



73-7921-250

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## ZW-L Transformer Owner's Manual

**CAUTION—**

**ELECTRICALLY-OPERATED PRODUCT:**

NOT RECOMMENDED FOR CHILDREN UNDER FOURTEEN YEARS OF AGE. AS WITH ALL ELECTRIC PRODUCTS, PRECAUTIONS SHOULD BE OBSERVED DURING HANDLING AND USE TO PREVENT ELECTRIC SHOCK. TRANSFORMER RATINGS — INPUT: 120 VAC; 50/60 HZ. AC OUTPUT: 18 V; 620 VA.

## ***Thank You!***

**T**hank you for your purchase of the Lionel ZW-L Transformer! True to the signature design elements of its iconic predecessor, the ZW-L Transformer features four-handle operation so you can run up to four different trains or accessories at the same time.

In the Conventional environment, the two engineer-type handles provide independent control of two variable voltage circuits with whistle/horn, bell, and direction control for train operation. The center controls can be set to your desired voltage for operating accessories.

In the Command Control environment, you can use the ZW-L Transformer to run your Conventional locomotives by remote control. Your CAB-2/CAB-1 Remote Controller can control the four individual outputs, each using a unique train (TR) or engine (ENG) ID#. Whistle/horn, bell, and direction commands are available for each output. Plus, you can throw the ElectroCouplers on select Conventional locomotives.

Read this manual thoroughly before using the system. It has important information on the setup and operation of your transformer.

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*Lionel®, Lionel ZW®, ZW®, CAB-1® Remote Controller, TrainMaster®, TMCC®, LEGACY®, ElectroCoupler®, RailSounds®, Lockon®, FasTrack®,*

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# ***Safety Information***

## **Operating your ZW-L Transformer safely**

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**Y**our Lionel ZW-L Transformer is ETL-listed and has been carefully designed to ensure peak performance. When using electrical devices, basic safety precautions should be observed.

### ***IMPORTANT SAFETY INSTRUCTIONS: READ CAREFULLY AND KEEP FOR FUTURE REFERENCE.***

- Read the manual and cautionary markings on the ZW-L Transformer thoroughly before using this device.
- This device is not recommended for children under fourteen years of age.
- Always unplug the ZW-L Transformer from the power source when not in use. Do not unplug by pulling the cord.
- Never insert objects into the ventilation slots on this device. Damage to sensitive electronic components can result.

### ***WARNING:***

- The ZW-L Transformer was meant to operate on 120-volt, 50/60-Hertz power. Do not connect this device to any other power supply.
- Parents should periodically inspect this device for potential hazards and, if necessary, have them repaired by Lionel Service. In the event that such a condition exists, the transformer should not be used until it has been properly repaired.
- The ZW-L Transformer is intended to be used indoors. Do not use this device outdoors or if water is present. Serious or fatal injuries may result.
- Use the ZW-L Transformer only for its intended purpose.
- Do not operate the ZW-L Transformer with a damaged cord, plug, or case.
- As with all electric products, precautions should be observed during handling and use to prevent electric shock. There are no user serviceable parts inside. If damaged, call Lionel Customer Service at 1-800-4-LIONEL (454-6635).
- Do not operate the ZW-L Transformer on your layout unattended. Obstructed accessories or stalled trains may overheat, resulting in damage to your layout.
- Periodically inspect all output connections to make sure that they are secure. A loose connection can produce extremely high temperatures.

# Safety Information

## Protecting your layout from overloads

**Y**our Lionel ZW-L is equipped with three levels of overload protection: dynamic power limiting, fold-back current limit, and circuit breakers. Each output has its own fold-back current limit and circuit breaker. The dynamic power limiting is applied across all four outputs. This provides multi-layer protection for your trains and transformer while supplying the maximum power possible for pulling lighted cars or fighting over grades with heavy loads.

Dynamic power limiting allows the 620W available from the transformer to be shared across the four outputs as necessary to power the connected loads. Up to 180W is available to each output as long as the total power of all four outputs does not exceed the 620W transformer rating. When the 620W total is reached the output that tried to take more power will be limited to maintain the 620W total. The red light on the transformer will flash while the output is being limited. The transformer can run in this mode indefinitely and will not shut down. When more power becomes available because of a change in the demand from the other outputs it will be automatically given to the limited output.

The fold-back current limit protects your transformer and layout from damage caused by severe overloads and short circuits in the case of derailments or objects falling on the track. At the same time it prevents the inconvenience of nuisance tripping caused by momentary overloads. It continuously monitors the output current of all four outputs. When there is a short on any of the outputs it will reduce the voltage on that output in a fraction of a second to hold the current at 10A. If the short circuit is not corrected in 3 seconds the transformer will interrupt power to that output. All other outputs will be unaffected. During the 3 seconds the red light on the ZW-L will flash. Once the output is shut down the red light will come on solid. To indicate which output(s) are experiencing the problem, the back light of the meter assigned to that output will be turned off. Refer to Figure 1 for the meters assigned to each output. For Conventional operation, move the throttle for that output to the Off position to reset the Transformer and resume normal operation. For Command operation press RESET or enter AUX1, 0 on the CAB-2/CAB-1 for that output.

The circuit breakers on the ZW-L Transformer are designed as a fail-safe for the electronic over-current protection. Because most problems will be protected by and corrected during fold-back mode operation (described in the previous section), circuit breakers should be tripped infrequently.

In the event that a breaker is tripped, the backlight on the meter assigned to that output will be turned off. Refer to Figure 1 for the meters assigned to each output. Correct the short circuit (e.g., make sure that the train's wheels are properly on the track and remove any foreign objects from the rails), return the handle(s) to the Off position, and then press the circuit breaker buttons shown in Figure 3 on page 9 to reset power.

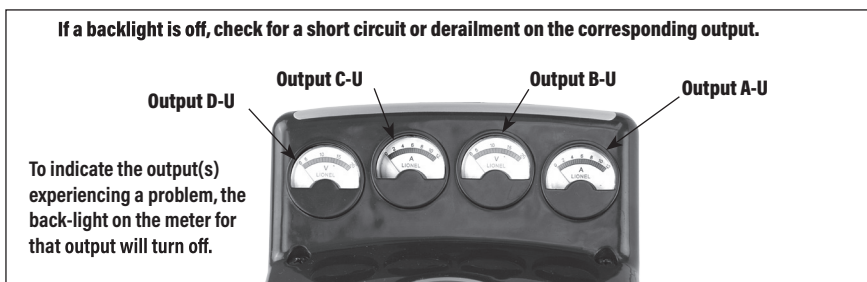


Figure 1. Meter light assignments (to show active fold-back mode/over-current protection)

# Features overview

## Operating controls

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**T**he ZW-L Transformer's main operating controls are highlighted in this section. Refer to Figure 2 on page 7 for the location of these features.

### ***THROTTLE LEVERS (all outputs)***

Each throttle lever controls the voltage to each of the corresponding outputs. Push the levers forward to increase track power. Throttles A and D have corresponding horn/whistle, bell, and direction buttons, making them ideal for full locomotive operation. Throttles B and C have variable voltage, making them ideal for accessory operation.

In single-lever mode, Throttle A controls the voltage to all four outputs. Throttles B, C, and D set the maximum voltage available from the corresponding outputs.

### ***DIRECTION (Outputs A-U and D-U)***

For Outputs A-U and D-U in regular 4-channel mode, the DIRECTION control buttons interrupts track power to activate the reverse unit in your locomotives. Your locomotive will not respond to this button when the reverse unit switch is in the OFF position.

### ***WHISTLE/HORN (Outputs A and D)***

For Outputs A-U and D-U in regular 4-channel mode, the WHISTLE/HORN button will activate your locomotive's whistle or horn. The sound will continue until the button is released. No external sound activation buttons are needed.

### ***BELL (Outputs A and D)***

For Outputs A-U and D-U in regular 4-channel mode, the BELL button will activate the bell sounds on locomotives equipped with this feature. Press the BELL button to begin the sounds; press the button again to turn off the ringing.

**Note!** Do not activate horns, whistles, or bells on RailSounds-equipped locomotives until track power has been turned on for a few moments, or a continuous horn/whistle or bell sound may occur. To correct this problem, simply turn off the transformer, then turn it back on.

### ***POWER SWITCH***

Use the power switch to turn on power to your transformer. The transformer should be switched Off and unplugged when not in use.

### ***GREEN INDICATOR LIGHT***

The green power indicator light will remain on during normal operation.

### ***RED INDICATOR LIGHT***

The red light will begin to flash if you exceed the power limit of the Transformer. The red light will remain on if an output has shut down because of an overload.

### ***"LIONEL" LIGHT***

The "LIONEL" light on the front of the unit will remain on during normal operation. For Command operation, the light will flash to indicate setting the ID# and flicker to indicate a weak or absent Command signal.

# Features overview

## Operating controls (continued)

### METERS

The ZW-L Transformer features two voltage meters. See Figure 2. The right-hand meter reads the voltage on Outputs A-U and B-U (default reading is Output A-U); the left-hand meter reads the voltage on Outputs C-U and D-U (default reading is Output D-U).

To read the voltage on Output B-U or C-U, touch the corresponding lever with your fingers or address these outputs with your CAB Remote Controller and adjust the voltage. The back-lighting will be brighter as the meter displays the voltage on the B-U and C-U outputs, as long as your fingers are in contact with the levers or the voltage is adjusted using the Remote Controller.

Likewise, the ZW-L Transformer features two amperage meters. The right-hand meter reads the amperage on Outputs A-U and B-U (default reading is Output A-U); the left-hand meter reads the amperage on Outputs C-U and D-U (default reading is Output D-U).

To read the amperage on Output B-U or C-U, touch the corresponding lever with your fingers or address these outputs with your CAB Remote Controller and adjust the voltage. The back-lighting will be brighter as the meter displays the amperage on Outputs B-U and C-U, as long as your fingers are in contact with the levers or the voltage is adjusted using the Remote Controller.

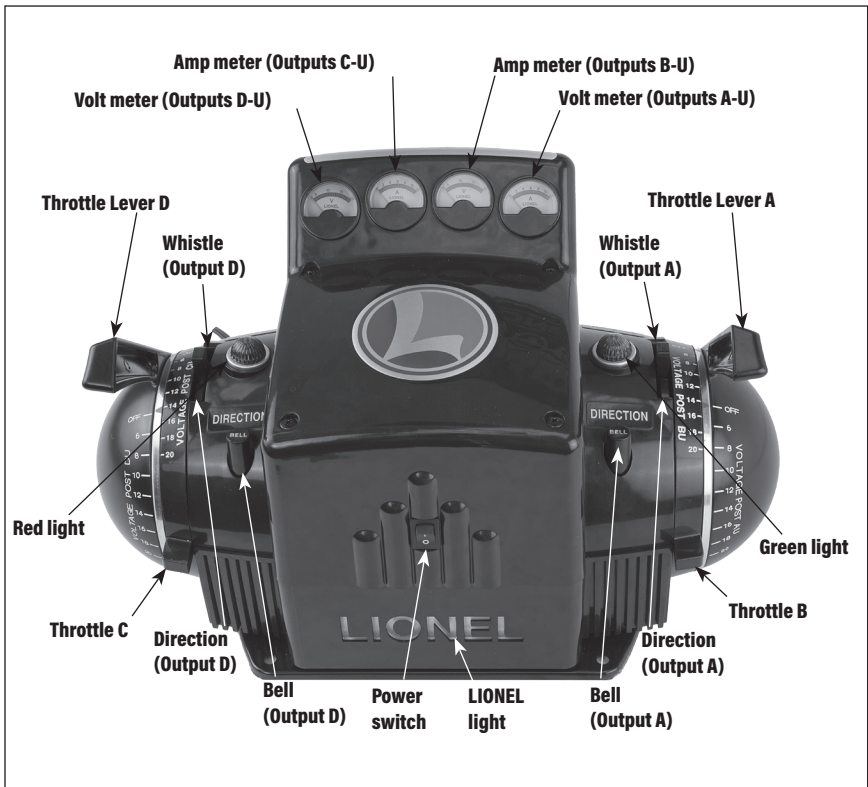


Figure 2. Operating controls

# Features overview

## Transformer controls

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**T**he transformer controls and binding posts located on the back of the transformer are highlighted in this section. Refer to Figure 3 on page 9 for the location of these features.

### ***BREAKERS (for outputs A-D)***

Four circuit breakers are provided, one for each output. For more information, please see page 5.

### ***COMMAND/CONVENTIONAL (CMD/CONV) SWITCH***

For Conventional operation, set the COMMAND/CONVENTIONAL switch to CONV. To operate the ZW-L Transformer with a CAB-2 or CAB-1 Remote Controller, set the switch to CMD.

### ***RUN/PROGRAM (RUN/PGM) SWITCH***

For operation in the Command environment, slide the switch to the PGM position to assign a unique TR or ENG ID# to each output; otherwise, leave the switch in the RUN position. For more information, see pages 19 and 21.

### ***1 CHANNEL/4 CHANNEL (1-CH/4-CH) SWITCH***

To control each output with the four corresponding throttle levers, slide the switch to the 4-CH position. To control the four outputs using a single lever (Throttle A), slide the switch to the 1-CH position. For more information, see pages 15 and 23.

**Note!** Direction, whistle and bell commands are sent on all four outputs in 1-channel (single-handle) operation mode.

### ***BINDING POSTS (for outputs A-D)***

For track and accessory connections.

### ***COMMAND BASE BINDING POST***

For Command Control operation. For added convenience, connect the communication wire from the Command Base to this post as an alternative to the outside rail. See page 17 for more information

### ***INTERNAL COOLING FAN***

Temperature controlled. The fan will cycle on and off as needed.



# Features overview

## Transformer controls (continued)

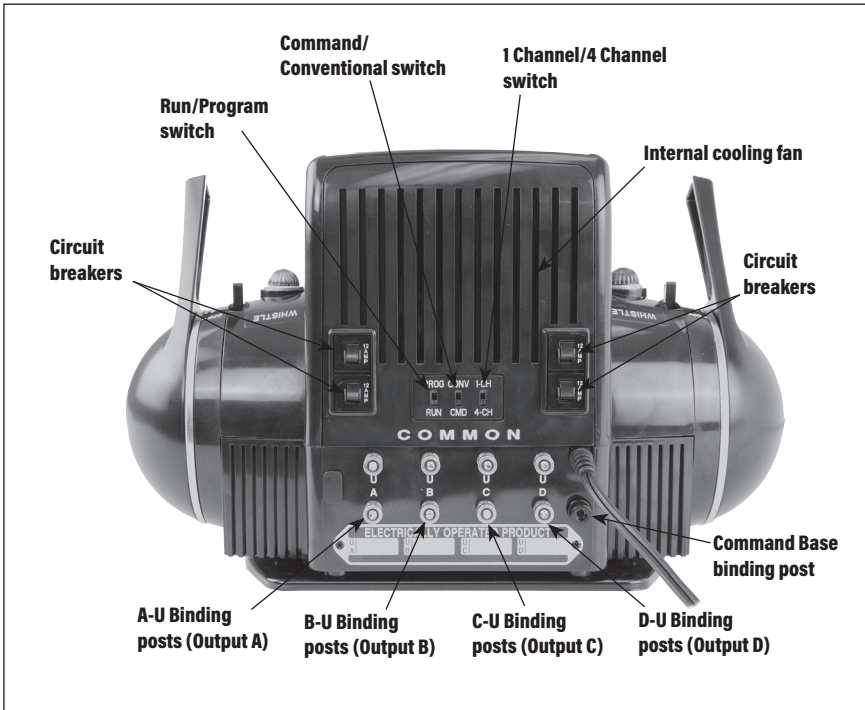


Figure 3. Transformer controls and features

# ZW-L Transformer set-up

## Connecting the ZW-L Transformer to your track

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**W**e recommend using Outputs A-U and D-U for your track connections because they have throttle, direction, bell, and whistle controls. Outputs B-U and C-U have only voltage control in Conventional mode.

For best results, use spade lugs (U-shaped connectors) on all ZW-L Transformer connections, and no more than two wires on each terminal. On larger layouts where several track wires are required, the use of separate junctions/terminal strips is recommended to prevent voltage drops.

**Caution!** Use 16-gauge or larger wire to connect the ZW-L to the track. Smaller gauge wire will not be able to handle the current safely.

**Caution!** Make sure all connections are very secure. A loose connection can produce extremely high temperatures. For this reason, do not touch terminals or track connections during use. Also, do not locate scenery materials such as lichen or ground foam near the terminals.

### *O-27 and O gauge track*

Begin by attaching a Lionel Lockon (available separately) to any section of straight track as illustrated in Figure 4 on page 11. To do so, fit the lip of the Lockon onto the edge of the outside rail and press the Lockon upward so that the clip snaps onto the center rail. Next, attach a wire to either the A or D terminal on the ZW-L Transformer and connect it to the No. 1 (center rail) terminal on the Lockon. Attach another wire to the U terminal on the ZW-L Transformer and connect it to the No.2 (outside rail) terminal on the Lockon.

*Lock-On connections:* Press down on the top of the terminal clip so that a metal loop is exposed. Slide the bare end of the wire into the exposed loop. See Figure 2. Release pressure on the terminal clip, allowing the crimped metal to pinch the end of the wire in the metal loop. Gently tug on the wire to check if the hold is secure.

**Note!** All of the U terminals are common; accessory ground connections can be made to the track.

### *FasTrack power terminal section*

If you have a FasTrack layout, simply connect the red spade-shaped connector on a FasTrack power terminal section (available separately, 6-12016) to the A or D terminal on the ZW-L Transformer. Connect the black spade-shaped connector to the U terminal.

# ZW-L Transformer set-up

## Connecting the ZW-L Transformer to your track (continued)

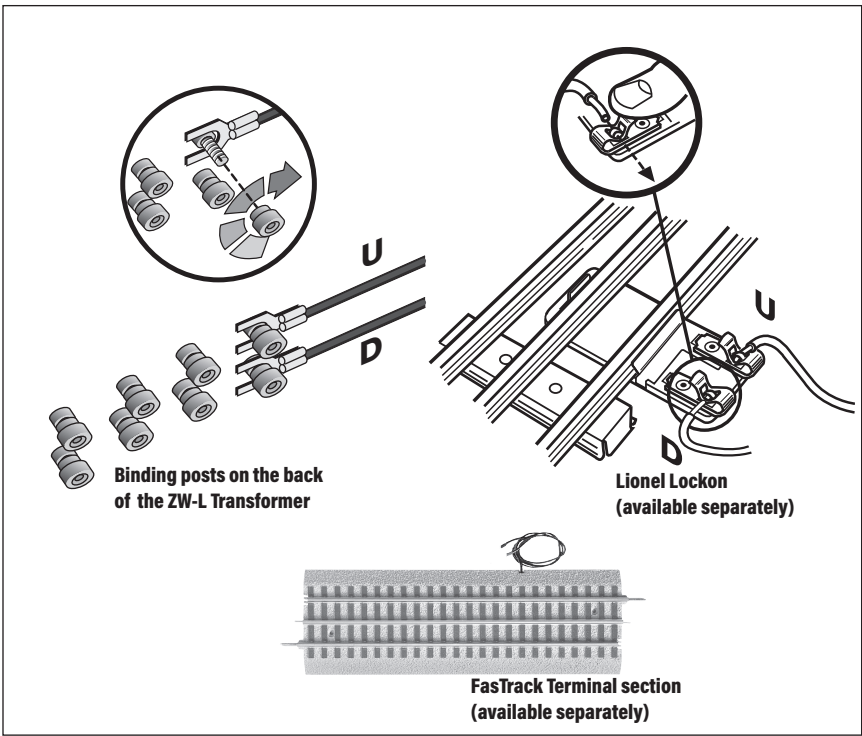


Figure 4. Track connections

## ZW-L Transformer set-up

### Supplying power across a large layout

**F**or larger layouts, you may choose to connect the ZW-L Transformer to the track at multiple points to avoid voltage drops or to have more power available for ascending grades, etc. An example is illustrated in Figure 5.

For ease of operation, the ZW-L Transformer can be placed in single handle mode (see the procedure on pages 15 and 18). Four separate loops can then be powered-up at the same time using Throttle A. All outputs will function like Throttle A. The voltages at Outputs B, C, and D will increase along with Throttle A to a maximum set by their individual throttle positions.

**Caution!** When powering multiple track loops, always make sure insulating pins are used to insulate the center rails between connected loops. Failure to do so will result in excessive current which can damage locomotives.

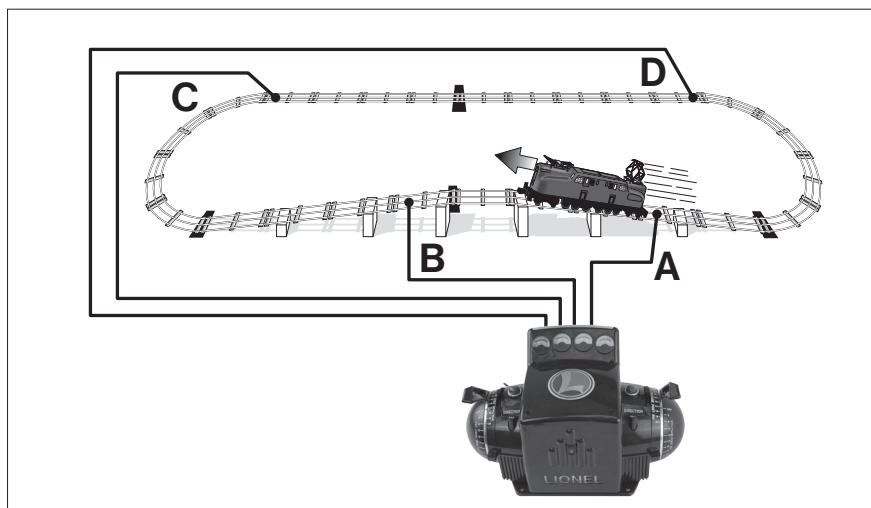


Figure 5. Track block/output assignments

## ***ZW-L Transformer set-up***

### **Connecting the ZW-L Transformer to your accessories**

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**W**hile output terminals A-U and D-U are designed for train control, B-U and C-U are intended to supply power for lights, switches, and accessory equipment.

For best results, use spadelugs (U-shaped connectors) on all ZW-L connections and no more than two wires on each terminal. On larger layouts where several wires are required, the use of separate junctions/terminal strips is recommended to prevent voltage drops.

The Throttle B and Throttle C levers control the voltage on the B-U and C-U outputs. Refer to the illustration on page 7 for the location of the control levers. Most illuminated accessories operate on 12 to 14 volts, while operating accessories work on voltage ranging from 10 to 16 volts depending on the condition of the accessory.

To adjust the proper voltage for your accessories, connect the accessory terminals to the B-U or C-U posts of your transformer and slowly adjust the corresponding throttle levers until you get the desired brightness of illumination or satisfactory operation of the mechanism. In the case of illuminated accessories, be sure to avoid setting the voltage too high, or you will burn out the lamps. If you operate with the lowest voltage possible, you will greatly extend the life of your lamps and other equipment. In the event that you have several accessories that require the same voltage, it is possible to use the same transformer binding posts for all of them.

**Caution!** Make sure all connections are very secure. A loose connection can produce extremely high temperatures. For this reason, do not touch terminals or track connections during use. Also, do not locate scenery materials such as lichen or ground foam near the terminals.

**Note!** Be sure to consult your accessory's owner's manual for recommended voltages and wiring hints

# ***Conventional operations***

## **Operating your trains in the Conventional environment**

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**A**fter the ZW-L Transformer is connected to the track or your accessory, slide the CMD/CONV switch to the CONV position, the 1-CH/4-CH switch to the 4-CH position, and then set the power switch to the On position. Refer to Figure 1 on page 7 and Figure 3 on page 9 for the location of these controls.

**Note!** The CMD/CONV switch and the 1-CH/4-CH switch must be set before power is turned on for the setting to take effect.

### ***THROTTLE LEVERS (all outputs)***

Each throttle controls the voltage to each of the corresponding outputs. Push the throttle levers forward to increase track power. Throttles A and D have corresponding horn/whistle, bell, and direction buttons, making them ideal for full locomotive operation. Throttles B and C have variable voltage, making them ideal for accessory operation.

### ***DIRECTION (Outputs A-U and D-U)***

For Outputs A-U and D-U, the DIRECTION levers interrupts track power to activate the reverse unit in your locomotives. Your locomotive will not respond to this button when the reverse unit switch is in the OFF position.

### ***WHISTLE/HORN (Outputs A-U and D-U)***

For Outputs A-U and D-U, the WHISTLE/HORN button will activate your locomotive's whistle or horn. The sound will continue until the button is released. No external sound activation buttons are needed.

### ***BELL (Outputs A-U and D-U)***

For Outputs A-U and D-U, the BELL button will activate the bell sounds on locomotives equipped with this feature. Press the BELL button to begin the sounds; press the button again to turn off the ringing.

**Note!** Do not activate horns, whistles, or bells on RailSounds-equipped locomotives until track power has been turned on for a few moments, or a continuous horn/whistle or bell sound may occur. To correct this problem, simply turn off the transformer, then turn it back on.

# ***Conventional operations***

## **Operating your layout with a single throttle lever (Throttle A)**

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**T**o control the voltage to all four outputs using a single throttle lever (Throttle A), set the power switch to the Off position (or unplug the Transformer), slide the 1-CH/4-CH switch to the 1-CH position, and then set the power switch to the On position.

### ***THROTTLE LEVER A***

Controls the voltage to all four outputs.

### ***THROTTLE LEVERS B, C, and D***

Set the maximum voltage available from the corresponding outputs. As Throttle A is increased, the output voltages of Outputs B-U, C-U, and D-U will increase up to the maximum set by the corresponding throttles.

### ***"A" DIRECTION BUTTON***

For all outputs, the "A" DIRECTION levers interrupts track power to activate the reverse unit in your locomotives. Your locomotive will not respond to this button when the reverse unit switch is in the OFF position.

### ***"A" WHISTLE/HORN BUTTON***

For all outputs, the "A" WHISTLE/HORN button will activate your locomotive's whistle or horn. The sound will continue until the button is released. No external sound activation buttons are needed.

### ***"A" BELL BUTTON***

For all outputs, the "A" BELL button will activate the bell sounds on locomotives equipped with this feature. Press the BELL button to begin the sounds; press the button again to turn off the ringing.

#### **Note!**

Do not activate horns, whistles, or bells on RailSounds-equipped locomotives until track power has been turned on for a few moments, or a continuous horn/whistle or bell sound may occur. To correct this problem, simply turn off the transformer, then turn it back on.

## ***Command Control operations***

### **Operating Conventional locomotives in the Command Control environment using a CAB-2/CAB-1 Remote Controller**

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**T**he ZW-L Transformer can also be controlled remotely in the Command Control environment with the addition of a Command Base and a CAB-2 or CAB-1 Remote controller (both available separately). When operated in Command Control you have complete control of all four of the ZW-L outputs from the CAB Remote Control. You can set the output voltage of each output independently. You can activate the Direction, Whistle and Bell functions on any of the four outputs. In addition, you can fire the ElectroCouplers on select conventional locomotives. The Direction, Whistle, and Bell controls on the ZW-L will also work in Command Control mode.



## Command Control operations

### Connecting the Command Base to the ZW-L Transformer

**Y**ou may choose to connect the Command Base (available separately) communication wire to the Command Base binding post on the back of the ZW-L Transformer. See Figure 6. Alternately, you may connect the Command Base communication wire directly to the outside rail.

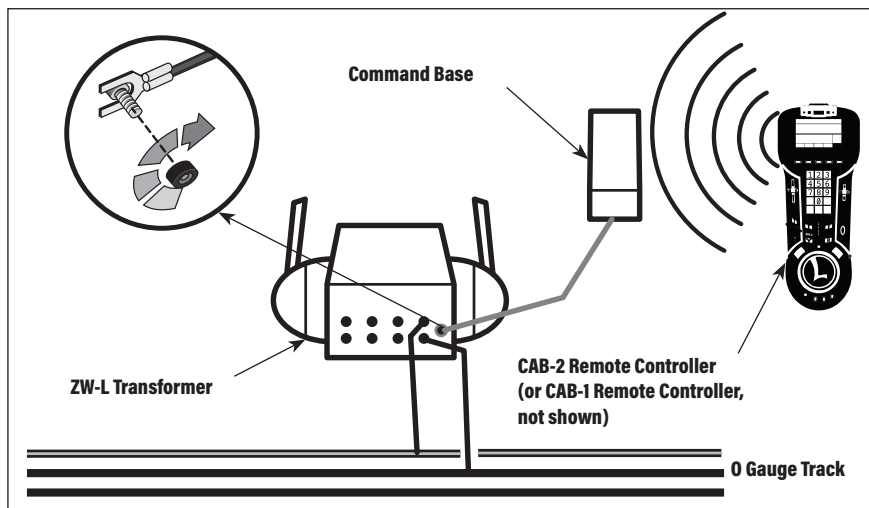


Figure 6. Command Base connection

**A**fter the Command Base is connected and turned on, slide the CMD, CONV switch to the CMD position, the 1-CH/4-CH switch to the 4-CH position, and then set the power switch to the On position. Refer to Figure 1 on page 3 and Figure 3 on page 9 for the location of these controls.

#### **Note!**

The CMD/CONV and the 1-CH/4-CH switches must be set before power is switched on for the setting to take place.

## ***Command Control operations***

### **Operating your layout in the Command Control environment using a single output**

---

**T**o control the voltage to all four outputs using a single throttle, set the power switch to the Off position, slide the 1-CH/4-CH switch to the 1-CH position and then set the power switch to the On position.

Address the A-U output to control all four outputs at the same time. Any function activated with the CAB-2 or CAB-1 Remote Control will be applied to all four outputs. Any operation addressed directly to the B-U, C-U or D-U output will be ignored.

# ***LEGACY Control System operations***

## **LEGACY Control System set-up**

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**B**efore you operate the ZW-L with the LEGACY Control System, you will need to set the device type, control mode, and assign a unique ID# to each output.

## **Assigning a unique ENG or TR ID# to each ZW-L output**

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**Y**ou will select a unique ID# for Output A-U and the next three consecutive ID#s will be assigned to Outputs B-U, C-U and D-U.

1. Plug in the LEGACY Base (see page 17) and set the ZW-L power switch to the On position.
2. Set the PROG/RUN switch to the PROG position.
3. Press ENG or TR on the CAB-2 Remote Control.
4. Enter the unique ID#. You may select any number from 1 to 95.

**Note!** Version 1.4 LEGACY system update is required to use TR ID#s 10 to 95. Using these ID#s with LEGACY system Version 1.3 or lower will result in unexpected operation.

5. Press SET. The LIONEL light on the front of the transformer will flash to indicate that the ID# has been set.
6. Slide the PROG/RUN switch back to the RUN position. Output A-U has now been assigned the ID# you selected and Outputs B-U, C-U and D-U have been automatically assigned the next three consecutive numbers.
7. Continue to the following section to set the device type and control mode.

# LEGACY Control System operations

## Setting the device type and control mode for each ZW-L output

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If the ZW-L has been assigned an ENG ID# you will need to select a device type and control mode for each of the ZW-L outputs so the CAB-2 knows how to operate the transformer. You may also give each ZW-L output a name and a road number. If the ZW-L has been assigned a TR ID# you will only need to set the control type.

### *If the ZW-L is assigned an ENG ID#:*

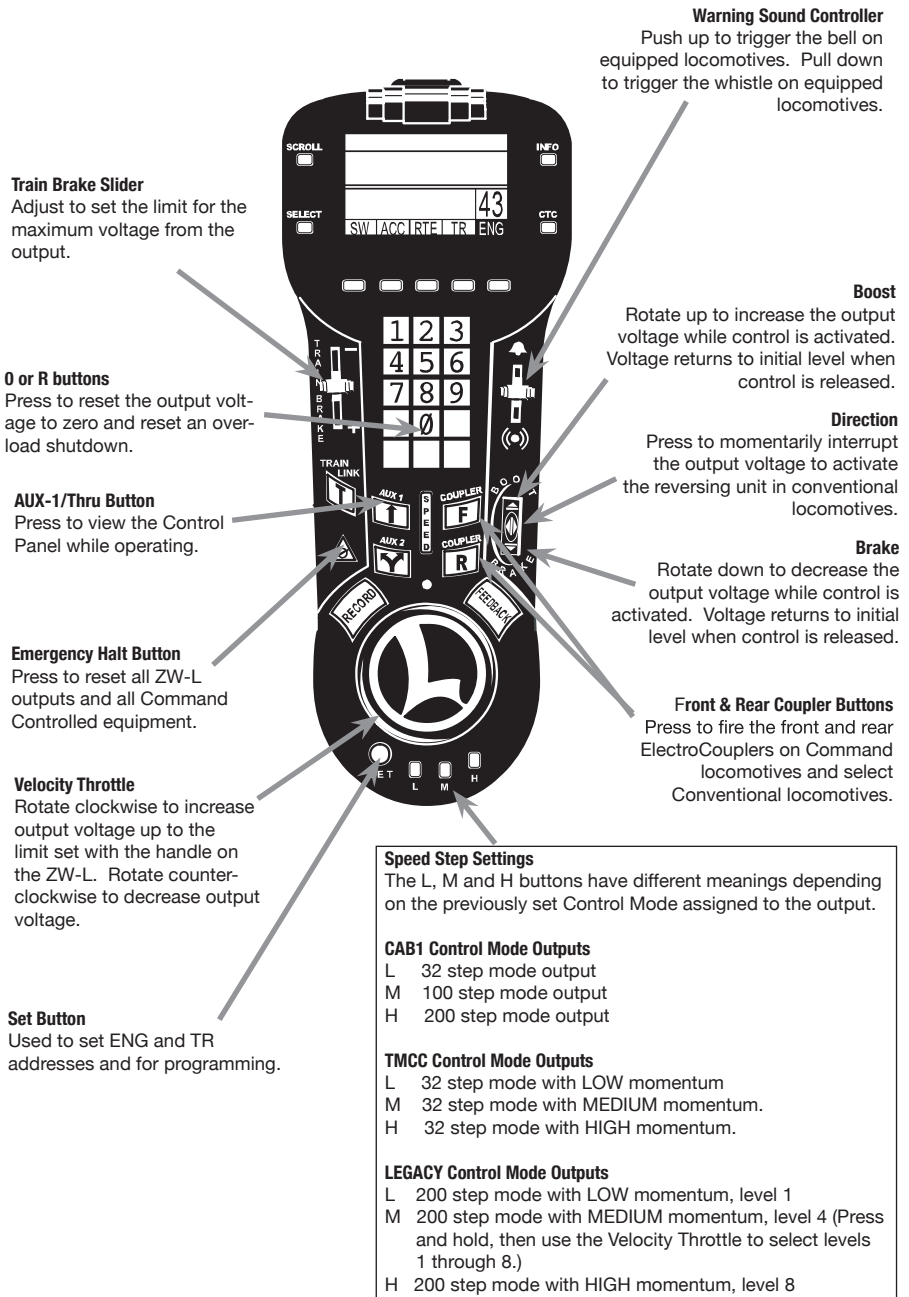
1. Assign a unique ENG ID#. Refer to page 19.
  2. Press ENG on the CAB-2 Remote Control.
  3. Enter the ID# assigned to Output A-U.
  4. Press INFO.
  5. Enter a name and road number for Output A-U if desired. Refer to the Legacy Control System manual for more information.
  6. Press SCROLL to display the Type screen.
  7. Select the device type
    - For LEGACY System with Version 1.4 update select XFMR.
    - For LEGACY System with Version 1.3 or lower select DSL.
  8. Press SCROLL again to display the Control screen.
  9. Select the control mode.
    - For LEGACY System with Version 1.4 update select CAB-1, TMCC or LEGACY.
    - For LEGACY System with Version 1.3 or lower select CAB-1.
- Note!** Using TMCC or LEG control modes with LEGACY system Version 1.3 or lower will result in unexpected operation.
10. Press CTC to exit.
  11. Repeat this process using the ENG ID#s for Outputs B-U, C-U and D-U.

### *If the ZW-L is assigned an TR ID#:*

1. Assign a unique TR ID#. Refer to page 19.
2. Press TR on the CAB-2 Remote Control.
3. Enter the ID# assigned to Output A-U.
4. Press INFO.
5. Press CLR. Display will ask NAME & ENGINES?
6. Press YES.
7. Press CTC to exit.
8. Repeat this process using the TR ID#s for Outputs B-U, C-U and D-U.

# LEGACY Control System operations

## LEGACY CAB-2 Remote Controller Commands



# ***TrainMaster Command Control operations***

## **TrainMaster Command Control operations**

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**B**efore you operate the ZW-L with the TrainMaster Command Control System, you will need to set the assign a unique ID# to each output.

1. Plug in the TrainMaster Command Base and set the ZW-L power switch to the On position.
2. Set the PROG/RUN switch to the PROG position.
3. Press ENG or TR on the CAB-1 Remote Control.
4. Enter the unique ID#. You may select any ENG ID# from 1 to 95 or any TR ID# from 1 to 6.
5. Press SET. The LIONEL light on the front of the transformer will flash to indicate that the ID# has been set.
6. Slide the PROG/RUN switch back to the RUN position.



Output A-U has now been assigned the ID# you selected and Outputs B-U, C-U and D-U have been automatically assigned the next three consecutive numbers.


# TrainMaster Command Control operations

## CAB-1 Remote Controller commands


 Fires the rear ElectroCoupler on Command locomotives and select Conventional locomotives.


 Fires the front ElectroCoupler on Command locomotives and select Conventional locomotives.


  The AUX1, 0 sequence sets the output voltage to zero and resets an overload shutdown.


 Increases the output voltage with a clockwise rotation up to the limit set by the handle on the ZW-L.  
Decreases the output voltage with a counter-clockwise rotation.

 Triggers the whistle on equipped locomotives.

 Triggers the bell on equipped locomotives.

 Momentarily interrupts the output voltage to activate the reversing unit in the locomotive.

 Increases the output voltage while button is pressed. Voltage returns to initial level when button is released.

 Reduces the output voltage while button is pressed. Voltage returns to initial level when button is released.

 Resets all ZW-L outputs to zero and resets all Command Controlled equipment.



### Speed Step Settings

- L** Sets the output to 32 speed step mode
- M** Sets the output to 100 speed step mode
- H** Sets the output to 200 speed step mode

## ***Non-Lionel locomotive operation***

### **Running non-Lionel locomotives with your CAB-2/CAB-1 Remote Controller**

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**Y**our ZW-L Transformer was designed to be compatible with all locomotives operating on AC voltage from 0 to 18 volts. No modification of the locomotive is required.

If you experience erratic operation of some non-Lionel locomotives (such as random horn and bell sounds), placing a lighted car on the track or connecting an accessory to track power should eliminate the problem.



# ***Maintenance and service***

## **Troubleshooting**

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### ***No lights or operation***

Be sure that the ZW-L Transformer is plugged into a working outlet and that the power switch is in the On position.

### ***Circuit breaker trips immediately when power is applied***

Recheck the wiring, look for short circuits. Disconnect all wiring and reconnect them one at a time until the defective circuit is found.

### ***Train runs but WHISTLE/HORN, BELL, or DIRECTION will not work***

Check the track connections to the ZW-L Transformer. The manual WHISTLE/HORN, BELL, and DIRECTION buttons function only on track Outputs A-U and D-U. The WHISTLE/HORN, BELL, and DIRECTION functions on channels B and C can only be controlled from a CAB-2 or CAB-1 Remote Controller.

### ***No change when DIRECTION is pressed***

Be sure that the locomotive reverse unit is in the ON position.

### ***Intermittent or absent accessory operation***

Check for loose, shorted, or improper wiring connections.

### ***The locomotive runs slowly or the lights dim at far end of track***

On larger layouts, additional track resistance may cause a voltage drop. Attach additional Lockons to the remote portion of your track and connect them directly to the transformer.

### ***Intermittent operation with repeated circuit breaker tripping***

The ZW-L Transformer capacity may have been exceeded. Disconnect your accessories one at a time until problem ceases. Check for track short circuits.

### ***BELL button blows whistle***

Check track wire connections. “U” should connect to outer rail.

### ***The ZW-L does not respond to the CAB-2/CAB-1 Remote Controller***

Check to see that the Command Base is plugged in and the green light is on. Ensure that a wire is connected between the Command Base “U” terminal and a ZW-L Transformer Command Base terminal (or to the U terminal on a track Lock-On). Turn the power off to the ZW-L and then back on. Check the batteries in CAB-2/CAB-1 Remote Controller. Reprogram the ID# of the ZW-L. Check that the CMD/CONV switch is in the CMD position.

# ***Maintenance and service***

## **Troubleshooting (continued)**

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### ***"LIONEL" light is flickering***

The Command signal is weak or absent. Check that the Command Base is plugged in and the green light is on. Ensure that the U terminal of the Command Base is connected to the BASE terminal on the ZW-L or to the outside rail of the track.

### ***Meter backlight is off on one or more meters***

Output(s) have been shut down because of an overload. Check the output connection for short circuits, and then reset the output. See page 5.

**Please visit [www.lionelsupport.com](http://www.lionelsupport.com) to order parts and access other important service information.**

# Maintenance and service

## FCC Statement

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Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

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Notes: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Lionel Limited Warranty Policy & Service

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**T**his Lionel product, including all mechanical and electrical components, moving parts, motors and structural components, with the exception of **TRACTION TIRES** are warranted to the original owner-purchaser for a period of **one year from the original date of purchase** against original defects in materials or workmanship when purchased through a **Lionel Authorized Retailer\***.

This warranty does **NOT** cover the following:

- Normal wear and tear
- Defects appearing in the course of commercial use
- Damage resulting from abuse/misuse of the product
- Damage resulting from consumer or unauthorized attempted repair or modification

Transfer of this product by the original owner-purchaser to another person voids this warranty in its entirety. Modification of this product in any way; visually, mechanically or electronically, voids the warranty in its entirety.

Any warranted product which is defective in original materials or workmanship and is delivered by the **original owner-purchaser** (this warranty is non-transferrable) to Lionel LLC **MUST** be accompanied by the original receipt for purchase (or copy) from an **Authorized Lionel Retailer\***, will at the discretion of Lionel LLC, be repaired or replaced, without charge for parts or labor. In the event the defective product cannot be repaired, and a suitable replacement is not available, Lionel will offer to replace the product with a comparable model (**determined by Lionel LLC**), if available. In the event a comparable model is not available the customer will be refunded the original purchase price (requires proof of purchase from the **Authorized Lionel Retailer\*** it was originally purchased). Any products on which warranty service is sought must be sent with prior Return Authorization # from Lionel freight or postage prepaid (Lionel will refuse any package when postage is due). Lionel is not responsible for any unauthorized contents of the package or shipping packaging or materials or any package sent without prior authorization. **Transportation and shipping charges are not covered as part of this warranty for international shipments.**

**NOTE: Products that require service that do not have a receipt will not be serviced by Lionel. Any product sent to Lionel under a Return Authorization and not accompanied by a receipt; the return shipping costs will be the responsibility of the customer.**

**In no event shall Lionel LLC be held liable for incidental or consequential damages.**

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**S**ome states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

## Instructions for Obtaining Service

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**I**f service for this Lionel LLC product is required you must **FIRST** call 1-800-4LIONEL (1-800-454-6635), Email Talktous@lionel.com, or write to Lionel Customer Service, 6301 Performance Drive, Concord, NC 28027. Please have the Lionel product number and original receipt showing the date, location of original purchase, and description of problem. You will receive a return authorization (RA) number to ensure your merchandise will be properly tracked and handled upon receipt at Lionel LLC.

Once you have your Return Authorization (RA) number, make sure the item is well packed to protect during shipping. (The original packaging was designed to protect product during transit).

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

## Warranty Information

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**P**roducts that are more than 3 years old, from date of manufacture, are not applicable for warranty coverage, even if they have never been sold prior to this date. (Under no circumstance shall any components or labor be provided free of charge.)



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