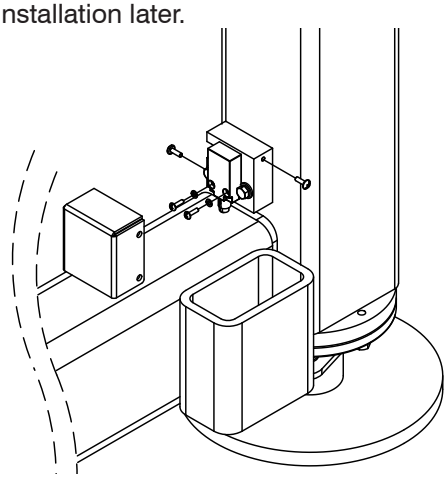
5.3-9 Outrigger Lower Limit Switch (LS65, LS66, LS67, LS68) Replacement and Adjustment

Machine Preparation

1. Ensure the aerial platform is parked on a firm level surface.
2. Fully retract the outriggers.
3. Turn the main power disconnect switch to the OFF position.
4. Chock or block the wheels to keep the aerial platform from rolling forward or backward.

Limit Switch Removal

1. Remove the bolts and washers (x4) securing the upper limit switch/hose cover. Set aside the hardware and cover for reinstallation later.
2. Remove the screws (x2) securing the lower limit switch cover. Set aside the hardware and cover for reinstallation later.
3. Remove the washers and screws (x2) securing the limit switch to the mount. Set aside for reinstallation later.



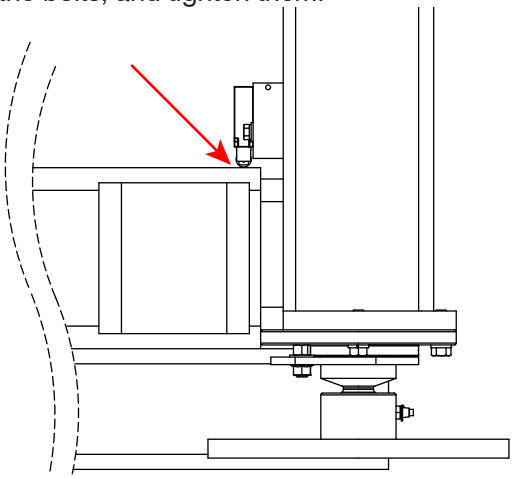
4. Cut the tie wraps and tape around the split loom as needed to expose the limit switch cable.
5. Disconnect the applicable wires from the connector, and cut the ferrules off of the wires on the end of the cable. Retain the connector for reuse later.
6. Remove the cable from the split loom. Gently pull the cable down through the outrigger weldment, and through the rubber grommet. Retain the rubber grommet. Discard the old limit switch and cable.

Limit Switch Replacement

1. Install a new limit switch **(138059)** to the mounting block using the hardware removed earlier.
2. Feed the new cable through the rubber grommet, and place the grommet in the hole in the outrigger weldment.
3. Feed the cable up through the outrigger weldment, until it comes out the top.
4. Working from top to bottom, adjust the cable in the split loom and close the split loom by wrapping electrical tape around it at regular intervals. Tie wrap the split loom to the hoses.
5. Cut off any unneeded length from the cable, and strip the end to exposed the wires beneath.
6. Strips the ends from each wire and crimp a ferrule to each wire end.
7. Insert the wires into the connector end removed previously (refer to 3.13 Outrigger Harness Wiring Diagram). Reconnect the connector.

Limit Switch Adjustment

1. Loosen the bolts securing the mounting block to the outrigger, and slide the block until the limit switch plunger is depressed halfway against the base weldment. Apply a small amount of Loctite to the bolts, and tighten them.



Limit Switch Testing

1. Turn main power disconnect switch on and start the engine.

2. With the outriggers fully retracted, the unit should be operable. With the outriggers extended more than halfway, the unit should not be operable.

Scissors

5.4-1 High Speed Cutout Limit Switch (LS5) Replacement and Adjustment

Machine Preparation

1. Ensure the aerial platform is parked on a firm level surface.

2. Chock or block the wheels to keep the aerial platform from rolling forward or backward.

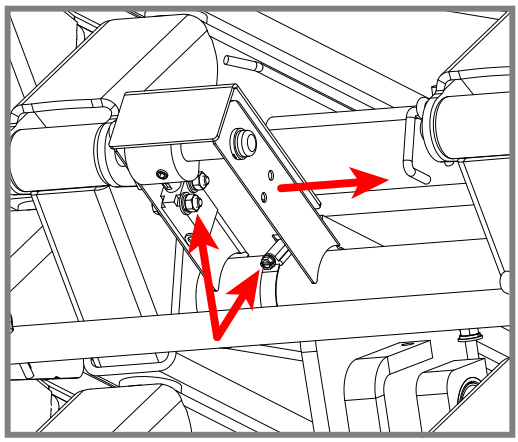
Limit Switch Removal

1. Raise the platform to give access to the limit switch cable, and deploy the maintenance stand.

2. Turn the main power disconnect switch to the OFF position.

3. Remove the gear clamp securing the limit switch cover, and slide the limit switch cover off of the pin. Set aside the clamp for reinstallation later.

4. Remove the bolts, washers, and nuts (x2) securing the limit switch to the cover. Set the cover and hardware aside for reinstallation later.



5. Remove the limit switch and free the limit switch cable by cutting the tie wraps.

6. Follow the cable into the electrical panel, and disconnect the limit switch wires from the electrical panel. Discard the limit switch.

Limit Switch Replacement

1. Mount the new limit switch (**122010**) on the cover, using the hardware removed previously (apply a small amount of Loctite to the bolts).

2. Slide the limit switch cover back onto the pin. Secure it with the gear clamp removed previously.

Limit Switch Electrical Connections

1. Route the new limit switch cable along the same path as the old one into the electrical panel cabinet. Use tie wraps as needed to secure them at regular intervals.

2 Strip the cable jacket back to separate the wires. Cut the wires to length if needed, and strip the ends.

3. Crimp a 18 GA red ferrule (**115401**) onto the end of the blue wire, and a 14-16 GA x 1/4 Terminal (**105359**) onto the end of the brown wire. Connect both wires to the electrical panel (refer to 3.16a Electrical Panel Wiring Diagram – S/N 37300235 & above).

3. Stow the maintenance stand and fully lower the platform**.**

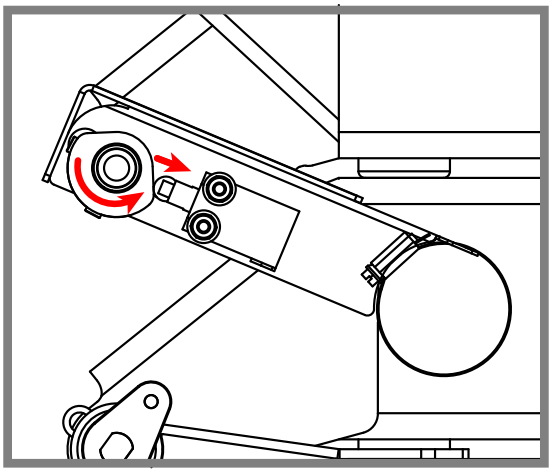
Limit Switch Cam Setup

1. Turn the main power disconnect switch to the ON position, and start the engine.

2. Attach the end of a measuring tape to the side of the platform with a tie wrap, in such a way that the measuring tape will hang down freely to the ground. **Note:** The end of the measuring tape should be level with the standing surface of the platform.

3. Raise the platform until the distance from the standing surface of the platform to the ground measures 7 ft (2.13 m).

4. Loosen the set screws (x2) on the limit switch cam, and rotate the cam until it depresses the limit switch plunger. Apply a small amount of Loctite to both set screws, and tighten them.



High Speed Cutout Limit Switch Testing

1. Raise the platform less than 84 in (213 cm), and drive the unit at full speed. The unit should move at high speed.

2. Then raise the platform over 84 in (213 cm). Drive forward with joystick fully forward. Machine should drive in low speed.

NOTE

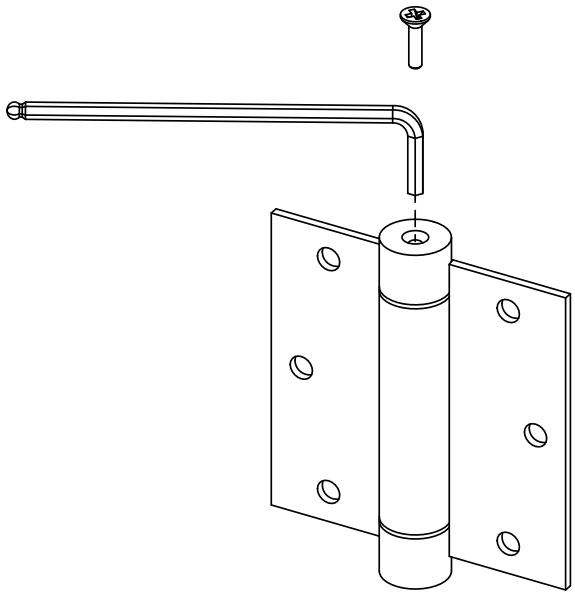
High Speed Cutout should occur within the tolerance zone of 81–87 (206–221).

5.5-1 Gate Springe Hinge Adjustment

1. The tension of the spring hinges should be such that when the gate is opened halfway and released, it will close fully and latch.

2. To adjust the tension of the spring hinges, first remove the safety locking screw located at the top or bottom of each hinge. Retain the screws for reinstallation later.

3. To increase the tension, insert a 5/32 hex wrench in the screw socket, and turn the wrench clockwise. To release the tension, depress the hex wrench in the socket, let it rotate counterclockwise, then release the hex wrench.



4. Adjust the tension on both hinges until the gate releases and latches from a half open position.

5. Reinstall the safety locking screws into the hinges when tension adjustment is complete.

www.skyjack.com