



GP-7/9 Diesel Engine

OPERATOR'S MANUAL



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 21 for a complete list of compatible transformers and wiring instructions.)



PLEASE READ BEFORE USE AND SAVE

Table of Contents

Set Up Checklist	3
Lubrication.....	3
Checking the Battery.....	3
Priming the Smoke Unit.....	4
Basic Operation	5
Activating Features.....	5
Proto-Sound 2.0 Operating Instructions	7
Activating Proto-Sound 2.0 Conventional Mode Features.....	7
Freight Yard Sounds (FYS).....	8
Proto-Coupler® Operation.....	9
Speed Control.....	10
Locking Locomotive Into A Direction.....	11
Reset To Factory Default.....	11
Automatic Sound Effects.....	11
Maintenance	12
Lubricating and Greasing Instructions.....	12
Cleaning The Wheels, Tires and Track.....	13
Traction Tire Replacement Instructions.....	14
Headlight Replacement Instructions.....	15
Self Charging Battery Back-Up.....	15
ProtoSmoke Unit Operation.....	16
Troubleshooting Proto-Sound® 2.0 Problems.....	18
Transformer Compatibility and Wiring Chart.....	21
Additional Features Accessible with the DCS Remote Control System.....	22
Service & Warranty Information.....	23
Limited One-Year Warranty.....	23
Authorized Service Centers.....	24

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.

Set Up Checklist

- Lubricate the locomotive
- Prime the smoke unit
- Check to see whether the battery needs to be charged for full sound effects
- 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 Fig. 1. Do not over-oil. Use only a drop or two on each pivot point.

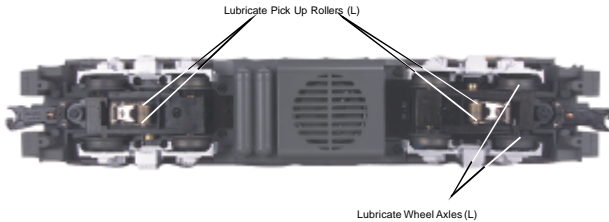


Figure 1. Lubrication Points on the Locomotive

Checking The Battery

You may find, if your locomotive 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 14.

Priming The Smoke Unit

When preparing to run this engine, add 15-20 drops of smoke fluid through the smokestack (see Fig. 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 the fluid (or have already added the fluid but choose to run smoke-free), turn off the smoke unit switch located under the engine (see Fig. 3).

Failure either to add fluid to the unit or to turn it off may damage the smoke unit heating element and/or wicking material.

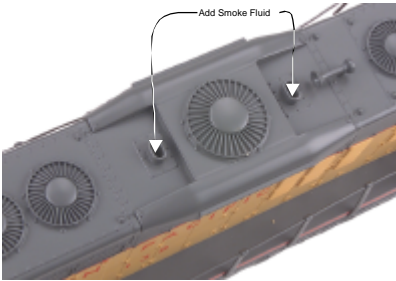


Figure 2: Adding Smoke Fluid

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

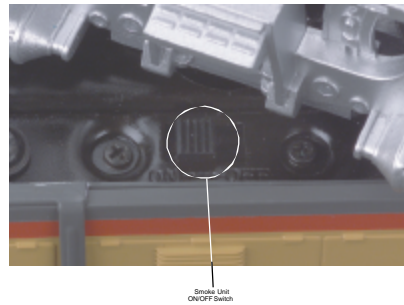


Figure 3: Smoke Unit Switch Location

Basic Operation

The Throttle knob controls how fast your train will travel.

Turn the throttle knob up ½-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.

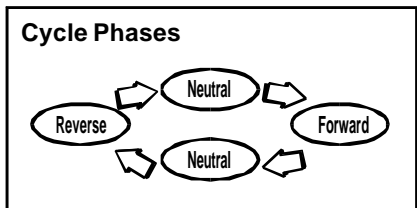
Activating Features

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.

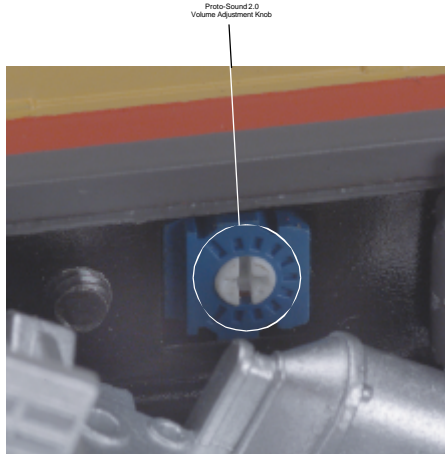


Figure 2: Manual Volume Adjustment Knob

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.

Activating Proto-Sound 2.0 Conventional Mode Features

Proto-Sound 2.0 features are activated by sequences of Bell and Horn 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 horn or ring the bell, you should tap the buttons very quickly with a 1/2-second pause between button presses. You may need to practice your timing to make this work smoothly.

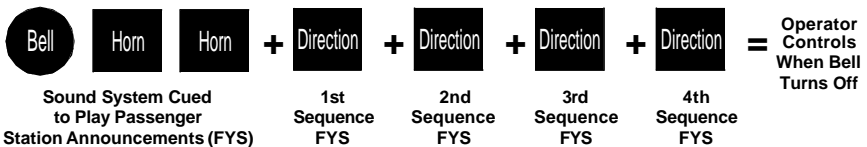
Timing Chart				
Press Horn Short & Firm	1/2 Sec. Pause	Press Bell Short & Firm	1/2 Sec. Pause	Press Bell Short & Firm
Total Time Lapse: 1 1/2 Seconds				

Feature to Be Activated:	Button Code:
Freight Yard Sounds	1 Bell, 2 Whistles
Fire the Rear Coupler	1 Bell, 3 Whistles
Fire the Front Coupler	1 Bell, 4 Whistles
Speed Control On/Off	1 Whistle, 2 Bells (From Neutral Only)
Lock into a Direction/Unlock	1 Whistle, 3 Bells
Reset to Factory Defaults	1 Whistle, 5 Bells (From Neutral Only)

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.

- To cue the sound system to play the FYS, quickly but firmly tap the Bell button once followed by 2 quick taps of the Horn button while the engine is moving. Tap the buttons quickly but allow approximately ½ second between each press.
- Press the Direction button 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 Horn and Bell buttons until the full FYS 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.
- After about 30 seconds, press the Direction button again to trigger the third FYS 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 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 Horn buttons and can ring the bell or blow the horn as usual.



Tips on Using FYS

- You can terminate FYS at any time 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 Proto-Sound 2.0, 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 (or if an original Proto-Sound engine, FYS are triggered differently and that engine's motor-disable feature will not be active when you run FYS in Proto-Sound 2.0).
- 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® 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. Use the code shown below (and in the chart on p. 7) to fire the coupler(s).

Rear Coupler:

To fire the rear coupler, quickly tap the Bell button once followed by three quick taps of the Horn button, allowing approximately ½ second to lapse between each quick button press. 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), quickly tap the Bell button once followed by four quick taps of the Horn button, allowing approximately ½ second to lapse between each quick button press. The sound of the liftbar and air line depletion will play, and the knuckle will be released.

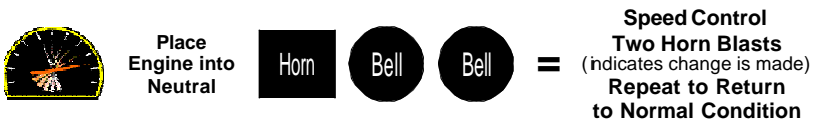


Speed Control

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.

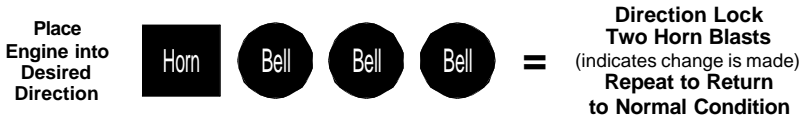
While the engine is programmed to start with the speed control feature activated, you can opt to turn it off. This means the engine's speed will fall as it labors up a hill and increase as it travels downward. It is also affected by the addition or releasing of cars while on the run. Because the engine will run more slowly at a given throttle voltage when speed control is on than when it is off, you should adjust the throttle to a lower power level for operation with speed control off to avoid high-speed derailments. When speed control is off, the volume will drop to allow for better low voltage operation.

To turn speed control on and off, put the engine in neutral, then quickly tap the transformer's Horn button one time then quickly tap the Bell button two times, allowing approximately ½ second to lapse between each quick button press. Two horn blasts will indicate that the engine has made the change. Repeat the 1 horn, 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.



Locking Locomotive 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 tap the Horn button once followed by three quick taps of the Bell button, allowing approximately ½ second to lapse between each quick button press. 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 Default

To override the settings you currently have assigned to the engine and reset it to its factory defaults, while in Neutral tap the Horn button quickly once, followed by five quick taps of the Bell button, allowing approximately ½ second to lapse between each quick button press. Two horn blasts will indicate that the engine has made the change.



Automatic Sound Effects

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

Lubricating and Greasing Instructions



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

Regularly lubricate all axles and linkage components 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.

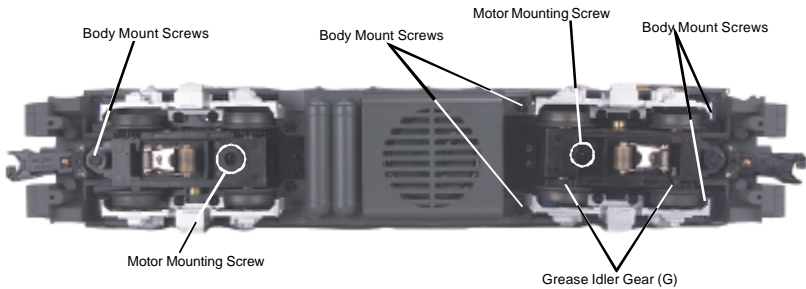


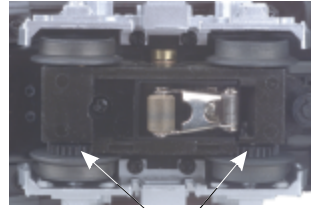
Figure 3: Body Removal Screw Locations

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 chassis screws as seen in Figure 3 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 Fig. 3).
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 chassis screws.

Lubricate the outside truck block idler and drive gears with grease. Use the diagram shown in Figure 4 below as a guide and add grease to the points marked with a “G.”



Grease Idler Gears

Figure 4: 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 and a clean rag or denatured (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. 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, 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 and remove the chassis as detailed on page 11.

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

Headlight Replacement Instructions

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 lights as shown in Figure 5 and replace it.

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

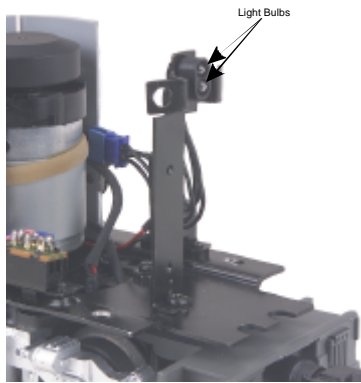


Figure 5: Removing The Replaceable Lights

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 inside the body shell. Replacement bulbs are available directly from the M.T.H. Parts Department.

Follow the body removal instructions found in the Lubrication and Greasing Instructions.

Gently disconnect the bulb harness from the socket on the constant voltage circuit or connector terminal and replace the bulb.

Self Charging Battery Back-Up

The special NiCad 7-cell 8.4v 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 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:

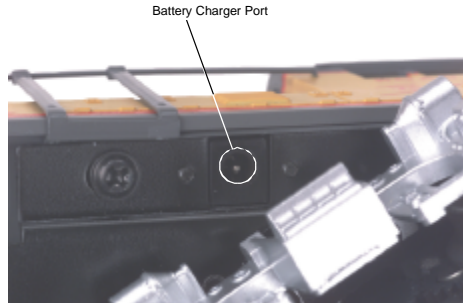
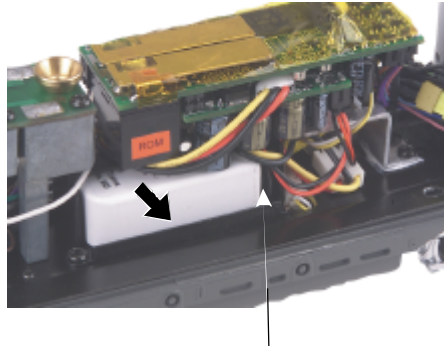


Figure 6: Battery Charger Port



Slide Out Battery In Direction Of Arrow and Disconnect Battery

Figure 7: Removing The Battery

ProtoSmoke® Unit Operation

This Premier diesel locomotive contains a Proto-Sound 2.0 controlled smoke unit that outputs smoke through the smkestack 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 a harmless smoke. The smoke is then

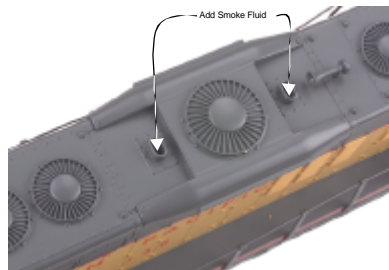


Figure 11: Filling The Smoke Unit

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 Fig. 10). 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 the fluid (or have already added the fluid but choose to run smoke-free), turn off the smoke unit switch located under the engine. Failure either to add fluid to the 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 (See Figure 5), remove the smoke unit inspection cover (see Fig. 11). 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.

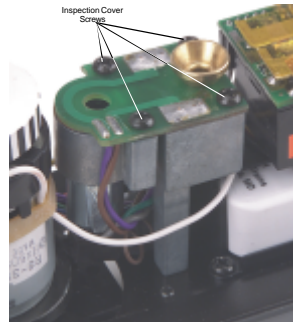


Figure 12: Inspecting The Smoke Unit Wick

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

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@mth-railking.com, 7020 Columbia Gateway Drive, Columbia MD 21046-1532).

Starting Up	Remedy
When I first turn the power on, the engine will not begin to run. I have to turn the throttle off and then on again to get the engine to operate.	This is normal behavior. To prevent accidental high-speed start-ups, Proto-Sound 2.0 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.
Whistle/Horn	Remedy
When I press the whistle/horn button, the bell comes on instead.	Reverse the transformer leads.
I can't get the horn to blow when I press the whistle button.	You may be pressing the button too quickly. Try pressing the whistle/horn button more slowly, taking approximately one full second to fully depress the button.
Bell	Remedy
When I press the whistle button, the bell sounds.	Reverse the transformer leads.
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.
The bell won't work on a separate bell button.	Check the wiring of the separate button.
Coupler	Remedy
When I try to fire the coupler, FYS starts.	You are waiting too long between whistle button presses.
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.

Cab Chatter	Remedy
Sometimes the Cab Chatter sounds don't play.	Cab Chatter plays only in neutral at random intervals.
Lock-out	Remedy
I can't get the engine to run after I power up the transformer. It sits still with the engine sounds running.	The engine is locked into the neutral position. Follow the procedure in the "Lock into a Direction" section.
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).
Volume	Remedy
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.
Battery	Remedy
The engine will not leave the initial neutral setting.	Check to be sure the battery is installed and fully charged. See the "Self-Charging Battery Back-Up" section.
I get no sounds when the engine shifts between directions.	The battery may be dead or need to be charged. See the "Self-Charging Battery Back-Up" section.
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.
FYS	Remedy
The FYS 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 sequence, it is probable that some of these sound clips will be repeated from time to time.

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

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-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

* 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, 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

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. 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, 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 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



PARTICIPATING N.A.S.C. RETAILER LIST

CANADA

TOY TRAIN WORKSHOP
CUMBERLAND
613-833-3125

THE TRAIN ROOM
ERGUS
519-787-3280

CALIFORNIA
TIN PLATE JUNCTION
OAKLAND
510-444-4780

COLORADO

MIZELL TRAINS INC
WESTMINSTER
303-429-4811

CONNECTICUT

NEW ENGLAND HOBBY
SUPPLY
MANCHESTER
860-646-0610

FLORIDA

ROUNDHOUSE SOUTH
PORT ORANGE
386-304-7002

MARYLAND

PLAZA HOBBY
CUMBERLAND
301-729-6424

ENGINE HOUSE HOBBIES
GAITHERSBURG
301-590-0816

CATOCTIN MOUNTAIN TRAINS
THURMONT
301-694-8331

MICHIGAN

MICHIGAN MODEL TRAIN
CENTER
PINCKNEY
734-426-1651

BRASSEUR ELECTRIC TRAINS,
INC.
SAGINAW
989-793-4753

NEW HAMPSHIRE

TREASURED TOYS
SALEM
603-898-7224

NEW YORK

AURORA RAILS & HOBBIES
EAST AURORA
716-652-5718

OHIO

DAVIS ELECTRONICS
MILFORD
513-831-6425

RICK'S TOY TRAINS
TOLEDO
419-478-0171

PENNSYLVANIA

BUSSINGER TRAINS
AMBLER
215-628-2366

FAIRCHANCE PHARMACY
FAIRCHANCE
724-564-7817

THE STATION
NEW CUMBERLAND
717-774-7096

VIRGINIA

LOCUST GROVE TRAINS
LOCUST GROVE
540-854-8955

DAVIS HOBBY SUPPLIES
PORTSMOUTH
757-397-1983

T S G HOBBIES
WARRENTON
540-347-9212

WISCONSIN

SOMMERFELD'S TRAINS
BUTLER
262-783-7797

GRAMPA'S TRAIN SHOP
RICE LAKE
715-234-2996



PARTICIPATING A.S.C. RETAILER LIST

CANADA

TOY TRAIN WORKSHOP
CUMBERLAND
613-833-3125

THE TRAIN ROOM
ERGUS
519-787-3280

CREDIT VALLEY RAILWAY
COMPANY
STREETSVILLE
905-826-1306

B&H TRAINS
TERREBONNE, QUEBEC
450-492-0317

ALABAMA

SOUTHERLAND STATION
HUNTSVILLE
256-533-4720

LIL' BOBBY'S HOBBIES
MONTGOMERY
334-277-1715

ARIZONA

ARIZONA TRAIN DEPOT
MESA
480-833-9486

CENTRAL COAST TRAINS
ATASCADERO
805-466-1391

CALIFORNIA

CENTRAL COAST TRAINS
ATASCADERO
805-466-1391

TRAIN SHACK
BURBANK
818-842-3330

ROUNDHOUSE
NORTH HOLLYWOOD
818-769-0403

DOLLHOUSES, TRAINS &
MORE
NOVATO
415-883-0388

TIN PLATE JUNCTION
OAKLAND
510-444-4780

RON'S WORLD
SAN CLEMENTE
949-361-5596

TRUCKS & TRAINS HOBBIES
SANTA ROSA
707-537-6586

COLORADO

CUSTOM RAILWAY SUPPLY
COLORADO SPRINGS
719-634-4616

MIZELL TRAINS INC
WESTMINSTER
303-429-4811

CONNECTICUT
NEW ENGLAND HOBBY
SUPPLY
MANCHESTER
860-646-0610

DELAWARE
K R R B MODEL TRAINS INC.
NEWARK
302-292-2779

FLORIDA

HOLLYWOOD STATION
HOLLYWOOD
954-921-2700

DEPOT HOBBY SHOP

LAKE WORTH
561-585-1982
READY TO ROLL
MIAMI
305-688-8868

FRANK'S TRAINS & HOBBIES
INC.
OLDSMAR
813-855-1041

COLONIAL PHOTO & HOBBY
ORLANDO
407-841-1485

WARRICK CUST OM HOBBIES
PLANTATION
954-370-0708

ROUNDHOUSE SOUTH
PORT ORANGE
386-304-7002

ILLINOIS

BIKE & CHOO CHOO
CONNECTION
SCHAUMBURG
847-882-7728

INDIANA

Y. O. R. K. TRAINS
MUNSTER
219-838-9999

SAMUELSON'S TRAIN SHOP
VALPARAISO
219-462-2708

IOWA

CABOOSE STOP HOBBIES
CEDAR FALLS
800-642-7012

KENTUCKY

L & N TRAINS & THINGS
LOUISVILLE
502-897-9005

LOUISIANA

AMERICA'S TRAIN YARD
BATON ROUGE
225-926-5592

MAINE

WHEELS, WINGS & THINGS
LUDLOW
207-532-6277

MARYLAND

PLAZA HOBBY
CUMBERLAND
301-729-6424

HOBBYTOWN U S A
FREDERICK
301-694-7395

ENGINE HOUSE HOBBIES
GAITHERSBURG
301-590-0816

J & B TRAINS
HAGERSTOWN
240-420-4930

THE TRAIN ROOM
HAGERSTOWN
301-745-6681

PURKEY'S TOY TRAINS
SYKESVILLE
410-549-6061

CATOCTIN MOUNTAIN TRAINS
THURMONT
301-694-8331

N & W TRAIN SHED
WILLIAMSPORT
301-223-8801

MASSACHUSETTS

NORTHEAST TRAINS
PEABODY
978-532-1615

EAST BAY HOBBIES
SEEKONK
508-336-5573

MICHIGAN

MICHIGAN MODEL TRAIN
CENTER
PINCKNEY
734-426-1651

BRASSEUR ELECTRIC TRAINS,
INC.
SAGINAW
989-793-4753

MISSOURI

SWITCH STAND
SAINT LOUIS
314-781-4458

MARK TWAIN HOBBY CENTER
ST. CHARLES
636-946-2816

NEVADA

RENO RAILS
RENO
775-337-6669

NEW HAMPSHIRE

RAILROAD SPECIALTIES
NASHUA
603-801-0801

TREASURED TOYS
SALEM
603-898-7224

NEW JERSEY

COUNTRY AND STUFF
ANDOVER
973-786-7086

COLUMBUS TRAIN STATION
COLUMBUS
609-518-1800

ATLANTIC RAILS
HAMMONTON
609-567-8490

GRAND CENTRAL STATION
KEARNY
201-955-6200

J & B TRAINS, INC.
MAPLE SHADE
856-414-0092

HOBBY SHOP
MATAWAN
732-583-0505

HOBBYMASTERS, INC
RED BANK
732-842-6020

RIDGEFIELD HOBBY
RIDGEFIELD
201-943-2636

TRAINS & THINGS
TRENTON
609-883-8790

COAST TRAINS AND
COLLECTIBLES
WALL
732-556-9005

HOLLY BEACH TRAIN DEPOT
WILDWOOD
609-522-2379

NEW YORK

AURORA RAILS & HOBBIES
EAST AURORA
716-652-5718

NASSAU HOBBY CENTER, INC.
FREEPORT
516-378-9594

HOBBY WORLD
MONTICELLO
845-794-8770

CITY DEPOT, INC.
NEW HAMPTON
845-374-3010

AMERICANA STORE
TIVOLI
845-757-4246

KROSS HARDWARE
WEST BABYLON
631-669-3069

NORTH CAROLINA

THE ROUNDHOUSE &
BACKSHOP
CARY
919-465-0810

TRAINS LTD.
CHARLOTTE
704-566-9070

DRY BRIDGE STATION
MOUNT AIRY
336-786-9811

THE FREIGHT YARD
SMITHFIELD
919-934-6229

TRAIN LOFT
WINSTON-SALEM
336-760-9817

OHIO

GLEN'S TRAIN SHOP
AKRON
330-253-6527

E & S TRAINS
AKRON
330-745-0785

T & K HOBBY SHOP
BRIDGEPORT
740-633-6607

SCHAFFNER'S TRAINS
CANTON
330-452-4444

TRAINS-N- THINGS
CANTON
330-499-1666

PARMA HOBBY
CLEVELAND
216-741-6440

SANDY'S HOBBY'S &
COLLECTIBLES
ELYRIA
440-365-9999

HUDSON TOY, TRAIN &
HOBBY
HUDSON
330-653-2997

CLEARVIEW TRAIN & HOBBY
LORAIN
440-277-4488

DIXIE UNION STATION
MASON
513-459-0460

DAVIS ELECTRONICS
MILFORD
513-831-6425

GRAND PACIFIC JUNCTION
OLMSTEAD FALLS
440-235-4777

RICK'S TOY TRAINS
TOLEDO
419-478-0171

ERIE RAILWAY DEPOT
TROY
937-440-9972

PENNSYLVANIA
AMERICAN HOBBY CENTER
ALIQUIPPA
724-378-3930

ALLENTOWN TOY TRAIN
SERVICE
ALLENTOWN
610-821-0740

ON THE RIGHT TRACK
ALTOONA
814-942-4345

BUSSINGR TRAINS
AMBLER
215-628-2366

YE OLDE TRAIN & CHRISTMAS
SHOPPE
BOYERTOWN
610-369-0755

CHARLEROI SWEEPER
CENTER
CHARLEROI
724-483-3397

CRANBERRY HOBBY DEPOT
CRANBERRY TWP
724-776-3640

FAIRCHANCE PHARMACY
FAIRCHANCE
724-564-7817

TOY TRAIN STATION
FEASTERVILLE TREV
215-322-5182

THE CABOOSE
LEHIGHTON
570-386-5352

HOBBY CITY
McMURRAY
724-942-2557

THE STATION
NEW CUMBERLAND
717-774-7096

FRYER'S STORE
ORWIGSBURG
570-366-2258
CHESTNUT TOYBOX
PHILADELPHIA
215-545-0455

TOBY TYLER'S HOBBY
CENTER
PITTSBURGH
412-653-5030

C. T. MC CORMICK HARDWARE
ZELIENOPLE
724-452-6130

SOUTH CAROLINA
EMERALD TRAIN & HOBBY
GREENWOOD
864-223-2247

TENNESSEE
MODEL RAILROAD & HOBBY
SHOP
MEMPHIS
901-384-6500

TEXAS
HOBBY TIME
AMARILLO
806.352.9660

RIVERVIEW TRAINS
ANGLETON
979-848-3895

GREAT TRAINS & HOBBIES
LONGVIEW
903-757-2720

VIRGINIA
LOCUST GROVE TRAINS
LOCUST GROVE
540-854-8955

TRAINS, ETC.
LORTON
703-550-1779

TRAIN DEPOT
MANASSAS
703-335-2216

CHESTERFIELD HOBBIES
MIDLOTHIAN
804-379-9091

DAVIS HOBBY SUPPLIES
PORTSMOUTH
757-397-1983

TOY TRAIN CENTER
RICHMOND
804-288-4475

T S G HOBBIES
WARRENTON
540-347-9212

NORGE STATION
WILLIAMSBURG
757-564-7623

WEST VIRGINIA
PATRICK'S TRAINS
WHEELING
304-232-0714

WISCONSIN
SOMMERFELD'S TRAINS
BUTLER
262-783-7797

WOODCRAFTER'S
BURLINGTON
262-763-5239

HOBBY OUTLET
FOND DULAC
920-924-3770

G B T V & TRAINS
GREEN BAY
920-496-9697

GRAMPA'S TRAIN SHOP
RICE LAKE
715-234-2996

THE TRAIN STORE
WAUKESHA
262-650-6675