

# SERVICE MANUAL

## MINI-LINELAYER



**BELL+HOWELL**  
Mail and Messaging  
Technologies

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## Overview

The Mini-Linelayer is used for applying fluorescent guidepaths for Mailmobile vehicles. It applies a 3/4 inch wide line to both carpeted and hard surface floors during a new vehicle installation or a line refresh. The Mini-Linelayer uses two peristaltic positive displacement pumps, driven by the front wheels, to supply a metered amount of fluid to the floor surface. Two pumps are used in the Mini-Linelayer to allow the different flow rates required for applying guidepath fluid to hard or carpeted floors. Guidepath fluid is applied at the following rates:

Type of Surface	Application Rate
Hard Surface	0.6ml/foot
Carpet	1.2ml/foot

Since each pump delivers 0.6ml/foot, one pump is used on hard surface floors, and both pumps are used on carpet.

### Note:

The Mini-Linelayer depends on the design and specifications of the pump, tubing, and front wheels to give the above application rates. Proper replacement parts are required to insure that the application rate is maintained.

When used on carpet, both pumps deliver the fluid to a foam brush which transfers the fluid to the right front wheel, which then transfers the fluid to the carpet. On a hard surface floor, a single pump delivers the fluid to a foam brush that is in direct contact with the floor.

A battery powered black light box and hood, which attaches to the front of the unit, is used for line refreshing. The black light illuminates the guidepath. The hood allows operation in brightly lit areas.

References to right, left, front, or rear are relative to a person standing directly behind and facing the Mini-Linelayer.

## Assembly

The battery for the black light should be charged overnight (10 to 12 hours) prior to use, using the supplied battery charger. Two types of battery chargers have been supplied with the Mini-Linelayer. If the charger is labeled as a “float” type charger, it will not overcharge the battery and may be left on for extended periods of time. If the charger supplied is not a float charger, the battery should only be left on the charger overnight.

## Handle

1. Place the upper handle into the lower handle, and fasten it with the supplied thumbscrew.
2. Fit the lower handle into the space between the box, axle spacer and support channels. Fasten to the chassis with the supplied thumbscrew.

## Pumps

### Note:

The Mini-Linelayer should be stored with the hoses removed from the pumps. If the hoses are not removed during storage, they will develop flat spots, which reduce the flow of guidepath fluid and require replacement.

1. Remove the Mini-Linelayer top cover.
2. If attached, remove the front wheel(s) fastened to the pump shaft. For use on hard surfaces, install a hose only in the pump on the right. For use on carpeted surfaces, install hoses in both pumps.
3. Loosen the four thumbscrews holding the pump to the Mini-Linelayer chassis and remove the pump.
4. Lay the pump on a work surface with the drive shaft pointing up. Slide one half of the pump housing off the shaft by lifting straight up, exposing the rotor holding the rollers.

### Notes:

The shaft contains two plastic washers located between the side of the rotor and the bearing in each housing. Make sure the washers are in place on each side of the rotor when the pump is assembled. See the pump drawing on the next page for washer location.

The pump does not need to be lubricated to operate properly. However, the addition of a **very small** amount of lubricant will make assembly easier.

Inspect the hose to be installed. If it has started to flatten out, as shown in Figure 1, it will not allow proper flow through the pump, and should be replaced.



New  
Hose

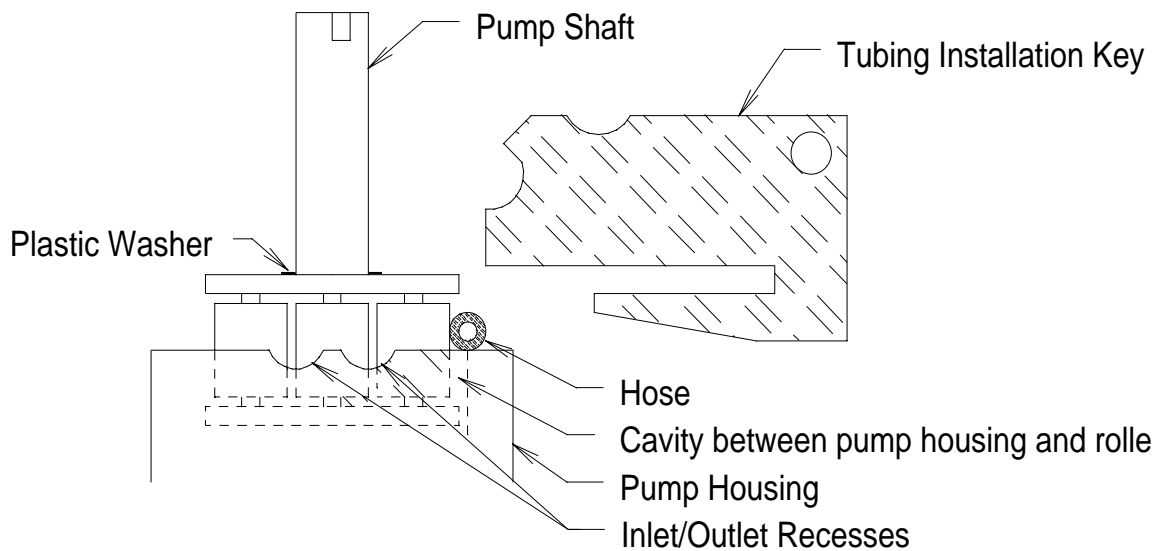


Hose in need  
of replacement

**Figure 1**

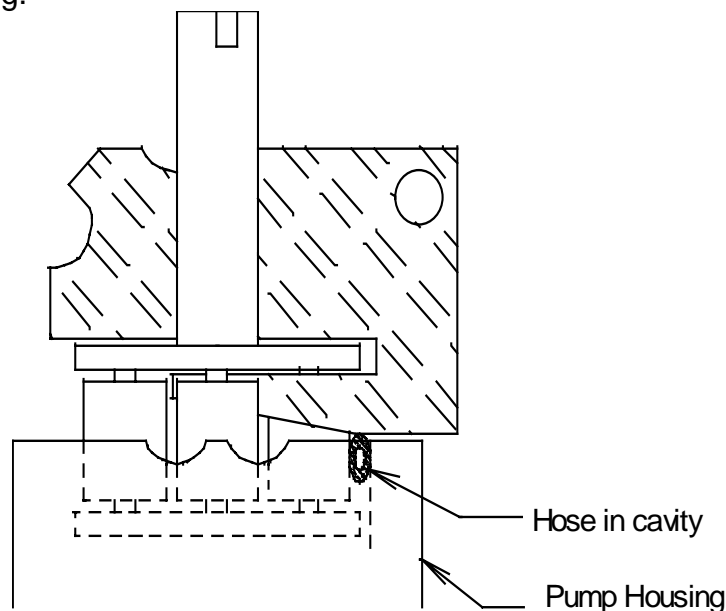
5. Remove the plastic washer from the rotor to prevent damage during hose installation. Rotate the rotor so that one of the rollers is between the inlet and outlet recesses in the head.

6. Drape the tubing over the rollers of the pump rotor, holding the hose in the inlet/outlet recesses. Place the tubing so the short (outlet) end extends 10" to the right on the right pump, and 14" to the left on the left pump.



**Figure 2**

7. Slide the slot of the tubing installation key over the rotor housing. Turn the key and rotor housing while holding the pump housing. This will slide the tubing between the rollers and pump housing.



**Figure 3**

9. While holding the hose in place, remove the hose installation key, replace the plastic washer (removed in step 6) on the pump shaft, and replace the pump housing. Make sure

the two pump housing halves close completely. Turn the shaft with the hose installation key or a screw driver to verify that the pump operates properly.

**Note:**

To verify that the hose is not pinched between the pump halves, hold the pump housing and pull one end of the hose. The hose should pull through the pump. Pull about 2 inches of hose through the pump, then pull it back.

10. Using the four mounting screws, fasten the pump to the Mini-Linelayer chassis. The screws only need to be finger tight. **Do not over-tighten.**
11. For use on a carpeted surfaces, repeat for the left pump.

**Front Wheels**

Knobs on each wheel are provided for hand priming the system. Turn the knobs forward to prime the system with guidepath fluid. Turn the knobs backwards to clear the system at the end of lines.

1. Slide the left front wheel, if removed, onto the pump shaft. Fasten the wheel's set screw with a 5/32" Allen wrench. The set screw should contact the flat part of the pump shaft. Do not push the wheel on so far that it comes in contact with the Mini-Linelayer chassis.

**Note:**

When operating the Mini-Linelayer, carry a 5/32" Allen wrench in case a wheel works loose.

2. For use on a carpeted floors, repeat step 1 for the right front wheel.
3. For use on a hard surface floors, slide the right front wheel onto the pump shaft, leaving a 3/8 to 1/2 inch space between the chassis and the wheel mounting collar. This space is for the brush holder. Fasten the set screw with a 5/32" Allen wrench.



## Black Light and Hood Assembly

The black light and hood assembly attaches to the Mini-Linelayer for guideway inspection and refreshment. A fully charged battery powers the two 6 watt black light bulbs in the assembly for several hours.

1. Mount the black light assembly to the hinge on the front of the Mini-Linelayer chassis using the supplied pin.
2. Pull the end of the hood over the front of the light assembly. Press the Velcro strips on the hood onto the Velcro strips on the front of the light assembly.
3. Locate the hood support rod, and insert the ends into the holes provided in the light assembly.
4. Connect the Mini-Linelayer internal power harness to the battery. Note polarity when connecting the battery: black wire to negative and red wire to positive.
5. Connect the black light assembly phone plug to the jack on the Mini-Linelayer chassis.

### Troubleshooting:

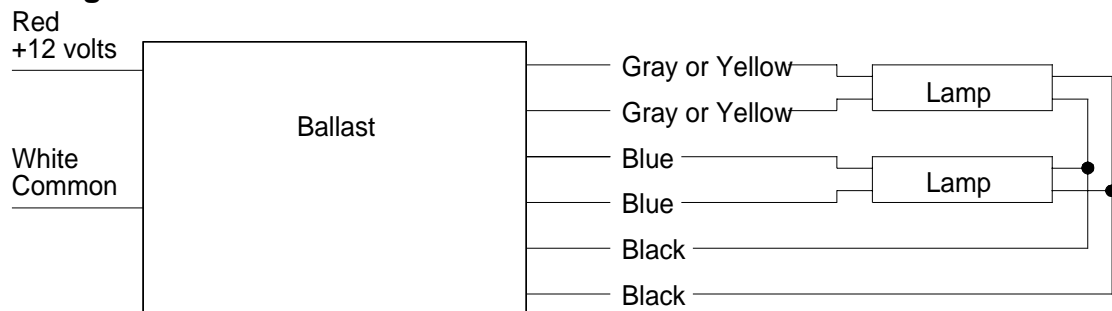
If both lamps do not light:

- Check battery voltage. It should be above 12.0 volts.
- Check the connections to the battery for proper polarity.
- Check to make sure the bulbs are properly seated.
- If the battery is low but recently charged, check the charger output. Proper open circuit voltage is approximately 14.0 volts (float type charger only).

If only one lamp lights:

- Check connections to the lamp.
- Switch the lamps from one holder to the other to see if the problem is in the lamp or the holder.
- Check battery voltage.

### Lamp wiring



**Figure 4**

The red wire from the ballast is connected to the red battery wire. The white wire from the ballast is connected to the black battery wire.

## Brush Assembly, Carpet

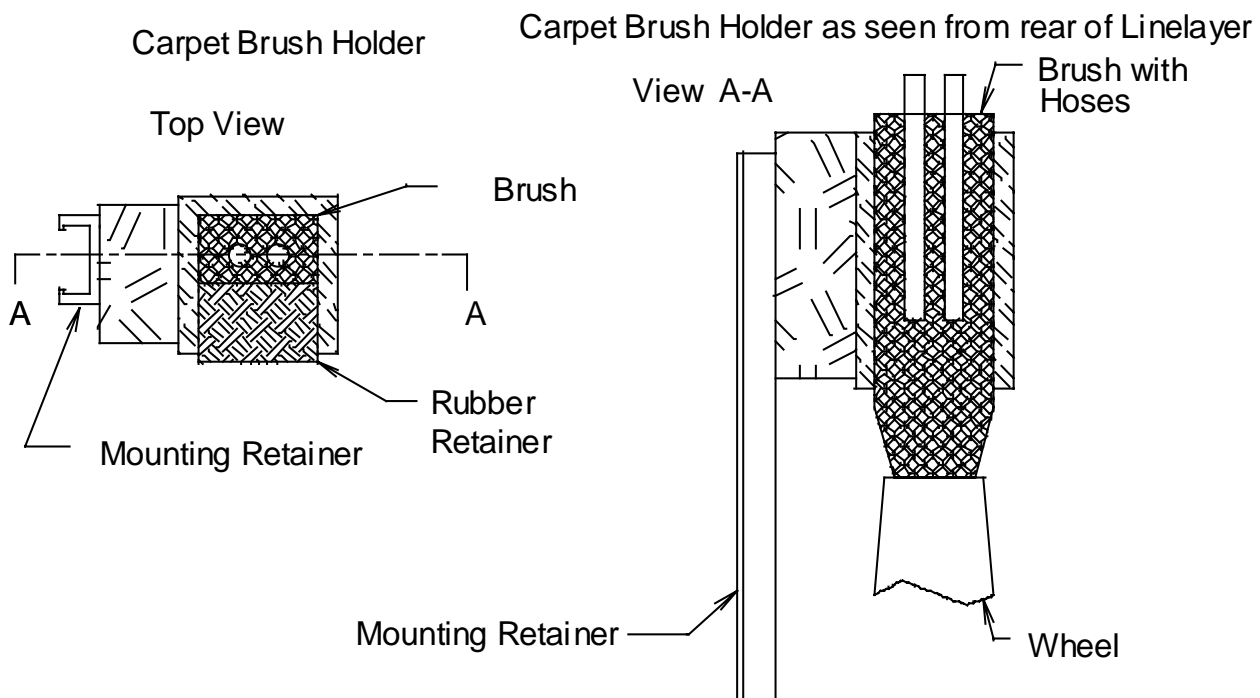
For laying guidepaths on carpet, a brush applies guidepath fluid to the right front wheel, which then transfers the fluid to the carpet. In this application, both pumps deliver fluid to the brush.

1. Slide the carpet brush holder into the two plastic trim strip retainers on the Mini-Linelayer chassis located by the right front wheel. The bottom of the holder should be about 1/2 inch to 3/4 inches above the wheel.
2. Make sure the wheel is centered under the brush holder. Adjust as required by moving the wheel in or out.

### Note:

When operating the Mini-Linelayer, carry a 5/32" Allen wrench in case a wheel works loose.

3. Carefully work the outlet hoses from both pumps into the applicator brush. Make sure both tubes are inserted into the brush at least 1 1/4 inches.
4. Press the applicator brush/tube assembly into the brush holder until the tip of the brush contacts on the surface of the Mini-Linelayer right front wheel. If the brush is pushed down too hard, the fluid will run down the sides of the wheel creating a wide blotchy line. If the brush is not pushed down sufficiently hard, fluid will only be deposited on the center of the wheel creating a thin wavy line.



**Figure 5**

5. Slide the foam rubber block into the holder to hold the applicator brush. The foam rubber block should not press tightly against the brush, but it should just provide sufficient friction to hold it in place.
6. Shake the guidepath fluid bottles to suspend precipitated material. Check the expiration date on the fluid bottles.
7. Place the guidepath fluid bottle(s) in the wells of the Mini-Linelayer, then insert the inlet tubes from each pump into the bottle(s).
8. Prime the system by spinning each wheel until fluid begins to enter the applicator brush. Once the entire surface of the wheel is wet, start laying line.
9. At the end of the line, spin the front wheels backwards to stop fluid delivery to the applicator brush. Use a paper towel or cloth to clean the right front wheel and brush holder, being careful not to drip any fluid on the floor. Use a damp sponge to clean up drips.
10. Remove the tubing from the pumps, flush the hoses, and clean the brush with water.

**Tip:**

To change from carpet to hard surface fluid, you do not need to remove the hoses from the pumps. Flush the hoses by pumping from a bottle filled with clean water to an empty bottle. Once the water coming out of the hoses is clean, remove the hoses from the clean water bottle and continue to pump air until the water is purged from the hoses. You can switch fluids safely now.

11. Clean the rolling surface and sides of the right front wheel with water to prevent any building up of guidepath fluid. If fluid is allowed to build up on the wheel, it will not produce a clean guidepath edge.

## Brush Assembly, Hard Surface

When laying guidepath on a hard surface, the applicator brush contacts the floor directly. In this application, only the right pump is used to deliver fluid to the brush.

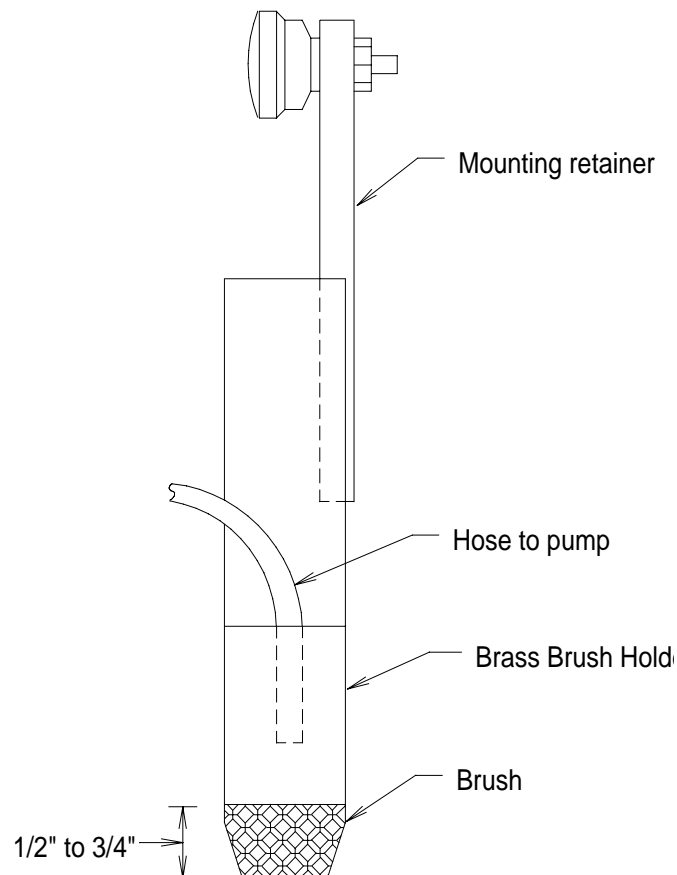
1. Place and secure the right front wheel about 1/2 inch from the Mini-Linelayer chassis.

**Note:**

When operating the Mini-Linelayer, carry a 5/32" Allen wrench in case a wheel works loose.

2. Carefully work the outlet hose from the right pump into the applicator brush. Make sure the tube has been inserted into the brush at least 1 1/4 inches.
3. Slide the applicator brush/tube assembly into the brush holder so the tip of the brush protrudes about 1/2 to 3/4 inch from the brush holder.

Hard Surface brush holder viewed from front of Mini-Linelayer



**Figure 6**

4. Slide the hard surface brush holder into the two plastic trim strip retainers on the chassis near the right front wheel.
5. Position the right front wheel on the pump shaft to leave space for the brush holder. Fasten the set screw with a 5/32" Allen wrench. The set screw should contact the flat part of the pump shaft.
6. Adjust the brush holder so the tip of the brush just touches the floor, then lower an additional 1/4 inch.

**Note:**

If the brush is pressed down on the floor surface too hard, the fluid will not be spread evenly, being too thin in the center and too thick on the edges. If the brush is pressed too lightly, fluid will puddle in the center and not flow out to the full 3/4 inch width.

7. Shake the guidepath fluid bottle to suspend precipitated material. Check the expiration date on the fluid bottle.
8. Place the guidepath fluid bottle in the right-side well of the Mini-Linelayer, then insert the inlet tube from the pump into the bottle.
9. Prime the system by spinning the wheel until fluid begins to enter the applicator brush. Once the entire surface of the brush is wet, start laying line.
10. At the end of the line, spin the front wheel backwards to stop fluid delivery to the applicator brush. Use a paper towel or cloth to clean up excess fluid on the brush holder, being careful not to drip any fluid on the floor. Use a damp sponge to clean up drips.
11. Remove the tubing from the pump, flush the hose, and clean the brush with water.

**Tip:**

To change from hard surface to carpet fluid, you do not need to remove the hose from the pump. Flush the hose by pumping from a bottle filled with clean water to an empty bottle. Once the water coming out of the hose is clean, remove the hose from the clean water bottle and continue to pump air until the water is purged from the hose. You can switch fluids safely now.

12. Clean the rolling surface and sides of the right front wheel with water to prevent any building up of guidepath fluid. If fluid is allowed to build up on the wheel, it will not produce a clean guidepath edge.

## Brush Assemblies EXP1054 for Carpet and Hard Surfaces

The two brush assemblies and #7014 pump are not supplied with the Mini-Linelayer and must be ordered if EXP1054 is used.

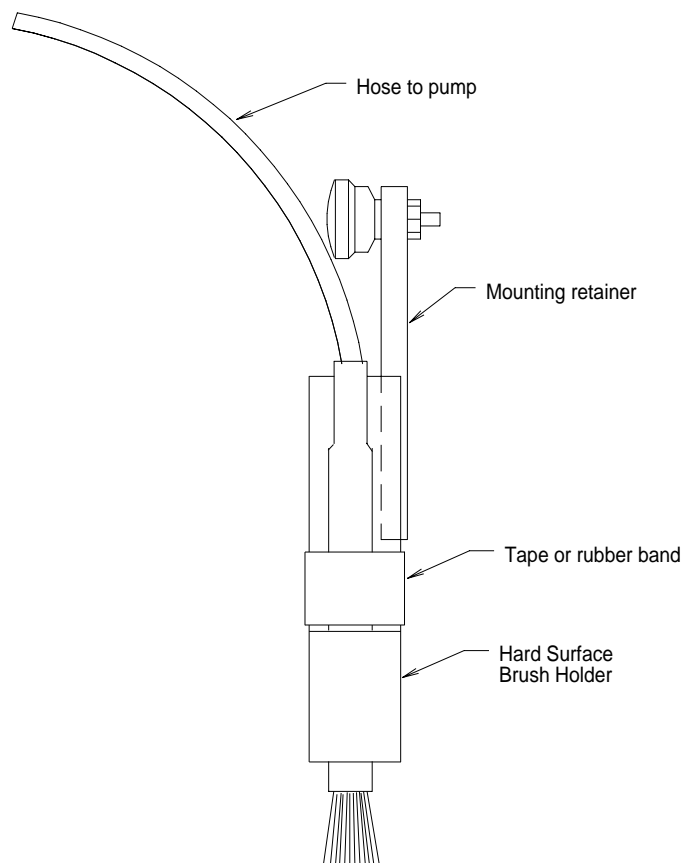
The EXP1054 applicator brush contacts the floor directly for use on both hard surface and carpet. Only the right-side pump is used. The hard surface applicator requires a #7014 pump, replacing the #7016 pump supplied with the Mini-Linelayer. The carpet applicator uses the standard #7016 pump.

1. Install the hose from the brush assembly into the pump.
2. Install the pump into the right side of the Mini-Linelayer. Position the right front wheel about 1/2 inch from the Mini-Linelayer chassis.

**Note:**

When operating the Mini-Linelayer, carry a 5/32" Allen wrench in case a wheel works loose.

3. Attach the EXP1054 brush assembly to the hard surface brush holder (see Figure 7).



**Figure 7**

4. Slide the hard surface brush holder into the two plastic trim strip retainers on the chassis near the right front wheel.
5. Adjust the space between the right front wheel and the pump, leaving space for the brush holder. Fasten the wheel's set screw with a 5/32" Allen wrench. The set screw should contact the flat part of the pump shaft.
6. Adjust the brush holder so the tip of the brush just touches the floor, and then lower an additional 1/8 inch.

**Note:**

If the brush presses down on the floor surface too hard, the fluid will not spread evenly, being too thin in the center and too thick on the edges. If the brush presses too lightly, fluid will puddle in the center and not flow out to the full 3/4 inch width.

7. Shake the guidepath fluid bottle to suspend precipitated material. Check the expiration date on the fluid bottle.
8. Place the guidepath fluid bottle in the right-side well of the Mini-Linelayer, then insert the inlet tube from the pump into the bottle.
9. Prime the system by spinning the wheel until fluid begins to enter the applicator brush. Once the entire surface of the brush is wet, start laying line.
10. At the end of the line, spin the front wheels backwards to stop fluid delivery to the applicator brush. Use a paper towel or cloth to clean the right front wheel and brush holder, being careful not to drip any fluid on the floor. Use a damp sponge to clean up drips.
11. Flush the hose and brush with water until clean.

**Note:**

Be sure to flush the hose and brush after each use. The hard surface brush assembly hose is made of Viton, and will swell if left in the guidepath fluid for an extended time. Once the tubing has been removed from the guidepath fluid, it will return to its normal shape.

## Maintenance

After each use:

1. Remove hoses from the pumps. Flush hoses and brushes with clean water.
2. Remove spilled guidepath fluid from the Mini-Linelayer with clean water.
3. Clean the wheels with clean water.
4. Charge the battery. For float type chargers, the charger may be left on indefinitely. The battery is charged when charge current drops to approximately 100mA. For conventional chargers, charge battery overnight (10 to 12 hours).
5. Check the voltage of the battery after each use. If a fully charged battery drops below 12.0 volts at the end of use, replace the battery.

Periodically:

1. Replace the hoses when they show signs of flattening (see Figure 1).
2. Replace the front wheels if the rubber tires show signs of coming apart.
3. Inspect the battery and black light cables for cuts or signs of fraying. Replace as required.
4. Replace the black light bulbs as required.
5. Over time the plastic trim strip retaining clips will wear and not hold the brush holder securely. When this happens, rotate the clips about 45° so the brush holder contacts an unused part of the retainer. After having been rotated several times, the retainers will require replacement.
6. Add a drop of light oil to each rear wheel bearing to keep the wheels spinning freely.



## Parts List

Part #	Description	QTY
7026956	Pump, Peristaltic #7016	2
7026982	Tubing, Flexible Tygon #16 x 45"	2
7026949	Battery, Gel Cell, 12V 10AH	1
7027059	Battery Charger	1
7028938	Internal Battery Harness	1
7027960	Connector, Phone Jack	1
7026370	Connector, Slip-on	2
7029344	Cable	13"
7027304	Retainer, Trim Strip (Brush holder)	2
7025845	Screw, Pan Head 10-32 x 3/8 (Brush holder)	2
7027963	Wheel, Rear, Linelayer	2
7027961	Nut, Push On Cap (for rear wheel)	2
7028802	Front Wheel Assy (with knob)	2
7026952	Knob, Assy (for Front Wheel Assy)	1
7025863	Screw, Set (for Front Wheel Assy)	1
7028805	Handle Assembly	1
7027955	Handle, Lower Half	1
7027956	Handle, Upper Half	1
7026985	Knob w/1/2" 1/4-20 Stud (attaches lower half to upper)	1
7027964	Grip, Foam	1
7027969	Cap, Plastic (for Upper handle half)	1
7026953	Knob (attaches handle to chassis)	1
7028804	Black Light Assembly	1
7027033	Ballast, Dual 12V	1
7027035	UV Bulb	2
7027959	Connector, Phone Plug	1
7027967	Hood, Black Cloth	1
7027009	Wire, Guide	1
7027952	Faspin (to hold light assy to chassis)	1
7028806	Brush Assy, Carpet	1
7027715	Brush, .75" wide	1
7029420	1.25" Foam Rubber (brush holder)	1.25"
7028807	Brush Assy, Hard Surface	1
7027715	Brush, .75" wide	1
7027071	Marker, Wet Line	AR
	<b>Optional Applicators &amp; pump for EXP1054</b>	
7028881	Brush Assy, EXP1054 Carpet	
7028882	Brush Assy. EXP1054 Hard (requires #7014 pump)	
7026954	Pump, Peristaltic #7014 (for hard surface applicator)	

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