

71-4295-250



LIONEL LEGACY Control System

V1.5

Features:





WELCOME

Welcome to the world of LIONEL LEGACY Command Control. The LIONEL LEGACY Control System controls every product made over the history of LIONEL in a way that is superior to any control available. It is truly the LIONEL LEGACY Control System.

Contemporary control systems for all model train gauges have been developed over the years to enhance your experience with electric trains. Command control is the most advanced way to control a layout and many operators are using command control systems on their layouts today.

This system is different. It integrates all of the new effects that LIONEL has made so popular. Sounds, smoke effects, servo-controlled speed and more are easily accessed during the normal course of operation. The LIONEL LEGACY Control System makes these features and effects available to you in an unprecedented variety of operating possibilities.

The LIONEL LEGACY Control System improves operation of every LIONEL ever made, starting in 1900. Enhanced speed resolution brings new realism to our prewar and post-war products, whether they are the originals that made history, or the TMCC equipped engines and operating cars that celebrated our heritage by bringing the latest technology to these great products. This control system is another milestone in LIONEL history.

The LIONEL LEGACY Control System improves all of the interfaces operators have become accustomed to using with modern command control trains. The new real-time “quilling” Whistle-Horn control is a great example. In place of our pioneering original method, pressing a button and triggering an onboard sound device, or hearing a pre-recorded sound from an electronic source, the LIONEL LEGACY Control System pioneers new control of the warning sounds through a spring-loaded lever that makes it possible for you to “play” the whistle just like real engineers did in the hey-day of steam operations. But that’s not all. You will also experience revolutionary new ways of controlling brake, boost, bell, direction, switches, routes and more. It is all new.

The LIONEL LEGACY Control System is here! Congratulations! You are onboard and right on time!

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CAUTION – ELECTRIC TOY

NOT RECOMMENDED FOR CHILDREN UNDER 14 YEARS OF AGE. AS WITH ALL ELECTRIC PRODUCTS, PRECAUTIONS SHOULD BE OBSERVED DURING HANDLING AND USE TO REDUCE THE RISK OF ELECTRIC SHOCK.

TRANSFORMER RATINGS – INPUT: 120 VAC; 60 HZ ONLY. AC OUTPUT: 18V 16VA PARENTS, PERIODICALLY EXAMINE THE TRANSFORMER FOR CONDITIONS THAT MIGHT RESULT IN THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS (SUCH AS DAMAGE TO THE OUTPUT CORD BLADES, HOUSING, OR OTHER PARTS) AND THAT, IN AN EVENT OF SUCH CONDITIONS, DO NOT USE THE TRANSFORMER UNTIL REPAIRED.



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Lionel LEGACY Control System Manual version 1.5
Visit www.lionel.com for up-to-date advancements.



V1.5 Upgrade Requirements

IMPORTANT NOTE:

If you are upgrading an existing LEGACY Control System from software version 1.2, 1.3 or 1.4, please do the following:

1. Purchase a LEGACY Writable Utility Module (6-37125), available from your Lionel dealer or www.lionelstore.com.
2. Download and install the free LEGACY SYSTEM Utility software (73-7125-S01) from www.lionel.com.
3. Following the instructions in the LEGACY System Utility manual, create a New CAB Module and update your CAB-2's internal software.
4. Following the instructions in the LEGACY System Utility manual, create a New BASE Module and update your LEGACY Base's internal software.

Existing information in your engine roster will be preserved; however, the LSU software can also make a backup of your entire database. We suggest you back up your LEGACY database before the upgrade.

If it is inconvenient for you to perform the LEGACY v1.5 upgrade using your own computer and LEGACY Writable Utility module, you may purchase a pair of Blue Memory Modules pre-programmed with current CAB and Base code from Lionel Customer Service.

To upgrade LEGACY systems currently running software version 1.1 and earlier, contact Lionel Customer Service.



V1.5 Feature Summary

The V1.5 release improves usability and stability and adds some new features based on feedback from users and requirements to support future products. Below is a list of the major enhancements and differences from V1.4.

1. Adds support for new multiple-engine memory module created by LEGACY System Utility.
2. Brand new Engine Lighting Control page (via AUX2 press & hold) provides control over all included locomotive lighting features.
3. Lighting touch screen icon changes—new Ground Light on/off icons have more prototypical appearance with revised default icons for steam and diesel locomotives.
4. Improved feedback/vibration operation.
5. Several improvements related to programming and clearing Routes; improved support for Routes for FasTrack Remote switches.
6. Improved the responsiveness of RailSounds prime mover effects for diesel and steam LEGACY Pulmor-type engines.
7. Added Flyer “S” gauge diesel and steamer locomotive selections.



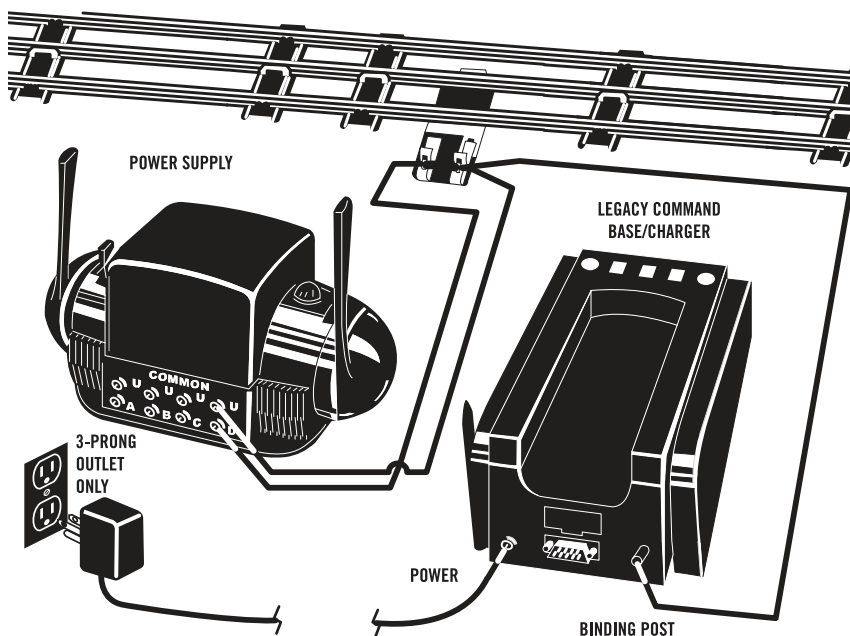
SETTING UP

Here's How

Take your system out of the box and become familiar with the contents. There are three available options for connecting the transformer and base to your track. Choose the right one that fits your layout.

- **Direct Connection**
- **Using a TPC controller**
- **With a LEGACY and TMCC base**

Direct Connection



First, connect your LEGACY Command Base/Charger binding post to both outside rails on the track using a single wire (or the solid black wire on your Fastrack terminal track). Ensure the Command Base cord is connected to a properly grounded three-prong socket.

Connect wires as shown in diagram above. Check out the diagram and see if you have everything right. The lights should be on. Remember, this system requires a three-prong socket for power.

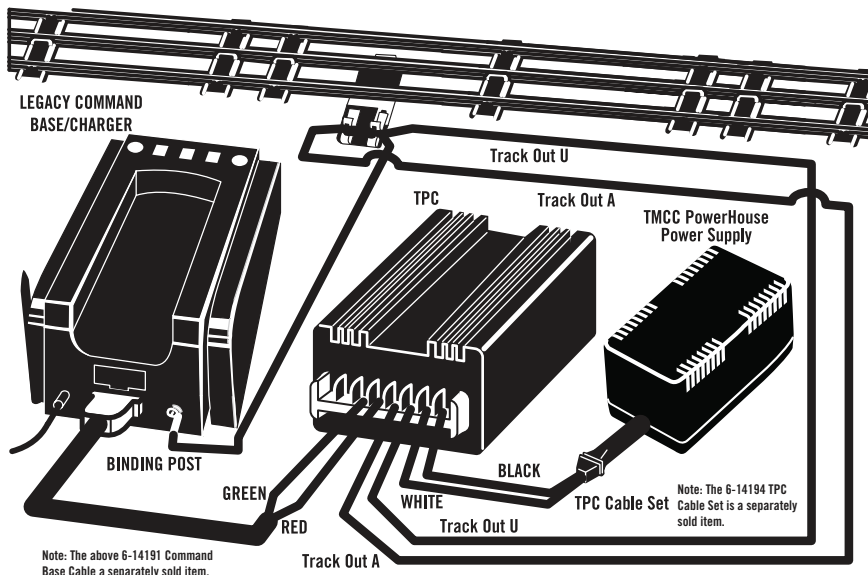
It is not necessary to add your new engine to your system's roster now. (You can just operate it as engine #1 to get started quickly.) Later on you can add it to your roster of engines by giving it a unique ID# using the directions that came with your new locomotive or refer to page 54 in this manual.

Note: Your new LIONEL LEGACY Control System equipped engine comes with a factory ID# 1 and will respond to that address immediately.



LEGACY Base with a TMCC Controller

Using a TPC Controller



Use the Direct Connection instructions on page 6 to connect up the LEGACY Command Base/Charger to your track. Then connect wires between the TPC and the LEGACY Command Base, the TPC and the track, and the TPC and Power Supply as shown in the above diagram.

With this configuration, you will be able to control the power supply to your track through the CAB-2 remote.



LEGACY & TMCC DUAL BASE OPERATIONS

Lionel LEGACY Control System and TMCC Dual set-up

Some operators may wish to continue using their TMCC CAB-1 remotes along with their CAB-2 to control Power-Masters and all other Lionel products, even “Lionel LEGACY Control System Equipped” Engines.

Power-Master Bridge

A separate component called the #994 Power-Master Bridge (#6-24279) is required to operate a Lionel Power-Master with the Lionel LEGACY Control System CAB-2 and Command Base/Charger.

Sharing Control

Two operators, one with a CAB-2 and one with a CAB-1, should not operate the same Engine or Train simultaneously. It is not recommended to “go between” CAB-2 and CAB-1 while operating the same Engine or Train. Doing this will make the graph on the CAB-2 incorrect.

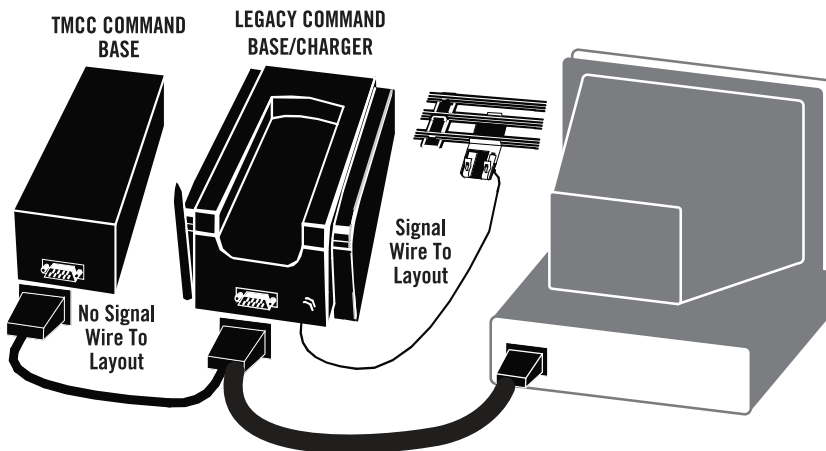
Two Systems at Once

It is possible for operators with CAB-1 to control any Engine or Train while other operators with CAB-2 control any other Engine or Train. Switches and Routes can still be thrown, but remember the limits of TMCC and CAB-1. A TMCC CAB-1 can only throw Routes 1-9 and control Trains 1-9. The higher addresses (10-99) must be reached with a CAB-2.

The “Y” cord that comes with your Lionel LEGACY Control System makes it possible to continue using your CAB-1 alongside your new Lionel LEGACY Control System. Set it up like the diagram below. The “Y” cord also allows for RS232 (DB9) connection to your computer for future applications.

NOTE: There should be only one signal wire going to the layout, from the LEGACY Command Base/Charger.

NOTE: Base-1L should not be used on a layout already utilizing a LEGACY Base.





THE LEGACY COMMAND BASE/CHARGER

Green Light (power)

Indicates power on

Yellow Light (status)

Used for feedback during special functions of Base

Red Light (com)

Indicates data send/receive from CAB-2 remote

Charging Lights

Flash on and off indicating that CAB-2 Remote is being charged. See page 78 for more info.

Charging Contacts

Used to connect the Base and remote physically, for charging purposes

Antenna

Used to send and receive commands from the CAB-2 remote

Power Jack

This is ONLY to be used with the LEGACY wall pack

DB9 Connector

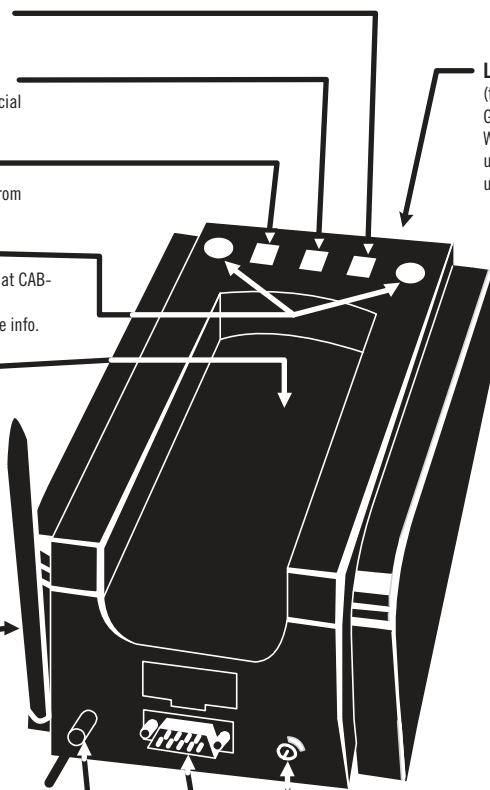
(TMCC Command Base & computer port)
Used with TPC's, TMCC base and future computer applications. See page 8 for more info.

Binding Post

Connection for TMCC signal wire that goes to track

Logo Light

(the word LEGACY in front)
Glowes while Base is in use. When the base is not being used, the intensity ramps up and down



Charging On/Off Switch

(underside of Base)
Turns off the charging feature if you are not using rechargeable batteries

Channel Select (Programming) Button

(underside of Base)
Used to change Base frequency



THE LEGACY CAB-2 REMOTE CONTROLLER

Main Display

Displays real-time information about your railroad system, Displays real-time feedback of operation

Scroll Button

Navigates thru entire list of Engines, Trains, Switches, etc

Select Button

Performs addressing by 3-4 Digit road number

Touch Screen Key Pad

A group of touch sensitive keys with icons for each function. These keys serve many purposes, and their icons change accordingly

Train Brake Slider

This Slider is used to increase or decrease the amount of Train Brake effect on the Engine or Train

TRAIN LINK Button

Quick select of train-link devices

AUX-1/Thru Button

Press to view the Control Panel while operating. Controls switch direction

AUX-2/Out Button

Controls switch direction. Toggles locomotive lighting on/off

Emergency Halt Button

Stops everything on layout, also stops recording playback

Record Button

Used to record and playback events

Velocity Throttle

Throttle control over engines, also used to navigate thru info/options

Set Button

Used to set Engine address and for programming

Info Button

Used to enter/view the info/options of selected component

CTC Button

Turns the Remote On and Off. Used to enter the Remote and Base Options. Pressing CTC while in a menu will always bring you back to main screen

SoftKeys

These keys directly correlate to the 5 selection boxes located at the bottom of the main screen. These are also used in the info/options menus to select options

Warning Sound Controller

Warning Bell and Variable Whistle/Horn control. Pull down to sound Whistle/Horn. Push up and release to trigger Warning Bell

Official R.R. Speed Control Button

Toggles the Touch-Screen to display R.R. preset speeds

Multi-Controller

Boost, Brake, and Direction control. Rock forward for Boost, rock backward for engine brake, and press down for direction change. Click-hold-and rock for absolute direction select

Front & Rear Coupler Buttons

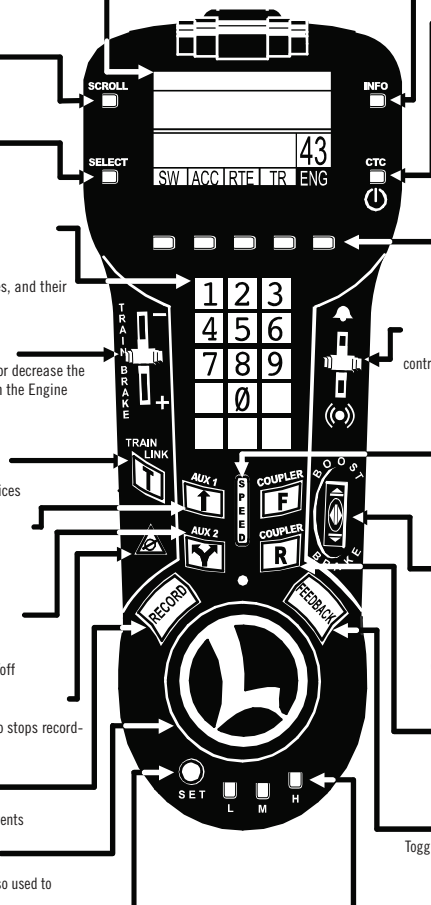
Fire Couplers

Feedback Button

Toggle on/off the vibration feedback feature in the CAB-2 Remote

Low, Medium, High Momentum Buttons

Used to select the desired momentum of your addressed engine/train/accessory





QUICK START

GET READY TO RUN

Get your engine running now by following the instructions in this quick start guide. First, power up the LEGACY Base after you have correctly connected it to your layout, then power up the track. Then “address the engine” so it can be controlled by your CAB-2 remote and learn to use the Velocity Throttle, Whistle, Bell, Brake and Direction commands.

Location

For smaller layouts you can locate the LEGACY system anywhere on the layout.

For a large model railroad layout, the best position for your LEGACY Command Base is as close to the center of your model railroad as you can get. This gives maximum communication strength to every corner of your layout. The signal strength of the CAB-2 allows you to communicate 30 feet. If you have a bigger layout, or need to relocate the reception point due to Base location, other 2.4ghz external antennas may help. See page 80 for a list of factory spec'd antennas. Experimentation for most advantageous position is recommended in system limit conditions.

Setting Up

Before you begin to run trains, make sure the LEGACY Base is plugged in, powered up and connected to the track as illustrated in the “Setting Up” diagram on page 6.

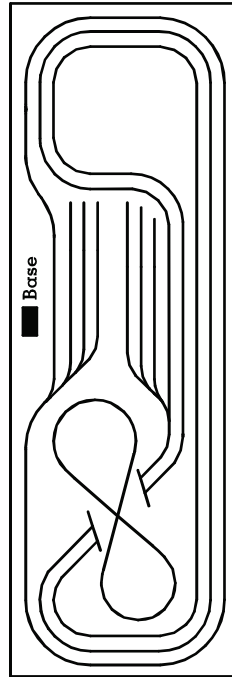
Press the CTC button on the CAB-2 remote to turn on the power. If the display on CAB-2 does not light up when you press the CTC button, you may need to charge the remote for about a half hour before use. Place the remote in the Base. The charging should begin immediately. The table for Charging Indicator Lights is on page 80. It is alright to leave your LEGACY Base powered on to charge the CAB-2 .

Power Up The Track

Refer to TPC, or ZW manual for correct method. With your engine on the track and ready to roll, power-up your track to a constant 18 VAC. If a circuit breaker trips when you turn on the LIONEL power supply, check the wheels of your locomotive and any cars to make sure they are all securely on the track. Check to make sure the track is free of all metals that may cause a short circuit.



5'x10' Layout



10'x50' Layout

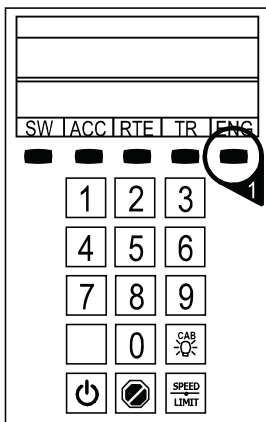
QUICK START (Continued)

Address Your Engine

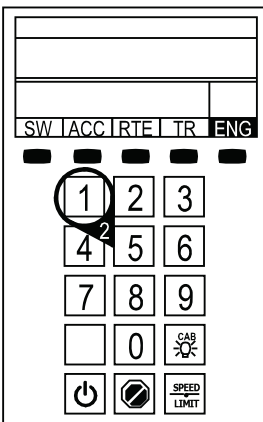
First, you must address the engine. This “tells” your CAB-2 which locomotive you want to control. This is important when you have more than one engine on your layout.

NOTE: CAB-2 will revert to CAB-1 mode for any engine, train or accessory UNLESS you enter the options for that addressed unit either manually or with a memory module. (See page 46 or page 74 respectively)

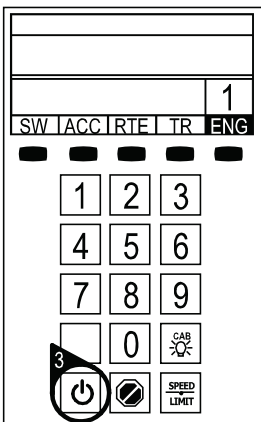
To address an engine with an ID# of 1:



1. Press ENG



2. Press 1



3. Press Start Up

Start 'Er Up

Now it is time to start up your engine's sound system.

To start the engine's RailSounds system, Tap Start-Up on the Touch-Screen or any action key (Whistle, Bell, Velocity Throttle, etc.)

Your engine sound system will start up and the Touch-Screen Control Panel will appear.

NOTE: Press and Hold Start-Up and you will hear Tower-Comm or Crew-Talk before engine start.

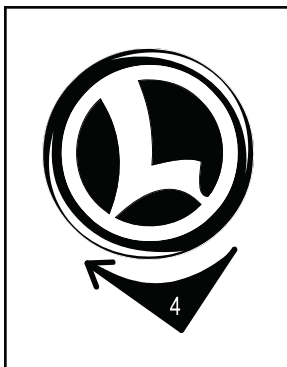
NOTE: Refer to your Engine Manual or page 54 for the procedure to CHANGE THE ENGINE ID.



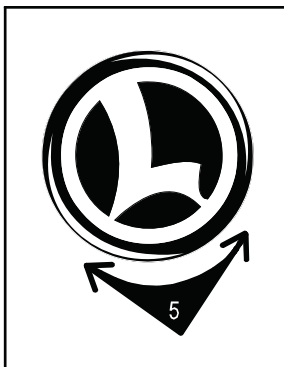
QUICK START (Continued)

THE VELOCITY THROTTLE

The Velocity Throttle (that big red rotary knob in the middle of your LIONEL remote) is used to start your engine moving, slow it down or speed it up. Use it simply by turning it clockwise (speed up) or counterclockwise (slow down).



4. Turn the Velocity Throttle clockwise a small amount. Your engine will begin to move.



5. Experiment with the engine's response to the Velocity Throttle. Turn the Velocity Throttle clock-wise and counter-clock-wise.



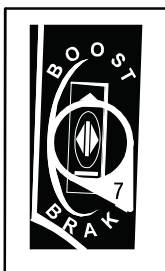
6. Slow and stop your engine by turning the Velocity Throttle counterclockwise

Note: Make sure that the Train Brake slider is moved up to the “-” or the engine will be sluggish or not move. See page 14 and page 23 for more information on the Train Brake.

THE MULTI-CONTROLLER

Direction

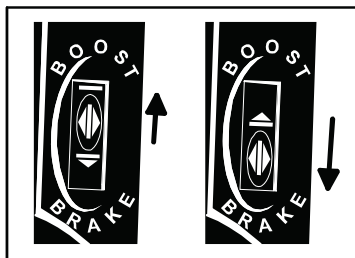
The direction of your engine toggles between forward and reverse at the touch of the Multi-Controller.



7. Press the Multi-Controller once. Your engine's lights will change directions.

Boost & Brake

Boost and Brake give you another way to control the speed of your train. Boost gives your loco a temporary increase in tractive power, and returns to the previous speed when you release the control, while the Brake command slows you down quicker than the Velocity Throttle alone and holds your speed at the adjusted level (if “Hold Braked Speed” is programmed in the system settings, refer to page 49 for more details).



8. Experiment with Boost and Brake. Notice how your engine responds to the Multi-Controller.

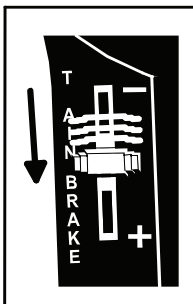


QUICK START (Continued)

THE TRAIN BRAKE SLIDER (Does not apply to CAB-1 mode)

A Train Brake is used to slow down and limit the top speed of your train by adding a load. The more the Train Brake is applied by pulling the Train Brake Slider down, the more laboring is heard from the engine. Applying more Train Brake will eventually slow down the train and it is even possible to stop a train by pulling the Train Brake Slider all the way down to the “+” symbol.

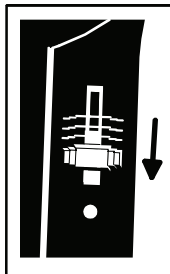
A tremendous amount of laboring can be heard whenever you apply the Train Brake in a large amount.



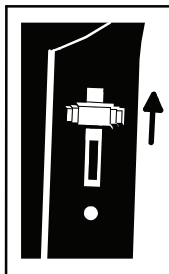
- Experiment with the Train Brake. Try a small amount of the Train Brake when your engine is moving down the rails at a medium speed

THE WARNING SOUND CONTROLLER

Warning sounds are an important part of LIONEL Railroading. Your LIONEL LEGACY Control System equipped engines have a real-time variable “quilling” whistle and horn (LIONEL TMCC engines do not have this feature).



- Blow the Horn/ Whistle by pulling down on the Warning Sound Controller.
- Try pulling down the Warning Sound Controller various amounts and listen. Notice the difference in intensity of the Whistle or Horn.



- Push the Warning Sound Controller up once and quickly release. Notice that the bell rings once.
- Push the Warning Sound Controller up and hold it for 1 second. Notice that the Bell is sounding continuously.
- Push the Warning Sound Controller up and hold it for 1 second. Notice that the continuous Bell stops.
- Experiment with ringing the Bell in your own rhythm or continuously, depending on how you push the Warning Sound Controller

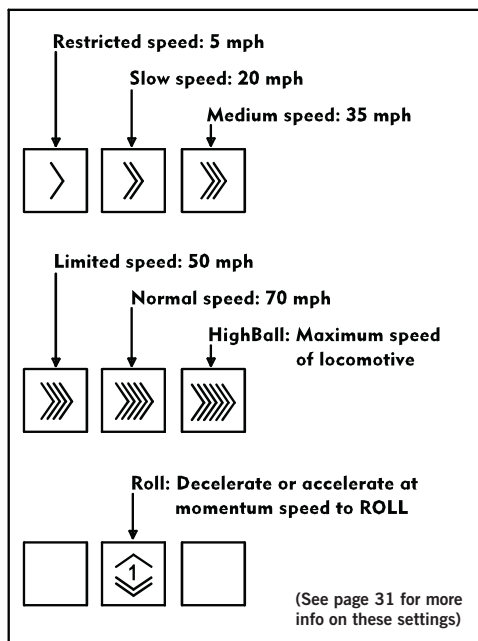
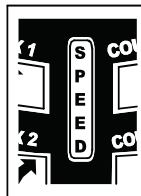


QUICK START (Continued)

THE SPEED CONTROL BUTTON

Selection of Official Rail Road Speed

The Speed Button is used to select a new Touch-Screen Icon Control set. This set of Touch-Screen keys is used to select official Railroad Speeds. Pressing AUX-1 returns you to the standard control panel. See page 31 for more information on Speed Control.



16. Press the Speed Control Button.
17. Press, hold and release the RR Speed icons one by one. Experiment.
18. The speed of the engine changes with each release of a different RR Speed key.
19. Tower Comm dialog occurs each time you press and hold a RR speed key.
20. The speed of the engine changes as soon as you release the RR speed key.
21. If you touch a RR speed key and release it quickly, a speed change is enabled with no dialog scene.
22. You can also use the Velocity Throttle and other action controls in this mode and continue to use Official RR speeds at the same time.
23. Press AUX-1 to leave the RR speed mode and return to the standard control panel.
24. Press the Speed Button to toggle between the Official RR Speed Control Panel and the Standard Control Panel.

At this point you know the basics of how to operate. There is a lot of fun waiting as you experience the interaction of the controls and the Touch-Screen.

Be sure to read the entire LIONEL LEGACY Control System Manual to get the most from your LIONEL products.

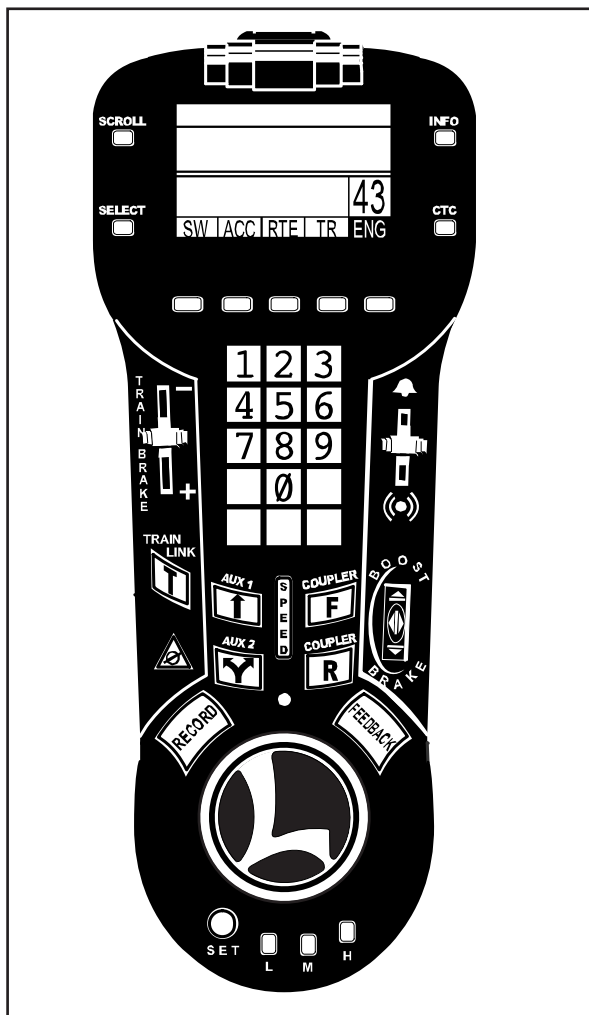




CAB-2 INTRODUCTION

LIONEL LEGACY addressing and controls are described in this section. This is the way our new CAB-2 and LIONEL LEGACY Control System products will operate the first time you try them.

There are a lot of new features available with CAB-2. Take the time to read the following descriptions of how the LIONEL LEGACY Control System CAB-2 controls work. It will be helpful. Although the signal on the track is similar to TrainMaster Command Control, the command-set has been expanded. This allows for much more control of your LIONEL Railroad. Please note that the Touch-Screen is Glass and should be used/handled with care.





CAB-2 Introduction (continued)

SPEED GRAPH (Does not apply to CAB-1 mode)

Target Line

The black Target Line moves across the graph quickly or slowly, depending on how you turn the Velocity Throttle. It indicates your "Target Speed." That is the speed you want your train to travel.

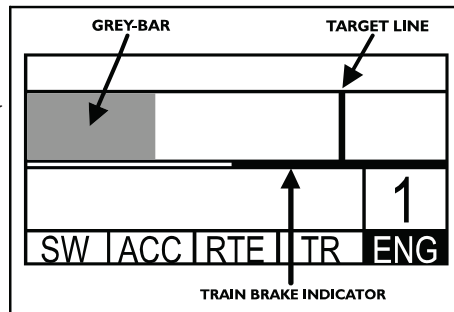
Grey-Bar

The Grey-Bar is your engine's "Commanded Speed."

The Grey-Bar always seeks the target line. The Grey-Bar moves across the speed graph at a pre-set rate.

The Momentum setting L, M, and H, is how you decide a pre-set rate of acceleration or deceleration for your train and the speed graph Grey-Bar on the display. Momentum setting is default pre-set to "M," Medium.

For more info, see the Momentum section on page 27.



Train Brake

The speed graph indicates how much the overall speed capability has been trimmed by adding the Train Brake load. Monitor the Train Brake by watching and checking the Train Brake Indicator as you move the Train Brake Slider (see figure Speed Graph: Overview above).

Laboring Generation

The difference between the Target Speed and the commanded speed creates a labor effect. Basically, the bigger the difference is, the more extreme the laboring effect becomes.

The laboring effects are changed by the Train Brake settings. As you apply Train Brake, the overall laboring effects become more intense. As you release the Train Brake, the overall laboring effects become less intense.

Summary

When your engine arrives at its "Target Speed," it holds that speed until you give it another speed command or "Target Speed." Then the speed graph's Grey-Bar, representing the movement of your train, moves toward its new target speed at a rate governed by the Momentum Control setting.



CAB-2 CONTROLS

LEGACY VELOCITY THROTTLE

Rotating the Velocity Throttle at different rates will result in control of engine sound effects as well as fine to coarse control of train speed, brake sounds, and direction.

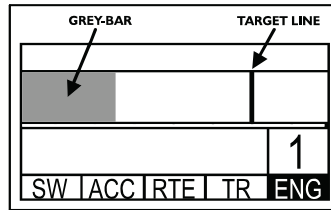


Counter-clockwise:
Decreases speed

Clockwise: Increases
speed

The Target Line and Grey-Bar

The Target line represents the desired speed of the train. The Grey-Bar represents the commanded speed of the train. It is this difference that lets you control features like the Auto-Brake independently of the speed of the train. Experiment with L M and H momentum and see how it affects your train's commanded speed compared to the Target line.



Velocity Throttle Speed Control

Velocity Throttle Speed Control with a Low momentum setting:

1. Turning the Velocity Throttle slowly takes 4 revolutions to move the target line and Grey-Bar from speed-step 1 to 200
2. Turning the Velocity Throttle quickly takes less than 1 revolution to move the target line and Grey-Bar from speed-step 1 to 200

Velocity Throttle Speed Control with a Medium or High Momentum setting:

1. The target line movement is the same as with the Low setting
2. The Grey-Bar movement is changed and moves slower than at the Low setting

Velocity Throttle Auto-Brake

Note the Auto-Brake is optional and can be enabled or disabled in the CTC menu options. For more information see the CTC section on page 48.

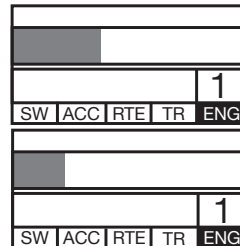
Move the target line to speed step 0 while the grey bar is above speed step 1

1. Trigger brake sounds during deceleration
2. Continue braking and sounds until stop is attained.

Move the target line above speed step 0

1. Stop braking sounds

Note that in Auto-Brake mode the braking rate is governed by your engine's momentum setting. The Auto- Brake will not stop your engine faster than the momentum setting will allow. For faster braking, use the Multi-Controller "Independent Brake" control or change your momentum to a lower setting while underway.





CAB-2 Controls (continued)

Velocity Throttle Diesel RPM Control

Rotate the Velocity Throttle Clockwise

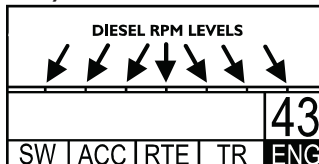
1. Raise RPM levels one step

Rotate the Velocity Throttle Counter-Clockwise

1. Lower RPM levels one step

Note that the rpm indicator in the speed graph (see diagram) will only change one step until a period of time passes.

Moving the Velocity Throttle slowly will not change RPM. This allows you to change speeds in varying amounts without changing the RPM settings more than one step at a time. Conversely, it enables you to change the RPM levels any amount of steps without dramatically changing the speed.



Manual RPM

Manual RPM controls have been added that are similar to TMCC manual rpm mode. In the manual RPM mode, the RPM will only change when the user utilizes the UP/DOWN touchscreen keys.



To utilize this feature simply press and hold the RPM up or down arrow and the "MANUAL RPM" message will appear indicating that RPM is in manual mode. Each press of the RPM key (up or down) will change the RPM respectively one level. Press and hold the RPM button again to revert back to auto mode or press the reset key.

Velocity Throttle Direction Control (V.T.D.C.)

Note the V.T.D.C. is, by default, ON. This is an optional feature that can be disabled in the CTC menu options. The V.T.D.C. is best used with Momentum set to M3 or higher. If Momentum is set at M2 or L, it is recommended that you disable this feature. The V.T.D.C. is another method of changing the direction of your Engine or Train in addition to using the Multi-Controller. Experiment with this method of changing direction.

Slow the locomotive down to speed step 0 and wait approximately 1 second (listen for an air release or steam blow down sound when the locomotive stops). Then give a counter-clockwise "quick-flick" of the Velocity Throttle (up to a half of a turn). This will:

1. Change the direction of the locomotive
2. Enable a let-off sound
3. Change direction of locomotive lighting
4. (On some models this will enable an engineer dialog)

(The V.T.D.C feature ONLY works in TMCC and LEGACY modes.

(The V.T.D.C. feature is not available in the CAB-1 mode of operation.)

Velocity Throttle Engine Laboring

Note that higher momentum levels allow more control of the laboring effect. Experiment with different momentum levels for different engines.

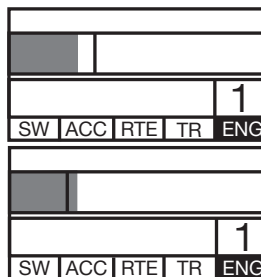
When the target line is above the grey bar

1. Laboring sounds will intensify as the target line is moved farther above the Grey-Bar
2. The laboring sound is affected by the distance between the Grey-Bar and the target line

When the target line is moved below the grey bar

1. Laboring sounds will weaken in intensity
2. Laboring sounds will gradually increase to normal (default) as the Grey-Bar reaches the target line

Note: Adding the Train Brake will make the laboring effects more extreme.

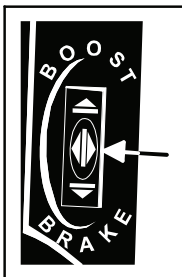




CAB-2 Controls (continued)

THE MULTI-CONTROLLER

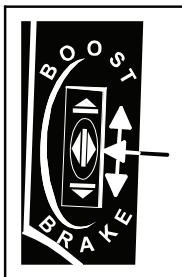
Toggle Direction



Press the Multi-Controller straight down (in the center)

1. Target line goes to speed step 0
2. Train stops
3. Direction is reversed
4. Directional lighting is reversed

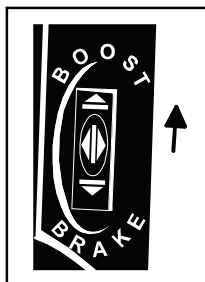
Absolute Direction Control



1. Press the Multi-Controller straight down
2. While holding it down, roll (push) it up
3. Direction will be Forward
4. Press the Multi-Controller straight down
5. While holding it down, roll (pull) it down
6. Direction will be Reverse

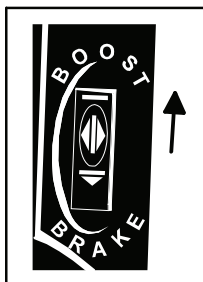
Boost

Controllable by pushing the Multi-Controller increasing amounts, including a “hold” position, Boost enables the operator to hold the boosted power at any level. A release of the Multi-Controller will return power to the original level set by the Velocity Throttle.



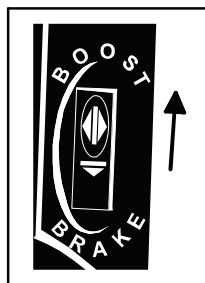
Pushing the Multi-Controller up a small amount and holding will

1. Introduce light laboring sounds
2. Hold the current speed



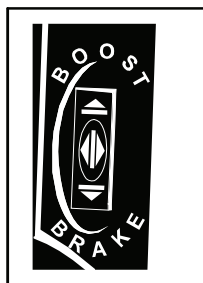
Pushing the Multi-Controller up halfway and holding will

1. Increase engine speed continuously at a medium rate
2. Introduce and hold medium laboring sounds
3. Introduce feedback vibration



Pushing the Multi-Controller up all the way and holding will

1. Increase engine speed continuously at a high rate
2. Introduce heavy laboring sounds
3. Increase feedback vibration



Releasing the Multi-Controller will

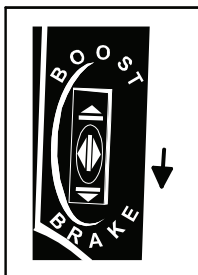
1. Let laboring sounds taper off to original “pre-boost” level
2. Return speed to original pre-boost value
3. End feedback vibration



CAB-2 Controls (continued)

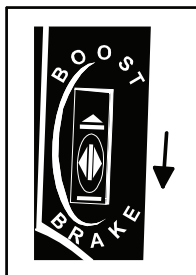
Independent Engine Brake

In real-life, railroad engineers use Independent Engine Brakes to brake the locomotive only. Independent Engine Brake Control is braking that you can hold, and adjust, and release anytime with the Multi-Controller. When the Engine Brake is applied, RPM levels and engine labor are reduced. When you release the Brake, the train maintains its current speed in a coasting condition. Apply the Velocity Throttle to leave “coasting” condition and maintain the speed with appropriate laboring level.



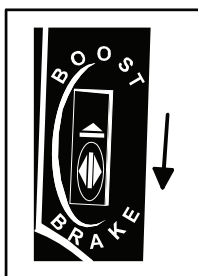
Pull the Multi-Controller a small amount

1. Introduce light braking sounds
2. Reduce engine RPMS and laboring sounds
3. Stop any acceleration or deceleration and maintain current “coasting/drift” speed



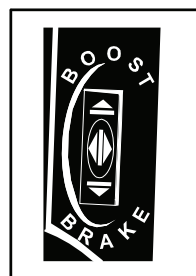
Pull the Multi-Controller all the way down and hold

1. Decrease engine speed continuously and quickly
2. Introduce and hold low laboring engine sounds
3. Introduce and hold heavy braking sounds
4. Introduce heavy feed-back laboring vibration



Pull the Multi-Controller more and hold

1. Decrease engine speed continuously at medium rate
2. Reduce engine RPMS and laboring sounds
3. Introduce and hold medium braking sounds
4. Introduce medium feedback laboring vibration



Release the Multi-Controller

1. Hold drifting and coasting labor sounds
2. Hold current coasting speed
3. End braking sounds
4. End feedback vibration



Turn the Velocity Throttle one notch

1. Maintain speed and restore normal laboring.

A Note about operating TMCC Engines:

The Boost and Brake with TMCC Engines are NOT controlled by the graph as LEGACY is, but by the Engine electronics responding to a command. With a TMCC Engine, the graph will stay at the speed the engine will return to AFTER you release Brake or Boost.

Experiment with braking a TMCC Engine and watch the graph to see how the speed returns to the graph when released. BUT, if you stop the Engine, It will stay stopped and the Target Line will be at 0.

When you use Boost in TMCC mode against the Train Brake, the graph stays where it was and after you release Boost the speed returns to the setting that is still on the graph.



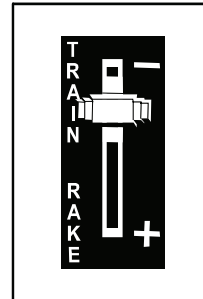
CAB-2 Controls (continued)

THE TRAIN BRAKE

In real life, a Train Brake is used to stretch out a train by applying air brakes to the wheels of the rolling stock. In doing this, it creates drag, which makes the engines work harder to pull the load.

Applying more Train Brake is an important part of slowing and stopping a train.

Train Brakes are also used to stop passenger train cars from banging together at the couplers by stretching out the train, which is useful for providing a smooth ride for passengers.



THE TRAIN BRAKE SLIDER (Does not apply to CAB-1 mode)

A Train Brake is used to slow down and limit the top speed of your train by adding a load.

The more the Train Brake is applied by pulling the Train Brake Slider down, the more laboring is heard from the engine. Eventually Train Brake application will slow down the train and it is even possible to stop a train by pulling the Train Brake Slider all the way down.

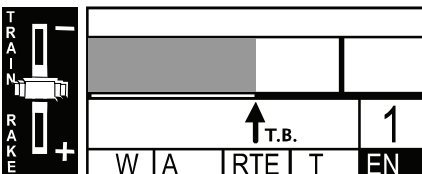
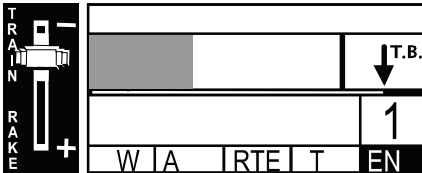
Note: Check to see that the slider is moved up to the “-” or engine will be sluggish or not move.

A tremendous amount of laboring can be heard whenever you apply the Train Brake in a large amount.

Operating the Train Brake

The Train Brake Slider can be pulled down varying amounts and used in conjunction with the Velocity Throttle. It can be used to stop a train.

Apply the Train Brake.





CAB-2 Controls (continued)

THE WARNING SOUND CONTROLLER

Bell

Ring a warning bell continuously or one ring at a time with your own rhythm signature, just like real steam engineers.

The Warning Sound Controller can be pushed up and held for 1 second to

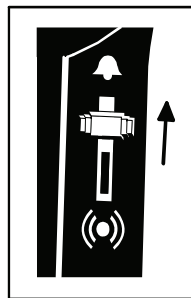
1. Start a continuous “bell” warning sound

The Warning Sound Controller can be pushed up and quickly released to

1. Stop a continuous “bell” warning sound

2. Play a single bell sound

3. Create your own “Bell signature” by pushing up and quickly releasing repetitively.



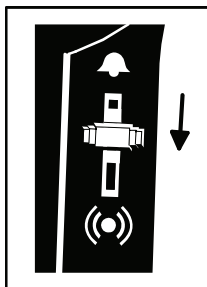
Whistle / Horn

By pulling down the Warning Sound Controller varying degrees, it is possible to create your own “signature” just like real locomotive engineers did by “quilling” in the hey-day of Steam power locomotives.

Operating Diesel engines, you can add more chimes as you pull the controller down, changing the harmonics and intensity of a diesel horn just like real engineers.

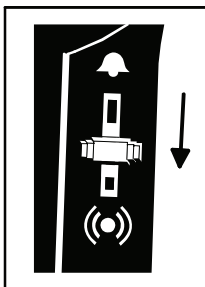
Once you become familiar with a horn or whistle on a new LIONEL LEGACY equipped locomotive, you will develop your own way of using it.

Note: Whistle and Horn sounds are unique and different in most engines.



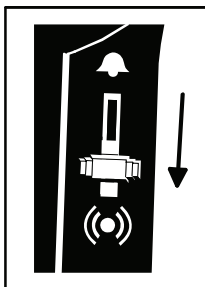
Pulling down the Warning Sound Controller a little

1. Triggers a soft warning sound



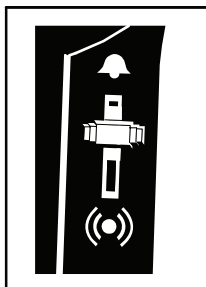
Pulling down the Warning Sound Controller more

1. Triggers a medium warning sound



Pulling down the Warning Sound Controller all the way

1. Triggers a loud warning sound



Releasing the Warning Sound Controller

1. Ends the warning Sound



CAB-2 Controls (continued)

WHISTLE HORN SIGNALS

The following is an abbreviated list of signals for use with the LEGACY Real-Time Quilling Whistle or Horn. The superior ability to control the duration of signals with the CAB-2 Warning Sound Controller makes issuing these signals easy and accurate.

Sources: B&O, C&O Operating Rules, 1969, The Pennsylvania Railroad Book of Rules, 1956

"o" = short sound "-" = long sound "____" = sustained sound "... " - succession of sound

o Apply brakes. Stop.

-- Release brakes. Proceed.

o o o When standing - Back. When running - Stop at next Passenger Station.

-- o ____ Approaching public grade crossings at grade. To be prolonged or repeated until crossing is reached

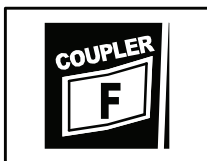
____ Approaching stations, junctions, and railroad crossings at grade.

o o o... Alarm for persons or livestock on the track.

____ o When running on left hand track of a two track section:

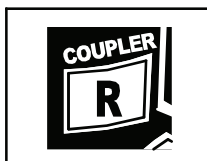
- (1) Approaching stations, curves, or other points where view may be obscured;
- (2) Approaching passenger or freight trains and when passing freight trains.

COUPLERS



Press the "F" front Coupler button

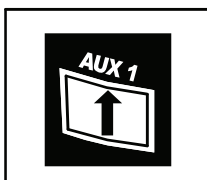
1. Uncouple the front coupler



Press the "R" rear Coupler button

1. Uncouple the rear coupler

AUX-1



Press AUX 1

Note: When Crew Talk or Tower Com Icons in the Touch-Screen keypad are negative (darkened), pressing them in that condition will trigger a negative reply from the Tower as to status of the orders i.e. NOT cleared for departure" or "HOLD your position" etc, and the response will be positive i.e. "Cleared for departure" if the icon is not negative. This feature enables you to play out a scene where the engineer is waiting for departure and finally get the order when YOU decide it is appropriate

1. With ENG addressed, open Touch-Screen control panel
2. Press AUX 1
3. Display Crew-talk and Tower-com Touch-Screen icons become negative
4. Press icon to trigger negative dialog

AUX-2



Press AUX 2

1. Headlight on/off
2. TMCC programming functions (follow TMCC directions that come with locomotive)
3. (press and hold) Toggles touch screen locomotive lighting control panel (see page 36)

CAB-2 Controls (continued)

SWITCH THROUGH



Press the Switch Through button

1. Throw an addressed switch through (or straight)

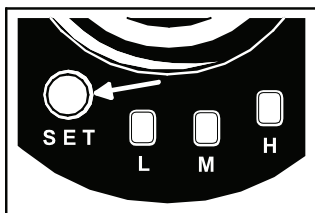
SWITCH OUT



Press the Switch Out button

1. Throw an addressed switch out (or curved)

SET



Used for various programming functions, i.e.: Press the SET button

1. Set address ID#
2. Set STALL
3. Provide programming function for some layout control components

HALT

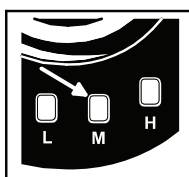


Press Halt

1. Stop all trains

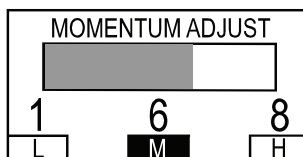
L, M, H MOMENTUM

L, M, and H are momentum levels in all LIONEL LEGACY Control System equipped engines.



Choose momentum level

1. Press L, M, H
- Press and hold M
1. Open display to choose from 8 levels of medium momentum
 2. Use Velocity Throttle to adjust
 3. Release M



Change momentum settings while underway and check out the response. It is easy to change your acceleration and deceleration rate while moving, just press the L, M, or H button.

LEGACY Momentum makes a train operate more realistically. But it take a long time to stop, just like a real train.

If you have a Target Speed that is 0 and a Train Speed that is high and you want to stop fast, try the L button! You can also use full braking on the Independent Engine Brake (pull it all the way), which is almost as fast.



CAB-2 Controls (continued)

TRAIN LINK



The TRAIN LINK function offers quick access to operating cars within a train while controlling that train. This functionality allows you to quickly operate items in a train without remembering ID's.

To utilize TRAIN LINK you must first build the consist that includes items you wish to access with TRAIN LINK. An example of this would be an engine, a breakdown unit, and a freight car. A maximum of 5 devices per train can be part of TRAIN LINK. Refer to page 60 for more information on building a lashup and page 64 on utilizing TRAIN LINK.

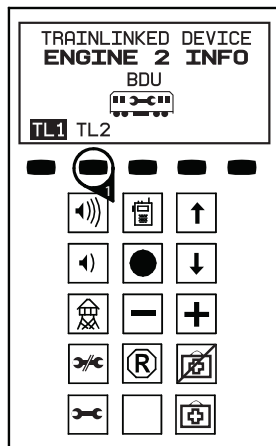
To utilize your TRAIN LINK devices you press TRAIN LINK while controlling your Train. The screen will change and in our example we would see a breakdown unit and a freight car. At this time the touchpad will reflect icons for the selected unit.

While in the TRAIN LINK screen you can switch between train linked devices by pressing the different softkeys (TL1~TL5). You can then control this item directly by pressing any of the touchpad items or remote keys. The softkeys will switch functionality of all the keys on the remote to the new TRAIN LINK item. The knob will only control a TRAIN LINK device if it is a CAB-1 type device that receives knob commands. Devices that normally have a graph will not link to the knob.

Once operation of the TRAIN LINK device is complete, press TRAIN LINK again to return to the train you where initially controlling.

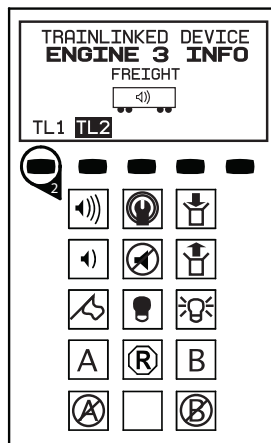
Using the example of a train that has been built with an engine, a breakdown unit, and a freight car and has been programmed with ID 1, 2 and 3 respectively, here's how TRAIN LINK would be used to operate these devices.

Select the train using the procedure found on page 63.



Press the TRAIN LINK button

1. Select the TL2 TRAIN LINK device to control it directly by pressing the TL2 softkey. TL1 is selected by default and the last selected is memorized when toggling the TRAIN LINK button. Notice that the touchpad icons change and reflect the device currently selected.
2. Select the TL1 TRAIN LINK device to control it directly by pressing the TL1 softkey.
3. Press the TRAIN LINK button again to return to the train that you were controlling





CAB-2 Controls (continued)

STALL

STALL is a useful setting for LIONEL engines that have AC Pullmor motors. Sometimes a Velocity Throttle will have to be turned a lot just to get these engines moving. Setting “STALL” enables you to immediately go from 0 to the level of power your engine requires to start movement as soon as you operate the Velocity Throttle.

NOTE: Your locomotive may not support STALL functionality. With the locomotive selected, press the SET button. If the headlight does not begin to flash, STALL functionality is not supported.

To set STALL, place your engine on a level straight track.

Set STALL

1. Press SET (headlight will flash)
2. Get your engine rolling
3. Turn the Velocity Throttle counter-clockwise until your engine just stops
4. Press SET (headlight will stop flashing, engine will stop)
5. Your engine's STALL power has been set
6. Press Reset on the Touch Screen
7. Experiment to find the STALL setting that best fits your Pullmor locomotive



Clear STALL Setting

1. Press SET (headlight will flash)
2. Press SET
3. STALL setting is cleared

Note: If necessary, set “STALL” to match starting of Pullmor engines in a lashup with other engines.



CAB-2 Controls (continued)

LEGACY RAILSOUNDS CONTROL OF LABORING EFFECTS

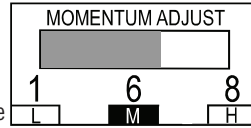
Momentum plays an important part in RailSounds Laboring effects. The higher the momentum setting, the more extreme control you have over the laboring effects.



Momentum Set

There are 8 levels of momentum 1 - L, 2-7 - M, 8 - H

Press M to adjust the momentum levels. As soon as you Press M, the screen will show a graph of the 8 momentum levels, illustrating the current level. While holding the M button down, turn the Velocity Throttle to choose the desired level of momentum.



Momentum Settings and Velocity Throttle Levels

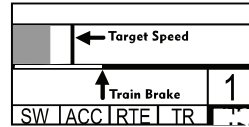
If you have set your engine's momentum at high or in the top range, locomotive motion will always be smooth and realistic. Acceleration will be slow and even. Because of the slow acceleration rate of a locomotive with heavy (M5, M6, M7, H) momentum set, there is the possibility of rotating the Velocity Throttle target speed to maximum with the locomotive still traveling very slowly. The difference between this high target speed and the actual speed of the locomotive governs the intensity of the loading effects in the locomotive's onboard RailSounds sound system, putting the laboring control in the Velocity Throttle. The higher the Labor graph rises the more intense the laboring sounds become in your LEGACY equipped locomotives.

- 1. Monitor the Labor Level by viewing the bar graph on the R.R. Speed Touch-Screen.

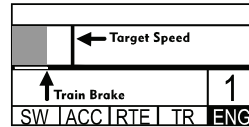


Train Brake and Velocity Throttle Levels

Another way to add intensity to the RailSounds loading effects is by using the Train Brake Slider. You will hear the difference as soon as you introduce the Train Brake into the control of the locomotive. Laboring effects become more and more intense as the Train Brake is applied.



Eventually the Train Brake will stop a rolling train. By using the Train Brake you can also model laboring effects without slowing the train down. As you introduce Train Brake watch the Train Brake indicator as it moves across the display from right to left, making it possible for you to judge when the Train Brake setting will impact the speed and actually slow down or stop your train.



Labor (EFX) Bias control

Another way to add intensity to the RailSounds loading effects without affecting the speed of the train is to set the Labor Bias.

These are two new touchscreen keys that can be found in the speed page. They allow you to increase or decrease the labor 'offset'. All the previous laboring effects still occur – this function allows you to 'add' more labor like trainbrake without effecting speed. Each engine and train has its own labor bias and can be individually adjusted. The train's speed will never exceed the Train Brake indicator. Trying to exceed that limit will only add laboring effects.



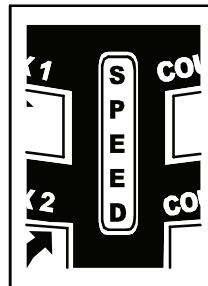


CAB-2 Controls (continued)

OFFICIAL RAIL ROAD SPEED CONTROL

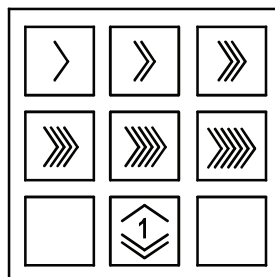
(New LIONEL LEGACY Engines Only)

Five (5) Official R.R. speeds are assigned to dedicated speed icons in the CAB-2 Touch-Screen. You must press the Speed Button on your CAB-2 to bring up the Official R.R. Speed icons in the Touch-Screen. Official R.R. Speeds are commanded whenever you press one of the Official R.R. Speed buttons. To leave the Official R.R. Speed control panel just press AUX-1 to go to the standard control panel, or press the Speed Button again. Two additional controls, “High Ball” (Top Speed) and “Brake to Roll” (speed step one), are possible with this Touch-Screen set of controls.



Selecting and Operating With Official R.R. Speeds

Official R.R. Speeds are available at the push of a button on the Touch-Screen. You can control the speed change and the dialog separately just by releasing the button at specific times. After pressing the Touch-Screen Speed ICON, when you hear the dialog you can release the button and allow the engine to change speeds whenever you think the engineer understood the order from the dispatcher. If you don't want to hear the dialog, just touch the Touch-Screen ICON and release immediately. Then the speed change will happen without the dialog.



Speed Commands With Crew-Talk Dialog

1. Press the Speed Button

The Official R.R. Speed ICONS will appear in the Touch-Screen

2. Press and hold an Official R.R. Speed Touch-Screen ICON

You will hear a dialog between the dispatcher and the engineer

3. Release the Official R.R. Speed Touch-Screen ICON anytime

The addressed train will now move towards the Official R.R. Speed.

Speed Commands Without Crew-Talk Dialog

1. Touch and quickly release (tap) an Official R.R. Speed Touch-Screen ICON

The addressed train will move towards the Official R.R. Speed.



CAB-2 Controls (continued)

Official Rail Road Speed Control (continued)

Train Speed Definitions:

**Restricted speed : 5 mph**

A speed that will permit stopping with one-half the range of vision, looking out for train, obstruction, switch not properly lined or broken rail, but not exceeding either 15 or 20 miles per hour as defined by the operating railroad.

**Slow speed: 20 mph**

A speed not exceeding 15 or 20 miles per hour, as defined by the operating railroad.

**Medium speed : 35 mph**

A speed not exceeding either 30 or 40 miles per hour, as defined by the operating railroad.

**Limited speed : 50 mph**

A speed not exceeding 45 or 60 miles per hour as designated by the operating railroad.

**Normal speed : 70 mph**

The maximum authorized speed.

**HighBall: Maximum speed of locomotive**

Not a prototypical speed.



Roll: Decelerate or Accelerate at momentum speed to ROLL (speed step one). Hold down for braking sounds.

Not an official railroad speed.

Roll Commands

Press and Hold Touch-Screen Roll Icon

1. **Activate brake sounds**
2. **Decelerate to speed step 1 (ROLL)**

Release Touch-Screen Roll Icon

1. **Brake sound stops**
2. **Deceleration continues to speed step 1**

Press Touch-Screen Roll Icon again

1. **Activate brake sounds**
2. **Deceleration continues**

Press Touch-Screen Roll Icon while at Stop

1. **Accelerate to ROLL (speed step one)**

Note: LIONEL research information is culled from several sources, including Illinois Central Railroad Information, Michigan Railroads, Union Pacific Railroad Terms Glossary and North American Signaling Basics.





CAB-2 Controls (continued)

TOUCH-SCREEN ICONS

The LEGACY Touch-Screen adapts to your operating condition.

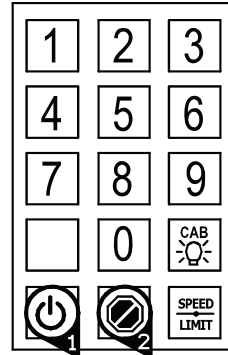
Addressing an Engine (*LEGACY Control System and TMCC*)

If you are addressing, the Touch-Screen allows you to enter ID numbers and information about the engine (or lashup) using the TMCC method. You get the Addressing Touch-Screen display by pressing ENG or TR.

Start-Up and Shut-Down Commands (*TMCC engines*)

Address the engine.

1. Tap the Start-Up Touch-Screen Icon to start up your TMCC engine.
2. Tap the Shut-Down Touch-Screen Icon to shut down your TMCC engine.



Start-Up and Shut-Down Commands (*LEGACY equipped engines only*)

Start-Up and Shut-Down sequences are designed to realistically start-up and shut-down your locomotive.



The **Start-Up** Touch-Screen ICON will enable a sequence of events including the smoke system starting up, Tower Communication dialog, and finally the engine starting up. This will happen whether you have previously set the smoke to OFF, L, M or H.

Note: To avoid having the smoke system start up, you must manually turn the smoke unit off on your locomotive. Please see the locomotive's directions for the location of the smoke unit switch.

Note: When a locomotive is first placed on the track and powered up, it will start-up from any action command, without pressing the Start-Up Touch-Screen ICON. In this case, the smoke unit will remain in the state it was last commanded to be in: OFF, L, M or H.



The **Shut-Down** Touch-Screen ICON will enable a sequence of events including the smoke system shutting down, Tower Communication dialog, and finally the engine shutting down.

Address your LEGACY engine.

1. Tap the Start-Up Touch-Screen Icon to start up your LEGACY engine with no dialog; or Press and HOLD the Start-Up Touch-Screen Icon to hear a Tower-Comm and Crew-Talk dialog. The smoke unit will respond, and the engine will start-up.
2. Tap the Shut-Down Touch-Screen Icon to shut down your LEGACY engine with no dialog; or Press and HOLD the Shut-Down Touch-Screen Icon to hear a Tower-Comm and Crew-Talk dialog. The smoke unit will respond, and the engine will shut down.

Note: After Start-Up, the Touch-Screen will change to the control panel.



CAB-2 Controls (continued)

Speed Limit Commands

To prevent inexperienced operators from operating an engine at an unsafe speed, it is recommended to set a High Speed Limit for that engine. This can only be done in the address screen, which is accessed by pressing either the TR or ENG address key. If the speed limit is set, the icon will appear inverted.



Use the Speed Limit Touch-Screen ICON to set a speed limit for your engines.

Set Speed Limit

With your engine or train at the desired high speed limit,

1. Press and release the ENG or TR address button
2. Press and hold the speed limit Touch-Screen ICON
3. SPEED LIMIT SET will appear at the top of your display screen
4. Speed Limit is set.

Clear Speed Limit

With your engine or train on the track,

1. Press and release ENG or TR
2. Press and hold the speed limit Touch-Screen ICON
3. Speed Limit is cleared

CAB Light Commands



Use the CAB Light Touch-Screen ICON to turn on and off the CAB light in the addressed engine.

With your engine or train on the track,

1. Press and release ENG or TR address button
 2. Press the CAB Light Touch-Screen ICON
- If the CAB light was previously on, it will turn off. If the CAB light was previously off, it will turn on.

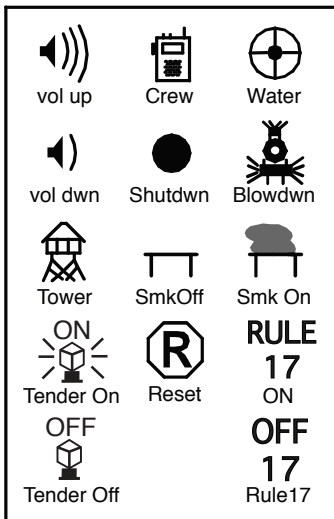
Operating With Touch-Screen Icons Section

The next few pages cover Touch-Screen Icons for Steam, Diesel, Electric, and Other Engines for these operating conditions:

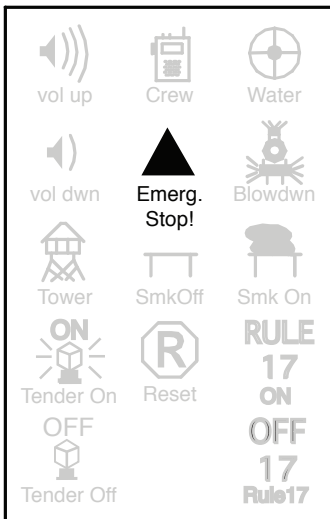
CAB-2 Controls (continued)

"LEGACY Equipped" STEAM & STEAM Switcher ENGINE Touch-Screen Icons:

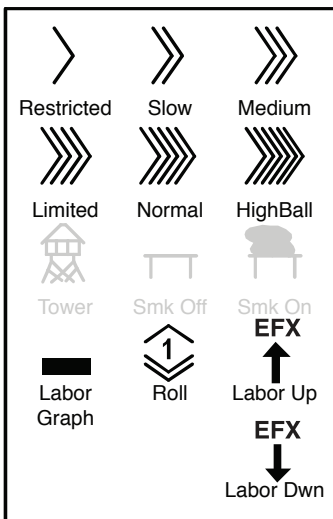
At Stop



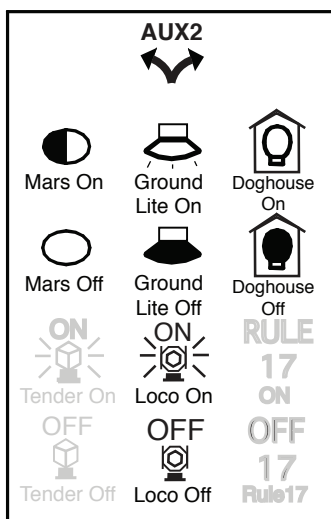
Underway



R.R. Speed



Lighting (AUX2 press-hold)



When an icon appears on more than one panel, it is illustrated in grey above.



CAB-2 Controls (continued)

"LEGACY Equipped" DIESEL & DIESEL Switcher ENGINE Touch-Screen Icons:

At Stop

| | | |
|---------|----------|---------------------|
| | | RPM ↑ Rev Up |
| vol up | Crew | |
| | | RPM ↓ Rev Dwn |
| vol dwn | Shutdown | |
| | | |
| Tower | SmkOff | Smk On |
| ON | | RULE 17 ON |
| Ditch | Reset | |
| OFF | | OFF 17 Rule17 |
| Ditch | | |

Underway

| | | |
|---------|-----------------|---------------------|
| | | RPM ↑ Rev Up |
| vol up | Crew | |
| | | RPM ↓ Rev Dwn |
| vol dwn | Emerg. Stop! | |
| | | |
| Tower | SmkOff | Smk On |
| ON | | RULE 17 ON |
| Ditch | Reset | |
| OFF | | OFF 17 Rule17 |
| Ditch | | |

R.R. Speed

| | | |
|----------------|---------|-----------------------|
| | | |
| Restricted | Slow | Medium |
| | | |
| Limited | Normal | HighBall |
| | | |
| Tower | Smk Off | Smk On |
| | | EFX ↑ Labor Up |
| Labor Graph | Roll | |
| | | EFX ↓ Labor Dwn |

Lighting (AUX2 press-hold)

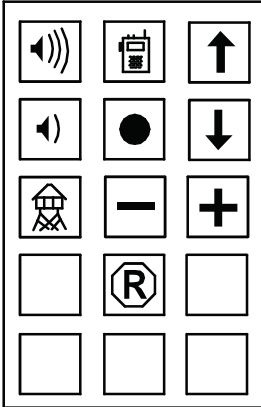
| | | |
|----------|--------------------|---------------------|
| AUX2 | | |
| | | |
| Mars On | Ground Lite On | Strobe On |
| | | |
| Mars Off | Ground Lite Off | Strobe Off |
| ON | | RULE 17 ON |
| Ditch | Loco On | |
| OFF | OFF | OFF 17 Rule17 |
| Ditch | Loco Off | |



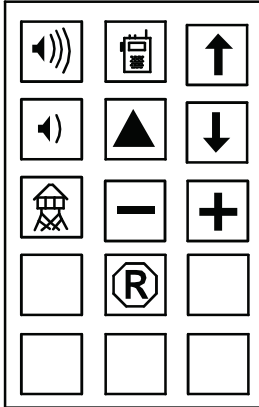
CAB-2 Controls (continued)

Other "LEGACY Equipped" ENGINE Touch-Screen Icons:

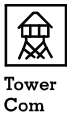
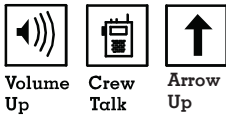
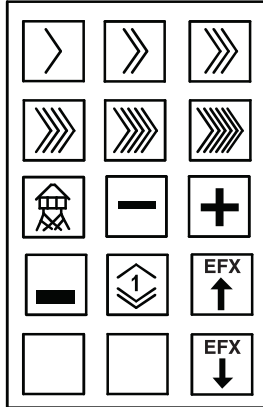
At Stop



Underway



R.R. Speed



Moving left to right, buttons that have not changed are lighter.

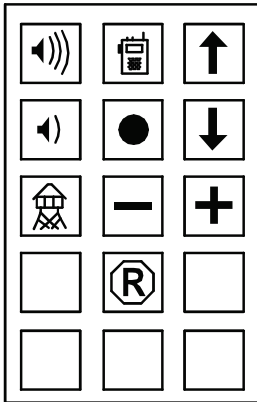




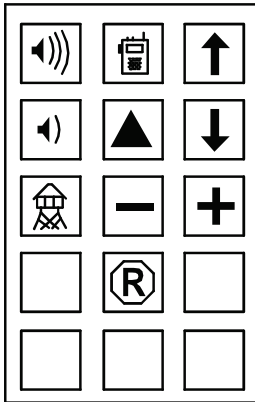
CAB-2 Controls (continued)

TMCC ENGINE Touch-Screen Icons:

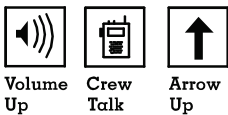
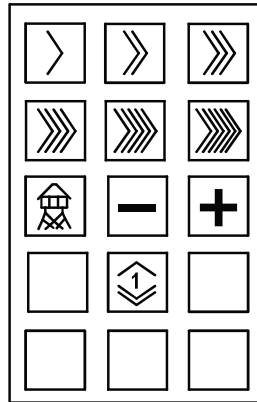
At Stop



Underway



R.R. Speed *



Volume Up



Crew Talk



Arrow Up



Volume Down



Rail-Sounds Shutdown



Arrow Down



Tower Com



Master Minus



Master Plus



Reset



Volume Up



Crew Talk



Arrow Up



Volume Down



Emerg. Stop



Arrow Down



Tower Com



Master Minus



Master Plus



Reset



Speed 1



Speed 2



Speed 3



Speed 4



Speed 5



High-Ball



Tower Com



Master Minus



Master Plus



Speed Step 1

** TMCC R.R. speeds may vary from engine to engine, and may not match LEGACY "Official R.R. speeds."*

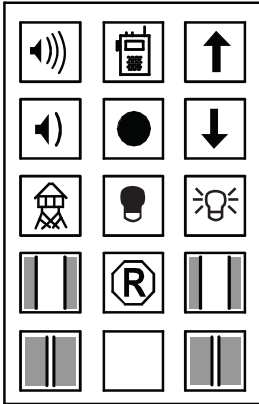
Note: In Addressing Mode for a TMCC Engine, the Touch-Screen will be the same as on page 34, without the Cab Light.



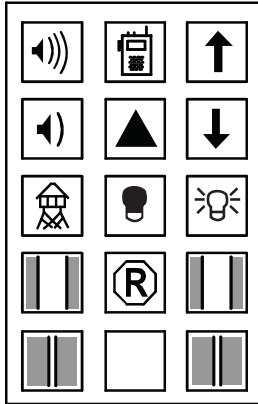
CAB-2 Controls (continued)

Acela Touch-Screen Icons:

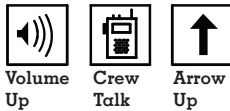
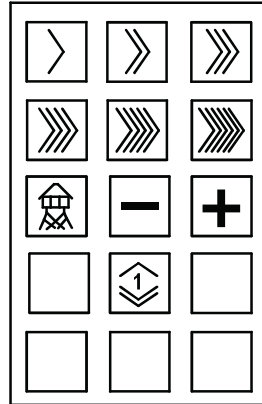
At Stop



Underway



R.R. Speed *



Volume Up



Crew Talk



Arrow Up



Volume Down



Rail-Sounds Shutdown



Arrow Down



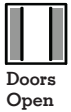
Tower Com



Lights Off



Lights On



Doors Open



Reset



Doors Open



Doors Close



Doors Close



Volume Up



Crew Talk



Arrow Up



Volume Down



Emerg. Stop



Arrow Down



Tower Com



Lights Off



Lights On



Doors Open



Reset



Doors Open



Doors Close



Doors Close



Restricted



Slow



Medium



Limited



Normal



High-Ball



Tower Com



Lights Off



Lights On



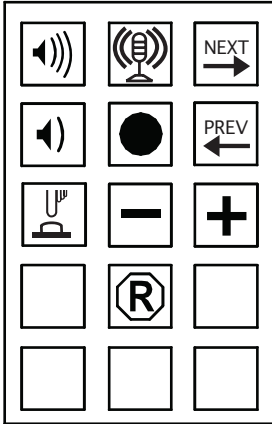
Roll



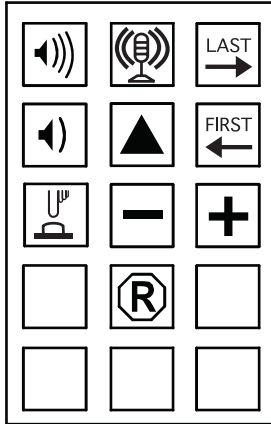
CAB-2 Controls (continued)

Subway Touch-Screen Icons:

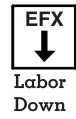
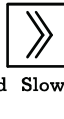
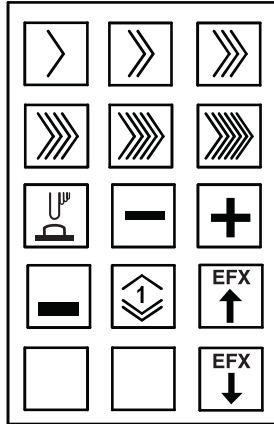
At Stop



Underway



R.R. Speed

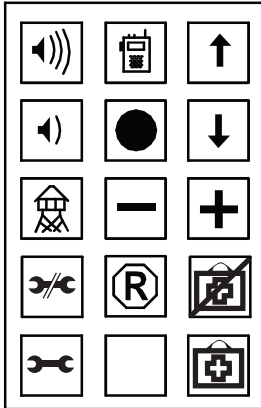




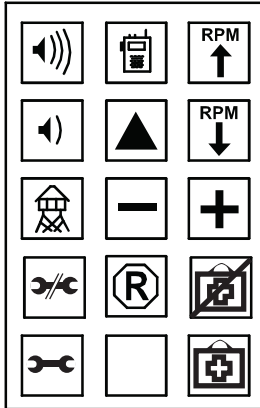
CAB-2 Controls (continued)

Break Down Unit Touch-Screen Icons:

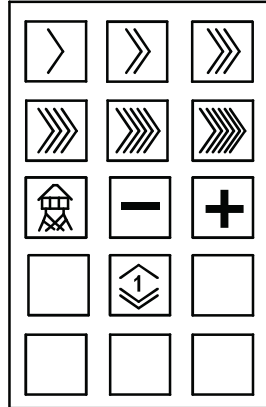
At Stop



Underway



R.R. Speed *



Volume Up



Crew Talk



RPM Up



Volume Down



Rail-Sounds Shutdown



RPM Down



Tower Com



Lights Off



Lights On



Break Time



Reset



Fail



Repair



Pass



Volume Up



Crew Talk



RPM Up



Volume Down



Rail-Sounds Shutdown



RPM Down



Tower Com



Lights Off



Lights On



Break Time



Reset



Fail



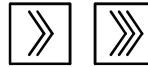
Repair



Pass



Restricted



Slow



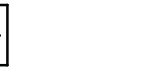
Medium



Limited



Normal



High-Ball



Tower Com



Master Minus



Master Plus



Labor Graph



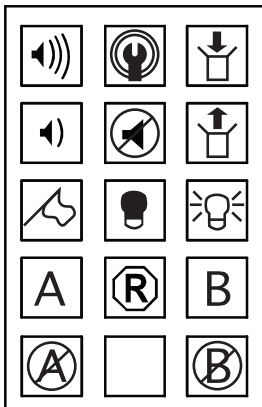
Roll



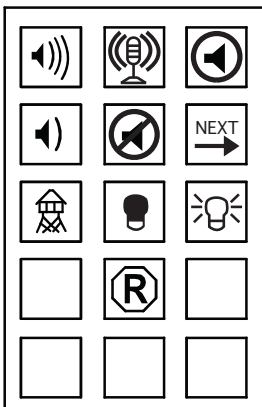
CAB-2 Controls (continued)

Non Motor Touch-Screen Icons:

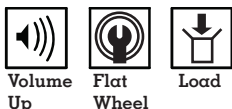
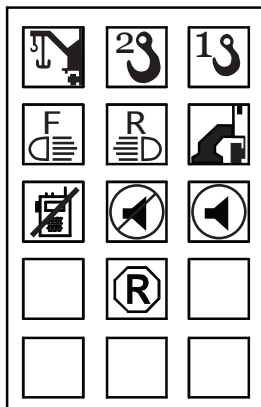
Freight Car



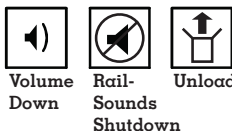
Passenger Car



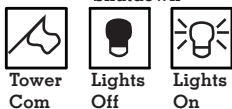
Crane/Boom Car



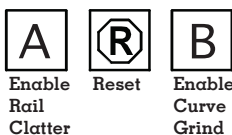
Volume Up Flat Wheel Load



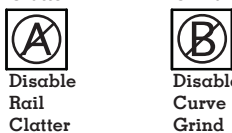
Volume Down Rail-Sounds Shutdown Unload



Tower Com Lights Off Lights On



Enable Rail Clatter Reset Enable Curve Grind



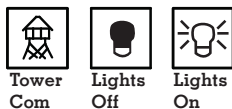
Disable Rail Clatter Disable Curve Grind



Volume Up Conductor Enable Sounds



Volume Down Mute Sounds Next Stop



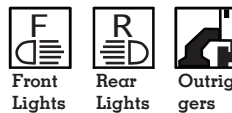
Tower Com Lights Off Lights On



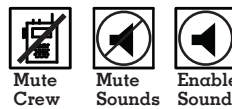
Reset



Boom Large Hook Small Hook



Front Lights Rear Lights Outriggers



Mute Crew Talk Mute Sounds Enable Sounds



Reset



CAB-2 Controls (continued)

RECORD

The Record Button on your CAB-2 allows you to record and play back any action that can be done with the controller!

The recording is stored inside of the remote. The recording works by saving the command sent and the delays between each command. The remote can store roughly 1000 events, with a maximum delay of 400 seconds between events. The amount of recording space used is directly proportional to the number of events - not the overall time of the recording.

To Create a Recording

1. Hold the RECORD Button down for 5 seconds and release.
2. Dialog 'RECORDING' will be displayed
3. The graph on the left is the 'saving buffer.' Try to keep this graph low
4. The graph on the right is the position in record. Recording will automatically end once all the memory is used.



Now, operate the Cab just like you would normally. Everything you do will be saved.

To Save a Recording

A Tap of the Record Button will save the recording normally. The dialog "Recording Created" will be shown. This means that the recording will play once and stop.

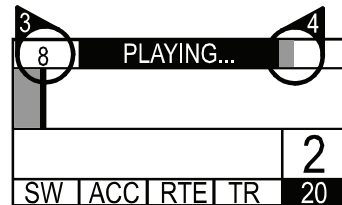
To Loop a Recording

A Five-Second Hold of the Record Button will save the recording and make it loop when finished. This means your recording will play back repeatedly until you stop it. The dialog "Recording Created" will be shown.

Note: It is recommended to stop and start your recording at the same location on the track if you are looping a train or an engine action.

To Play Back a Recording

1. Just tap the RECORD Button,
2. Dialog 'PLAYING' will be displayed
3. Countdown on left is time until next command is sent out
4. Graph on right is position in recording time



To stop playback while it is in progress just tap the Record Button.

To Erase The Recording

Hold The Record Button For 5 Seconds.

Upon release 'RECORDING' will be shown. Tap Record Button again to end recording. This will create a recording with nothing in it.

As always, HALT will stop everything, including the recording playback.

That's it!

Note: The Record function replaces the functions of the Lionel Action Recorder Controller (ARC). An ARC will work with the LEGACY System, but only in CAB-1 or TMCC Mode. To utilize the ARC with a LEGACY engine, change the engine's configuration to TMCC or CAB-1 Mode.



CAB-2 Controls (continued)

FEEDBACK

See. Hear. Feel.

As your engine's Commanded Speed moves toward your Target Speed, you can hear, see, and feel your engine at work.

Pick up the CAB-2. Experiment for yourself. Momentum is default "M" medium setting. See how the Momentum affects your engine's rate of Acceleration.

Listen. Hear the laboring sounds, coasting sounds, braking sounds, RPM changes and more as your engine moves towards its "Target Speed."

Feel. If you have the CAB-2 "FEEDBACK" effect on, you will "feel" the engine laboring through RPM ramps, forced braking, boosting, stopping, starting, and other conditions.

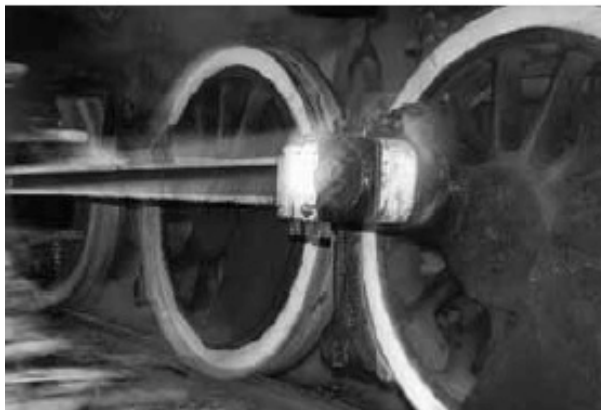
Press the Feedback Button:

- 1. Feedback "on" message appears in display

Press the Feedback Button again:

- 1. Feedback "off" message appears in display

| | | | | |
|-------------|-----|-----|----|-----|
| FEEDBACK ON | | | | |
| 2343 | | | | |
| | | | | 43 |
| SW | ACC | RTE | TR | ENG |





CAB-2 Controls (continued)

INFO

The INFO menu is where you find all of your Engine, Train, Accessory, Switch and Route options. Options are either downloaded from a memory module that came with your LIONEL LEGACY product, using the LEGACY system Utility (LSU) software, or entered manually. This procedure only needs to be done once.

IMPORTANT! When you have completed entering your engine's INFO, the LEGACY system will know how to control your train, and how you want to view it on the Display screen, whether it is LEGACY or TMCC.

| ENGINE 1 INFO | | | |
|--------------------|--------------|---------|-------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| ASSIGN NAME | | | |
| [NAME] | LOAD AUX CLR | | |

Accessing Engine INFO

Address engine by its ID#

1. Press INFO
2. Press SCROLL button repeatedly to move through categories of Options

| ENGINE 1 INFO | | | |
|--------------------|--------------|---------|-------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| ASSIGN NAME | | | |
| [NAME] | LOAD AUX CLR | | |

Entering Engine INFO with Memory Modules

See page 74

Entering Engine INFO with LEGACY System Utility

See LSU manual

Entering Engine Options Manually

Each LEGACY Command set comes with a TMCC diesel and steam Memory Module. These modules have the important INFO your LEGACY system uses to control the engine correctly. There are still some options you may want to adjust or enter manually.

| ENGINE 1 INFO | | | |
|--------------------|--------------|---------|-------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| ASSIGN NAME | | | |
| [NAME] | LOAD AUX CLR | | |

Once you have accessed the Engine INFO you may enter options manually :

1. Enter the correct info in each of the engine tabs
 - a. Find the desired ENGINE OPTION in the display window.
 - b. Select it by pressing the softkey under it.
 - c. Select one of the choices in every category.
 - d. Check all the ENGINE OPTION categories and make sure the choices are the desired ones.

Note: Make sure you get every desired Engine Option right. It will perfect the LEGACY system operation of your Velocity Throttle, Control Panel, Speed Graph and RailSounds.



CAB-2 Controls (continued)

INFO - NAMING PROCEDURE

Names can be given to Engines, Trains, Accessories, Switches and Routes. Follow this method to use the LEGACY Naming feature.

Address an EN, TR, ACC, or SW.
Enter the ID # (1-99)
Press INFO

| | | | | | | | | |
|---------------|-------------|----------------|--------------|-------------------|---|-----|-----|------|
| ENGINE 1 INFO | | | | | | | | |
| Custom | Type DSL | Control LEG | Sound LRS | | | | | |
| ASSIGN NAME | | | | A B C D E F G H I | | | | |
| NAME | LOAD | AUX | CLR | ← | → | ADD | DEL | NEXT |

Press the NAME softkey.

You will see the Alpha-Numeric character choices.

- To enter numbers, use the keypad. For letters, scroll Velocity Throttle to the first character.
- Add the character by pressing the softkey under ADD.
- Add additional characters.
- If using multiple words separate them using a SPACE.
- Use the LEFT and RIGHT ARROW keys to select characters to edit, delete them and replace them.
- Delete characters by using the softkey under DELETE.
- There is a limit of 31 characters (including SPACES). Use abbreviations where needed.
- The Touch-Screen can be used to enter numerics (Add must be pressed to add them to the name.)
- When the last letter of the name you are entering is highlighted DO NOT press the ADD softkey, simply press the NEXT softkey.
- When finished adding the name (for ENG, ACC RTE & TR only) press the NEXT softkey. (For SW press the SET softkey or the SET button on the bottom of the CAB-2. The remote will automatically exit the naming screen.)
- The "Assign Road Number" screen will appear (this screen will not appear for RTE or SW naming).
- Enter a road number if you want. This can be up to a 4-digit road number. (If you enter the wrong number, simply fill the box with additional numbers. Once the box is full, re-enter the number you want.)
- Press the SET softkey or the SET button on the bottom of the CAB-2. NAME SAVED will appear momentarily then the screen will return to the INFO page.
- Press the CTC button to exit to the operating screen.

Left Arrow/Right Arrow
For deleting/editing a
letter in the name

ADD
For selecting a letter
to add to the name

DELETE
For deleting a
letter from the
name

NEXT
To save the name
and move to the
Road Number screen
(SET)
(To save name of
SW or RTE)

| | |
|------------------|-----|
| NAME SAVED! | |
| UP BIGBOY | |
| ROAD NUMBER SET! | |
| 4014 | |
| BACK | SET |



CAB-2 Controls (continued)

CTC: CENTRAL TRAIN CONTROL

Power up the CAB-2

With the CAB-2 powered down,

1. Press CTC
 - a. The display will illuminate
 - b. The Base will be found and identified
 - c. The operating screen will appear
 - d. You are ready to control your layout and run trains

LIONEL LINES

CHANNEL 1
 Central Train Control
 CAB V1.5 BASE V1.5

SCROLL TO CONFIGURE

Power Down the CAB-2

With the CAB-2 powered up,

1. Press and hold CTC
 - a. Wait until the display screen clears
 - b. The CAB-2 is powered down

Return to the Operating Screen

After you have finished building a lashup, creating a Route, or modifying the options for the LEGACY system, it is easy to return to the operating screen.

1. Press CTC
 - a. You will leave the task you have been working with
 - b. The operating screen will return

CTC INFO

CTC INFO is where all the options for your LEGACY Control System are found.

1. Press CTC

- a. Now you can scroll through the System Options with the Velocity Throttle or Scroll button

After any option choice is made, press the CTC key to exit the System Settings menu, or use the Velocity Throttle or Scroll button to go to the next option.

We will now go through the LIONEL LEGACY System Settings categories

V.T.D.C. - Velocity Throttle Direction Control

With your Train or Engine stopped, a "flick" (fast turn) counter-clockwise of the Velocity Throttle will:

1. Enable a Direction change

Choose between ON and OFF for this feature

SYSTEM SETTINGS

VELOCITY THROTTLE
 DIRECTION CONTROL

V.T.D.C. OFF

ON **OFF**

V.T.A.B. - Velocity Throttle Auto-Brake

With your Train or Engine underway, moving the Target line to 0 with the Velocity Throttle will:

1. Enable a brake sound

2. Slow your Train or Engine to a stop at the rate set in Momentum

- a. Note that it is possible to control the intensity of the brake sounds by turning the Velocity Throttle small amounts while the brake sound is enabled.

Choose between ON and OFF for this feature

SYSTEM SETTINGS

VELOCITY THROTTLE
 AUTOMATIC BRAKE

V.T.A.B. OFF

ON **OFF**

NOTE These features are recommended for use at higher momentum levels. To experiment with these features, use M5 or higher. (see Momentum Set page 27). Using these features at low momentum levels is not recommended because there is not enough time to implement correct control.



CAB-2 Controls (continued)

Hold Braked Speed

With your Train or Engine being controlled by the Independent Engine Brake,

1. **(ON)** The engine will hold at the new brake speed
2. **(OFF)** The engine will return to the speed it was traveling before the Independent engine brake was enabled

Choose between ON and OFF for this feature.

| |
|-------------------|
| SYSTEM SETTINGS |
| HOLD BRAKED SPEED |
| HOLD OFF |
| ON OFF |

Channel Select - Remote Manual Channel Select

If you are experiencing communication problems with your Base, you may change the Base Channel manually. It also may be necessary to change the channel to get off of the same channel used by another Base in a Club or Show environment. To select the channel of your CAB-2 remote to match the Base channel:

1. **Set your Base to the desired channel (see page 79)**
2. **Enter the desired CAB-2 channel 1-9 on your numeric keypad**

Enter channel number with Keypad

| |
|------------------|
| SYSTEM SETTINGS |
| CHANNEL SELECT |
| CHANNEL 1 |
| PRESS KEYPAD 1-9 |

Name Railroad

The default name for your railroad is LIONEL LINES. You can set a new name of your liking:

1. **Press NAME**
 - a. **Use Naming screen**
 - b. **See Naming procedure (see page 47)**

| |
|---------------------|
| SYSTEM SETTINGS |
| NAME RAILROAD |
| LIONEL LINES |
| NAME |

Keypad "Beep" On-Off

A beeping sound reinforces the fact that you have pressed a button and sent a command. You can select whether you want to hear this audible tone:

1. **Select ON or OFF**

Choose between ON and OFF for this feature

| |
|--------------------|
| SYSTEM SETTINGS |
| KEYPAD BEEP ON-OFF |
| BEEP OFF |
| ON OFF |

Display Contrast

To adjust the Display Screen to your own eyesight:

1. **Choose a value on the keypad 1-9**
 - a. **Corresponding values are 10% to 90%**

Enter Keypad value 1-9

| |
|------------------|
| SYSTEM SETTINGS |
| DISPLAY CONTRAST |
| 50% |
| PRESS KEYPAD 1-9 |

Keypad Contrast

To adjust the Touch-Screen Keypad to your own eyesight:

1. **Choose a value on the keypad 1-9**
 - a. **Corresponding values are 10% to 90%**

Enter Keypad value 1-9

| |
|------------------|
| SYSTEM SETTINGS |
| KEYPAD CONTRAST |
| 50% |
| PRESS KEYPAD 1-9 |



CAB-2 Controls (continued)

Backlight Timer

To adjust the amount of time the backlight stays on after any command:

1. Enter Keypad Value 1-9

- a. The time the backlight stays on will be highlighted

| | |
|----------------|----------------|
| 1 = Always off | 6 = 3 minutes |
| 2 = 5 seconds | 7 = 5 minutes |
| 3 = 10 seconds | 8 = 10 minutes |
| 4 = 30 seconds | 9 = Always On |
| 5 = 1 minutes | |

| |
|------------------|
| SYSTEM SETTINGS |
| BACKLIGHT TIMER |
| 3 MINUTES |
| PRESS KEYPAD 1-6 |

Sleep Timer

To adjust the amount of time the remote stays “live” before it turns off completely (once the remote turns off it requires a re-initialization period before any commands can be transmitted):

1. Enter Keypad Value 1-3

- a. The time the remote stays “live” before turning off completely, requiring a re-initialization period.

| | | |
|----------------|----------------|----------------|
| 1 = 15 Minutes | 2 = 30 Minutes | 3 = 60 Minutes |
|----------------|----------------|----------------|

| |
|---|
| SYSTEM SETTINGS |
| REMOTE SLEEP TIMER TIME BEFORE POWERDOWN |
| 15 MINUTES |
| PRESS KEYPAD 1-3 |

(Note: After 30 minutes, if no key has been pressed both screens will turn off (to conserve battery power) the moment any key is pressed the screens will immediately come back to life.)

Route Throw Rate

When you throw a Route, it is possible to adjust the rate (time between throws) that your switches will throw:

1. Enter Keypad value 1-9

- a. Your choice will be highlighted
- b. Rates between INSTANT and 2 seconds will be displayed
- c. Example, enter number 9 with keypad, and all Routes will throw with 2 seconds between each switch throw, or enter number 2 with keypad and all Routes will throw with .25 seconds between each switch throw

| |
|--------------------|
| SYSTEM SETTINGS |
| ROUTE THROW RATE |
| 1.0 SECONDS |
| PRESS KEYPAD 1-9 |

| |
|---|
| Warning: Do not set the throw rate faster than 1 second if you are using a SC-2 controller. |
|---|

Clear Database - Clears All Settings

BE CAREFUL AND BE SURE THAT YOU WANT TO CLEAR YOUR SYSTEM SETTINGS!

1. Press Clear

- a. Your settings will be cleared

| |
|---------------------------------------|
| SYSTEM SETTINGS |
| CLEAR DATABASE CLEARS ALL SETTINGS |
| WARNING |
| CLEAR |



CAB-2 Controls (continued)

LEGACY OPERATION OF TMCC ENGINES

LEGACY Features That Improve Operating Older TMCC Engines:

| | | |
|---------------------|----------------------------------|-------------|
| Railroad Speeds | More Momentum control | Train Brake |
| Speed Graph display | Addressing by Name & Road-Number | |

Upgrading A TMCC Layout To LEGACY Is Easy:

Simply connect the LEGACY Base/Charger to your existing track wire and TMCC Controller cable (RS 232 port). Disconnect your TMCC Command Base from these old connections. You don't need them anymore. If you want to keep using your TMCC CAB-1, See LEGACY & TMCC DUAL BASE OPERATIONS on page 8.

LEGACY defaults to CAB-1 mode for any unit (Engine, Train, Accessory, Switch, or Route) that you have not chosen options for in the INFO menu. See the section "CONTROLLING YOUR LAYOUT" starting on page 53 for instructions on setting up existing TMCC units and/or new LEGACY units for LEGACY operation.

Use your existing ENG, TR, RTE, SW, and ACC ID #'s to operate your layout.

Add Names and other information about your layout whenever you wish.

See page 8 for all information on using your TMCC CAB-1 and LEGACY CAB-2 together.



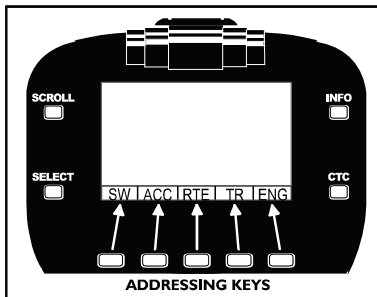


CONTROLLING YOUR LAYOUT

ADDRESSING INTRODUCTION

A traditional ID# must be assigned and programmed into each LEGACY controlled device on the layout.

1. **ENG:** An engine ID# is assigned to anything that operates on the track. This includes all engines, vehicles, breakdown units, operating passenger cars, operating freight cars, cranes and cabooses. See the specific operating manual on how to program Engine ID#. Page 54 shows how to assign and program most Engine ID#'s.
2. **TR:** A train/track ID# is used by LEGACY to address a group of Engine ID#'s and TPC's to address tracks for power.
3. **ACC:** Accessory ID#'s are used to address stations, switch towers, buildings, lights and most loading equipment. Note: Some loading equipment associated with an operating car will use the Engine ID# of the car. See the equipment or car operating manual.
4. **SW:** A Switch ID# is used to control switches. See the switch or SC controller manual on how to program Switch ID#'s.
5. **RTE:** A Route ID# is used by LEGACY to address a group of Switch ID#'s.



Associate the keys with the corresponding address type in the Display window.

Traditional ID# Addressing

Press any Address key (SW, ACC, RTE, TR, ENG)

1. **Enter the ID# (1-99)**
2. **Operate**
 - a. **An action command must be issued to**
 - i. Trains
 - ii. Engines
 - iii. Accessories
 - iv. Switches

Advanced Addressing

LEGACY Control provides a variety of Addressing methods: by Name, by Road Number on the side of the engine, or by Traditional ID# addressing. Pick the one you like the best or use all of the methods described in this section

Address Keys

Address keys are used whenever you operate with the CAB-2. This section explains the methods used to address engines, trains, accessories, switches, and routes.



CONTROLLING YOUR LAYOUT (continued)

OPTIONS

Entering Options

Entering Options is quick and easy with LEGACY equipped products because they include a custom Memory Module that enters all the Options automatically. See page 55 for more info.

Generic Steam and Diesel engine Memory modules are included with the LEGACY Control System to make it easy to enter the most amount of features for your existing TMCC engines. You will only need to enter the RailSounds type, road-name and road-number manually.

It is necessary to choose Options in the INFO menu to support some methods of addressing with the LIONEL LEGACY Control System. Options you can choose and enter into the system are outlined in this section. These options only need to be entered once.

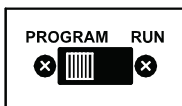
Editing Options

All information such as Name and Road Number or Control Settings can be modified at any time by using the engine's ID# and pressing INFO.

The LEGACY System defaults to CAB-1 Mode for any engine or train until you designate otherwise by using a Memory Module or entering options manually.

CHANGE THE ENGINE ID#

To give your Engine a new ID#:



1. Make sure no other CABs are in use

2. Slide the engine's program/run switch to "Program"

3. Power down your track

4. Put the engine on the track.

5. Power up your track.

6. Press ENG on the remote

7. Enter a unique engine ID# 1 to 99

8. Press SET

9. The horn should blow, the headlight flash, or both. (The light will not flicker if it has the same ID# on LEGACY loco only)

10. Power down your track



11. Take the engine off the track (if needed to access the Program/Run switch)

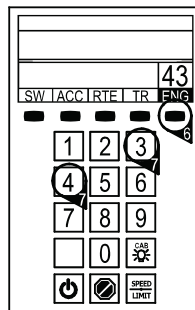
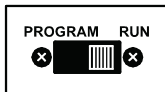
12. IMPORTANT!

Slide the engine's Program/Run switch back to "Run" right away

13. Put the engine on the track (if needed)

14. Power up your track

15. You are ready to operate



Controlling Your Layout: ENGINES

Engine Options

It is necessary to enter all the options in the Engine options section of the INFO menu.

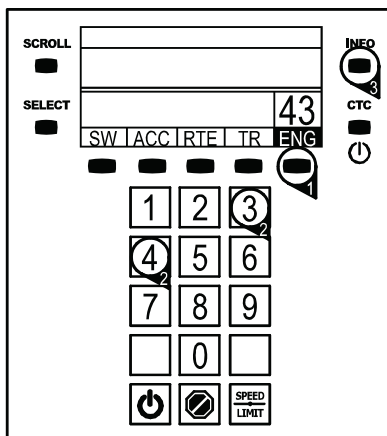
Entering Options manually or with a memory module is only necessary one time. All other LEGACY remotes will have this information too!

To access Engine Options

1. Press **ENG**
2. Enter Engine ID# (1-99)
3. Press **INFO**

View the Train Options screen.

| ENGINE 1 INFO | | | |
|--------------------|------|---------|-------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| ASSIGN NAME | | | |
| NAME | LOAD | AUX | CLR |



You can choose from Customize Engine, Engine Type, Engine Control Type, and Engine Sound Type.

There are three ways to enter options information for an engine: using a LEGACY Engine Memory Module, using a MCC/Generic Engine Memory Module, and entering the options manually.

LEGACY Engine Memory Modules (refer to page 74 for details)

1. Address a **LIONEL LEGACY Control System** equipped engine with its ID# (1-99)
2. Press **INFO**
3. Press the **LOAD** button, or just insert a memory module into the remote
4. Follow on-screen prompts

Information about your new engine will be downloaded into the system and associated with the ID# you have entered. All other remotes will have the information too.

TMCC and Generic Engine Memory Modules

1. Address a **TMCC Control System** equipped engine with its ID#

Continue with the above steps to load information about the engine into the system. All other remotes will have the information too.

After loading your generic TMCC memory module, you may wish to manually add the specific name and road number of your engine. Just follow the directions in the next section.



Controlling Your Layout: ENGINES (Continued)

To access Engine Options

1. Press **ENG**
2. Enter Engine ID# (1-99)
3. Press **INFO**

Customize Engine

Scroll to Customize Engine

1. Press **NAME** button to access Naming Screen
 - a. (See Naming page 47)
 - b. When naming is complete, Press Next
 - c. Add Road number
 - d. When Road Number is complete, press the Set softkey or the Set button at the bottom of the remote.

| ENGINE 1 INFO | | | |
|--------------------|-------------|----------------|--------------|
| Custom | Type DSL | Control LEG | Sound LRS |
| ASSIGN NAME | | | |
| NAME | LOAD | AUX | CLR |

| | | | | | | | |
|---------------|---|-----|-----|------|---|---|---|
| BIGBOY | | | | | | | |
| U | V | W | X | Y | Z | . | : |
| ← | → | ADD | DEL | NEXT | | | |

Set AUX Engine Options using the following steps

1. Press **AUX**
2. Slide the **ENG** switch to **PROGRAM**
3. Enter the **AUX** code
4. Slide the **ENG** switch to **RUN**
5. Press **INFO** to return

Clear Options using the following steps

1. Press **CLR**
2. Follow the on-screen prompts



Controlling Your Layout: ENGINES (Continued)

To access Engine Options

1. Press **ENG**
2. Enter Engine ID# (1-99)
3. Press **INFO**

| ENGINE 1 INFO | | | |
|-----------------------------------|--------------|---------|-------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| ASSIGN NAME | | | |
| <input type="text" value="NAME"/> | LOAD AUX CLR | | |

| ENGINE 1 INFO | | | |
|-------------------------------------|------|---------|-----------|
| Custom | Type | Control | Sound |
| | DSL | LEG | LRS |
| DIESEL | | | |
| <input checked="" type="checkbox"/> | DSL | STM | DSW SSW ▼ |

| ENGINE 1 INFO | | | |
|-------------------------------------|------|---------|-----------|
| Custom | Type | Control | Sound |
| | ELC | LEG | LRS |
| ELECTRIC | | | |
| <input checked="" type="checkbox"/> | ELC | SUB | LPD LPS ▼ |

| ENGINE 1 INFO | | | |
|-------------------------------------|------|---------|-----------|
| Custom | Type | Control | Sound |
| | ACC | LEG | LRS |
| ACCESSORY | | | |
| <input checked="" type="checkbox"/> | ACC | PAS | BDU FRT ▼ |

| ENGINE 1 INFO | | | |
|-------------------------------------|------|---------|-------|
| Custom | Type | Control | Sound |
| | ACLA | LEG | LRS |
| LIONEL ACELA | | | |
| <input checked="" type="checkbox"/> | ACLA | CRN | ▼ |

Engine Type

Scroll to Engine Type

To select these additional types you can utilize the ▼ MORE button in the Type tab

1. Choose the correct engine type:

- a. Diesel (DSL)
- b. Steam (STM)
- c. Diesel Switcher (DSW)
- d. Steam Switcher (SSW)
- e. Electric (ELC)
- f. Subway (SUB)
- g. Flyer Pullmor Diesel (FPD)
- h. Flyer Pullmor Steam (FPS)
- i. Accessory (ACC)
- j. Passenger (PAS)
- k. Breakdown Unit (BDU)
- l. LEGACY Freight sounds car (FRT)
- m. Lionel Acela (ACLA)
- n. Crane/Boom Car (CRN)
- o. Transformer (XFMR)

Note: These additional device types were added in Version 1.3 to add customized functionality to the touchpad and to better support TRAIN LINK and the variation of TMCC products available. You can have up to 16 devices in a train.

The purpose of these additional types has proven useful not only in operation but also in conjunction with TRAIN LINK functionality. These types, when placed in a consist, will function correctly i.e., they won't respond to the train sound commands or trigger their couplers but with train link they can quickly be selected and operated. See page 28 for more information on using TRAIN LINK.



Controlling Your Layout: ENGINES (Continued)

| ENGINE 1 INFO | | | |
|----------------------|------|---------|-------|
| Custom | Type | Control | Sound |
| | OTH | LEG | LRS |
| LIONEL LEGACY | | | |
| CAB1 TMCC LEG | | | |

Control Type

Scroll to Control Type

1. Choose the correct Control type:
 - a. CAB-1 MODE
 - b. TMCC MODE
 - c. REL 100 MODE
 - d. LEGACY MODE

Check the Table of Options on page 81 for more information about these settings.

| ENGINE 1 INFO | | | |
|----------------------|------|---------|-------|
| Custom | Type | Control | Sound |
| | OTH | LEG | LRS |
| SOUND TYPE | | | |
| NS RS RS5 LRS | | | |

Sound Type

Scroll to Sound Type

1. Choose the correct Sound type:
 - a. NO SOUNDS
 - b. RAILSOUNDS 2-4
 - c. RAILSOUNDS 5
 - d. LEGACY RAILSOUNDS

Completion

When you have set your Options, you are ready to operate

1. Press CTC to exit to Operating Display Screen
2. Press INFO to return to INFO menu

Engine Queueing

This system allows changes to continue in the background when you have an engine or train that has not reached its target speed and you 'deselect it' (change to another engine or leave the main operating screen) the queue will take over controlling that engine. Currently the queue will run up to 5 engines in the background.

If the queue reaches its maximum size the remote will put the first LEGACY engine that was added to the queue into 'autopilot' mode. In this mode it will continue towards the target speed with no noticeable misbehavior. In this case the only loss is the graph information until it stops accelerating. If the remote can not find a LEGACY engine to put into autopilot mode it will select the first added TMCC engine. This engine will be sent to the target speed at its internal momentum which is different from the remote; in this situation you may notice a difference in the locomotives behavior. In any case this only occurs in the rare case when more than 5 engines are changing speed at one time.

Engine Addressing Methods

Try these Engine Addressing Methods. If your Engine's info has not been entered in ENGINE OPTIONS of the INFO menu, only the Traditional TMCC and Toggle methods outlined in this Engine Addressing Methods section (page 53) will apply.

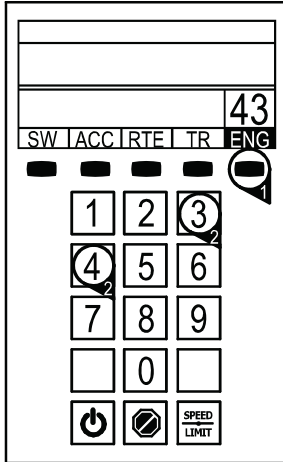
There are four ways to address engines: Traditional ID#, Road-Number, Name, and Toggle.



Controlling Your Layout: ENGINES (Continued)

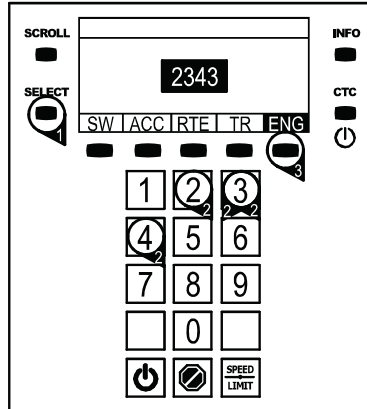
Traditional ID

1. Press ENG
2. Enter the Engine's 2 digit ID# (1-99)



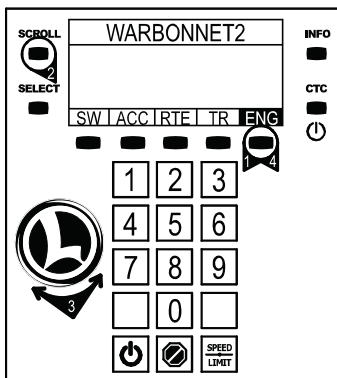
Road Number

1. Press SELECT
2. Enter the Road Number Engine
3. Press ENG

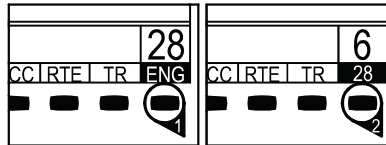


Name

1. Press ENG
2. Press SCROLL
3. Address box will blink fast, use the Velocity Throttle to scroll to the desired name
4. Press ENG



Toggle



1. Press ENG
2. Press ENG again to toggle between your last two Engine addresses
3. Now pressing any key will activate that Engine's Control Panel in the Touch-Screen and activate the Name and speed graph in the display window. If that Engine is underway, the correct speed will appear in the speed graph.
4. To replace one of the two Engines available for toggling with a new Engine:
 - a. Put the Engine that you want to replace in the box directly below the blinking box by pressing ENG
 - b. Put the Engine you want to keep in the blinking box
 - c. Enter the new Engine Number in the blinking box
 - d. Send any command
 - e. Now you can toggle between the new Engine and the one you wanted to keep.



Controlling Your Layout: TRAINS

TRAIN OPTIONS

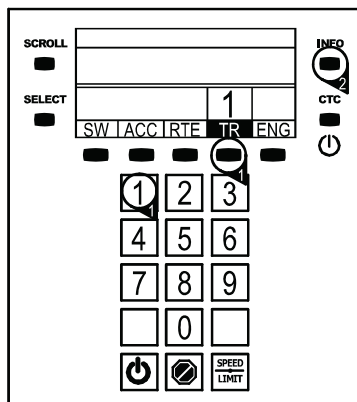
It is necessary to enter all the options in the Train Options section of the INFO menu.

To access Train Options

1. Press **TR**
2. Enter the Train ID# you wish to create or change
3. Press **INFO**

View the Train Options screen

| TRAIN 1 INFO | | | |
|---------------|-------|---------|-------|
| UNNAMED TRAIN | | | |
| Leader | Type | Control | Sound |
| ENG4 | DSL | LEG | RS5 |
| NAME | BUILD | CLR | |



| | | | |
|----------|---|-----|----------|
| TR | | | |
| NOPQRSTU | | | |
| ← | → | ADD | DEL NEXT |

Name

4. Press Name softkey
 - a. (See Naming page 47).
 - b. When naming is complete, Press Next
 - c. Add Road number
 - d. When Road Number is complete, Press Set

NOTE: Trains created with only LEGACY Locomotives can be addressed with a 2-digit ID# (1-99).

LASHUPS

To allow a Train to have more than one Engine, a lashup is required. Building a lashup allows you to control a group of Engines as one, in a prototypical manner.

In a LEGACY Control System Lashup, Crew Talk, Tower Comm dialog and Warning Sounds are heard only from the head-end unit. Direction changes are accompanied by reversed lighting. The front and rear couplers are triggered from the head-end unit or the back of the lashup automatically. All you need to do is build the lashup according to the instructions, by using the Icons in the CAB-2 display. The Options of the head end unit automatically become the options for the complete lashup.

It is still possible to control any of the Engines in the lashup individually. When you issue a Train command, the individual Engine you were controlling will return to the group. If there is a difference in speed, the individual Engine will return to the speed of the lashup at the rate set in the Train momentum.

The name of engine will be displayed in Train Builder along with the graphic representations of the item in consist, i.e., If you add a Steamer you see a Steamer icon. Accessories can also be placed in a consist. The main purpose of this is to utilize TRAIN LINK with accessories (ACC).

The Select and Scroll keys can be used in Train Builder to add engines with ease.


Controlling Your Layout: TRAINS (continued)

NOTE: When a lashup is created, the lead Engine sets the type of control. So if you have a LEGACY loco in the head of the consist, a TMCC loco will not move, as it does not “understand” 200 speed steps. For best results, use same-type engines - LEGACY/LEGACY or TMCC/TMCC - for lashups.

You can solve this by setting the LEGACY loco as a TMCC loco in the INFO selections; then you can place the LEGACY loco in the lead position.

Notice when you build a Train, the lead loco sets the operating mode for the Train. Keep this in mind and remember the limitations for the TMCC locos, since they are not able to operate in LEGACY mode.

Build a LASHUP

| TRAIN 1 INFO | | | |
|---|-------|---------|---------|
| TRAINMASTERS | | | |
| Leader | Type | Control | Sound |
| ENG4 | DSL | LEG | RS5 |
| NAME | BUILD | CLR | |
| BUILD LASHUP | | T1 | |
|  1 | | | |
| DIR | ACC | ADD | DEL SET |

5. Press BUILD softkey

(Note: when building a lashup, if an engine icon is facing to the right, it is forward, and when it is facing to the left it is rearward.)




6. Enter the front Engine ID#

- (It is not necessary to enter ENG, just enter the #)
- It will appear in the blinking box
- If your engine has a name, it will be displayed in the builder

7. Press ADD to add the front Engine

- The Engine will move to the right and the blinking box will be ready for your next Engine to be added

When the ENG is added, the touchscreen will update as shown allowing you to enable/disable sound, announcements and TRAIN LINK options for each ENG. If the device is an accessory, only the TRAIN LINK option can be enabled/disabled.

| | | |
|--|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |
| | 0 | |
|  10 |  9 |  8 |

8. Press the Announcement icon to enable/disable announcements for this ENG.

9. Press the HORN icon to enable/disable the horn for this ENG.

10. Press the TRAIN LINK icon to add this device to the TRAIN LINK list.

Non-engine items are automatically set as a TRAIN LINK device by default. To change TRAIN LINK status you press TRAIN LINK button in the train builder, a chain link icon should appear. In the current release you can Link up to 5 items per train.

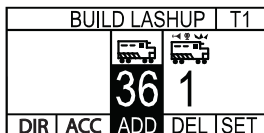
Sound Masking is the ability to move the dialog and horn output on the newest LEGACY engines. (and some TMCC/LEGACY combinations such as Super Bass Roar). If the Horn or Announcements have enabled for a ENG, it will be automatically disabled for any other device.

The CROWN icon on top of the ENG indicates that this is the lead engine.

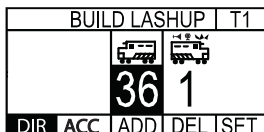
TRAIN LINK items are indicated with a LINK over the engine icon. Once an item is set as a TRAIN LINK it can be quickly accessed while operating a train.



Controlling Your Layout: TRAINS (continued)



11. Press ADD to add the second Engine
 - a. The Engine will move to the right and the blinking box will be ready for your next Engine to be added
12. Enter the second Engine ID# in the blinking box or press SCROLL to enter scroll mode, then use the Velocity Throttle to select an existing Engine ID#. Add all the Engines you want in your lashup in this manner. Press SCROLL again to exit scroll mode.
 - a. Press ACC to change the device to an accessory or
 - b. Press ENG to change accessory to an engine



13. To change the direction of an Engine in your lashup
 - a. Turn the Velocity Throttle to move the Engine you want into the blinking box
 - b. Press DIR to change the direction of the Engine



14. To delete an Engine from your lashup
 - a. Turn the Velocity Throttle to move the Engine you want to delete into the blinking box
 - b. Press DEL

15. To save your lashup
 - a. Press SET
 - b. Watch the on-screen prompts and wait until you see the message TRAIN CREATED!
16. To clear a lashup, press Clear
17. Press CTC to exit to the operating screen

Note: SUPPORT FOR LEGACY SWITCHER

If a switcher is in a lashup with other LEGACY engines the speed controls will be reprogrammed so the switcher runs the same speed as the LEGACY engines. This allows LEGACY switchers and road engines to run in a lashup.

When lashing LEGACY engines with different top speeds, the SPEEDLIMIT is automatically determined by the slowest engine in the consist. The engine speed is determined by the MAXSPEED value that resides in the engine module. The engines in the consist must be loaded with a module to utilize this feature.

The switcher, when configured as a road engine, will continue to operate as a road engine until either engine info is cleared or the engine is removed from the train.

ENGINES CAN EXIST IN MULTIPLE TRAINS. With this configuration you can save train configurations and when you desire to use them simply pull up the train builder and press set.

HYBRID MODE support for Super Bass Roar Unit. (TMCC engine as head, Super Bass Roar Unit in LEGACY mode in rear) This will output labor commands in TMCC mode to trigger the Super Bass Roar Unit. In addition, if the operator moves the HORN to the Super Bass Roar Unit, the BELL and HORN controls will trigger the LEGACY Super Bass Roar Unit. Likewise if the operator moves the dialog icon to the LEGACY Super Bass Roar Unit, the RR speed announcements and key 2, 5 and 7 announcements will come from the Super Bass Roar Unit. This function will also work with other LEGACY engines that may exist in this configuration.

Earlier production versions of LEGACY locomotives may not support SOUND MASKING.

Train Addressing Methods

Try these Train Addressing Methods. If your Train's info has not been entered in TRAIN OPTIONS of the INFO menu, only the Traditional TMCC and Toggle methods outlined in this Train Addressing Methods section will apply.

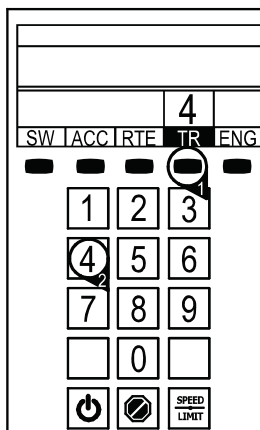
There are four ways to address trains: Traditional ID#, Road-Number, Name, and Toggle.



Controlling Your Layout: TRAINS (continued)

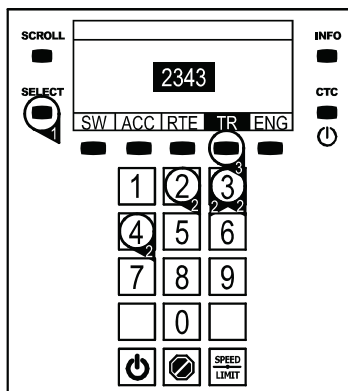
Traditional ID

1. Press TR
2. Enter the Trains's one or two digit ID #



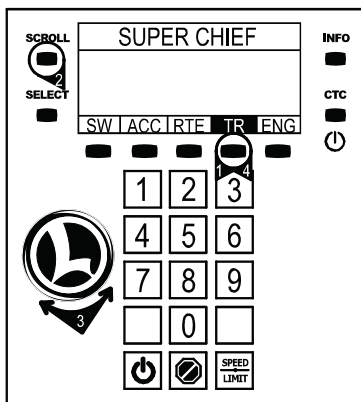
Road Number

1. Press SELECT
2. Enter the Road number painted on the side of your head-end engine
3. Press TR

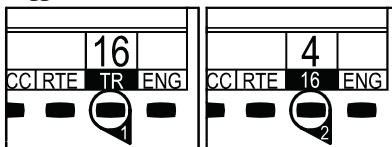


Name

1. Press TR
2. Press SCROLL
3. Use the Velocity Throttle to scroll to the desired name
4. Press TR



Toggle



1. Press TR
2. Press TR again to toggle between your last two train addresses

3. Now pressing any key will activate that Train's Control Panel in the Touch-Screen and activate the NAME and speed graph in the display. If that Train is underway, the speed will be correct in the speed graph.
4. To replace one of the two Trains available for toggling with a new Train:
 - a. Put the Train that you want to replace in the box directly below the blinking box by pressing TR
 - b. Put the Train you want to keep in the blinking box
 - c. Enter the new Train Number in the blinking box
 - d. Send any command
 - e. Now you can toggle between the new Train and the one you wanted to keep.



Controlling Your Layout: TRAINS (continued)

BUILDING A TRAIN

Building a train is an extension of building a lashup described in the previous section by adding other operating cars to the train. For example, a train could consist of an engine, a Break-Down Unit and a Freight Car with sounds, each having their own unique engine ID's.

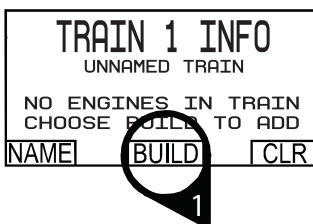
All operating cars have a graphical representation. So, when you build a train with a crane car for example, the system will pull up the icon associated with the crane car.

For this example, let's assume you have programmed the engine ID's 1, 2 and 3 into the engine, BDU and freight car respectively using the procedure found on page 54. Now let's build a train with them and set the BDU and freight car as TRAIN LINK devices so that they can be easily addressed while running the train.

Using the procedure on page 60, bring up a train info screen by pressing "INFO" after entering a train ID. Use a train ID that has not been previously built. The following screen will appear.

Bring up the Train Info Screen

1. PRESS BUILD



Add the head Engine

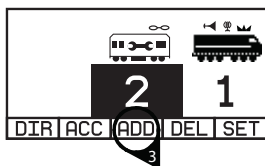
2. Press the 1 key and you should see the icon for the selected engine appear.

In our case, a Diesel is selected. A crown appears to indicate this is the head of the train, along with the horn and announcements icons to indicate they are turned on for this train. The icons at the bottom of your touchscreen can be pushed to enable/disable the horn or announcements for this engine as shown on page 61.



NOTE: The right most engine will always have the crown and can not be a TRAIN LINK. To change the head engine, you must add an engine to the right of the current right most engine.

If your engine is facing opposite the forward direction of the train, press the "DIR" soft key to change it's direction.



Add a Break Down Unit to the Train

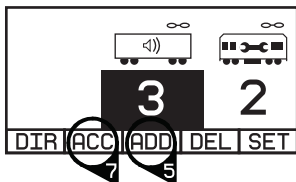
3. Press the "ADD" softkey to create a new train location

4. Press the 2 key to add the Break Down Unit or press SCROLL to enter scroll mode, then use the Velocity Throttle to select the BDU Engine ID#. Press SCROLL again to exit scroll mode. A link icon will appear by default on top of the BDU. This indicates that the BDU is added to the list of TRAIN LINK devices.

Note: If you wish to remove this as a TRAIN LINK device, press the TRAIN LINK icon at the bottom of the touchpad. Push it again to enable it.

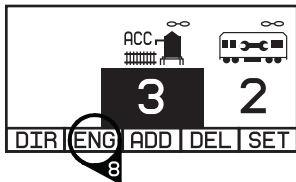


Controlling Your Layout: TRAINS (continued)



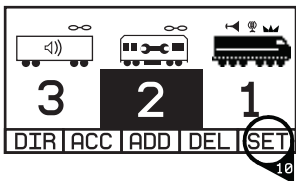
Add a Freight Car to the Train

5. Press the "ADD" softkey to create a new train location 6. Press the 3 key to add the Freight Car or press SCROLL to enter scroll mode, then use the Velocity Throttle to select the FRT Engine ID#. Press SCROLL again to exit scroll mode. As with the BDU, a link icon appears by default to indicate this device is a TRAIN LINK. Toggle the TRAIN LINK icon on the touchpad to enable/disable it.



Add an Accessory to the Train

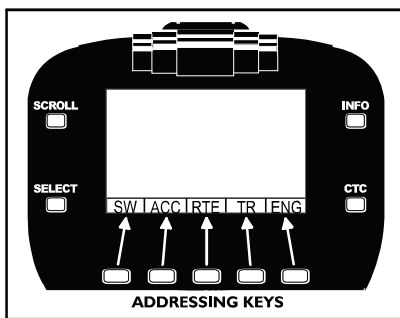
7. Press the "ACC" softkey to change the ENGINE ID to an Accessory ID.
- Note that the ACC softkey has now changed to an ENG softkey.
8. Press the "ENG" softkey to change the Accessory ID to an ENGINE ID. The accessory can also be a TRAIN LINK to make it more accessible while running the train.



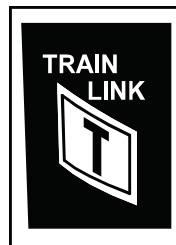
Scroll through the train devices

9. Using the velocity knob, turn it in either direction to scroll through the three train devices you have added to the train. You can now change any settings on the particular device you have selected before completing the build of the train.
10. Press the "SET" softkey to build the train.

The LEGACY system will now program the system to act as a single train. All TRAIN LINK devices can now be accessed via the TRAIN LINK button when running the train.



11. Wait a brief moment (or press the CTC button) to return to the main screen and begin operating your train.



You can now begin operating your train. Press the TRAIN LINK button to see your TRAIN LINK devices. Refer to page 28 for details on using the TRAIN LINK button.

Controlling Your Layout: ACCESSORIES

Accessory Options

Enter all the options in the Accessory Options section of the INFO menu.

To access Accessory Options

1. Press ACC
2. Enter accessory ID# (1-99)



Press INFO to access Naming Screen

4. Input desired name (see page 47)
5. When the last letter of the name you are entering is highlighted, DO NOT press the ADD soft key, simply press the NEXT soft key.
6. Enter a number (optional)
7. Press the Set softkey or the Set button at the bottom of the remote.

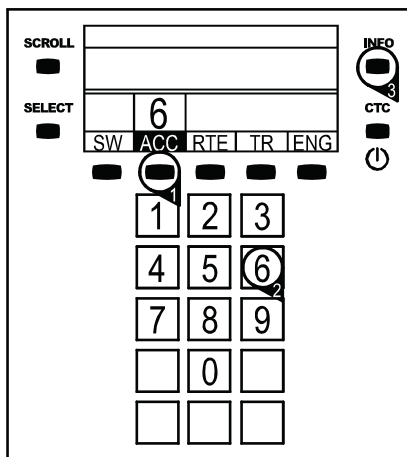
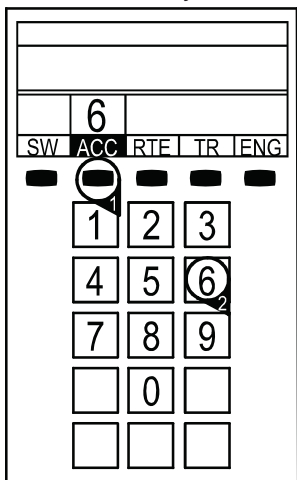
Accessory Addressing Methods

Try these Accessory Addressing Methods. If your Accessory's info has not been entered in ACCESSORY OPTIONS of the INFO menu, only the Traditional and Toggle methods outlined in this Accessory Addressing Methods section will apply.

There are four ways to address accessories: Traditional ID#, Name, Road Number, and Toggle.

Traditional ID

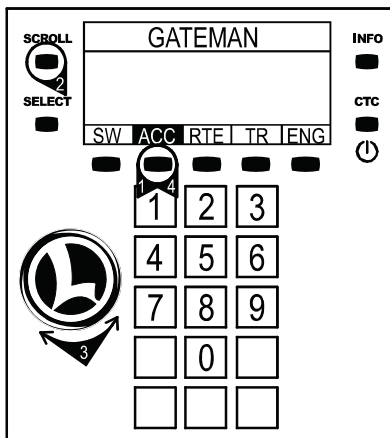
1. Press ACC
2. Enter the Accessory's ID# (1-99)



3.

Name

1. Press ACC
2. Press SCROLL
3. Use the Velocity Throttle to scroll to the desired name
4. Press ACC

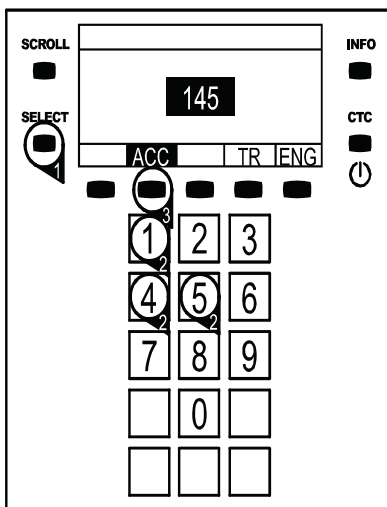




Controlling Your Layout: ACCESSORIES (Continued)

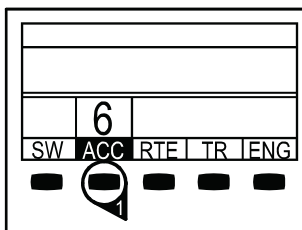
Road Number

1. Press SELECT
2. Enter the Road number for the Accessory
3. Press ACC

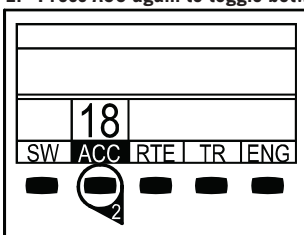


Toggle

1. Press ACC



2. Press ACC again to toggle between your last



- two accessory addresses
3. Now pressing any key will activate that Accessory Control Panel in the Touch-Screen and activate the NAME and other info in the Display.

Controlling Your Layout: SWITCHES

Switch Option

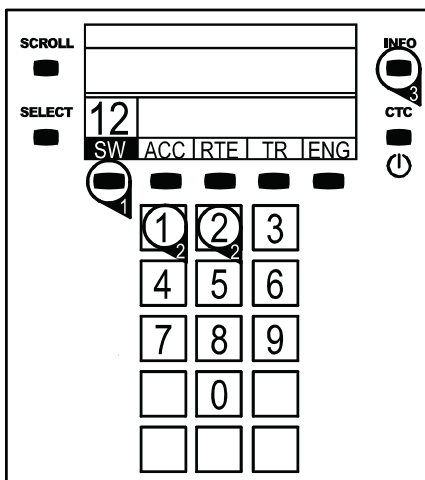
Enter options in the Switch Options section of the INFO menu.

To access Switch Options

1. Press SW
2. Enter switch ID# (1-99)
3. Press INFO to access Naming Screen



4. Input desired name (see page 47). To enter numbers, use the keypad
5. When the last letter of the name you are entering is highlighted, press SET.





Controlling Your Layout: SWITCHES (continued)

Switch Addressing Methods

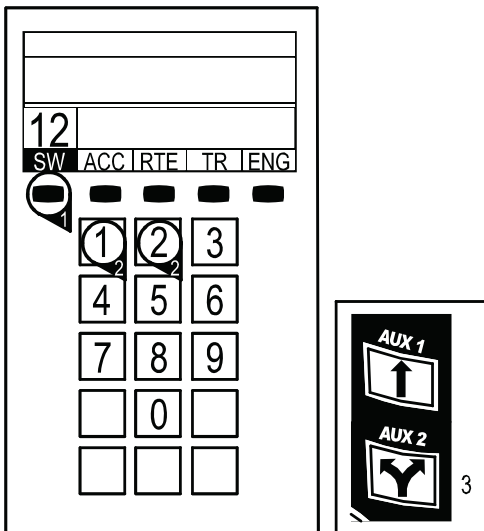
Try these Switch Addressing Methods. If your switch's info has not been entered in SWITCH OPTIONS of the INFO menu, only the Traditional ID# and Toggle methods outlined in this section will apply.

There are three ways to address switches: Traditional, Name, and Toggle.

Traditional ID#

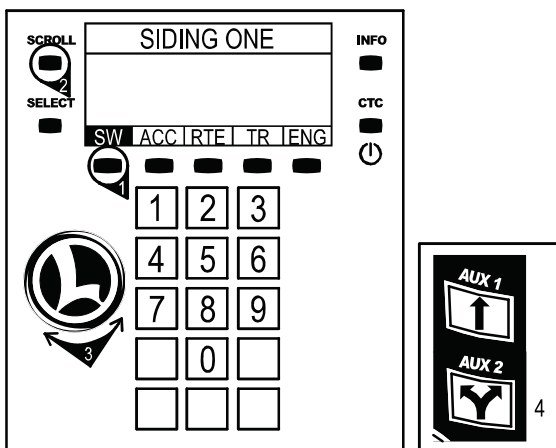
1. Press SW
2. Enter the one or two digit switch ID#
3. Press the THROUGH or OUT key
4. The switch will throw
5. *Enter a new ID# (1-99)
6. Throw the switch
7. Repeat

*Once you have already addressed a switch, it is not necessary to press the SW key every time you want to throw the switch through or out, or to enter a new Switch address. Just enter the ID#. You can continue doing this until you press any other address key.



Name

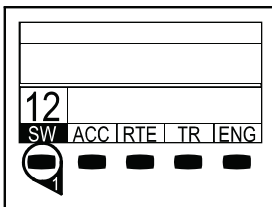
1. Press SW
2. Press SCROLL
3. Use the Velocity Throttle to scroll to the desired name
4. Press "through" or "out"



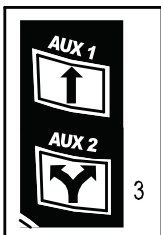
Controlling Your Layout: SWITCHES (continued)

Toggle

1. Press SW
2. Press SW again to toggle between your last two switch addresses



3. Throw the switch



Controlling Your Layout: ROUTES

Route Options

Enter all the options in the Route Options section of the INFO menu.

To access Route Options

1. Press RTE
2. Press INFO



3. Enter RTE #

Choose from Name, Build, and Clear

Name - (See Naming Procedure, page 47)

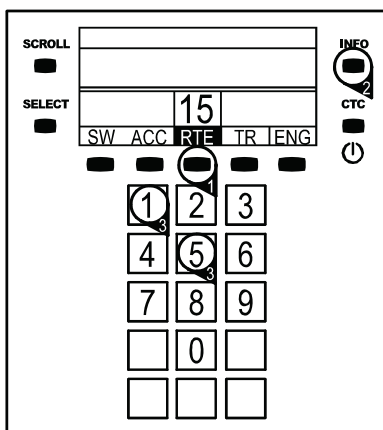
Build - (See Build a Route, page 71)

Clear - Clear Route settings

Completion

When you have set your Options you are ready to operate

1. Press CTC to exit to Operating Display Screen
2. Press INFO to return to INFO menu

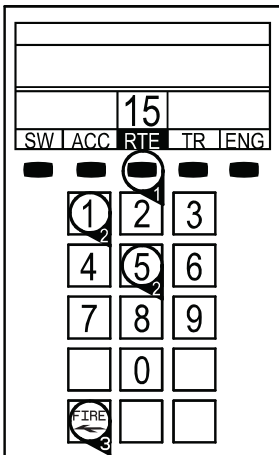




Controlling Your Layout: ROUTES (continued)

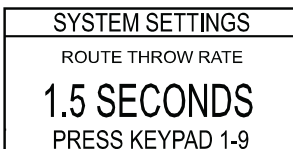
Route Addressing Methods

There is one way to address and throw Routes: Traditional ID#.



Traditional ID

1. Press RTE
2. Enter Route ID# (1 or 2 digits)
3. Press FIRE to throw the switch



Route Throw Rate

Press CTC

1. Scroll to "SYSTEM SETTINGS ROUTE THROW RATE"
 - a. Select a number 1-9 on the keypad until you see the rate you wish to set.
 - b. You can select any rate from "instant" to "2 seconds" between Switch throws on your Routes.

Warning: Do not set the throw rate below 1 second if you are using a SC-2 controller!



Controlling Your Layout: ROUTES (continued)

Building a Route

Building a Route allows you to control a group of Switches and Sub-Routes with one command. In the CTC options menu (see page 48), you can set the rate at which the Switches and Sub-Routes in the Route will throw.

There are three key differences between LEGACY and TMCC Routes:

1. LEGACY Routes can contain other Routes. These are called Sub-Routes.
2. LEGACY Routes can throw Switches at a user adjustable rate.
3. LEGACY Routes, while they are single digit ID# Routes by default, can be changed to be double digit ID# Routes if you wish. It is possible to choose any number 1-9 and have all Routes that start with that number become double digit Routes. You can have both double digit Routes and single digit Routes. In the CTC options Menu (see page 48), you can select Routes 1-9 to be double digit Routes, making a total amount of 99 Routes. While double digit Routes make more Routes available, they are slower to throw, requiring 2 button presses. Single digit Routes allow for quick throw of Routes with one button press. An example of this implemented on your layout would be mainline single digit Route ID#'s 1-8, and 9 double digit ID# Routes in your yard that all begin with ID# 9, i.e. 90, 91, 92, 93, 94, 95, 96, 97, 98, and 99.

It is possible to add 16 Switches or Sub-Routes to a Route. You can add any number of Switches or Sub-Routes but the total number of entries can not exceed 16. Sub-Routes can be used to enable a master Route to enable more than 16 Switches.

Example: RTE 1 contains 2 Sub-Routes Routes and 14 Switches for a total of 16.

Example: RTE 2 contains 4 Sub-Routes Routes and 12 Switches for a total of 16.

Example: RTE 3 contains 1 Sub-Route and 2 Switches for a total of 3.

Build a Route

1. Press RTE
2. Press INFO
3. Enter the Route number
4. Press BUILD softkey (button directly under BUILD)
5. Enter the first Switch ID#
 - a. (It is not necessary to press SW, just enter the #)
 - b. It will appear in the blinking box
6. Press either the through or diverging icon

SW Y | SW I

7. Press the diverging icon again to change the direction of the divergence

SW Y

| | | | | |
|---------------|-------|-----|-----|-----|
| ROUTE SETUP | | | | |
| ENTER ROUTE # | | | | |
| [REDACTED] | | | | |
| NAME | BUILD | CLR | | |
| BUILD ROUTE | | | R1 | |
| | ↖ | | | |
| | 3 | | | |
| SW Y | SW I | RTE | DEL | SET |
| BUILD ROUTE | | | R1 | |
| | ↖ | | | |
| | 3 | | | |
| SW Y | SW I | RTE | DEL | SET |



Controlling Your Layout: ROUTES (continued)

8. Add another Switch ID#
 - a. The previous Switch ID# will move to the left and the blinking box will be ready for your next Switch to be added

| BUILD ROUTE | | R1 |
|-------------|-----|-------------|
| ← | — | |
| 3 | 1 | |
| SWY | SWI | RTE DEL SET |

9. Select the correct icon for your Switch
10. Enter the rest of the Switch ID#'s in the blinking box
11. Select the correct icons for each one as you add them
12. To add an existing Route to a Route,

- a. Enter a Route ID#
- b. Press RTE
- c. The RTE icon will appear

| BUILD ROUTE | | R1 |
|-------------|-----|-------------|
| ← | ← | |
| 3 | 1 | 9 |
| SWY | SWI | RTE DEL SET |

13. Add all the Switches and Routes to your Route in this manner.
14. To change the direction of a Switch in your Route
 - a. Turn the Velocity Throttle to move the Switch you want to change into the blinking box
 - b. Press the through or diverging icon to change the direction of the selected Switch
15. To delete a Switch or Route from your Route
 - a. Turn the Velocity Throttle to move the Switch or Route you want to delete into the blinking box
 - b. Press DEL
16. To save your new Route
 - a. Press SET
 - b. Watch the on-screen prompts and wait until you see the message **ROUTE CREATED!**
17. Press CTC to exit to the operating screen

TRACK POWER

Power your layout with one or more of the following products. Be sure to read the directions that come with the products. Some of these products will require a TMCC CAB-1 to operate. Some can accept additional power from Power-Houses. It is recommended to add the #994 Power-Master Bridge (# 6-24279) to your layout to operate some of these products with the LEGACY system.

LEGACY PowerMaster

- Requires external power from Power-House or Transformer
- Address as track 1-99

Power-House Lock-On / Power-House set

- Non-addressable by remote control
- Built in automatic Circuit Breaker

TPC Track Power Controller

- Requires external power from Power-House or Transformer
- Plugs into DB9 port on LEGACY Command Base
- Address as Engine (EN) 0-99 or Track (TR) 0-9

Power-Master / Power-House set

- Requires #994 Power-Master Bridge (# 6-24279) or TMCC CAB-1
- Address as Track (TR) 0-9

Other Post-War Power Supplies/ Transformers ZW, KW, Train-Master 250W, Train-Master 150W etc.

- Non-addressable by remote control
- Built in automatic circuit Breaker

PWC ZW / Power-House set

- Communication through Track connection (455khz)
- Address as Track (TR) 1-9
- Address as (TR) 0 for conventional control

Power-Houses are available in 135 and 180 watt versions and provide power to these devices with the exception of the post war transformers in the "Other" category. Extra Power-Houses can be added to the PWC ZW and TPC to provide more power.

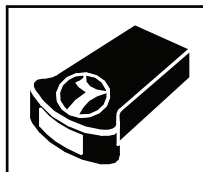




RAILROAD SYSTEM MANAGEMENT

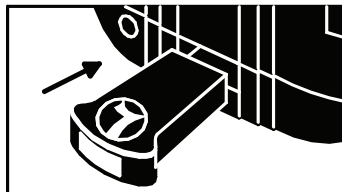
Engine Memory Module Download to the LEGACY Control System CAB-2

Your engine will perform at its best when all its options are loaded into your LEGACY system. Many LIONEL LEGACY equipped locomotives include an orange memory module, which is one way to load these settings. Alternately, you can use the two tan generic TMCC modules included with the #990 LEGACY Command set and further modify these generic settings using the CAB2 remote (see page 46). You may also use the LEGACY System Utility (LSU) software to set these options. Finally, starting with LEGACY system v1.5, you can use the LSU software and a black LEGACY Writable Utility Module to create your own custom memory modules holding information for one or more locomotives. These Multi-engine modules are a convenient way to bring information for all your locomotives when visiting a club layout.



Downloading LEGACY Engine Memory Modules

1. Address a LIONEL LEGACY Control System equipped engine with its ID#
2. Press INFO
3. Select LOAD with the soft keys
4. Insert your Orange, Tan or Black module into your remote
5. For orange or tan modules, follow the on-screen prompts to load the engine info
6. For black modules, use the Velocity Throttle to select the desired engine
7. Follow the on-screen prompts to load the engine info



Information about your new engine will be down-loaded into the system and associated with the ID# you entered in step 1. All other remotes will have the information too.

TMCC and Generic Engine Memory Modules

Generic Steam and Diesel engine Memory modules are included with the LEGACY Control system to make it easy to enter the most important options of your existing TMCC engines. For specific information, (not necessary to operate) you will only need to enter the RailSounds type, road-name and road-number manually.

Once the info has been entered manually (see page 55, Engine options), address the engine, and you are ready to operate.

NOTE: Supplied with your LEGACY Control System are 4 modules, two tan modules for generic TMCC steam or generic TMCC diesel, and Two blue modules for restoring factory settings to the CAB-2 and LEGACY Command Base. These modules are clearly labeled on the end.

Memory Module Description Table

| Color | Type | Description | Used In |
|--------|------------------------|-------------------------------------|----------------|
| ORANGE | Factory Engine Module | Contains Engine Information | CAB-2 |
| TAN | Generic Engine Modules | Contains Generic Engine Information | CAB-2 |
| BLUE | Factory OS Modules | Full Software | BASE-2 / CAB-2 |
| BLACK | Writable User Module | Shipping blank | BASE-2 / CAB-2 |

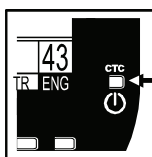


Railroad System Management (continued)

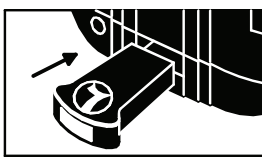
LIONEL LEGACY Control System Revision Memory Modules

The Lionel LEGACY system allows you to choose what version of software you would like to use. As Updates are released you may want to go back to the original software. If you are upgrading from LEGACY v1.1 or earlier, contact customer service. If you are upgrading from v1.2, the update will clear your engine roster and other LEGACY system information and you'll need to re-enter it. If you are upgrading to v1.5 from v1.3 or later, your engine roster & settings will remain intact. However, it is still suggested that you use the LEGACY Utility Software to backup your database prior to updating.

LIONEL LEGACY CAB Control System Update Module Procedure

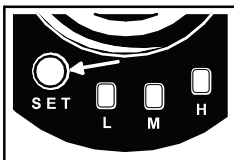


1. Turn Power off using the Central Train Control Button (CTC).

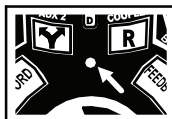


2. Remove the Module port cover from the top of the LEGACY CAB. Then insert the CAB Update Module into the Module port.

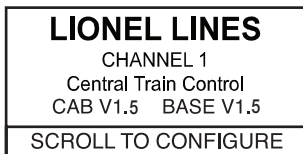
Note: Make sure that you use the Module that is labeled CAB.



3. Press and Hold the SET Button on the bottom of the LEGACY CAB.
4. While holding down the SET button, Press the CTC Button to turn the Power on to begin the update.



5. The Red indicator light will start to Flash rapidly,
6. Release the SET Button.

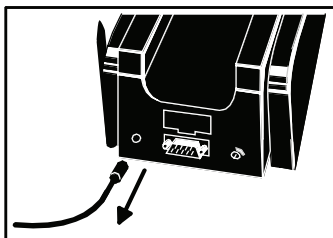


7. Once the Red indicator light stops, the CAB will self-start. Your CAB will now be updated. The update will be displayed in the Central Train Control scrolling screen. You will see CAB V 1.5 for the Remote and Base V 1.5 for the Base version.

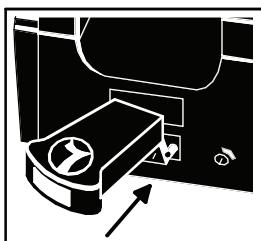


Railroad System Management (continued)

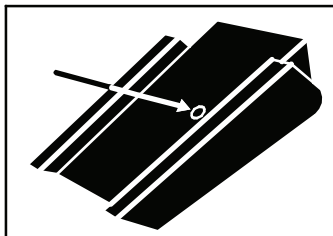
LIONEL LEGACY BASE Control System Update Module Procedure



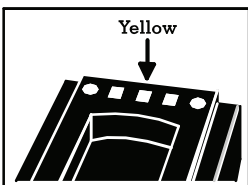
1. Remove the Power Jack from the LEGACY Base to Power the Base unit down.



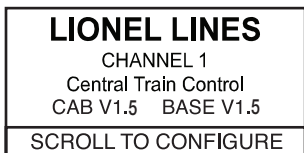
2. Open/remove the Module port cover that is above the Data connector and insert the BASE update Module.
Note: Be sure you are using the BASE update Module.



3. On the Bottom side of the BASE there is a Channel Select button. Press and hold the Channel Select Button while you plug in the Power jack back into the BASE.



4. The Yellow center LED will begin to Flash on the top end of the Base. The two other LED's will be on solid. The Lionel name on the both sides of the Base will also Flash while programming the update. Release the channel select button and wait until the Yellow and the side Lionel LED's stops Flashing.



5. The BASE will Restart on its own. At that time the Green LED will Flash once followed by the Yellow LED then finally the Red LED. Once the Base restarts, turn the LEGACY CAB on. Press the CTC button once again after the CAB fully powers up to get to the Central Train Control screen to verify that the new software has been installed. You will see CAB V1.5 and BASE V1.5 in the Central Train Control scrolling screen.

Note: The status light (yellow on Base, red on remote) will stop flashing quickly if the update is successful. If the light will not go off and blinks a number sequence slowly, it is indicating an error code. If you encounter this please refer to the following table to diagnose the cause.



Railroad System Management (continued)

Module Update Error Codes

| Lights Sequence | Error Description | Possible Cause |
|---|--------------------------------------|---|
| 2 BLINKS IN A ROW | Hardware error detected on data line | <ul style="list-style-type: none"> • Removed module during update • Module not inserted properly |
| 3 BLINKS IN A ROW | Incorrect Module Inserted | Incorrect module inserted |
| 4 BLINKS IN A ROW | Memory Module corrupted | Bad Module |
| 5 BLINKS IN A ROW | Module to advanced to read | Incorrect or unrecognized new module |
| 6 BLINKS IN A ROW | Verify fail after program | <ul style="list-style-type: none"> • Removed Module during update • Module not inserted properly • Possible hardware issue |
| 1 LONG, 1 SHORT BLINK 1 LONG, 2 SHORT BLINKS 1 LONG, 3 SHORT BLINKS | Internal setting error | Contact Customer Service Immediately (586) 949-4100 |

Note: that if you do a full reprogram it is suggested that you perform a 'clear database' command from the CTC menu once the LEGACY Control System update is complete. Any additional instructions or steps will be included in the Update Module you received.

NOTES



REMOTE TO BASE BINDING

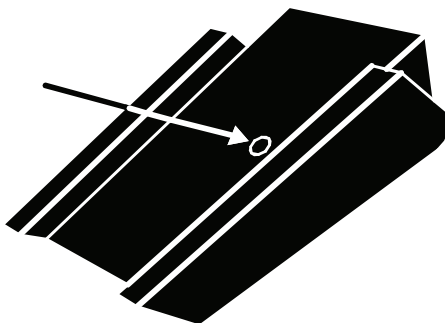
Introduction

When you are operating in a club environment or a display environment with two or more Railroads in operation in close proximity there will be communication problems if both Railroads are using the same channel on their respective Command Bases. You must change one of the Command Bases to a new channel and then match the CAB-2 remotes you wish to use to that channel.

To learn the channel of your Command Base:

Press the indented button on the back of your Command Base

1. Watch the Base yellow light blinking
2. Observe and note the number of repetitions
 - a. That number is the channel of your Command Base





Remote To Base Binding (continued)

To change the channel of your Command Base:

Press the indented button on the back of your Command Base again.

(Each time you press the indented button the Command Base channel will change)

1. **Watch the Base light blinking**
2. **Observe and note the number of repetitions**
 - a. **That number is the new channel of your Command Base**
 - b. **Repeat to change the channel of your Command Base again.**

All of your CAB-2 remotes must be set to the same channel as your Base to operate with it.

To match the channel of your CAB-2 and Command Base:

Press the CTC button

1. **Scroll to channel select**
2. **Using the Touch-Screen numbers,**
 - a. **Enter the channel of your Base**
 - b. **(That is the same number you located by watching the Command Base yellow light)**
3. **In all other Remotes controlling your Railroad**
 - a. **Press CTC**
 - b. **Scroll to Channel Select**
 - c. **Enter the same number using the Touch-Screen**

| | |
|-----------|-----------|
| CHANNEL 1 | 2404.0MHz |
| CHANNEL 2 | 2412.2MHz |
| CHANNEL 3 | 2420.4MHz |
| CHANNEL 4 | 2428.6MHz |
| CHANNEL 5 | 2436.8MHz |
| CHANNEL 6 | 2447.6MHz |
| CHANNEL 7 | 2458.4MHz |
| CHANNEL 8 | 2469.2MHz |
| CHANNEL 9 | 2480.0MHz |

NOTE: CAB-1L remotes must also be set to the same channel as your Base and CAB-2 remotes. Refer to the CAB-1L manual for information on channel selection.

The system operates on the same frequencies as many other common wireless devices. If you experience signal quality issues, or lack of range between CAB and Base, you may need to change channels to resolve the issue.

Base Communication

Two Bases cannot exist on the same channel. If two Bases in close proximity are set to the same channel, range and reliability will be compromised.

Radio Link Warning Light

If you are operating the CAB-2 out of range of the LEGACY Command Base/Charger, a red Radio Link Warning Light will flash on your remote.

If the Radio Link Warning Light triggers at close range, it is a good indication that the channel is poor. Then you should try to find the best channel for your environment. A clean channel can extend range greatly and insure reliability.

Interference from Cameras

Popular wireless cameras used in the railroad hobby use channel 1-4. Setting the Base channel at 5 or above will correct the problem.



CHARGING INDICATOR LIGHTS CHARTS

While Charging The Remote

| | |
|------------------------|---|
| Slow Alternating Red | Charger in preconditioning state Transition to fast charge when battery voltage reaches 3.0V |
| Fast alternating red | Charger in fast charging state Transition to top off when battery trend begins to decline |
| Slow alternating Green | Charger in top off state Transition to complete after 60 min in top off |
| Solid both Green | Charging cycle complete Transition Indicator lights go out after remote is removed |

ERROR Indications

| | |
|---|--|
| Solid both red when remote is first installed | Indicates battery temp over 30C Recovery is automatic after temp cool to below 30C |
| Solid both red while in charging cycle | Battery temp reaches 55C Recovery is automatic after temp cools to below 45C If this condition continues the batteries may be faulty |
| Both fast blink red while in charging mode | The battery voltage exceeds 5.5V Recovery is accomplished by removing the remote from charger Possible indication of the wrong battery type such as alkaline batteries |

Note: *If the re-chargable batteries are not charging properly, check the Charger Switch under the Base/Charger to be sure it is set to "ON."*

Battery Level Indicator

The Battery Level Indicator is at the upper left side of the CAB-2 Screen.



indicates Battery is charged



indicates Battery needs charging

Antenna Specifications

Factory antenna specs only, do not exceed these ratings.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3dB. Antennas not included in this list or having a gain greater than 3dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

BOBOTO TELECOM INSTRUMENT FACTORY, model no. TLB-2400-3A-RP SMA

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p. is not more than permitted for successful communication.



TABLE OF OPTIONS

Throughout this manual references to Options are made. In the INFO menu, Options can be selected. The following Table of Options shows the possibilities that are available to you in tuning the performance of your LIONEL products. From time to time, more Options may be added to particular product types.

Remember to visit www.lionel.com regularly for up-to-date advances.

This manual will be updated regularly to include options added for new products. A good example of options coming in the future would be "RailSounds tuning." Manuals that come with future controllers will be updated to reflect these advances, both in the text, and the Options tables. Occasionally, future Components and System Revision Memory Modules will include a new updated manual that is current with the LIONEL LEGACY Control System.

NOTE: Navigating the INFO and OPTION menus can be done with either the Scroll button or the Velocity Throttle.

CUSTOM

| | |
|------|--------------|
| NAME | Assign Name |
| LOAD | Load MM |
| AUX | Aux Settings |
| CLR | Clear Name |

RAIL-SOUNDS TYPE

| | |
|-----|--------------------|
| NO | No Sounds |
| RS | Rail Sounds 2-4 |
| RS5 | Rail Sounds 5 |
| LRS | LEGACY Rail-Sounds |

Look in documentation or box label for Rail-Sounds version

TYPE

| | |
|------|-----------------------|
| DSL | Diesel |
| STM | Steam |
| DSW | Diesel Switcher |
| SSW | Steam Switcher |
| ELC | Electric |
| SUB | Subway |
| LPD | LEGACY Pullmor Diesel |
| LPS | LEGACY Pullmor Steam |
| ACC | Accessory |
| PAS | Passenger |
| BDU | Break Down Unit |
| FRT | Freight |
| ACLA | Acela |
| CRN | Crane/Boom |

CAB 1 MODE

+or - Relative commands
Lionel Power Masters
Lionel TPC's
Engine or Track settings
Electric RR or EOB speed control

TMCC MODE

32 absolute speed commands
Lionel Locomotives & Accessories
Electric RR or EOB speed control

REL 100 MODE

100 Relative speed commands
Electric RR or EOB speed control
Lionel OEM's (with Electric RR cruise)

LEGACY MODE

200 absolute speeds
Lionel LEGACY engines
Lionel LEGACY accessories

TRAIN INFO OPTIONS

| | |
|-------|--|
| NAME | Name addresses Train |
| BUILD | Build > Reconfigure order of the addressed train |
| CLR | Clear the addressed train (road number, Engines in train, name of train, etc.) |

**Table Of Options (continued)****ACCESSORY INFO OPTIONS**

| |
|-----------------------------|
| Goes Right to Naming Screen |
| Set Road Number Screen |

SWITCH INFO OPTIONS

| |
|-----------------------------|
| Goes Right to Naming Screen |
| Set Road Number Screen |

CTC MENU OPTIONS

| | |
|--|------------------|
| V.T.D.C. - Velocity Throttle Direction Control | On/Off |
| V.T.A.B. - Velocity Throttle Auto Brake | On/Off |
| Hold - Hold Braked Speed | On/Off |
| Channel Select | Press Keypad 1-9 |
| Name Railroad | Use Naming |
| BEEP - Keypad Beep | On/Off |
| Display Contrast | Press Keypad 1-9 |
| Keypad Contrast | Press Keypad 1-9 |
| Backlight Timer | Press Keypad 1-6 |
| Sleep Timer | Press Keypad 1-3 |
| 2 Digit Route ID# | Press Keypad 1-9 |
| Route Throw Rate | Press Keypad 1-9 |
| Clear Database - Clears All Settings | Select CLEAR |

ROUTE INFO OPTIONS

| | |
|------------------------|-------------|
| Set Road Number Screen | |
| NAME | Assign Name |
| BLD | Build Route |
| CLR | Clear Route |



TOUCH-SCREEN ICONS REFERENCE



Start Up



Shut Down



Emerg. Halt



Speed Limit



Cab Light Toggle



Volume Up



Volume Down



Crew Talk



Tower Com



Rail-Sounds Shutdown



Water Injector



Blow Down



Smoke Down



Smoke Up



RPM Up



RPM Down



Pantograph Auto



Pantograph Off



Ground Light On



Ground Light Off



Hazard Light On



Hazard Light Off



Strobe On



Strobe Off



Mars On



Mars Off



Aux Horn



Reset



Restricted



Slow



Medium



Limited



Normal



High-Ball



Roll



Labor Graph



Arrow Up



Arrow Down



Master Minus



Master Plus



Port Door Open



Starboard Door Open



Port Door Closed



Starboard Door Closed



Zero



One



Two



Three



Four



Five



Six



Seven



Eight



Nine



Flat Wheel



Load



Unload



Tower Comm



Enable Rail Clatter



Enable Curve Grinding



Disable Rail Clatter



Disable Curve Grinding



Crew Dialog Off



Out Riggers



Front Beam



Rear Beam



Big Hook



Small Hook



Boom Up Down



Announce ON



Light On



Light Off



Next



Previous



Set Train LINK



Un-mute



Mute



Buzzer



Rule 17 On



Rule 17 Off



Ditch On



Ditch Off



Doghouse ON



Doghouse Off



Diner Utensil



Dialog Off



Labor Bias Up



Labor Bias Down



Activate Route



CAB Light Off



HORN On



Brake Sounds Only



Tender Marker On



Tender Marker Off



Engine Marker On



Engine Marker Off



Reset 1



Reset 2



Reset 3



Break-time



Fail



Pass





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LIONEL LEGACY CONTROL SYSTEM

LIONEL LEGACY CONTROL SYSTEM



LIONEL LEGACY  **CONTROL SYSTEM**