

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.



M.T.H. Electric Trains®
Z-4000 400-Watt Transformer
Operating Instructions



The M.T.H. Z-4000® Transformer is a state-of-the-art UL-approved 400-watt model railroad-hobby transformer. It features a microprocessor-controlled interface that provides the model railroader unprecedented control over any AC-powered model locomotive and locomotive sound system. The Z-4000 transformer may be used alone for local control of a model railroad or it can be paired with a remote control system, such as the M.T.H. Z-4000 Remote Control System or the M.T.H. DCS Remote Control System. Operators of any AC powered O, S, or Standard Gauge locomotive, regardless of manufacturer, will appreciate the power and control features found in the Z-4000 transformer. For your own safety and that of your equipment, please read the following pages before beginning to use your Z-4000 Transformer.

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

Read this manual thoroughly before using this device.

M.T.H. recommends that all users and persons supervising use examine the hobby transformer periodically for conditions that may result in the risk of fire, electric shock, or injury to persons, such as damage to the primary cord, plug blades, housing, output jacks or other parts. In the event such conditions exist, the transformer should not be used until properly repaired.

This Z-4000 is intended for indoor use. Do not use if water is present. Serious injury or fatality may result.

Do not operate the Z-4000 with damaged cord, plug, switches, buttons or case.

The Z-4000 was designed to operate on 120 volt, 60 Hertz power. Do not connect to any other source of power.

To avoid the risk of electrical shock, do not disassemble the unit. There are no user-serviceable parts inside. If the unit is damaged contact M.T.H. Service for instructions.

Do not use this Z-4000 for other than its intended purpose.

As with all electrical appliances, the Z-4000 should not be left plugged in and turned on when unattended.

Transformer Ratings

Input:	120VAC	60Hz	464W	
Output:	Tracks 1&2:	0-22VAC	180W	
	AUX 10:	10VAC	30W	
	AUX 14:	14VAC	42W	

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. 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 or FAX MTH Electric Trains, 7020 Columbia Gateway Drive, Columbia, MD 21046, 410-381-2580 (FAX No. 410-381-6122), stating 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.
2. CAUTION: Make sure that 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 it be insured. A cover letter, including your name, address, daytime phone number, Return Authorization Number, a copy of your sales receipt and a full description of the problem, must be included to facilitate the repairs. Please include the description regardless of whether you discussed the problem with one of our service technicians when contacting MTH for your Return Authorization Number.

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

Limited One-Year Warranty

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

See our website at www.mth-railking.com or call 410-381-2580 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

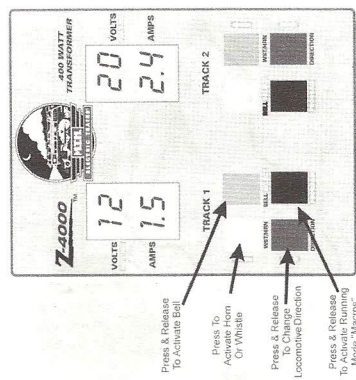
The Z-4000 Transformer's control panel has a voltage display, amperage display, and horn, bell, direction, and programming buttons for two track outputs. Two additional fixed voltage outputs are also available, making the Z-4000 the perfect choice for operating O, S, or Standard Gauge locomotives and accessories.

The Z-4000 was designed to operate any AC-powered model train or operating accessory. The transformer contains two variable outputs, each capable of providing 180 watts to the track or accessory, and two fixed voltage outputs of 10 and 14 volts respectively. The fixed outputs are designed for powering accessories like lamps and switches, while the variable outputs should be utilized for locomotive and operating accessories. In addition, the Z-4000 features individual circuit breakers for each output and utilizes a state-of-the-art design that minimizes voltage fluctuation when bell or horn buttons are activated.

Operating a locomotive or accessory is a straight-forward process. Voltage output is controlled by the throttle setting. Adjusting the throttle setting will control the track voltage, which is shown on the VOLTS display. Pressing the DIRECTION, WHISTLE/HORN and BELL buttons should cause the locomotive to change direction, blow its whistle or horn and ring its bell (if the engine is so equipped), respectively. It is important to wire up the Z-4000 to your track correctly in order for the horn or bell does not function when their buttons are pressed, check the transformer connections for proper hook ups. The buttons also perform secondary functions (shown in white letters with blue background) when the Z-4000 is in Program mode. For more information on using the buttons, see the "Basic Operating Instructions" and "Programming Proto-Sound® Features" sections of these operating instructions.

As with all electrically powered products, certain precautions should be taken before operating the Z-4000 transformer. Please review the precautions section in the back of this book before operating your Z-4000.

Note: If at any time the red warning light illuminates and stays lit (located on the left side of the transformer case), the operator must return the throttle handles to the OFF position to reset the transformer output.



WIRING UP THE Z-4000 TRANSFORMER

The Z-4000 contains connectors that are designed to accept banana jack connectors or may be used as traditional screw down binding posts at the back of the transformer case. Each connector is color coded, BLACK for ground (-) and RED for positive (+) connections. The top row of connectors are BLACK and act as common ground connections for each output, while the bottom row of connectors are RED and provide the positive connection for each output. Connect the BLACK or ground terminal to either outer rail of the track and the RED or positive terminal to the center rail of the track. Wiring the constant voltage outputs (used for accessories) follows the same convention.



Once the track and/or accessories have been wired up to the Z-4000, plug the AC power cord into any 110V household plug and follow the remaining operating instructions.

Note: The owner should not, at any time, attempt to connect or short any of the voltage outputs together in an effort to gain more power output. If the user attempts such a procedure, the Z-4000 may become permanently disabled. At the very least, the Z-4000 will automatically shut down and the red OVERLOAD light will be illuminated.

FCC REGULATIONS

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: reorient or relocate the receiving antenna, increase the separation between the equipment and receiver, connect the equipment into an outlet on a circuit different from that to which the receiver is connected, consult the dealer or an experienced radio/TV technician for help. Any changes or modifications not expressly approved by M.T.H. ElectricTrains could void the user's authority to operate this equipment in the USA.

PROBLEM		SOLUTION
In PG 52, Voltage is too high, need to shut down to Neutral.	Press PROGRAM, then turn throttle to the OFF position.	
The "Boost" Features shuts off after 25 seconds.	Press PROGRAM, verify that readout is PG-52 and resume "Boost" operation.	
The Bell, Whistle/Horn, Program and Direction Buttons do not respond.	Push deliberately in the middle of the button. Do not press more than one button at a time.	
Red "Overload" LED Indicator remains "ON" at startup.	Make sure that both throttle handles are in the "OFF" position.	
The Bell rings when Wst/Hrn Button is pushed and/or the Whistle or Horn blows when the Bell Button is pushed.	Check that the track connections are proper. They are likely reversed.	
If the Whistle is programmed to blow in Forward or Reverse and the Bell to ring in neutral - activating the lockout function in Neutral causes the Bell to ring.	This is normal. Pressing the Bell Button will turn the bell off.	
All the wires are properly attached but no power outputs from either Track 1, Track 2 or the Auxiliary outputs.	Check that all the circuit breakers are closed and that the Power Switch is ON.	

1. Make sure the two large throttle handles located on either side of the transformer are in the fully lowered (or OFF) position.
2. Turn the Z-4000 on by pressing the Power On button located on the lower right front side of the transformer case.
3. Displays should illuminate and read approximately 0.0 VOLTS and 0.0 AMPS as no power to the track will be applied when the throttle handles are in the OFF position. When the handles are in their fully raised or HI position, approximately 22 volts of power will be applied to the track.
4. Move a throttle handle slightly from the OFF position toward the HI position. You will see the VOLTS display for the track you are operating show a starting voltage of approximately 5 volts applied to the track. In other words, the Z-4000 has an effective start-up voltage setting of approximately 5 volts, rather than 1, 2, 3, or 4 volts. This convention follows the design of the Proto-Sound® system and does not effect the operation of any other manufacturer's locomotive or accessory.

Note:: If no load is present on the track when power is first applied (by moving the throttle up from the fully lowered position), the voltage meter will jump to approximately 10 volts. A load is created if any accessory, lighted car or locomotive is present on the track when power is applied. No Accidental Startups will occur with the Z-4000 because the variable outputs are protected from accidental high-power startup. If the throttle handles are not in the OFF position when the Z-4000 is first turned on, no power will be applied to the track and the red OVERLOAD light will illuminate.

5. When you are ready to run the locomotive, raise the throttle handle to increase voltage to the track until the train begins to move. Proto-Sound-equipped and some other recent locomotives are programmed to begin in neutral, so you will need to push the Direction button to put these engines into forward. Older locomotives may automatically begin in forward.

Operation Buttons:

Horn/Whistle - To sound the horn or whistle, firmly press the Horn/Whistle button. The longer you hold the button down the longer the horn or whistle will sound. The horn/whistle will stop when you release the button.

Bell - To sound the bell (if the engine is so equipped), firmly press and release the Bell/Select button. To turn the bell off, press and release the Bell/Select button again. The bell will continue to ring from the time you turn it on until you press and release the button again, to turn it off.

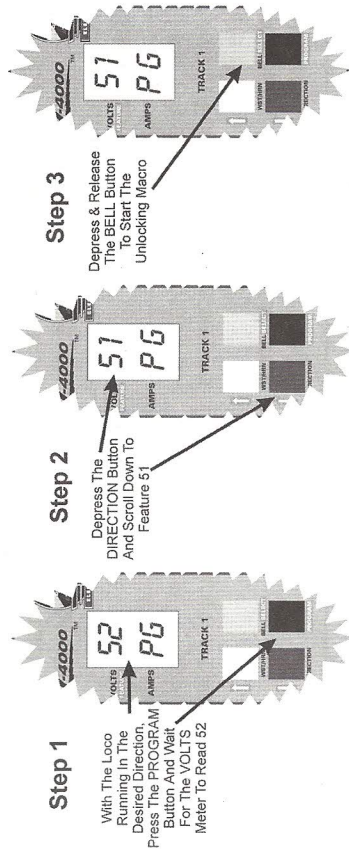
Direction - To change the direction of the train, or to put it in neutral, firmly press and release the Direction button. (Alternately, you can still change directions by dropping and restoring power with the throttle handles, as you do with other transformers) With the reverse units used in M.T.H. and most other model trains, the direction will not go directly from forward to reverse. If a train has been going forward, the first press will put the train from forward into neutral, the second press into reverse, the third press back into neutral, and the fourth back into forward. Please refer to your locomotive's operating instructions for more information.

PROGRAMMING PROTO-SOUND® 2.0 FEATURES

Proto-Sound 2.0 features are triggered by a series of combination signals. You will press the horn/whistle and bell buttons in certain combinations to trigger each feature. There is no Program Button operation in Proto-Sound 2.0. Please see your engine's operating instructions for the combination signals to operate its features.

In order to Unlock the engine and allow it to change directions, do the following:

1. While the transformer is applying voltage to the track, firmly press and release the Program button. The Volts display will flash off, then read "52" and the Amps display will flash off then read "PG."
2. Depress the Direction Button and scroll to feature 51.
3. Firmly press and release the Bell button to start the Unlock Macro. At this point, the Z-4000 will blow the locomotive horn or whistle while reducing the track voltage to 0.0. Within three seconds of the track voltage dropping, your locomotive will sound a ding of its bell and track power will be restored. At this point the locomotive will be in RESET. Turning the transformer off and then on again will allow the locomotive to move forward. Operate using the direction buttons or throttle as usual to change directions.



Handle Tension Adjustment

Your Z4000 includes Handle Adjustment Screws. The **Handle Tension Screws** are located on the bottom of the Z4000 with directions so that you may adjust the tension to your liking.

Locking an Engine into a Direction:

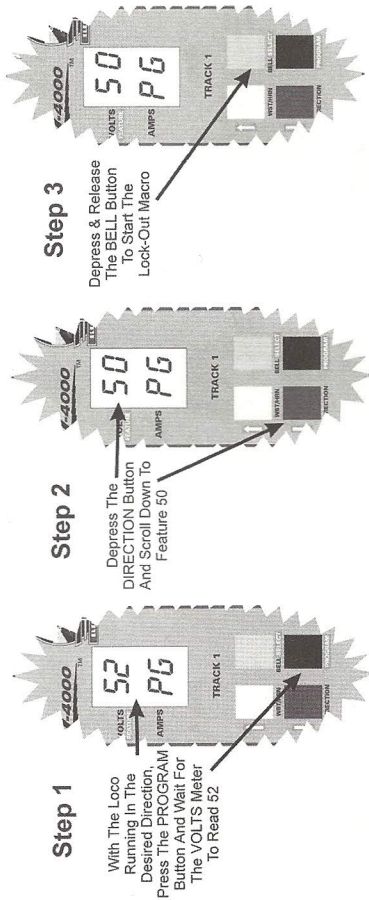
Proto-Sound-equipped engines have a feature that allows you easily to lock the engine into the direction it is currently running. Before you can do this, the locomotive's lock-out feature must be enabled. Most later Proto-Sound-equipped locomotives are programmed with the lock-out feature disabled to prevent accidental lock-outs. Please see the operating instructions for your locomotive for how to enable the lock-out feature.

1. While the transformer is applying voltage to the track, firmly press and release the Program button. The Volts display will flash off, then read "52"; and the Amps display will flash off then read "PG."

2. Depress the Direction Button and scroll to feature 50.

3. Firmly press and release the Bell button to start the Lock-Out Macro. At this point, the Z-4000 will blow the locomotive horn or whistle while reducing the track voltage to 0.0. Within two seconds of the track voltage dropping, your locomotive will sound a short blast of its whistle or horn and track power will be restored. At this point the locomotive will be locked into the direction it was traveling when you activated the feature. Turning the transformer off and then on again should not allow the engine to stop and change direction.

4. *Note: When locking an engine into Neutral, you must set track voltage below 10 volts. At this voltage, activation of the Lock-Out Macro may cause the bell to begin ringing rather than sounding the whistle/horn. This is normal.*



PROGRAMMING ORIGINAL PROTO-SOUND® FEATURES

Programming While in RESET:

Most of the programming features are accessed from the RESET Mode. When you first turn on the transformer, Proto-Sound-equipped engines will be in RESET. You can return to RESET at any point during operation simply by turning off power to the track (putting the throttle handles into the fully lowered OFF position) for ten seconds or more. You will hear the sounds of the engines on that track decrease and a single ding to indicate that it has powered off.

When in RESET, your engine will not respond to the whistle or bell buttons with a horn blast or continuous bell ringing. If you don't want to configure or change your locomotive using any of the programmable features, simply leave RESET by raising the throttle and wait 5-10 seconds before running the locomotive. After you leave RESET, your engine will operate normally in all the directions, forward, neutral and reverse. Remember though, once power is turned off for more than 10 seconds, the next time power is applied to the track, your engine will be back in RESET.

1. While the engine is off, firmly press the Program button to enter Program Mode. The amps display will read "PG" to indicate that you have entered PROGRAM. When in PROGRAM, the transformer's Bell, Whistle/Horn, and Direction buttons assume secondary programming responsibilities that make accessing the RESET features easy. The white lettering on blue background describes what each button's secondary function is. Note: While in PROGRAM, the displays for the other track will be blank and controls will be locked.
2. Use the Whistle/Horn button to scroll up to the desired feature number or the Direction button to scroll down (see your locomotive's operating instructions to determine which number accesses which feature). The feature number will be shown in the Volts display.
3. Firmly press the Bell/Select button to indicate that you wish to select the feature number displayed.
4. The locomotive will make air release sounds to indicate what feature number you have selected (i.e. if you chose feature number six, the air release will sound six times in rapid succession). This will be followed by a series of

clinks and clanks to reconfirm your selected feature number. One clank indicates the number five and one clink indicates the number one. Hence, feature six will draw one clank followed by one clink. Feature fifteen, on the other hand, would draw three clanks and no clinks, and feature twenty-two would draw four clanks followed by two clinks. The volts window will also display the number you have selected.

5. At this point, you can access the specific setting you wish to program in the chosen RESET feature by firmly pressing the Bell/Select button. See your locomotive's operating instructions for directions how to program each feature.

Note: your locomotive's operating instructions may indicate that you should use the Whistle/Horn Button to change feature settings. However, in PROGRAM, the Bell/Select Button does this. The Whistle/Horn and Direction buttons continue to allow you to scroll up and down between feature numbers.

6. If you wish to program other RESET features, repeat steps 2-5.

7. Once you have finished programming features, press and release the Program button to lock in your settings and to return the throttle and buttons to their primary functions. You will know you have successfully exited PROGRAM when the amps display no longer shows "PG."

8. When Power is turned back on the Engine will be in RESET.

Programming While in a Direction:

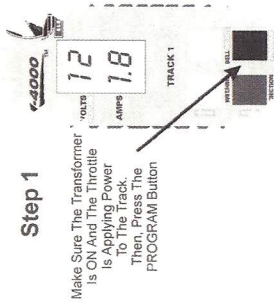
Firmly pressing the Program button while the transformer is applying power to the track (7.5 volts or more) and the locomotive is in a direction (Forward, Reverse, Neutral) allows you to boost power to the locomotive, or to lockout or unlock directional control of Proto-Sound-equipped engines. Directions for each setting are given below.

Boosting an Engine's Speed:

You can temporarily boost power to the track (and the engine's speed) without changing the commanded track voltage at the throttle.

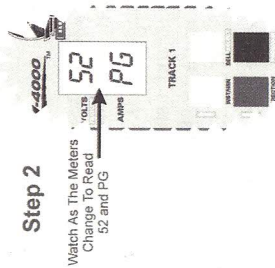
1. While the transformer is applying voltage to the track, firmly press and release the Program button. The Volts display will flash off, then read "52" and the Amps display will flash off then read "PG."
2. Firmly press and hold the Bell Button. The Volts display will change from "52" to read the actual track voltage. The track voltage will increase for as long as the Bell button is depressed (up to about 25 seconds) and the Z-4000's maximum output voltage has not been exceeded.

3. When you release the Bell button, the track voltage will gradually decrease to the commanded level set with the throttle.



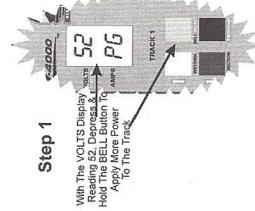
Step 1

Make Sure The Transformer Is ON And The Throttle Is Applying Power To The Track. Then, Press The PROGRAM Button



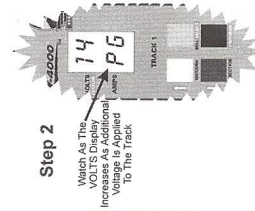
Step 2

Watch As The Meters Change To Read 52 and PG



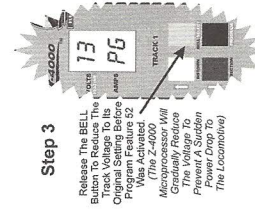
Step 1

With The Volts Display Reading 52, Depress & Hold The Bell Button To Apply More Power To The Track



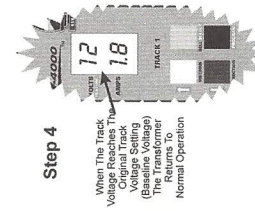
Step 2

Watch As The Volts Display Increases As Additional Power Is Applied To The Track



Step 3

Release The BELL Button To Reduce The Track Voltage To Its Programmed Level (The Program Feature 52 Was Activated. The Z-4000 Will Gradually Reduce The Voltage To Power Drop To The Locomotive)



Step 4

When The Track Voltage Reaches The Original Track Voltage (Baseline Voltage) The Transformer Returns To Normal Operation