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Diesel Locomotive Instruction Sheet

This instruction sheet is for a variety of engines that may include different features. Contact Customer Service for the latest information about your specific engine if you are unsure about the features. Please check the information on the outside of the box to determine which system you have. Read this instruction manual thoroughly for important tips on operating and maintaining your diesel locomotive. When properly cared for, it will last a lifetime.

QUADRA-GRIP™ Traction System: Your locomotive is equipped with a Quadra-Grip Traction System. Two of the drive wheels are fitted with rubber tires, resulting in superior pulling power. For this reason, high speed starts and sudden stops should be avoided to prevent cars from derailing. Smooth throttle control will also result in more realistic operation. Locomotives with Quadra-Grip achieve maximum traction to pull heavy loads at greater speeds.

Conventional Engine

Operation: Your diesel features a solid-state, electronic reversing unit (E-unit), utilizing a state of the art, integrated circuit design. The E-unit operates as follows: Each time the power to the locomotive is interrupted, the E-unit changes states. This can be done by moving the transformer control to the off position, or pushing the direction button on your transformer (if the transformer is equipped with a direction button). The sequence of operation is forward-neutral-reverse-neutral-forward.

The engine can also be locked into any mode of operation by moving the Reverse On-Off Switch to the off position. This switch is located on the underside of the locomotive chassis. When the switch is moved to off, the locomotive will "lock" into the next mode of operation in the sequence. For instance, if the engine is moving forward, then is stopped and the switch is moved to off, the engine will be locked in neutral. Note: if the switch is moved to off while the engine is under power, it will lock into its present mode.

In addition, the Reversing Unit has a forward-reset feature. Should the engine sit without power from track for a brief time, operation will resume in the forward direction upon being re-energized.

Horn and Smoke: This conventional locomotive may be equipped with a digital horn that operates at the push of the whistle/horn button on most transformers. This engine may also have an operating smoke unit. For the first fill with smoke fluid, use between 10 to 15 drops of smoke fluid. Use about 5 drops in subsequent uses. Add directly to the smoke stack. Be sure the fluid goes down the chimney tube.

It is very important to keep the heater element wet with some fluid. If the aroma changes from smoke to a slight burning smell, this is a sign the smoke fluid is running low. This could cause failure of the heater element.

Turn the smoke unit on and off using the slide switch under the engine. Switch to the off position if the locomotive is run without Smoke Fluid. While in neutral, the motor in the smoke generator will pulse on and off. This is done to protect the heater element.

Smoke Output in Conventional mode is dependent on transformer voltage. When running the engine alone, it will run at lower voltage and the smoke output will be low. To increase the smoke output, add more cars to the train, thereby increasing the voltage needed to run the train.

Cruise Control: This engine is equipped with K-Line Cruise Control, an innovative feature that continually measures the speed of the engine and adjusts the motor power to compensate for changes in grade. With the Cruise Control active, the engine will maintain a nearly constant speed up and down hills, through switches and around curves.

When operating with conventional transformer control, the locomotive will speed up as the track voltage is increased, but not all the track power is sent directly to the motors. A portion is reserved and used only when more power is needed, as when climbing a hill. Simply set the transformer throttle so the train is moving the desired speed, and the Cruise Control will maintain that speed. You will notice that the engine will require more voltage to start moving. This is normal.

When running a Cruise Control equipped engine in a consist with other engines, it may be desirable to turn off the Cruise Control feature. In conventional transformer control, the Cruise Control feature can be disabled by moving the "Cruise ON/OFF" switch, located under the engine, to the off position. The feature can be turned back on by placing the switch in the "ON" position. The switch should only be moved when track power is off.

Command Engine with RailSounds

Transformer Operation (Non-command): Place your engine on the track. This engine is designed to operate on 7-18 volts AC. Virtually all AC transformers are suitable, as well as the Lionel TrainMaster Command railroad control system. NOTE: Do not power your locomotive with DC. Damage to electronic components may occur.

When you first power up your track, the engine will wait 3 to 8 seconds as it listens for the digital language from the TrainMaster Command Base (sold separately). When it's determined that it's on a conventional (nonCommand) railroad, the headlights will illuminate and RailSounds will fire up. At this point the engine is in neutral. (This occurs when placing the locomotive on your railroad for the first time. Thereafter, it starts in forward after every 3 second power interrupt).

Get your locomotive moving. Press the DIR button on your transformer. This sequences the Lionel Command reverse unit to the next operating state. The reverse unit alternates between three states: forward, neutral and reverse.

Adjust track voltage until your locomotive moves at a desired speed. To increase speed, increase track voltage. To decrease speed, reduce voltage. To stop the locomotive, cut track power. To select a single operating state (example forward only), you can deactivate the reverse unit's sequencing function. Get your locomotive moving in the desired direction, then slide the PROGRAM / RUN switch on the underside to PROG (see figure below).

Lionel RailSounds

Lionel RailSounds is the most realistic model railroad sound system in the world. This diesel features digital samples from authentic diesels for the ultimate in realism.

Begin by installing a 9-volt alkaline battery, if desired, in the locomotive. This engine has the battery clip inside, so you remove the screws and lift off the engine shell. Connect the 9-volt battery to the battery clip and place the battery in the holder. Replace the body shell and reinsert the screws. NOTE: Although track voltage powers RailSounds, the battery is required for uninterrupted operation while changing directions and shutdown sequences. Use only alkaline batteries; do NOT use heavy duty or rechargeable batteries.

Apply track power and the RailSounds system delivers an authentic start-up sequence, followed by the sounds of the locomotive at idle. As the engine speed increases, the sound of the RPMs move through four levels of roar. Sounds return to idle only after the locomotive has come to a complete halt. To silence diesel RPM roar (horn and bell remain unaffected), slide the RailSounds switch on the underside of the chassis from Rail to Signal before powering the locomotive. To return to the diesel RPM roar, return the switch to the Rail position.

NOTE: Discontinue locomotive power for 10 seconds after changing the RailSounds Rail/Signal switch.

NOTE: If RailSounds drops out during track power interrupts, replace the battery. Recommended Brands: Duracell, Radio Shack or Energizer Alkaline. Do NOT use Ray-o-vac or Duracell Ultra.

Experiencing the range of RailSounds

With RailSounds, you experience the sounds of real railroading like never before. Simply put, it's the most sophisticated, authentic model railroad sound system in the world.

Four diesel-roar levels. Your engine speed determines the level of diesel RPM roar - automatically, if you prefer: idle, slow, medium or full-speed output.

Horn. Press WSTL/HRN on your transformer to activate the horn; release it to discontinue.

Mechanical bell. Press BELL on your transformer to begin the sound; again to discontinue.

Full control of RPMs. Prefer hands-on control of diesel RPM roar? Want to ramp up RPMs before pulling out, just like real diesels do? It's easy with RailSounds. Place your locomotive in neutral and increase track voltage to maximum. RPMs will continue to increase as long as the engine remains in neutral, eventually reaching their highest level. Now, decrease track voltage to the desired speed level. Press DIR on your CAB-1 remote or transformer, and head out with your engine at full churn, just like the real thing. RPMs will remain at that level until the locomotive has come to a complete halt. Experiment with controllable RPMs.

Reverse unit reset sound. Power down your track, wait for 3-5 seconds and listen for the air release sound - that's the locomotive telling you its Lionel Command reverse unit has just reset to forward operation.

Shutdown sequence. No other model railroad sound system shuts down like RailSounds. Turn off track power, and after the air-release reset sound, you have 2 seconds to restart the locomotive. If you're done with operations, RailSounds will commence with an authentic shutdown sequence about 2 seconds after the air-release reset occurs.

Notes on RailSounds

Insert a screwdriver into the volume control knob on the underside of the diesel and turn to adjust sound output. Turn slowly and do not force.

Listen for incidental locomotive sounds during RailSounds operation. They're automatic and authentic.

The 9-volt alkaline battery you installed ensures continuous diesel roar.

Longer track-power interruptions (including derailments) cause RailSounds to shut down after 7 seconds.

TrainMaster Command Operations

The Command control environment

Lionel TrainMaster Command is the advanced model railroad control system from Lionel. TrainMaster Command gives you the power to operate multiple Command-equipped locomotives on the same track, at the same time. To operate in Command mode, you need a Command Base and a CAB-1 remote. These can be purchased from your retailer.

Place your engine on the track. Make sure track power is OFF before placing them on the track. Make sure your Lionel Command Base is ON and its communications wire is connected to the COMMON post on your transformer or directly to the outer rail. Once positioned on the track, increase track voltage to FULL.

Address your engine using the CAB-1:

Press ENG, then 1 on the numeric keypad of your CAB-1 remote.

This command is sent by the CAB-1 to the Command Base, which then translates your command into digital code. That code is sent around your railroad's outside rails in the form of a digital "halo." All Command-equipped engines listen to this digital communication, but they do not respond until they hear their individual ID number - in this case, 1. The digital language of TrainMaster Command - and not track power - controls the actions of Command equipped engines.

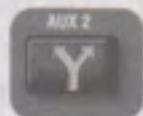
All Command-equipped engines come factory-programmed with an ID# of 1. See page 5 for information on changing this ID#.

Throttle up or press any command button on the CAB-1. Your engine will respond to every command.

Press AUX1 to activate numeric keypad



Press AUX2 to turn headlight on and off



Press F Coupler Button to release the front coupler. Press R Coupler Button to release the rear coupler. Coupler Release sounds will be heard.



Press HALT to shut down all PowerMaster electrical outlets on your railroad. Stops all Command-equipped engines in operation.



Turn the THROTTLE to the right to accelerate, left to decelerate



Press WSTL/HRN to activate horn. Release it to discontinue.



Press BELL once to activate the bell, again to discontinue.



Press DIR - the locomotive decelerates to a complete stop; turn the throttle up, and the locomotive will accelerate in the new, opposite direction. There is no neutral state.



Press and hold BOOST for extra power. Release BOOST and return to the engine's previous speed.

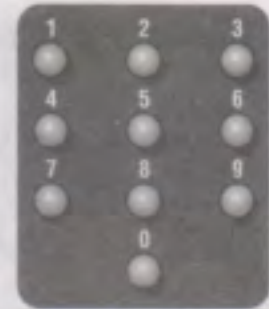


Press and hold BRAKE to slow down or stop. Release BRAKE and return to previous speed.

CAB-1 Commands

CAB-1 Numeric Keypad Commands

When you press the AUX1 on CAB-1, you turn the numeric keypad into 10 command buttons. The keypad lets you control extra command features (until you press any top row button).



- 0** Stops and resets the engine. Resets the direction to FORWARD. Resets RailSounds to automatic RPM. RPMs return to automatic.
- 1** Raises the volume of RailSounds.
- 2** CrewTalk is the sound of walkie-talkie communication.
- 3** Raises RailSounds RPM level. Starts up RailSounds. RPMs increase. Startup sequence commences. Steam Blowoff is heard if RailSounds is already on.
- 4** Lowers the volume of RailSounds.
- 5** Activates the RailSounds shutdown sequence. Just like the real thing, your locomotive RPMs must be at idle for shutdown to occur. Press 6 repeatedly to lower RPMs until they won't descend further. Your locomotive is now at idle. Press 5 to initiate the shutdown sequence. Diesel shutdown commences. Remember, the horn, bell and RPMs will not sound until you restart RailSounds.
- 6** Lowers RailSounds RPM level.
- 7** TowerCom is an audible announcement from the tower.
- 8** Turns the smoke unit off (only diesels with smoke)
- 9** Turns the smoke unit on (only diesels with smoke). Hold down to momentarily increase smoke.

Tuning your locomotive's performance

Braking and Boosting

There's more to starting and stopping than just turning the CAB-1 throttle. Press and hold the BOOST or BRAKE command buttons - they give you a temporary change of speed and are the superior way to handle grades, momentary stops-and-starts and more. Plus, using BRAKE in the Command environment gives you a bonus RailSounds effect - the realistic sound of squealing brakes. When the button is released, the locomotive will return to its previous speed. Before the locomotive returns to its previous speed, any movement of the throttle will cause the engine to remain at its current speed.

Sound Quality

To achieve your preferred RailSounds master volume level, we recommend you use your volume control screw knob located on the underside of your engine. Turn the knob left or right to adjust the volume to your liking. For quick remote-control of volume below the master setting - for example, muting - use the CAB-1 numeric keypad's volume control. Press AUX1 and then 4 several times on the numeric keypad to lower overall RailSounds output. Press 1 to increase volume. The remote set volume will return to max each time the locomotive is powered up.

Cruise Control: This engine is equipped with K-Line Cruise Control, an innovative new feature that continually measures the speed of the engine and adjusts the motor power to compensate for changes in grade. With the Cruise Control active, the engine will maintain a nearly constant speed up and down hills, through switches and around curves. The Cruise Control feature works when operating in Command Control operation.

When operating with Trainmaster Command Control, simply set the desired speed using the CAB-1 remote, and the locomotive will maintain that speed. For best results, the track voltage should be set to around 18 volts. There are some special commands that are used to make the unique Cruise Control features function with the Trainmaster system. The number of speed steps can be adjusted by pressing the following sequence on the CAB-1: DIR, BELL, AUX1, then either 1, 2 or 3. Each button should be held for one full second. This sets the number of steps between stopped and full speed. Press the Bell button again to turn off the bell.

Setting Speed Steps

32 Steps: DIR, BELL, AUX1, 1 (factory setting)

128 Steps: DIR, BELL, AUX1, 2

256 Steps: DIR, BELL, AUX1, 3

The 32 step setting is best for doubleheading with other TMCC engines. The 128 setting is best for normal operation, and the 256 setting is used for ultra precise speed setting. Note that when rotated slowly, each revolution of the CAB-1 throttle is equivalent to 30 speed steps, so changing the speed step setting will change the number of times the throttle has to be rotated to get to full speed.

Operating Consists: When running a Cruise Control equipped engine in a consist with other engines, it may be desirable to turn off the Cruise Control feature. The Cruise Control feature can be disabled by moving the "Cruise ON/OFF" switch, located under the engine, to the off position. The feature can be turned back on by placing the switch in the "ON" position. The switch should only be moved when track power is off.

In the TMCC mode, while the Cruise Control feature is disabled, the "stall speed" can be set by getting the engine moving, slowing the engine until it just stops, then pressing F, AUX1, F, AUX1. To remove the stall setting, press DIR, then press F, AUX1, F, AUX1. Setting the stall speed of all engines in a consist will make them all start at the same time. (Note that this command will open the front coupler.) Cruise Control equipped engines cannot be programmed from the CAB-1 to run reversed in a consist.

NOTE: If Multi-Unit Diesels do not move in the same direction, press AUX1, 0 to synchronize.

Assigning your locomotive a new ID#

As your fleet of Command-equipped engines grows, new engines require different ID#. Choose from any between 2 and 99. Remember, all Command-equipped engines ship as ID#1.

We recommend that you choose an easy to remember ID# for your engine. Some possibilities are part of the engine road number, your age or any two digit number that is not used by another engine. If you like, write the number on a small piece of tape and put this on the bottom of the engine chassis to aid in remembering.

Step 1: Turn the Command Base ON and set the engine on the track.

Step 2: Slide the PROGRAM / RUN switch to PROGRAM, then power up.

Step 3: Turn track power on.

Step 4: Press ENG and new ID#.

Step 5: Press SET located under the removable cover.

Step 6: See the headlight flash and hear the horn blow; that's your signal that programming has been accepted.

Step 7: Set the PROGRAM / RUN switch to RUN.

Your engine remembers its ID# until you change it again.

Reprogramming your locomotive to restore features

Due to the inevitable derailments, static and the nature of electricity, it is possible that your engine could someday lose its setup program. The symptoms of this condition would be unresponsiveness in command mode. This can easily be remedied by "reprogramming" your engine using the following steps.

Step 1: Move switch on locomotive from RUN to PROGRAM.

Step 2: Turn on Command Base.

Step 3: Place locomotive on track, then turn on power to track.

Step 4: Press ENG then input locomotive ID#. Press SET.

Step 5: Press AUX1, then press 8 for Diesel or 5 for Diesel with Strobe.

Step 6: Turn off power to track, wait ten seconds.

Step 7: Remove locomotive from track, move switch from PROGRAM to RUN.

Step 8: Place locomotive back on track, turn power on to track.

Step 9: Press ENG and ID#, then operate normally.

Smoke: Check the information on the outside of your box to determine if your diesel includes an operating smoke unit. For the first fill with smoke fluid, use between 15 to 20 drops of smoke fluid. Use about 10 drops in subsequent uses. Add directly to the smoke stack. If there are two openings, use the rear opening for better performance. Be sure the fluid goes down the chimney tube.

It is very important to keep the heater element wet with some fluid. If the aroma changes from smoke to a slight burning smell, this is a sign the smoke fluid is running low. This could cause failure of the heater element.

Command Mode: The smoke unit must be turned on using the slide switch under the cab of the engine for Command mode. When track power is applied, the smoke output is off until the engine is addressed. Any command sent to the engine turns on the smoke output. Smoke can be turned on and off using CAB-1 Commands (AUX 1, 8 = Off, AUX 1, 9 = On). Press AUX 1 and hold down 9 for a momentary boost of smoke output. Do not hold more than 10 seconds.

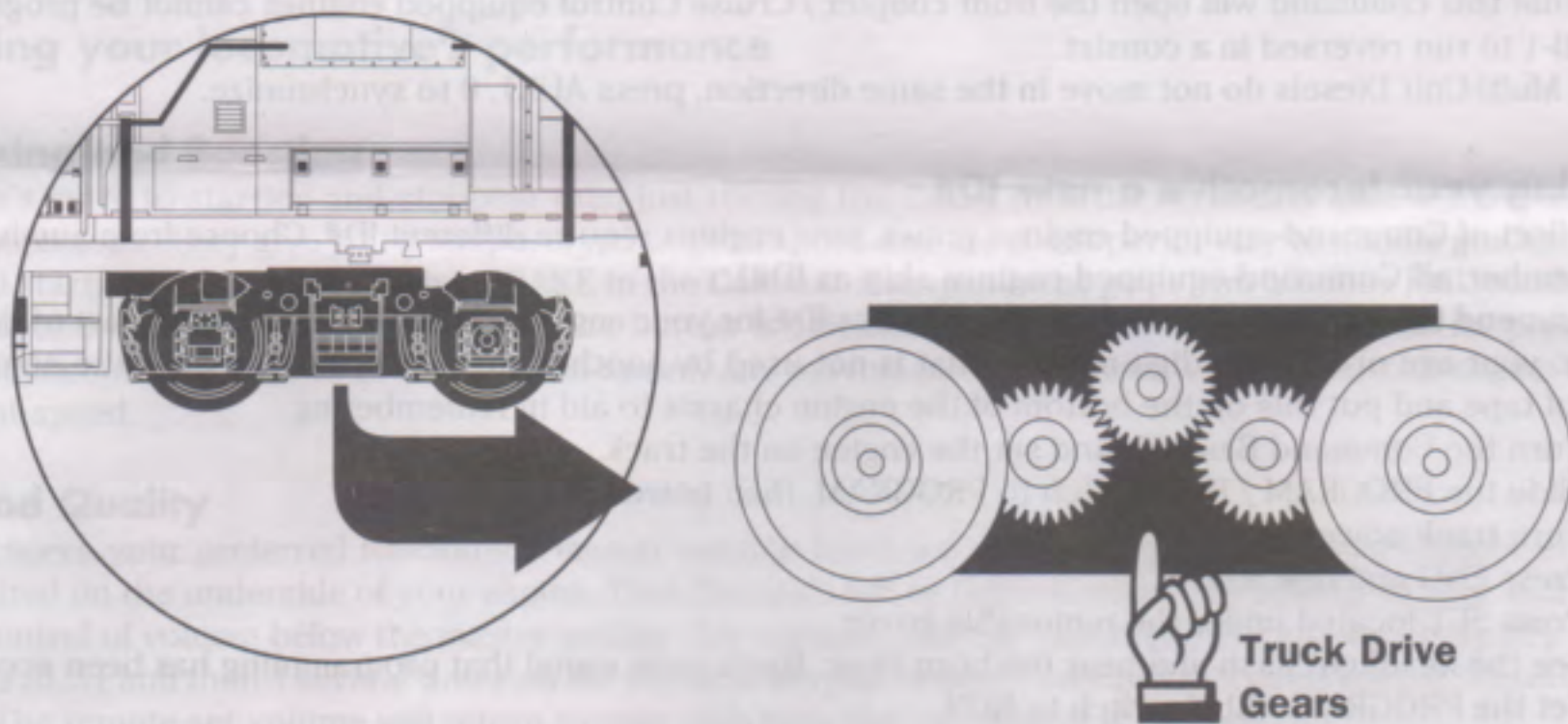
When the engine is reset (AUX 1, 0) or the sounds turned off (AUX 1, 5), the smoke output is also turned off until the next command is sent to the engine.

NOTE: Do not leave smoke fluid in the smoke unit after running. Make sure you run engine until smoke fluid has run out.

Engine Maintenance

Lubricating your diesel

K-LINE Diesels are designed to provide years of quality operation with very little maintenance required. Periodically apply gear lubricant to the truck drive gears. Turn over the engine to locate these behind the truck side frames. The wheel hubs should be lubricated occasionally with light machine oil. Remove any excess oil or grease, especially if it has come in contact with the traction surfaces of the wheels. Do not overlubricate.



Multiple Unit Engines

K-LINE Multiple Unit Diesel Engines are sold in a variety of configurations. The most common are: two Powered "A" Units with one dummy "B" Unit or two Powered "A" Units.

All configurations are completely functional as packaged, however, additional matching engines may be available to create other arrangements. Please follow the instructions below to ensure proper operation of the engines.

The connections between the engines allow the electronics of the Leading "A" engine to control its two motors and the motors of any powered engine following (most likely the Trailing "A"). The engines were designed with multiple motors for superior pulling power. It is recommended that the linked F-units operate on 42 inch curves, however, if you wish to run the F-Units on 31 inch curves, additional couplers are included to achieve greater clearance of the diaphragms around the sharper curves. E-Unit Diesels require a 42 inch curve for operation.

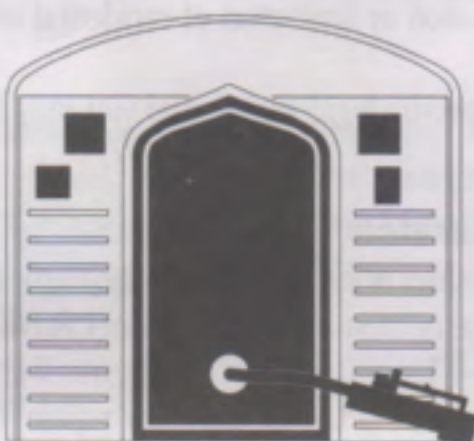
NOTE: If you are running two or more powered units, we recommend using at least a K-956 or a similarly powered transformer.

CONNECTIONS

K-LINE Multiple Unit Engines are equipped with PowerLink. This allows the electronics in the lead engine to control the motors of all subsequent engines. It is essential to link the engines in the right order for optimum operation. Use the following diagram of connectors to determine which engine is which. This information will allow you to link the engines properly.



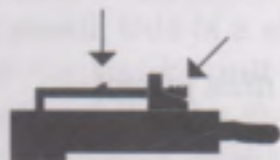
Receptacle Only
Leading "A" / Rear of "B"



Plug Only
Trailing "A" / Front of "B"

The Plug

Plug Lock Ridged End



PLUG ATTACHMENT

Insert plug into receptacle until it clicks and locks into place.

PLUG RELEASE

Depress ridged end of lever with fingernail and pull gently. Do not pull out the the plug without releasing lock or you may damage the connecting wires.

Limited Warranty/Lionel Service

This Lionel product, including all mechanical and electrical components, moving parts, motors and structural components, except for light bulbs, is warranted to the original consumer-purchaser, for **one year** against original defects in materials or workmanship when purchased through an authorized Lionel merchant.

This warranty does NOT cover normal wear and tear, light bulbs, defects appearing in the course of commercial use, or damage resulting from abuse or misuse of the product by the purchaser. Transfer of this product by the original consumer-purchaser to another person voids this warranty. Modification of this product voids this warranty.

Any warranted product which is defective in original materials or workmanship and is delivered by the original consumer-purchaser to Lionel L.L.C. or an authorized Lionel L.L.C. Service Center, together with proof of original purchase will, at the option of Lionel L.L.C., be repaired or replaced, without charge for parts or labor. In the event the defective product cannot be repaired, and a replacement is not available, a refund of the original purchase price will be granted. Any products on which warranty service is sought must be sent freight or postage prepaid, as transportation and shipping charges are not covered by the warranty.

In no event shall Lionel L.L.C. be liable for incidental or consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

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

Instructions for Obtaining Service

If service for this Lionel L.L.C. product is required, bring the item, along with your dated sales receipt and completed warranty information to the nearest Authorized Lionel Service Center. Your nearest Lionel Service Center can be found by calling 1-800-4-Lionel, or by accessing our Website at www.lionel.com.

If you prefer to send your product back to Lionel L.L.C. for repair in Michigan, you must first call 586-949-4100 or FAX 586-949-5429, or write to Customer Service, P.O. Box 748, New Baltimore, MI 48047-0748, stating what the item is, when it was purchased and what seems to be the problem. You will be sent a return authorization letter and label to ensure your merchandise will be properly handled upon receipt.

Once you have received your return authorization and label, make sure that the item is packed to prevent damage during shipping and handling. We suggest that you use the product's original packaging. This shipment must be prepaid and we recommend that it be insured.

Please make sure you have followed all of the above instructions carefully before returning any merchandise for service. You may choose to have your product repaired by one of our Authorized Lionel Service Centers after its warranty has expired. A reasonable service fee will be charged.

Warranty Information

Please complete the information below and keep it, along with your dated sales receipt. You must present this and your dated sales receipt when requesting warranty service.

Name _____

Address _____

Place of Purchase _____

Date of Purchase _____

Product Number _____

Product Description _____



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K2500-100GKL

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K-LINE BY LIONEL

SD-70MAC & SD-75M

Clarification of details unique to this diesel locomotive

Locating Components

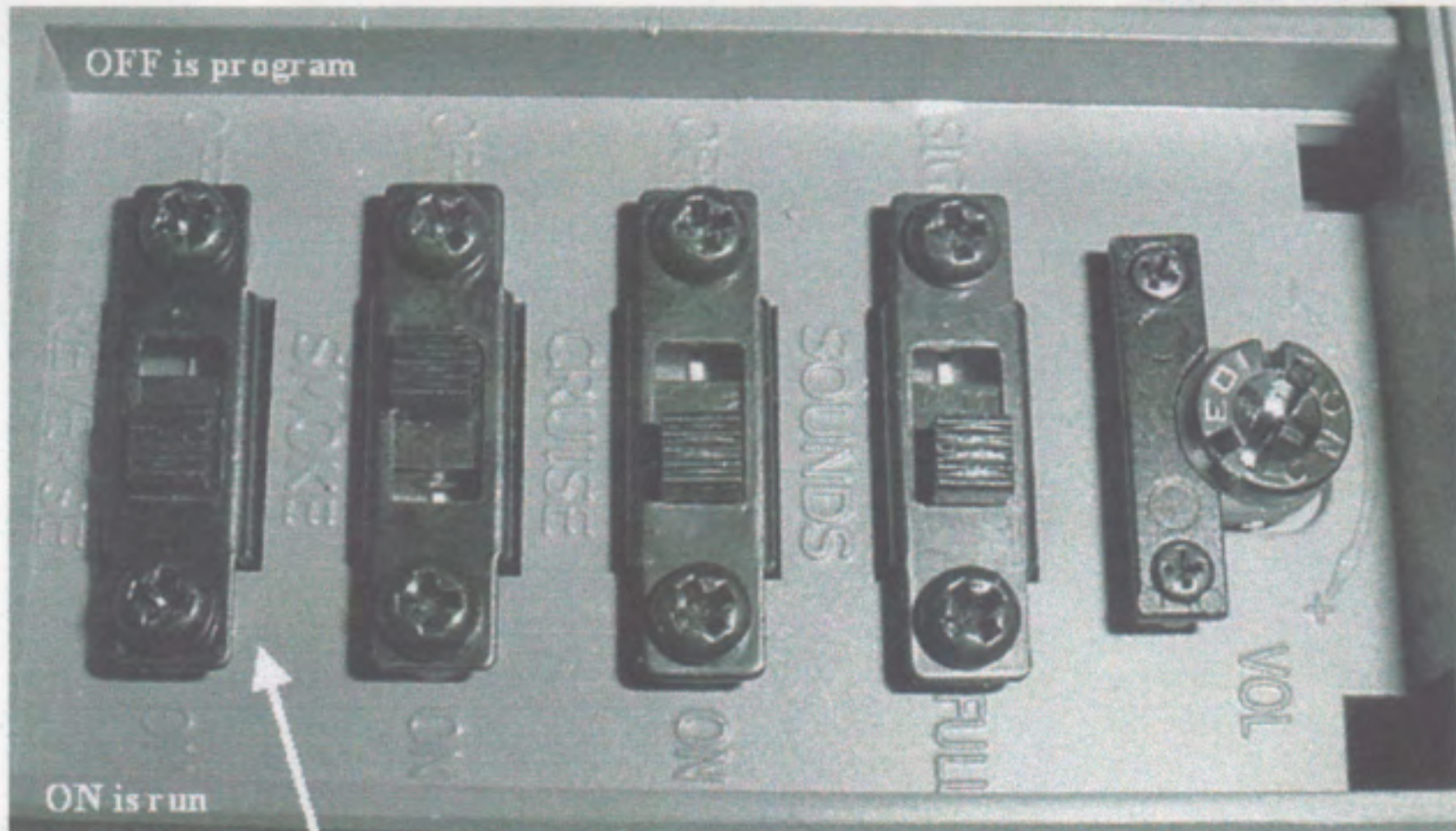
Lift-off hatch for 9v battery (optional) is simulated dynamic brake fan.

Lift-off hatch for switches, volume control and smoke unit



Body shell is secured from underneath the chassis with 3 pairs of screws - at the front edge of the cab, approximately 2" behind the cab and far end of the long hood. Screws are underneath the chassis - underneath the trucks on the two ends.

Switches



Switch descriptions are molded into the shell and are correct for conventional control only models.

For the TMCC models the switch labeled REVERSE is the PROGRAM/RUN switch.