



# RKS SD-45 Diesel Engine

## OPERATOR'S MANUAL

(Loco-Sound)



### Compatibility

This engine will operate on any traditional O-31 Gauge track system, including M.T.H.'s RealTrax® or ScaleTrax™ or traditional tubular track. It is also compatible with most standard AC transformers. (See page 22 for a complete list of compatible transformers and wiring instructions.)



PLEASE READ BEFORE USE AND SAVE

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**CAUTION: ELECTRICALLY OPERATED PRODUCT:**

Not recommended for children under 10 years of age. M.T.H. recommends adult supervision with children ages 10 - 16. As with all electric products, precautions should be observed during handling and use to reduce the risk of electric shock.

**WARNING:** When using electrical products, basic safety precautions should be observed, including the following:  
Read this manual thoroughly before using this device.

- M.T.H. recommends that all users and persons supervising use examine the hobby transformer and other electronic equipment periodically for conditions that may result in the risk of fire, electric shock, or injury to persons, such as damage to the primary cord, plug blades, housing, output jacks or other parts. In the event such conditions exist, the train set should not be used until properly repaired.
- Do not operate your layout unattended. Obstructed accessories or stalled trains may overheat, resulting in damage to your layout.
- This train set is intended for indoor use. Do not use if water is present. Serious injury or fatality may result.
- Do not operate the hobby transformer with damaged cord, plug, switches, buttons or case.

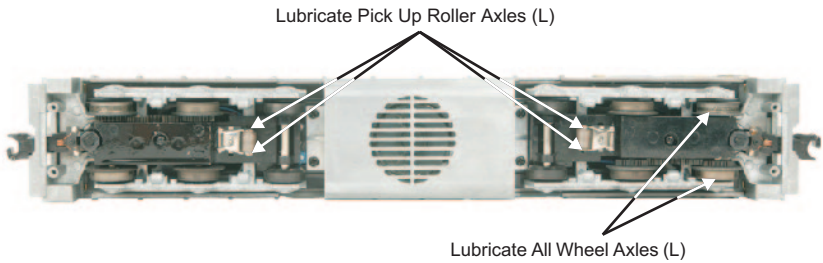
This product may be protected by one or more of the following patents:  
6,019,289; 6,280,278; 6,281,606; 6,291,263; 6,457,681; 6,491,263; 6,604,641;  
6,619,594; 6,624,537; 6,655,640.

# Set Up Checklist

- Lubricate the locomotive
- Prime the smoke unit
- Apply power to run as described in the Basic Operating Section of this manual

## Lubrication

You should lubricate the engine to prevent it from squeaking. Use light household oil and follow the lubrication points marked “L” in Figure 1. Do not over-oil. Use only a drop or two on each pivot point.



*Figure 1. Lubrication Points on the Locomotive*

# Priming the Smoke Unit

When preparing to run this engine, add 15-20 drops of smoke fluid through the smokestack (see Figure 2). We recommend M.T.H. ProtoSmoke, Seuthe, LGB, or LVTS fluids. Do not overfill the unit or the fluid may leak out and coat the interior engine components.

If you choose not to add smoke fluid (or have already added fluid but choose to run smoke-free), turn off the smoke unit by turning the smoke unit switch to the “OFF” position. **Failure either to add fluid to the smoke unit or to turn it off may damage the smoke unit heating element and/or wicking material.**

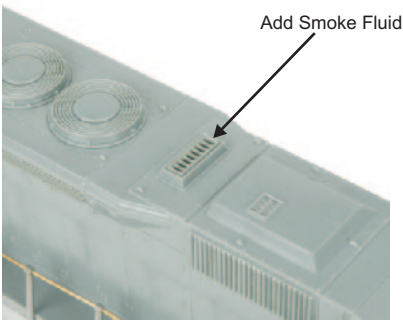


Figure 2. Adding Smoke Fluid

 **Running the engine without a primed smoke unit may cause damage**

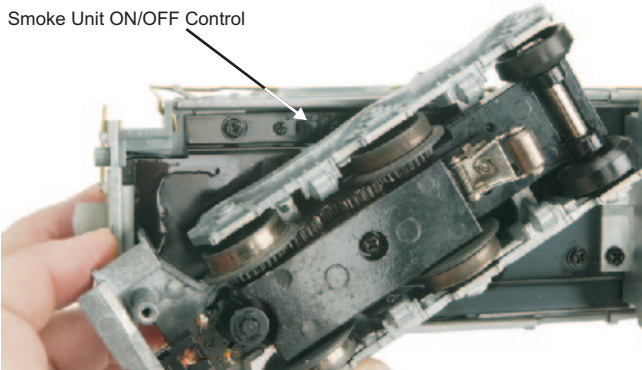


Figure 3. Smoke Unit Control

# Basic Operation

The Throttle knob controls how fast your train will travel. Turn the throttle knob up 1/2-way, until the engine and caboose lights shine bright. Put the engine into motion by pressing the Direction button on your transformer once. (hold it for approximately 1 second)

If the engine does not begin to move as soon as you firmly press the Direction button, you may not have sent enough voltage to the track to make the train move. Turn the throttle up a bit higher until the train begins to move.

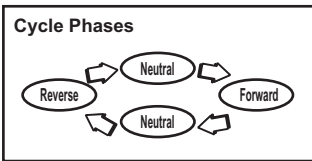
## Activating Features

**Throttle** - To increase or decrease track voltage, and therefore train speed, turn the throttle control knob. Turning clockwise will increase voltage and speed, while turning counterclockwise will decrease voltage and speed. The engine will maintain the speed you set after you release the throttle until you turn it again to change the voltage and speed.

**Bell** - To sound the bell, in an engine equipped with a bell firmly press and release the Bell button. To turn the bell off, press and release the Bell button again. The bell will continue to ring from the time you turn it on until you press and release the button again to turn it off.

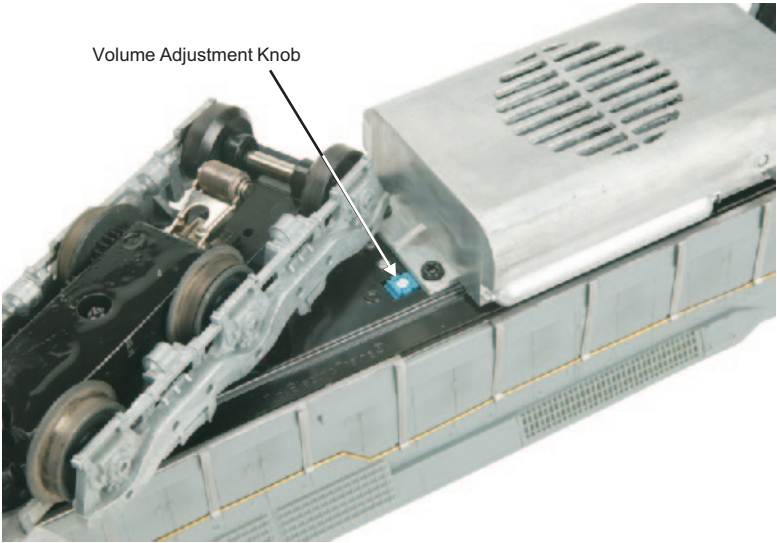
**Horn/Whistle** - To sound the whistle, firmly press the Horn/Whistle button. The whistle will sound for as long as you continue to depress the button. It will stop when you release the button.

**Direction** - Your train is programmed to start in neutral. The train will always cycle neutral-forward-neutral-reverse with each press and release of the direction button. The engine is programmed to restart in neutral each time the track voltage is turned off for 25 seconds or more.



# Manual Volume Control

To adjust the volume of all sounds made by this engine, turn the master volume control knob located next to the fuel tank clockwise to increase the volume and counter-clockwise to decrease the volume.



*Figure 4. Manual Volume Adjustment Knob*

# Loco-Sound Operating Instructions

## Speed Control

M.T.H. engines equipped with Loco-Sound have speed control capabilities that allow the engine to maintain a constant speed up and down grades and around curves, much like an automobile cruise control. You can add or drop cars on the run, and the engine will maintain the speed you set.

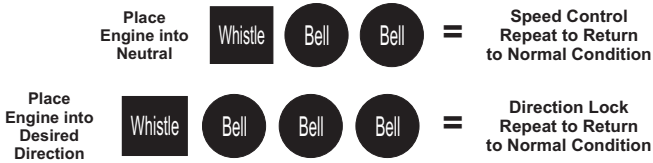
While the engine is programmed to start with the speed control feature activated, you can opt to turn it off. This means the engine's speed will fall as it labors up a hill and increase as it travels downward. It is also affected by the addition or releasing of cars while on the run. To maintain a constant speed when speed control is turned off, you need to adjust track voltage yourself.

**To turn speed control on and off**, put the engine in neutral, then quickly tap the transformer's Whistle button one time then quickly tap the Bell button two times, allowing approximately ½ second to lapse between each quick button press. Repeat the 1 whistle, 2 bells code to return it to the other condition. **You will want to do this during the initial neutral upon start-up if you ever couple this engine to another engine that is not equipped with speed control to avoid damaging the motors in either engine.** Each time you shut down the engine completely, it will automatically turn speed control on.

# Direction Lock

You can lock your engine into a direction (forward, neutral, or reverse) so that it will not change directions. To do this, put the engine into the direction you want or into neutral, to lock it into neutral, run it at a very slow crawl (as slowly as it will move without halting), and quickly but firmly tap the Whistle button once followed by three quick taps of the Bell button, allowing approximately 1/2 second to lapse between each quick button press. The engine will not change direction (including going into neutral) until you repeat the 1 whistle, 3 bells code to return the engine to its normal condition, even if the engine is kept without power for extended periods of time.

Timing Chart				
Press Whistle Short & Firm	1/2 Sec. Pause	Press Bell Short & Firm	1/2 Sec. Pause	Press Bell Short & Firm
Total Time Lapse: 1 1/2 Seconds				



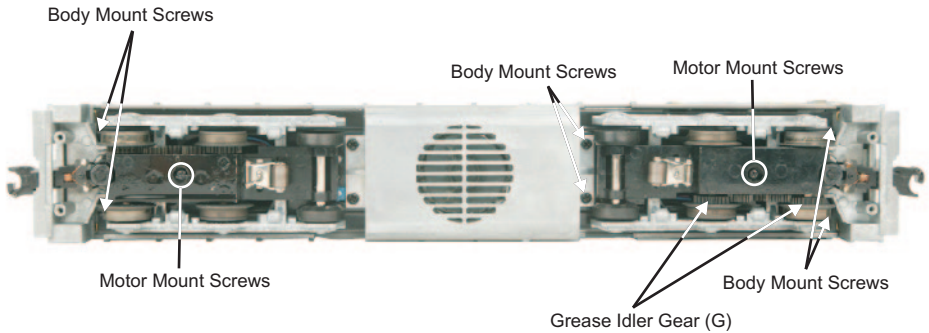


# Maintenance

## Lubricating and Greasing Instructions

The engine should be well oiled and greased in order to run properly.

Regularly lubricate all axles and pickup rollers to prevent squeaking. Use light household oil, such as that found in M.T.H.'s maintenance kit. Do not over oil. Use only a drop or two on each pivot point.



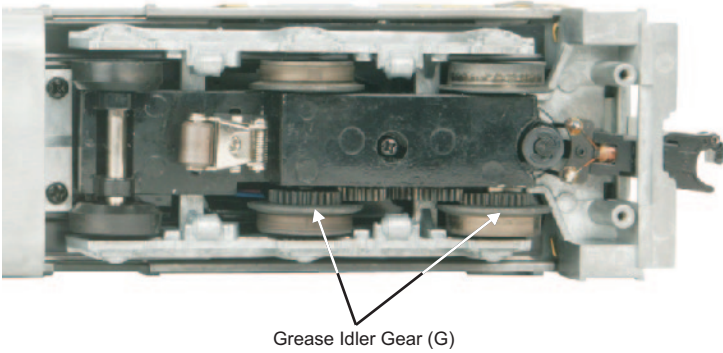
*Figure 5. Body Removal Screw Locations*

The locomotive's internal gearing was greased at the factory and should not need additional grease until after 50 hours of operation or one year, whichever comes first. Follow the greasing instructions below. Note that in some tightly packed engines you may need to move internal components temporarily in order to access the gears.

1. To access the gear box, remove the cab from the chassis by unscrewing the body mount screws as seen in Figure 5 and lifting the cab from the chassis.
2. Once the cab is removed, remove the trucks by unscrewing the black Phillips motor mount screw located on the underside of the drive trucks (see Figure 5).
3. Once the motor mount screw has been removed, pull the motor away from the truck block and lightly coat the motor worm gear and bronze drive gear (in the truck block) with grease.
4. Reassemble the truck and motor, being careful not to pinch any wires between the truck block and motor mount.

5. After repeating the procedure for the other motor, reassemble the chassis and body, being careful that the wire harnesses are not caught between the chassis and body, and reinstall the body mount screws

Lubricate the outside truck block idler and drive gears with grease. Use the diagram shown in Figure 6 below as a guide and add grease to the points marked.



*Figure 6. Greasing The Idler Gears*

## **Cleaning The Wheels, Tires, and Track**

Periodically check the locomotive wheels and pickups for dirt and buildup, which can cause poor electrical contact and traction and prematurely wear out the neoprene traction tires. Wheels and tires can be cleaned using denatured (not rubbing) alcohol applied with a cotton swab.

To clean the track, use RailKing Track Cleaning Fluid or denatured (not rubbing) alcohol and a clean rag. Unplug the transformer and wipe the rails of the track, turning the rag frequently to ensure that you are using clean cloth on the rails. Thereafter, keep an eye on the track and clean it when it gets dirty to ensure good electrical contact and to lengthen the life of the tires.

# Traction Tire Replacement Instructions

Your locomotive is equipped with two neoprene rubber traction tires on each powered truck block. While these tires are extremely durable, they may occasionally need replacement.

First, remove the truck sides from the truck block. To do this, turn your engine upside down and remove the chassis as detailed on page 12.

Remove the trucks from the chassis and the truck sides from the trucks in order to slip the new tire over the grooved drive wheel. Once the truck sides have been removed:

1. Make sure the old tire has been completely removed from the groove in the drive wheel, using a razor blade or small flathead screwdriver to pry away any remains.
2. Slip the new tire onto the wheel. You may find it useful to use two small flathead screwdrivers to stretch the tire over the wheel.
3. If you twist the tire while stretching it over the wheel, you will need to remove and reinstall the tire. Otherwise your engine will wobble while operating.
4. Make sure the tire is fully seated inside the groove. Use a razor blade to trim away any excess tire that will not seat inside the groove properly.
5. Reassemble in the reverse order.

Replacement parts are available directly from the M.T.H. Parts Department (order online: [www.mth-railking.com](http://www.mth-railking.com), e-mail: [parts@mth-railking.com](mailto:parts@mth-railking.com); mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, FAX: 410-381-6122).

# Locomotive Light Bulb Replacement

To replace the headlight and cab interior lights on this locomotive, follow these instructions.

Follow the cab removal instructions in the “Lubrication and Greasing Instructions” section on pg. 12 of this manual. Once the body has been removed, follow the instructions below and remove the lights as shown in Figure 7.

## Headlight

The locomotive’s headlight is controlled by a constant voltage circuit in the engine. The headlight is easy to remove and replace when it burns out. The bulb has a quick disconnect plug that attaches the bulb harness to a connector terminal.

Gently disconnect the bulb harness from the connector terminal and remove bulbs through the rear of the headlight socket. Insert the new bulb harness and reconnect. Replacement bulb harnesses are available directly from the M.T.H. Parts Department.

## Cab Interior Lights

The cab interior lights are also made with a bulb harness that attaches to a quick disconnect plug. Gently disconnect the bulb harness from the connector, and remove the bulb. Insert the new bulb harness and reconnect. Replacement bulb harnesses are available directly from the M.T.H. Parts Department.

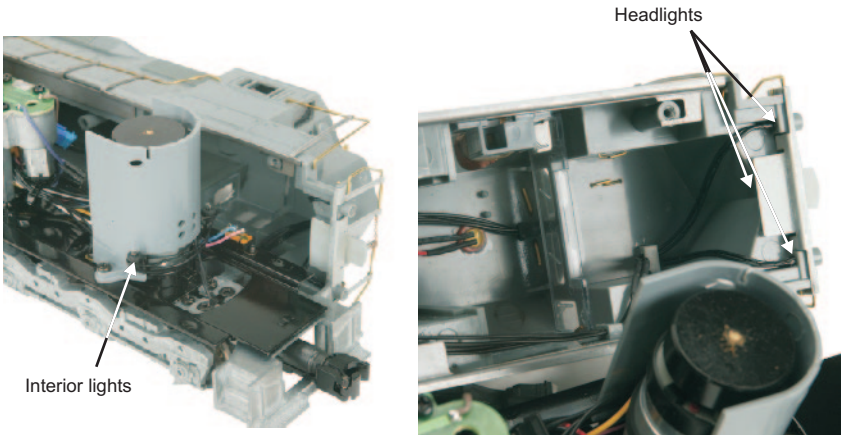


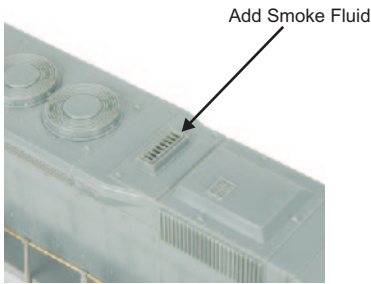
Figure 7. Replacing the Light Bulbs

## ProtoSmoke® Unit Operation

This diesel locomotive contains a Proto-Sound 2.0 controlled smoke unit that outputs smoke through the smokestack on the roof of the engine. The smoke unit is essentially a small heating element and wick that soaks up and then heats a mineral oil-based fluid that emits smoke. The smoke is then forced out of the stack by a small electric fan. Smoke volume is controlled by the Proto-Sound 2.0 system.

With a few easy maintenance steps, you should enjoy trouble-free smoke unit operation for years.

When preparing to run this engine, add 15-20 drops of smoke fluid through the smokestack (see Figure 8). We recommend M.T.H. ProtoSmoke, Seuthe, LGB, or LVTS fluids. Do not overfill the unit or the fluid may leak out and coat the interior engine components.



*Figure 8. Filling The Smoke Unit*

To adjust the amount of smoke produced, turn the smoke unit volume control clockwise to increase the amount of smoke, or counter-clockwise to reduce the amount (see Figure 3)

If you choose not to add smoke fluid (or have already added fluid but choose to run smoke-free), turn off the smoke unit by turning the smoke unit switch to the “OFF” position (see Figure 3). **Failure either to add fluid to the smoke unit or to turn it off may damage the smoke unit heating element and/or wicking material.**

When the smoke output while running the engine begins to diminish, add another 10-15 drops of smoke fluid or turn the smoke unit off.

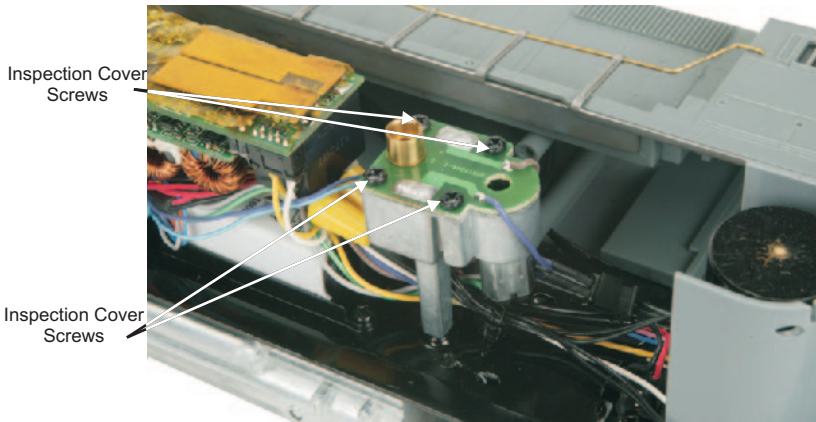
When storing the unit for long periods of time, you may want to add about 15 drops of fluid to prevent the wick from drying out.

After removing the engine from storage, add another 25 drops of fluid, letting the wick soak up the fluid for 15 minutes prior to operation.

After removing the engine from storage, add another 25 drops of fluid, letting the wick soak up the fluid for 15 minutes prior to operation.

If you experience poor or no smoke output when the smoke unit is on and has fluid, check the wick to see if it has become hard, blackened, and unabsorbent around the heating element. After removing the locomotive body from its chassis (See Figure 5), remove the smoke unit inspection cover (see Figure 9). After removing the inspection cover screws, lift the inspection plate away and inspect the wick. If it is darkly discolored and hard, it should be replaced.

Replacement parts and wick replacement instructions are available directly from the M.T.H. Parts Department (order online: [www.mth-railking.com](http://www.mth-railking.com), e-mail: [parts@mth-railking.com](mailto:parts@mth-railking.com); mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, FAX: 410-381-6122).



*Figure 9. Inspecting the Smoke Unit Wick*

# Troubleshooting Loco-Sound™ Problems

Although Loco-Sound has been designed and engineered for ease of use, you may have some questions during initial operation. The following table should answer most questions. If your problem cannot be resolved with this table, contact M.T.H. for assistance (e-mail: [service@mth-railking.com](mailto:service@mth-railking.com); telephone: 410-381-2580; fax: 410-423-0009; mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532).

<b>Starting Up</b>		<b>Remedy</b>	
When I first turn the power on, the engine will not begin to run.		This is normal behavior. To prevent accidental high-speed start-ups, Loco-Sound is programmed to start up in neutral anytime track power has been turned off for several seconds. See the "Basic Operation" section for more details.	
The engine will not start after I press the Direction button.		You may not be sending enough power to the track to power the engine. Press the throttle up for a few more seconds to increase track power.	
<b>Whistle</b>		<b>Remedy</b>	
I can't get the whistle to blow when I press the whistle button.		You may be pressing the button too quickly. Try pressing the whistle button more slowly, taking approximately one full second to fully depress the button.	
<b>Bell</b>		<b>Remedy</b>	
I can't get the bell to ring when I press the bell button.		You may be pressing the button too quickly. Try pressing the bell button more slowly, taking approximately one full second to fully depress the button.	
<b>Lock-out</b>		<b>Remedy</b>	
I can't get the engine to run after I power up the transformer. It sits still with the engine sounds running.		The engine may be locked into the neutral position. Follow the procedure in the "Lock into a Direction" section to unlock the engine's direction.	
The engine won't lock into forward, neutral, or reverse.		Engine speed must be below 10 scale mph (approx. 10 volts or less in conventional mode).	
<b>Volume</b>		<b>Remedy</b>	
The sounds seem distorted, especially when the Horn or bell is activated.		Loco-Sound volume is set too high. Turn the volume control knob on the bottom of the tender counter-clockwise to <u>reduce the volume</u> .	
No sound.		Volume is set too low, adjust volume control knob on the bottom of the chassis clockwise to increase the volume or check connector to speaker.	

# Transformer Compatibility and Wiring Chart

Note that many of the operational commands described in these instructions require a bell button, so if you are using a transformer other than the one included in this set and your transformer does not have its own bell button, you should consider adding one to get the full benefit of the system.

Transformer Model	Center Rail	Outside Rail	Min/Max. Voltage	Power Rating	Transformer Type
MTH Z-500	Red Terminal	Black Terminal	0-18v	50-Watt	Electronic
MTH Z-750	Red Terminal	Black Terminal	0-21v	75-Watt	Electronic
MTH Z-1000	Red Terminal	Black Terminal	0-14v 0-18v	80-Watt 100-Watt	Electronic
MTH Z-4000	Red Terminal	Black Terminal	0-22v	390-Watt	Electronic
Lionel 1032	U	A	5-16v	90-Watt	Standard
Lionel 1032M	U	A	5-16v	90-Watt	Standard
Lionel 1033	U	A	5-16v	90-Watt	Standard
Lionel 1043	U	A	5-16v	90-Watt	Standard
Lionel 1043M	U	A	5-16v	90-Watt	Standard
Lionel 1044	U	A	5-16v	90-Watt	Standard
Lionel 1053	U	A	8-17v	60-Watt	Standard
Lionel 1063	U	A	8-17v	60-Watt	Standard
All-Trol	Left Terminal	Right Terminal	0-24v	300-Watt	Electronic
Dallee Hostler	Left Terminal	Right Terminal			Electronic
Lionel LW	A	U	8-18v	75-Watt	Standard
Lionel KW	A or B	U	6-20v	190-Watt	Standard
Lionel MW	Outside Track Terminal	Inside Track Terminal	5-16v	50V.A.	Electronic
Lionel RS-1	Red Terminal	Black Terminal	0-18v	50V.A.	Electronic
Lionel RW	U	A	9-19v	110-Watt	Standard
Lionel SW	U	A	Unknown	130-Watt	Standard
Lionel TW	U	A	8-18v	175-Watt	Standard
Lionel ZW	A,B,C or D	U	8-20v	275-Watt	Standard
Lionel Post-War Celebration Series ZW	A,B,C or D	Common	0-20v	135/190 Watt	Electronic



# Service & Warranty Information

## How to Get Service Under the Terms of the Limited One-Year Warranty

When you suspect an item is defective, please check the operator's manual for standard operation and troubleshooting techniques that may correct the problem. Additional information may be found on the M.T.H. Website. Should you still require service, follow the instructions below to obtain warranty service.

First, e-mail, write, call or fax a M.T.H. Authorized Service Center (ASC) in your area to obtain Repair Authorization. You can find the list of ASCs on the M.T.H. Website, [www.mth-railking.com](http://www.mth-railking.com). Authorized Service Centers are required to make warranty repairs on items sold *only* from that store; all other repairs may-- or may not be done at the store's own discretion. If you did not purchase the item directly from the ASC, you will need to select a National Authorized Service Center (NASC). These centers are compensated by M.T.H. to perform warranty service for any customer whose repair qualifies for warranty service. A list of NASC retailers can be located on the M.T.H. Website or by calling 1-888-640-3700. Should the warranty no longer apply, you may choose either an ASC or NASC retailer to service your M.T.H. Product. A reasonable service fee will be charged.

**CAUTION:** Make sure the product is packed in its original factory packaging including its foam and plastic wrapping material to prevent damage to the merchandise. There is no need to return the entire set if only one of the components is in need of repair *unless otherwise instructed by the Service Center*. **The shipment must be prepaid and we recommend that it be insured. A cover letter including your name, address, daytime phone number, e-mail address (if available), Return Authorization number (if required by the service center, a copy of your sales receipt and a full description of the problem must be included to facilitate the repairs. Please include the description regardless of whether you discussed the problem with a service technician when contacting the Service Center for your Return Authorization.**

Please make sure you have followed the instructions carefully before returning any merchandise for service. Authorized M.T.H. Service Centers are independently owned and operated and are not agents or representatives of M.T.H. Electric Trains. M.T.H. assumes no responsibility financial or otherwise, for material left in their possession, or work done, by privately owned M.T.H. Authorized Service Centers. If you need assistance at any time email MTH Service at [service@mth-railking.com](mailto:service@mth-railking.com), or call 410 381-2580.

## Limited One-Year Warranty

**All M.T.H. products purchased from an Authorized M.T.H. Train Merchant are covered by this warranty.**

See our website at [www.mth-railking.com](http://www.mth-railking.com) or call 1-888-640-3700 to identify an Authorized M.T.H. Train Merchant near you.

M.T.H. products are warranted for one year from the date of purchase against defects in material or workmanship, excluding wear items such as light bulbs, pick-up rollers, batteries, smoke unit wicks, and traction tires. We will repair or replace (at our option) the defective part without charge for the parts or labor, if the item is returned to an M.T.H. Authorized Service Center (ASC) or M.T.H. National Authorized Service Center (NASC) within one year of the original date of purchase. This warranty does not cover damages caused by improper care, handling, or use. Transportation costs incurred by the customer are not covered under this warranty.

Items sent for repair must be accompanied by a return authorization number, a description of the problem, and **a copy of the original sales receipt from an Authorized M.T.H. Train Merchant**, which gives the date of purchase. If you are sending this product to an Authorized Service Center, contact that Center for their return authorization.

This warranty gives you specific legal rights, and you may have other rights that vary from state to state. Specific questions regarding the warranty may be forwarded to M.T.H. Directly

Service Department:  
M.T.H. Electric Trains  
7020 Columbia Gateway Drive  
.Columbia MD 21046-1532