CAUTION—ELECTRIC TOY
NOT RECOMMENDED FOR CHILDREN UNDER EIGHT YEARS OF AGE. AS WITH ALL ELECTRIC PRODUCTS, PRECAUTIONS SHOULD BE OBSERVED DURING HANDLING AND USE TO PREVENT ELECTRIC SHOCK.

TRANSFORMER RATINGS—INPUT: 120 VAC; 60 HZ ONLY.
AC OUTPUT: 18 V; 80 VA

Union Pacific
TMCC Diesel Freight
Ready-to-Run Train Set
Owner’s Manual

featuring
TRAINmaster®
and
RailSounds 5.0
and
ODYSSEY SYSTEM
Congratulations!

Congratulations on your purchase of the ready-to-run Union Pacific Diesel Freight Train Set with the TrainMaster Command Control and the RailSounds 5.0 sound system! This set features everything you need to get started—a mighty CW-80 Transformer, a huge loop of FasTrack track, a string of detailed cars, and a TrainMaster Command Control equipped Lionel locomotive. Plus, you get the authentic locomotive sounds of the RailSounds 5.0 sound system.

Have fun growing with this complete train set! Start with the set components, then follow your imagination into your own miniature world. Expand your railroad empire with additional FasTrack track sections, enhance your layout with accessories, lengthen your consist with extra cars, or operate a new locomotive at the head end of your train! To unlock the advanced features of your TrainMaster Command Control equipped locomotive, you may choose to purchase the TMCC CAB-1 Remote Controller (6-12868) and the Command Base (6-12911). Explore the possibilities at your authorized Lionel dealer.

Use this Owner's Manual to learn how to set up, operate, and maintain your train set for years of reliable operation.

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Lionel®, TrainMaster®, Odyssey®, RailSounds®, CrewTalk™, TowerCom™, DynaChuff™, StationSounds™, Pullmor®, ElectroCoupler™, Magne-Traction®, CAB-1® Remote Controller, PowerMaster®, Lionel Zw®, ZW®, PowerHouse®, TMCC®, Lionelville™, Lockon®, Wireless Tether™, LionMaster®, FatBoy™, American Flyer®, TrainSounds™, PowerMax™

The name FasTrack® is used with permission from Pitsco, Inc.
Union Pacific Diesel Freight Train Set Inventory

- LionMaster SD-90 diesel locomotive with RailSounds 5.0 sound system
- Three-bay ACF hopper
- Flatcar with two Semi-trucks
- Double door boxcar
- Cylindrical hopper
- Extended vision caboose
- CW-80 Transformer with accessory wire
- Seven straight FasTrack track sections
- Twelve curved FasTrack track sections
- One straight FasTrack terminal track section
- Replacement traction tire
- Owner's Manual
- Lionel RailRoader Club flyer

Parents! The transformer included with this set should be periodically examined for conditions that may result in the risk of fire, electric shock, or injury to persons (such as damage to the output cord, blades, housing, or other parts). In the event that such conditions exist, the transformer should not be used until properly repaired.
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Operating your CW-80 Transformer safely

Your Lionel CW-80 Transformer is listed by Underwriter’s Laboratory Inc. and has been carefully designed to ensure peak performance. When using electrical products, basic safety precautions should be maintained.

Be sure to observe the following guidelines:

• Read the manual thoroughly before using this device.
• This device is not recommended for children under eight years of age.
• Parents should periodically inspect this product for potential hazards and, if necessary, have them repaired by an authorized Lionel Service Center. In the event that such a condition exists, the transformer should not be used until it has been properly repaired.
• The CW-80 Transformer is intended to be used indoors. Do not use this device if water is present. Serious or fatal injuries may result.
• Use the CW-80 Transformer only for its intended purpose.
• The CW-80 Transformer was meant to operate on 120-volt, 60-Hertz power. Do not connect this product to any other power supply.
• Do not operate the CW-80 Transformer with a damaged cord, plug, or case.
• To avoid the risk of electrical shock, do not disassemble the unit. There are no user serviceable parts inside. If damaged, take this product to an authorized Lionel Service Center.
• Do not operate the CW-80 Transformer on your layout unattended. Obstructed accessories or stalled trains may overheat, resulting in damage to your layout.
• Always unplug the CW-80 Transformer from the power source when not in use.
• Never insert objects into the ventilation slots on this product. Damage to sensitive electronic components can result.
Creating your layout

Building your Lionel layout

Your set comes with twelve curved, seven straight, and one terminal section of track. By adding more FasTrack track sections, you can create an endless number of exciting track arrangements for more fun, action, and variety. The railroad empire of your dreams can quickly become a reality!
Creating your layout

Joining the FasTrack track sections

FasTrack track sections join together easily. With interlocking roadbed sections and large rail tabs, the track fits together securely so you always get good electrical contact. Take a look at Figure 1 to see how to join the track sections.

1. **Line up your two sections of track.**

2. **Insert the rail tabs into the openings at the ends of the corresponding rails.**

3. **Press the sections together until the interlocking roadbed snaps into place.**

![Figure 1. Joining the track sections](image)
Creating your layout

Wiring your CW-80 Transformer

Connect your FasTrack terminal section to the CW-80 Transformer. Use the wires that are already attached to the terminal section. Make sure that all connections are secure. Loose connections can produce extremely high temperatures. For this reason, do not touch the terminals or track connections during use. Also, do not locate scenery materials such as lichen or ground foam near the terminals.

1. **Feed the wires through the notch in the FasTrack terminal section.** Refer to Figure 2 on page 9.

2. **Loosen the red TRACK thumbscrew terminal, then slide the red spade-shaped connector into position.** The thumbscrew post should be positioned between the “blades” of the spade connector. Tighten the thumbscrew to secure the connection.

   **Note!** Be sure that the “blades” of the spade connectors are in contact with the thumbscrew post. You may choose to insert one of the blades into the hole in the post to improve the electrical contact.

3. **Loosen the black TRACK thumbscrew terminal, then slide the black spade-shaped connector into position.** Tighten the thumbscrew to secure the connection.

   **Note!** Be sure that the “blades” of the spade connectors are in contact with the thumbscrew post. You may choose to insert one of the blades into the hole in the post to improve the electrical contact.

4. **If you need to power an accessory (available separately at your authorized Lionel dealer), connect the accessory to the ACCESSORY thumbscrew terminals.** Use the accessory wire included with the CW-80 Transformer.

   **Note!** To adjust the accessory output voltage, see page 32.

5. **Plug the CW-80 Transformer into your wall outlet (120 volts).**

   As your layout expands, you may also make power connections with the stripped ends of wires, placing no more than two wires on each terminal. For best performance on large layouts, it is recommended that you use 16-gauge wire to connect your CW-80 Transformer to the track. On larger layouts where several track connections are required, the use of separate junctions/terminal strips (available at your local electronics store) is recommended to prevent voltage drops.

   **Caution!** To prevent the excessive build up of heat, be sure to select the proper wire gauge for your layout. Follow these guidelines:
   - Track connections must be made with 18-gauge wire or heavier. Larger layouts require a minimum of 16-gauge wire.
   - Use 24-gauge wire only when connecting single accessories that require lower current.
   - When wiring multiple accessories (two or more) or accessories that require higher current, be sure to use 18- to 16-gauge wire.
Creating your layout

Wiring your CW-80 Transformer (continued)

Figure 2. Controller connections
Conventional transformer operations

Conventional operations

Your locomotive is capable of operating in the conventional environment, controlled by nothing more than a standard Lionel alternating-current (AC) transformer. The CW-80 transformer is illustrated in Figure 3.

In the conventional environment, your locomotive cycles through a repeating pattern of operations: forward, neutral, reverse, neutral, and so on. To advance to the next operation, press the DIRECTION button on your transformer. Alternately, you could use the throttle to briefly turn off track power so that the locomotive advances to the next operation when power is restored.

Once you cycle the locomotive into forward or reverse, you control your locomotive’s speed by varying track voltage with the transformer’s throttle. To increase the speed of the locomotive, you increase track voltage. To decrease the speed, you decrease track voltage. To stop the locomotive and to change directions (or to enter neutral), track voltage is turned off or interrupted.

Use the WHISTLE and BELL buttons on your transformer to activate these features.

To experience all of your locomotive’s features, we recommend operating in the TrainMaster Command Control environment. With a simple one-wire connection, you can use the CAB-1 Remote Controller to access all of the functions of your locomotive. Refer to pages 22-30 to see how to operate your locomotive in the TrainMaster Command Control environment.

Figure 3. Transformer features
Conventional transformer operations

Operating your locomotive in the conventional environment

1. Place your locomotive on Lionel or Lionel-compatible O-31 or larger track.
2. Power your locomotive at 8-18 volts with your alternating current (AC) transformer.
   **Caution!** Power your locomotive with an alternating-current (AC) transformer only. Powering your locomotive with a direct-current (DC) transformer may result in damage to sensitive electronic components.
3. Wait three to eight seconds as your locomotive determines whether it is in a conventional environment or a TrainMaster Command Control environment.
   When the locomotive has determined that a TrainMaster Command Base is not connected to the track, the locomotive’s headlight will illuminate and the RailSounds sound system will start. You are ready for operation in the conventional environment.
4. Move ‘em out!
   Press the DIRECTION button on your transformer to sequence your locomotive through the repeating pattern of operations: forward, neutral, reverse, neutral, and so on. You may also briefly turn off track power to advance the locomotive to the next operating state.
   Adjust the throttle until your locomotive moves at your desired speed.
   **Note!** When placing your locomotive on your layout for the first time, it will start out in neutral. Thereafter, it will start in forward after every power interruption lasting five seconds or longer.

   Use the HORN and BELL buttons on your transformer to activate those features. Adjust the volume using the volume control knob located inside the locomotive. Refer to Figure 5 on page 14.
Conventional transformer operations

Locking your locomotive into a single direction

When the Command reverse unit switch is in the RUN position, your locomotive sequences through a repeating pattern of operations: forward, neutral, reverse, neutral, and so on.

To “lock” your locomotive into a single direction (for example, to operate in forward only), you can deactivate the Command reverse unit’s sequencing function. Refer to Figure 4 for the location of the Command reverse unit switch.

1. Use your transformer’s DIRECTION button or interruptions in track power to get your locomotive moving in the desired direction or into neutral.

2. Slow the locomotive down without stopping (reduce the throttle without turning off track power).

3. Slide the Command reverse unit switch to the PGM position. At this point, the locomotive is “locked” into your chosen direction.

To restore the forward-neutral-reverse sequence, just slide the Command reverse unit switch back to the RUN position.

**Note!** Your locomotive will “reset” to forward after any power interruption lasting five seconds or longer, regardless of the direction you set.

Figure 4. Switch locations
Your locomotive is equipped with the Lionel RailSounds 5.0 sound system, the most realistic model railroad sound system in the world. The RailSounds 5.0 sound system brings the sounds of the railroad to your layout through high quality sound recordings of real locomotives.

When you operate your locomotive in the conventional environment, you get the realistic sounds of the diesel motor, which automatically revs up as the speed of the locomotive increases. You can sound the locomotive’s horn or activate the ringing of the mechanical bell. CrewTalk dialog and TowerCom announcements are triggered with the horn button on your controller. When you are through with operations and power down the track, your locomotive’s RailSounds 5.0 sound system starts a realistic shutdown sequence (a nine-volt alkaline battery is required, see page 14).

When you operate your locomotive in the TrainMaster Command Control environment, you get full control of the RailSounds 5.0 sound system. In addition to the horn and bell sounds, the locomotive’s RPM sounds automatically rev up, and you can also set a particular RPM level using your CAB-1 Remote Controller. In the Command Control environment, the release of the ElectroCouplers is accompanied by a coupler release sound. Use the BRAKE button, and listen for the sound of squealing metal. You can also trigger CrewTalk dialog and TowerCom announcements, which simulate the interaction between the locomotive crew and the dispatcher. Whenever you choose to shutdown your locomotive, the realistic shutdown sequence commences (a nine-volt alkaline battery is required if track power is turned off, see page 14).
While the RailSounds 5.0 sound system is powered through the track, we recommend that you install a nine-volt alkaline battery to prevent the sound system from shutting down during track power interruptions (for example, at a switch or a dirty section of track). Follow these steps and refer to Figure 5 as you install the battery.

**Note!** If the RailSounds 5.0 sound system turns off during interruptions in track power, you may need to replace the battery.

1. Carefully lift up and remove the rear roof-top hatch.
2. Remove the protective cover from the battery harness.
3. Snap the battery harness onto the nine-volt alkaline battery’s terminals.
4. Slide the battery into the battery clip.
5. Replace the hatch.

---

Figure 5. Battery installation and volume control knob location
**RailSounds 5.0 sound system operations**

**Using the RailSounds 5.0 sound system in the conventional environment**

When you first power up your locomotive, you will hear the sounds of the locomotive at rest. As the locomotive set moves, the RPM sounds automatically increase with the locomotive’s speed. In the conventional environment, the horn and bell sounds are activated by your transformer controls.

To silence the motor sounds, slide the RailSounds 5.0 sound system switch located on the underside of the locomotive to the SIGNALSOUNDS position before you power up the locomotive or after the locomotive has been powered down for a minimum of ten seconds. The horn and bell sounds will still be active. To adjust the volume, use the volume control knob located under the radiator hatch. Refer to Figure 5 on page 14.

**Note!** For proper operation of the RailSounds 5.0 sound system during track power interruptions and for the locomotive shutdown sequence, you must install a nine-volt alkaline battery. See page 14.

In the conventional environment, you will experience several features of the RailSounds 5.0 sound system.

- **Eight levels of diesel motor RPM.** The level of diesel motor RPM automatically varies with your throttle adjustments.
- **MultiHorn.** A different horn sound at different speeds—a RailSounds 5.0 sound system exclusive.
- **Mechanical bell.** Press BELL on your transformer to begin the effect, then press BELL a second time to discontinue the effect.
- **CrewTalk dialog and TowerCom announcements.** CrewTalk dialog is triggered by your transformer’s HORN button.
- **Reverse unit reset sound.** Power down your track, wait three seconds, and listen for the air-release sound—that’s the locomotive telling you that its Lionel Command reverse unit has reset to forward (a nine-volt alkaline battery is required).
- **Shutdown sequence.** When you turn off track power, you have two seconds to power up again after you hear the reverse unit reset sound. If you do not restore power, you will hear the realistic diesel shutdown sequence. Because track power is off, a nine-volt battery is required for this sequence to function. Refer to Figure 5 on page 14.
In the conventional environment, CrewTalk dialog and TowerCom announcements are triggered by short whistle blasts and vary with the state of the locomotive.

- If the locomotive has been stopped for less than 15 seconds, a short whistle blast triggers a “please standby” dialog.
- If the locomotive has been stopped for longer than 15 seconds, a short whistle blast triggers a “cleared outbound” dialog.
- If the locomotive is moving, a short whistle blast triggers an “all clear ahead” dialog.
- If the locomotive is moving with the bell activated, a short whistle blast triggers a “slow to caution” dialog.
RailSounds 5.0 sound system operations

Using the RailSounds 5.0 sound system in the TrainMaster Command Control environment

To access all of the features of the RailSounds 5.0 sound system, you must operate your locomotive in the TrainMaster Command Control environment. The CAB-1 Remote Controller is required to activate features such as TowerCom announcements, CrewTalk communication, and coupler release sounds. Refer to pages 22-30 to learn how the RailSounds 5.0 sound system is integrated into TrainMaster Command Control operations.

**Note!** For proper operation of the RailSounds 5.0 sound system during track power interruptions and for the locomotive shutdown sequence, you must install a nine-volt alkaline battery. See page 14.

In the TrainMaster Command Control environment, you will experience all of the features of the RailSounds sound system.

- **Eight levels of diesel motor RPM.** Your CAB-1 Remote Controller throttle automatically determines the level of the diesel motor RPM. You may also set the RPM sounds to a particular level manually using your CAB-1 Remote Controller. Refer to pages 25 and 26 for manual adjustments.

- **MultiHorn.** A different horn sound at different speeds—a RailSounds 5.0 sound system exclusive.

- **Mechanical bell.** Press BELL on your CAB-1 Remote Controller to begin the effect, then press BELL a second time to discontinue the effect.

- **Squealing brakes.** Press the BRAKE button and listen for the squealing of the locomotive’s brakes as the locomotive slows down.

- **Coupler release sounds.** Use your CAB-1 Remote Controller to release an ElectroCoupler, and you get the sounds of the coupler opening.

- **CrewTalk dialog and TowerCom announcements.** Use your CAB-1 Remote Controller to trigger conversations between the dispatcher and locomotive engineer. You’ll hear “hold for clearance,” “cleared for departure,” and many other exchanges. See pages 18 and 19.

- **Shutdown sequence.** When you turn off track power, you have two seconds to power up again after you hear the reverse unit reset sound. If you do not restore power, you will hear the realistic diesel shutdown sequence. Because track power is off, a nine-volt battery is required for this sequence to function. Refer to Figure 5 on page 14. You may also trigger the shutdown sequence without powering down the track using the AUX1, 5 command when the locomotive is stopped and the diesel RPM sounds are at their lowest level.
Activating the CrewTalk dialog and TowerCom announcements in the Command Control environment

With the RailSounds 5.0 sound system, CrewTalk dialog and TowerCom announcements feature a variety of brief radio conversations between the engineer and dispatcher. All dialog is intelligible, and each comment is followed by at least one automatic response.

CrewTalk dialog is an engineer-initiated radio conversation with the dispatcher. TowerCom announcements are a dispatcher-initiated radio conversation with the engineer. Be sure to listen for the different combinations of words and phrases that comprise these exchanges.

Refer to Table 1 below for the dialog commands. The dialog in the table provides examples of the conversations you can trigger. The actual phrasing will vary.

<table>
<thead>
<tr>
<th>Locomotive</th>
<th>Commands</th>
<th>Example dialog</th>
</tr>
</thead>
</table>
| Stopped    | AUX1, 2  | Crew: Can we go?  
             |          | Tower: No, please standby |
|           | AUX1, 7  | Tower: Stand by for clearance.  
             |          | Crew: Roger. |
|           | 2        | Crew: Can we go?  
             |          | Tower: Roger, you are clear. |
|           | 7        | Tower: You are clear for departure.  
             |          | Crew: Roger, we are clear. |
|           | AUX1, 5  | Crew: Signing off!  
             |          | Shutdown sequence |
| Moving     | AUX1, 2* | Crew: Train is arriving.  
             |          | Tower: Roger, you are clear inbound. |
|           | AUX1, 7* | Tower: You are clear for arrival.  
             |          | Crew: Roger. |
|           | 2        | Crew: Are we clear ahead?  
             |          | Tower: You are all clear. |
|           | 7        | Tower: You are all clear.  
             |          | Crew: Roger. |
|           | AUX1, 5  | Tower: Come to an immediate stop.  
             |          | Crew: We are stopping now. |
|           | 5        | Tower: Slow to caution speed.  
             |          | Crew: Roger, slowing now. |

* Activating either AUX1, 2 or AUX1, 7 while the locomotive is in motion enables a “train has now arrived” conversation for 15 seconds. If the train stops within this time, pressing 2 or 7 will play this special conversation.

Table 1. CAB-1 Remote Controller dialog commands
RailSounds 5.0 sound system operations

RailSounds 5.0 sound system dialog on a round trip

Refer to Figure 6 for a sample dialog script for the locomotive's round trip.

Note! Actual phrasing may vary.

**TOWER-INITIATED DIALOG**

AUX1, 7 - “Stand by.”
7 - “You are clear.”
5 - “Slow to caution speed.”
AUX1, 5 - “Come to a full stop.”

7 - “Welcome back, stand by.”
7 - “All clear ahead.”
AUX1, 7 - “You are clear inbound.”

**ENGINEER-INITIATED DIALOG**

AUX1, 2 - “Are we clear?”/”No, stand by.”
2 - “Can we go yet?”/”Yes, you are clear.”
2 - “Still clear ahead?”/”Roger, you are clear.”

7 - “we have arrived and we are standing by.”
AUX1, 2 - “We are arriving,”/”OK, you are clear inbound.”

Figure 6. RailSounds 5.0 sound system dialog on a round trip
**Odyssey System operations**

The Odyssey System is “cruise control” for your locomotive. Once the speed control is set, your locomotive will maintain a constant speed, no matter what load is placed on the locomotive or grades you have on your layout. The Odyssey System also allows for extremely slow movement that will amaze any scale enthusiasts.

In the conventional environment, you activate the Odyssey System and set your locomotive to operate at one particular speed. Your locomotive maintains this speed until you turn off speed control or set a new speed.

In the Command Control environment, the Odyssey System is activated using your CAB-1 Remote Controller. When the Odyssey System is active, your locomotive will maintain its speed until you adjust the CAB-1 Remote Controller’s throttle.

**Activating the Odyssey System in the conventional environment**

Follow these steps to activate your locomotive’s speed control in the conventional environment.

1. Slide the Odyssey switch to the ODY position. Refer to Figure 4 on page 12 for the location of the switch.

2. Run the locomotive at the desired speed for approximately five seconds.

3. Press and hold the HORN button on the transformer.

4. While holding the HORN button, increase the track voltage by at least three volts (at least a quarter turn).

The locomotive’s speed will increase before returning to the initial speed. At this point, speed control is set. Increasing the throttle will not increase the speed of the locomotive; however, decreasing the throttle will decrease the speed of the locomotive.

**Note!** You may notice a slight delay between adjusting your transformer’s throttle and the change in your locomotive’s speed as the Odyssey System works to regulate the voltage to the motor. If you desire instantaneous response to throttle changes, turn off the Odyssey System.

**Caution!** In the conventional environment, the lights in the locomotive are connected directly to track power. To prolong the life of your lamps, do not exceed 14 to 16 volts for extended periods.
Odyssey System operations

Turning off the Odyssey System in the conventional environment

Follow these steps to turn off the Odyssey System in the conventional environment.

1. While the locomotive is in neutral, turn your controller up to the maximum power (no more than 19 volts), wait one second, then press and hold the horn button.

2. While holding the HORN button, slowly reduce the track voltage to approximately one-third or one-half of the full power.

3. Release the HORN button.

4. Move the locomotive in forward OR reverse. The locomotive is now out of speed control mode.

   Sliding the Odyssey System switch to the NO ODY position will disable the Odyssey System. We recommend that you keep the Odyssey System switch in the NO ODY position unless you want to activate the locomotive’s speed control.

Odyssey System Command Control operation

When the Odyssey System is activated, changes in the speed of the locomotive will correspond to each signal from the Command Base. For example, when you address the locomotive and slowly turn the throttle knob, the first flash of the light on the Command Base corresponds to the first speed step, which is the slowest speed of the locomotive. The locomotive will maintain that speed until you increase or decrease the throttle.

In the TrainMaster Command Control environment, you can use your CAB-1 Remote Controller to turn the Odyssey System on or off. The position of the Odyssey System switch (see Figure 4 on page 12) is the Odyssey System default setting when you power up the locomotive. You can override the default setting with the following commands. The override settings will be cleared and the default setting will be restored when you power down the locomotive.

Do not wait longer than two or three seconds between pushing the buttons in each sequence. If the command is not accepted, repeat the sequence.

Note! The locomotive must be in “neutral” when you enable or disable the Odyssey System.

Turn off the Odyssey System.

Note! When you press 7, you will trigger a TowerCom announcement. This has no impact on the Odyssey System function.

Turn on the Odyssey System.

Note! When you press 9, you will activate the Air release sound and turn on the smoke unit (if it was off). This has no impact on the Odyssey System.
TrainMaster Command Control operations

TrainMaster Command Control operations

TrainMaster Command Control is the advanced model railroad control system from Lionel. To operate your locomotive in the Command Control environment, you need a Command Base (available separately, 6-12911) and a CAB-1 Remote Controller (available separately, 6-12868). These products are available together in the TrainMaster Command Set (available separately, 6-12969).

Your commands are sent by the CAB-1 Remote Controller to the Command Base, which then translates the command into digital code. That code is sent through the outside rails to your locomotive, which will not respond until it recognizes its unique ID#. TrainMaster Command Control gives you the power to operate multiple Command-equipped locomotives on the same track at the same time.

Keep in mind that track power is like gasoline in the tank of a car—it gives you the power to go places, but it doesn’t tell you where to go or how fast to get there.

Operating your locomotive in the Command Control environment

1. **Turn off track power and plug-in the Command Base.** Be sure that the Command Base is connected to the outside rail or to the Common/Ground/U terminal on your track power supply.

2. **Place your locomotive on Lionel or Lionel-compatible O-31 or larger track.**

3. **Increase track voltage to full power (no more than 19 volts AC).** On PowerMasters, slide the CMD/CONV switch to CMD. Program Track Power Controllers to Command Control operation.

   **Note!** Do not power your locomotive with a direct-current (DC) transformer. Damage to sensitive electronic components may occur.

4. **Press ENG and enter the ID# to address your locomotive with your CAB-1 Remote Controller.** All Lionel locomotives come factory-programmed as ID# 1. To change the ID#, see page 28.

5. **Throttle up and move ‘em out!** Your locomotive will respond to every command from your CAB-1 Remote Controller.
The CAB-1 Remote Controller commands are detailed below. The corresponding RailSounds sound system effects are in bold italic type.

- **Releases the front coupler.**
  
  **Coupler release sound.**

- **Releases the rear coupler.**
  
  **Coupler release sound.**

- **Activates the numeric keypad.**
  
  **Air release sound.**

- **Toggles the headlight on and off.**

- **Accelerates the locomotive with a clockwise rotation. Decelerates the locomotive with a counter-clockwise rotation.**

- **Shuts down all PowerMasters on your railroad.**
  
  Stops all TrainMaster Command Control-equipped locomotives in operation. Use **HALT** only in emergency situations.

- **Activates the locomotive’s horn. Release the button to discontinue the sound.**
  
  **Multihorn diesel horn sound.**

- **Toggles the bell sound on and off.**
  
  **Mechanical bell sound.**

- **Changes the locomotive’s direction. The locomotive decelerates to a stop and continues in the opposite direction when you increase the throttle.**
  
  **Air release sound.**

- **Increases the locomotive’s speed while the button is pressed. Release the button to return to the initial speed.**

- **Decreases the locomotive’s speed while the button is pressed.**
  
  **Squealing brake sounds.**
TrainMaster Command Control operations

CAB-1 Remote Controller numeric keypad commands

When you press the AUX1 button on your CAB-1 Remote Controller, you turn the numeric keypad into ten command buttons. These commands are specific to your locomotive, and an overlay is included to help you learn these functions. After you press the AUX1 button, you will be able to press any numbered button until you address a different Command Control equipped product. The corresponding RailSounds sound system effects are in bold italic type.

1. Stops and resets the locomotive. Resets the locomotive’s direction to forward. Resets the RailSounds sound system to automatic RPM operation. Horn blows. RPM sounds return to automatic.

2. Raises the volume of the RailSounds sound system. Sound volume increases.

3. Activates CrewTalk communication. CrewTalk communication.

4. Increases the RailSounds sound system RPM level. Starts the RailSounds sound system. RPM level increases. Start-up sequence commences.

5. Lowers the volume of the RailSounds sound system. Sound volume decreases.

6. Activates the shutdown sequence. Like prototypical locomotives, the RPM level must be at idle for shutdown to occur. Press 6 repeatedly to lower the RPM level until the RPM sounds reach idle. Press 5 to initiate the shutdown sequence and listen for the CrewTalk communication. Keep in mind that the horn, bell, and RPM sounds are inactive until you restart the RailSounds sound system by pressing 3. CrewTalk communication. Diesel shutdown sequence.

7. Lowers the RailSounds sound system RPM level. RPM level decreases.

8. Activates a TowerCom announcement, which includes a call-out specific to your locomotive. Pressing 7 the first time triggers a “hold for clearance” message. Press 7 again, and a “clear for departure” message plays. There is a four-second delay in this function. TowerCom announcement.

9. Turns off the smoke unit. Air release sound.

10. Turns on the smoke unit if the smoke unit switch is in the ON position. Be sure to add smoke fluid before turning on the smoke unit to prevent damage to your locomotive. Air release sound.

Note! AUX1, 8 and 9 function only if the locomotive’s smoke unit switch is in the ON position. See Figure 4 on page 12 for switch location.
**TrainMaster Command Control operations**

**CAB-1 numeric keypad table**

The 3, 5, and 6 keys on your CAB-1 can perform several different functions when controlling your locomotive. These functions include:

- Starting up and shutting down the engine sounds.
- Controlling the engine RPM sounds manually ("Manual RPM Mode").

If you press **AUX1** immediately before you press the 3, 5 or 6 button, its function will be modified. The following table summarizes the functions of these CAB-1 Remote Controller buttons for your locomotive.

<table>
<thead>
<tr>
<th>Key Command</th>
<th>RailSounds sound system</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>If the RailSounds sound system is shut down, engine sounds start up. If the RailSounds sound system is running, engine enters manual RPM mode and revs up RPM one level with each press.</td>
</tr>
<tr>
<td>AUX1, 3</td>
<td>(same as above)</td>
</tr>
<tr>
<td>5</td>
<td>If locomotive is stopped, engineer announces &quot;shut down,&quot; engine sounds turn off. If the locomotive is moving, the dispatcher instructs, &quot;Slow to caution speed.&quot;</td>
</tr>
<tr>
<td>AUX1, 5</td>
<td>If the locomotive is moving, the dispatcher instructs, “Emergency stop!”</td>
</tr>
<tr>
<td>6</td>
<td>If the locomotive is moving, engine enters manual RPM mode and revs down RPM one level with each press.</td>
</tr>
<tr>
<td>AUX1, 6</td>
<td>(same as above)</td>
</tr>
</tbody>
</table>

**Tuning your locomotive’s performance**

TrainMaster Command Control allows you to fine-tune the performance of your locomotive. Use your CAB-1 Remote Controller to make these adjustments.

**Note!** These settings will be lost if you assign a new ID#.

**RPM RUN LEVEL**

Your locomotive has eight levels of RPM sounds, corresponding to the eight run levels in a real diesel locomotive. The three ways in which you can control your locomotive’s RPM sounds are discussed as follows.
TrainMaster Command Control operations

Tuning your locomotive’s performance (continued)

**Automatic RPM Mode**

In Automatic RPM Mode, your locomotive’s RPM run level is controlled by movements of the throttle on your CAB-1 Remote Controller. A small clockwise motion of the throttle knob will cause the RPM sounds to ramp up one run level, while a small counter-clockwise motion of the throttle knob will cause the RPM sounds to ramp down one run level.

While the locomotive is ramping between run levels, it will ignore additional throttle movements. Once the RPMs have finished ramping to the next run level, additional throttle motions will again trigger another RPM ramp. This feature will allow you to “fine-tune” your RPM run level, regardless of the locomotive’s speed, using only the throttle knob. This mode is the default setting for your locomotive on power up.

**Manual RPM Mode**

In Manual RPM Mode, you can set your locomotive’s RPM run level to a constant value by pressing the AUX1, 3 or AUX1, 6 key sequences on your CAB-1 Remote Controller. When your locomotive is in this mode, its RPM run level will not vary with throttle movements or with the speed of the locomotive.

To enter Manual RPM Mode, press the AUX1, 3 key sequence while the locomotive is stopped, or press either the AUX1, 3 or AUX1, 6 key sequence while the locomotive is moving. Pressing AUX1, 3 will cause your locomotive to enter Manual RPM Mode and ramp up one RPM run level; pressing AUX1, 6 will cause your locomotive to enter Manual RPM Mode and ramp down one RPM run level. You may then press the 3 or 6 key additional times to ramp your locomotive’s RPMs through all the run levels. Once you set your locomotive’s RPM run level it will remain there until you change it with the 3 or 6 keys, or until you exit Manual RPM Mode.

You may cause your locomotive to exit Manual RPM Mode in several ways: reset the locomotive with AUX1, 0 key sequence; enter the shutdown sequence with the AUX1, 5 key sequence; or turn off the track power and allow the locomotive to reset.

**Speed RPM Mode**

In Speed RPM Mode, your locomotive’s RPM run level is controlled only by the actual speed of the locomotive.

To enter Speed RPM Mode, press the AUX1, BRAKE key sequence while the locomotive is stopped. A distinctive “clunk” sound will be heard. Once your locomotive is in Speed RPM Mode, the RPMs will ramp up and down through its eight run levels depending on how fast the locomotive is moving on the track. (Note that this is how your locomotive’s RPMs are controlled when it is running in Conventional Mode.)

To exit Speed RPM mode, reset the locomotive with AUX1, 0 key sequence or turn off the track power and allow the locomotive to reset.
TrainMaster Command Control operations

Tuning your locomotive’s performance (continued)

Momentum
The TrainMaster Command Control momentum feature simulates the labored performance of a locomotive pulling a light, moderate, or heavy load. Press L, M, or H (located under the removable panel on the CAB-1 Remote Controller) to adjust the momentum setting. For quicker response to your commands, press L, which is the factory default setting. Your locomotive will keep this setting until it is changed.

Adjusting the speed
The BRAKE and BOOST buttons give you incremental control of your locomotive’s speed while you press and hold these buttons, allowing you to make small, gradual adjustments around curves and over grades. The locomotive will resume its initial speed when the buttons are released. Listen for the squeal of your locomotive’s brakes when you use the BRAKE button.

Sound volume
Press AUX1, 1 or 4 on your CAB-1 Remote Controller to raise and lower the overall volume of the RailSounds sound system. To limit your locomotive’s volume, we recommend that you adjust your locomotive’s volume control knob (see Figure 5 on page 14 for the location).

Setting the maximum speed
You may use your CAB-1 Remote Controller to set your locomotive’s maximum speed. This will prevent locomotives from derailing as a result of excessive speed.

1. With the Command reverse unit switch in the RUN position, address your locomotive by pressing ENG and entering the ID#.
2. Press SET on the CAB-1 Remote Controller. The headlight will flash.
3. Get your locomotive moving at your desired maximum speed.
4. Press BOOST.

The maximum speed has been set. To clear this setting, press SET and then BOOST, holding each button for one second.

Setting the minimum speed
You may use your CAB-1 Remote Controller to set your locomotive’s minimum, or stall, speed.

1. With the Command reverse unit switch in the RUN position, address your locomotive by pressing ENG and entering the ID#.
2. Press SET on the CAB-1 Remote Controller. The headlight will flash.
3. Get your locomotive moving at your desired minimum speed.
4. Press SET again. The locomotive will stop.

The next time you throttle up, your locomotive will start at the speed you set. To clear this setting, press SET twice, holding the button for one second each time.
TrainMaster Command Control operations

Assigning your locomotive a new ID#

As your roster of TrainMaster Command Control-equipped locomotives grows, you will want to give each unit a unique ID#. The locomotive will respond to commands associated with its ID# while all other units will disregard these commands.

1. Slide the Command reverse unit switch on your locomotive to the PGM position. See Figure 4 on page 12 for switch location.
2. Place the locomotive on the track.
3. Connect the Command Base and plug it in.
4. Power up the track.
5. Press ENG.
6. Enter the unique ID#. Choose any number from 1 to 99 that has not been assigned to another locomotive (ENG). We recommend using a part of your locomotive’s cab number.
7. Press SET. The locomotive’s horn will sound, or the headlights will flash if the RailSounds sound system is off.
8. Slide the Command reverse unit switch back to the RUN position.

The locomotive’s ID# has been set. Be sure to record the new ID# for your reference.

Note! For reprogramming to restore your locomotive’s functions, see page 30.
TrainMaster Command Control operations

Building a lash-up

TrainMaster Command Control allows you to couple your Command Control-equipped locomotives together, forming a multiple unit lash-up. Just like with the real railroads, lash-ups allow you to pull longer trains and climb steeper grades. You will find that the lighting operates prototypically—the lead unit’s headlight and interior lights are illuminated when the train is in forward, and the rear unit’s headlight and interior lights are on when the train is in reverse. For more information, refer to your TrainMaster Command Control manual.

To build a lash-up, assign a unique engine (ENG) ID# to each unit. Arrange the units on the track and couple them together. The Command reverse unit must be set to RUN.

**Note!**
If you press a wrong button, start over with that particular unit. The assignment isn’t saved until you press SET.

Start with the lead (front) unit

1. Press TR and enter your lash-up ID# (1-9) on your CAB-1 Remote Controller. No other lash-up or track should share this ID#.
2. Enter the unique ID# of the lead unit.
3. Press F.
4. Press SET on the CAB-1 Remote Controller.

Add the middle units, one at a time

1. Press TR and enter the lash-up ID# (1-9) on your CAB-1 Remote Controller.
2. Enter the unique ID# of the middle unit.
3. Press SET on the CAB-1 Remote Controller.
4. Repeat these steps for any additional middle units.

Complete the lash-up by adding the rear unit

1. Press TR and enter the lash-up ID# (1-9) on your CAB-1 Remote Controller.
2. Enter the unique ID# of the rear unit.
3. Press R.
4. Press the DIRECTION button if the unit is facing rearward.
5. Press SET on the CAB-1 Remote Controller.

You are now ready to operate your locomotive as a lash-up. Simply press TR and enter the lash-up ID#, then use your CAB-1 Remote Controller to operate your locomotives. To operate an individual unit within the lash-up, press ENG and enter the ID# for that particular unit.
TrainMaster Command Control operations

Reprogramming your locomotive to restore features

If your locomotive is unresponsive to your commands in the TrainMaster Command Control environment, we recommend that you follow this procedure to reset your locomotive.

1. Slide the Command reverse unit switch to the PGM position. See Figure 4 on page 12 for switch location.
2. Plug in and connect your Command Base.
3. Place your locomotive on the track, then power up the track.
4. Press ENG and enter the locomotive’s ID#.
5. Press SET.
6. Press ENG and enter the locomotive’s ID# again.
8. Enter 8 for this particular locomotive.
9. Turn off track power and wait ten seconds.
10. Slide the Command reverse unit switch back to the RUN position.

At this point, your locomotive has been reset. Restore power to the track and operate the locomotive as usual. Be sure to use the ID# entered in Step 4.
Powering your layout with the CW-80 Transformer

Your CW-80 Transformer provides a total output of five amps. The track outputs will deliver all of this power to the track when no accessories are connected to the Transformer. Keep in mind that connected accessories borrow some of this power. For example, if the accessories require two amps of the total five-amp capacity of the Transformer, you have three amps available for track power. This built-in flexibility will provide power for virtually any small- to medium-sized railroad. Also, available voltage depends on how much load is on the two outputs. Generally, track voltage and accessory voltage are 0-18 volts (AC) each.

This Transformer is capable of operating trains up to and including dual-motored AC locomotives. To operate at this level of track power, it may be necessary to disconnect any accessories. You may also attempt to lower the accessory voltage settings. Refer to the “Setting the accessory output” section on page 32.

You may momentarily approach or exceed the five-amp limit of the CW-80 Transformer when pulling illuminated cars, fighting over grades with heavy loads, or operating accessories. When you reach five amps, the green light on the Controller will begin to flash. This indicates that the Transformer is in “fold-back mode.” In fold-back mode, the Transformer is automatically reducing, or folding back, power. This gradual reduction in power provides interruption-free operation while you bring the amperage back down to a safe level.
Lionel offers accessories of all shapes and sizes — from crossing signals to coal and lumber loaders — available at your authorized Lionel dealer. When you are ready to operate your new accessory, the CW-80 Transformer allows you to choose how much power your accessory receives with programmable accessory output. The ability to control the voltage allows you to set the speed of your accessory motors and the intensity of your lights. Accessories connected to the accessory output terminals receive constant voltage whenever the transformer is plugged in, regardless of the throttle position. Follow these steps to set the voltage.

**Note!** The accessory output voltage was set to 12 volts at the factory.

1. **Connect your accessory to the CW-80 Transformer as discussed on page 8.**
2. **Bring the throttle all the way back to turn off the power.**
3. **Press and hold down the DIRECTION, WHISTLE, and BELL buttons on the Transformer. Refer to Figure 3 on page 10 for the location of these buttons.**
   The green light on the Transformer will flash, and track power will turn off.
4. **With all three buttons held down, raise the throttle slowly until you reach your desired accessory voltage.**
5. **Release the buttons once you have reached your desired voltage.** The accessory turns off, and the solid green light indicates that you have set the accessory voltage.
6. **Bring the throttle all the way back to turn off the power.**
   The voltage will momentarily increase, briefly causing the lights to shine brighter or the motors to operate faster, before returning to the set level. At this point, increasing the throttle again will control track power only.
Operating and servicing your train set

Adding fluid to the smoke generators in your locomotive and caboose

Your locomotive and caboose are equipped with smoke generators that produce a safe, clean, white smoke during operation. In order to function, the smoke generators require the periodic addition of Lionel smoke fluid. A small bottle of smoke fluid is included with your set.

To add smoke fluid, press down and unscrew the cap of the smoke fluid bottle, then pierce the top of the nozzle with a pin. Add 10 to 15 drops of fluid into the duct on your locomotive or your caboose’s stack. Refer to Figure 7 for the locomotive’s duct. Power up your train set, and smoke production will start momentarily. Smoke production will start faster if you increase the voltage. When smoke production decreases, add four to eight additional drops of smoke fluid.

If you prefer to operate your locomotive or caboose without smoke, slide the smoke switches to the OFF or NO SMK position. Refer to Figure 4 on page 12 for the location of this switch on the underside of the locomotive. Refer to Figure 10 on page 37 for the location of this switch on the underside of the caboose.

When the smoke unit switches are in the ON position, always keep a small amount of smoke fluid in the smoke units. Operating your smoke units without smoke fluid will cause damage to the heating element.

Caution! Always operate your smoke units with the addition of smoke fluid to prevent damage to the heating element.

Figure 7. Duct location
Operating and servicing your train set

Lubricating your locomotive

Help your Lionel locomotive lead a long and productive life on your railroad by maintaining it properly. To keep your locomotive lubricated, we recommend that you purchase a Lionel Lubrication and Maintenance Kit (6-62927), available from your authorized Lionel dealer.

When you find that the lubrication points illustrated in Figure 8 appear dry, lubricate your locomotive after you have removed any accumulated dirt and dust. There are two basic rules to keep in mind when you are lubricating your locomotive: use only a small amount of lubrication and avoid getting grease or oil on your locomotive’s wheels, roller pick-ups, or the track.

![Figure 8. Underside details and lubrication points](image_url)
Operating and servicing your train set

Replacing your locomotive’s LEDs and lamps

Your locomotive is illuminated by several LEDs and lamps. While the LEDs are expected to last for the life of the locomotive, you may find that the lamps may require replacement. We recommend that you have the lamps serviced at an authorized Lionel Service Center. See the Lionel Service section on page 40 for more information.

Replacing the traction tires

Your locomotive is equipped with traction tires (Lionel part no. 620-8201-206) to increase the tractive effort of your locomotive and allow it to pull more cars at once. During the course of normal operations, the traction tires may become worn out. We recommend that you have the traction tires replaced by an authorized Lionel Service Center because the truck and side frames must be removed to access the wheels. See the Lionel Service section on page 40 for more information.
Operating and servicing your train set

Using the couplers

Each car features magnetic couplers. To operate the couplers by hand, slide the uncoupling tab on the side of the coupler arm toward the car. Do not push down on the tab. To operate the couplers with a Remote-Control Track section (available separately, 6-65530 for O gauge; 6-65149 or 6-12746 for O-27 gauge; and 6-12020 or 6-12054 for FasTrack layouts), simply position the uncoupling trigger over the magnetic disc on the track and press UNCOUPLE on the controller. Refer to Figure 9 for the locations of the uncoupling tab and uncoupling trigger.

Figure 9. Uncoupling tab and trigger locations

Removing the packing material from the double door boxcar

Two stacks of cardboard have been placed on top of the auto frames inside the car. The cardboard secures the auto frames during shipping. When you are ready to operate the car, simply slide the cardboard out through the doors.
**Operating and servicing your train set**

**Replacing the lamp in your extended vision caboose**

During the course of normal operation, the lamp inside your caboose may require replacement. Follow these steps and refer to Figure 10 as you replace the lamp.

1. Remove the screws from both ends of the car.
2. Remove the end platforms, then lift the body and window shell off the frame.
3. Pull the lamp out of the socket and replace it with part no. 600-0161-300, available from your authorized Lionel Service Center or Lionel Service.
4. Place the body and window insert back onto the frame and slide the end platforms back into place.
5. Complete the lamp replacement by installing the two end screws.

![Diagram of the lamp replacement process](image)

**Figure 10. Lamp replacement**
Maintaining and servicing your set

Troubleshooting

**No lights or operation**
Be sure that the CW-80 Transformer is plugged in and the wires are connected.

**Train runs, but WHISTLE, BELL, and DIRECTION buttons do not work**
Check track connections. The track must be connected to the “A” and “U” terminals on the Transformer.

**No change when DIRECTION button is pressed**
Be sure that your locomotive’s reverse unit switch is ON.

**Accessory operation is intermittent or absent**
Check for loose, shorted, or improper connections. Also, the accessory voltage may have been set too low for the accessory; refer to page 32 and reset the voltage to a higher level.

**Locomotive runs slowly or lights dim at the far end of the track**
On larger layouts, additional track resistance may cause reduced track voltage as the trains move away from the power terminal section. Install additional FasTrack terminal sections around your layout and connect them to your Transformer to distribute power.

**Green light begins to flash**
The power limit of the Transformer has been exceeded. The unit will gradually reduce power until the problem is corrected.

**Bell button blows horn**
Switch the wire connections at the Transformer terminals. The U terminal should be connected to the outside (common) rail.
Maintaining and servicing your set

Advanced connections: powering two isolated blocks with two transformers

As you expand your layout, you may decide to create two isolated blocks of track. Trains in each block are controlled by separate transformers.

Before you operate your trains on this type of layout, be sure that your transformers are in phase. Operating your trains on a layout with two transformers that are out of phase may cause damage to the locomotive's sensitive electronic components.

To be certain that your transformers are in phase, use a small 18-volt lamp with leads (available at your local electronics supply store) to perform a quick test. Refer to Figure 11.

1. Attach one lamp wire to the center rail in one block.
2. Attach the second lamp wire to the center rail in the other block.
3. Power up both blocks of track. Both transformers should be set to full power.
4. See if the lamp illuminates.

If the lamp illuminates brightly, your transformers are not in phase. Do not operate your trains on the layout until you change the wiring. If the lamp does not illuminate or illuminates dimly, your transformers are in phase and should not cause problems.

To bring your transformers into phase, simply swap the track wires at the A and U terminals on one of the transformers. If you are using an older transformer that lacks a polarized plug, you may reverse the plug at the outlet so that the prongs are inserted into the opposite openings. Repeat the procedure described above, and you should find that the lamp does not illuminate.

Note! This will also reverse the operation of the BELL and WHISTLE buttons on the transformer with the switched 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