SKYJACK

SERVICE MANUAL

SJ12, SJ16

VERTICAL MAST

213558AAA
October 2019
ANSI/CSA, CE , AS

Section 1 – Scheduled Maintenance

1.1 Read and heed

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

1.1-1 Mobile Elevating Work Platform (MEWP) definition

A mobile machine intended for moving persons, tools, and material to working positions, consisting of a work platform with controls, an extending structure and a chassis.

1.1-2 Purpose of equipment

The Skyjack Vertical Mast lifts are designed to move personnel, tools, and materials to working positions.

1.1-3 Use of equipment

The MEWP is a highly maneuverable, mobile work station. Work platform elevation and elevated driving must only be done on a firm, level surface.

1.1-4 Service policy and warranty

Skyjack warrants each new product to be free of defective parts and workmanship for the first 2 years or 3000 hours, whichever occurs first. Any defective part will be replaced or repaired by your local Skyjack dealer at no charge for parts or labor. In addition, all products have a 5 year structural warranty. Contact the Skyjack Service Department for warranty statement extensions or exclusions.

1.1-5 Ownership of MEWP

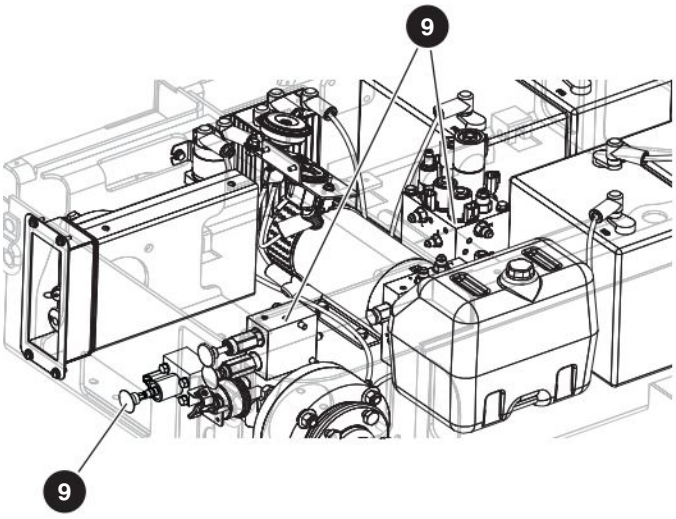
Notify Skyjack of MEWP ownership. If you sell or transfer the ownership of a MEWP, promptly notify Skyjack of the new owner's contact information.

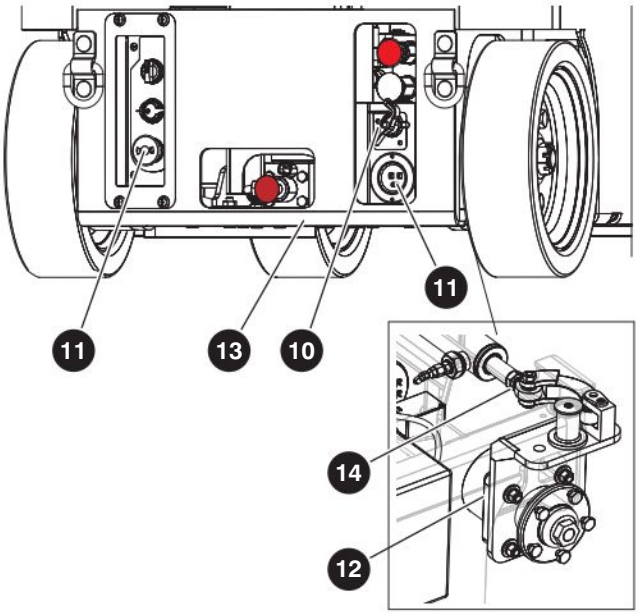
Skyjack needs this information to inform the owner of any updates or additional activities that are necessary to keep the machine in proper working condition.

1.1-6 Optional equipment

This MEWP is designed to accept a variety of optional accessories. Refer to the operation manual for a list of the optional accessories. Operating instructions for these options are located in Operation manual.

For components or systems that are not standard, speak to the Skyjack Service Department. Give the model and serial number for each applicable MEWP.





9 Manifolds (B)

- Make sure all fittings and hoses are correctly tightened.
- Make sure there is no indication of hydraulic leakage.
- Make sure there are no loose wires or missing fasteners.

10 Main Power Disconnect Switch (B)

- Turn main power disconnect switch to off position.
- Make sure all cables are secure and switch is in proper working condition.

11 Base Controls (B)

- Make sure there are no signs of visible damage and all switches operate correctly.
- **AC power socket (B)**
  - Make sure there is no visible damage.

12 Brakes (B, C)

- **B - Frequent/periodic/pre-delivery Inspection**
  - Make sure there are no loose or missing fasteners.
  - Make sure there is no visible damage.
- **C - Annual Inspection**
  - Make sure that the disc show no signs of wear and/or physical damage
  - Replace the disc or pin brakes if necessary.

13 Base Weldment (B)

- There are no cracks in the welds or structure.
- There are no signs of deformation.

14 Grease points (B)

- Make sure there is no visible damage.
- Make sure there is no dirt or blockages.

Table 2.7 Floor Loading Pressure - CE, AS

Model		Total MEWP Weight	Total MEWP Load		
			Wheel**	LCP***	OFL***
SJ12	min*	863 kg	275 kg	647 kPa	7.8 kPa
	max*	1090 kg	430 kg	891 kPa	9.8 kPa
SJ16	min*	980 kg	355 kg	774 kPa	8.8 kPa
	max*	1207 kg	510 kg	1010 kPa	10.8 kPa

* **Min:** Minimum MEWP weight (Unloaded platform, no options/attachments) *1840AB*
Max: Maximum MEWP weight (Platform loaded to capacity with options/attachments)

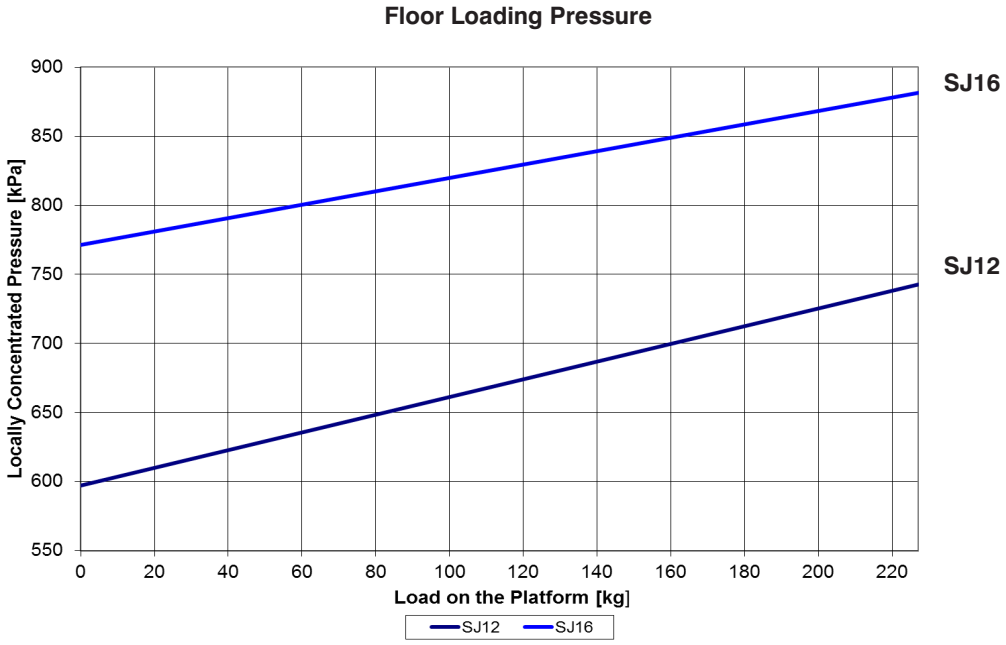
** **Wheel** is the weight that can be experienced on one wheel.
Note: *This is more than 25% of the machine weight due to possible weight distribution over the machine and platform.*

*** **LCP:** Local Concentrated Pressure is a measure of how hard the MEWP presses on the area in direct contact with the floor/tire.
OFL: Overall Floor Load (Pressure) is a measure of the average load the MEWP imparts on the whole surface directly underneath the chassis. This has been calculated by dividing the MEWP weight by the overall floor area occupied by the MEWP (on wheels).

Note: *The floor covering (e.g., tile, carpet, etc.) or the structure (e.g., beams) of the operating surface must be able to withstand more than the values indicated above.*

NOTE

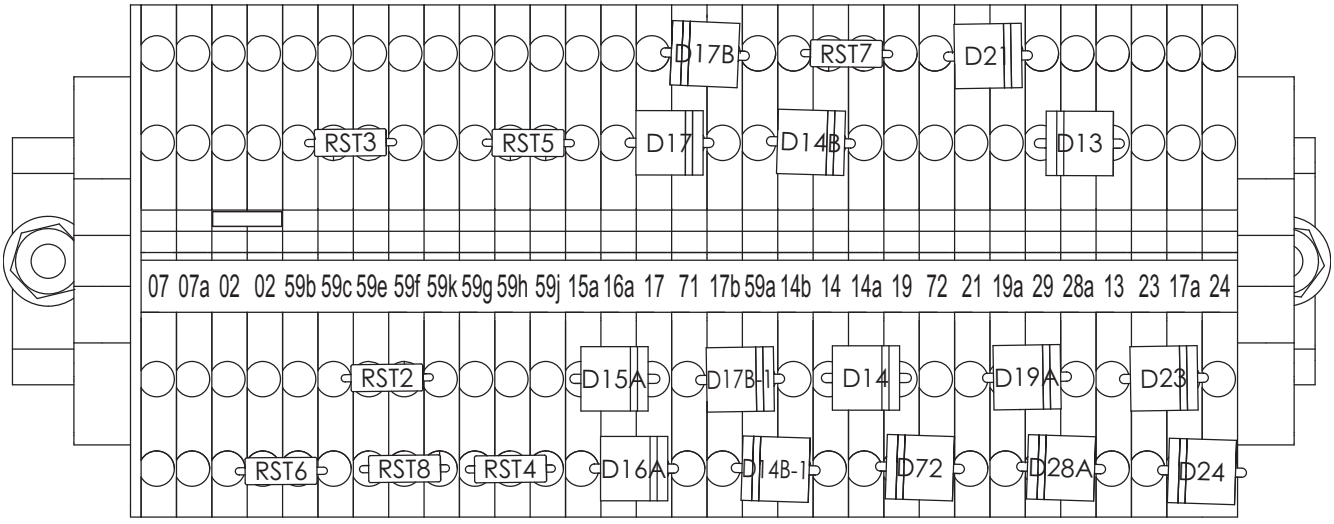
The **LCP** *or* **OFL** *that an individual surface can withstand varies from structure to structure and is generally determined by the engineer or architect for that particular structure.*



3.4 Hydraulic Component Parts List

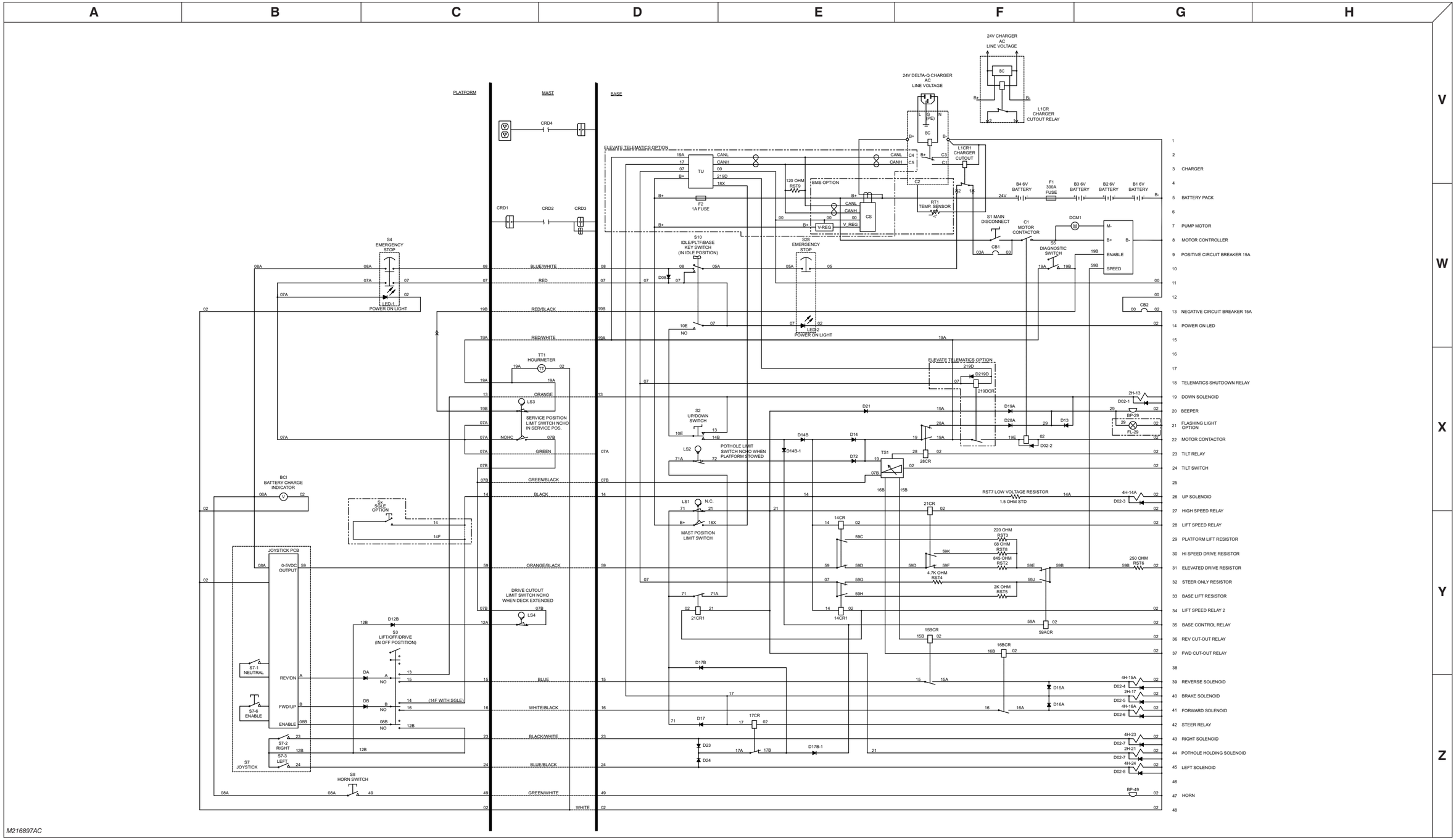
Index No.	Skyjack Part No.	Description
2H-13	151696	VALVE, Control (Emergency lowering)
2H-21	103655	VALVE, Pothole release
4H-14A	158185	VALVE, Lift
2H-17	103656	VALVE, Control (Brake)
4H-15	156850	VALVE, Control (Reverse drive) (Includes 4H-16)
4H-16	-	VALVE, Control (Forward drive) (Includes 4H-15)
4H-23	158186	VALVE, Control (Right steer) (Includes 4H-24)
4H-24	-	VALVE, Control (Left steer) (Includes 4H-23)
BR1	154839	MOTOR, Brake (Right)
BR2	154839	MOTOR, Brake (Left)
C1	151733	CYLINDER (Steer)
C2	159471	CYLINDER (Lift)
C3	211118	CYLINDER (Pothole)
CB1	147889	MOTOR, Counterbalance
R1	N/A	VALVE, Relief (System)
R2	158853	VALVE, Relief (Steering)
R3	151684	VALVE, Relief (Lift)
V1	146561	VALVE, Override(Brake)
F1	N/A	FILTER, Strainer
MB1	151270	BLOCK, Manifold (Powerpack)
MB2	210426	BLOCK, Manifold (Main)
MB3	136540	BLOCK, Manifold (Brake)
MB4	159802	BLOCK, Manifold (Holding)
M1	139412	MOTOR, Drive (Right)
M2	139412	MOTOR, Drive (Left)
P1	151270	PUMP, DC motor
P2	146559	PUMP, Hand
QD1	122420	QUICK DISCONNECT
O1	108721	ORIFICE (0.055”) (Lowering speed) **(SJ12)**
	159416	ORIFICE (0.043”) (Lowering speed) **(SJ16)**
O2	141518	ORIFICE (0.031”)
FC1	158852	CONTROLLER (Priority flow)

3.13 Terminal Strip



M229318_TerminalStrip

3.23 Electrical Schematic (ANSI/CSA)



M216897AC

14. Loose or broken wire #19B in Mast control cable or its connections.	**Check continuity between Mast function cable connector P2 pin #5 and Platform connector X1 pin #C4 on cable. Check for loose or corroded connections on cable connectors.Replace if wire is defective.**
15. Loose or broken wire #19B from Diagnostic switch S5 to Mast Control cable.	**Check continuity. Replace if defective.**
16. Loose or broken wire #19B from Diagnostic switch S5 to Motor Controller. (Enable signal)	**Check continuity. Replace if defective.**
17. Loose or broken wire #19 from Base terminal block to Tilt switch TS1	**Check continuity. Replace if defective.**
18. Defective Tilt switch TS1.	**Test Tilt switch. Replace if defective.**
19. Loose or broken wire #28 from Tilt switch TS1 to Tilt Relay 28CR.	**Check continuity. Replace if defective.**
20. Loose or broken wire #02 from Tilt switch TS1 to Base terminal block.	**Check continuity. Replace if defective.**
21. Defective Tilt Relay 28CR.	**Check relay. Replace if defective.**
22. Loose or broken wire #19A from Tilt Relay 28CR to Motor Contactor C1.	**Check continuity. Replace if defective.**
23. Loose or broken wire #59A from Base terminal block to Base Control Relay 59ACR.	**Check continuity. Replace if defective.**
24. Loose or broken wire #02 from Base terminal block to Base Control Relay 59ACR.	**Check continuity. Replace if defective.**
25. Defective Base Control Relay 59ACR.	**Check relay. Replace if defective.**
26. Loose or broken wire #07 from Base terminal block to Lift Speed Relay2 14CR1.	**Check continuity. Replace if defective.**
27. Loose or broken wire #59H from Lift Speed Relay2 14CR1 to Base terminal block.	**Check continuity. Replace if defective.**
28. Defective Base Lift Resistor RST5.	**Check resistor and make sure it is secure. Replace if defective.**
29. Loose or broken wire #59J from Base terminal block to Base Control Relay 59ACR.	**Check continuity. Replace if defective.**

4.2-5 Up Function Slow from Base Control Console

1. Loose or broken wire #14 from base terminal block to lift speed relay2 14CR1.	**Check continuity. Replace if defective.**
2. Loose or broken wire #02 from base terminal block to lift speed relay2 14CR1.	**Check continuity. Replace if defective.**
3. Defective lift speed relay2 14CR1.	**Check relay. Replace if defective.**

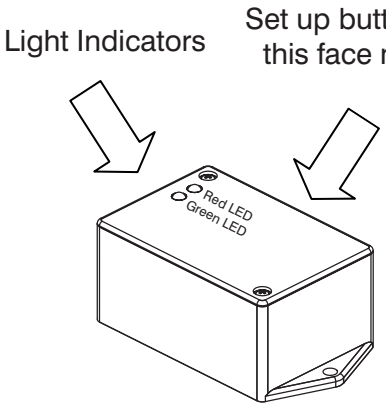
4.2-20 Reverse Drive Function Inoperative

1. Loose or broken wire #15 from Lift/Off/Drive switch S3 to Platform connector X1 pin #A10.	**Check continuity. Replace if defective.**
2. Loose or broken wire #15 in mast control cable or its connectors.	**Check continuity between Mast function cable connector P2 pin #3 and Platform connector X1 pin #A9 on cable. Check for loose or corroded connections on cable connectors.Replace if wire is defective.**
3. Loose or broken wire #15 from Mast function cable to Reverse Cutout Relay 15BCR.	**Check continuity. Replace if defective.**
4. Defective Tilt switch TS1.	**Test Tilt switch. Replace if defective.**
5. Loose or broken wire #15B from Tilt switch TS1 to Reverse Cutout Relay 15BCR.	**Check continuity. Replace if defective.**
6. Loose or broken wire #02 from Reverse Cutout Relay 15BCR to Base terminal block.	**Check continuity. Replace if defective.**
7. Defective Reverse Cutout Relay 15BCR.	**Check relay. Replace if defective.**
8. Loose or broken wire #15A from Reverse Cutout Relay 15BCR to Base terminal block.	**Check continuity. Replace if defective.**
9. Loose or broken wire #15A from Base terminal block to Reverse Valve coil 4H-15A.	**Check continuity. Replace if defective.**
10. Loose or broken wire #02 from Base terminal block to Reverse Valve coil 4H-15A.	**Check continuity. Replace if defective.**
11. Defective Reverse Valve coil 4H-15A.	**Check continuity. Replace if defective.**

4.2-21 Two or More Functions at One Time

1. Shorted diode(s).	**Check continuity of all diodes. Replace if defective.**

5.4-2 Reprogramming Existing Tilt Switch

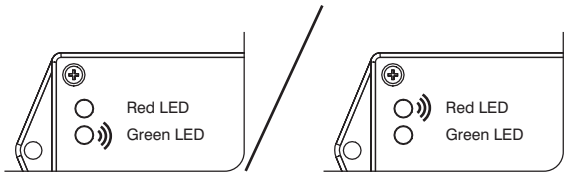


1. Make sure the aerial platform is parked on a firm level surface.
2. Chock or block wheels to keep the aerial platform from rolling forward or backward.
3. Lower platform completely. Extend the transverse deck to the service position. Open the base cover and prop it in position using the rod provided.
4. Push in " ● " emergency stop buttons and turn main disconnect switch to " ◯ " off position.

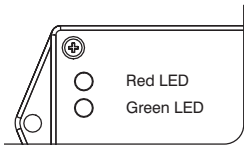
NOTE

The tilt circuit is only powered when activating a function.

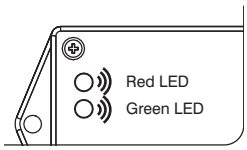
5. Remove any covers to locate and view the tilt switch.
6. Disconnect all wires #02 from motor contactor.
7. Remove base control console from the base. Remove the cover plate on the base control console to access the terminal strip.
8. Install jumper wire between #7 and #19 to terminal strip.
9. Turn main disconnect switch to " | " ON position. Pull out " ● " emergency stop buttons.
10. Verify switch is powered. (Red or green LED will be continually blinking)



11. Reprogram the Tilt Switch
    1. Press and hold the set up button for 3 seconds.
    Results: Both LEDs will be OFF.



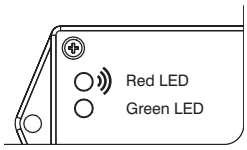
    2. Both LEDs will flash.



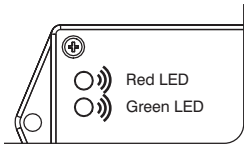
IMPORTANT

Step "c" must be completed within a 5 second period, or the switch will automatically exit program mode and return to normal operation using previously stored data.

    3. Press and release set up button 3 times.
    4. If 5 second period has expired prior completion, repeat Step "a", "b" and "c".
    5. Observe program delay / stabilization time. (Only the red LED will blink for 4 seconds)



    6. Both LEDs will flash for 1 second.
    Results: The switch is learning the new zero position.



    7. Both LEDs will turn on solid for 1 second.
    Results: The new zero position has been learned.

E-0-2-2	Low battery voltage while charging. Algorithm dependent. Typically 0.1V/cell.	▪ Another device may be drawing current from the battery. ▪ Check the battery voltage and cable connections. ▪ Check battery size and condition. Batteries may be overdischarged. ▪ Use another charger to bring the batteries above the minimum voltage. ▪ This error automatically clears once the condition has been corrected.
E-0-2-3	High AC voltage error (>270 VAC)	▪ AC voltage is too high. Connect charger to an AC source that has a stable AC voltage between 85 and 270 VAC/45-65 Hz. ▪ In newer software versions this does not prevent charging. ▪ This error will automatically clear once the condition has been corrected.
E-0-2-4	Charger failed to turn on properly	▪ Disconnect AC input and battery for 30 seconds. If the error persists, contact Delta-Q Technologies.
E-0-2-5	AC voltage has dipped below 80 VAC 3 times in 30 seconds	▪ AC source is unstable. This could be caused by an undersized generator and/or input cables that are too long or too small. ▪ Connect the charger to an AC source with a stable AC voltage between 85 and 270 VAC/45-65 Hz. ▪ This error will automatically clear once the condition has been corrected.
E-0-2-8	Attempt to select algorithm incompatible with this software	▪ Update charger software, continue to use existing algorithm* or select a different charging algorithm that is compatible. *** Notes** ▪ If selecting a different algorithm, the existing algorithm will remain in the charger. ▪ If upgrading an existing algorithm, the existing algorithm will be deleted. Contact Delta-Q Technologies for a software upgrade to run the new algorithm.
E-0-2-9	Cannot transmit on CAN bus	▪ Check the physical CAN connector, electrical bus conditions, and other CAN modules for correct functioning. For example, check that termination resistance is approximately 60 ohms.
E-0-3-0	CAN heartbeat timeout on Battery module	▪ May be caused by a missing heartbeat message. Check the CAN bus battery module for correct function. ▪ This error automatically clears once the condition has been corrected.
E-0-3-1	The Vref for the ADC measurements has triggered an alarm	▪ Internal charger error. Disconnect AC and the battery for a minimum of 30 seconds and retry. ▪ If the problem persists, contact Delta-Q Technologies. ▪ This error automatically clears once the condition has been corrected.

2. Once the chains are disconnected, raise the mast section and remove the lower wear pads. Mark the location of each wear pad.
3. Lift mast section 5 up and away from the mast column, make sure the harnesses and the control cable enclosure box are clear at the top of the mast. Set the mast section aside.

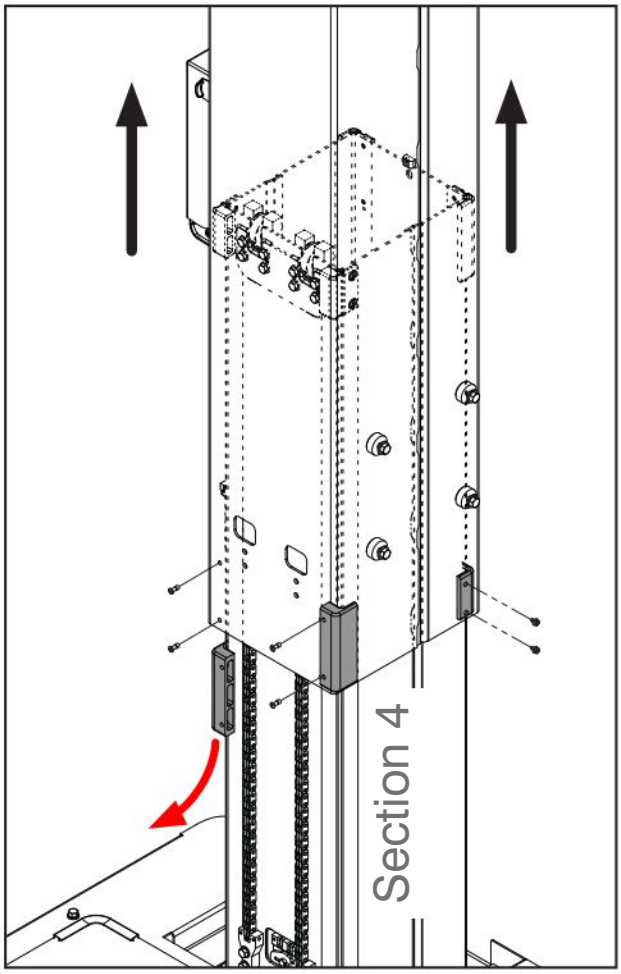


Figure 20 *Wear Pads Removal (Section 5)*

5.11-3 Mast Section 4 Removal

1. **(SJ16 Only)** Pull the chains laying on the outside of section 4 up and over the single rollers so they drop into the mast column. Make sure they do not tangle.

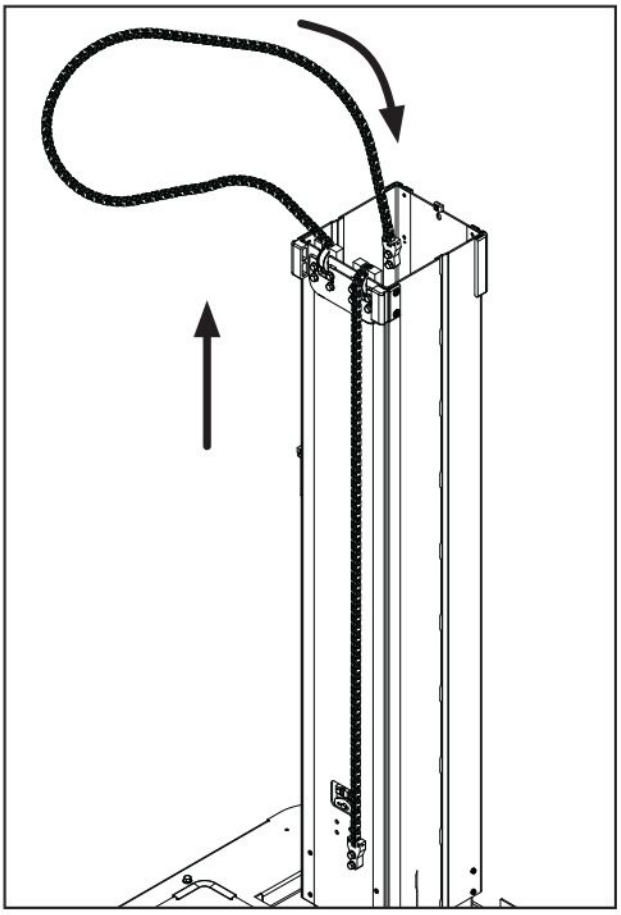


Figure 21 *Section 3 to Section 5 Chains (SJ16 Only)*

NOTE

It is recommended that 2 lifting straps (or similar) be attached evenly to mast section 4 for a straight, even lift.

NOTE

For SJ12 - Attach lifting straps away from mast grab handle and receptacle box.

6. Locate the limit switch at the top of the mast, then press and hold the plunger away from the opening with a piece of tape to avoid any potential damage when the next section passes over it.

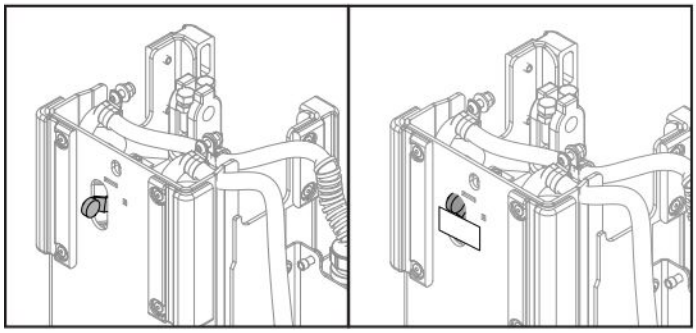


Figure 47 *Mast Limit Switch*

5.13-2 Mast Section 2 Installation

1. Pull the chains attached to the mast section 1 up and over so the they drop into the mast column. Make sure they do not tangle.

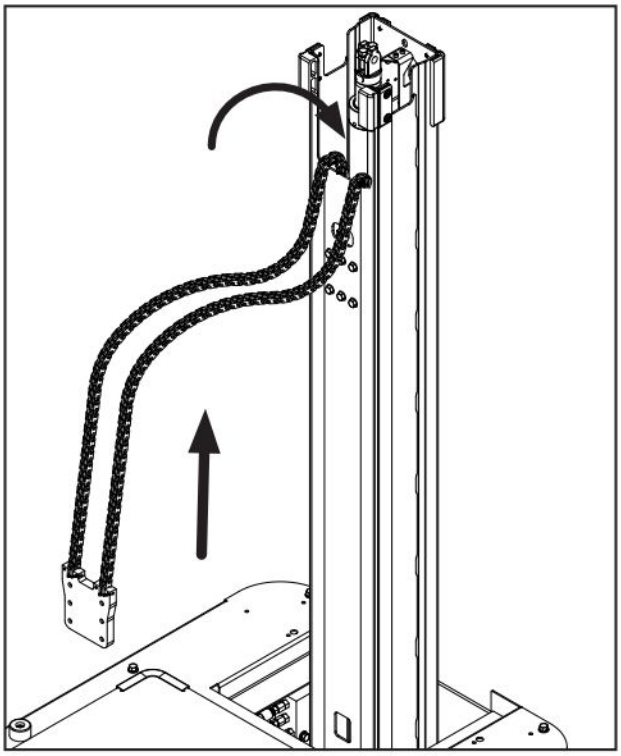


Figure 48 *Mast Section 1 Chains*

NOTE

It is recommended that 2 lifting straps (or similar) be attached evenly to mast section 2 for a straight, even lift.

2. Lift mast section 2 over the mast column, then slowly and carefully lower the section in place. Make sure the harnesses and the control cable enclosure box are clear at the top of mast section 1.
3. Lower the section until the bottom end of the mast is at a suitable working height to install the lower wear pads.
4. Install the rear (short) wear pads with the 10-32 x 3/8'' screws. Install the front (long) wear pads using 3/16'' x 1/4''-3/8'' rivets.

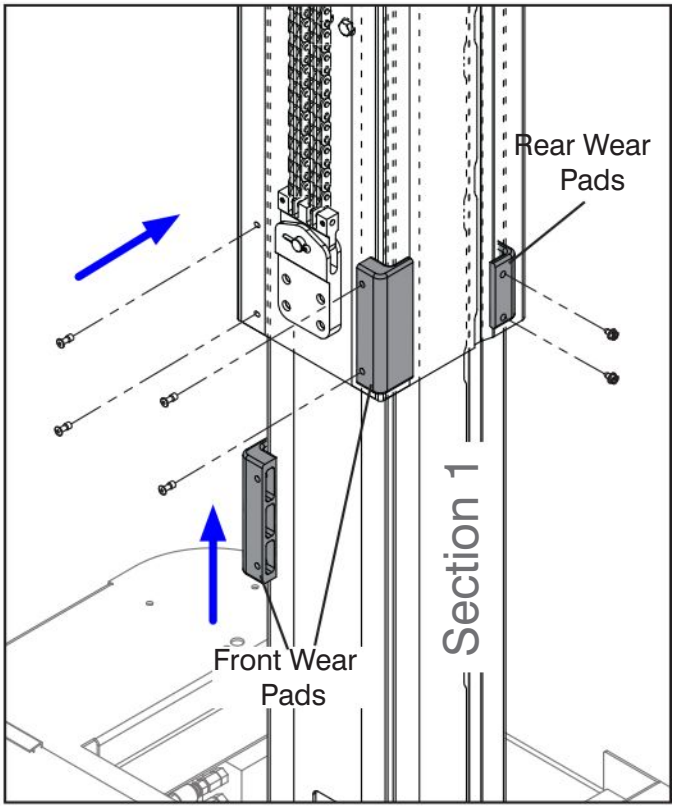


Figure 49 *Wear Pads Installation (Mast Section 2)*

5. Fully lower the section in place.
6. Remove tape to release the limit switch.

5. Disconnect the two harness plug connectors and the mast limit switch harness.
6. Remove all clamps securing the harnesses to the mast base.

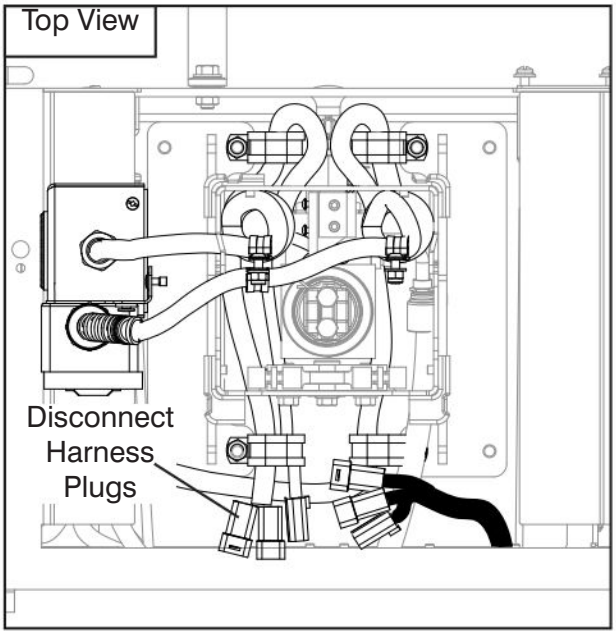


Figure 71 *Harness Disconnection*

7. Remove the rivets securing the power inlet at the base of the mast, then disconnect the wires and pull the harness through from the inside of the base so that it is clear.(ANSI/CSA Only)

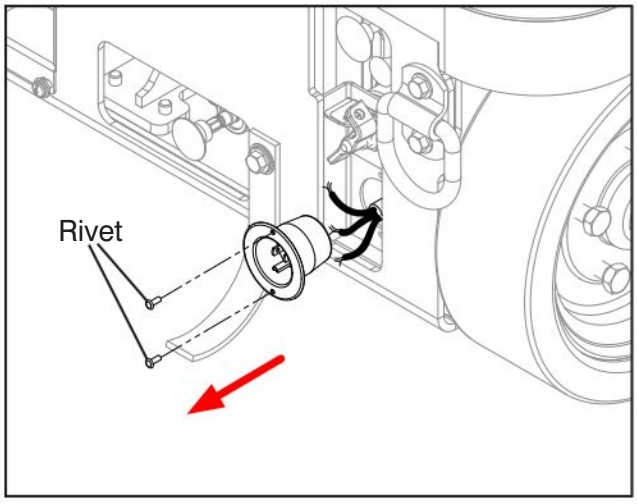


Figure 72 *Power Inlet Removal*

8. Lower the mast so that is slightly supported by the lifting straps.
9. Remove all hardware securing the mast to the base as shown.

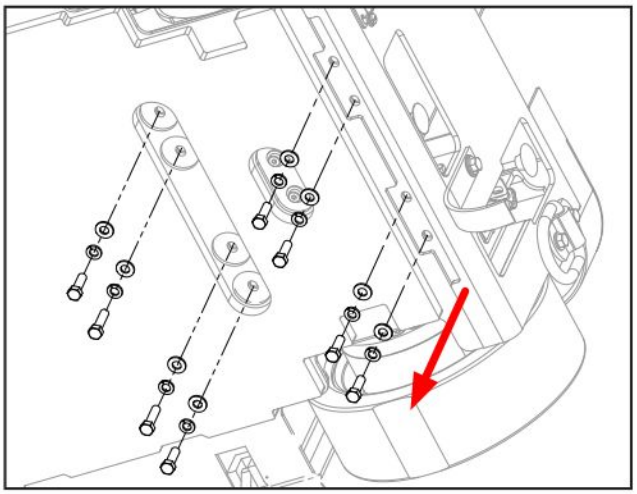


Figure 73 *Mast Hardware Removal*

10. Lift the mast assembly straight up and off the cylinder, ensuring the harnesses are clear. Set the mast aside.

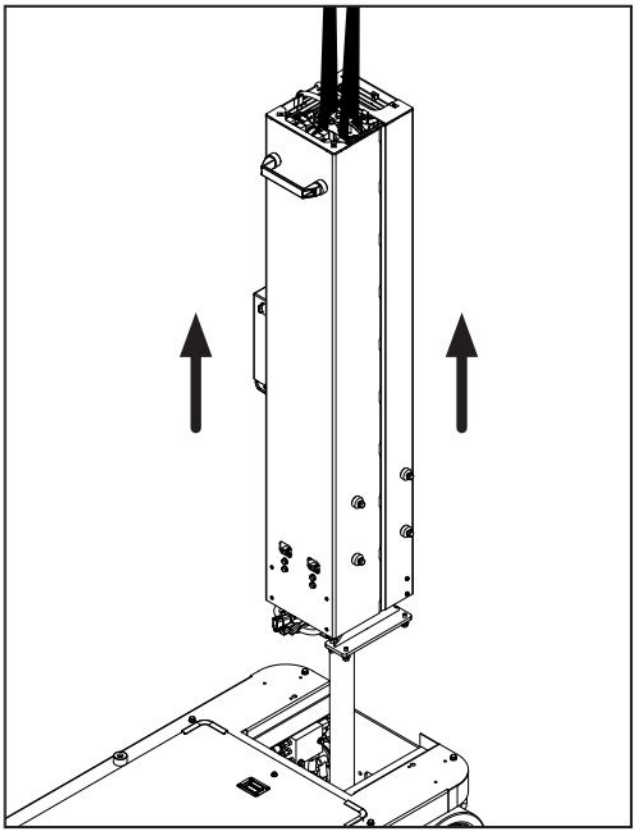


Figure 74 *Mast Removal*