OUT-RIDER®
PUL-1100

www.bruno.com

DEALER:

INSTALLATION MANUAL
MAN-1100-1
REVISED 01-27-2003
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MAXIMUM LOAD RATING

The maximum load rating decal for the specific vehicle is located on the rear-facing side of the lift base assembly.

This rating is appropriate for lifts installed according to Bruno instructions.

<table>
<thead>
<tr>
<th>LIFT MODEL</th>
<th>MAXIMUM LOAD RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUL-1100 Out-Rider®</td>
<td>up to 200 lbs. (90 kg)</td>
</tr>
<tr>
<td>PUL-1100 Out-Rider® with heavy-duty outer arm</td>
<td>up to 300 lbs. (135 kg)</td>
</tr>
</tbody>
</table>

**WARNING**

The lift weight rating is the MAXIMUM load rating. The maximum load rating for the specific vehicle application has been determined during the design of the mounting assembly. During dealer installation, factors inherent to specific applications including, but not limited to, vehicle structure and condition, operating environment, and customer ability may reduce the effective weight rating. The structure of the lift itself is NOT a factor in establishment of load ratings.
CARTON CONTENTS

REMOVE ALL CONTENTS BEFORE DISCARDING CARTONS!

CARTON ONE
• lift base assembly
• vertical arm assembly
  • control box assembly
  • motor harness
  • chain
• swivel tube
• drive tube
• docking device and C-arm/pickup device (if applicable)
• parts box
  • sub-base parts kit (VSL-K-550)
  • wiring kit (ASL-K-405CC)
  • Out-Rider® parts kit (PUL-K-1100)
• installation manual

CARTON TWO
• outer arm assembly with actuator
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OUTER ARM ASSEMBLY</td>
</tr>
<tr>
<td>B</td>
<td>ACTUATOR</td>
</tr>
<tr>
<td>C</td>
<td>VERTICAL ADJUSTMENT TUBE</td>
</tr>
<tr>
<td>D</td>
<td>PLASTIC BOOT</td>
</tr>
<tr>
<td>E</td>
<td>MOTOR/SPROCKET COVER</td>
</tr>
<tr>
<td>F</td>
<td>LIFT BASE</td>
</tr>
<tr>
<td>G</td>
<td>SWIVEL TUBE</td>
</tr>
<tr>
<td>H</td>
<td>DRIVE SPROCKET WELDMENT</td>
</tr>
<tr>
<td>I</td>
<td>CHAIN</td>
</tr>
<tr>
<td>J</td>
<td>CONTROL SWITCH ASSEMBLY</td>
</tr>
<tr>
<td>K</td>
<td>MOTOR HARNESS</td>
</tr>
<tr>
<td>L</td>
<td>CONTROL HARNESS EXTENSION</td>
</tr>
<tr>
<td>M</td>
<td>CONTROL BOX ASSEMBLY</td>
</tr>
</tbody>
</table>
TOOLS FOR INSTALLATION

INSTALLATION NOTES

All hardware items needed for this installation have been included in the installation kit. If it becomes necessary to replace any of the bolts or fasteners, use only GRADE 5 hardened steel hardware. GRADE 5 bolts can be identified by the three (3) hash marks on the bolt head. BOLTS WITHOUT THE GRADE 5 MARKINGS ON THE HEAD ARE NOT STRONG ENOUGH TO BE SAFELY USED IN THIS APPLICATION.

GRADE 5 BOLT HEAD

Available at auto parts stores.

TOOLS NEEDED FOR INSTALLATION

- wire stripper/crimper
- 3/8" drive socket set
- 3/8" drive ratchet
- combination wrench set (SAE)
- hex key set (Allen wrenches)
- slotted screwdrivers
- electric drill with 1/8", 3/8", and 11/64" bits
- tube of silicone or underbody sealant
- Teflon® grease
- thin screwdriver or punch smaller than 3/16"
- 1-5/8" hole saw (suitable for use in sheet metal)
- 2 weights (for example, sandbags)
- wooden paint stir stick, or similar tool

NOTE TO INSTALLER

Before starting the installation, provide the customer with the enclosed Operator's Manual. Encourage the customer to read the manual as the installation is being performed. Information contained in this manual along with the hands-on training will help the customer understand correct and safe lift operation.
The PUL-1100 OUT-RIDER is shipped partially assembled in two cartons. Please refer to the Carton Contents page for a list of the components included in each carton.

ASSEMBLING THE PUL-1100

1. Apply a liberal coating of Teflon®-based grease (such as Magnalube®) to the swivel tube, as well as to the top and bottom bushings in the base assembly.

2. Wrap the drive chain (e) around the drive sprocket (f).

3. Arrange the chain so that the excess length extends on the side of the sprocket where the hold down latch bracket (g) is attached.

4. Loop the excess chain length around the small drive sprocket (h) on the base assembly.

5. Slide the swivel tube (m) down through the drive sprocket weldment (f) and drive sprocket (k), into the swivel tube housing until the tube seats itself in the base assembly.

6. Align the hole in the drive sprocket (h) with the inside of the swivel tube housing (i) in the base assembly.

7. Assemble the (a) outer arm assembly and (b) actuator on the vertical adjustment tube (c) using the two 1/2-13 x 3.25" bolts (d) and self-locking nuts provided.

* Teflon® is a registered trademark of the DuPont Co.
** Magnalube® is a registered trademark of Saunders Enterprises, Inc.

(a) outer arm assembly
(b) actuator
(c) vertical adjustment tube
(d) 1/2-13 x 3.25" bolt

Installation Notes

Verify carton contents against the packing list.

Installation Notes

Tighten the nuts to prevent looseness in the assembly, but still leave sufficient clearance to allow the outer arm assembly and actuator to move freely at the pivot points.

Installation Notes

A stop block is welded to the bottom of the drive sprocket. Be sure that this block is inserted between the two set screws designed to limit the travel of the lift arm to approx. 280 degrees.
LIFT ARM HEIGHT ADJUSTMENT

1. Set the lift arm in place in the base, but do not insert or tighten the screws until AFTER adjusting the swivel stops (see ADJUSTING LIFT SWING later in this manual).

2. Install the molded plastic sprocket cover (A) with the (2) self-tapping sheet metal screws provided.

3. Slide the plastic boot (B) above the holes on the vertical adjustment tube (C) and assemble the outer arm assembly to the swivel tube by sliding the vertical adjustment tube (C) into the swivel (D) tube and securing it with the 1/2-13 by 3-3/4" bolt and self-locking nut (E &F) provided. **Finger tighten** the self-locking nut (F) at this point to allow for any necessary adjustment.

![Diagram of lift arm assembly]

CAUTION

Be sure to place weights (such as 100-lb. sandbags) on the ends of the lift legs before you rotate the lift arm to select the best mounting location for the lift.

Failure to properly stabilize the lift base may cause the lift to tip over if the lift arm is rotated to a position opposite that of the lift base legs. In this case, the arm or motor head could strike the body of the vehicle with enough force to damage the lift, the vehicle, or both.
INSTALLATION

**Installation Notes**
Center and align vertical adjustment tube with swivel tube to remove excess play and eliminate lift rattling when driving.

4. Adjust set screws so that the vertical adjustment tube is centered and aligned with the swivel tube.

5. Slide the plastic boot down the vertical adjustment tube until it is firmly seated in position, overlapping the top edge of the swivel tube.

---

**DETERMINING THE BEST INSTALLATION LOCATION**

1. Position the scooter / wheelchair in the transfer position that best suits the client.

2. Place the lift on the pickup bed in the estimated installation position.

3. Steady the lift (ask someone to hold it in position, or place sandbags on the lift legs).

4. Push down on the latch release handle.

5. Rotate the lift arm so that it is positioned directly above the scooter / wheelchair docking device.

6. Adjust the length of the outer arm so that the lift belt extends vertically, without slack, from the lift head to the docking device. 
NOTE: To achieve the correct position, you may have to slide the base forward or rearward on the pickup bed.

7. Once you have determined the correct installation position, mark the location of the three mounting holes.

8. Drill 3/8" holes at the (3) marked locations

9. Bolt the lift base to the pickup bed.

---

**WARNING**

Before drilling mounting holes in the vehicle floor, thoroughly inspect the underside of the vehicle to be sure that the drill will not damage vehicle components (fuel tank, wiring, brake and fuel lines) when it penetrates the vehicle floor.
SECURING THE LIFT

1. To route the motor harness, choose a location on the pickup bed, near the lift.

2. BEFORE SECURING THE LIFT BASE, step drill (gradually increasing the hole diameter) a hole until it measures 11/16", to accommodate the motor harness. (On some vehicles, the drain knockout in the bed may be used.)

3. Using the hardware provided, secure the lift to the pickup bed, as shown above.
   - Be sure to mount the support washer to ensure optimal support for the lift.
   - The washer includes 4 holes for greater flexibility during lift placement.
   - One 5/16" fender washer is included for installation in a tight corner where the support washer will not fit, or in cases where the mounting hole is drilled through a frame member, making the extra support unnecessary.

Installation Notes
After tightening the mounting bolts, apply a liberal coating of silicone sealer (or underbody coating) to the ends of the bolts, washers and nuts on the underside of the vehicle to prevent corrosion which might weaken the installation.

WARNING
Before drilling mounting holes in the vehicle floor, thoroughly inspect the underside of the vehicle to be sure that the drill will not damage vehicle components (fuel tank, wiring, brake and fuel lines) when it penetrates the vehicle floor.

CAUTION
Be sure to insert the support washer as shown. It spreads the load over a wide area on vehicle bed. If the support washer provided fails to ensure good contact with the vehicle bed, fabrication of a larger washer may be required.
1. The two (2) safety screws (provided):
   • limit the swivel rotation of the lift;
   • prevent the lift arm from hitting the side of the vehicle when the lift is powered out;
   • prevent the lift arm from hitting the window or inner panels of the pickup box when the lift is powered in.

2. The safety screws are mounted in a bracket welded to the swivel tube housing, just below the large sprocket. They are designed to limit the swivel by contacting a stop block welded to the bottom of the large sprocket.

**Installation Notes**
The safety screws are designed to prevent the user from swiveling the lift too far.

They ARE NOT DESIGNED TO come in contact with the stop block on a daily basis.
MOUNTING THE C-ARM OR PICKUP CLAW TO THE LIFT

CAUTION
Make sure criss-crossed stitched area mounts between pins as shown.

Installation Notes
- Be sure to stop lift before the white stitched sight line on the lift belt enters the belt guide slot.
- Make sure criss-crossed stitched area mounts between pins as shown.

PICKUP CLAW
- white stitched sight line

DOCKING DEVICE INSTALLATION

1/2-13 x 5.5" LONG
GRADE 5 ASSEMBLY BOLT

INSTALLATION

INSTRUCTIONS:
[1] REMOVE SHROUD IF REQUIRED TO EXPOSE SEAT POST.
[2] ATTACH MOUNTING PLATE WELDMENT TO THE SEAT POST WITH HARDWARE PROVIDED. REPLACE PLASTIC SHROUD.
[3] USE TRIM PATTERN TO TRIM REAR SHROUD IF NECESSARY.
[4] INSTALL UPPER DEVICE ASSEMBLY AND CHECK CLEARANCES TO THE SEAT AND BAVEL MECHANISMS. IF REQUIRED, LOWER THE MOUNTING PLATE WELDMENT ON THE SEAT POST AND RE-SECURE HARDWARE.
[5] UNITS THAT HAVE THE POWER SEAT MOTOR TO THE FRONT OR BATTERIES THAT ARE SPACED VERY CLOSE TOGETHER NEAR THE POST WILL REQUIRE TRIMMING THE MOUNTING PLATE WELDMENT. THIS WILL ALSO REQUIRE TRIMMING THE UPPER DOCKING DEVICE ASSEMBLY IN THE VERTICAL TUBE. THE SHORTER 1/2" DIA. ASSEMBLY BOLT WILL BE USED.
[6] SECURELY TIGHTEN THE 10/2" DIA. ASSEMBLY BOLT FASTENING THE UPPER DEVICE ASSEMBLY. THIS IS A GRADE 5 BOLT AND MUST BE TIGHTENED UNTIL THE SPLC LOCK WASHER IS COMPRESSED FLAT.

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ELECTRICAL

ELECTRICAL HOOK-UP

Power is carried to the Control Box through a red wire [12 Volts (+)] and is terminated with an insulated push-on connector.

1.) Connecting electrical power to the unit:
   • ground the motor on the lift to the body of the vehicle, routing a 10 ga. power cable (red wire) from the vehicle’s battery to the control box location,
   • install an in-line fuse-holder at the battery,
   • make the electrical connections.

2. Position the control box inside the cab in a suitable location behind the driver’s seat (the floor is preferable). (For passenger-side applications, position the control box behind the passenger seat.)


4. To attach the ground wire, capture the ring terminal of the ground wire connector under the head of one of the #12X3/4” Phillips sheet metal screws and 1/4” external tooth washer.

5. Tighten the screw to secure the ring terminal.

RISK OF ELECTRIC SHOCK

To avoid electrical shock, disconnect the ground (-) cable at the battery. The ground post on the battery is usually identified by a (-) sign and the cable is usually black.

RISK OF ELECTRIC SHOCK

To avoid electrical shock, remove metal jewelry (rings, bracelets, watches, etc.) which might accidentally come in contact with an electrical component.

CONTROL BOX AND RELATED COMPONENTS
CONTROL BOX AND HARNESS EXTENSION INSTALLATION

1. Mark the hole location for the mounting flange and drill (2) 11/64" holes.

2. Secure the control box using (2) #12 x 3/4" sheet metal screws and (2) 1/4" external tooth lock washers, as shown.

   NOTE: Be sure to capture the ground lead between the screw head and the mounting strap to ensure a good ground connection for the lift.

3. Route the control harness extension, under the carpet, from the control box to bottom of pillar behind the driver seat.

4. Using the P-clip and sheet metal screw provided, attach the end of the control switch assembly to the bottom of the pillar behind the driver seat.

5. Connect the end of the control switch assembly to the control harness extension.

6. Plug the mating end of the extension into the control box assembly.

   cable clamp
   control switch assembly

MOTOR HARNESS INSTALLATION

1. Step drill (gradually increasing diameter) an 11/16" hole near the electrical box, for routing the motor cable.

2. Route the motor harness from the 11/16" hole in the cab to the 11/16" hole in the bed.

   NOTE: The male and female connectors must be installed after the motor harness is threaded through the hole in the bed of the pickup.

3. Using a rubber grommet, secure each end of the motor harness in the drilled holes.

4. Apply silicone sealant (or underbody coating) around the edge of the grommet on the motor harness.

WARNING

Before drilling mounting holes in the vehicle floor, thoroughly inspect the underside of the vehicle to be sure that the drill will not damage vehicle components (fuel tank, wiring, brake and fuel lines) when it penetrates the vehicle floor.

WARNING

RISK OF ELECTRIC SHOCK

To avoid electrical shock, disconnect the ground (-) cable at the battery. The ground post on the battery is usually identified by a (-) sign and the cable is usually black.
5. Using a 1/8" bit, drill pilot holes for the #10X3/4" sheet metal screws to secure the motor harness to the vehicle underbody.

6. Using the P-clips and #10X3/4" sheet metal screws provided, secure the motor harness to the vehicle underbody.

NOTE: Complete the remaining wiring before reconnecting the vehicle ground (-) cable.
ROUTING THE MAIN POWER LEAD

Routing the power wire will probably be the most challenging part of this procedure. It must be routed through the **INTERIOR** of the vehicle. **DO NOT** run the wire underneath the vehicle where it is very vulnerable to damage from road debris, corrosive road spray, moving mechanical or drive train components, and hot exhaust parts.

**INSTALLATION NOTES**

Routing the power wire will probably be the most challenging part of this procedure. It must be routed through the **INTERIOR** of the vehicle. **DO NOT** run the wire underneath the vehicle where it is very vulnerable to damage from road debris, corrosive road spray, moving mechanical or drive train components, and hot exhaust parts.

**WARNING**

The in-line fuse holder must be installed at the battery to ensure effective protection against short circuiting. **DO NOT** install the in-line fuse holder at the lift. Failure to observe this warning will leave the power wire unprotected, possibly resulting in damage to the vehicle and/or injury to the vehicle occupants.

**ELECTRICAL SYSTEM**

Power is carried to the lift through a red, 12-volt (+) wire terminated with an insulated, push-on connector. This connector also serves as a disconnect at the lift, allowing temporary removal of the lift without cutting and splicing wires.

Connecting electrical power to the lift consists of:

- grounding the lift to the body of the vehicle
- routing a power cable (red wire) from the vehicle battery to the control box
- inserting an in-line fuse at the battery
- routing motor wires from the control box to the lift.

The power (red) wire will be routed from the vehicle battery to the lift. Since the battery is usually located in the engine compartment, it will be necessary to route the wire through an opening in the firewall, into the passenger compartment, then to the control box located behind the driver's or passenger's seat.

Careful examination of the vehicle configuration will nearly always reveal an existing grommet in the fire wall through which the wire may be passed. If this is not the case, it may be necessary to drill a 3/16" hole through the fire-wall. Before drilling, check to be sure that the drill will not pierce any vital components under the dash (heater core, wiring etc.).

**IF YOU DRILL THROUGH THE FIRE WALL:**

- Install a grommet, or tape the wire where it passes through the hole to prevent chafing which could lead to a short circuit.
- Seal the hole with silicone sealer or underbody coating to prevent fumes from entering the passenger compartment.

**RISK OF ELECTRIC SHOCK**

To avoid electrical shock, **ALWAYS disconnect power to the lift before working on electrical wiring.**

**WARNING**

To avoid electrical shock, **ALWAYS disconnect power to the lift before working on electrical wiring.**
ELECTRICAL

ROUTING THE POWER LEAD

• Route the red power lead from the vehicle battery to the lift location.

BE SURE THAT THE POWER LEAD:

• does not become entangled around the side or under the mat or carpet;
• does not interfere with any under-dash components;
• does not drape where the driver’s feet might become entangled in the lead;
• does not contact hot engine components;
• is protected against rough metal edges and moving components.

• Using a blunt instrument such as a wooden paint stir stick, tuck the lead under the edge of sill plates or carpeting.

• Cut off the excess wire.
• Strip the wire.
• Attach an insulated push-on connector (provided) with an electrical crimping tool
• Connect this wire to the red lead from the control box. Be sure these two leads connect securely.
• Join the power cable to the in-line fuse with a butt connector.
• Connect the ring connector to the in-line (30 amp ATO-style) fuse.
• Secure the ring connector to the positive (+) battery terminal.
• Clean the ground (-) cable clamp and negative (-) battery terminal with a battery terminal brush.
• Remove the positive (+) battery cable clamp from the positive (+) battery terminal.
• Using a wire brush designed to clean battery connections, remove all traces of corrosion from the cable clamps and battery terminals (be sure to clean the inside of the clamp, and the surface of the battery post which contacts the clamp).
• Replace any badly corroded battery clamp bolts.
• Reconnect ground cable to battery.
• Recheck all electrical connections.

NOTE: Complete the remaining wiring before reconnecting the vehicle’s ground (-) cable.
joining power cable to "ATO" style 30-amp fuse and fuse holder
FINE TUNING

FITTING THE LIFT TO THE SCOOTER / WHEELCHAIR

1. Park the scooter or chair alongside the vehicle in the intended loading location.

2. Power the lift arm out over the scooter / wheelchair.

3. Fully lower the lift arm (use the switch which controls the Actuator, not the lift head motor).

4. Depress the DOWN switch (lift head motor control) to lower the lift belt enough to allow the C-arm or pickup claw to engage the docking device on the scooter / wheelchair.

5. Depress the UP switch (lift head motor control) to lift the scooter / wheelchair until the C-arm or pickup claw is approx. 2 inches below the belt guide (use the white stitched sight line on the belt).

6. Fully raise the lift arm (actuator control switch).

7. Carefully swing the lift in while checking to be sure that the scooter / wheelchair will clear the side of the pickup box.

8. With the scooter / wheelchair suspended over the side of the pickup box, measure the clearance between the top of the pickup box and the lowest part of the scooter/wheelchair. The ideal clearance is 2”.

9. Whenever the height of the vertical adjustment tube is changed, carefully repeat the above steps to ensure that the scooter / wheelchair will not contact the sides of the pickup box during loading and unloading.

10. When the height of the vertical adjustment tube is properly adjusted, tighten the self-locking nut on the bolt enough to keep it from vibrating loose, but not so tight that it will distort the swivel tube.

11. Power the lift fully IN, then DOWN to place the scooter or wheelchair in the pickup box.

12. Confirm correct placement in the pickup box.

Installation Notes
Before proceeding, make sure the circuit breaker is in the ON position.

Installation Notes
If the clearance exceeds the minimum, Bruno recommends that you swing the lift out, lower the scooter / wheelchair to the ground and adjust the height of the vertical adjustment tube to a lower setting.

Installation Notes
Be especially careful to check adjustment of the swivel stops. The lift should stop before the scooter / wheelchair contacts the pickup box or cab.
APPLICATIONS

Out-Rider® shown with Pow'r Topper™, Power Chair and Turny™

Out-Rider® shown with Manual Wheelchair
LOADING AND UNLOADING

LOADING

1. Open driver-side door.
2. Move scooter / wheelchair into transfer position.
3. Turn scooter off (lock the wheelchair wheels).
5. Raise the lift to a height that allows it to clear the side of the pickup.
6. Press the OUT switch (b).
7. Rotate the lift fully out to its stop position.
8. Pressing DOWN on the ARM switch, lower the arm completely down.
9. Pressing DOWN on the BELT switch (c), lower the docking device to the scooter / wheelchair.
10. Pressing UP on the BELT switch, raise the scooter / wheelchair to a height approx. 2" from the motor head. STOP WHEN THE WHITE STITCHED SIGHT LINE ON THE BELT REACHES THE BELT GUIDE.
11. Pressing UP on the ARM switch, raise the lift arm to raise the scooter / wheelchair to a height that will allow the unit being lifted to clear the side of the pickup.
12. Pressing the IN switch, guide the scooter / wheelchair with your hand has the unit swings over the side of the pickup.
13. Press DOWN on the ARM switch, lower the scooter / wheelchair to the bed of the pickup.

NOTE: If the scooter/wheelchair does not set firmly in place with the arm completely lowered, lower the belt until it does.

UNLOADING

1. Pressing UP on the BELT switch, raise the scooter / wheelchair to a height no closer than 2" from the motor head. STOP WHEN THE WHITE STITCHED SIGHT LINE ON THE BELT REACHES THE BELT GUIDE.
2. Pressing UP on the ARM switch, raise the lift arm to raise the scooter / wheelchair to a height that will allow it to clear the side of the pickup.
3. Pressing OUT switch, rotate the lift fully out to its stop position.
4. Pressing DOWN on the ARM switch, fully lower the lift arm to its stop point.
5. Pressing DOWN on the BELT switch, lower the scooter / wheelchair until it is in the transfer position.
6. Detach the C-arm or pickup claw from the docking device on the scooter / wheelchair.
7. Repeat steps 10, 11 and 12 of the LOADING procedure to return the lift to its position within the confines of the pickup bed.
8. Transfer from the pickup to the scooter / wheelchair.
9. Turn the scooter ON (release the wheelchair brake).
10. Close the pickup door. You're on your way!
# TROUBLESHOOTING

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift does not operate</td>
<td>1. ON/OFF switch is off</td>
<td>1. Be sure ON/OFF switch is on.</td>
</tr>
<tr>
<td>(neither in/out nor up/down)</td>
<td>2. Blown fuse.</td>
<td>2. Replace fuse.</td>
</tr>
<tr>
<td></td>
<td>3. Loose electrical connection</td>
<td>3. Verify connections with test lamp or voltmeter.</td>
</tr>
<tr>
<td></td>
<td>4. Vehicle’s battery is dead or battery cable clamps are defective or badly</td>
<td>4. Attempt to start vehicle or check battery and cable connections.</td>
</tr>
<tr>
<td></td>
<td>corroded</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> A battery with weak cells may have enough power to start a warm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>engine, but lack sustained power to run accessories.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Bad ground connection</td>
<td>5. Verify the connection with a continuity tester or multimeter.</td>
</tr>
<tr>
<td>Only one function operates:</td>
<td>1. Loose electrical connection</td>
<td>1. Unplug and replug connections. Check with test lamp or multimeter.</td>
</tr>
<tr>
<td>either in/out or up/down</td>
<td>2. Defective relay</td>
<td>2. Check with test lamp or multimeter.</td>
</tr>
<tr>
<td></td>
<td>3. Defective switch</td>
<td>3. Check with test lamp or multimeter.</td>
</tr>
<tr>
<td></td>
<td>4. Defective motor</td>
<td>4. Check for power at the motor with test lamp or multimeter.</td>
</tr>
<tr>
<td>Lift operates slowly,</td>
<td>1. Poor ground, salt corrosion on mounting bolts</td>
<td>1. Verify ground connection. Remove corrosion.</td>
</tr>
<tr>
<td>lacks power or stalls</td>
<td>2. Loose electrical connections</td>
<td>2. Unplug and replug connections. Check with test lamp or multimeter.</td>
</tr>
<tr>
<td></td>
<td>3. Weak vehicle battery</td>
<td>3. Check battery or operate engine at fast idle for several minutes</td>
</tr>
<tr>
<td></td>
<td>4. Loose or corroded battery cable clamps and terminals</td>
<td>4. Remove clamps from terminals, clean clamps and terminals thoroughly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with a suitable tool and reinstall.</td>
</tr>
</tbody>
</table>
## Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Defective motor or worn gears.</td>
<td>2. Replace offending motor.</td>
</tr>
<tr>
<td>Outer arm squeals up/down</td>
<td>1. Worn outer arm bearings</td>
<td>1. Replace outer arm.</td>
</tr>
<tr>
<td>Belt is frayed</td>
<td>1. Twisted belt or sharp edges on belt guide</td>
<td>1. Check belt guide for sharp belt guide edges. Deburr or replace guide. Replace belt.</td>
</tr>
<tr>
<td>Lift makes scraping or grinding noises when swiveled in/out</td>
<td>1. Foreign matter in swivel tube and bearings</td>
<td>1. Have dealer disassemble lift, clean swivel tube and bearings, and perform preventive maintenance.</td>
</tr>
<tr>
<td>Lift functions are reversed (belt goes down when UP switch is pressed, and up when DOWN switch is pressed)</td>
<td>1. Lift has been run down too far, causing belt to wrap backwards around spool.</td>
<td>1. Run lift down until belt wraps. correctly around spool.</td>
</tr>
<tr>
<td>Swing motor functions, but arm does not swing in or out</td>
<td>1. Sheared roll pin attaching sprocket to drive sprocket weldment</td>
<td>1. Drill hole to 3/16&quot;. Insert 3/16&quot; roll pin.</td>
</tr>
<tr>
<td>NOTE: This problem most likely occurs because the IN or OUT switch continues to be depressed too long after the lift has stopped its rotation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lift swings in and out with difficulty</td>
<td>1. Excessive friction is causing motor to struggle</td>
<td>1. Spray silicone-base lubricant on swing areas.</td>
</tr>
</tbody>
</table>
In the event of a power failure:

- Push the red handled spring lock near the drive tube.
- Manually rotate the lift in or out, as needed.
- When the lift is in the desired position, secure it using a bungee cord or rope.

After power is restored, rotate the lift until the spring lock engages. The lift can then be rotated using power rotation.

CAUTION

Failure to properly secure the lift may cause the lift to strike the body of the vehicle when the vehicle is in motion.
BASE ASSEMBLY COMPONENTS (VSL-600/670/690/PUL-1100)

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>QTY</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>BUS-30001</td>
<td>SWIVEL BUSHING (BOTTOM)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>BUS-30002</td>
<td>SWIVEL BUSHING (TOP)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>HSL-38006</td>
<td>3/8-16 X 1 1/2&quot; LG HEX HEAD CAP SCREW</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>NS-50001</td>
<td>1/4-20 X 3/8&quot; LG SLOTTED BINDER HEAD NYLON MACHINE SCREW</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>NPL-3111</td>
<td>5/16-18 HEX NUT (PLATED)</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>NSN-36191</td>
<td>3/8-16 NYLON INSERT LOCK NUT</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>SSS-31301</td>
<td>9/16-18 X 1 3/4 LG SET SCREW</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>VSL-60154</td>
<td>CHAIN TENSIONER ASSEMBLY</td>
</tr>
</tbody>
</table>

BASE WELDMENT FOR VISUAL PURPOSES ONLY. NOT INCLUDED IN BOM.
SUB BASE MOUNTING KIT

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>QTY</th>
<th>PART NO</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>STL-0046</td>
<td>SUPPORT WASHER</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>ETW-31001</td>
<td>5/16&quot; EXTERNAL TOOTH WASHER</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>FHC-31802</td>
<td>5/16-18 X 2&quot; LG FULL THREAD HEX HEAD CAP SCREW</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>FRW-31001</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>FSW-31001</td>
<td>9/16&quot; FLAT WASHER</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>NPL-31181</td>
<td>5/16-18 HEX NUT (PLATED)</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>SBC-02901</td>
<td>1/4&quot; SPACER PLATE</td>
</tr>
</tbody>
</table>

BASE WELDMENT SHOWN FOR VISUAL PURPOSES ONLY. NOT INCLUDED IN BOM

NOTE:
1. 1/4" SPACER PLATE (7) SHOULD BE POSITIONED AS SHOWN PRIOR TO FASTENING BASE INTO VEHICLE.

VSL-K-550
REV. 5 (2182)(11-9-01)(JEJ)
ATTACH CLAMPING CLAWS TO LIFT BELT

1. FISH LIFT BELT AROUND CENTER BELT GUIDE PIN
2. ASSEMBLE LOOP TO LEFT BELT GUIDE PIN AND SECURE PINS WITH 1/4" PUSH PINS.

NOTE: ATTACH LIFT BELT USING 1/4" PUSH PINS AS SHOWN IN ILLUSTRATION.
ONE YEAR LIMITED WARRANTY
for
Bruno Vehicle Lift

Bruno Independent Living Aids, Inc. ("Bruno"), warrants to the original purchaser of a Bruno Vehicle Lift that the Bruno Vehicle Lift is free from defects in material and workmanship for a period of one year from date of purchase.

The exclusive remedy for a defect in a Bruno Vehicle Lift shall be the repair or replacement, at the option of Bruno, of the defective part or component. After the first 30 days of this warranty, only parts and components are covered. This warranty does not cover labor and other services after the initial 30 days. If repair or replacement of a Bruno Vehicle Lift is not commercially practical or cannot be timely made, Bruno may elect to refund the purchase price of the Bruno Vehicle Lift instead of repairing or replacing the Bruno Vehicle Lift.

IN NO EVENT SHALL BRUNO BE RESPONSIBLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER SUCH DAMAGES ARISE FROM CLAIMS BASED ON CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR PRODUCT LIABILITY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

ALL IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN THEIR DURATION TO THE LENGTH OF THE WARRANTY STATED ABOVE FOR THE AFFECTED COMPONENT. Some states do not allow limitations on how long an implied warranty lasts so the above limitation may not apply to you.

To obtain warranty service, you must follow these procedures:

1. Obtain return authorization by calling your local Bruno dealer or Bruno at 1-800-882-8768;
2. Return the Bruno Vehicle Lift, freight prepaid, to the address provided by your Bruno dealer or Bruno with proof of purchase indicating the date purchased.

Bruno will pay for shipping back to the purchaser within the continental United States and Canada if a defect in material or workmanship is discovered. Return freight and repair charges will be the responsibility of the purchaser if the problem is not covered by warranty.

This warranty does not cover damage or failure caused by misuse, abuse, accidents, physical damage, modifications not made by Bruno, damage in shipment, or repairs undertaken by anyone other than Bruno factory employees or authorized distributors. The original purchaser of a Bruno Vehicle Lift that is leased or rented shall be the person or entity acting as the lessee or rental provider.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Bruno specifically does not authorize any person to extend the time or scope of this warranty.

For further information regarding this limited warranty, please contact Bruno by calling 1-800-882-8768 or writing to Bruno at the following address:

Bruno Independent Living Aids, Inc.
Attention: Service Department
Post Office Box 84
Oconomowoc, WI 53066