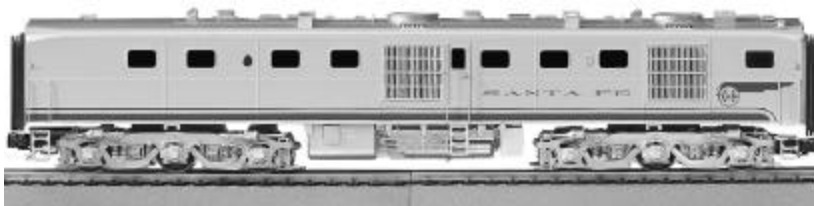




MTH DL-110 OPERATING INSTRUCTIONS



Thank you for purchasing the MTH Electric Trains DL-110 locomotive. This 1/4" scale reproduction of the famous DL-110 locomotive measures over 19" in length and weighs almost 5 pounds. Despite its scale size, the locomotive is capable of operating on O-42 3-rail track with most compatible AC transformers (see the chart on page 9 for a complete list of compatible transformers and wiring instructions) and is completely compatible with the DL-109 A unit diesel.

The locomotive is equipped with several deluxe features that are simple and fun to operate. Each feature is described among the following pages which should be read before the engine is operated. For those of you who can't wait to get started, the *Quick Start Basic Operating Instructions* found on Pages 3 and 4 should be read so that you understand the basics of the operating system.

PREMIER

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QUICK START - BASIC OPERATION

The MTH DL-110 B Unit contains state-of-the art electronics with several built-in automatic features for incredibly realistic operation. The DL-110 B-Unit is easy to operate with your existing MTH DL-109 A unit using any compatible standard AC transformer (see the compatibility chart on page 7). All models are equipped with an operating smoke system that ***should be primed with smoke fluid before operating***. Adding 20 - 25 drops of fluid through the smoke stack should be sufficient. ***If you choose to not prime the units with fluid, turn the smoke unit switch located under the trailing truck to the OFF position.*** (See Figure 1) This will prevent any damage from occurring to the smoke unit when running the engine without a primed smoke unit. For more information see the section on page 4 on Smoke Unit operation.

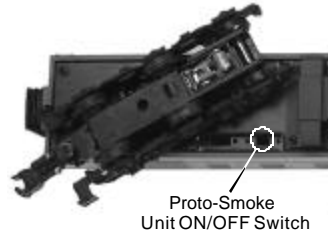


Fig 1. Smoke Unit Switch

The DL-110 powered B-Unit is controlled by a DCRU® electronic reverse unit which unit operates in the same manner that all reverse units function by using forward, neutral and reverse states that are entered each time the throttle is turned on and off or by using the transformer direction switch (if so equipped). Simply plug the B-Unit wire harness into the existing sockets of the DL-109 A Unit set to allow Proto-Coupler® equipped engines and directional lighting systems to function. Once connected, advance the transformer throttle to cycle all A and B units together from RESET to Forward as explained in the DCRU section below.

DCRU® REVERSE UNIT

As mentioned in the Basic Operating section, the engine is controlled by a DCRU® reverse unit that contains the standard forward-neutral-reverse states found on most reverse units. However, when power is first applied to the track, the reverse unit begins in RESET or what seems like a neutral state. Power must be interrupted again to get the locomotive to enter the forward state. The system will enter RESET whenever power to the track is

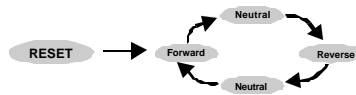


Figure 2: DCRU™ Cycle Phases

off for three or more seconds. NEUTRAL should be referred to as the state between Forward and Reverse.

Because the ProtoSound® system or DCRU® reverse unit found in your powered MTH DL-109 A unit is not directly connected to the DCRU® unit in your powered DL-110 B-Unit, you must cycle the power on and off slowly to maintain proper synchronization between each powered unit's reverse unit. If the units should become unsynchronized, simply shut down power for three or more seconds. Upon repowering, each unit should come up in RESET. If you choose to operate your existing DL-109 A units in a "locked-out" state, a lockout switch on the powered DL-110 B-Unit has been provided so that you can manually "lock-out" the B-Unit in the same direction the powered A Units are configured.

PROTOSMOKE™ UNIT OPERATION

The DL-110 contains a self-powered smoke unit that outputs a steady stream of smoke through the smoke stack on the roof of the engine. The ON/OFF switch located next to the power truck must be in the ON position in order for the smoke unit to function. See Fig. 1 on page 3.

The smoke unit is essentially a small heating element and wick which soaks up and then "cooks" a mineral oil-based fluid that omits a harmless smoke. The smoke is then forced out of the stack via a small electric fan which runs at a constant speed. However, the smoke intensity can be varied by increasing the transformer voltage setting. The higher the setting, the more intense the smoke output.

For best results, we recommend that you add 20 - 25 drops of ProtoSmoke™, Seuthe, LGB or LVTS fluid before you run the engine. If you don't choose to add the fluid, then the smoke unit switch should be turned off.

Failure to either add the fluid or turn the switch off could lead to damage to the smoke unit heating element and or wicking. Add the fluid through the smoke stack hole. After adding the fluid, gently blow into the stack to eliminate any air bubbles. Do not overfill the unit as overfilling can cause the fluid to leak out and coat the interior engine components. When the smoke output begins to diminish while running the engine, an additional 20-25 drops of smoke fluid should be added or the

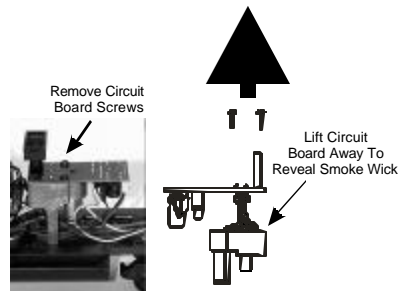


Figure 2: Inspecting The Smoke Unit

smoke unit switch should be turned off. When storing the engine for long periods of time, you may want to add at least 20 drops of fluid to keep the wick soaked with fluid and prevent it from drying out. After removing the engine from storage, it is advisable to add another 25 drops of fluid, letting the wick soak up the fluid for 15 minutes prior to operation.

SMOKE UNIT MAINTENANCE (2 and 3-Rail)

***CAUTION:** Operating the engine without smoke fluid and with the smoke unit switch in the ON position can damage your smoke unit wick, causing the wick to become hard, blackened and unabsorbant around the heating element. When this occurs, it may be difficult for the wick to soak up the smoke fluid resulting in poor or no smoke output. If that occurs, we recommend that you inspect and/or replace the wick taking care to not run the engine without fluid in the future. You can inspect the wick to see if it needs replacement by removing the smoke unit circuit board from the smoke unit body as seen in Fig.2. After removing the circuit board screws lift the circuit board away and inspect the wick. If the wick is darkly discolored and hard, it should be replaced.*

OIL & LUBRICATION INSTRUCTIONS

In order for the engine to perform correctly and quietly, it is important that the chassis be lubricated before operation. Lubrication should include all truck block bushings and pickup rollers to prevent them from squeaking. Use light household oil and follow the lubrication points marked "L" in Fig. 3 below.



Figure 3: Lubricating The Chassis

The locomotive's internal gearing in both power trucks has been greased at the factory and shouldn't need additional grease until after 50 hours of operation or one year whichever comes first. Grease cannot be added to the internal gearing until the body is removed from the chassis which is held in place by four Phillips screws. The screws are located on each end of the chassis as seen in Fig. 5 on the following page. After removing the screws, lift the body away from the chassis and lay the body next to the chassis.



Figure 4: Greasing The Chassis Trucks

Next, remove the truck blocks from the chassis by unscrewing the large Phillips motor mount screw on the bottom of each truck block (See Fig. 5). 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. Reassemble the truck and motor, being careful not to pinch the pickup and ground wires between the truck block and motor mount. Repeat the procedure for the other motor and truck and then reassemble the chassis to the body. When reassembling the chassis and body, be very careful that the lighting wire harnesses are not caught between the body and chassis as this can lead to a short which may damage the electronic circuit boards beyond repair.

In addition to the truck block internal gearing, it is a good idea to lubricate the outside truck block "idler" and "drive" gears with grease. Use the diagram shown in Fig. 4 on page 6 as a guide and add grease to the points marked with a "G".

Periodically, check the locomotive wheels and pickups for dirt buildup as this can significantly affect the engine's ability to perform properly. Dirty track and dirty wheels can cause both poor electrical contact as well as poor traction, especially on elevated track sections. Finally, dirt and oil build up can prematurely wear out the neoprene traction tires.

TRACTION TIRE REPLACEMENT INSTRUCTIONS

Your locomotive is equipped with two neoprene rubber traction tires on each power truck. While these tires are extremely durable and long-lasting there may arise a time where they will need to be replaced. Should this occur, you will need to remove the trucks and truck sides on the truck block from the chassis in order to slip the new tire over the grooved drive wheel. We suggest you follow the disassembly instructions found in the

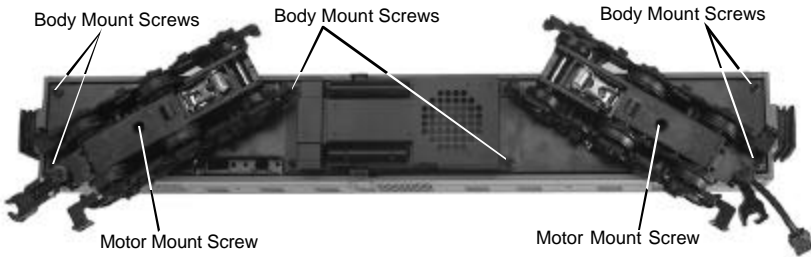


Figure 5: Removing The body From The Chassis

Lubrication section on the preceding pages to disassemble the chassis and truck blocks from the body.

Before the new tire can be installed, you must make sure the old tire has been completely removed from the groove in the drive wheel. Use a razor blade or small flatblade screwdriver pry away any remains left from the old tire that may still be in the drive wheel groove. Once the old tire has been completely removed, slip the new tire onto the wheel. You may find it useful to use two small flatblade screwdrivers to assist you in stretching the tire over the wheel. Be careful to avoid twisting the tire when stretching it over the wheel. If a twist occurs, the tire will have to be removed and reinstalled or a noticeable wobble in your engine will occur when operating the locomotive. In addition, it is important to make sure that the tire is fully seated inside the groove. Any portion of the tire extending out of the groove can cause the engine to wobble. A razor blade can be used to trim away any excess tire that doesn't seat itself inside the groove properly.

Once the new tire(s) are in place, reassemble the truck sides to the truck blocks and then reassemble the chassis to the body. Replacement tires are available directly from MTH Electric Trains.

O-42 OPERATION

While the MTH DL-110 B-Unit is more than capable of operating on O-42 curves and switches, you may find that certain light freight cars are prone to derailling when being pulled or pushed by the MTH DL-110 through O-42 switches. Should this occur, we suggest adding weight to the cars making them heavier and less likely to derail.

TRANSFORMER WIRING CHART

ProtoSounds® is designed to work with any standard AC transformer that uses a “Pure Sine-Wave” format. The chart below lists the many Lionel® compatible transformers, such as the Lionel KW or ZW models. In addition, the chart details how the terminals on these compatible transformers should be attached to your layout. The Trainmaster system from Lionel® (marked with an asterisk below) will not function correctly with ProtoSounds without disrupting the sound effects. Therefore, whenever ProtoSounds senses that the Trainmaster system is being used, it automatically disables ProtoSound’s sound effects. The operator retains control over the engine, but no sound effects will play.

**ProtoSounds needs over 14 volts of power to work properly. Overloading or using in-line accessories with this transformer may lower the peak voltage below ProtoSound’s requirements.*

Transformer Model	Center Rail	Outside Rail	Min/Max. Voltage	Power Rating	Transformer Type
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
Cab-1/Powermaster	A	U	0-18v	135V.A.	Electronic
Dallee Hostler	Left Terminal	Right Terminal			
Lionel LW	A	U	8-18v	75-Watt	Standard
Lionel KW	A or B	U	6-20v	190-Watt	Standard
MRC Tech II	Left Terminal	2 nd From Left	0-15v*	40V.A.	Electronic
Lionel MW (not recommended)	Outside Track Terminal	Inside Track Terminal	5-16v*	50V.A.	Electronic
R.O.W.	Red Terminal	Black Terminal	0-24v	384-Watt	Standard
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 or D	U	8-20v	275-Watt	Standard
MTH Z4000	Black	Red	5-18v	390-Watt	Standard

WARNING:

When using electrical products, basic safety precautions should be followed including the following:

- Read this and all related manuals (transformer/power supply, locomotive, etc.) thoroughly before using this device.*
- This device is not recommended for children under eight years of age without adult supervision.*
- MTH recommends parents examine the toy transformer used to power this device periodically for conditions that may result in the risk of fire, electric shock, or injury to persons, such as damage to the primary or output cord, plug blades, housing or other parts (including proper functioning of the circuit breaker), and that, in an event such conditions exist, the transformer should not be used until properly repaired.*

SERVICE & WARRANTY INFORMATION

HOW TO GET SERVICE UNDER THE TERMS OF THE LIMITED ONE YEAR WARRANTY

For warranty repair, do not return your product to the place of purchase unless it was purchased from Mike's Train House in Columbia, MD. Instead, follow the instructions below to obtain warranty service as our dealer network is not prepared to service the product under the terms of this warranty.

1. First, write, call, email or FAX MTH Electric Trains, 7020 Columbia Gateway Drive, Columbia, MD 21046, 410-381-2580 (FAX No. 410-423-0009), or on the internet at service@mth-railking.com or our web site, www.mthtrains.com, stating which product you have, when it was purchased and what seems to be the problem. You will be given a return authorization number to assure that your merchandise will be properly handled upon its receipt at MTH.
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, a copy of your sales receipt, the Return Authorization number and a full description of the problem, must be included to facilitate the repairs. Please include the description regardless of whether or not you discussed the problem with one of our service technicians when contacting MTH for your Return Authorization number.*
3. Please make sure you have followed the instructions carefully before returning any merchandise for service.

LIMITED ONE YEAR WARRANTY

This item is warranted for one year from the date of purchase against defects in material or workmanship. We will repair or replace (at our option) the defective part without charge for parts or labor, if the item is returned to the address below within one year of the original date of purchase. This warranty does not cover items that have been abused or damaged by careless handling. Transportation costs incurred by the customer are not covered under this warranty.

This warranty gives you specific legal rights and you may have other rights which vary from state to state.

ProtoSounds® is a trademark of MTH Electric Trains. DCRU® is a registered copyright of QS Industries, Inc. Lionel® and Railsound® are registered trademarks of Lionel L.L.C.