



# SD70ACE & SD70M-2 Diesel Freight Set

Operation Manual (3V PS2)



PSA



FYS

PLEASE READ BEFORE USE AND SAVE

[www.mthtrains.com](http://www.mthtrains.com)

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## **CAUTION: ELECTRICALLY OPERATED PRODUCT:**

**Recommended for Ages 14 and up. Not recommended for children under 14 years of age without adult supervision. As with all electric products, precautions should be observed during handling and use to prevent 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.
- The transformer was designed to operate on regular US household current (120 volt, 50-60 Hertz). Do not connect to any other source of power.
- To avoid the risk of electrical shock, do not disassemble the transformer unit. There are no user-serviceable parts inside. If the unit is damaged contact M.T.H. Service for instructions.
- The transformer is equipped with an internal circuit protector. If the circuit protector trips, unplug the power cord from the electrical wall outlet, check your layout for any short circuits. The circuit breaker will reset automatically when the short is removed from the circuit.
- Unplug the transformer from the electrical wall outlet when not in use.
- Do not use this transformer for other than its intended purpose.

## **Transformer Ratings:**

Input: 120 VAC, 60 Hz Only, Output: Z-750: 21VAC 3.75A 78VA; Z-1000: 14VAC 80W or 18VAC 100W

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; 6,653,640.

# Set Up Checklist

- Assemble RealTrax®
- Lubricate the engine
- Priming the Smoke Unit
- Place the engine and cars on the track and couple them together
- Check to see whether the battery needs to be charged for full sound effects
- Connect the transformer and installing the DCS Remote Commander
- Apply power to run as described in the Basic Operation section of these instructions.

## Set Includes

- Diesel Engine
- 3 Cars



Receiver

Remote

DCS Remote Commander Set (50-1033)



8-Pieces O-31 Curve RealTrax (40-1002)



4-Pieces Straight RealTrax (40-1001)



Z-500 Transformer



DVD/CD-Rom



Real Trax wire harness (40-1015)



Lighted Lock-On (40-1003)

## Tools Needed



Optional Battery Charger (50-1019)



Pliers



Scissors



Philips Screwdriver



Cotton Swab or Rag



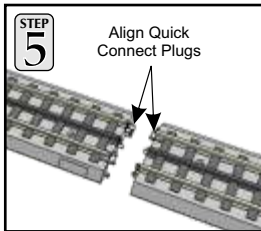
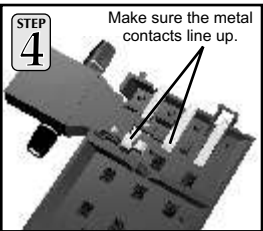
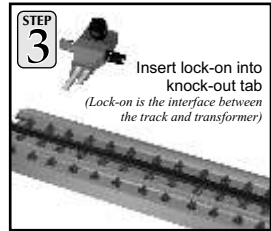
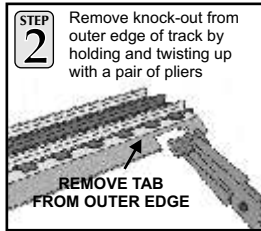
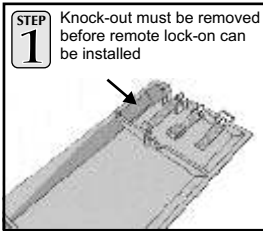
M.T.H. Maintenance Kit (30-50051)

You can obtain replacement parts and replacement instructions 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), Fax: 410-423-0009, Phone: 410-381-2500, Mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, ).

# Getting Started

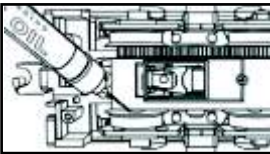
## Assembling RealTrax®

The quick connectors and built-in roadbed allow you to set up RealTrax anywhere, including carpeted surfaces.

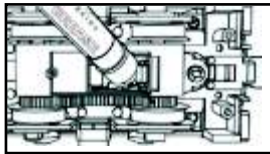


## Lubricating the Engine

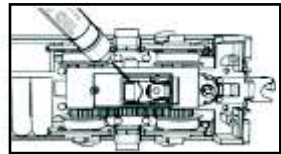
Lubricate all exposed moving parts before operating using a multi-purpose, plastic-compatible oil (available with M.T.H.'s Maintenance Kit (#30-50010), sold separately) or a light household oil. Follow the lubrication points.



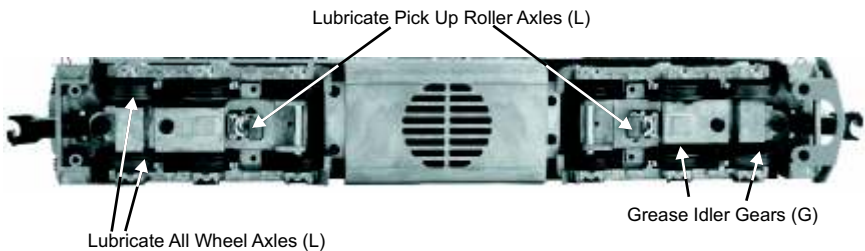
Lubricate Axles



Grease Gears



Lubricate Pick-Up Rollers  
(Do Not Lube the Flat Part of Pick-Up Rollers)



## Priming the Smoke Unit

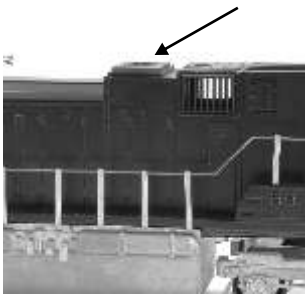
You should prime the smoke unit with smoke fluid before operating. Add 15-20 drops of smoke fluid from the included pipette through the smokestack, then gently blow into the stack to eliminate any air bubbles in the fluid.

If you choose not to prime the unit with fluid, turn the smoke unit control see illustration to the OFF position. (Full Counter Clockwise Position) **Running the engine without a primed smoke unit may cause damage.** See the "ProtoSmoke™ Unit Operation" section of this book for more information on smoke unit maintenance.



**Running the engine without primed  
Smoke unit may cause damage**

Add Smoke Fluid



1. Adding Smoke Fluid



2. Remove Fan Cover to Access  
Smoke Unit and Volume Controls



3. Fan Cover Removed



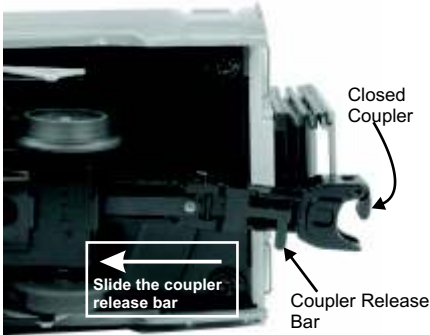
Smoke Unit Control

4. Smoke Unit Control

## Coupling the Engine and Cars

1) Place the engine and cars on the track. Open couplers by pushing or sliding the coupler release bar in towards the car.

### Closed Coupler



### Open Coupler



\*Bottom view of car is shown for easy view of coupler release bar.

2) Push cars together to couple.



\*\*Cars pictured may differ from the cars in your set.

## Checking the Battery

You may find, if your set was built several months before you set it up, that the rechargeable battery has run down and needs to be charged before operating. If you notice that the sounds are garbled, test and charge the engine as described in the "Self-Charging Battery Back-Up" on page 16.

**Manual Volume Control** - To adjust the volume of all sounds made by this engine, turn the manual volume control (shown below) clockwise to increase the volume and counter-clockwise to decrease the volume.



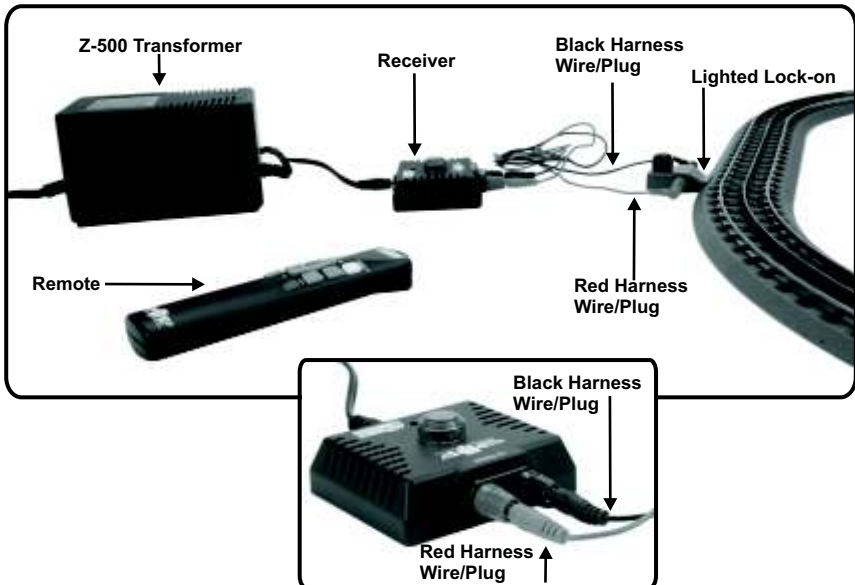
Manual Volume Control

## Connecting the Transformer & Installing DCS Remote Commander Set

Your set comes with M.T.H.'s latest DCS System, the DCS Remote Commander. The DCS Remote Commander includes a handheld Remote which communicates with a Receiver powered by a UL approved Transformer to provide an easy-to-use, safe power source for your new train set. To install the DCS Remote Commander and Transformer please use the following instructions:

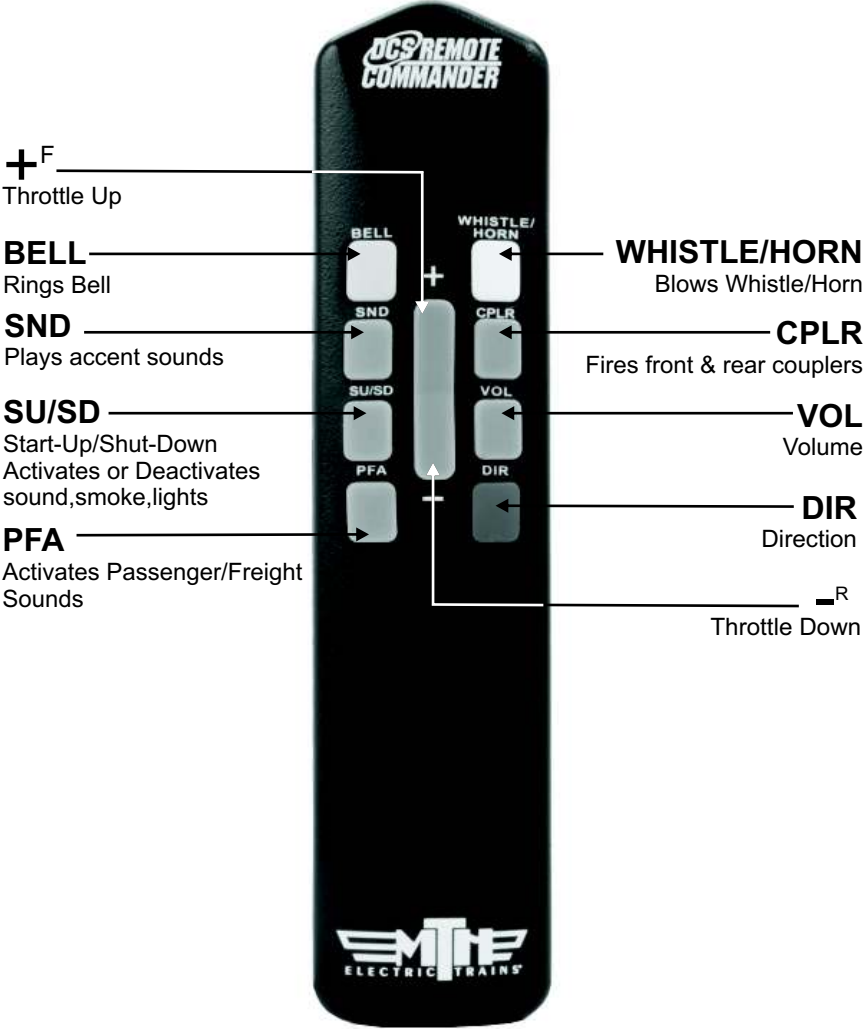
1. Ensure the Z-500 transformer is unplugged.
2. Install two AA batteries (not included) into the Remote. You will need a small screw driver.
3. Plug the Z-500 transformer barrel jack into the port labeled "Power" on the Receiver. Using the RealTrax Wire Harness plug the color-coded wires from the Receiver to the Lighted Lock-on.
4. Make sure that the engine and cars are properly assembled and coupled on the track and then plug the Z-500 transformer into any 110 volt AC wall outlet. You will know that you have power to the receiver and the track if you see the green LED atop the Receiver and the green light atop the Lighted Lock-on will come on. Subsequent pushes of any buttons on the remote will cause the green LED atop the Receiver to blink, indicating it is receiving the signal.

See Illustrations Below



# Basic Operation

After making sure everything is properly assembled, aim the Remote at the Receiver and press the SU/SD Button on the Remote. (\*\* NOTE - Because this is an infrared line-of-sight remote, you must aim the remote at the receiver in order to send signals to the track. \*\*). Once pressed the Engine start up sound will begin as well as the lights and smoke unit will turn on. Now press the + end of the Throttle Control and the train will start to move forward. Each time you press the + end of the Throttle Control the train will move faster and faster. Please see the Operating Buttons Using the Handheld Remote for more information on using the Remote to operate the train.



**Note:** You cannot use this Remote and Receiver with pre-1997 versions of Proto-Sound™ or with Proto-One™, Proto-Plus™, Proto-Deluxe II™ engines, whatever the date.



## Operation Buttons Using the Remote Handheld

**START UP/SHUT DOWN (SU/SD)**- Pressing this button will start your engine. Its lights, sound and smoke (if equipped) will turn on when pressed once and off when pressed again (if the train is already on).

**Throttle Control (+ and -)** (center rocker)- After START UP, quickly pressing and releasing the **+** end of the Throttle Control allows you to increase the speed of your locomotive in 1mph increments. Holding the **+** end of the Throttle Control down without releasing it will bring the engine up to top speed in about 7 seconds. Pressing and holding the **-** end of the Throttle Control for about 7 seconds will allow you to gradually bring your speed down until your engine reaches a complete stop. Quickly pressing and releasing the **+** or **-** end of the Throttle Control will increase or reduce your locomotives speed by 1 mph increments.

**PFA** – Pressing this button will activate the Passenger or Freight announcements on your engine. Pressing it again will shut the feature off. (See the instructions later in this manual for the PFA operational sequence.)

**BELL** – Pressing and releasing this button will turn on the bell sound in your engine. Press and release the button again to shut it off.

**Whistle/Horn** – Pressing and holding this button will play the whistle or horn sound on your engine. Release the button and whistle sound will decay just like the real thing. Also, depending upon how long you hold the button, once you release it the engine will play up to three different whistle endings

**CPLR** – Pressing the button will activate the coupler sound and functions. Within 2 seconds of pressing the CPLR button you must then press either the **+** (front coupler) or **-** (rear coupler). Doing so will trigger the coupler sound effect.

**VOL** – Selecting the volume button and then pressing either the **+** or **-** allows you to set your engine at any volume you desire.

**SND** – Pressing the sound button once will initiate a host of different idle sound effects on your engine. These randomly generated idle sound effects only work when the train is in a neutral or stopped position.

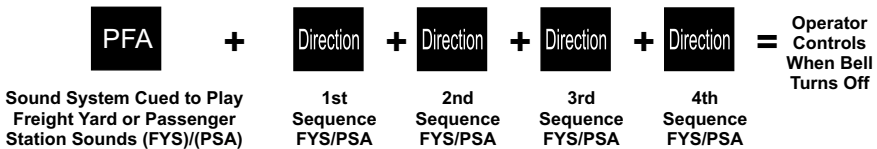
**DIR** – Pressing this button will bring your engine to a gradual stop and then sit at 0mph in the opposite direction it was traveling. After the engine has come to a complete stop, press the **+** end of the Throttle Control to start the engine moving in the opposite direction and to increase its speed.

**Note:** If your locomotive is so equipped, the smoke unit is not controlled by this remote. In order to turn the smoke unit off/on you must first disconnect power from the track, manually turn the smoke unit control to the “OFF” or “ON” position, full counter-clockwise or some degree of clockwise position, and reapply power. (Small screwdriver may be required for this operation)

## Freight Yard Sounds (FYS) or Passenger Station Announcements (PSA):

Your engine is equipped with a sound package of either freight yard or passenger station sounds that you can play. **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/PSA sufficient time to run through each sequence.**

- To cue the sound system to play the FYS/PSA, press the PFA Button on the remote.
- Press the Direction button once to stop the engine. This will trigger the first sequence of FYS/PSA. 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 Horn/Whistle and Bell buttons until the full FYS/PSA sequence is complete.
- After waiting about 30 seconds for that sequence to run, press the Direction button again to trigger the second sequence of FYS/PSA.
- After about 30 seconds, press the Direction button again to trigger the third FYS/PSA sequence.
- 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/PSA sequence.
- The FYS/PSA 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 Horn/Whistle buttons and can ring the bell or blow the horn/whistle as usual.



### Tips on Using FYS/PSA

- You can terminate FYS/PSA at any time by pressing the PFA Button on the remote.
- You do not have to be in Forward to use FYS/PSA. 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.
- FYS/PSA can be triggered from Neutral. It will operate the same as if triggered while in motion except that, at the conclusion of the FYS/PSA, the engine will depart in the next direction of travel, as opposed to the direction it was traveling before entering Neutral.

## Proto-Coupler™ Operation

This locomotive is equipped with one or more coil-wound Proto-Couplers for remote uncoupling action. Because Proto-Couplers are controlled through the Proto-Sound® 2.0 microprocessor, they do not require an uncoupling track section or modification to your layout to function. You can fire a coupler from neutral or while in motion.

## Rear Coupler:

To fire the rear coupler, press the CPLR Button on the remote and then press the – end of the throttle control. The sound of the liftbar and air line depletion will play, and the knuckle will be released.



## Front Coupler:

To fire the front coupler (if your engine has one), press the CPLR Button on the remote and then press the + end of the throttle control. 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.

## Reset to Factory Defaults

From the factory your engine is set to run with the DCS Remote Commander System at the factory default. If for some reason your engine address changes, the engine must be reset to factory default in order to operate from your DCS Remote Commander. The factory defaults cannot be reset with a DCS Remote Commander, you must use a DCS system, a DCS Commander, or see your local dealer. When using a DCS Commander or a DCS System, follow the reset instructions in those device's operating manuals.

## Automatic Sounds

The following sound effects automatically play in your engine:

**Squealing Brakes:** This sound plays anytime the engine speed decreases rapidly.

**Cab Chatter:** This sound play when the engine idles in neutral.

**Engine Start-up and Shut-down:** This sound plays when the engine is initially powered on or is powered off for five seconds or more.

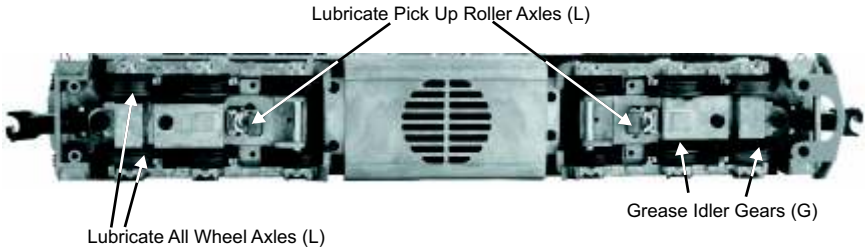
# Maintenance

## Lubricating and Greasing Instructions



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

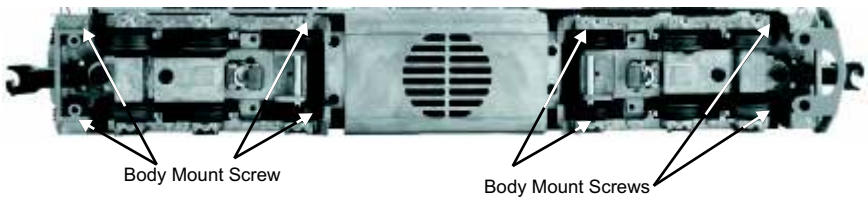
Regularly lubricate all axles and pickup rollers to prevent squeaking. Use light household oil, such as that found in M.T.H.'s maintenance kit. Do not over oil. Use only a drop or two on each pivot point.



### *Lubrication Points on the Locomotive*

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 shown below and lifting the cab from the chassis.



### *Body Removal Screw Locations*

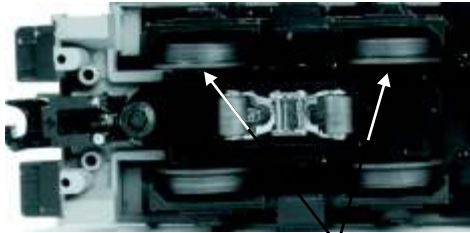
2. Once the cab is removed, remove the trucks by unscrewing the black Phillips motor mount screw located on the underside of the drive trucks (see above).

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 below as a guide and add grease to the points marked.



Grease Idler Gear (G)

### *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 found in Maintenance Kit (30-50051) 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.



Track Cleaning Block (40-1099)

Clean any type of track with this heavy-duty track cleaning block (40-1099). Durable constructed from ABS plastic, the block includes a built-in cleaning pad. For really stubborn track, you can insert sandpaper into the block in just a few quick steps.



Maintenance Kit (30-50051)

# 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.

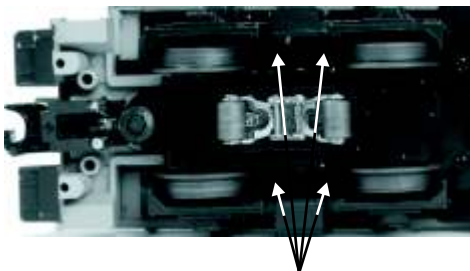
First, remove the truck sides from the truck block. To do this, turn your engine upside down. If there are visible Phillips screw heads between the truck frame and truck block (see below), go to step A. If not, go to step B.

A. Remove the two Phillips screws that attach each truck side 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. 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 (Order online: [www.mth-railking.com](http://www.mth-railking.com), e-mail: [parts@mth-railking.com](mailto:parts@mth-railking.com), Fax: 410-423-0009, Phone: 410-381-2500, Mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532,).



Truckside Screws

## **Locomotive Light Bulb Replacement**

To replace burned out light bulb 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, locate the burned out light bulb(s).

Carefully remove bulb(s) from mounting. Disconnect light bulb harness from main wire harness.

Replacement bulb harnesses 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), Fax: 410-423-0009, Phone: 410-381-2500, Mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, ).

Connect replacement bulb harness and reassemble in reverse.

# Self Charging Battery Back-up

The special rechargeable 2.4v self-charging battery recharges continuously during train operation and should last for up to five years. The battery is a dry battery that should not leak or cause any damage to your engine. Depending upon when your engine was built, it may need to be charged right out of the box. If 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) 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:

- 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).
- Use M.T.H.'s battery recharger (Item No. 50-1019) (sold separately) that plugs into a wall outlet and a special port under the engine to recharge the battery overnight without leaving it on the track.

**Replace:** If the sounds are not improved at the end of the 15-minute test charge, it is time to replace the battery. Available through M.T.H. Parts:

(Item No. 50-1024) AA NiCad Proto-Sound® Battery (Blue Casing)

(Item No. BG4000004) AAA NiMH Proto-Sound® Battery (Green Casing)

DO NOT substitute alkaline batteries for these rechargeable batteries. Using alkaline batteries in this system can result in damage to the PS 2.0 circuit board and/or the batteries.

\*\*Do not use alkaline batteries for testing or checking purposes for the 3-Volt PS2 boards. Using alkaline batteries will damage the 3-Volt battery charging circuit.\*\*



Lift Out Battery



## Optional Battery Charger

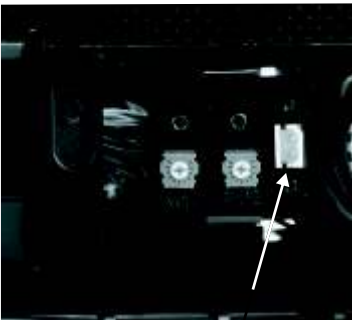
The Proto-Sound 2 Battery Charger (50-1019) is an optional add on that can be purchased on [www.mthtrains.com](http://www.mthtrains.com).



Remove Fan Cover to Access  
Battery Charger Port



Fan Cover Removed



Battery Charger Port



Optional Battery Charger (50-1019)

# 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 page 5 for adding the smoke diagram). We recommend M.T.H. ProtoSmoke™ fluid. Do not overfill the unit or the fluid may leak out and coat the interior engine components.

To adjust the amount of smoke produced, turn the smoke unit control clockwise to increase the amount of smoke, or counter-clockwise to reduce the amount. (See page 5 for Smoke Unit Control location)

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 control to the “OFF” position, fully Counter Clockwise 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.**

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.

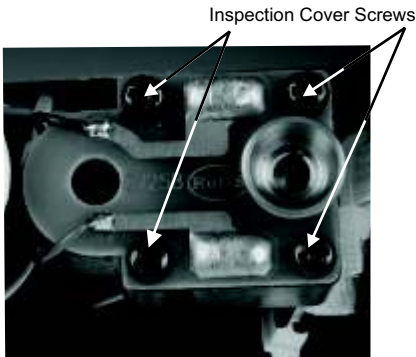
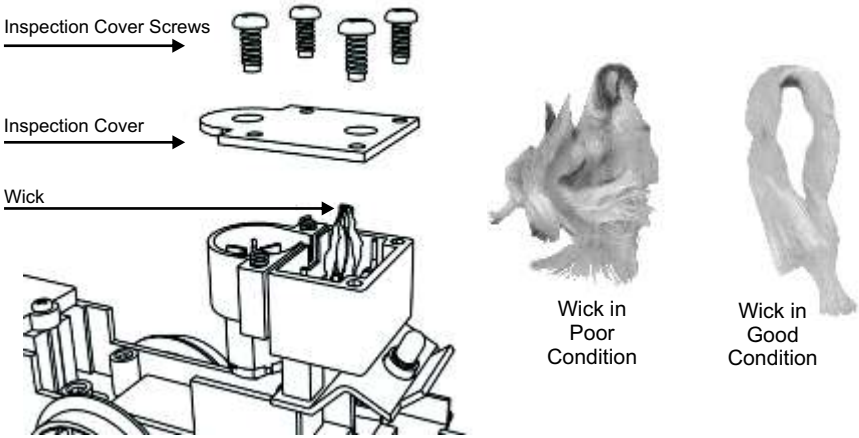
When storing the unit for long periods of time, you may want to add about 15 drops of fluid to prevent the wick from drying out.

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.

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, remove the smoke unit inspection cover (see below). 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), Fax: 410-423-0009, Phone: 410-381-2500, Mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, ).

To access the smoke wick refer to page 12 in Removing the Body. Once the body is removed locate the inspection cover and follow the below diagram.



## ProtoSmoke™ Fluid

ProtoSmoke™ is the recommended fluid for M.T.H. products and can be used in other manufacturers products as well. Choose from 12 different scents:

Christmas, Coal, Diesel, Wood Burning, Coffee, Eggs & Bacon, Vanilla, Candy Cane, Barbeque, Pipe Smoke, Cinnamon Roll, and Apple Pie



# DCS Remote Commander Troubleshooting Guide

The following Guide will help you trouble shoot your DCS Remote Commander handheld remote.

Symptom	Solution
Engine has no sound	Ensure SU/SD has been pressed. Press the VOL button then press + on the throttle control to raise the volume
Engine's coupler will not fire	1. Ensure the model has coil-wound proto-couplers. 2. Press the CPLR button then press + or - on the throttle control within 2 seconds to fire the front (+) or rear (-) coupler.
Engine only plays first PFA sequence sounds	Press the DIR button to cycle through all four PFA sequences
Engine Volume is not adjusting when the throttle control is pressed	Press the VOL button then press + or - on the throttle control within 2 seconds to raise or lower engine volume
Idle sounds are not playing when the SND button is pressed	Engine must be standing still to play the Idle Sounds
Engine does nothing when Start-Up is pressed	Engine address must be set to factory default. The engine must be reset to factory defaults using either a DCS System or a DCS Commander.
Green light on receiver is not flashing when a button is pressed on the handheld remote	Replace the batteries in the handheld remote with two fresh "AA" batteries. Be sure the remote is generally pointing toward the receiver base within 20 feet. Remove red lens and make sure IR receiver is centered.

**WARNING – DO NOT CONNECT AC POWER TO THE TRACK WHEN OPERATING AN HO ENGINE. PERMANENT DAMAGE WILL OCCUR TO THE ENGINE.**

# 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 ([www.mth-railking.com](http://www.mth-railking.com), e-mail: [parts@mth-railking.com](mailto:parts@mth-railking.com), Fax: 410-423-0009, Phone: 410-381-2500, Mail: 7020 Columbia Gateway Drive, Columbia MD 21046-1532, ).

<b>Coupler</b>	<b>Remedy</b>
The Proto-Coupler™ won't let the engine uncouple on the fly.	Try lubricating the coupler knuckle with a dry graphite lubricant. Do NOT use oil.
The coupler does not fire or stay coupled.	The coupler needs to be cleaned. Wipe with denatured alcohol (not rubbing alcohol) and let dry.
<b>Cab Chatter</b>	<b>Remedy</b>
Sometimes the Cab Chatter sounds don't play.	Cab Chatter plays only in neutral at random intervals.
<b>Volume</b>	<b>Remedy</b>
The sounds seem distorted, especially when the whistle or bell is activated.	Proto-Sound® 2.0 volume is set too high. Turn the volume control knob on the bottom of the chassis counter-clockwise to reduce the volume.
<b>Battery</b>	<b>Remedy</b>
After I turn off my transformer, my engine continues to make sounds before quitting.	Proto-Sound® 2.0 is designed to continue to sound for a few seconds after power to the track has been shut off.
<b>FYS/PSA</b>	<b>Remedy</b>
The FYS/PSA sounds occasionally repeat themselves.	Proto-Sound® 2.0 has a built-in random number generator that randomly selects each sound clip to play. Because there are a limited number of sound clips available in each FYS/PSA sequence, it is probable that some of these sound clips will be repeated from time to time.

FYS/PSA	Remedy
Once in FYS/PSA, the engine doesn't go into reverse.	So that FYS/PSA effects can be as realistic as possible, Proto-Sound® 2.0 disables the reversing unit whenever FYS/PSA is enabled. This way the engine remains still at its stop as the operator cycles through the FYS/PSA sequences.
When the FYS/PSA enters its last sequence the bell automatically comes on.	FYS/PSA is programmed to start ringing the bell at that point. After approximately 12 seconds it will automatically turn off.
When FYS/PSA is enabled, pressing the whistle and bell buttons has no effect.	Because FYS/PSA must control various effects in each sequence, Proto-Sound® 2.0 takes control of these sound effects until you exit
I push the direction button but the next sound clip in the sequence does not play or the engine does not come out of FYS/PSA after fourth press of the direction button.	Each FYS/PSA clip must play for approx. 30 seconds before FYS/PSA will advance to the next step in the FYS/PSA cycle. Wait at least 30 seconds in each FYS/PSA sound clip before pressing the direction button.

# Transformer Compatibility and Wiring Chart

Proto-Sound® 2.0 is designed to work with most standard AC transformers. The chart below lists the many compatible transformers. 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. In addition, the chart details how the terminals on these transformers should be attached to your layout.

<b>RECOMMENDED AC TRANSFORMERS</b>					
<b>Transformer Model</b>	<b>Center Rail</b>	<b>Outside Rail</b>	<b>Min/Max. Voltage</b>	<b>Power Rating</b>	<b>Transformer Type</b>
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	0-21v	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
Lionel LW	A	U	8-18v	75-Watt	Standard
Powermaster	U	A	8-18v	135VA	Electronic
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

\* Conventional Mode Only

# Additional Features Accessible With The DCS Remote Control System

(Additional equipment required)

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™ Variable Output Control - Controls how much smoke each engine outputs and matches smoke to locomotive speed
- Locomotive Lighting Control - Controls locomotive headlights, marker and interior lights, beacon lights, ditch lights, and MARS lights
- Emergency Stop-Single button push stops all Proto-Sound® 2.0 trains but does not turn off the power
- 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, 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



## Quick-Start DVD

The included Quick-Start DVD demonstrates the start-up and basic operation of this set as well as other information about model railroading. You may find it helpful to view the DVD before operating this set.

## RailWare Interactive CD ROM

M.T.H. provides a free RailWare CD ROM in each Ready-To-Run set. It is full of helpful information on M.T.H. product history, track planning software, a dealer finder, and information and video clips on Loco-Sound and Proto-Sound 2.0. Follow the directions below to use the CD ROM.

Minimum System Requirements: Pentium 100, 16MB RAM, Windows 95 or later, CD ROM drive, Sound Card, display properties set to greater than 256 colors. The CD will not work on a Mac OS unless you run VirtualPC®.

## Running RR-Track Software

You may run the RR-Track software directly off of the CD ROM or you may install the software to your hard drive.

1. On the Desktop, click on the icon that says My Computer.
2. Find your CD ROM drive.
3. With the M.T.H. CD ROM in the drive, double click on the icon for the CD ROM drive.
4. Find the folder on the CD ROM entitled INSTALLATION.
5. Choose the folder inside entitled RRTRAXSETUP.
6. Run the file in that folder called SETUPEXE and follow the directions it provides.

The program may ask you for a registration code. If it does type in "M.T.H." and it will run.

Additional track libraries can be obtained directly from RR-Track. See their website for more information [www.rrtrack.com](http://www.rrtrack.com).

## Installing Adobe Acrobat Software

To read some of the electronic documents included on the CD ROM, you will need to install the Adobe Acrobat Reader® if it is not already on your computer. To install the software:

1. On the Desktop, click on the icon that says My Computer.
2. Find your CD ROM drive.
3. With the MTH CD ROM in the drive, double click on the icon for the CD ROM drive.
4. Find the folder on the CD ROM entitled INSTALLATION.
5. Choose the folder inside entitled ACROBAT READER.

\*If you are running Windows 95, 98 or NT choose the folder 32 BIT. Run the file AR32E301.EXE and follow the directions it provides.

If you have problems you cannot resolve by using these directions, contact [custserv@mth-railking.com](mailto:custserv@mth-railking.com) or call 410-381-2580 for further help.

# 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 trouble-shooting 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 410-381-2580. 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. Retailer are covered by this warranty. See our Website [www.mthtrains.com](http://www.mthtrains.com) to identify an M.T.H. Retailer 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, replace, or credit (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