

PROJACK M1 SERVICE AND REPAIR

(Draft Copy)

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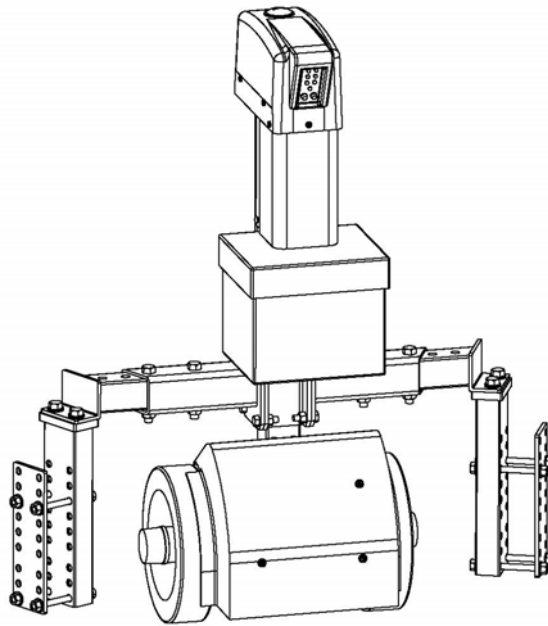


Fig. 1.0

NOTES, CAUTIONS, AND WARNINGS

NOTE: There are several references in this manual to the left and/or the right side of the unit. To determine the left or right side, stand beside the unit and face the same direction as the trailer tongue is pointing.

⚠ CAUTION: There are many torque specifications given in this manual for the various bolts and screws found on the unit. Some of these torque specs are given in “in. lb.” ratings while others are given in “ft. lb.” ratings. Be sure to read the specs carefully before tightening a bolt or screw.

⚠ CAUTION: Do not at any time let brake fluids, gasoline, petroleum-based products, penetrating oils, and etc. contact plastic parts. They contain chemicals that can damage, weaken or destroy plastic.

⚠ CAUTION: The PROJACK M1 unit contains delicate electronic components that can be damaged by static shock. Always work in a static free area and wear a grounded anti-static wrist strap when handling any electronic component.

⚠ WARNING: When servicing, use only identical PROJACK M1 replacement parts. Use of any other part may create a hazard or cause product damage.

⚠ WARNING: When servicing the PROJACK M1 unit, always disconnect the negative battery cable to prevent accidental starting.

⚠ WARNING: Some repair procedures require the PROJACK M1 unit to be unbolted from its mounting brackets and placed onto a suitable workbench. The unit weighs approximately 120 lbs without a battery installed. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.

TRANSMITTER, RECEIVER, ON & OFF PUSHBUTTONS, LEDs, & WIRING HARNESS THEORY OF OPERATION

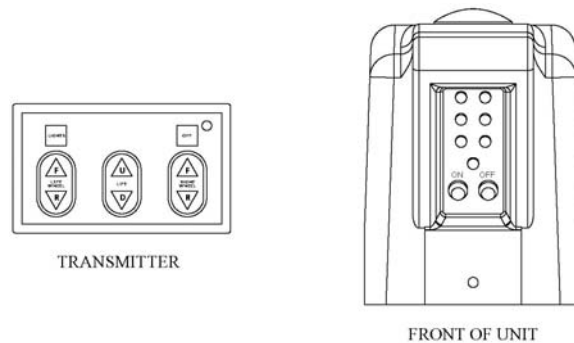


Fig. 1.1

The PROJACK M1 unit is controlled by a remotely operated handheld transmitter. The transmitter has eight (8) pushbuttons and one (1) LED. There are six (6) pushbuttons that control the three (3) gearmotors on the main unit. There is a pushbutton that controls the illumination LEDs and there is a pushbutton that will turn off the power on the main unit. The LED on the face of the transmitter should illuminate green when any button is pressed. This indicates that a signal is being sent to the receiver in the main unit.

A readily available CR2450 coin battery, located beneath the battery cover, powers the transmitter.

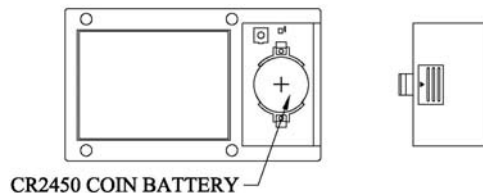


Fig. 1.2

When any button on the transmitter is pressed, an electronic signal is sent to a receiver inside the unit. The receiver interprets the signal and then commands the appropriate relays/switches to open or close. These relays/switches control current to the three (3) gearmotors and illumination LEDs. The receiver, relays/switches, and other related electronic components are mounted on a printed circuit board (PCB). This receiver PCB is located under the PCB cover at the top of the unit.

There are two pushbuttons mounted on the front of the PCB cover (one with a black protective cover and one with a red cover). The pushbutton with the black cover is used to turn ON the receiver. The pushbutton with the red cover is used to turn OFF the receiver. These pushbuttons are wired to the receiver PCB with a detachable connector.

The receiver PCB has an automatic time delayed OFF feature. If the receiver doesn't detect a signal from the transmitter for 1½ minutes, the unit will automatically turn itself OFF.

There are seven (7) LEDs located on the front of the PCB cover. The six (6) upper LEDs combine to form an illumination light and are controlled by the LIGHTS pushbutton on the transmitter. The seventh LED, located just above the ON & OFF pushbuttons, is an operating condition indicator. This LED should illuminate green after the ON pushbutton has been pressed. Whenever the receiver is detecting a signal from the transmitter, the operating condition LED should flash green. If a problem (such as an overload on the lift motor) is detected by the electronic components on the receiver PCB, the operating condition LED should illuminate red. All seven (7) LEDs are mounted to a PCB. The LED PCB is wired to the receiver PCB with a detachable connector.

The receiver PCB is designed to go into a safety mode whenever the lift gearmotor is put into a stall condition, such as when the lift screw is at either of its limits. When in this safety mode, the operating condition LED will illuminate red and the function associated with the overload will cease to operate. To exit the safety mode, press the transmitter button that controls the opposite function (press DOWN if the lift screw has hit the UP limit or vice versa). In some cases, the lift screw may be jammed against a limit to an extent that the gearmotor cannot provide enough power to reverse the screw and back it off the limit. An access plug is provided in the top of the PCB cover so that a 9/16-inch socket wrench can be used to turn the lift screw and back it off the limit.

The PROJACK M1 unit utilizes three (3) gearmotors. One gearmotor is located near the top of the unit and provides power to the lift screw. The other two gearmotors are located in the lower drive unit. Each lower drive gearmotor operates one of the two (2) drive wheels. The drive wheels operate independently of one another. By varying the ON time and/or the clockwise/counterclockwise rotation of each gearmotor, the unit can be driven straight or steered in both forward and reverse.

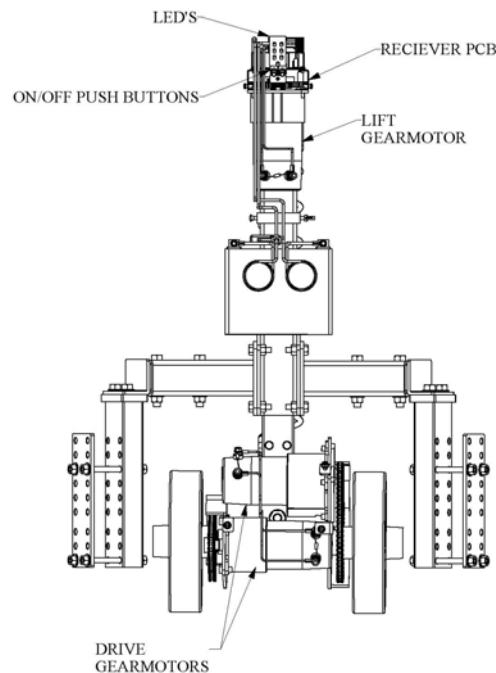


Fig. 1.3

The PROJACK M1 unit must be powered by a 12V DC power source. This power source is usually in the form of a 12V lead acid battery which can be housed in the optional direct mount battery box or can be mounted somewhere nearby on the trailer tongue frame rails.

The three (3) gearmotors and the 12V DC power source are connected to the receiver PCB by a wiring harness. Each individual wire in the wiring harness is hard wired to the receiver PCB on one end and has a ¼-inch ring terminal on the other end for attaching to the gearmotors and the 12V DC power source. The wire that connects to the 12V DC power source positive (+) terminal has a 60-amp time delay fuse mounted inline to protect the unit from electrical overloads.

Each gearmotor has a .1µf 200-ma ceramic capacitor wired between its power terminals. This is to help filter out electronic noise which could affect the operation of the receiver.

TRANSMITTER/RECEIVER TROUBLESHOOTING

If the PROJACK M1 unit fails to respond to the control buttons on the transmitter, check the following:

Does the indicator LED on the face of the transmitter illuminate green when any button is pressed?

NOTE: Try every button, one at a time.

- A. No. If the indicator LED fails to illuminate green after any button has been pressed, replace the transmitter battery with a known good one. If the transmitter LED fails to illuminate green while any button is pressed with a known good battery, replace the transmitter. NOTE: A new transmitter will need to be synchronized to the receiver PCB. See instructions under the SYNCHRONIZING TRANSMITTER AND RECEIVER section.
- B. Sometimes. If the indicator LED on the face of the transmitter illuminates green when some (but not all) buttons are pressed, the keypad could be bad. The keypad is available separately and can be replaced. NOTE: When the keypad is replaced, the transmitter PCB must be synchronized to the new keypad. Refer to the SYNCHRONIZING TRANSMITTER KEYPAD WITH TRANSMITTER PCB section.
- C. Yes. Check the operating condition LED on the main unit. Is it illuminated, and if so, what color is it?
 1. No. If not illuminated, press the main power ON pushbutton on the front of the main unit. If the operating condition LED doesn't illuminate, try pressing the OFF pushbutton followed by the ON pushbutton again. If it still fails to illuminate, check the following:
 - a. Check the condition of the 12V DC power source and charge or correct as necessary.
 - b. Check the connections between the battery cables and the battery terminals. Clean and retighten as necessary.
 - c. Check the condition of the battery cables. Any frayed or broken wires must be replaced.
 - d. Check the 60-amp fuse located inline with the positive (red) battery cable. Replace if necessary. See instructions under FUSE section.
 - e. Check the ON & OFF pushbuttons for correct operation (gain access to the pushbutton wiring harness connector by referring to the instructions under the ON & OFF PUSHBUTTON SWITCH ASSEMBLY REPLACEMENT section). The ON pushbutton is a normally open switch. It should only show continuity while the button is being pressed. The OFF pushbutton is a normally closed switch. It should show continuity in the relaxed state and no continuity when the button is being pressed. Replace the switch assembly if defective.

If all of the above check good, and the operating condition LED fails to illuminate after pressing the ON pushbutton, the receiver PCB/wiring harness will need to be replaced.

2. Yes. If the operating condition LED is illuminated green, does it flash green while pressing any one of the transmitter pushbuttons (other than the OFF pushbutton)?
 - a. Yes. This indicates that the receiver is receiving a signal from the transmitter. The transmitter and receiver are functioning normally. If the unit still doesn't function, the problem lies elsewhere.
 - ❑ Try pressing all of the buttons, except the OFF pushbutton, on the transmitter (press one at a time). If none of the buttons cause any action to occur, there is a defective component on the receiver PCB and the receiver PCB/wiring harness must be replaced.
 - ❑ If some buttons cause action and others don't, first confirm that the transmitter indicator LED illuminates green when the button related to the malfunction is pressed. Then check the appropriate device related to the non-functioning button. For example, if the UP/DOWN function fails to operate, perform the following:

- Disconnect the battery, remove the lift motor cover, and inspect the connection of the wiring harness to the lift motor terminals.
- Check the wiring harness for frayed or broken wires.
- Check to see that the lift screw turns freely by removing the access plug in the top of the PCB cover and manually turning the lift screw with a 9/16-inch socket wrench. Turn the lift screw clockwise to extend the unit or counter-clockwise to retract the unit. NOTE: A substantial amount of force may be needed to overcome the gear reduction in the gearmotor. Be sure to replace the access plug when finished.

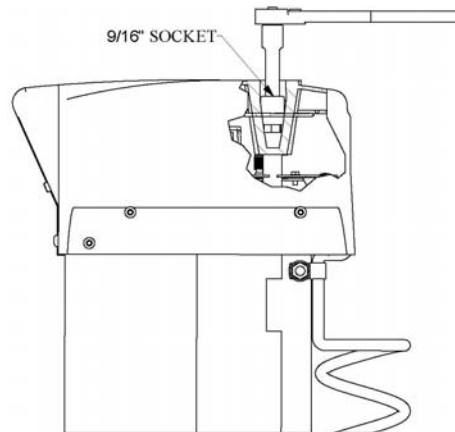


Fig. 1.4

- If a cause for the problem hasn't been located, test the operation of the lift gearmotor.
 - Ensure that the lift screw is not at, or near, either limit. Remove the access plug in the top of the PCB cover and manually turn the lift screw with a 9/16-inch socket wrench. Turn the lift screw clockwise to extend the unit or counter-clockwise to retract the unit. Be sure to replace the plug when finished.
 - Disconnect the lift motor from the wiring harness and momentarily connect jumper wires from the 12V power source to the motor terminals.
 - Test the operation of the gearmotor in the opposite direction by reversing the jumper wires.
 - If the gearmotor doesn't operate in one or both directions, the gearmotor is bad and will need to be replaced (once again, be sure that the lift screw is not at either limit).
 - If the gearmotor does respond in both directions to the current from the jumper wires, there is likely a bad relay on the receiver PCB. In such a case, the receiver PCB/wiring harness must be replaced.⁹
- b. No. If the LED doesn't flash green, the receiver is not detecting a signal from the transmitter. In some cases, the transmitter and receiver may need to be re-synchronized. See the section under the SYNCHRONIZING TRANSMITTER AND RECEIVER section. If re-synching doesn't solve the problem, try synching a known good transmitter to the unit. If normal functions return, the original transmitter is bad and must be replaced. If the unit fails to function with a known good transmitter, the receiver PCB/wiring harness is bad and must be replaced.
- 3. Yes. If the operating condition LED illuminates red, the components on the receiver PCB have detected an overload condition in the lift gearmotor and have entered a

safety mode. This usually occurs when the lift screw has been forced against either its up or down limit. To exit the safety mode, press the transmitter button that controls opposite function (press DOWN if the lift screw has hit the UP limit or vice versa). In some cases, the lift screw may be jammed against its limit to such an extent that the gearmotor cannot provide enough power to reverse the screw and back it off the limit. In such cases, it will be necessary to remove the access plug in the top of the PCB cover and use a 9/16-inch socket wrench to turn the lift screw off its limit. Turn the lift screw clockwise to extend the unit or counter-clockwise to retract the unit. Be sure to replace and tighten the access plug when finished.

BATTERY

The PROJACK M1 unit requires a 12V DC. power source. Some installations will utilize an existing 12V battery that is already mounted to the trailer tongue. On other installations where there wasn't an existing battery, there is an optional battery box that can be mounted directly to the front of the PROJACK M1 unit.

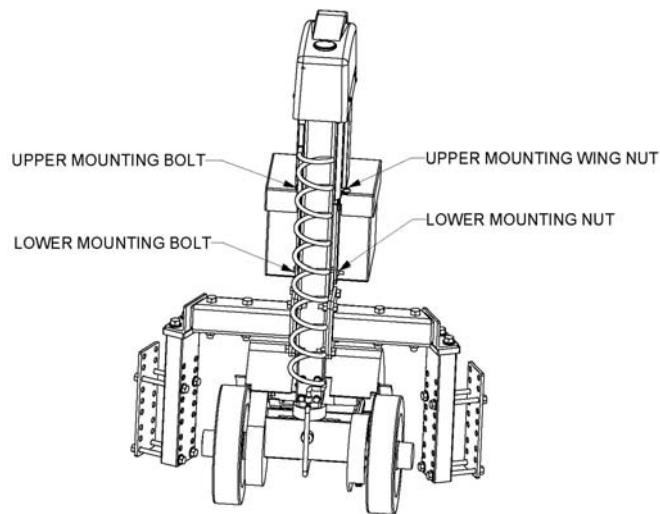


Fig. 1.5

Accessing the battery with the optional direct mount battery box:

1. Locate the upper battery box mounting bolt.
2. Remove the 1/4-inch wing nut from the upper battery box mounting bolt.
3. Support the battery box with one hand and remove upper battery box mounting bolt.
4. Tilt the battery box forward.
5. Lift off the battery box cover and set aside.
6. Disconnect the negative battery cable.
7. Disconnect the positive battery cable.
8. Lift the battery from the battery box.

Battery replacement with the optional direct mount battery box:

1. Insert the battery into the battery box with the battery terminals toward the front of the unit.

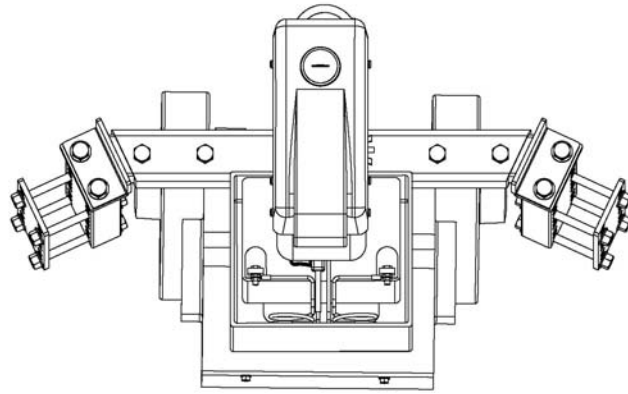


Fig. 1.6

2. Connect the positive (red) battery cable to the positive (+) battery terminal.
3. Connect the negative (black) battery cable to the negative (-) battery terminal.
4. Coil the battery cables and place them in the battery box in front of the battery.
5. Place the battery box cover onto the battery box.
6. Locate the metal sleeve that is welded to the front of the outer lift tube. The upper battery box mounting bolt must pass through the hole in this sleeve when reassembling.

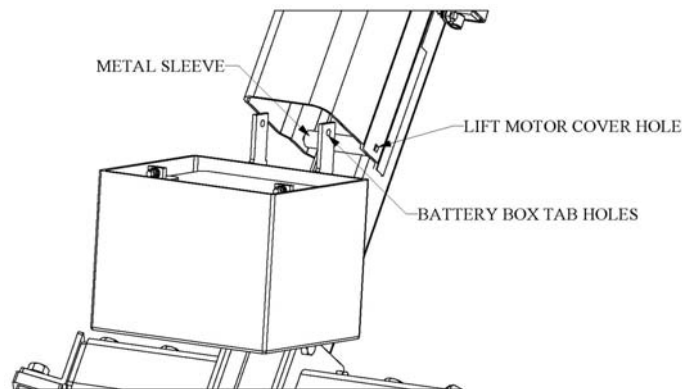


Fig. 1.7

7. Tilt the battery box to the upright position. The two (2) mounting tabs on the upper rear of the battery box should enter inside of the lower end of the lift motor cover.
8. Align the holes in the battery box mounting tabs with the holes in the lower rear of the lift motor cover and the hole in the metal sleeve. NOTE: Ensure that the battery cables are not kinked or pinched between the battery box and the outer lift tube assembly. Push any excess battery cable into the battery box.
9. Insert the battery box retaining bolt through the square hole in the left side of the lift motor cover. (Determine the left side of the unit by facing the same direction that the trailer tongue is pointing.)
10. Secure with wing nut. Do not tighten excessively as the plastic parts could be broken by over tightening.

⚠ WARNING: If the battery box retaining wing nut is lost, it must be replaced with a nylon inserted locknut type wing nut. A standard type wing nut may loosen and fall off due to vibration. This could lead to the battery box opening up and dumping the battery onto the ground or roadway.

FUSE

The PROJACK M1 utilizes a 60-amp time delay fuse. This fuse and its holder are located inline with the positive (red) battery cable. On installations that utilize the optional direct mount battery box, gain access to the fuse and its holder by opening up the battery box. Refer to the instructions in the BATTERY section. On other installations simply find the fuse and its holder, near the battery, inline with the positive (red) battery cable. After the fuse holder has been located, remove the protective rubber cover. If the fuse has been blown, remove it and replace it with a *9312 Maxi Plug-in Fuse* (60-amp, color code blue).

⚠ CAUTION: A blown fuse is a probable sign of an electrical overload. Before replacing a blown fuse, determine the cause for the electrical overload and correct it. Never try to defeat the function of the fuse by installing a higher amperage rated fuse or by shorting the fuse holder terminals.

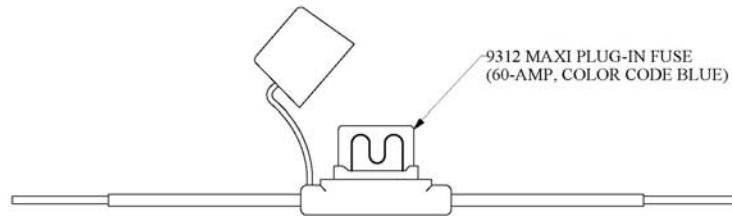


Fig. 1.8

ON & OFF PUSHBUTTON SWITCH ASSEMBLY REPLACEMENT

Remove the pushbutton switch assembly:

1. Disconnect the negative battery cable. Refer to the BATTERY section for instructions.
2. Remove the two (2) screws that secure the upper end of the lift motor cover to the PCB cover.
3. Remove the screw that secures the LED/Pushbutton cover to the lift motor cover.
4. Remove the four (4) screws that secure the PCB cover to the PCB support brackets.

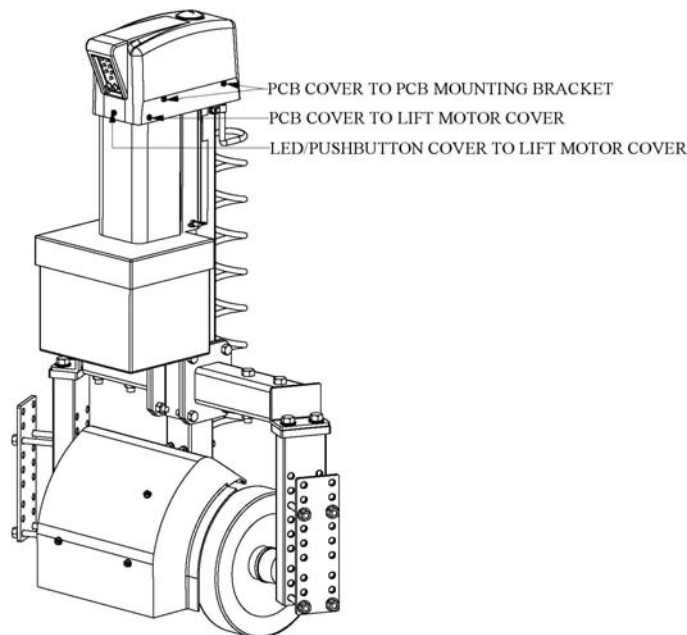


Fig.1.9

5. Carefully slide the LED/Pushbutton cover upward approximately 1/4-inch to clear the attachment lip and then pull forward approximately 1-inch. Be careful not to strain the wires connecting the ON & OFF pushbutton switches and the LED PCB to the receiver PCB.

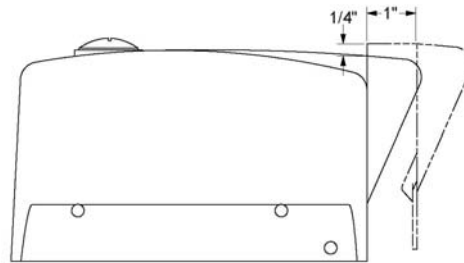


Fig. 1.10

6. Carefully pull the PCB cover straight up until clear of the unit and set aside.
7. Disconnect the ON & OFF pushbutton switch wiring harness connector and the LED PCB wiring harness connector from the receiver PCB.

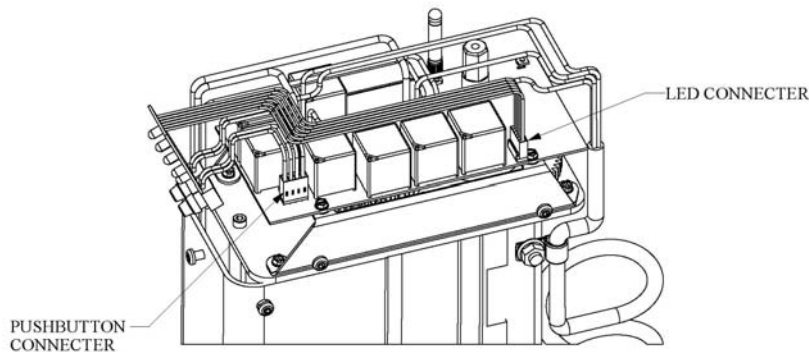


Fig. 1.11

8. Grasp the red pushbutton protective cover on the OFF switch and turn counterclockwise until it is free, pull the switch out of the housing, and reattach the protective cover to the switch. Repeat this process for the ON switch.

Install the pushbutton switch assembly:

1. Grasp the red pushbutton protective cover on the new OFF switch and turn counterclockwise until it is free of the switch, insert the switch into the hole for the OFF switch, and secure by threading the cover clockwise onto the switch. Repeat this process for the ON switch.
2. Connect the wiring harness connectors to the receiver PCB board. Refer to Fig. 1.11.

⚠ CAUTION: The connectors are designed to plug in one way only. Carefully examine the connectors and determine the correct way to orient them before plugging them in. Improper connection attempts could damage the receiver PCB and/or the wiring harness connectors.

3. Hold the LED/Pushbutton cover in its appropriate position with one hand, and with your other hand, carefully place the PCB cover into its appropriate position. Be careful not to strain the wiring harnesses.

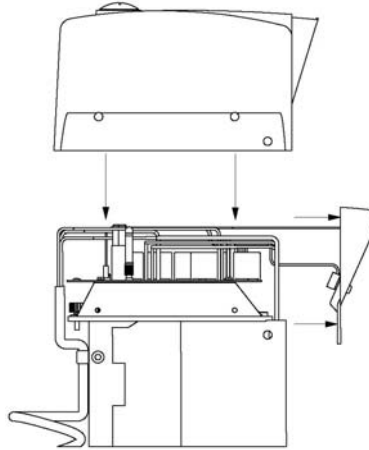


Fig. 1.12

4. Fit the LED/Pushbutton cover onto the PCB cover making sure to align and engage the attachment lip located on the underside of the LED/Pushbutton cover into the corresponding groove in the PCB cover. Refer to Fig. 1.10.
5. Align the four (4) mounting holes in the PCB cover with the holes in the PCB support brackets and partially thread in the original screws.
6. Align the two (2) mounting holes in the PCB cover with the holes in the upper end of the lift motor cover and secure with the original screws. Tighten to 10 in. lbs.
7. Tighten the four (4) screws that secure the PCB cover to the PCB support brackets. Tighten to 10 in. lbs.
8. Ensure that the attachment lip on the underside of the LED/Pushbutton cover is firmly engaged into the corresponding groove in the PCB cover. Secure the LED/Pushbutton cover to the lift motor cover with the original screw. Tighten to 10 in. lbs.
9. Reconnect the negative battery cable.

LED PCB ASSEMBLY REPLACEMENT

Remove the LED PCB assembly.

1. Disconnect the negative battery cable. Refer to the BATTERY section for instructions.
2. Remove the two (2) screws that secure the upper end of the lift motor cover to the PCB cover. Refer to Fig. 1.9.
3. Remove the screw that secures the LED/Pushbutton cover to the lift motor cover.
4. Remove the four (4) screws that secure the PCB cover to the PCB support brackets.
5. Carefully slide the LED/Pushbutton cover upward approximately ¼-inch to clear the attachment lip and then pull forward approximately 1-inch. Be careful not to strain the wires connecting the ON & OFF pushbutton switches and the LED PCB to the receiver PCB. Refer to Fig. 1.10.
6. Carefully pull the PCB cover straight up until clear of the unit and set aside.
7. Disconnect the ON & OFF pushbutton switch wiring harness connector and the LED PCB wiring harness connector from the receiver PCB. Refer to Fig. 1.11.
8. Grasp the red pushbutton protective cover on the OFF switch and turn counterclockwise until it is free, pull the switch out of the housing, and reattach the protective cover to the switch. Repeat this process for the ON switch.
9. The LED PCB is attached to the LED/Pushbutton cover with a two-sided adhesive gasket. Carefully pry the old LED PCB from the housing-cover with a putty knife or suitable tool.
10. Clean off any remaining gasket and/or adhesive.

Install the LED PCB assembly

1. Peel the backing off both sides of the new gasket and affix the gasket to the new LED PCB.

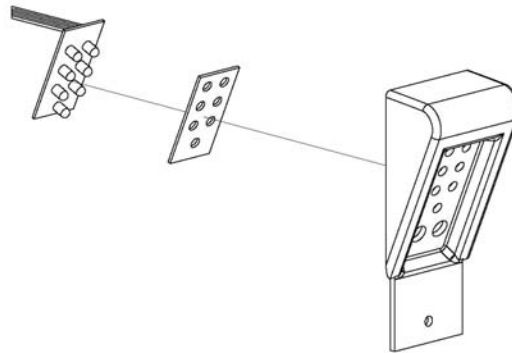


Fig. 1.13

2. Align the LEDs with the corresponding holes in the LED/Pushbutton cover and firmly press the two parts together. Confirm that there are no gaps between them.
3. Grasp the red pushbutton protective cover on the Off switch and turn counterclockwise until it is free of the switch, insert the switch into the hole for the OFF switch, and secure by threading the cover clockwise onto the switch. Repeat this process for the ON switch.
4. Connect the wiring harness connectors to the receiver PCB board. Refer to Fig. 1.11.

⚠ CAUTION: The connectors are designed to plug in one way only. Carefully examine the connectors and determine the correct way to orient them before plugging them in. Improper connection attempts could damage the receiver PCB and/or the wiring harness connectors.

5. Hold the LED/Pushbutton cover in its appropriate position with one hand, and with your other hand, carefully place the PCB cover into its appropriate position. Be careful not to strain the wiring harnesses. Refer to Fig. 1.12.
6. Fit the LED/Pushbutton housing cover onto the PCB cover making sure to align and engage the attachment lip located on the underside of the LED/Pushbutton cover into the corresponding groove in the PCB cover. Refer to Fig. 1.10.
7. Align the four (4) mounting holes in the PCB cover with the holes in the PCB support brackets and partially thread in the original screws.
8. Align the two (2) mounting holes in the PCB cover with the holes in the upper end of the lift motor cover and secure with the original screws. Tighten to 10 in. lb.
9. Tighten the four (4) screws that secure the PCB cover to the PCB support brackets. Tighten to 10 in. lbs.
10. Ensure that the attachment lip on the underside of the LED/Pushbutton cover is firmly engaged into the corresponding groove in the PCB cover. Secure the LED/Pushbutton cover to the lift motor cover with the original screw. Tighten to 10 in. lbs.
11. Reconnect the negative battery cable.

RECEIVER PCB/WIRING HARNESS REPLACEMENT

On most applications, the receiver PCB/wiring harness can be replaced while the unit is still attached to the trailer. For those applications where access is limited, the unit may need to be removed and placed on a suitable workbench. If removal from the trailer is necessary, remove the battery first.

Remove the receiver PCB and wiring harness.

1. Gain access to the battery, disconnect the battery cables, and remove the battery. Refer to the section under BATTERY for instructions.
2. Remove the three (3) screws that secure the drive motor cover to the lower drive unit. Set the drive motor cover aside. NOTE: If access to the lower drive unit is limited, reposition it by removing the access plug in the top of the PCB cover and turning the lift screw extension with a 9/16-inch socket wrench. Turn the screw clockwise to extend the unit or counter-clockwise to retract the unit.

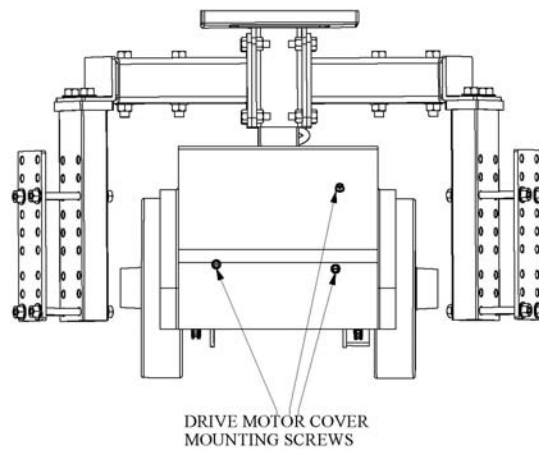


Fig. 1.14

3. Remove the two (2) screws that secure the upper end of the lift motor cover to the PCB cover. Refer to Fig. 1.9.
4. Remove the screw that secures the LED/Pushbutton cover to the lift motor cover.
5. Remove the four (4) screws that secure the PCB cover to the PCB support brackets.
6. Carefully slide the LED/Pushbutton cover upward approximately 1/4-inch to clear the attachment lip and then pull forward approximately 1-inch. Be careful not to strain the wires connecting the ON & OFF pushbutton switches and the LED PCB to the receiver PCB. Refer to Fig. 1.10.
7. Carefully pull the PCB cover straight up until clear of the unit and set aside.
8. Carefully spread the sides of the lift motor cover apart, pull forward, and remove from the unit.
9. Disconnect the ON & OFF pushbutton wiring harness connector and the LED PCB wiring harness connector from the receiver PCB. Refer to Fig. 1.11.
10. Set the LED/Pushbutton cover assembly aside.
11. Locate the two (2) power terminals on each of the three (3) gearmotors and make a note of the color of each wire that connects to them so that they can be replaced in their proper location. Notice also the filter capacitor attached between the motor terminals. Refer to Fig. 1.15.

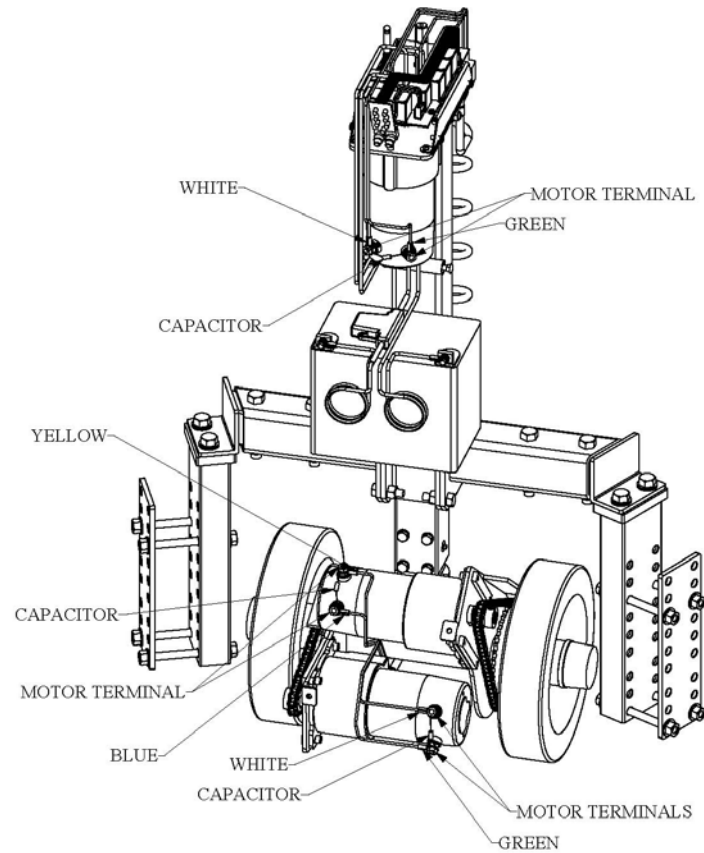


Fig. 1.15

12. Make a careful note of the routing of the various wires throughout the unit.

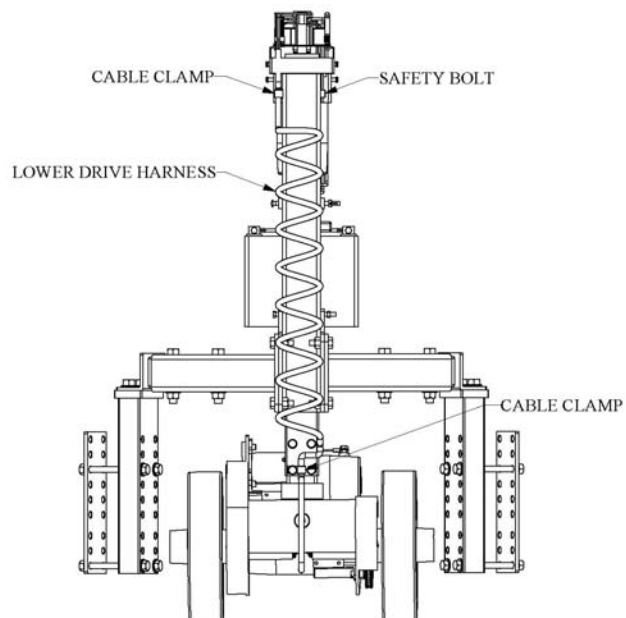


Fig. 1.16

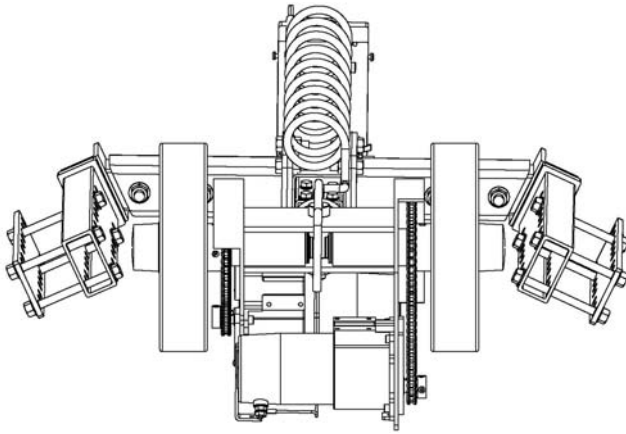


Fig. 1.17

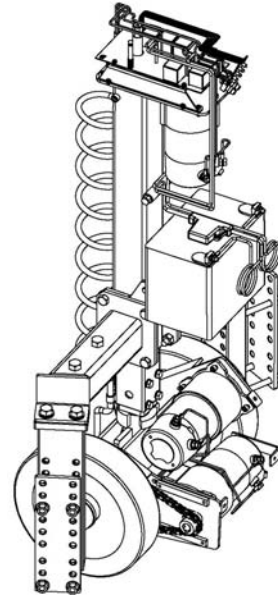


Fig. 1.18

13. Disconnect the wiring harness ring terminals and the filter capacitor from all three (3) gearmotors.

⚠ CAUTION: Hold the wiring harness ring terminal with one hand while loosening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.

14. Locate the two (2) wiring harness cable clamps on the rear of the unit (one is located on the safety bolt just below the rear of the lift motor mounting plate and the other is located on one of the steering housing mounting bolts). Note their placement and orientation. Refer to Fig. 1.16.
15. Unbolt the wiring harness cable clamps.
16. Locate the four (4) screws that secure the receiver PCB to the PCB support brackets. Notice the small urethane washers between the PCB and the PCB support brackets. The urethane washers have adhesive on one side and are adhered to the PCB support brackets.

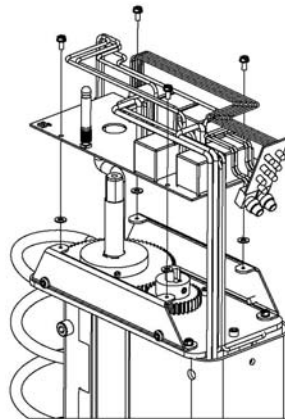


Fig. 1.19

⚠ CAUTION: The receiver PCB contains delicate electronic components that can be damaged by static shock. Always work in a static free area and wear a grounded anti-static wrist strap when handling the receiver PCB.

17. Remove the screws holding the PCB to the PCB support brackets.
18. Carefully remove the receiver PCB with its wiring harness from the unit. Ensure that the urethane washers remain adhered to the PCB support brackets at all four (4) mounting hole locations.

⚠ CAUTION: Do not allow the wires to be caught on anything as the assembly is removed from the unit as this could strain the wiring harness connections to the PCB.

Install the receiver PCB and wiring harness.

⚠ CAUTION: The receiver PCB contains delicate electronic components that can be damaged by static shock. Always work in a static free area and wear a grounded anti-static wrist strap when handling the receiver PCB.

1. If installing a new receiver PCB and wiring harness, transfer the two (2) cable clamps from the old lower drive unit wiring harness to the new lower drive unit wiring harness at the same distance from the wire ends.
2. Align the large hole in the rear of the receiver PCB over the upper end of the lift screw extension.
3. Carefully lower the PCB down onto the PCB support brackets.
4. Ensure that all four (4) urethane washers are in place on the PCB support brackets.
5. Secure the receiver PCB to the PCB support brackets with the original screws. Tighten to 5 in. lbs.

⚠ CAUTION: Do not over tighten the screws as the PCB could be damaged.

6. Refer to Figs. 1.16, 1.17, & 1.18 and route all wires of the wiring harness to their proper locations. Do not place the ring terminals onto the motor terminals at this time.
7. Secure the lower drive unit wiring harness to the back of the unit using the original cable clamps in their original locations. Refer to Fig. 1.16.
8. Attach the original filter capacitors between the terminals of each gearmotor. NOTE: Place the capacitor leads onto the gearmotors in a clockwise direction. This will help keep them from coming off the terminals as the serrated nuts are tightened.

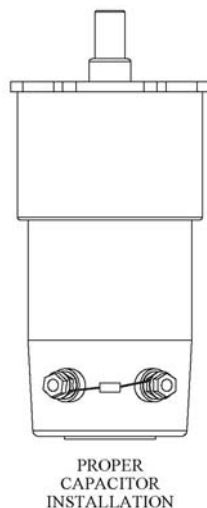


Fig. 1.20

9. Place the ring terminals of each color-coded wire onto their proper locations on all three (3) gearmotors. Refer to Fig. 1.15.
10. Secure the wiring harness ring terminals and capacitor ends to the motor terminals with the original serrated nuts.

⚠ CAUTION: Hold the wiring harness ring terminal with one hand while tightening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.

Tighten the nuts to 15 in. lbs.

11. Connect the LED PCB wiring harness connector and the ON & OFF pushbutton switch assembly wiring harness connector to the receiver PCB board. Refer to Fig. 1.11.

⚠ CAUTION: The connectors are designed to plug in one way only. Carefully examine the connectors and determine the correct way to orient them before plugging them in. Improper connection attempts could damage the receiver PCB and/or the wiring harness connectors.

12. If a new receiver PCB is being installed, perform the following steps:
 - a. Temporarily connect the battery cables to the proper battery terminals.
 - b. Synchronize the transmitter to the new receiver. Refer to the SYNCHRONIZING THE TRANSMITTER AND RECEIVER section.
 - c. Disconnect the battery terminals.
13. Hold the LED/Pushbutton cover in its appropriate position with one hand, and with your other hand, carefully place the PCB cover into its appropriate position. Be careful not to strain the wiring harnesses. Refer to Fig. 1.12.
14. Fit the LED/Pushbutton cover onto the PCB cover making sure to align and engage the attachment lip located on the underside of the LED/Pushbutton cover into the corresponding groove in the PCB cover. Fig. 1.10.
15. Align the four (4) mounting holes in the PCB cover with the holes in the PCB support brackets and partially thread in the original screws.
16. Place the lift motor cover into position, align the two (2) mounting holes in its upper end with the corresponding holes in the PCB cover, and secure with the original screws. Tighten to 10 in. lbs.
17. Tighten the four (4) screws that secure the PCB cover to the PCB support brackets. Tighten to 10 in. lbs.
18. Ensure that the attachment lip on the underside of the LED/Pushbutton cover is firmly engaged into the corresponding groove in the PCB cover. Secure the LED/Pushbutton cover to the lift motor cover with the original screw. Tighten to 10 in. lbs.
19. Reconnect the battery cables to the proper battery terminals and reassemble the battery box. Refer to the BATTERY section.
20. Place the lower drive unit cover into position, align the mounting holes, and secure with the three (3) original screws. Tighten to 25 in. lbs.

SYNCHRONIZING TRANSMITTER AND RECEIVER

Whenever an additional or replacement transmitter is to be used with the PROJACK M1 unit or if the receiver PCB has been replaced, the transmitter must be synchronized to the receiver. To accomplish this, perform the following steps:

1. Remove the two (2) screws that attach the PCB cover to the upper end of the lift motor cover. Refer to Fig. 1.9.
2. Remove the screw that secures the LED/Pushbutton cover to the lift motor cover.
3. Remove the four (4) screws that attach the PCB cover to the PCB support brackets.

4. Carefully slide the LED/Pushbutton cover upward approximately ¼-inch to clear the attachment lip and then pull forward approximately 1-inch. Be careful not to strain the wires connecting the ON & OFF pushbutton switches and the LED PCB to the receiver PCB. Refer to Fig. 1.10.
5. Carefully pull the PCB cover straight up until clear of the unit and set aside.
6. Press the ON pushbutton.
7. Locate the red pushbutton on the right rear corner of the receiver PCB and press it. NOTE: Determine the right side by standing beside the unit and face the same direction as the trailer tongue is pointing.

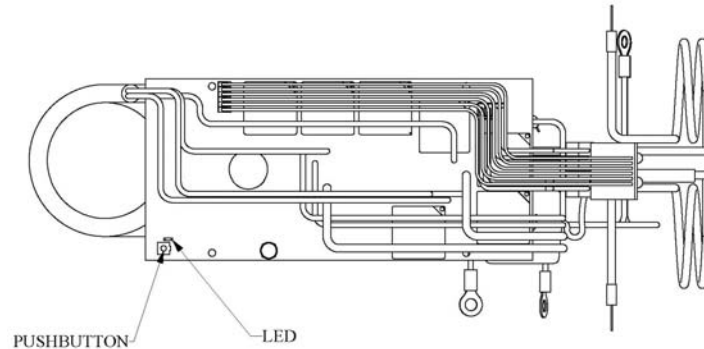


Fig. 1.21

8. The LED next to the pushbutton will begin to flash.
9. Press any button on the transmitter (make sure that the green LED on the transmitter lights to indicate a valid transmission).
10. Press the red pushbutton on the receiver PCB again.
11. The transmitter is now synchronized with the receiver.
12. Press the Off pushbutton.
13. Confirm that the ON & OFF pushbutton and the LED PCB wiring harnesses are properly connected to their respective locations on the receiver PCB.
14. Hold the LED/Pushbutton cover in its appropriate position with one hand, and with your other hand, carefully place the PCB cover into its appropriate position. Be careful not to strain the wiring harnesses. Refer to Fig. 1.12.
15. Fit the LED/Pushbutton cover onto the PCB cover making sure to align and engage the attachment lip located on the underside of the LED/Pushbutton cover into the corresponding groove in the PCB cover. Refer to Fig. 1.10.
16. Align the four (4) mounting holes in the PCB cover with the holes in the PCB support brackets and partially thread in the original screws. Refer to Fig. 1.9.
17. Align the two (2) mounting holes in the upper end of the lift motor cover with the corresponding holes in the PCB cover, and secure with the original screws. Tighten to 10 in. lb.
18. Tighten the four (4) screws that secure the PCB cover to the PCB support brackets. Tighten to 10 in. lbs.
19. Ensure that the attachment lip on the underside of the LED/Pushbutton cover is firmly engaged into the corresponding groove in the PCB cover. Secure the LED/Pushbutton cover to the lift motor cover with the original screw. Tighten to 10 in. lbs.

SYNCHRONIZING TRANSMITTER KEYPAD WITH TRANSMITTER PCB

Should the keypad on the transmitter ever need replacing, the transmitter PCB must be synchronized to the new keypad. To accomplish this perform the following steps:

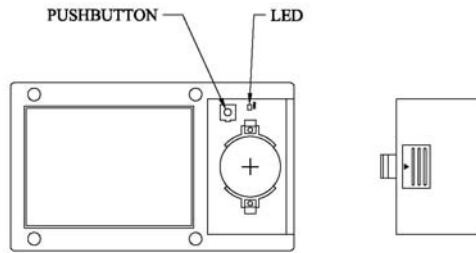


Fig. 1.22

1. Open the battery door on the transmitter.
2. Press the red button next to the battery once. The LED (CR10) next to the red pushbutton will begin to flash.
3. Press every key on the keypad once. The order doesn't matter.
4. Press the red button again. The LED will stop flashing.

The new keypad is now synchronized to the transmitter PCB.

TIRE/WHEEL ASSEMBLY REPLACEMENT

Remove the wheel:

1. Support the trailer tongue with the conventional trailer jack or by connecting the trailer to a vehicle.
2. Using the remote control transmitter, position the lower drive unit so that the wheel is accessible. Make sure that the wheel is not in contact with the ground.

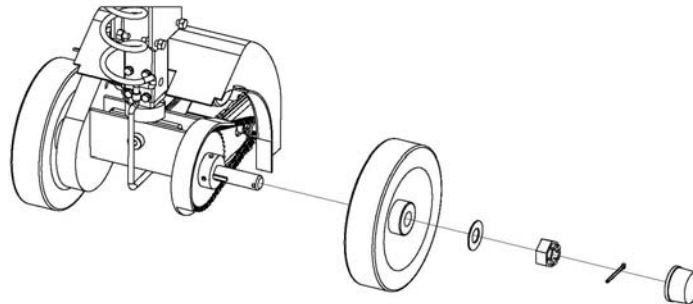


Fig. 1.23

3. Remove the wheel hubcap by simultaneously pulling outward and to the side (the hubcap has an internal groove which snaps over a washer directly behind the wheel retaining nut).
4. Remove the cotter pin from the wheel retaining nut.
5. Remove the wheel retaining nut and washer.
6. Remove the wheel.

Install the wheel:

1. Apply a thin coating of lithium-based grease to the mating surfaces of the new wheel hub and the axle to prevent rust and thereby aiding in future wheel removal.
2. Place the new wheel onto the axle, align the axle drive key with the keyway in the wheel hub, and push the wheel firmly against the drive sprocket hub.
3. Place the washer onto the axle and thread the wheel-retaining nut onto the axle.
4. Hand tighten the wheel-retaining nut until all slack has been removed and then back the nut off until the hole in the axle aligns with one of the slots in the nut. NOTE: The nut should be backed off a minimum of 1/8 turn to ensure proper working clearances.
5. Install a new cotter pin.
6. Install the hubcap by snapping it over the washer behind the wheel-retaining nut.

DRIVE CHAIN REPLACEMENT

Remove the drive chain:

1. Support trailer tongue with conventional trailer jack or by connecting the trailer to a vehicle.
2. Using the remote control transmitter, position the lower drive unit so that the lower drive unit is accessible. Make sure that the drive wheels are not in contact with the ground.
3. Remove the three (3) screws that secure the drive motor cover to the lower drive unit and set the motor cover aside. Refer to Fig. 1.14.
4. Remove both tire/wheel assemblies. Refer to the TIRE/WHEEL ASSEMBLY REPLACEMENT section.
5. Keeping all body parts clear of moving parts, use the remote control transmitter to rotate the drive chain around until the drive chain master link is accessible.

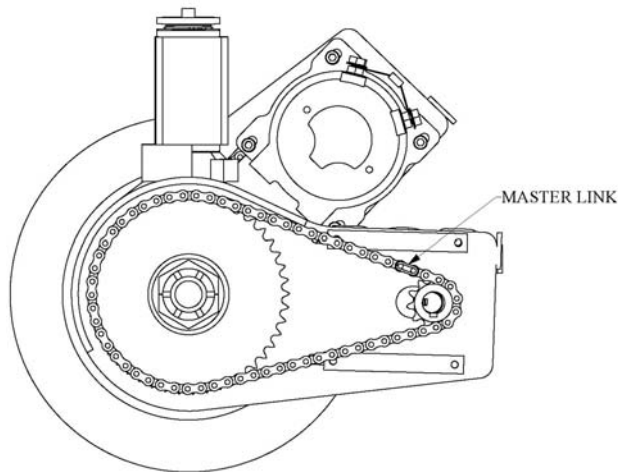


Fig. 1.24

6. Remove the negative battery cable. Refer to the BATTERY section.
7. Loosen the four (4) gearmotor retaining bolts and slide the motor toward the drive axle to provide slack in the drive chain. NOTE: A 9-inch long T-handle 3/16-hex wrench will aid in the loosening of the motor retaining bolts.

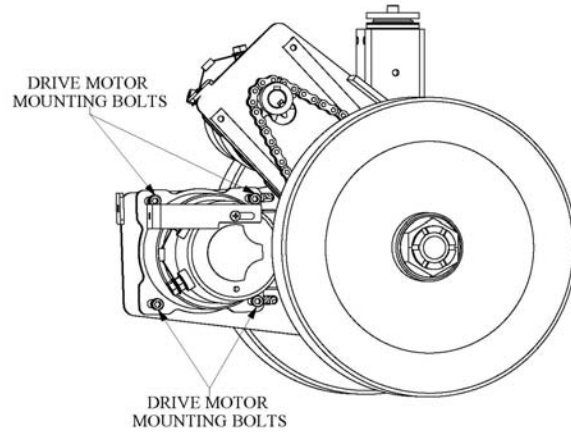


Fig. 1.25

8. Disconnect the master link and remove the drive chain.

Install the drive chain:

1. Place the new drive chain around the chain sprockets and connect the ends with the new master link.
2. Pull outward on the gearmotor until there is between 1/8–3/8 inch slack in the drive chain.

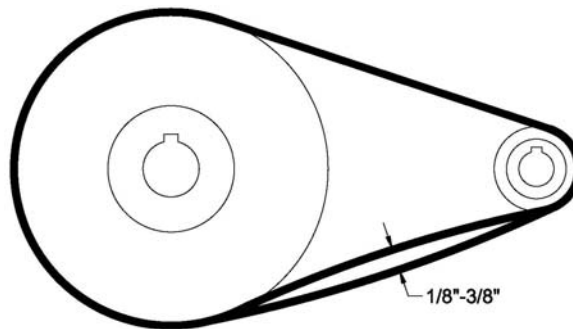


Fig. 1.26

3. Tighten the four (4) gearmotor retaining bolts to 100 in. lbs. Recheck the drive chain tension.
4. Replace the tire/wheel assemblies. Refer to the TIRE/WHEEL ASSEMBLY REPLACEMENT section for proper assembly methods.
5. Replace the drive motor cover and secure with screws. Tighten to 25 in. lbs.
6. Replace the negative battery cable.

CHAIN SPROCKET REPLACEMENT

Remove the sprockets:

1. Remove the drive chain. Refer to the DRIVE CHAIN REPLACEMENT section.
2. Loosen the two (2) setscrews that secure the drive axle sprocket and remove the sprocket. NOTE: Located between the drive axle sprocket and the bearing flange is a .03-inch shim washer. Ensure that the shim washer and the drive key remain on the axle

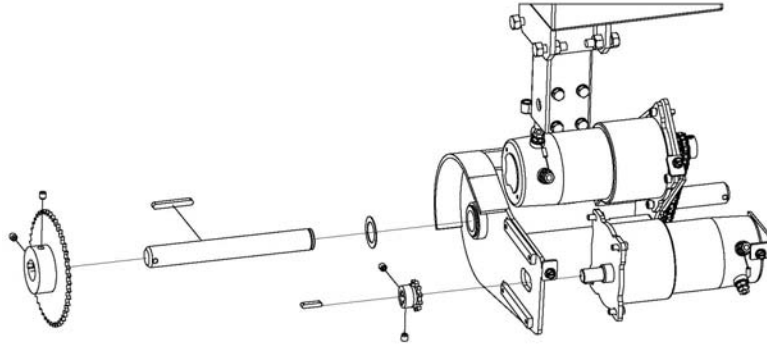


Fig. 1.27

3. Loosen the two (2) setscrews that secure the motor sprocket to the motor output shaft. Ensure that the drive key remains on the motor output shaft.

Install the sprockets:

1. Install the new drive axle sprocket onto the axle (hub side out), align the axle drive key with the keyway in the sprocket, and slide it firmly against the shim washer & bearing flange.
2. Tighten both setscrews in the drive axle sprocket. Tighten to 100 in. lbs.
3. Ensure that the axle spins freely. Adjust the sprocket location on the axle if necessary.
4. Place the new motor sprocket (hub side toward the motor) onto the motor output shaft, align the drive key with the keyway in the sprocket, and slide the sprocket onto the motor output shaft until it is inline with the axle sprocket (use a straight edge to help align the sprockets).
5. Apply thread locking compound to the two (2) motor sprocket setscrews and tighten to 40 in. lbs.
6. Install a new drive chain. Refer to the DRIVE CHAIN REPLACEMENT section for remaining reassembly instructions (be sure to adjust the chain tension properly, tighten the motor mount bolts properly, and adjust the wheel-retaining nuts properly & install new cotter pins).
7. Replace the drive motor cover and secure with screws. Tighten to 25 in. lbs.

LOWER DRIVE GEARMOTOR REPLACEMENT

Remove the lower drive gearmotor:

1. Remove the lower drive motor cover, tire/wheel assemblies, drive chain, drive motor sprocket, and drive key. Refer to the related sections for each (be sure to remove the negative battery cable before attempting to disconnect the chain master link).
2. Make a note of the color code of each wire that is connected to the motor terminals. Notice also the filter capacitor wired between the motor terminals. Refer to Fig. 1.15.
3. Disconnect the wiring harness ring terminals and the filter capacitor from the gearmotor.

⚠ CAUTION: Hold the wiring harness ring terminal with one hand while loosening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.

4. Remove the four (4) mounting bolts and lock washers from the gearmotor. Refer to Fig. 1.25.
NOTE: A 9-inch long T-handle 3/16-hex wrench will aid in the loosening of the motor retaining bolts. Retain the two (2) tap bars that the mounting bolts thread into.

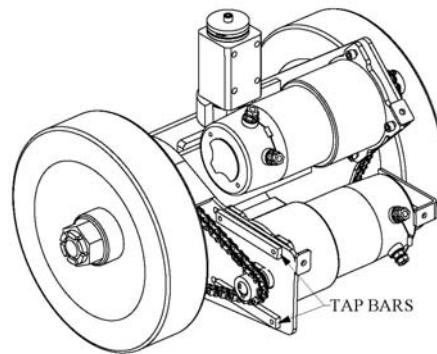


Fig. 1.28

5. Remove the gearmotor.

Install the lower drive gearmotor:

1. Place the new gearmotor in its proper location
2. Loosely secure the new gearmotor to the lower drive frame weldment with the mounting bolts, lock washers, and tap bars.
3. Reinstall the drive key, drive motor sprocket, drive chain, and tire/wheel assemblies. Refer to the related sections for each part for the proper assembly methods (be sure to adjust the chain tension properly, tighten the motor mount bolts properly, tighten the sprocket setscrews properly, adjust the wheel retaining nuts properly and install new cotter pins).
4. Reattach the filter capacitor to the drive motor terminals. Refer to Fig. 1.20.
5. Place the ring terminals of each color-coded wire onto their proper locations on the drive motor. Refer to Fig. 1.15.
6. Secure the wiring harness ring terminals and capacitor ends to the motor terminals with the original serrated nuts.

⚠ CAUTION: Hold the wiring harness ring terminal with one hand while tightening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.

Tighten the nuts to 15 in. lbs

7. If installing a new right drive wheel gearmotor, the cover mounting bracket attached to the motor cap must be transferred from the old motor to the new motor. Tighten the screw to 15 in. lbs.

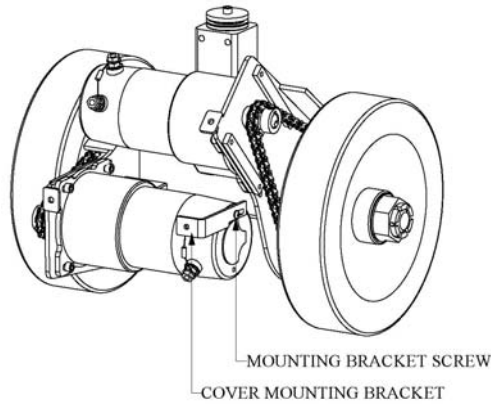


Fig. 1.29

8. Replace the drive motor cover and secure with screws. Tighten to 25 in. lbs.
9. Reconnect the negative battery cable.

LIFT GEARMOTOR REPLACEMENT

Remove the lift gearmotor:

1. Remove the receiver PCB/wiring harness and related components from the unit. Refer to the RECEIVER PCB/WIRING HARNESS REPLACEMENT section. Be sure to follow the precautionary steps regarding static-shock prevention. Store the PCB/wiring harnesses in a static free container making sure to not allow the wiring harnesses to strain their connections on the PCB.
2. Remove the setscrew that secures the lift motor drive gear to the lift motor output shaft and remove the gear and drive key.

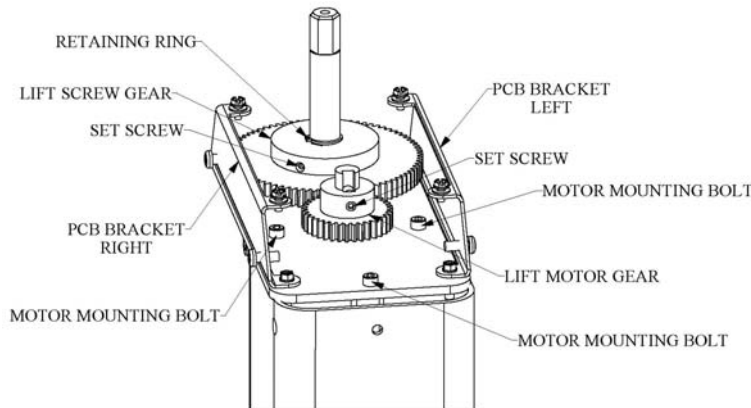


Fig. 1.30

3. Support the lift motor with one hand and remove the three (3) lift motor mounting bolts and lock washers. Lower the motor from the unit.

Install the lift gearmotor:

1. Place the new lift gearmotor into its proper location and secure with the original mounting bolts and lock washers. Tighten to 80 in. lbs.
2. Place the drive key into the lift motor output shaft keyway.

3. Place the gear onto the shaft (hub side up), align the drive key with the gear keyway, and slide the gear onto the motor output shaft until the gear is meshed and inline with the lift screw gear.
4. Secure the gear to the motor output shaft by tightening the setscrew. Tighten to 60 in. lbs.
5. Install the receiver PCB/wiring harness and related components. Refer to the RECEIVER PCB/WIRING HARNESS REPLACEMENT section. Be sure to follow the precautionary steps regarding static-shock prevention.

INNER TUBE ASSEMBLY REPLACEMENT

Remove the inner lift tube assembly:

1. Remove the receiver PCB/wiring harness and related components from the unit. Refer to the RECEIVER PCB/WIRING HARNESS REPLACEMENT section. Be sure to follow the precautionary steps regarding static-shock prevention. Store the PCB/wiring harnesses in a static free container making sure to not allow the wiring harnesses to strain their connections on the PCB.
2. Remove the unit from the trailer.
 - a. If the direct mount battery box is used, locate and remove the lower battery box mounting bolt and nut. Set the battery box aside. Refer to Fig. 1.5.
 - b. With the help of an assistant, steady the unit, and remove the four (4) ½ X 1-inch bolts that secure the outer support arms to the support rails.

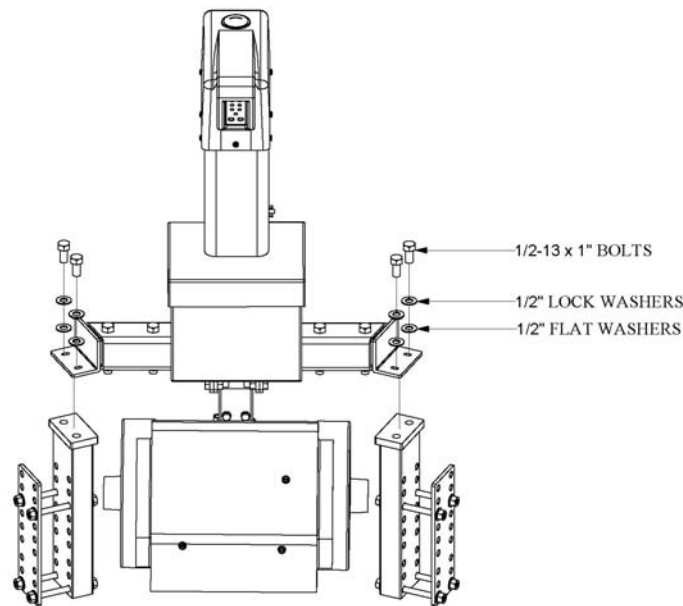


Fig. 1.31

- c. Lifting the unit by the support arms, remove the unit from the trailer, and place it on a suitable workbench.

⚠ WARNING: The unit weighs approximately 120 lbs. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.

3. Remove the shoulder bolt, nut, and washer that secure the lower drive unit to the steering shaft and set the lower drive unit aside.

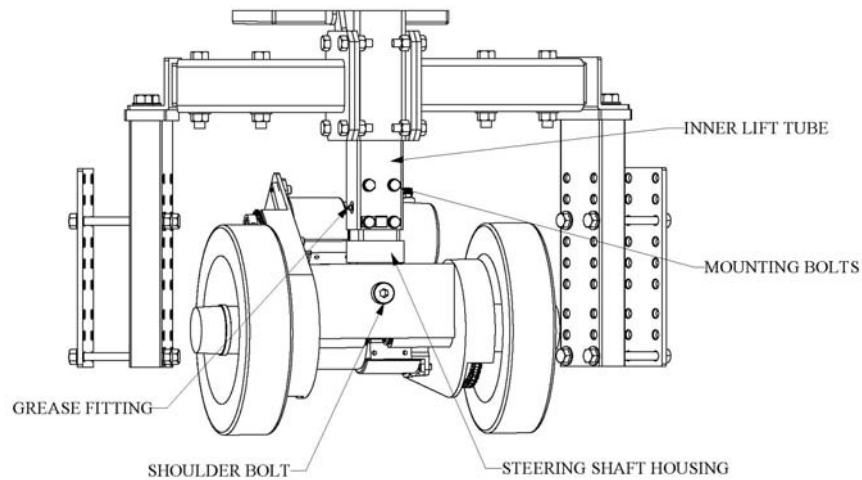


Fig. 1.32

4. Remove the grease fitting from the side of the steering shaft housing.
5. Mark the front sides of steering shaft housing and the inner lift tube.
6. Remove the eight (8) bolts and washers that secure the steering shaft housing to the inner lift tube assembly.
7. Remove the steering shaft assembly from the inner lift tube assembly.
8. Remove the four (4) screws that secure the receiver PCB support brackets to the lift motor mounting plate. Refer to Fig. 1.10 Notice that the brackets are left and right handed. Set the brackets aside.
9. Remove the retaining ring, located just above the lift screw gear, from the lift screw.
10. Loosen the setscrew in the lift screw gear and remove the gear.
11. Remove the drive key from the lift screw. Notice the notch in one end of the drive key. This notch is designed to clear the bearing bushing.

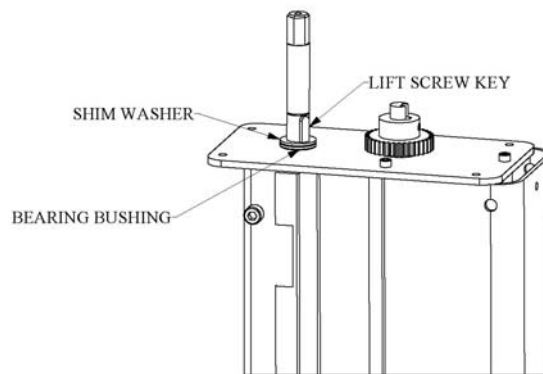


Fig. 1.33

12. Remove the shim washer.
13. Remove the safety bolt and nut (located just below the lift motor mounting plate) if not already removed during PCB/wiring harness removal. Refer to Fig. 1.16.
14. Slide the inner lift tube assembly out of the outer lift tube assembly. **NOTE:** The lift screw thrust bearing is installed between a flange on the lift screw and the underside of the outer lift tube cap. Be careful, when disassembling the inner lift tube assembly from the outer lift tube weldment, to secure both thrust bearing races, the ball cage and the ball bearings.

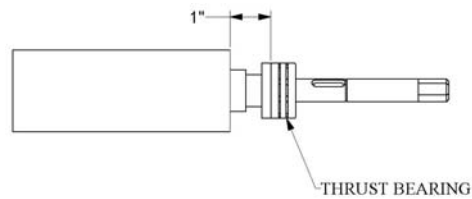


Fig. 1.34

Install the inner lift tube assembly:

1. Ensure that the lift screw flange (for the thrust bearing) is at least 1-inch from the upper end of the inner lift tube. Turn the screw clockwise to extend it. Refer to Fig. 1.34.
2. Pack the thrust bearing with good quality lithium based grease and place it in its proper location on the new inner lift screw.
3. Assemble the inner and outer lift tubes. NOTE: Movaload recommends replacing the bearing bushing in the outer lift tube weldment whenever the inner lift tube assembly is being replaced. Refer to Fig. 1.33.
 - a. Place the new inner lift tube assembly (with thrust bearing) in the upright position.
 - b. Orient the front side of the outer lift tube with the front side of the inner lift tube.
 - c. Slide the outer lift tube down over the inner lift tube.
 - d. Align the lift screw extension with the hole in the bearing bushing and lower the outer lift tube down until it makes contact with the thrust bearing.
4. Place the shim washer onto the lift screw extension and slide it flush against the bearing bushing.
5. Install the drive key into the keyway with the notched end oriented so that it will clear the bearing bushing. Refer to Fig. 1.33.
6. Place the lift screw gear onto the lift screw extension (hub side up), align it with the drive key, and slide it flush against the shim washer.

⚠ CAUTION: If the gear does not slide over the lift screw extension freely, support the opposite end of the lift screw (inside the inner lift tube) with a suitable device before applying any force to the gear. Failure to do this will cause the drive key to be driven into the shim washer and bearing bushing, damaging both.

7. Install a new retaining ring next to the lift screw gear. NOTE: If the retaining ring groove is not clear of the gear, it may be necessary to rotate the lift screw clockwise several turns. This will extend the upper end of the lift screw away from the inner lift tube and allow it to protrude through the outer lift tube correctly.
8. Tighten the setscrew in the gear. Tighten to 60 in. lbs.
9. Insert the steering housing assembly into the inner lift tube assembly, align the bolt holes, and secure with the eight (8) bolts and washers. Tighten to 15 ft. lbs.
10. Install the grease fitting into the steering housing.
11. Attach the lower drive unit to the steering shaft with the shoulder bolt, nut, and washer. Tighten to 40 ft. lbs.
12. Loosely attach the receiver support brackets to the lift motor mounting plate with screws. Do not tighten at this time.

⚠ CAUTION: The receiver PCB contains delicate electronic components that can be damaged by static shock. Always work in a static free area and wear a grounded anti-static wrist strap when handling the receiver PCB.

13. Align the hole in the rear of the receiver PCB over the upper end of the lift screw extension

14. Attempt to align the four (4) receiver PCB mounting holes with the corresponding holes in the receiver support brackets. Reposition the brackets as necessary to align the holes. Tighten the screws that secure the brackets to the lift motor mounting plate. Tighten to 15 in. lbs.
15. Ensure that the urethane washers remain adhered to the PCB support brackets at all four (4) mounting hole locations.
16. Secure the receiver PCB to the PCB support brackets with the original screws. Tighten to 5 in. lbs.

 **CAUTION: Do not over tighten the screws as the PCB could be damaged.**

NOTE: Check for uniform clearance between the hole in the receiver PCB and the lift screw extension. Readjust the support brackets if necessary.

17. Complete the reassembly of the receiver PCB/wiring harness assembly to the unit. Refer to the RECEIVER PCB/WIRING HARNESS ASSEMBLY REPLACEMENT section (disregard the battery installation instructions until the unit has been remounted to the trailer).
18. Reattach the unit to the trailer:
 - a. Lift the unit by the support arms and place it over the support rails, align the boltholes, and secure with the original bolts, lock washers, and flat washers. Tighten to 70 ft. lbs.

 **WARNING: The unit weighs approximately 120 lbs. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.**

- b. Install the battery box (if used), battery, and reconnect the battery cables. Refer to the BATTERY section.

LIFT SCREW THRUST BEARING REPLACEMENT

Refer to the INNER LIFT TUBE ASSEMBLY REPLACEMENT section.

STEERING HOUSING ASSEMBLY REPLACEMENT

Refer to the INNER LIFT TUBE ASSEMBLY REPLACEMENT section.

DRIVE AXLE REPLACEMENT

Remove the drive axle:

1. Remove the unit from the trailer:
 - a. Disconnect the battery cables. Remove the battery if mounted in the optional direct mount battery box. Refer to the BATTERY section.
 - b. If the unit is equipped with the optional direct mount battery box, locate and remove the lower mounting bolt and set the battery box aside. Refer to Fig. 1.5.
 - c. With the help of an assistant, steady the unit and remove the four (4) ½ X 1-inch bolts that secure the outer support arms to the support rails. Refer to Fig. 1.31.
 - d. Lifting the unit by the support arms, remove the unit from the trailer and place it on a suitable workbench.

 **WARNING: The unit weighs approximately 120 lbs. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.**

⚠ CAUTION: Do not lift the unit by any of the plastic protective covers. Whenever the unit is not mounted on the trailer, never allow the unit's weight to be supported by any of the plastic protective covers.

2. Remove the three (3) screws that secure the drive motor cover and set the cover aside. Refer to Fig. 1.14.
3. Remove both tire/wheel assemblies. Refer to the TIRE/WHEEL ASSEMBLY REPLACEMENT section.
4. Loosen the four (4) gearmotor retaining bolts and slide the motor toward the drive axle to provide slack in the drive chain. NOTE: A 9-inch long T-handle 3/16-hex wrench will aid in the loosening of the motor retaining bolts. Refer to Fig. 1.25.
5. Disconnect the master link and remove the drive chain.
6. Loosen the two (2) set screws that secure the drive axle sprocket and remove the sprocket. Refer to Fig. 1.27.
7. Remove the .030-inch shim washer and the drive key from the axle.
8. Remove the retaining ring on the inner end of the axle.

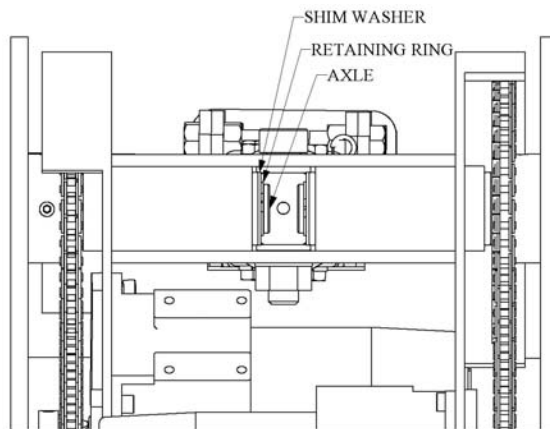


Fig. 1.35

9. Remove the .060-inch shim washer from the inner end of the axle.
10. Remove the axle from the lower drive frame.

Install the axle:

1. Insert the new axle into the lower drive frame (insert end with retaining ring groove).
2. Place a .060-inch shim washer onto the inner end of the axle and secure with a new retaining ring.
3. Place a .030-inch shim washer onto the outer end of the axle and slide firmly against the bearing bushing.
4. Insert the drive key into the axle keyway.
5. Install the drive axle sprocket onto the axle (hub side out), align the axle drive key with the keyway in the sprocket, and slide it firmly against the shim washer & bearing flange.
6. Tighten both setscrews in the drive axle sprocket. Tighten to 100 in. lbs.
7. Replace the drive chain and secure with master link.
8. Pull outward on the gearmotor until there is between 1/8–3/8 inch slack in the drive chain. Refer to Fig. 1.26.
9. Tighten the four (4) gearmotor retaining bolts to 100 in. lbs. Recheck the drive chain tension.
10. Replace the tire/wheel assembly. Refer to the TIRE/WHEEL ASSEMBLY REPLACEMENT section for proper assembly methods.
11. Replace the drive motor cover and secure with screws. Tighten to 25 in lbs.
12. Reattach the unit to the trailer:

- a. Lift the unit by the support arms and place it over the support rails, align the boltholes, and secure with the original bolts, lock washers, and flat washers. Tighten to 70 ft. lbs. Refer to Fig. 1.31.

⚠ WARNING: The unit weighs approximately 120 lbs. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.

- b. Install the battery box (if used), battery and/or reconnect the battery cables. Refer to the BATTERY section.

LOWER FRAME SUBASSEMBLY REPLACEMENT

Remove the lower frame subassembly:

1. Remove the unit from the trailer:
 - a. Disconnect the battery cables. Remove the battery if mounted in the optional direct mount battery box. Refer to the BATTERY section.
 - b. If the unit is equipped with the optional direct mount battery box, locate and remove the lower mounting bolt and set the battery box aside. Refer to Fig. 1.15.
 - c. With the help of an assistant, steady the unit and remove the four (4) ½ X 1-inch bolts that secure the outer support arms to the support rails. Refer to Fig. 1.31.
 - d. Lifting the unit by the support arms, remove the unit from the trailer and place it on a suitable workbench.

⚠ WARNING: The unit weighs approximately 120 lbs. Use of an overhead chain hoist or winch is recommended, if available. Do not lift the unit without help. Proper lifting technique is essential to avoid injury. Lift with your arms and legs, not your back. Ignoring these precautions can result in back injury.

⚠ CAUTION: Do not lift the unit by any of the plastic protective covers. Whenever the unit is not mounted on the trailer, never allow the unit's weight to be supported by any of the plastic protective covers.

2. Remove the three (3) screws that secure the drive motor cover and set the cover aside. Refer to Fig. 1.14.
3. Locate the two (2) power terminals on both of the lower drive gearmotors and make a note of the color code of each wire that connects to them so that they can be replaced in their proper location. Notice also the filter capacitor attached between the motor terminals. Refer to Fig. 1.15.
4. Make a careful note of the routing of the various wires throughout the lower drive unit. Refer to Figs. 1.16 and 1.17.
5. Disconnect the wiring harness ring terminals and the filter capacitor from both lower drive gearmotors.

⚠ CAUTION: Hold the wiring harness ring terminal with one hand while loosening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.

6. Remove the tire/wheel assemblies, drive chains, chain sprockets, and lower drive gearmotors. Refer to the related section for each item.
7. Remove the shoulder bolt, nut, and washer that secure the lower frame subassembly to the steering shaft. Refer to Fig. 1.32.

Install the lower frame subassembly:

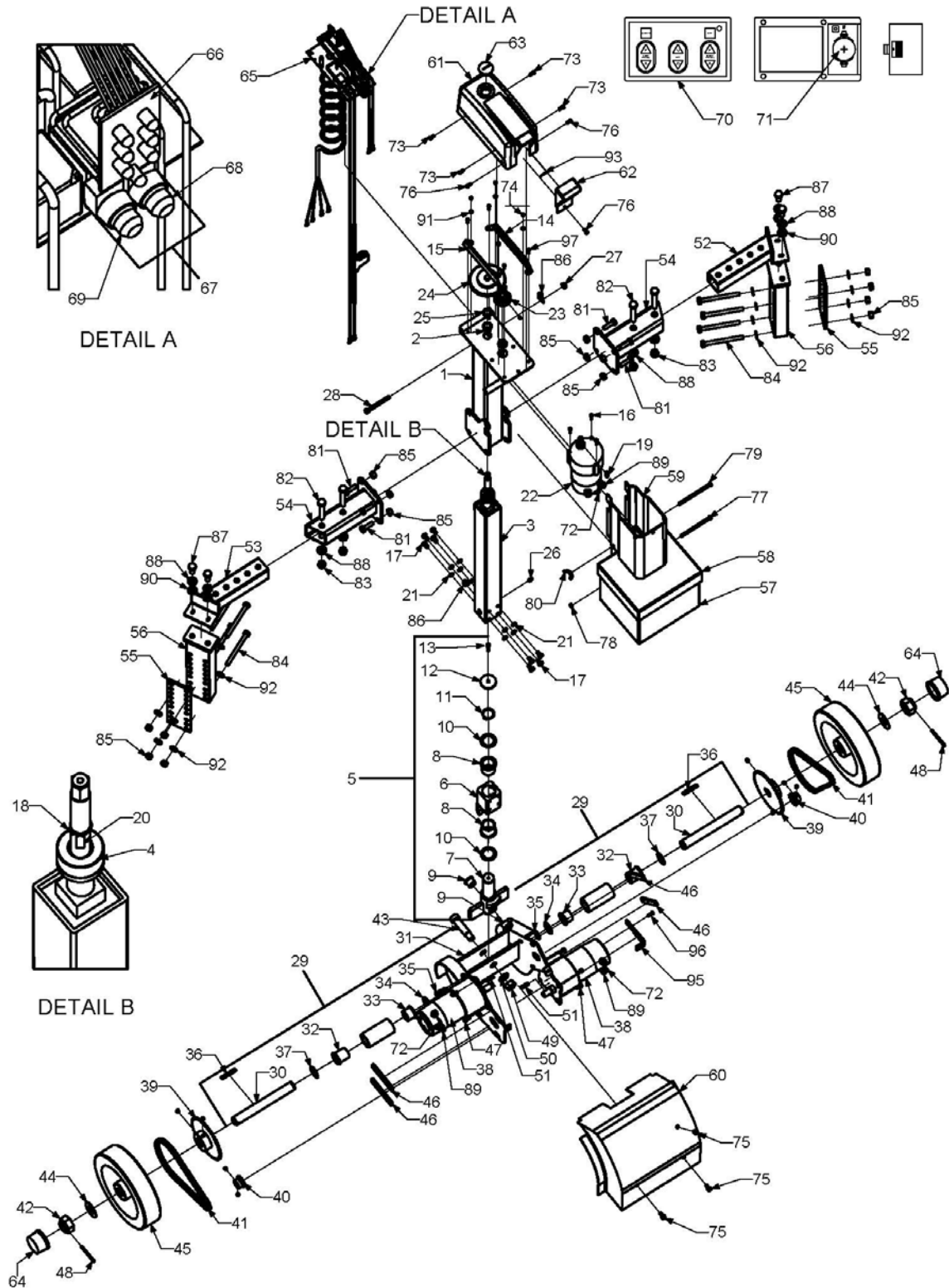
1. Attach the new lower frame subassembly to the steering shaft with the shoulder bolt, nut, and washer. Ensure that the lower drive unit is oriented with the gearmotors toward the front of the unit. Tighten to 40 ft. lbs.
2. Reattach the lower drive gearmotors, chain sprockets, chains, and tire/wheel assemblies. Refer to the related sections for each item.
3. Attach the filter capacitors between the terminals of each gearmotor. Refer to Fig. 1.20.
4. Place the ring terminals of each color-coded wire onto their proper locations on both gearmotors. Refer to Fig. 1.15.
5. Secure the wiring harness ring terminals and capacitor ends to the motor terminals with the serrated nuts.

 **CAUTION: Hold the wiring harness ring terminal with one hand while tightening the serrated nut with a wrench. This is to help avoid turning the terminal stud inside the motor and/or to avoid wire breakage. Never allow the motor terminal studs to turn as the motor could be damaged.**

Tighten the nuts to 15 in. lbs.

6. Place the lower drive unit cover into position, align the mounting holes, and secure with the original screws. Refer to Fig. 1.14. Tighten to 25 in. lbs.
7. Reattach the unit to the trailer:
 - a. With the help of an assistant, lift the unit by the support arms and place it over the support rails, align the bolt holes, and secure with the original bolts, lock washers, and flat washers. Refer to Fig. 1.31. Tighten to 70 ft. lbs.
 - b. Install the battery box (if used), battery and/or reconnect the battery cables. Refer to the BATTERY section.

PROJACK M1 EXPLODED VIEW



PARTS LIST FOR PROJACK M1

KEY NO.	PART NUMBER	QTY.	DESCRIPTION
1	301008	1	Outer Lift Tube Weldment (Includes Key No. 2)
2	301026	1	Bearing, Flanged (.625 ID X .875 OD X .50 LG X .125 in. FL)
3	301009	1	Inner Lift Tube Assembly (Includes Key No. 4)
4	301013	1	Bearing, Lift Screw Thrust
5	301014	1	Steering Shaft Subassembly (Includes Key Nos. 6-13)
6	nas	1	Steering Shaft Housing Weldment
7	nas	1	Steering Shaft Weldment
8	301017	2	Bearing, Flanged (1.25 ID X 1.50 OD X 1.5 LG X .188 in. FL)
9	301018	2	Bearing, Flanged (.75 ID X .875 OD X .75 LG X .125 in. FL)
10	301019	2	Washer, Shim (1.255 ID X 1.75 OD X .031 in. TH)
11	301020	1	Retaining Ring, 1 1/4 in. Shaft (1.175 in. ID)
12	301035	1	Washer, Flat (.33 ID X 1.78 OD X .125 in. TH)
13	301036	1	Bolt, Socket Head Cap Screw (M8X1.25X20mm)
14	301002	1	PCB Support Bracket LH
15	301037	1	PCB Support Bracket RH
16	301021	3	Bolt, Hex Head Cap Screw (1/4-20 X 5/8 in. G5)
ns	302035	3	Washer, Split Ring Lock (1/4 in.)
17	301022	8	Bolt, Hex Head Cap Screw (5/16-18 X 5/8 in. G5)
18	301023	1	Retaining Ring, 5/8 in. Shaft (.579 in. ID)
19	301024	1	Key, Lift Motor (3/16 in. sq. X 1.0 in. LG)
20	301025	1	Key, Lift Screw (3/16 in. sq. X .812 in. LG)
21	301032	8	Washer, Split Ring Lock (5/16 in.)
22	301027	1	Gearmotor, Lift
23	301028	1	Gear 45T (.625 in. ID)
24	301029	1	Gear 72T (.625 in. ID)
25	301030	1	Washer, Shim (.63 ID X .031 in. TH)
26	301031	1	Grease Fitting (1/4-28 in.)
27	301033	1	Nut, Hex Serrated Flange (5/16 in.)
28	301034	1	Bolt, Hex Head Cap Screw (5/16-18 X 3.0 in. G5)
29	302004	1	Lower Drive Frame Subassembly (Includes Key Nos. 30-37)
30	302001	2	Axle
31	nas	1	Lower Drive Frame Weldment
32	302020	2	Bearing, Flanged (1.00 ID X 1.25 OD X 1.5 LG X .125 in. FL)
33	302021	2	Bearing, Flanged (1.00 ID X 1.25 OD X 1.0 LG X .125 in. FL)
34	302022	2	Washer, Shim (1.005 ID X .062 in. TH)
35	302023	2	Retaining Ring, 1.0 in. shaft (.925 in. ID)
36	302024	2	Key, Axle (1/4 in. sq. X 2.0 in. LG)
37	302025	2	Washer, Shim (1.005 ID X .031 in. TH)
38	302010	2	Gearmotor, Wheel Drive
39	302011	2	Sprocket 35B-45-1
40	302012	2	Sprocket 35B-11-.625
41	302013	2	Chain 35R-64P W/C
42	302014	2	Nut, Slotted Hex (1.0-14 in.)
43	302015	1	Bolt, Shoulder (.75 OD X 2.25 in. LG)
44	302017	2	Washer, Hub Cap (1.02 ID X 2.0 OD X .08 in. TH)
45	302018	2	Wheel & Tire Assembly
46	302019	4	Tap Bar, Motor Mount
47	302026	8	Bolt, Socket Head Cap Screw (1/4-20 X 1.0 in.)
ns	302035	8	Washer, Split Ring Lock (1/4 in.)
48	302027	2	Cotter Pin (3/16 X 2.0 in.)
49	302028	1	Nut, Nylon Insert Hex (5/8-11 in.)
50	302029	1	Washer, Flat (5/8 in.)
51	302030	2	Key, Wheel Drive Motor (3/16 in. sq. X 1.0 in. LG)

ns-Not shown

nas-Not available separately

PARTS LIST FOR PROJACK M1 (Cont'd)

KEY NO.	PART NUMBER	QTY.	DESCRIPTION
52	303010	1	Arm, LH Outer Support
53	303001	1	Arm, RH Outer Support
54	303002	2	Arm, Center Support
55	303003	2	Plate, Support
56	303004	2	Rail, Support
57	304001	1	Battery Box
58	304002	1	Cover, Battery Box
59	304003	1	Cover, Lift Motor
60	304004	1	Cover, Wheel Drive Motor
61	304005	1	Cover, PCB
62	304006	1	Cover, Lens/LED
63	304007	1	Access Plug
64	304008	2	Hub Cap
65	305001	1	Receiver PCB/Wiring Harness Assembly
66	305003	1	LED PCB Assembly
67	305012	1	On & Off Pushbutton Switch Assembly (includes Key Nos. 68-69)
68	305008	1	Red Pushbutton Boot
69	305009	1	Black Pushbutton Boot
70	305002	1	Transmitter PCB Assembly
71	305010	1	CR 2450 Coin Battery
72	305011	3	Capacitor 0.1 uf 200 ma. ceramic
73	306001	4	Bolt, Phillips Pan Head Taplite (#10-32 X 1/2 in.)
74	306002	4	Bolt, Hex Washer Taplite (#6-32 X 3/8 in.)
75	306003	7	Bolt, Phillips Pan Head Taplite (1/4-20 X 1/2 in.)
76	306004	3	Bolt, Phillips Pan Head Hi-Lo (#10 X 1/2 in.)
77	306005	1	Bolt, Hex Head Cap Screw (1/4-20 X 4.0 in. w/1.0 in. thread, G5)
78	306006	1	Nut, Nylon Insert Lock (1/4-20 in.)
79	306007	1	Bolt, Carriage (1/4-20 X 4 1/2 in. w/.125 neck, G5)
80	306008	1	Nut, Nylon Insert Wing (1/4-20 in.)
81	306009	8	Bolt, Hex Head Cap Screw (3/8-16 X 1 1/4 in. G5)
82	306010	4	Bolt, Hex Head Cap Screw (1/2-13 X 3 1/4 in. G5)
83	306011	4	Nut, Nylon Insert Lock (1/2-13 in.)
84	306012	8	Bolt, Hex Head Cap Screw (3/8-16 X 4 1/2 in. G5)
85	306013	16	Nut, Nylon Insert Lock (3/8-16 in.)
86	306014	2	Cable Clamp, Neoprene Dipped (5/16 X 7/16 in.)
87	306015	4	Bolt, Hex Head Cap Screw (1/2-13 X 1.0 in. G5)
88	306016	8	Washer, Split Ring Lock (1/2 in. G5)
89	306017	6	Nut, Serrated Flange (1/4-20 in.)
90	306018	4	Washer, USS Flat (1/2 in.)
91	306019	4	Washer, HDU Foam w/Acrylic PSA 1 Side (.61 OD X .18 ID X .06 in. TH)
92	306020	16	Washer, USS Flat (3/8 in.)
93	306021	1	Gasket, LED (2.2 X 1.15 X .06 in., w/ 2 sided adhesive)
94	306022	1	Gasket, Rear PCB Cover (4.6 X .75 .75 in. w/1-sided adhesive)
95	302031	1	Bracket, Drive Motor Cover
96	302032	1	Bolt, Pan Head Phillips (#10-32 X 5/8 in.)
ns	302033	1	Washer, USS Flat (#10)
ns	302034	1	Washer, Split Ring Lock (#10)
97	306023	4	Bolt, Hex Head Taplite (1/4-20 X 1/2 in.)

ns-Not shown

nas-Not available separately