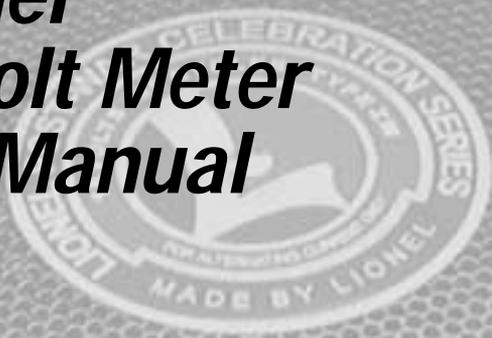


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***Lionel  
ZW Amp/Volt Meter  
Owner's Manual***



**C**ongratulations on purchasing the Lionel ZW amp/volt meter. With the addition of this unit to your ZW power supply or controller, you can now monitor the

voltage and current used on your layout with digital accuracy. Please check the contents of your package to ensure you have the following items;

<b>Volt/amp meter unit</b>	<b>1</b>
<b>Black phillips pan head screws- 1"</b>	<b>2</b>
<b>Silver hexagonal binding post extensions- 1 5/16"</b>	<b>4</b>
<b>Black insulated binding post cap nuts</b>	<b>4</b>
<b>Service Center List</b>	<b>1</b>
<b>Warranty Card</b>	<b>1</b>

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## INSTALLATION:

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Before you begin installing your new meter to the ZW be certain that power is switched off. Be certain to unplug the ZW from the wall outlet. For new ZW controllers, be sure you switch off and unplug all Power House units supplying your controller.

1. Remove the wires between the ZW and your track and accessories. To simplify installation, you might wish to label each wire before removing it from its binding post.
2. Now you are ready to install the meter. First, completely remove the two screws located on the top of the ZW case at the rear corners. Save these screws in case you ever decide to remove the meter from the ZW. Now remove all the binding post thumb screws and set them aside. If you have a new ZW, you must also remove the nuts from the top row of binding posts.
3. Unpack the meter and place it on the back of the ZW. The upper binding posts on the ZW will align with the holes at the bottom of the meter case. The two holes near the meter screen on the curved surface will align with the screw holes on the top of the ZW case.

Locate the (2) long black phillips head screws included in the screw package that came with your meter and install them into the holes on the curved top of the meter and into the top of the ZW. Tighten these screws taking care to make sure the binding posts pass

through the holes in the bottom of the meter case. If you have a new ZW controller, be sure the reset pin enters the reset hole in the back of the controller case.

4. In the package of screws included with your new meter, locate the four black binding post caps. Insert one cap through each hole in the back of the meter case and tighten to a snug fit. CAUTION: DO NOT OVERTIGHTEN THESE SCREWS. "FINGER TIGHT" IS SUFFICIENT.

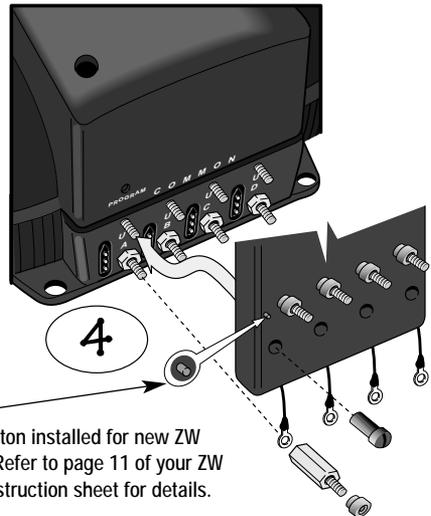
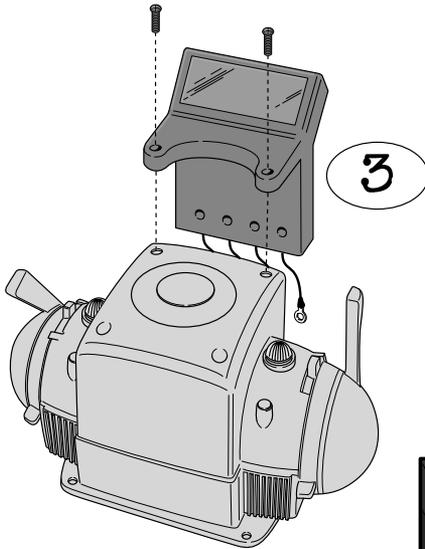
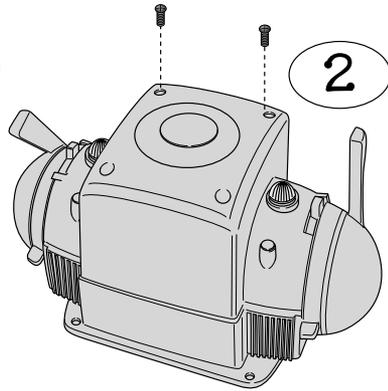
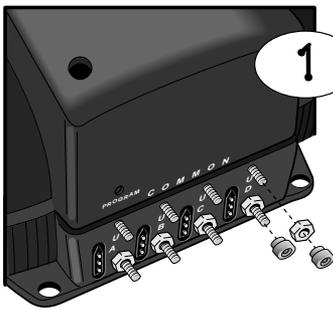
There are four wires with circular terminals that extend from the bottom of the meter case. Place each terminal over their respective binding post. Follow the illustration (on page 4) and be sure no wires are crossed. Now locate the four silver hexagonal binding post extensions included in your accessory package.

Thread one extension on each of the four lower binding posts on the back of the ZW (see illustrationa on page 4). As you tighten these, be sure that the wires from the meter are not being pulled or pinched.

5. Now replace the binding post nuts you removed earlier on all the exposed posts. Return your ZW to your layout and reconnect the wires to the track. These connections will be identical to what you had before.

You are now ready to restore power to your ZW and run trains with your new Amp/Volt Meter!

# INSTALLATION: (Continued)



## OPERATION:

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There is no on/ off switch for your new meter. As soon as you apply power to any output on the ZW, the display will turn on. There is one display for each output on the ZW. The top row shows how much voltage is applied to each output. This display will be on as long as any of the four control handles is set above zero. The bottom row shows the current draw for each output. These numbers are only visible if there is a current draw from the output posts on the ZW. Both displays are constantly updated to reflect changes in the power being used from each control.

Once the display turns on, the top row will remain on, even if all control handles are off. After about 1 minute, the display will automatically shut off unless power is applied to any of the four outputs. Just before the meter shuts off, the top row will

flash the word "OFF". To turn it back on just move any control handle off of zero.

There is a rechargeable battery installed inside the meter. This battery will be charged any time more than 9 Volts is supplied from any output.

With a low battery while running only one channel on the ZW, the readings from the amp/volt meter may be inaccurate. Either recharge the battery or advance one of the other channels above 9 volts.

**NOTE:** If you have a new ZW, and need to reset the controller for any reason, simply press the small button on the lower left corner of the meter, just above the binding posts. To calibrate the controller or change the ID numbers, refer to your ZW instructions.

## CURRENT AND VOLTAGE:

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The meter measures both current and voltage. Voltage can be thought of as the amount of electricity passing to the train. Current is the force with which it is moving. Under normal operating conditions you will only see small fluctuations in voltage and current. As you add more cars with lights, more engines and more sound cars to a track powered with the ZW, you will see an increase in current. The voltage setting roughly corresponds to the speed your engine is running.

If you notice drastic changes in voltage or current while running your engine, this may indicate dirty track or a problem with the locomotive, cars or wiring. After a time, you will be able to determine what normal operating conditions are for various engines, and trains on your layout.

## MAINTAINENCE:

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You may need to clean the lens of the meter periodically. We recommend using a clean, soft, damp rag. A small amount of cleaner for eyeglasses with plastic lenses may be used if desired.

Over time, the display may begin to shut off quickly after all the handles of the ZW are moved to zero. This is caused by a dis-

charged battery in the meter. To charge the battery, dial any of the four control handles up above 9 volts. Be sure to remove any engines and cars from your track that will be powered by the handle you use. Leave the ZW on for several hours to ensure a full charge.

## Replacing Battery

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If you operate your ZW meter at low voltage for extended times without fully charging the internal battery, the battery may develop a "memory" and refuse to retain a charge. If after repeated charge and discharge cycles it still will not operate properly, the battery may need replacement.

1. Turn off all power to the ZW and unplug from the wall. Remove the meter from the ZW. Remove the 8 screws from the back of the meter.
2. Carefully open the case and unplug the 9V battery. Be careful not to touch the components on the circuit board. They are static sensitive.
3. Remove the battery from the case. It is held by a dot of glue.
4. Replace the battery with a rechargeable Ni-cad 9V 160mAH battery. **USE ONLY RECHARGEABLE BATTERIES. REGULAR ALKALINE BATTERIES MAY LEAK OR EXPLODE IF USED IN THIS METER!** Plug the battery into the 9V connector.
5. Replace the cover over the circuit board and battery. Be sure to replace the Program/Reset pin on meters for the new ZW. The 4 longer screws with the smaller head are used at the holes behind the digital meter screen.

## Limited Warranty/Lionel Service

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**T**his Lionel product, including all mechanical and electrical components, moving parts, motors and structural components, except for light bulbs, is warranted to the original consumer-purchaser, for one year against original defects in materials or workmanship when purchased through an authorized Lionel dealer.

This warranty does NOT cover normal wear and tear, light bulbs, defects appearing in the course of commercial use, or damage resulting from abuse or misuse of the product by the purchaser. Transfer of this product by the original consumer-purchaser to another person voids this warranty. Modification of this product voids this warranty.

Any warranted product which is defective in original materials or workmanship and is delivered by the original consumer-purchaser to Lionel L.L.C. or an authorized Lionel L.L.C. Service Station, together with proof of original purchase will, at the option of Lionel L.L.C., be repaired or replaced, without charge for parts or labor. In the event the defective product cannot be repaired, and a replacement is not available, a refund of the original purchase price will be granted. Any products on which warranty service is sought must be sent freight or postage prepaid, as transportation and shipping charges are not covered by the warranty.

### In no event shall Lionel L.L.C. be liable for incidental or consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This limited warranty gives you specific legal rights, and you may have other rights which vary from state to state.

### Instructions for Obtaining Service

If service for this Lionel L.L.C. product is required, bring the item, along with your dated

sales receipt and completed warranty information to the nearest Authorized Lionel Service Station. Your nearest Lionel Service Station can be found by calling 1-800-4-Lionel, or by accessing our Website at [www.lionel.com](http://www.lionel.com).

If you prefer to send your product back to Lionel L.L.C. for factory repair, you must first call 810-949-4100 or FAX 810-949-5429, or write to Customer Service, P.O. Box 748, New Baltimore, MI 48047-0748, stating what the item is, when it was purchased and what seems to be the problem. You will be sent a return authorization letter and label to ensure your merchandise will be properly handled upon receipt.

Once you have received your return authorization and label, make sure that the item is packed to prevent damage during shipping and handling. We suggest that you use the product's original packaging. This shipment must be prepaid and we recommend that it be insured.

Please make sure you have followed all of the above instructions carefully before returning any merchandise for service.

### Warranty Information

Please complete the information below and keep it, along with your dated sales receipt. You must present this and your dated sales receipt when requesting warranty service.

Name \_\_\_\_\_

Address \_\_\_\_\_

Place of Purchase \_\_\_\_\_

Date of Purchase \_\_\_\_\_

Product Number \_\_\_\_\_

Product Description \_\_\_\_\_

\_\_\_\_\_

