ONE YEAR LIMITED WARRANTY

This engine is warranted for one year from the date of purchase against defects in material and workmanship. We will repair or replace at our option, the defective part without charge for parts or labor, if it is received within one year from the date of purchase. This warranty does not cover items that have been abused or damaged by careless handling. Transportation cost, if any, incurred by you are not covered by this warranty.

1. Should service be required during the warranty period, return the defective engine POST PAID to:

US Mail:	**UPS or FEDEX:**
K-LINE Customer Service	K-LINE Customer Service
PO Box 2831	6909 Dodsons Crossroads
Chapel Hill, NC 27515	Hillsborough, NC 27278

   Be sure to include a copy of your sales receipt or other form of proof of purchase to verify that the engine qualifies for complete service at no charge.

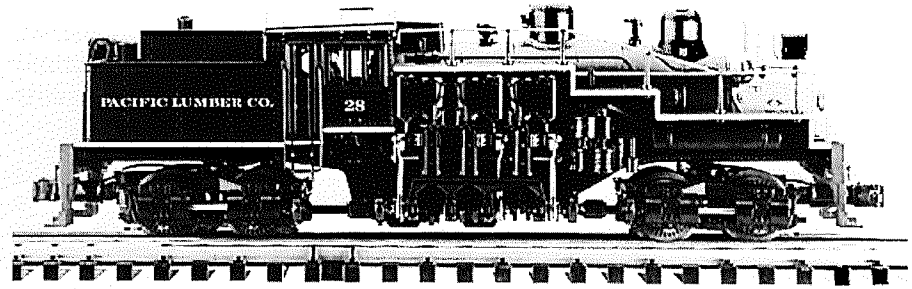
2. CAUTION: Make sure the engine is well packed to prevent damage to the engine. We recommend that the package be insured.

3. Please make sure that all instructions were followed carefully before returning any merchandise for service. For questions, call **919-942-1116** or go to our Web Site: **www.k-linetrains.com**

PO Box 2831 Chapel Hill, NC 27515
919-942-1116
FAX: 919-929-4050
service@kilnetrains.com
www.k-linetrains.com

K-LINE®

Shay Locomotive Owner's Manual



Please note this manual is for a variety of Shay engine configurations that may include different features. Contact Customer Service for the latest information about your engine. While most **K-LINE** steam engines now feature a Lionel Command reverse unit and RailSounds sound system, some feature a conventional reverse unit with whistle and bell or whistle only. 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 locomotive. When properly cared for, it will last a lifetime.

About the Shay

History

The most popular geared engine used in logging operations was the Shay, with over 2700 engines built by Lima Locomotive Works between 1880 and 1945. This steamer, designed by logger Ephraim Shay, features a vertical engine on the right side, an off center boiler to the left and a lineshaft that connects the engine to every axle. This provided extra power, with reduced weight, so the Shay could climb steep grades and follow rough track, two hallmarks of early logging railroading.

Shays were produced in a variety of designs that ranged from 13-Ton 2-Truck models to 150-Ton 4-Truck models. Shays were also offered in wood, coal, and oil fired models.

The Shay was used in a wide variety of services including: industrial, quarry, contractors, logging, mining, branch lines and mountain sections of trunk-line railways. It is the most economical and efficient heavy duty locomotive so far produced for these classes of service.

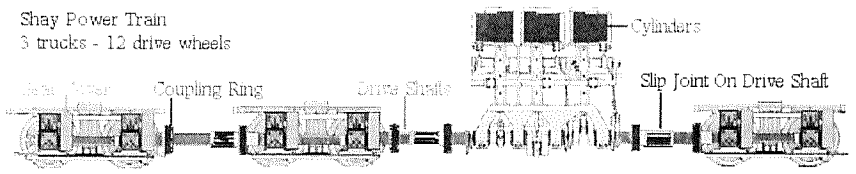
It is especially adapted to industrial railroads in and around large manufacturing plants. Its value as a switching engine is due to the rapidity with which it will accelerate a load and to its ability to spot cars at given points in a minimum of time. It is designed to take any curve on which standard cars can be operated.

For use on heavy grades, sharp curves and light rails, the Shay is particularly desirable. The large number of exhausts at slow speeds produces a steady draft. This gives the Shay excellent steaming qualities and tends to reduce the consumption of fuel to a minimum.

The Shay Locomotive has the greatest hauling capacity, in comparison with its weight, of any locomotive.

Operation

The Shay's unique operation characteristics are directly attributable to its power train and geared wheel sets. Each truck on a Shay consists of a 4 wheel set. The left side wheels look similar to a normal freight car wheel. The right side wheels have an outside bevel gear that mate to the bevel gears on the line (drive) shaft. These are, in turn, coupled to a square shaft. A hollow square shaft, sleeve shaft, slips over the square shaft. The hollow shaft is attached to the crankshaft from Shay's vertical cylinders.



Shay Power Train ©Rick Henderson **www.shaylocomotives.com** used by permission.

This arrangement allows all wheels to be driven for extra power and each truck to pivot for sharp curves and uneven track.

Further Information

Information on the Shay can be found in most books on Steam Locomotives.

For those with Internet access, we recommend the following website:

http://www.shaylocomotives.com

This is an excellent and extensive website that is devoted entirely to the Shay

K-LINE Scale Shay

The **K-LINE** 1:48 Scale Model of the 60-Ton, 3-Cylinder, 2-Truck Shay brings this distinctive engine to the layouts of every railroader.

Scale Shay Features

- 1:48 Scale
- All New Tooling
- Die Cast Boiler
- Die Cast Metal Chassis
- Flywheel Equipped Motor
- Puffing Smoke Synchronized to Wheels
- Working Connecting Rods, Shafts and Gears
- Metal Wheels and Axles

- Cruise Control™
- Lighted Cab Interior
- Fire Box Glow
- Separate Metal Handrails
- Directional Lighting including Operating Headlight
- Solid Brass Builder's Plates
- Engineer and Fireman Figures
- Decorative Gold Plated Bell and Whistle
- Convienient Switch Panel Located on Top Of Locomotive Under Coal Load.
- Operates on O-31
- 13.5" Long

The following additional features are available on the TMCC version.

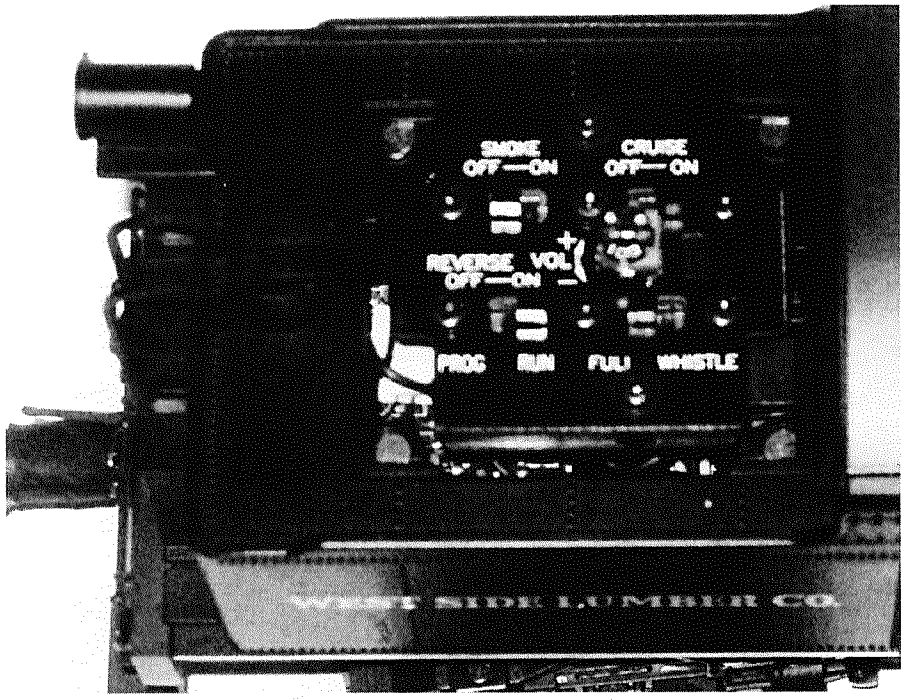
- TrainMaster Command Control
- Lionel RailSounds including CrewTalk and TowerCom
- Puffing Smoke Synchronized to Sounds and Wheels
- Constant Voltage Headlight
- Electrocoupler on Both Ends of Engine

Switch Panel

The switch panel is a special feature of the Shay. It is a very convenient panel located on the top of the locomotive that contains all of the switches and other controls for the locomotive. The switch panel is located under the coal load behind the cab of the locomotive. The coal load cover has metal tabs on each corner that are held in place by small magnets on each corner of the panel. This provides a secure holding mechanism for the coal load cover that requires no tools to gain access to the switches. The coal load cover is also "keyed" so that it only fits when oriented in the correct direction.

The following switches/controls are located on the switch panel:

- Smoke on/off
- Cruise on/off
- Reverse on/off
- PROG/RUN
- FULL/WHISTLE
- Volume Control



Switch Panel

O31 Operation

The Shay locomotive is capable of operating on O31 curve track. However, to prevent derailment of some cars that could be coupled to the Shay, the couplers must be adjusted for O31 operation. The adjustment is a simple operation that only requires a Phillips screwdriver and a few minutes of time.

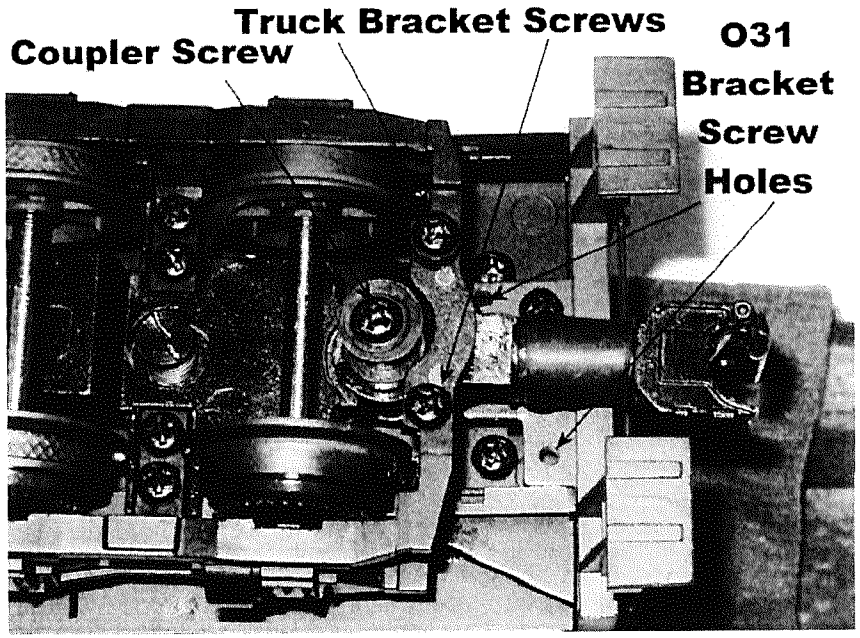
The coupler adjustment simply moves the coupler forward about ½". Two different coupler attachments are built into each end of the Shay. One on the edge of each truck assembly (the couplers come from the factory attached to these), one near the front edge of the frame, and one near the rear edge of the frame. The factory coupler attachments provide a more realistic look to the couplers and work fine on all curves greater than O31. For O31 operation the couplers need to be removed from the truck attachments and placed on the frame attachments.

The following items will be needed to change the coupler positions: #2 Phillips screwdriver, 2 coupler brackets, and 4 bracket screws. The coupler brackets and screws are supplied in the Shay box.

The following procedure should be used to move the couplers:

1. Turn the locomotive upside down in a foam cradle or on a folded towel or pillow. This will protect the delicate parts on the top from damage and ensure that the paint is not scratched.

2. Locate and remove the 2 Truck Bracket Screws that hold the rear coupler in place on the rear truck assembly.

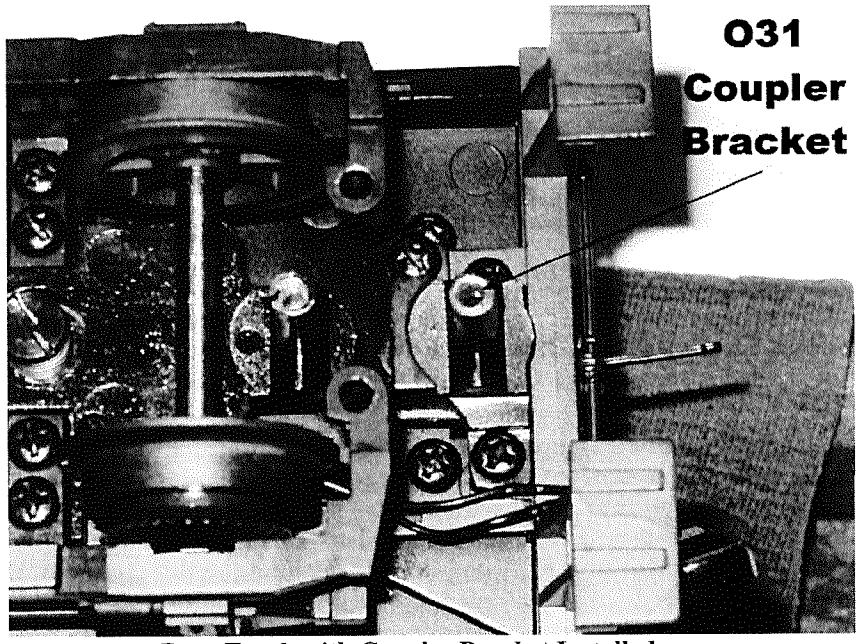


Rear Coupler in Factory Default Configuration

3. Remove the Coupler Screw and retainer washer located above the spring at the base of the coupler.

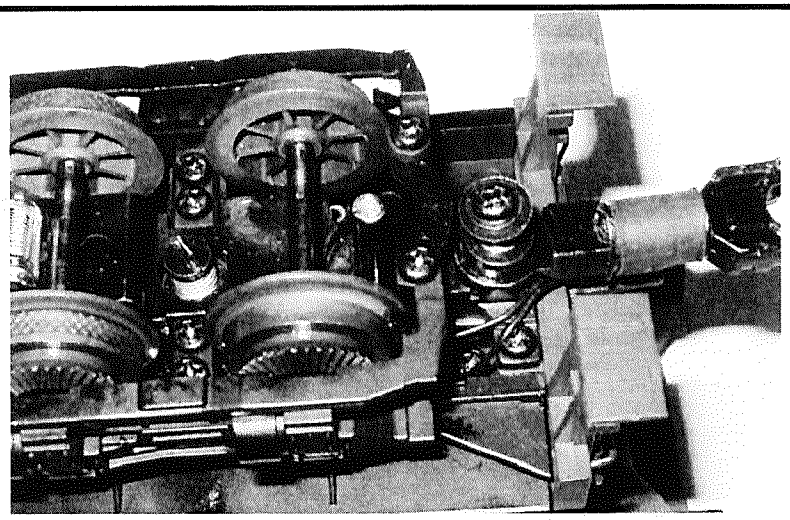
4. Lift out the coupler and replace the Truck Bracket and 2 screws that held it to the truck assembly.

5. Install the supplied coupler bracket on the rear frame of the locomotive. It is designed to fit over the 2 screws that are already at the edge of the frame.



6. **Rear Truck with Coupler Bracket Installed**

7. Place the coupler, coupler ring, and spring over the shaft on the bracket. Compress the spring and install the screw and retainer washer on the top of the shaft. NOTE: If the Shay is equipped with Electrocouplers, you may have to **gently** pull on the wires to get enough slack to install the coupler on the new bracket.



Rear Truck with Coupler in O31 Position

Repeat steps 2-6 for the front coupler.

Conventional Engine

Operation

Your Shay engine 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 it 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 control panel underneath the coal load on the back of the locomotive. When the switch is moved to off, the locomotive will "lock" into the current mode of operation. For instance, if the engine is moving forward and track power is stopped and the switch is moved to off, the engine will remain in forward when power is reapplied. The engine can be locked in forward, neutral or reverse.

In addition, the Reversing Unit has a forward-reset feature. Should the engine sit without power from the track for a brief time, operation will

resume in the forward direction upon being re-energized.

Whistle/Bell

The conventional Shay locomotive is equipped with a digital horn that operates at the push of the whistle/horn button on most transformers. It is also equipped with a bell feature that can be activated using the bell button on your transformer. If you transformer is not equipped with a bell button, use a K-0952 controller.

Smoke

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. See the **Engine Maintenance** section for further information on smoke unit operation.

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 on the control panel under the coal load, 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 alternating current. Virtually all alternating current transformers are suitable, as well as the Lionel TrainMaster Command model railroad control system. ***NOTE:*** Do not power your locomotive with direct current (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 three second power interrupt).

Start 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.

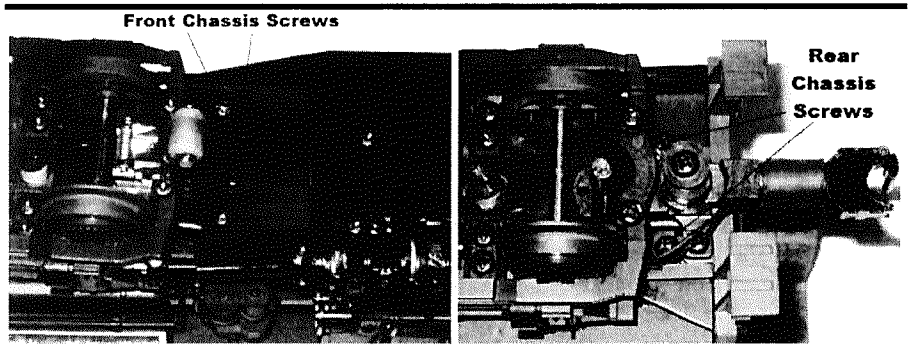
Adjust track voltage until your locomotive moves at a desired speed. Increase track voltage to increase speed. Reduce track voltage to decrease speed. Cut track power to stop the locomotive.

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 and turn off track power. Slide the PROGRAM / RUN switch on the underside of the engine to PROGRAM. This will lock the engine in that that direction. Should the engine sit without power from the track for a brief time, operation will resume in the forward direction upon being re-energized.

Lionel RailSounds

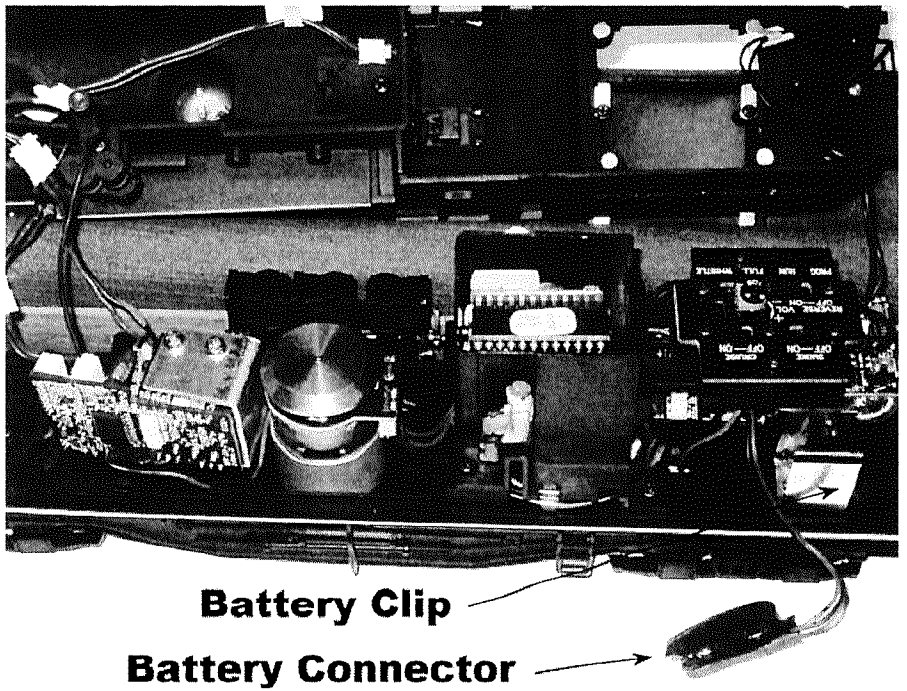
Lionel RailSounds is the most realistic model railroad sound system in the world. This locomotive features digitally stored sounds from authentic steam engines for the ultimate in realism.

Begin by installing a 9-volt alkaline battery, if desired. This requires the entire locomotive chassis to be removed. Do this by removing the four Chassis Screws on the bottom of the locomotive and carefully removing the shell.



Chassis Screw Locations

Connect the 9-volt battery to the battery connector and place the battery in the clip.



Battery Location and Connection

Carefully replace Chassis on the Frame. Check to make sure that no wires are caught between the Chassis and Frame.

Reinsert the 4 Chassis Screws.

NOTE: Although track voltage powers RailSounds, the battery is required for uninterrupted operation while changing direction and shutdown sequences. Use only alkaline batteries; do not use heavy duty batteries.

Apply track power and RailSounds system delivers an authentic start-up sequence, followed by the sounds of the locomotive at rest. As the engine speed increases, chuffing begins, increasing with speed of the engine. Sounds return to idle only after the locomotive has come to a complete halt. To silence the chuffing (whistle and bell remain unaffected), slide the RailSounds switch from RS (RailSounds) to SS (SignalSounds) before powering up the locomotive. To re-activate the steam chuffing, return the switch to the RS position.

NOTE: Discontinue locomotive power for 10 seconds after changing the RailSounds RS/SS switch.

NOTE: If RailSounds drops out during track power interrupts, replace the battery. The following brands are recommended: 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.

Variable chuff rate: Your engine speed determines the steam chuff rate.

MultiWhistle: Press WSTL/HRN on your transformer to activate the different whistle every time; release it to discontinue.

Authentic bell: Press BELL on your transformer to begin the sound; press again to discontinue. Even the final hit is muted like the real thing.

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.

NOTE: Battery must be installed for shutdown sequence.

Notes on RailSounds

Insert a screwdriver into the volume control knob on the switch panel and turn slowly to adjust sound output. 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 engine sounds, even during short track-power interrupts.

Longer track-power interruptions (including derailments) cause RailSounds to shut down after 7 seconds. For even more authentic RailSounds effects, operate in TrainMaster Command environment.

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 the engine 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.*

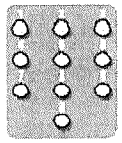
This command is sent by the CAB-1 to the Command Base, which then translates your command into digital code. That code is sent around your railroad's outside rails to the train. All Command-equipped engines listen to this digital communication, but they do not respond until they hear their individual 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 ID# 1. See section on **Assigning Your Locomotive a New ID#** for information on changing this ID#.

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

CAB-1 Commands

CAB-1 Numeric Keypad Commands



When you press the **AUX1** button 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. The direction is reset to FORWARD.

1 Raises the volume of RailSounds.

2 CrewTalk is the sound of walkie-talkie communication.

3 Starts up RailSounds. 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 must be idle for shutdown to occur. Press 5 to initiate the shutdown sequence. Steam shutdown commences. Remember, the horn and bell will not sound until you restart RailSounds.

6 Generates Steam Release Sound.

7 TowerCom is an audible announcement from the tower.

8 Turns off the smoke unit.

9 Turns on the smoke unit. 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 **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

To adjust the speed steps on your throttle enter one of the following command sequences that corresponds to the number of steps per full revolution of the throttle knob.

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

128 Steps: DIR, BELL, AUX1, 2 1

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.

NOTE For DCS handheld users: The DCS handheld only outputs 31 Steps. To setup for 32 steps enter the following commands: **DIR**, **BELL**, **VOL+**

Adjusting Chuff Settings

The chuff rate can be changed by entering the following command sequence: **DIR**, **WSTL**, **AUX1**, **#**. # is a numeric key in the range of 3 – 6. The factory default setting is 6.

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. Cruise Control™ equipped engines cannot be programmed from the CAB-1 to run reversed in a consist.

Engine Maintenance

Lubricating your locomotive

K-LINE steam engines are designed to provide years of quality operation with very little maintenance required. Using a small amount of light machine oil on the end of a toothpick, lubricate all points of linkage on the eight drive wheels and all drive rods. Do not over oil. The more often the engine is run, the more often the drivers need to be lubricated. Remove any excess oil or grease, especially if it has come in contact with the traction surfaces of the wheels.

Changing/Removing the Battery

The Shay is equipped with a battery for the sound system. The battery should be removed when the engine will not be used for a long period of time. It should also be replaced periodically to prevent leakage from corroding any adjacent surfaces. See the **Lionel RailSounds** section for instructions on battery installation.

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.

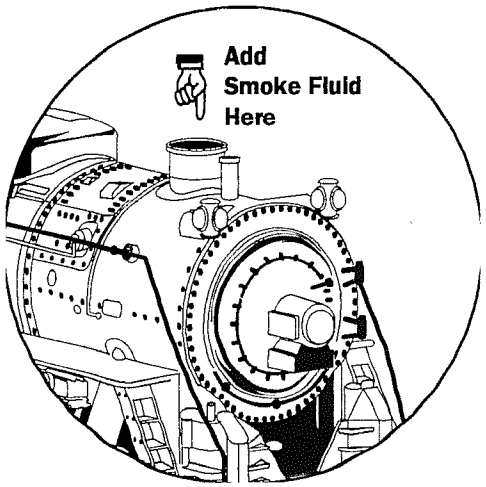
It is very important to keep the heater element wet with some fluid. If the aroma changes from smoke to a slight burning smell, this is a sign the smoke fluid is running low. This could cause failure of the heater element.

Conventional Mode: Turn the smoke unit on and off using the slide switch under the cab of 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.

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: **AUX1**, **8** turns smoke Off and **AUX1**, **9** turns smoke On. Press **AUX1** and hold down **9** for a momentary boost of smoke output. Do not hold for more than 10 seconds.



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.

1. Turn the Command Base ON and set the engine on the track.
2. Slide the PROGRAM / RUN switch to PROGRAM, then power up.

3. Turn track power on.
4. Press **ENG** and new ID#.
5. Press **SET** located under the removable cover at the bottom of CAB1.
6. See the headlight flash and hear the horn blow; that's your signal that programming has been accepted.
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.

1. Move switch on locomotive from RUN to PROGRAM.
2. Turn on Command Base.
3. Place locomotive on track, then turn on power to track.
4. Press **ENG** then input locomotive ID#. Press **SET**.
5. Press **AUX1**, and then press **4** to return engine to factory program settings.
6. Turn off power to track, wait ten seconds.
7. Remove locomotive from track, move switch from PROGRAM to RUN.
8. Place locomotive back on track, turn power on to track.
9. Press **ENG** and ID#, and then operate normally.