73-1960-250
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THE POLAR EXPRESS™

Ready-to-Run Train Set Owner's Manual

CAUTION—ELECTRIC TOY

NOT RECOMMENDED FOR CHILDREN UNDER EIGHT YEARS OF AGE. AS WITH ALL ELECTRIC PRODUCTS, PRECAUTIONS SHOULD BE OBSERVED DURING HANDLING AND USE TO REDUCE THE RISK OF ELECTRIC SHOCK.

TRANSFORMER RATINGS—INPUT: 120 VAC; 60 HZ ONLY.
AC OUTPUT: 18 V; 80 VA

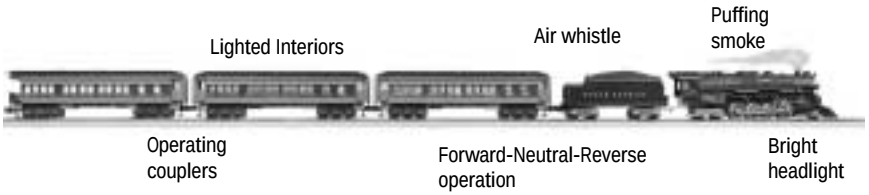
Congratulations!

Congratulations on your purchase of *The Polar Express* Train Set! This set features everything you need to get started—a mighty CW-80 Transformer, a huge loop of easy-to-assemble FasTrack track, a string of detailed cars, and a powerful Lionel locomotive.

Have fun growing with this complete train set! Start with the set components, then follow your imagination into your own miniature world. Expand your railroad empire with additional FasTrack track sections, enhance your layout with accessories, lengthen your consist with extra cars, or operate a new locomotive at the head end of your train! Explore the possibilities at your authorized Lionel dealer.

Use this Owner's Manual to learn how to set up, operate, and maintain your train set for years of reliable operation.

The Polar Express Train Set Features



Parents! **The transformer included with this set should be periodically examined for conditions that may result in the risk of fire, electric shock, or injury to persons (such as damage to the output cord, blades, housing, or other parts). In the event that such conditions exist, the transformer should not be used until properly repaired.**

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The Polar Express Train Set Inventory

- **2-8-4 Berkshire steam locomotive**
- **Tender with air whistle**
- **Two passenger coaches**
- **Observation car**
- **Four articulated figures**
- **Christmas bell**
- **CW-80 Transformer with accessory wire**
- **Three straight FasTrack track sections**
- **Eight curved FasTrack track sections**
- **One straight FasTrack terminal track section**
- **Smoke fluid**
- **Replacement traction tire**
- **Owner's Manual**
- **Service Center list**
- **Instruction video**
- **Lionel RailRoader Club flyer**

Creating your layout

Operating your CW-80 Transformer safely

Your Lionel CW-80 Transformer is listed by Underwriter's Laboratory Inc. and has been carefully designed to ensure peak performance. When using electrical products, basic safety precautions should be maintained.

Be sure to observe the following guidelines:

- Read the manual thoroughly before using this device.
- This device is not recommended for children under eight years of age.
- Parents should periodically inspect this product for potential hazards and, if necessary, have them repaired by an authorized Lionel Service Center. In the event that such a condition exists, the transformer should not be used until it has been properly repaired.
- The CW-80 Transformer is intended to be used indoors. Do not use this device if water is present. Serious or fatal injuries may result.
- Use the CW-80 Transformer only for its intended purpose.
- The CW-80 Transformer was meant to operate on 120-volt, 60-Hertz power. Do not connect this product to any other power supply.
- Do not operate the CW-80 Transformer with a damaged cord, plug, or case.
- To avoid the risk of electrical shock, do not disassemble the unit. There are no user serviceable parts inside. If damaged, take this product to an authorized Lionel Service Center. A list of authorized Service Centers is packed with this unit.
- Do not operate the CW-80 Transformer on your layout unattended. Obstructed accessories or stalled trains may overheat, resulting in damage to your layout.
- Always unplug the CW-80 Transformer from the power source when not in use.
- Never insert objects into the ventilation slots on this product. Damage to sensitive electronic components can result.

Creating your layout

Building your Lionel layout

Your set comes with eight curved, three straight, and one terminal section of track. Figure 1 provides some examples of layouts that you can build with these track sections.

By adding more FasTrack track sections, you can create an endless number of exciting track arrangements for more fun, action, and variety. The railroad empire of your dreams can quickly become a reality!

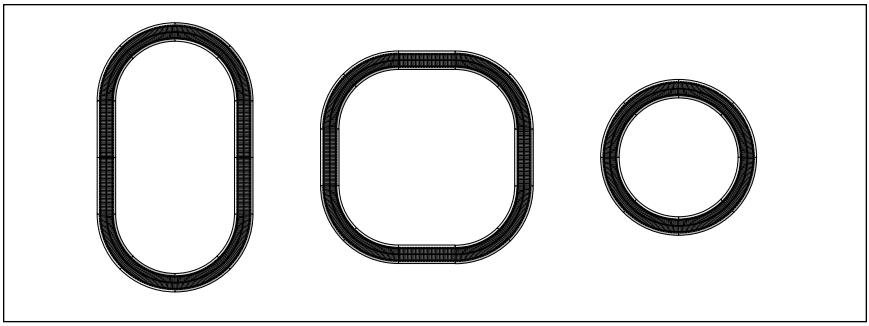


Figure 1. Track layout ideas

Joining the FasTrack track sections

FasTrack track sections join together easily. With interlocking roadbed sections and large rail tabs, the track fits together securely so you always get good electrical contact. Take a look at Figure 2 to see how to join the track sections.

1. **Line up your two sections of track.**
2. **Insert the rail tabs into the openings at the ends of the corresponding rails.**
3. **Press the sections together until the interlocking roadbed snaps into place.**

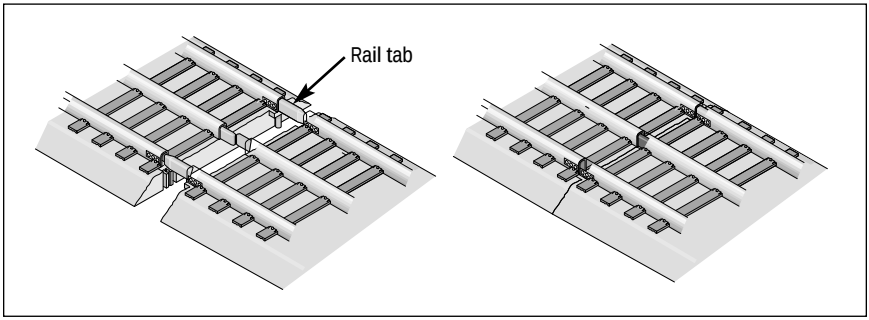


Figure 2. Joining the track sections

Creating your layout

Wiring your CW-80 Transformer

Connect your FasTrack terminal section to the CW-80 Transformer. Use the wires that are already attached to the terminal section. Make sure that all connections are secure. Loose connections can produce extremely high temperatures. For this reason, do not touch the terminals or track connections during use. Also, do not locate scenery materials such as lichen or ground foam near the terminals.

1. **Feed the wires through the notch in the FasTrack terminal section.** Refer to Figure 3.
2. **Loosen the red TRACK thumbscrew terminal, then slide the red spade-shaped connector into position.** The thumbscrew post should be positioned between the "blades" of the spade connector. Be sure that the blades are touching the metal post. Tighten the thumbscrew to secure the connection.
3. **Loosen the black TRACK thumbscrew terminal, then slide the black spade-shaped connector into position.** Tighten the thumbscrew to secure the connection. The thumbscrew post should be positioned between the "blades" of the spade connector. Be sure that the blades are touching the metal post.
4. **If you need to power an accessory (available separately at your authorized Lionel dealer), connect the accessory to the ACCESSORY thumbscrew terminals.** Use the accessory wire included with the CW-80 Transformer.
5. **Plug the CW-80 Transformer into your wall outlet (120 volts).**

As your layout expands, you may also make power connections with the stripped ends of wires, placing no more than two wires on each terminal. For best performance on large layouts, it is recommended that you use 16-gauge wire to connect your CW-80 Transformer to the track. On larger layouts where several track connections are required, the use of separate junctions/terminal strips (available at your local electronics store) is recommended to prevent voltage drops.

Caution!

To prevent the excessive build up of heat, be sure to select the proper wire gauge for your layout. Follow these guidelines:

- Track connections must be made with 18-gauge wire or heavier. Larger layouts require a minimum of 16-gauge wire.
- Use 24-gauge wire only when connecting single accessories that require lower current.
- When wiring multiple accessories (two or more) or accessories that require higher current, be sure to use 18- to 16-gauge wire.

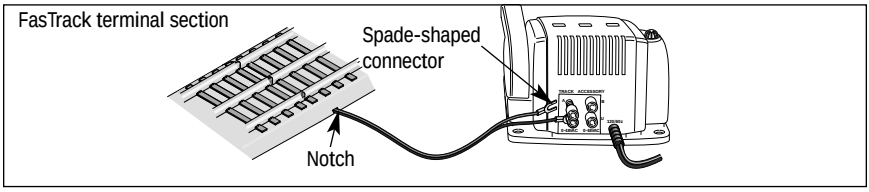


Figure 3. Controller connections

Running your trains

Running your train set

1 ***With track power off, place your train set on the track.***
Refer to page 8 for information on coupling the cars.

2 ***Connect the drawbar between the locomotive and tender.***
See Figure 4.

Caution! If the smoke unit switch is in the ON position, add smoke fluid to your locomotive's stack to prevent damage to the smoke unit. Refer to page 9 for additional information.

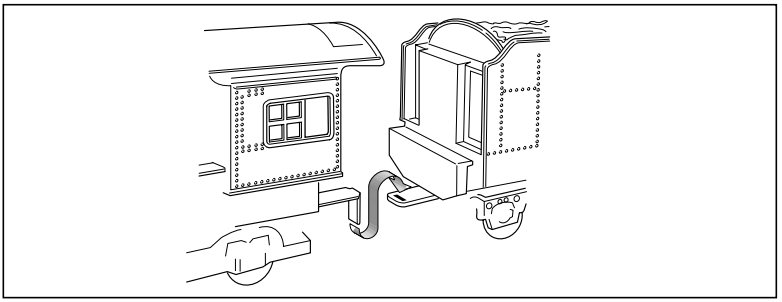


Figure 4. Drawbar connection

3 ***Power up your locomotive with your transformer.***

Your locomotive is designed to operate on 7-15 volts alternating current. Virtually all Lionel and Lionel-compatible alternating-current transformers are suitable.

Note! Do not power your locomotive with direct-current (DC) transformers. The locomotive was designed for use with alternating-current (AC) transformers only.

4 ***Move 'em out!***

Get your locomotive moving. Your locomotive goes through a repeating pattern of operations: forward, neutral, reverse, neutral, and so on. To sequence the reverse unit, press the DIRECTION button on your transformer, or briefly bring the throttle all the way back to the OFF position and then forward. Each press of the DIRECTION button or interruption in track power causes the locomotive to advance to the next operational state.

Adjust track voltage until your locomotive moves at your desired speed.

Running your train

Adding smoke fluid to your locomotive's smoke generator

Your locomotive is equipped with a smoke generator that produces safe, clean white smoke during operation if the smoke unit switch is in the ON position. Refer to Figure 9 on page 13 for the location of the switch.

The smoke generator requires the periodic addition of Lionel smoke fluid in order to function. A small bottle of smoke fluid is included with this set. Press down and unscrew the cap. Pierce the end of the nozzle with a pin, then add about four drops of fluid directly into the locomotive's stack. Smoke production commences momentarily. It will start faster if you run your locomotive at higher speeds. When smoke production decreases, add more fluid (about four drops). An idle locomotive will not smoke.

Smoke production is greater at higher voltages and when the locomotive is pulling a heavy load or a long consist.

Note! If you prefer to operate the locomotive without smoke or you do not want to add smoke fluid, slide the smoke unit switch to the OFF position.

Caution! When the smoke unit switch is in the ON position, always keep a small amount of smoke fluid in the locomotive's smoke generator; the generator's element can become damaged if operated without smoke fluid. This is particularly true if your locomotive sits in neutral for an extended period of time without smoke fluid in the generator.

Coupling

When coupling your cars, at least one of the mating couplers must be open as shown at the left in Figure 5. Press down on the lock release to open the coupler, then push the cars toward each other until they lock together.

Note! Keep in mind that it's easier to couple cars on a straight stretch of track.

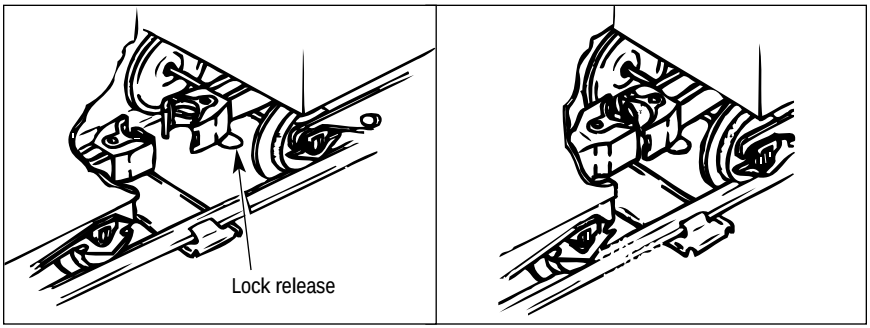


Figure 5. Coupler operation

Running your train

Slide the tabs on the observation car platform into the slots in the rear of the body. Refer to Figure 6.

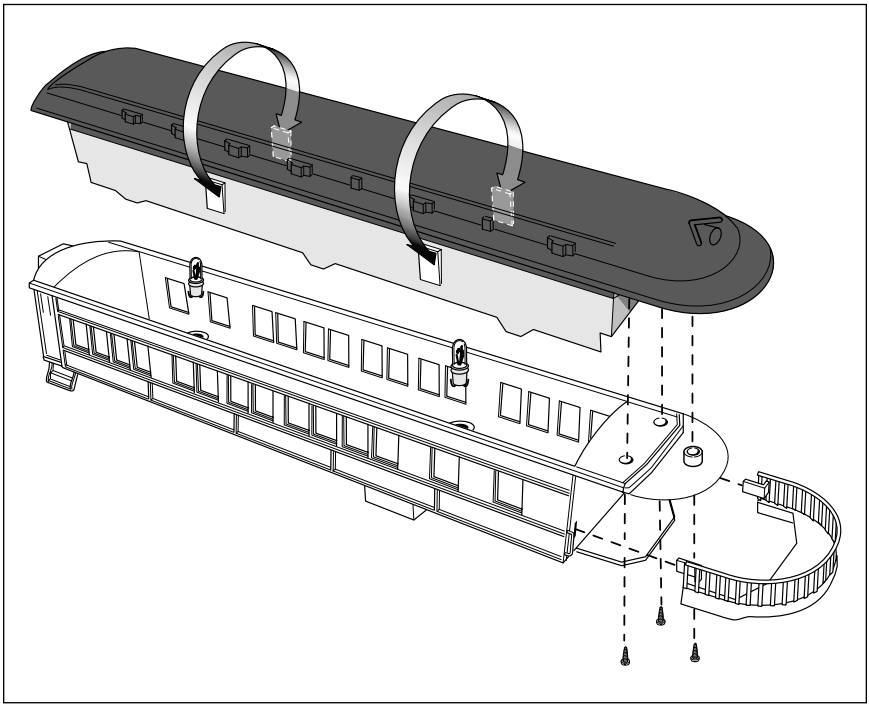


Figure 6. Observation car platform

Running your train

Attaching the figures

The four figures included with this train set are equipped with holes that allow them to ride on the train. As illustrated in Figure 7, press the figures onto the posts located on the roofs of the passenger cars and on the locomotive.

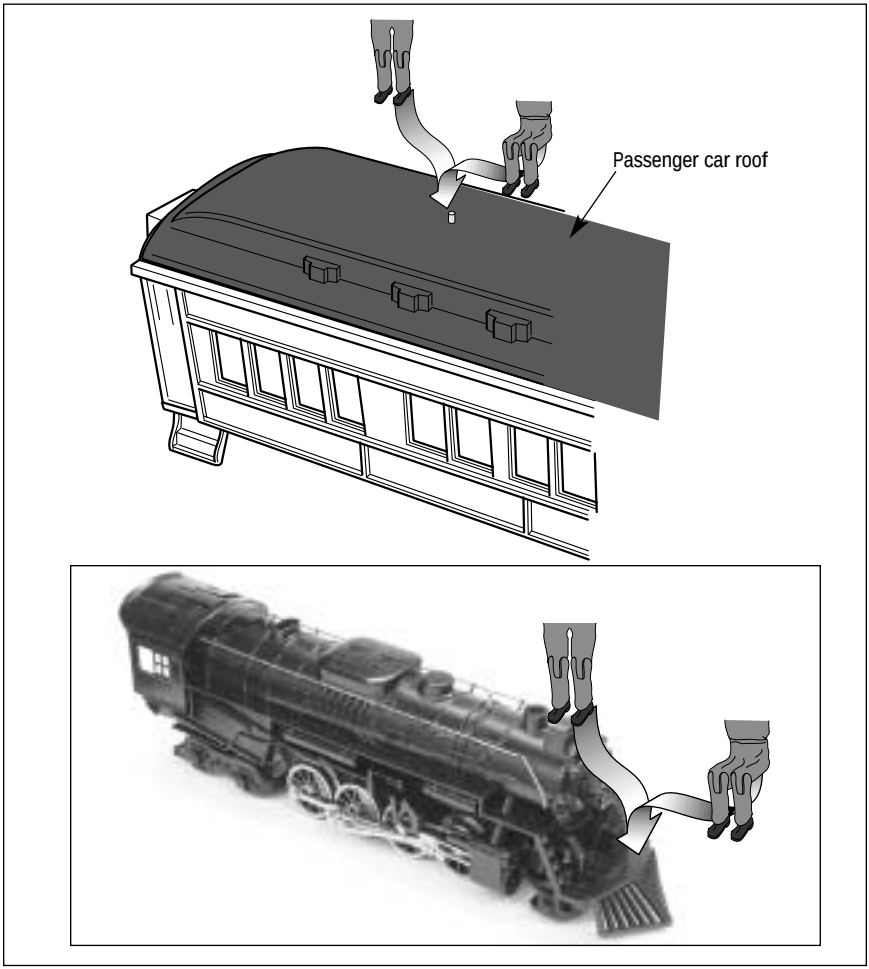


Figure 7. Figure installation

Running your train

Experiencing the features of the CW-80 Transformer

Refer to Figure 8 on page 13 for the location of the Transformer features listed in this section.

THROTTLE

Push the throttle forward to increase track power. The markings on the throttle approximate the percentage of full power. For more realism, push the throttle slowly to gradually increase or decrease the speed of the locomotive. Slowing or stopping the locomotive with the throttle instead of the DIRECTION button will allow you to continue in the same direction when you increase the throttle again. To achieve this effect, reduce the throttle to the point that the locomotive stops moving, but don't completely turn off the throttle. That way, your train won't sequence into neutral.

DIRECTION

The DIRECTION control button interrupts track power to activate the reverse unit in your locomotive. Your locomotive will not respond to this button when the reverse unit switch is in the OFF position.

WHISTLE

The WHISTLE 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.

Note! Your locomotive features an operating air whistle in the tender.

BELL

The BELL button will activate the bell sounds on locomotives equipped with this feature. Press and hold the BELL button for two to three seconds to begin the sounds; press and hold the button again to turn off the ringing.

Note! Your locomotive is not equipped with bell sounds.

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 CW-80 Transformer, then turn it back on.

POWER-ON INDICATOR

The green light will remain on during normal operation. The green light will begin to flash if you exceed the power limit of the Transformer. The unit will allow you to momentarily exceed the power limit, but power will be gradually reduced until the problem is corrected. The benefit is that the Transformer will not instantly turn off.

Experiencing the features of the CW-80 Transformer (continued)

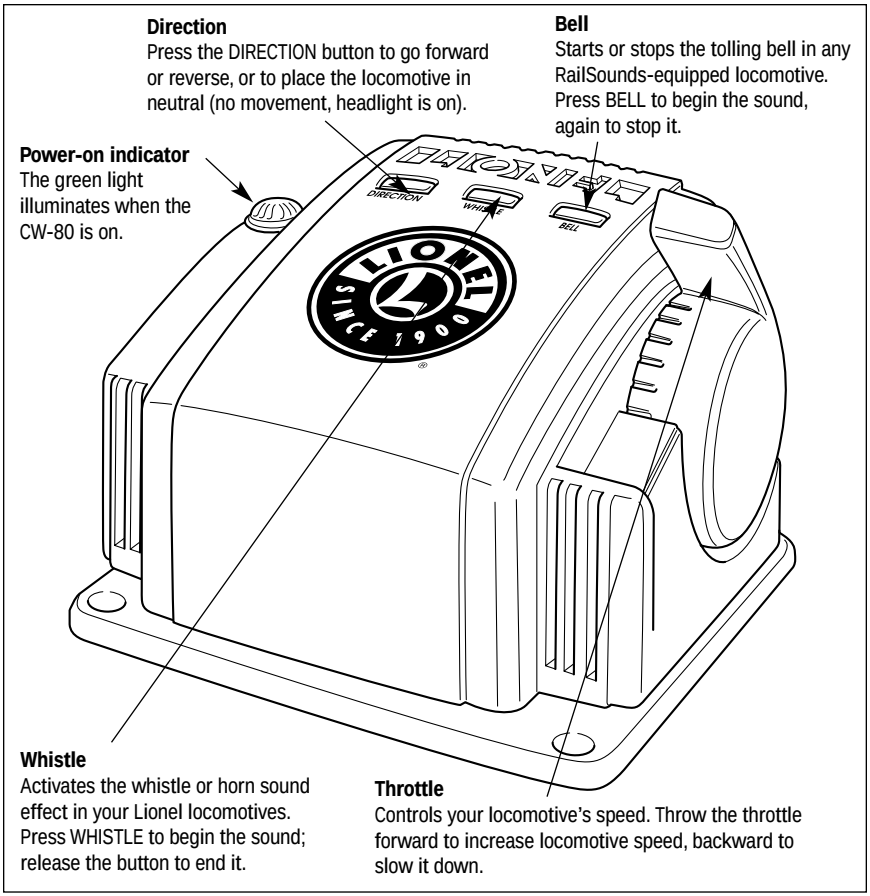


Figure 8. Transformer features

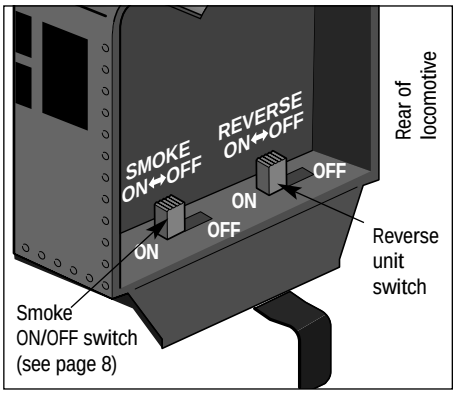
Reverse unit procedure

The electronic reverse unit inside your Lionel locomotive acts like the transmission in a car. When you apply power to the track, the locomotive moves in the direction specified by the reverse unit—or it sits in neutral, awaiting another power interruption. Power interruptions are the signal that tells the reverse unit to sequence to the next operational state.

To interrupt power and sequence the locomotive's reverse unit, press the direction control button or briefly bring the throttle lever all the way back to the OFF position. Refer to Figure 10 for the location of these controls. The reverse unit alternates between three states: forward, neutral, and reverse.

Also, the locomotive can be "locked" into a certain mode of operation by throwing the reverse unit switch located inside the cab (see Figure 9). To lock your locomotive into a specific operational state, sequence the locomotive into the desired state and reduce track power without completely powering down the locomotive, then throw the switch to the OFF position. The DIRECTION button will then have no affect on the direction of the locomotive. If you would like to resume forward-neutral-reverse operation, simply throw the reverse unit switch back to the ON position.

Additionally, this reverse unit has a "power-up reset" feature. If the locomotive sits without power for a short period of time, the reverse unit will automatically reset and start in the forward direction when the transformer is turned on or "powered up," regardless of the reverse unit switch position. If the switch is in the OFF position, the locomotive will start in the forward direction and be "locked" there.



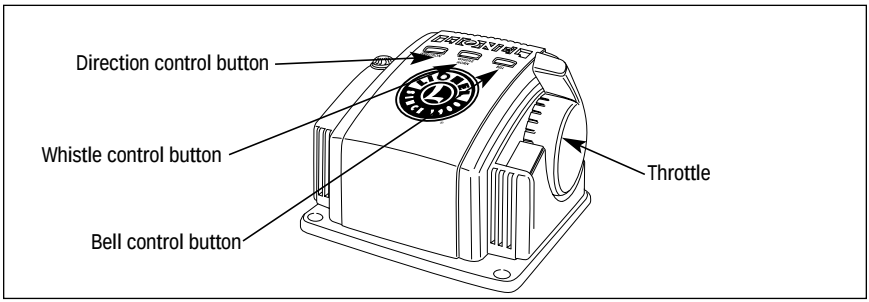


Figure 10. Direction control button location

CW-80 Transformer operation

Powering your layout with the CW-80 Transformer

Your CW-80 Transformer provides a total output of five amps. The track outputs will deliver all of this power to the track when no accessories are connected to the Transformer. Keep in mind that connected accessories borrow some of this power. For example, if the accessories require two amps of the total five-amp capacity of the Transformer, you have three amps available for track power. This built-in flexibility will provide power for virtually any small- to medium-sized railroad. Also, available voltage depends on how much load is on the two outputs. Generally, track voltage and accessory voltage are 0-18 volts (AC) each.

This Transformer is capable of operating trains up to and including dual-motored AC locomotives. To operate at this level of track power, it may be necessary to disconnect any accessories. You may also attempt to lower the accessory voltage settings. Refer to the "Setting the accessory output" section on page 16.

You may momentarily approach or exceed the five-amp limit of the CW-80 Transformer when pulling illuminated cars, fighting over grades with heavy loads, or operating accessories. When you reach five amps, the green light on the Transformer will begin to flash. This indicates that the Transformer is in "fold-back mode." In fold-back mode, the Transformer is automatically reducing, or folding back, power. This gradual reduction in power provides interruption-free operation while you bring the amperage back down to a safe level.

CW-80 Transformer operation

Setting the accessory output

Lionel offers accessories of all shapes and sizes — from crossing signals to coal and lumber loaders — available at your authorized Lionel dealer. When you are ready to operate your new accessory, the CW-80 Transformer allows you to choose how much power your accessory receives with programmable accessory output. The ability to control the voltage allows you to set the speed of your accessory motors and the intensity of your lights. Accessories connected to the accessory output terminals receive constant voltage whenever the transformer is plugged in, regardless of the throttle position. Follow these steps to set the voltage.

Note! The accessory output voltage was set to 12 volts at the factory.

1. **Connect your accessory to the CW-80 Transformer as discussed on page 6.**
2. **Bring the throttle all the way back to the OFF position.**
3. **Press and hold down the DIRECTION, WHISTLE, and BELL buttons on the Transformer. Refer to Figure 8 on page 12 for the location of these buttons.**

   The green light on the Transformer will flash, and track power will turn off.
4. **With all three buttons held down, raise the throttle slowly until you reach your desired accessory voltage.**
5. **Release the buttons once you have reached your desired voltage.**

   The accessory turns off, and the solid green light indicates that you have set the accessory voltage.
6. **Bring the throttle all the way back to turn off the power.**

   The voltage will momentarily increase, briefly causing the lights to shine brighter or the motors to operate faster, before returning to the set level. At this point, increasing the throttle again will control track power only.

Maintaining and servicing your set

Lubricating your locomotive

Help your steam locomotive lead a long and productive life on your railroad by maintaining it properly.

We recommend that you purchase a Lionel Lubrication and Maintenance Kit (6-62927), available from your Lionel dealer. Two basic rules to keep in mind: never over-lubricate (a small amount will do) and avoid getting grease or oil on the locomotive's wheels, contact rollers, or your track.

You'll know your locomotive requires lubrication when visual inspection reveals dryness on the parts indicated in Figure 11. Remove accumulated dirt and dust before lubricating, and always lubricate any locomotive emerging from prolonged storage.

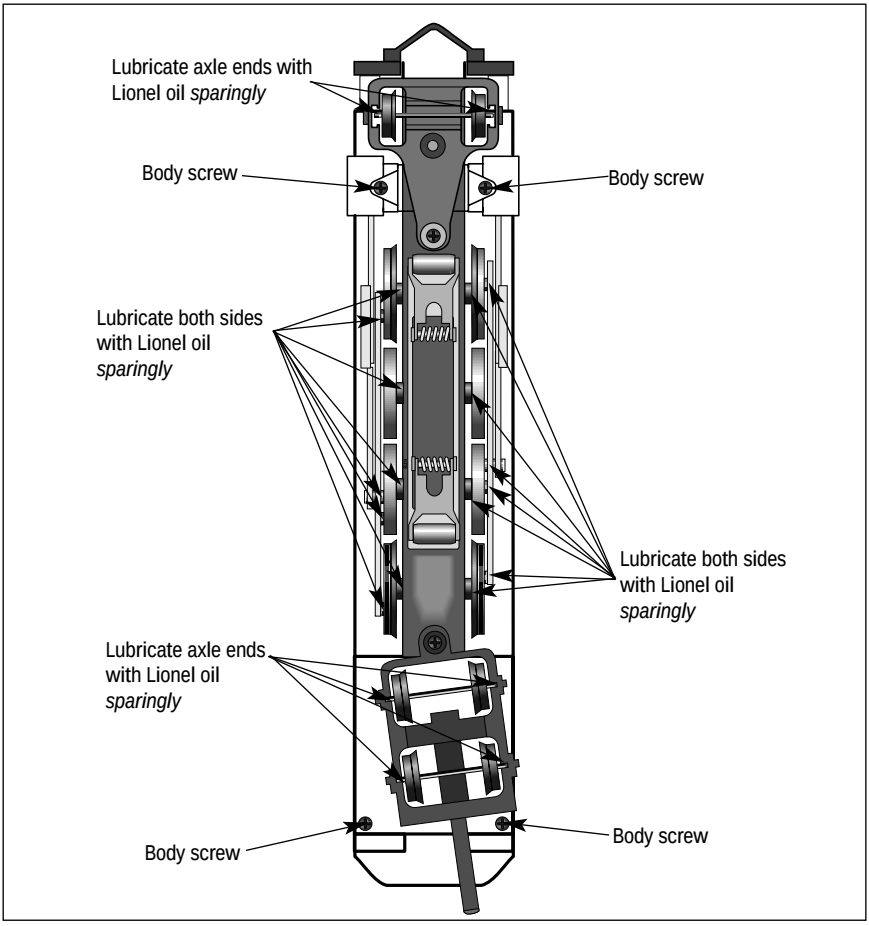


Figure 11. Lubrication points

Maintaining and servicing your set

Replacing your locomotive's traction tire

One of the locomotive's drive wheels is fitted with a rubber traction tire to enhance tractive effort, allowing your locomotive to pull many cars at once.

To replace the traction tire, simply unscrew the drive rod nut from the wheel using a 3/16" nut driver. Refer to Figure 12. Remove the old traction tire from under the drive rod and slip on the replacement, Lionel part no. 600-0242-206. Replace the spacer, retighten the drive rod nut, and you're ready to pull that long freight back to the yard.

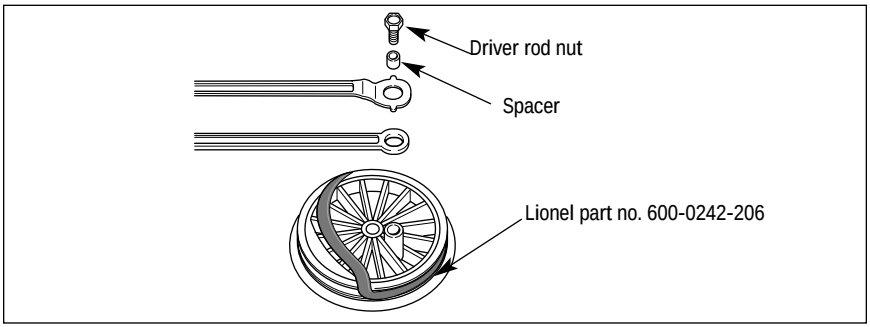


Figure 12. Traction tire replacement

Replacing your locomotive's headlamp

Your locomotive's headlight and marker lights are illuminated by one lamp. During the course of normal operations, the lamp may require replacement.

Carefully remove the three body screws (see Figure 11on page 16 for their locations), then lift the body off of the frame. Locate and unscrew the expired lamp shown in Figure 13. Replace the lamp with Lionel part no. 600-2314-300, available from your authorized Lionel Service Center. (See the Lionel Service section on page 20 for more information.) Reinstall the cab and the three screws, taking care to not pinch any wires during reassembly.

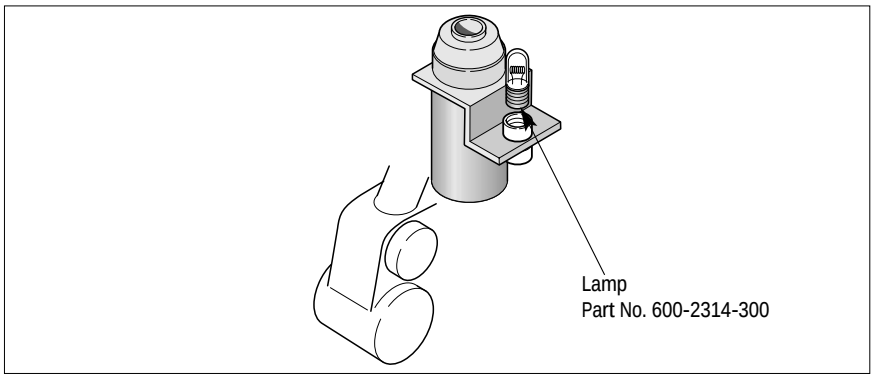


Figure 13. Lamp replacement

Maintaining and servicing your set

Replacing the passenger car lamps

Each passenger car is illuminated by two lamps, Lionel part no. 600-8352-311. During the course of normal operations, you may find that the lamps require replacement. Replacement lamps are available at your authorized Lionel Service Center or from Lionel Service in Chesterfield, MI.

Before performing this procedure on the observation car, pull the platform back to disengage the tabs from the slots in the body. Lift away the platform and remove the three screws from the underside of the roof above the end platform.

1. As illustrated in Figure 14, press in the four window insert tabs.
2. Lift away the roof and window insert.
3. Pull the expired lamp straight up and out of the socket and install the replacement.
4. Replace the roof and window insert. Replace the three screws in the roof above the observation car platform. Refer to Figure 14.

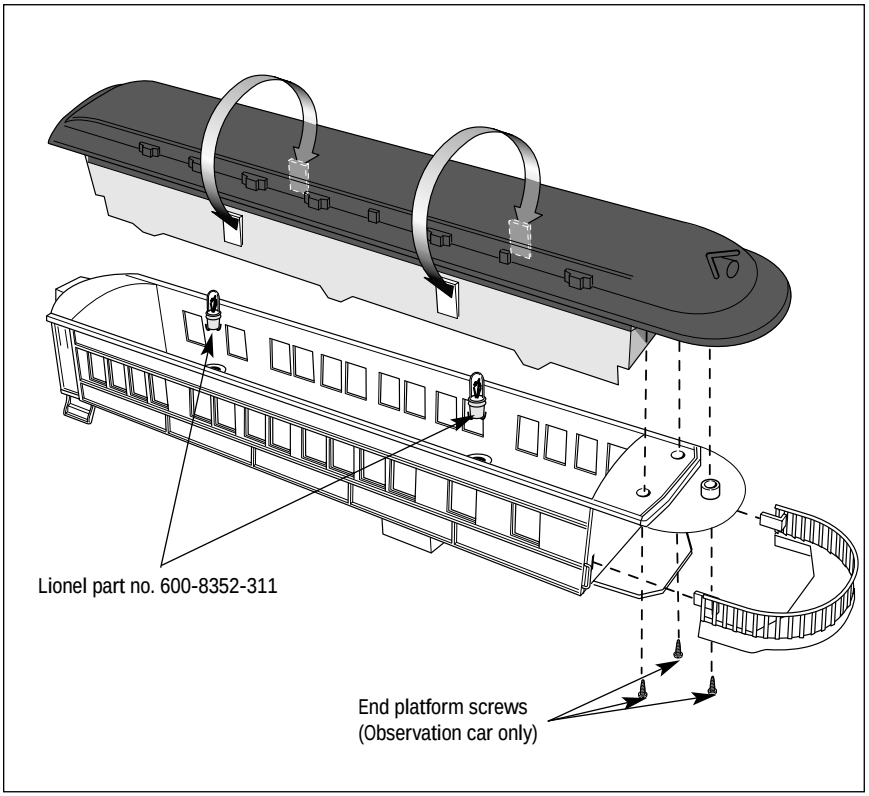


Figure 14. Passenger car lamp replacement

Maintaining and servicing your set

Advanced connections: powering two isolated blocks with two transformers

As you expand your layout, you may decide to create two isolated blocks of track. Trains in each block are controlled by separate transformers.

Before you operate your trains on this type of layout, be sure that your transformers are in phase. Operating your trains on a layout with two transformers that are out of phase may cause damage to the locomotive's sensitive electronic components.

To be certain that your transformers are in phase, use a small 18-volt lamp with leads (available at your local electronics supply store) to perform a quick test. Refer to Figure 15.

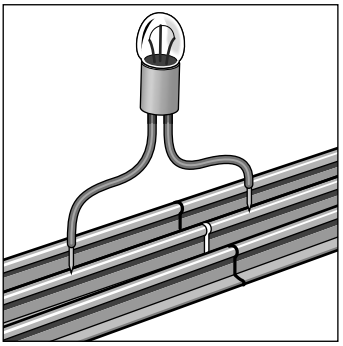


Figure 15. Testing for proper phasing

1. Attach one lamp wire to the center rail in one block.
2. Attach the second lamp wire to the center rail in the other block.
3. Power up both blocks of track. Both transformers should be set to full power.
4. See if the lamp illuminates.

If the lamp illuminates brightly, your transformers are not in phase. Do not operate your trains on the layout until you change the wiring. If the lamp does not illuminate or the lamp is dim, your transformers are in phase and should not cause problems.

To bring your transformers into phase, simply swap the track wires at the A and U terminals on one of the transformers. If you are using an older transformer that lacks a polarized plug, you may reverse the plug at the outlet so that the prongs are inserted into the opposite openings. Repeat the procedure described above, and you should find that the lamp does not illuminate or the lamp is dim.

Note! This will also reverse the operation of the BELL and WHISTLE buttons on the transformer with the switched wires.

Limited Warranty/Lionel Service

This 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 merchant.

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 Center, 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 Center. Your nearest Lionel Service Center can be found by calling 1-800-4-Lionel, or by accessing our Website at www.lionel.com.

If you prefer to send your product back to Lionel L.L.C. for repair in Michigan, you must first call 586-949-4100 or FAX 586-949-5429, 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. You may choose to have your product repaired by one of our Authorized Lionel Service Centers after its warranty has expired. A reasonable service fee will be charged.

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 _____