

# RAILKING SW 8&9 DIESEL ENGINE OPERATING INSTRUCTIONS



This RailKing SW 8&9 Diesel Engine is perfectly suited for all types work on your railroad. It has an ABS body and die-cast floor and runs on O-31 track. This RailKing Diesel Engine contains state-of-the-art electronics with many built-in automatic features for incredibly realistic operation. Despite these advanced features, the locomotive is easy to operate with any compatible standard AC transformer (see the compatibility chart on page 18), and is completely compatible with most other 3-rail locomotives, rolling stock, and accessories.

This locomotive is equipped with Proto-Sound 2.0 with Digital Command System (DCS). This new system will allow you to operate your locomotive in Command mode (when used with the DCS Remote Control System, sold separately) or Conventional mode. Conventional operating features are described in the following pages, while the **DCS operating features are covered in the set of operating instructions that accompanies the DCS equipment.** Conventional Mode operation of this locomotive is much simpler than operation of original Proto-Sound engines. For your own safety and that of your equipment, please read the instructions before you operate this engine.



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# Initial Lubrication

Although the engine was lubricated at the factory, it is important that you lubricate the chassis before operation. Lightly grease the outside idler and drive gears (marked “G” in Fig. 3 on pg. 10) to prevent them from squeaking. Use light household oil and follow the lubrication points marked “L” in Fig. 2 on pg. 10. Do not over-oil. Use only a drop or two on each pivot point.

At this point, you are ready to put your engine on the track and begin running it.

# Basic Operation

**Throttle** – Throttle up the power to your track. Give about 10-14 volts or enough power so that the engine’s headlight shines brightly. Then put the engine into motion by either firmly pressing the Direction button on your transformer or remote once or dropping and advancing the throttle to put the engine in forward

## Operation Buttons

Use the operation buttons on your transformer or remote as described below.

**Horn/Whistle** - To sound the horn, firmly press the Horn/Whistle button. The horn will sound for as long as you continue to depress the button. It will stop when you release the button. The horn has four different endings, depending on whether you hold the button for less than three seconds, three seconds, four seconds, or five seconds or longer.

**Bell**- To sound the 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.

**Direction** – Your train is programmed to start in neutral. The first direction after neutral upon start-up is forward. Firmly press and release the Direction button to allow the engine to move forward. Just as you must stop your automobile between forward and reverse, this engine will not go directly from forward to reverse; it goes into neutral between directions. If the train has been moving forward, the first press of the Direction button will put the train from forward into neutral, the second press into reverse, the third press back into neutral, and the fourth back into forward. To prevent accidental high-speed start-ups, this 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 under the engine clockwise to increase the volume and counter-clockwise to decrease the volume (see Fig. 1).



*Figure 1. Location of the Proto-Sound 2.0 Volume Adjustment Knob*

# **Proto-Sound 2.0 Operating Instructions**

**This manual contains the operating instructions for Proto-Sound 2.0 in conventional mode only. Instructions for accessing DCS command mode features accompany the DCS Remote Control System equipment**

Because Proto-Sound 2.0 is an all-new system developed by M.T.H.'s own research and development team, it operates differently from original Proto-Sound. Most Proto-Sound 2.0 features are automatically enabled, and the reset has been eliminated, so there is no need to program features as with original Proto-Sound. Although the new system is easier to operate than original Proto-Sound, you should read these instructions thoroughly before using Proto-Sound 2.0 features in order to prevent harm to yourself or your equipment.

## **Activating Proto-Sound 2.0 Conventional Mode Features:**

Proto-Sound 2.0 features are activated by sequences of Bell and Whistle button pushes described below. Please read the full descriptions of each feature before using it. To use these buttons to activate features rather than to blow the whistle or ring the bell, you should press the buttons for a shorter time (1/2 second); you may need to practice your timing to make this work smoothly.

## **Freight Yard Sounds (FYS):**

Your engine is equipped with a sound package of freight yard sounds that you can play when you pull into a yard. **Each sequence described below will play as long as it is left on, randomly generating sounds, but be sure to allow approximately 30 seconds between the button pushes described below to allow the FYS sufficient time to run through each sequence.**

1. To cue the sound system to play the FYS, quickly but firmly press the Bell button once followed by 2 quick presses of the Whistle button while the engine is moving.
2. Press the Direction button or drop and advance the throttle once to stop the engine. This will trigger the first sequence of FYS. The reverse unit is temporarily disabled so that the train will not move as you use the Direction button to trigger the sounds, and Proto-Sound 2.0 has disabled operator control over the Whistle and Bell buttons until the full FYS sequence is complete.
3. After waiting about 30 seconds for that sequence to run, press the Direction button again to trigger the second sequence of FYS.
4. After about 30 seconds, press the Direction button again to trigger the third FYS sequence.
5. Again, after allowing about 30 seconds for that sequence to run, press the Direction button one more time to trigger the fourth and final FYS sequence. The FYS will continue, and within a few seconds, the engine will start and move out on its own at the current throttle setting, in the same direction it was traveling when you began the sequence. Once the bell turns off, the operator regains control of the transformer's bell and whistle buttons and can ring the bell or blow the whistle as usual.

## Tips on Using FYS

- You can terminate FYS at anytime by turning off power to the track for 15 seconds.
- You do not have to be in Forward to use FYS. At the conclusion of the full sequence, the train will pull away from the station in whatever direction you were going when you activated the feature.
- You can use FYS even if you are double-heading with another engine. If the second engine is not equipped with FYS at all, you must remember not to leave the throttle at a high voltage level once you have stopped the engine to run the FYS. Otherwise, the engine without FYS will begin vibrating on the track as its motors strain to move the train, since they cannot be automatically disabled during the FYS cycle. If the second engine is an original Proto-Sound engine equipped with FYS, you may choose to disable it when used in double-heading operations, so you will not experience competing FYS sounds. To disable FYS in an original Proto-Sound engine, see the operating instructions for that engine.
- FYS can be triggered from Neutral. It will operate the same as if triggered while in motion except that, at the conclusion of the FYS, the engine will depart in the next direction of travel, as opposed to the direction it was traveling before entering Neutral.

## Proto-Coupler<sup>®</sup> Operation

This locomotive is equipped with two coil-wound Proto-Couplers for remote uncoupling action. Because the Proto-Coupler is controlled through the Proto-Sound 2.0 microprocessor, it does not require an uncoupling track section or modification to your layout to function. You can fire the coupler(s) from neutral or while in motion. Use the codes shown below (and in the chart on p. 5) to fire the coupler(s).

### Rear Coupler:

To fire the rear coupler, press the Bell button once followed immediately by three pushes of the Whistle button. The sound of the liftbar and air line depletion will play, and the knuckle will be released.

### Front Coupler:

To fire the front coupler, press the Bell button once followed immediately by four pushes of the Whistle button. The sound of the liftbar and air line depletion will play, and the knuckle will be released.

### Speed Control:

M.T.H. engines equipped with Proto-Sound 2.0 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 turn speed control on and off**, put the engine in neutral, then press the transformer's Whistle button one time then immediately press the Bell button two times. Two horn blasts will indicate that the engine has made the change. 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.



## **Lock into a Direction:**

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 press your remote's Horn button once followed immediately by three presses of the Bell button. Two horn blasts will indicate that the engine has made the change. The engine will not change direction (including going into neutral) until you repeat the 1 horn, 3 bells code to return the engine to its normal condition, even if the engine is kept without power for extended periods of time

## **Reset to Factory Defaults:**

To override the settings you currently have assigned to the engine and reset it to its factory defaults, while in Neutral press the Whistle button once, followed immediately by five quick pushes of the Bell button. Two horn blasts will indicate that the engine has made the change.

## **Automatic Sounds:**

Certain Proto-Sound 2.0 sound effects automatically play in programmed conventional mode conditions:

- **Squealing Brakes** play any time the engine's speed decreases rapidly.
- **Cab Chatter** plays at random intervals when the engine idles in neutral.
- **Engine Start-up and Shut-down** sounds play when the engine is initially powered on or is powered off for five seconds or more

# Maintenance:

## Lubrication and Greasing Instructions

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

You should regularly lubricate all outside idler gears and pickup rollers to prevent them from squeaking. Use light household oil and follow the lubrication points marked “L” in Fig. 2. Do not over oil. Use only a drop or two on each pivot point.

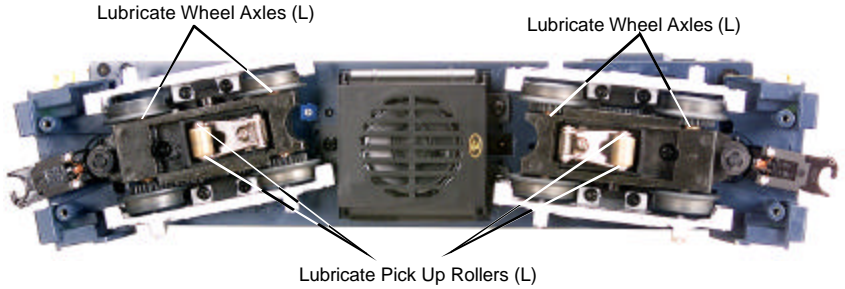


Figure 2. Lubrication Points on the Engine

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. Use lithium based grease and follow the greasing instructions on the next page. Note that in some tightly packed engines you may need to move internal components temporarily in order to access the gears.

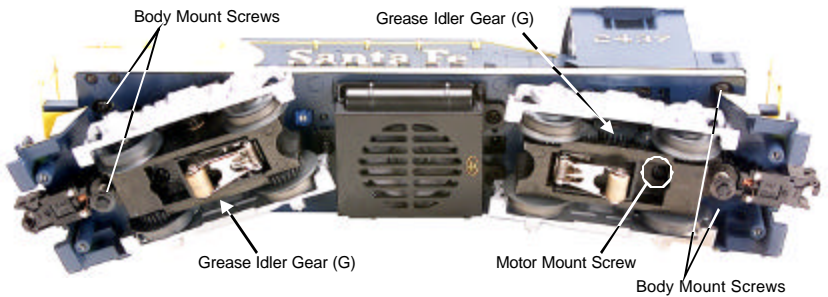


Figure 3. Body Mount Screws and Greasing Points.

1. Remove the Phillips screws from the chassis, as seen in Figure 3 on pg. 10, then lift the body away from the chassis. Use caution when removing the body to make sure the handrails clear the cab housing so that the paint is not damaged
2. Remove the truck blocks from the chassis by unscrewing the black Phillips motor mount screw (labeled motor mount screw in Figure 3 on pg. 10) on the bottom of each truck block
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. Repeat the procedure for the other motor and truck
6. Reassemble the chassis and body, being careful that the wires are not caught between the body and chassis, as this can lead to a short that may damage the electronics beyond repair.

## **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 as well as prematurely wear out the neoprene traction tires. Wheels and tires can be cleaned using denatured alcohol (not rubbing alcohol), which can be found in home improvement stores, applied with a cotton swab.

Occasional cleaning of the track will also help to ensure good electrical contact and to prolong the life of your engine's tires. To clean the track, use a clean rag and denatured alcohol (not rubbing alcohol). 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.

## 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, you may need to replace them at some point.

First, remove the truck sides from the truck block. To do this, turn your engine upside down. If there are visible Phillips screw heads between the truck frame and truck block (see Fig. 4), go to step A. If not, go to step B.

A. Remove the two Phillips screws that attach the truck sides to the truck block.

B. 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. See Fig. 4 for which screws you must remove to do this.

*Figure 4. Screws to Remove to Access the Traction Tires*

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 doesn't seat itself inside the groove properly.
5. Reassemble in reverse order.

One set of replacement tires is packaged with the model. Additional tires are available directly from the M.T.H. Parts Department (phone: 410-381-2580; fax: 410-423-0009; e-mail: parts@nth-railking.com; mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532).

## Locomotive Light Bulb Replacement

To replace the light bulb in the locomotive, follow these instructions:

Follow the cab removal instructions found in the “Lubrication and Greasing” section of this booklet. Once the body has been removed, remove the lightbulbs as shown in Fig. 5a and 5b and replace it.

You can obtain replacement bulbs directly from the M.T.H. Parts Department.

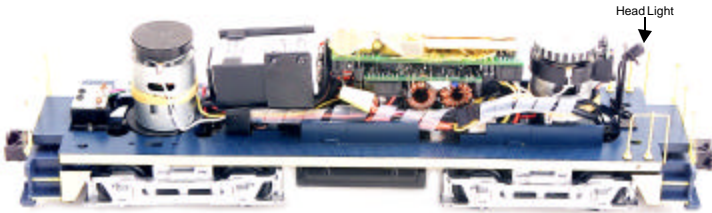


Figure 5a. Location of the headlamp in the Engine

Figure 5b. Replacing the rear light

## Self-Charging Battery Back-Up

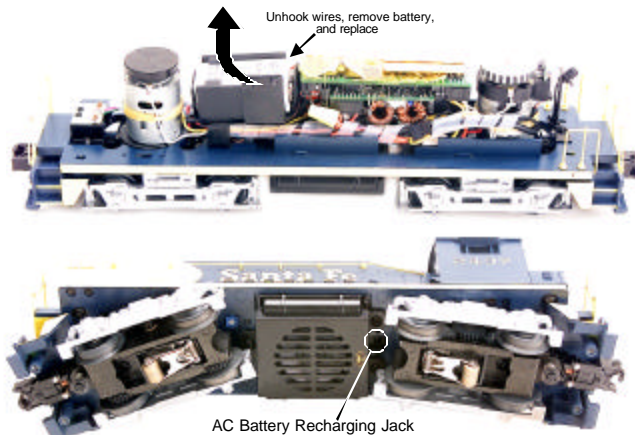


Figure 6. Replacing the Battery. Location of the Battery Re-charging Jack.

The special NiCad 7-cell 8.4v self-charging battery in this engine improves performance at any speed. It ensures that power to the sound system will remain on during directional changes, or when travelling over dirty track or switches. The self-charging battery system is automatically turned on or off whenever track power is turned on or off.

Track power (when applied) recharges the battery, which should last for up to five years. The special NiCad battery is a dry battery that should not leak or cause any damage to your engine. However, even this special battery will eventually wear down and need to be replaced, and **depending upon when your engine was built, it may need to be charged right out of the box.** When you notice that your engine sounds seem distorted or garbled at low voltages or become silent when power from the transformer is turned off, test the battery to determine whether it should be recharged or replaced.

**Test:** Put the engine in neutral and leave the track voltage at 10-12 volts (high enough for the lights to shine brightly and the engine to move steadily) for 15 minutes.

**Recharge:** If the sounds are improved at the end of the 15-minute test charge, the battery charge has run down and can be recharged. There are a number of ways you can do this:

- Use M.T.H.'s recharger (sold separately) that plugs into a wall outlet and a special port under the engine (see figure 6 on pg. 13) to recharge the battery overnight.
- Or Leave the engine in neutral with track voltage at 10-12 volts for 6-7 hours so the battery can fully recharge (if your engine has a smoke unit, be sure it is turned off).
- Or you can remove the battery (see figure 6 on pg. 13) and charge it in any standard slow charge battery recharger, following the recharger's directions.

**Replace:** If the sounds are not improved at the end of the 15-minute test charge, it is time to replace the battery (see figure 6 on pg. 13).

Contact the M.T.H. Parts Department (phone: 410-381-2580; e-mail: [parts@mth-railking.com](mailto:parts@mth-railking.com); mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532) for a replacement battery. A standard 9v alkaline battery can be substituted until your replacement arrives, but since alkaline batteries cannot be recharged, it will eventually wear down. Do NOT use a 6-cell 7.2v battery like those found in most convenience stores.

# **Troubleshooting Proto-Sound® 2.0 Problems**

Although Proto-Sound 2.0 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 (telephone: 410-381-2580; fax: 410-423-0009; [service@nth-railking.com](mailto:service@nth-railking.com), 7020 Columbia Gateway Drive, Columbia MD 21046-1532).





## **Compatibility**

This engine will operate on any traditional O-31 or larger O Gauge track system, including M.T.H.'s RealTrax<sup>®</sup> or ScaleTrax<sup>™</sup> or traditional tubular track. It is also compatible with most standard AC transformers. (See page 18 for a complete list of compatible transformers and wiring instructions.)

# **Transformer Compatibility and Wiring Chart**

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

## **Additional Features Accessible with the DCS Remote Control System:**

While conventional mode operation of a Proto-Sound 2.0 engine yields wonderfully realistic sound and several train control features, command mode operation allows the user to access a world of command functions never before accessible to O Gauge railroaders. With the addition of the DCS Remote Control System (including a DCS remote handheld and Track Interface Unit, users gain many advanced features, including:

- **DCS Proto-Speed Control**-Establishes desired locomotive speed in scale miles per hour increments via a thumbwheel control and allows operator to set maximum speed and acceleration/deceleration rates
- **ProtoSmoke<sup>®</sup> Variable Output Control**-Controls how much smoke each engine outputs and matches smoke to locomotive speed
- **Locomotive Lighting Control**-Independently controls locomotive headlights, marker and interior lights, and ditch lights
- **Emergency Stop**-Single button push deactivates all layout operation
- **One Touch Global Mute/UnMute**-Single button mutes or unmutes all DCS-controlled locomotives' user-defined actions, including sound, lights, and smoke
- **Proto-Dispatch Operation**-Public Address-like feature allows users to speak through locomotive speaker during operation
- **Proto-Cast**-Allows users to play audio recordings through locomotive speaker during operation
- **Proto-Doppler Sound Effects Set Up**-Users can configure locomotive for Doppler Operation, including setting distance points for Doppler start, repeat, and stop modes
- **Independent Volume Control of Engine Sounds, Bell, Horn & Whistle** for each Locomotive
- **Control up to 50 different DCS-Equipped Locomotives at one time with multiple TIUs**

- Proto-Effects™ Set Up-User can select individual Proto-Effects™ operations to be active or inactive, including cab chatter, train wreck sounds, coupler sounds, and wheel clickety-clack sounds
- Direction Control Set Up-User can set initial individual start-up direction (start in forward or reverse) for double-heading operations
- Locomotive Consist Set-up-User can determine locomotive values for consist make-ups, allowing multiple locomotives belonging to a consist to operate together
- Query Locomotive Information-User can query locomotive programming to learn locomotive address and engine data information, including scale miles traveled
- User Can Query, Set and Operate Track and Accessory Interface Units for Programming Digital Command Operations for up to 250 Accessories and 250 Individual Switches
- User Can Script, Record and Playback Train Routes

Operating instructions for all DCS Command features will accompany the DCS remote control equipment.

## **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 followed 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 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 transformer should not be used until properly repaired.
- As with all electrical appliances, this product should not be left in operation when unattended





# Service & Warranty Information

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

For warranty repair, follow the instructions below to obtain warranty service.

1. First, e-mail, write, call or fax an Authorized M.T.H. Service Center in your area or M.T.H. Electric Trains to obtain Repair Authorization. You can find the list of Authorized Service Center s on the M.T.H. website, [www.mth-railking.com](http://www.mth-railking.com). Otherwise, contact M.T.H. (at e-mail: [service@mth-railking.com](mailto:service@mth-railking.com); 7020 Columbia Gateway Drive, Columbia, MD 21046; tel: 410-381-2580; fax: 410-423-0009), stating when the item was purchased and describing the problem. If you contact M.T.H., you will be given a return authorization number to assure that your merchandise will be properly handled upon its receipt.

2. CAUTION: Make sure the product is packed in its original factory packaging including its foam and plastic wrapping material so as to prevent damage to the merchandise. 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, 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 or M.T.H. for your Return Authorization.***

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

## 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 light bulbs 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 Authorized M.T.H. Service Center or M.T.H. Electric Trains 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 the item to M.T.H., call 410-381-2580, fax 410-423-0009, or e-mail the Service Department at [service@mth-railking.com](mailto:service@mth-railking.com) to obtain a return authorization number. 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.