

**LIONEL
LEGACY**

Dec 12 06 ny changes to reflect new order and doc changes

Dec 16 06 ny changes to reflect new order and doc changes

WELCOME

STARTING OUT

ENGINE ID #

Universal address

MEMORY MODULE DOWNLOAD TO THE LEGACY CONTROL SYSTEM

TMCCengine and retrofit engines

Custom Read/Write Memory Modules

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Entering engine options

GIVING YOUR ENGINE A NAME

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**Arrival and departure sequence
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Sequence options**

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WORK AREA...HARD HAT REQUIRED

WELCOME

Dec 6 06 ny changes to text

Dec 13 06 ny changes to text

Welcome to the world of Lionel Legacy Command Control. Congratulations on your purchase of this new operating system. It is the system others will be judged by in the years to come.

The Lionel Legacy Control System controls every product made over the history of LIONEL, 107 years at this date, 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 pre-war 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 hallmark of this new Lionel system is simplicity. Yet under the surface is a state of the art operating system with pioneering advances that

have never been seen, felt, or heard before. This system makes and supports Lionel history.

One interface, the throttle, has been re-invented to provide an operating experience that is unparalleled in model trains to this date. Just imagine controlling all the train effects from your throttle while watching your train and rarely having to look at the controller to find a button or read a display!

The Lionel Legacy Control System is here! Congratulations! You are onboard and right on time!

STARTING OUT

Dec 6 06 ny changes

Dec 12 06 ny added 3 prong socket reminder.

Dec 13 06 ny added factory ID # 1 ...

Here's how to start.

Take your system out of the box, become familiar with the contents and set it up following these instructions:

Insert diagram 1(command base connection and lights description) here

First, plug in the Command Base power cord to a three prong socket and connect your command base to the track with the single wire included. 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.

Before you operate your new Lionel Legacy Control System equipped engine, give your engine an ID # and set it up correctly by adding it to your system's roster of engines. Follow the directions that came with your locomotive or read on in this manual.

Note that your new Lionel Legacy Control System equipped engine comes with a factory ID # 1 and will respond to that address immediately.

ENGINE ID #

Now, it's time for the engine. You can start by giving your new engine a ID#.

Insert diagram 1.5 address assignment (program run switch) here

To give your new Engine an ID#:

- 1 Slide the program/run switch to "Program".
- 2 Power down your track.
- 3 Put the engine on the track.
- 4 Power up your track.
- 5 Make sure no other CABs are in use
- 6 Press EN
- 7 Enter a unique engine ID # 1 to 98 with Cab 2

Insert diagram 1.1 (assign ID#) here

- 8 Press SET

Insert diagram 1.2 (set button) here

- 9 The horn should blow, the headlight pulse, or both.
- 10 Take the engine off the track (optional) and
- 11 Slide the program/run switch back to "Run" right away.
- 12 Power down your track.
- 13 Put the engine on the track again.
- 14 Power up your track.
- 15 You are ready to operate.

UNIVERSAL ADDRESS ID # 99

If you would like to run all the trains on your layout at once with one address, just address ID # 99 to start up all your engines at once. Every engine will respond to ID # 99. It is not necessary to program the engine to ID # 99.

All engines are factory programmed to respond to ID #1 or ID # 99 at the factory. You can change the ID # 1 but not the ID # 99.

MEMORY MODULE DOWNLOAD TO THE LEGACY CONTROL SYSTEM

- *dec 4 06 ny (saving to custom read/write memory modules added)*
 - *dec5 06 ny changes reflecting UPLOAD and changed uploading directions to use "save INFO" prompt*
- dec 12 06 ny changes to New Lionel Legacy Control System equipped Engines*

-

Now it is time to insert the memory module and load the system with all of your new engine's information. This is a necessary step that you only do once.

New Lionel Legacy Control System equipped Engines

Each Legacy engine is packaged at the factory with a unique memory module. Make sure you locate, use and save the memory module. It will enter all the unique information about your engine when you plug it into the CAB 2.

Now you are ready to insert your engine's unique memory module into CAB 2. It will be downloaded into the system and associated with the TMCC ID # you have entered. All other remotes will have the information too.

TMCC Engines and Retrofit Engines Custom Read/Write Memory Modules

Older TMCC engines have their Engine options entered manually. Here's how to save that info so you can take it with you to a new Legacy layout.

Once the info has been entered manually (see page XXX, Engine options), address the engine, and insert a Read/Write memory module into Cab 2. Follow the prompts to upload. Now you have saved the engine INFO into the Memory Module.

TMCC engines do require a Read/Write memory module if you want to take them to a new layout and would like to have the name and engine options available to download into the new layout's Legacy system base.

When you arrive at the new layout, pick up a CAB 2 and address your older TMCC locomotive. Then insert the memory module into the Cab 2. You have added all the INFO for that locomotive into the new layout's Legacy System.

Read/Write modules come with retrofit kits or are purchased separately.

Insert Diagram 3.7 (Insert Memory Module) here.

How to upload Engine Options to Memory modules

With your TMCC engine addressed, and Engine options manually entered,

- 1 Address TMCC engine
- 2 Press INFO
- 3 Insert memory module into remote
- 4 Select "SAVE INFO"

When the information is uploaded (a few seconds, watch the Display screen) you can remove the memory module from the CAB 2 and place it in the optional TMCC 2 Legacy Roll-Top Memory Garage or another safe place.

Diagram 3.8 of memory module inserting into CAB 2 here

To view the saved information about your engine at any time, just press INFO.

Diagram 3 of display with engine name, road-number and TMCC ID# here

Memory Garage

Store your Memory Modules in the Memory Garage

Insert Diagram 3.5 (Memory Garage), here.

The optional Memory Garage is a modular piece of the master control panel.

INFO

Dec 4 06 ny changes

INFO is the where you find all of your train, engine, track, or accessory options. These options are either downloaded from a memory module that came with your LIONEL LEGACY product or entered manually for TMCC products.

TO ACCESS INFO:

Address train, engine, track or accessory

Press INFO.

Scroll through Options for the train, engine, track or accessory

Insert diagram 8 of INFO menu Options page here

After scrolling through, select from each of the categories in the Options menu. Choose the description that matches your train, track, engine or accessory. Move to the next category and choose again. Repeat until each of the categories has a choice made to match your train, track or accessory. This procedure only needs to be done once.

Now you have completed entering your TMCC 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.

ENTERING ENGINE OPTIONS

Here's how to do it step by step:

First, make sure you have addressed your engine by its ID#

To enter INFO:

Insert diagram 9 of a selection from engine options (control types) here

Pressing INFO will

- 1 Open the info display window
- 2 Scroll through the categories with the Rotary and get familiar with them. Find "Engine Options"

Insert diagram 9 of a selection from engine options (control types) here

- 3 Enter the correct info in "Engine Options" by
 - a. Locating the correct *ENGINE OPTION* in the center box
 - b. Select it by pressing the soft-key under it
 - c. Select one of the choices in the category
 - d. Move on to the next category
 - e. Check all the *ENGINE OPTION* categories and make sure the choices are correct.
 - f. If a TMCC1 engine is retrofitted to LEGACY, Choose LEGACY under Control types.
 - g. If a TMCC 1 engine is not retrofitted, choose TMCC 1 under Control types.
 - h. If an engine is a Diesel, select Diesel under Engine types.
 - i. If a sound system is RS 5, select RS5 under Sound types
 - j. If an engine is an Odyssey, select Odyssey under Speed Control.
 - k. Make sure you get every Engine Option right. It will perfect the Legacy system operation of your Velocity Throttle, Control Panel, Speed Graph and Rail-sounds.

GIVING YOUR ENGINE A NAME

NAMING PROCEDURE

Dec 4 06 ny created

Dec 5 06 ny changes to use “numerics” for entering number

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

Address an EN, TR, ACC, or SW
For Route, just press RTE

Press INFO

Insert display screen diagram “OPTIONS” here

If requested, Enter ID #

Scroll through Options to NAME
1 select name

Insert display screen diagram “Enter Name” here

You will see the Alpha-Numeric character choices.

- 1 Scroll to the first character.
- 2 Add the character by scrolling to it and pressing ADD
- 3 Add more characters
- 4 If using multi-words, insert a SPACE between them.
- 5 Delete what you want to change
- 6 Scroll to mistakes, delete them and replace them.
- 7 There is a limit of XX characters. Use abbreviations where needed.
- 8 When you are finished naming, Press set
- 9 Make sure Display prompt says SAVED.

Insert display screen diagram “Enter Road number or Lionel number” here

Follow the prompt to enter a Road number or Lionel number up to 4 digits bt using the numerics on the touch screen.
Press set to save.

CTC

Dec 4 06 ny changes

Use CTC button to toggle between

- 1 Real Time Operation Display screen
- 2 Base and CAB options

Insert diagram 12 CTC toggle (two windows) here

Scroll clockwise for Base OPTIONS and counter-clockwise for CAB2 Remote options.

CAB2 Modes of Operation

There are two modes of operating your CAB 2
They are found in the CAB2 remote options menu

Cab 1 Mode

Cab 1 mode is just like operating a CAB 1
The display will show everything a CAB1 can do.

Cab 2 Mode (default)

CAB 2 Mode provides all of the new TMCC2 Legacy features.

Insert diagram 15 mode select here

ACCESSING CAB MODES

Press CTC

- 1 Scroll to counter-clockwise to CAB2 Remote options.
- 2 Choose CAB 1 or CAB 2.

SELECT

Dec 5 06 ny changes to select here

Dec 12 06 ny punctuation changes

Insert diagram 13 select Road number or Lionel number (box with 4 digit number) here

- 1 Press “SELECT” to address a unit by its number.
- 2 A display window appears for you to enter the number.
- 3 Enter the number in the display window.
- 4 Press the EN, ACC, TR or SW soft-key.

You are now ready to run your selected unit.

SCROLL (Rotary throttle)

Dec 5 06..... ny changes

*Dec 12 06 ny changes to *route*

Insert diagram 14 scroll (2 windows show names of 2 engines) here

Press EN, TR, ACC, *RTE, or SW.

Press Scroll

- 1 Scroll through the name selections
- 2 Locate the name
- 3 Press EN, TR, ACC, *RTE, or SW
- 4 EN, TR, ACC, or SW_is now addressed
- 5 *RTE is thrown.

*Routes throw as soon as they are addressed.

TRADITIONAL OPERATING with Cab 2

Dec 12 06 ny changes to content

Introduction

Insert diagram 15.5 CAB 2

Lionel Legacy addressing and controls for Traditional command control operation are described in this section. This is the way your new CAB 2 and LIONEL Legacy products will operate the first time you try them. There are a lot of new features available immediately with CAB 2.

When you learn to use the Options menu in the Cab 2, you will discover that there are many optional “advanced” methods of using the Direct Controls. But for now the Direct Controls are default set up for basic operation. You can access the advanced optional features in ENGINE OPTIONS of the INFO menu

Take the time to read the following descriptions of how the CAB 2 controls work. It will be helpful. Although the signal on the track is similar to Train-Master Command Control, the amount of commands has been increased by many thousands, allowing for much more control of your Lionel Railroad.

ADDRESSING WITH LEGACY CONTROL

Dec 5 06 ny added "Addressing" to titles

Dec 6 06 ny added "ACCESSING (type) OPTIONS"

Dec 6 06 ny added "ADDRESSING (type) METHODS" to titles

Dec 14 06 ny..... clarification of terms

Dec 18 06 ny..... re-ordering of instructions and new line, " first....." added throughout

Address Keys

Address keys are used whenever you address. This section explains different methods to address switches, accessories, routes, trains and engines. In addition, options you can select to enable these different methods are outlined.

Insert diagram 60 address keys 1 here

SWITCH

First, you must enter all the options in the Switch Options section of the INFO menu.

SWITCH OPTIONS

To access Switch Options

- 1 Press switch
- 2 Enter SW ID#
- 3 Press INFO

View the switch options screen

Insert diagram " Switch options" here

There is one just one option, name.

SWITCH ADDRESSING METHODS

After all of the SWITCH OPTIONS have been entered, try these SWITCH ADDRESSING METHODS to address your Switch. 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 ID#

Diagram 4 of traditional addressing here

- 1 Press SW
- 2 Enter the one or two digit SW #
- 3 Press the THROUGH or OUT key
- 4 The switch will throw
- 5 enter a new ID #**
- 6 throw the switch**
- 7 repeat

Name

Insert Diagram 6 of name addressing here (name in box)

- 1 Press SW
- 2 Press SCROLL
- 3 Use the rotary to scroll to the desired name
- 4 Press SW
- 5 press “through” or “out”

Toggle

Insert Diagram 7 of toggle addressing here (2 diagrams with button press and different addresses)

- 1 Press SW
- 2 Press SW again to toggle between your last two switch addresses
- 3 enter another ID #**
- 4 throw the switch**
- 5 repeat

ACCESSORY

Dec 14 06 ny..... clarification of terms

First, you must enter all the options in the Accessory Options section of the INFO menu.

ACCESSORY OPTIONS

Dec 4 06 ny..... created

Dec 5 06 ny..... added TMCC to control types

Dec 14 06 ny..... clarification of terms

To access Accessory Options

- 1 Press Accessory
- 2 Enter Accessory ID#
- 3 Press INFO

View the Accessory Options screen

Insert diagram "Accessory Options" here

Choose from Control type, Speed Control, ACC type, Name

Control type

Press Control Type

- 1 Legacy
- 2 TMCC

Insert diagram "Accessory Control Type" here

Speed Control

Press Speed Control (choose one)

- 1 Speed control
- 2 Relative

Insert diagram "Acc Speed Control" here

Accessory type

Press ACC Type

- 1 Light (toggle)
- 2 Motor driven accessory (toggle)
- 3 Momentary

Insert diagram "ACC Type" here

Name

Press Name

- 1 Access naming screen

Insert diagram "NAME Accessory" here

ACCESSORY ADDRESSING METHODS

After all of the Accessory info has been entered, try these ACCESSORY ADDRESSING METHODS to address your Accessory. 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# (see page XX)

Diagram 4 of traditional addressing here

- 1 Press Accessory
- 2 Enter the Accessory's ID#

Lionel Number

Insert Diagram 5 of Lionel Number addressing here (4 digit Lionel number in box)

Need diagram of old accessory and number plate

- 1 Press SELECT
- 2 Enter the Lionel number found on your accessory
- 3 Press Accessory

Name

Insert Diagram 6 of name addressing here (name in box)

- 1 Press Accessory
- 2 Press SCROLL
- 3 Use the rotary to scroll to the desired name
- 4 Press Accessory

Toggle

Insert Diagram 7 of toggle addressing here (2 diagrams with button press and different addresses)

- 1 Press Accessory
- 2 Press Accessory again to toggle between your last two Accessory addresses

- 3 Now pressing any key will activate that Accessory Control
- 4 Panel in the touch-screen and activate the NAME and other info in the Display.

ROUTE

First, you must enter all the options in the Route Options section of the INFO menu.

ROUTE OPTIONS

Dec 4 ny..... created

To access Route Options

- 1 Press Route
- 2 Press INFO
- 3 Enter RTE ID #

View the Route Options screen

Insert diagram "Route Options" here

Choose from view, edit, clear, name, SPD

Press View

- 3 View shows all the switches and Routes in a Route.

Insert diagram "View Route" here

Press Edit

- 3 Edit takes you to the ROUTE BUILD Screen.
- 4 (see ROUTE BUILD)

Insert diagram "Route Build" here

Press Clear

- 4 Edit takes you to empty ROUTE BUILD Screen.

Insert diagram "Route Build" here

Press Name

- 1 access naming screen

Insert diagram "NAME Route" here

Press SPD

- 1 Adjust time between switch throws

Insert diagram "Throw Rate" here

ROUTE ADDRESSING METHODS

After all of the ROUTE info has been entered, try these ROUTE ADDRESSING METHODS to address your ROUTE. If your ROUTE's info has not been entered in ROUTE OPTIONS of the INFO menu, only the Traditional and Toggle methods outlined in this ROUTE ADDRESSING METHODS section will apply.

There are two ways to address and throw Routes

Traditional ID#

Diagram 4 of traditional addressing here

- 1 Press Route
- 2 Enter a one or *two digit number
- 3 The route will throw

Name

Insert Diagram 6 of name addressing here (name in box)

- 1 Press Route
- 2 Press SCROLL
- 3 Use the rotary to scroll to the desired name
- 4 Press Route

QUICK ROUTE ADDRESS

*Customize your ROUTE addresses to suit your own layout and keep fast single-digit operation of your main routes.

Press CTC

- 1 Scroll to Base Options
- 2 Scroll to and choose Quick address
- 3 Select from Train or Route
- 4 Choose Route

Insert diagram 61.5 route address choices here

If you wish to have more ROUTE addresses, there is an easy method to add them. This feature is useful if you have used all your addresses and you have a yard but no addresses to access it with ROUTES. You can select any number 1-9 and make any ROUTE address that starts with that number be a two-digit address. If you want, you can make the 9 tracks of your yard be all double-digit addresses, starting with 9. That would be 90, 91 92, etc to 99. This can be done with any number you choose, or all numbers if you wish.

The advantage of single digit ROUTE addresses is speed and simplicity. For that reason, you may want to retain some single digit ROUTE addresses for your main Routes.

TRAIN

First, you must enter all the options in the Train Options section of the INFO menu.

TRAIN OPTIONS

Dec 4 06 ny created doc

To access Train Options

- 1 Press TR
- 2 Enter TR #
- 3 Press INFO

Insert diagram "Train Options" here

Choose from View, Build, Clear, Name, Type

Press View

- 1 View shows all the engines in a train.

Insert diagram "View Train" here

Press Build

- 1 Build takes you to the LASHUP BUILD Screen.
- 2 (see LASHUP BUILD)

Insert diagram "Lash up Build" here

Press Clear

- 1 Clear all engines from this Lash up

Insert diagram "CLEAR lash up" here

Press Name

- 1 access naming screen

Insert diagram "NAME Train" here

Press Type

- 1 access Type screen

TRAIN ADDRESSING METHODS

After all of the TRAIN info has been entered, try these TRAIN ADDRESSING METHODS to address your Train. 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# (see page XX)

Diagram 4 of traditional addressing here

- 1 Press train
- 2 *Enter the train's 1 or 2 digit ID#

Road Number

Insert Diagram 5 of road-number addressing here (4 digit road-number in box)

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

Name

Insert Diagram 6 of name addressing here (name in box)

- 1 Press Train
- 2 Press SCROLL
- 3 Use the rotary to scroll to the desired name
- 4 Press Train

Toggle

Insert Diagram 7 of toggle addressing here (2 diagrams with button press and different addresses)

- 1 Press Train
- 2 Press Train again to toggle between your last two Train addresses

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. Visit *TRAIN OPTIONS* in the INFO menu to add all the info unique to this train.

QUICK TRAIN ADDRESS

*Customize your TRAIN addresses to suit your own layout and keep quick single-digit operation of your main routes.

Press CTC

- 1 Scroll to Base Options
- 2 Scroll to and choose Quick address
- 3 Select from Train or Route
- 4 Choose Train

Insert diagram 62 Train Quick address here

If you wish to have more TRAIN addresses, there is an easy method to add them. You can select any number 1-9 and make any TRAIN address that starts with that number be a two-digit address. That would be 90, 91 92, etc to 99 if you select 9 to be two digit addresses. This can be done with any number you choose, or all numbers if you wish.

The advantage of single digit TRAIN addresses is speed and simplicity. For that reason, you may want to retain some single digit TRAIN addresses for your favorite trains.

ENGINE

First, you must enter all the options in the Engine Options section of the INFO menu.

ENGINE OPTIONS

Engine options is by far the largest category of options. It is important to enter the correct options for each engine. Here's how to do it step by step:

First, make sure you have addressed your engine by its ID#

Press Engine

- 1 Enter Engine ID#

Press INFO:

Insert diagram 9 “engine options” here

Pressing INFO

- 4 Opens the info display window
- 5 Scroll through the categories with the Rotary and get familiar with them. Explore “Engine Options”

Insert diagram 9 of a selection from engine options (control types) here

- 6 Enter the correct info in “Engine Options” by
 - a. Locating the correct *ENGINE OPTION* in the center box
 - b. Select it by pressing the soft-key under it
 - c. Select one of the choices in the category
 - d. Move on to the next category
 - e. Check all the *ENGINE OPTION* categories and make sure the choices are correct.
 - f. If a TMCC1 engine is retrofitted to LEGACY, Choose LEGACY under Control types.
 - g. If a TMCC 1 engine is not retrofitted, choose TMCC 1 under Control types.
 - h. If an engine is a Diesel, select Diesel under Engine types.
 - i. If a sound system is RS 5, select RS5 under Sound types
 - j. If an engine is an Odyssey, select Odyssey under Speed Control.

- k. Make sure you get every Engine Option right. It will perfect the Legacy system operation of your Velocity Throttle, Control Panel, Speed Graph and Rail-sounds.

ENGINE ADDRESSING METHODS

After all of the engine INFO has been entered, try these ENGINE ADDRESSING METHODS to address your engine. 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 will apply.

There are four ways to address engines

Traditional ID#

Diagram 4 of traditional addressing here

- 1 Press engine
- 2 Enter the engine's 2 digit ID#

Road Number

Insert Diagram 5 of road-number addressing here (4 digit road-number in box)

- 1 Press SELECT
- 2 Enter the Road number painted on the side of your engine
- 3 Press Engine

Name

Insert Diagram 6 of name addressing here (name in box)

- 1 Press Engine
- 2 Press SCROLL
- 3 Use the rotary to scroll to the desired name
- 4 Press Engine

Toggle

Insert Diagram 7 of toggle addressing here (2 diagrams with button press and different addresses)

- 1 Press Engine

- 2 Press Engine again to toggle between your last two engine addresses

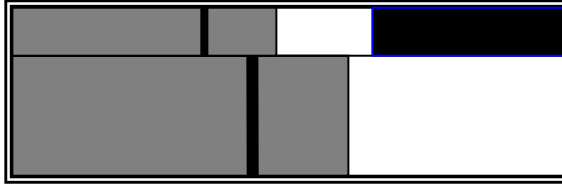
Now pressing any key will activate that engine's Control Panel in the touch-screen and activate the Name and speed graph in the display window. If that engine is underway, the correct speed will appear in the speed graph.

SPEED GRAPH

Dec 5 06 Ny changed text

Dec 12 06 ny removed text *The Speed Graph reveals the control power of the Velocity Throttle.* Changed momentum description in speed graph overview

Insert diagram 17 speed graph (target line, grey-bar, and train brake bar) here



Speed Graph Target Line

The **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.

Speed Graph 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.

Train Brake Window and Bar

Needs rewrite for new graph

This graph indicates how much the overall speed capability has been trimmed by adding the Train Brake load. To the left you see a reduced speed graph, illustrating the new trimmed capability. To the right, the black bar represents the amount of drag the Train Brake has applied to the throttle.

Speed Graph Overview

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.

DIRECT CONTROL SECTION

Dec 5 06 ny changes....removed “ing” and “will” for simplicity in many areas

*Dec 2 06 ny mod to direction and train brake

You can use this set of controls in conjunction with VTSC (see page xxx), or disable VTSC and just use this set of controls.

Direction

*dec 2 06 ny Simplified introduction restricts to Legacy engines only

Direction Control in Legacy engines with Speed Control.

*dec 2 06 ny New changes default to standard direction

Standard Direction Control is the default.

Insert diagram 44 legacy dir control here

Standard Direction Control in Speed Controlled Engines (DEFAULT)

(Odyssey motor control, Legacy motor control)

Press Direction once, underway,

- 1 target line goes to speed step 0
- 2 train stops
- 3 Direction is reversed
- 4 directional lighting is reversed

Legacy Direction Control (optional) in Speed Controlled Engines

(Odyssey motor control, Legacy motor control)

Optional Legacy Direction Control can be enabled in the “DIRECT CONTROL” section of “ENGINE OPTIONS” in the INFO menu.

Legacy Direction Control makes it possible to use the direction control to slow down an engine, and brake to a ROLL condition (speed step one) just by pressing Direction one time. If you want to stop the engine quickly, press Direction twice. At that point your engine will quickly be stopped with brake-sounds and still be in forward. Pressing Direction while the engine is stopped will reverse engine direction.

Press direction once, underway,

- 1 target line goes to speed step 1 ROLL
- 2 Initiates auto-brake

When grey –bar reaches speed step 1 ROLL

- 1 Brake sounds stop, throttle holds at speed step 1,
- 2 Enables one let-off sound,
- 3 Starts continuous warning bell sound. (Legacy engines only)
- 4 Display says ROLL

Press direction a second time, underway,

- 1 Brakes engine to a quick stop with brake sounds
- 2 Enables a let-off sound upon stopping.
- 3 Stays in forward

Press direction a second time, during ROLL condition,

- 1 Stop engine
- 2 Trigger let-off sounds
- 3 Stop continuous warning bell sounds. (Legacy engines only)
- 4

Dec 5 06 ny...removed pressing direction twice underway per John R as redundant

Press direction once while stopped

- 1 Reverse with let-off sounds.

Optional Legacy Direction Control in Non Speed-Controlled Legacy retrofitted Engines

***dec 2 06 ny added stall description to replace ROLL in non speed controlled engines**

Note: Since non-speed controlled engines do not regulate exact speeds, it is unreliable to expect a consistent ROLL condition at speed step one. This type of engines requires that you set a STALL setting to replace ROLL.

STALL condition should be set just as your engine is about to stop moving. Even with this setting, your engine behaviour may not be exact. This is a limitation of any non-speed control engine. Experiment with the STALL setting to learn about each engine's behaviour and adjust it accordingly.

To set STALL

- 1 Press SET (headlight will flash)
- 2 Get your engine moving at it's lowest consistent speed.
- 3 Press SET (headlight will stop flashing, engine will stop)
- 4 Your engines STALL setting has been set

Press direction once, underway

- 1 Brakes engine with brake sounds to a STALL condition.
Ask bruce about brake response to stall setting and motor stop?
- 2 at stall, the brake sound stops,
- 3 a let-off sounds
- 4 and a continuous bell warning sound starts. (Legacy engines only)
- 5 CAB2 Display says STALL.

Press direction a second time, underway.

- 1 Stop the engine quickly with brake sounds (speed step 0)
- 2 Enable a let-off sound.

Press direction at STALL condition.

- 1 Stop (speed step 0) the engine with a let-off sound and
- 2 Stop continuous warning bell sound. (Legacy engines only)

Press direction twice underway

- 1 Brake the engine quickly to a stop (speed step 0) with brake sounds
- 2 At stop condition, end the brake sounds and
- 3 Enable a let-off sound.

Press direction once while stopped

- 1 Reverse engine direction
- 2 Trigger a let-off sound and
- 3 Trigger backup lighting.

Train Brake

Dec 2 06 ny changed to one big graph

reviewing rpm levels to compress with train-brake?????

Insert diagram 45 Train Brake here

Legacy Train Brake Control

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. As the Legacy Train Brake is applied there are three ways the effect is modeled.

- 1 More laboring**
- 2 Less speed potential**
- 3 Adjusted momentum rates for acceleration and deceleration.**

The Train Brake slider can be pulled down varying amounts, and used with the Velocity Throttle

Insert diagram 46 train brake levels(speed graph with train brake) here

- 1 To introduce loading effects
- 2 To limit the top speed of a train.
- 3 To increase the amount of loading used to move the train from a stopped condition.
- 4 To introduce more RPM levels at lower speeds as a diesel powered train begins to move. (Compress ticks)

Dec 4 06 ny changes ,,,removed “moving” Train Brake value in #5

- 5 To generate a Train Brake value in the Speed Graph display
- 6 To control “Train Brake equipped” rolling stock
- 7 To stimulate appropriate sounds from “Train Brake equipped” rolling stock.
- 8 To change the engine’s default laboring level.

Bell

Legacy Bell Control Introduction

Ring a warning bell continuously or one ring at a time, just like real steam engineers did back in the day.

Insert diagram 46 continuous bell control here

The bell control can be pushed up and held for two(2) seconds to

- 1 Start a continuous “bell” warning sound
- 2 Stop a continuous “bell “ warning sound

Insert diagram 47 single bell control here

The bell control can be pushed up and quickly released to

- 1 Play a single bell sound

Whistle / Horn

Legacy Whistle and Horn Control Introduction

By pulling down the control 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 and early Diesels. Note: Whistle and Horn sounds are different in most engines.

Insert diagram 48 whistle control 1 here

Pulling down the Whistle/Horn control 1/3rd of the way
1 Triggers a soft warning sound

Insert diagram 49 whistle control 2 here

Pulling down the Whistle/Horn control 2/3rds of the way
1 Triggers a medium warning sound

Insert diagram 50 whistle control 3 here

Pulling down the Whistle/Horn control all the way
1 Triggers a loud warning sound

Insert diagram 51 whistle control 4 here

Releasing the Whistle/Horn control
1 Ends the warning sound

Boost

Legacy Boost Control introduction

Boost control has always supplied more power when it is needed. Legacy adds to that, letting you “hold” the power at any level, before you release and return to the original level set in the throttle.

Insert diagram 52 boost control 4 here

Pushing the Control up all the way and holding at level 4 will

- 1 Increase engine speed continuously (set rate?)
- 2 Introduce and hold heavy laboring sounds

Insert diagram 53 boost control 3 here

Pushing the Control up and holding at level 3 will

- 3 Increase engine speed continuously (set rate?)
- 4 Introduce and hold medium laboring sounds

Insert diagram 53.5 boost control 2 here

Backing off the control will

- 1 Let laboring sounds taper off to <current “boosted speed” grey-bar vs. target line>
- 2 Maintain current “boosted” speed

Insert diagram 54 boost control 1 here

Releasing the Control will

- 1 Let laboring sounds taper off to original “pre-boost” level <grey-bar vs. target line>
- 2 Return speed to original pre-boost value
- 3 Let-off sound at pre-boost value

Independent Engine Brake

Legacy Engine Brake Control introduction

Engine Brakes have been in use in TMCC since the beginning. Legacy Brake Control takes it a step further with braking that you can hold, and adjust, and release anytime to go back to the throttle's original target speed setting.

Insert diagram 55 brake control level 4(full) here

Pulling the Control all the way down to level four (full) and holding will

- 1 Decrease engine speed continuously and quickly
- 2 Introduce and hold low laboring engine sounds
- 3 Introduce and hold heavy braking sounds
- 4 Trigger level 4 feedback

Insert diagram 55.5 brake control 3 here

Pulling the Control to level three (75%) and holding will

- 1 Decrease engine speed continuously at a slower rate
- 2 Introduce and hold low laboring engine sounds
- 3 Introduce and hold medium braking sounds
- 4 Trigger level 3 feedback

Insert diagram 56 brake control 2 here

Pulling or relaxing the Control to level two (50%) and holding will

- 1 decrease engine speed continuously at slowest rate
- 2 introduce and hold low laboring engine sounds
- 3 introduce and hold low braking sounds
- 4 trigger no feedback

Insert diagram 56 brake control 1 here

Pulling or relaxing the Control to level one (hold) will

- 1 Let engine laboring sounds level off to <current "braked speed" grey-bar vs. target line>
- 2 Hold and Maintain current "braked" speed
- 3 Decrease brake sound to light laboring and hold
- 4 No Feedback

Insert diagram 57 brake control 4 here

Releasing the Control will

- 1 Let laboring sounds return to original "pre-brake" level <grey-bar vs. target line>
- 2 Return speed to original pre-brake value
- 3 End Braking sounds

4 Let-off sound

Uncouple

Insert diagram 58 uncouple control 1 here

Pressing the "F" front uncouple button will

- 1 Uncouple the front coupler.
- 2 Engineer dialog (some models)

Pressing the "R" rear uncouple button will

- 1 Uncouple the rear coupler
- 2 Engineer dialog (some models)

Trainlink

Train-Link Addressing feature needs intro

Insert diagram 59 train-link control 1 here

Pressing the Train-Link Button will

- 1 Customize any other icon controls to a “unique” one hit only application, returning to normal.

Pressing and holding the train-link button while pressing any #1-9 will

- 1 Address sequential Train-link cars in an addressed train and
- 2 Open the “Operating Car” control panel on Cab 2.

Aux 1

***Reprogramming tmcc engines pulled**

Insert diagram 64 aux 1 here

Pressing Aux 1 will

- 1 Customize Crew- talk and Tower-Com controls as *one hit only* “negative” dialogs, returning to normal.
- 2 Display Crew-talk and Tower-com icons negative
- 3 Customize any other icon controls to a “unique” one hit only application,
- 4 Return to normal after any keystroke.

Aux 2

Insert diagram 65 aux 2 here

Pressing Aux 2 will

reserved

Switch

Insert diagram 66 switch control through here

Switch Through

Pressing the Switch Through button will

- 1 Throw an addressed switch through (or straight)

Switch Out

Insert diagram 67 switch control out here

Pressing the Switch Out button will

- 1 Throw an addressed switch out (or curved)

Halt

Insert diagram 68 HALT here

Pressing Halt will

- 1 Stop all trains

Set

Insert diagram 69 set here

Pressing Set will

- 1 set address ID#
- 2 set Stall
- 3 provide programming function for some layout control components.

L, M, H.

Insert diagram 70 LMH here

Pressing L, M, H, will

- 1 Choose momentum level
- 2 Display a momentum graph for that level
- 3 Provide programming function for some TMCC trackside components.

OFFICIAL R.R. SPEED CONTROL (New Lionel legacy engines only)

Dec 6 06 ny created

Five (5) Official Railroad speeds are assigned to dedicated speed icons in the CAB 2 touchscreen. You must press the Cab 2 SPEED button to bring up the dedicated speed icons in the touch-screen. Dedicated speeds are commanded whenever you press one of the dedicated speed buttons. To leave the dedicated speed touchscreen just press SPEED again.

Insert diagram "speed" button here..... insert diagram " dedicated speed touchscreen" here

OPERATING WITH OFFICIAL RAILROAD SPEEDS

Press a Dedicated speed Touch-screen ICON

- 1 You will hear a dialog between the dispatcher and the engineer
- 2 The addressed train will move towards the dedicated speed.

LIONEL RESEARCH

Train speed Definitions:

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.

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: 15 mph

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

Medium speed : 30 mph

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

Limited speed : 45 mph

Not exceeding 45 or 60 miles per hour as designated by the operating railroad.

Normal speed : 65 mph

The maximum authorized speed shown in the timetable.

HighBall: Maximum speed of locomotive

Not a prototypical speed.

Brake: Decelerate at momentum speed to ROLL (speed step one)

TOUCH-SCREEN

The Legacy touch-screen adapts to your operating condition.

If you are addressing, it is a numeric display.



diagram 57.1 of numeric display touch-screen

If you are operating underway, it is a graphic display of control functions for the particular engine you have addressed. (Legacy engines only)

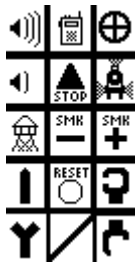


diagram 57.25 of steam engine control (underway) (with switch addressed) touch-screen



diagram 57.3 of diesel engine control (underway) (with sequence) touch-screen

If you are operating at stop, it is a graphic display of control functions for the particular engine you have addressed. (Legacy engines only)



diagram 57.4 of diesel engine control (stopped) (with switch addressed) touch-screen



diagram 57.45 of steam engine control (stopped) touch-screen

If you are operating with dedicated engine speeds, it gives you the 5 standard R.R. speeds and “full speed” as single commands.



diagram 57.5 of dedicated speed touch-screen



diagram 57.55 of dedicated speed touch-screen (with switch addressed)

The Legacy Control touch-screen adapts to whatever you are controlling.

Future LIONEL Legacy Control products may have engine or accessory specific features that do not come as standard on other products. When you purchase one of these future products, there will be an additional system upgrade memory module for the unique touchscreen.

The system upgrade memory module will provide a chronological system upgrade for your remote and/or base. Follow the simple instructions enclosed with your latest product to download new touchscreens into your system. If you have more than one system upgrade for more than one product at the same time, it is only necessary to download the latest chronological version.

RECORD

Use the Legacy <RECORD> button to record any action that you desire to see repeated.

A complete recording always consists of a stored trigger command and an action sequence. Once the action is recorded, playing back is simple. The Trigger Command, which can be any combination of key presses, will always playback that sequence automatically whenever it is entered.

Recording

Insert diagram 59.5 (Record button, LED) here

To create the stored trigger, press <record> briefly

- 1 *The led blinks fast*
- 2 In this state the user enters the trigger commands.
 ie, <TR> <I>
- 3 The led goes out on the first key-press

To **erase the stored trigger** and try again, press <record> and hold it down

- 1 *The led blinks fast*
- Release the record button
- 1 *The trigger is erased*
 - 2 *The led stops blinking*

To **save the stored trigger**, press <record> briefly

- 2 *The led blinks slowly*

To **record the sequence of commands**, once the trigger is saved and the led is blinking slowly, the user enters the sequence to be recorded, ie, <AUX I> <7>.

- 1 The led goes out on the first keypress

To **erase the sequence of commands** and try again, press <record> and hold it down.

- 1 *The led blinks slowly*
- Release the Record button
- 1 *the sequence is erased*
 - 2 *the led stops blinking*

To **save the recorded sequence**, press <record> briefly

- 1 *The led emits a steady light for 3 seconds, confirming recording done*

To save the complete recording,

- 1 Press <SET>
- 2 *The screen reads TR1 sequence saved*

In summary, if the led is blinking fast, you can record a trigger. If the led is blinking slowly, you can record a sequence. If the led is not blinking, you can press <record> briefly to clear and start recording

Note that only one recording can be saved for any trigger. Recording a new sequence with the same trigger will erase the sequence previously recorded with that trigger.

Playback

Because the trigger is a sequence of commands, the recording plays whenever that sequence is entered.

Memory

There is a limit to the memory available for recording.

To see how much memory you have available,

- 1 Press <CTC>. Scroll to “Record Options”.
- 2 Then Press <MEM> to view Record Memory (graph)

Now you can see how much memory remains. The grey-bar represents Memory used.

While you are viewing, notice the boxes in the bottom of the screen

Insert diagram 59.7 of (Record Options “Memory”) here

The triggers are illustrated alpha-numerically in boxes above each soft-key.

- 1 Scroll through all the triggers.
- 2 Soft key buttons are used to select each trigger to view the recording.

When the trigger you are looking for appears,

- 1 press the soft-key under that Trigger.

Now you can view all the info about that recording.

- 1 -You will see the stored Trigger.
- 2 -You will see all the commands making up the sequence, in order.
- 3 -You will see the duration in seconds.
- 4 -You will see the % of memory used by the selected sequence.

Erase

If you wish to **erase a sequence and start again with the same sequence trigger**,

- 1 just press record briefly
- 2 enter the same trigger, and
- 3 start again as described under RECORD

If you wish to **erase a sequence**, follow the directions below.

To **erase any sequence**, press <record> briefly

- 1 *The led blinks fast*

In this state the user enters the trigger commands for that sequence ie, <TR> <I>

- 2 *The led goes out on the first keypress*

To **erase the stored trigger and sequence**, press <record> and hold it down

- 1 *The led emits a steady light for 3 seconds, confirming erasing done*
- 2 *The screen reads TR1 sequence erased*

Insert diagram 59.9(sequence erased) here

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, and other conditions.

Insert diagram 17.1 FEEDBACK button here

SEQUENCED CONTROL SECTION

In this next section we will introduce you to three parts of the Legacy Control system that work together.

LEGACY VELOCITY THROTTLE

MOMENTUM

LEGACY SEQUENCED CONTROL

Together, these control methods are a new way to control your trains.

Operating a train with the Legacy Velocity Throttle enables you to control whistle/horn, bell, independent engine brake, crew-talk, blow-down effect, let-offs, loading, speed and more. This is all done through sequences that happen when you trigger them with certain throttle moves.

Though it is always possible to control these effects through the Direct Control method, the velocity throttle is capable of operating the effects without looking away to the Direct Controls.

You have the choice of either method, or both methods at the same time.

In this section, you will encounter new terms ROLL, TRANS, ARRIVAL & DEPARTURE TRIGGER, and GATE. Refer to the diagram to understand where these conditions are on the speed graph.

Insert diagram 19 “MASTER SEQUENCE” here

Insert diagram 19.2 “A&D magnifier” here

Insert diagram 19.1 “Master Sequence illustrated speed graph” here

These diagrams show the full 200 speed steps in the range of the Velocity Throttle and the Lionel Legacy system. The “Master Sequence” illustration and Display Window “Speed Graph” illustrate where all of the different Conditions, Triggers and Gates are located. Become familiar with this to understand what follows next in this manual.

LEGACY VELOCITY THROTTLE

Rotating the Velocity throttle at different rates will result in control of effects as well as fine to coarse control of train speed.

Velocity Throttle Speed

Velocity Throttle *Speed* Control with a *Low* momentum setting

- 1 Turning the rotary slowly takes 4 revolutions to go from speed-step 1 to 200
- 2 Turning the rotary quickly takes less than 1 revolution to go 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 affected and moves slower than at the “Low” setting.

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 Auto-Brake

Velocity Throttle *Brake* Control

Insert diagram 20 VT Brake (Target Line at speed step 1, grey bar at 50%) here



Move the target line to speed step 1 (Roll) while the grey bar is above speed step 1

- 1 Trigger a brake sound during deceleration
- 2 Continue braking and sounds until speed step 1, (ROLL condition) is attained.

- 3 Trigger a brake sound during deceleration until the target line is moved up from speed step 1 (ROLL Condition).

Velocity Throttle Horn/Whistle Control

Move the target line to speed step 200 (Maximum speed) while the grey bar is below speed step 200

- 1 Trigger a Loud warning.

Move the target line below speed step 200

- 1 End a Loud warning.

Passing through an A&D trigger or gate

- 1 May trigger a warning or signal sound
- 2 (see Legacy Sequenced Control)

Velocity Throttle RPM Control

Velocity Throttle Diesel RPM Control

Insert diagram 24a VTSC RPM (shows rpm ticks) here

Rotate the Velocity Throttle through its range past RPM ^ markers

- 1 Change RPM levels.

When grey-bar increases through an RPM mark,

- 1 RPMs increase each time.

When grey -bar decreases through an RPM mark,

- 1 RPMs decrease each time.

Internal.....Mark and Bruce, Since an RPM ramp takes a definite amount of time to play, a scheme for sending the absolute ramp up or down commands in cue may be needed to make sure RPM ramping is solid. Perhaps this would necessitate the standard time-length for an RPM ramp to be identified. Commands could then be stored and sent out on cue when the user is changing speeds with direct or low momentum control. Or , on the other hand, if the absolute RPM level is known, the ramps would just keep climbing until the right level is reached. Internally in Railsounds, smoke may be triggered to correspond to the rpms rising.....The deciding factor is how long it takes the grey-bar to go from one RPM tick to another. If that amount of time is shorter

than the duration of a standard ramp time, we will need a cue that plays all the absolute ramps until they “catch up” with the grey-bar position. Bruce may be able to do this inside RS but that would not help us with the “FEEDBACK” cab2 vibration effects we want at RPM changes... we need to solve this. NY

An alternative is to use the old tmcc method of ramping which is trigger a ramp up or down whenever the throttle goes up or down. We could fall back and use this method whenever the momentum rate is too fast to accommodate an RPM trigger from the graph.

Velocity Throttle Direction Control

Insert diagram 25 VTSC direction (show bottom 5 steps magnified) here

Quickly turn the rotary counter clockwise, from a stop, at speed step 0

- 1 Change the direction of the locomotive
- 2 Produce a let-off sound
- 3 Produce an engineer dialog (some models)
- 4 Reverse locomotive lighting (back-up light)

Velocity Throttle Engine laboring

Insert diagram 28 VTSC laboring (Target 80 grey-bar 40) here

When the target line is above the grey bar.

- 1 Laboring sounds will intensify greatly, gradually decreasing to normal (default) as the grey-bar reaches the target line.
- 2 The laboring sound is affected by the distance between the grey-bar is from the target line.

Insert diagram 28.5 VTSC laboring (Target 40 grey-bar 80) here

When the target line is below the grey-bar.

- 1 Laboring sounds will weaken in intensity, gradually increasing to normal (default) as the grey-bar reaches the target line.
- 2 The laboring sound is affected by the distance between the grey-bar and the target line.

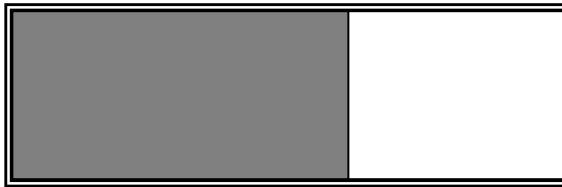
MOMENTUM

Momentum plays a big part in exploring the new features of the Velocity Throttle and Legacy Sequence control.

Momentum settings govern the amount of time it takes your engine to reach its Target Speed. During that time, a lot of events happen automatically. Momentum, *the rate of your engine's acceleration*, is set to "M" or medium as a default. Setting Momentum to "L" will greatly increase acceleration and deceleration rates, affecting the timing of some "sequence control" features, while setting Momentum to "H" will decrease the rates of acceleration and deceleration, giving you more time to experience "sequence control" transition events.

Momentum has 3 settings, L is low or direct, M is user settable, and H is high. Engines default to "M". Experiment with "L", "M", and "H".

You can easily "customize" each engine's "M" momentum settings and store these settings by using the method described next:



Note diagram incorrect

diagram 18 momentum select and graph

Press and Hold the M button

- 1 Display a momentum graph labeled "M".
- 2 Continuing to hold the button down will enable you to use your rotary to move the grey area of the graph up or down to a new setting.
- 3 Release the "M" button.
- 4 Now you have re-set the momentum for "M". Try it out and adjust it until you like it. The new setting will be saved automatically for whatever engine you are using. Customize the momentum settings for each of your engines this way.

LEGACY SEQUENCED CONTROL

Lionel Legacy Control System Equipped engines only

Dec 18 06 nycall out Legacy only

Enter and leave the Sequenced Control mode by pressing the center-most key at the bottom of the Touch-screen.



diagram xx.x “Sequence Control off / on key”

Sequenced Control

This section tells you how to use your Velocity throttle for performing sequenced control operation of effects and sounds, as well as train speed.

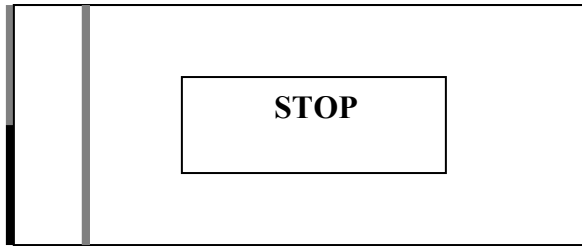
ARRIVAL & DEPARTURE SEQUENCE

Arrival & Departure Sequence Introduction:

Control the actions and language of a train in daily operation. Prototypical events, sequenced with arrivals and departures are at the heart of Legacy sequenced Control. It’s all done with the velocity throttle. Follow this sequence from departure to arrival.

A&D Start

Insert diagram 30 A&D Start (magnified bottom 5 steps) here



*diagram 100 A&D display screen “Stop”
 note..... Black-line is target. Grey-bar is commanded speed. Grey-line signifies next event*

Increase from 0 to throttle notch Trans +

- 1 Start smoke element (starts immediately) (Legacy engines only)

Increase from 0 to throttle notch Trans + and wait (for three seconds)

- 2 Start dialog (SCENE Departure granted) (Legacy engines only)
- 3 After approx 10 seconds at trans +, smoke element off. (Legacy engines only)

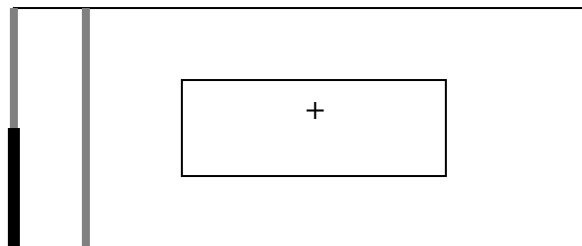


diagram 101 A&D display screen “TRANS +”

Increase from trans + or 0 to throttle notch Trans ++

- 1 Start continuous bell sound (Legacy engines only)
- 2 Blow Warning Whistle /Horn
- 3 Ramp up Diesel RPMs
- 4 Start smoke fan (diesels) (Legacy engines only)
- 5 Let-off

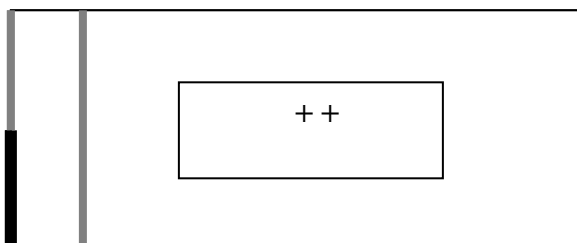
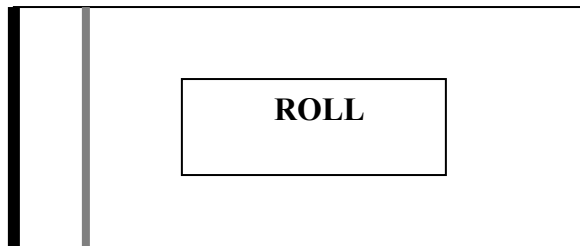


diagram 102 A&D display screen “TRANS ++”

Increase from Trans+ or Trans ++ condition to (1) ROLL Condition

- 1 Start the train rolling
- 2 Show the A&D display Departure trigger grey-line



*diagram 103 A&D display screen “ROLL”
note departure trigger grey-line signifies next event*

A&D Departure

Insert diagram 31 A&D departure (bottom 25 steps) here

Increase from ROLL Condition to Departure trigger

A&D Departure trigger effects are

- 1 Whistle blow (could be prototypical signal.. Railsounds sequence) (Legacy engines only)then,
- 2 Departure Crew-Talk Dialog SCENE “have departed (Legacy engines only)
- 3 Continuous bell stops (Legacy engines only)

A&D Departure trigger effects play if

- 1 *Grey-bar has last been at “Stop” position*
- 2 Target speed is set above the Departure trigger and
- 3 The grey-bar passes through the Departure trigger

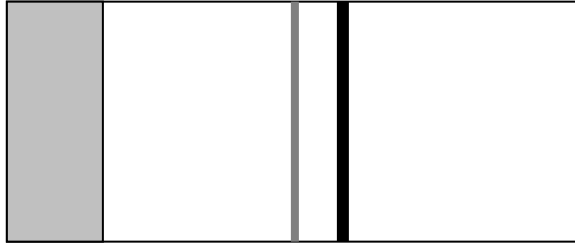


diagram 104 A&D display screen “Grey bar passes through departure trigger” note A&D departure GATE grey-line signifies next event

A&D Post-Departure

Insert diagram 32 A&D post departure (grey-bar 40% target line 90%) here

Grey-bar Increase from Departure trigger to A&D Gate

A&D Post departure effects are

- 1 long whistle blow

A&D Post departure effects play if

- 1 Train (grey-bar) passes up through A&D Gate



diagram 105 A&D display screen “Grey bar at A&D post-departure Gate.”

Note pre-arrival grey-line signifies next event

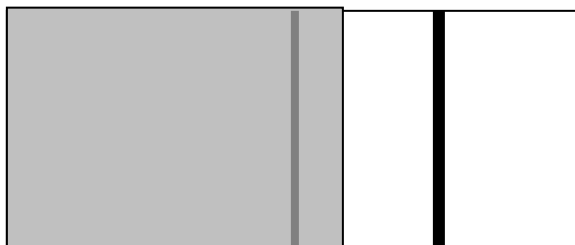


diagram 106 A&D display screen “Grey bar passes post-departure Gate.”

A&D Pre-Arrival

Insert diagram 33 A&D pre-arrival (target line 40% grey-bar 50%) here

Decrease through A&D Gate

A&D Pre-Arrival effects are

- 1 Dialog SCENE “All Clear” (in transit) (Legacy engines only)

A&D Pre-Arrival effects play if

- 2 Train (grey-bar) passes down through A&D Gate after last *triggering the A&D post-departure sequence.*

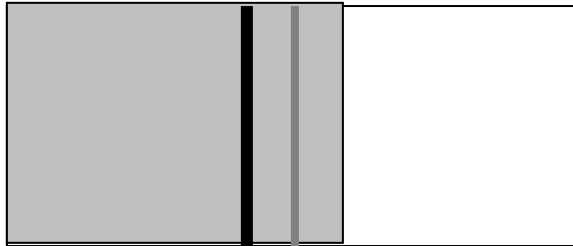


diagram 107 A&D display screen “Grey bar approaches pre-arrival Gate.”



diagram 108 A&D display screen “Grey bar at pre-arrival Gate.”



diagram 109 A&D display screen “Grey bar passes pre-arrival Gate.”
Note A&D Arrival trigger grey-bar signifies next event

A&D Arrival

Insert diagram 34 A&D Arrival (target bar 5 grey-bar 10) here
Decrease from A&D Gate to A&D Arrival trigger

A&D Arrival effects are

- 1 Whistle blows (absolute whistle start and end)
- 2 Continuous bell begins (Legacy engines only)
- 3 Crew-Talk Dialog SCENE “Arriving Soon”
(Legacy engines only)

A&D Arrival effects play if

- 3 Grey-bar passes through the Arrival trigger after last passing down through the A&D Gate and triggering the A&D pre-arrival sequence.



diagram 110 A&D display screen “Grey bar approaches arrival Gate.”

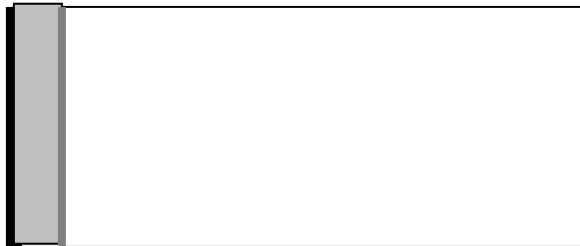


diagram 111 A&D display screen “Grey bar at arrival Gate.”

Insert A&D diagram ROLL here

Auto-Brake to ROLL (with target line at speed step one)

A&D ROLL effects are

- 1 brake sounds end
- 2 Continuous bell begins (Legacy engines only)

A&D ROLL effects play if

1 train is at speed step one after passing through arrival trigger

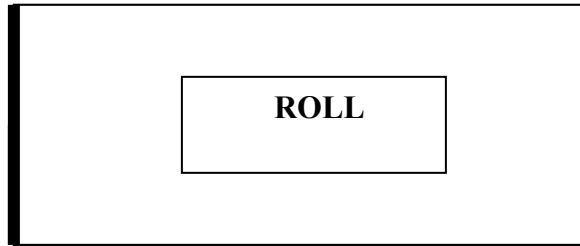


diagram 112 A&D display screen "Grey bar at ROLL"

A&D Trans –

Decreasing from Roll to throttle notch Trans -

A&D Arrival Trans - effects

1 "Brake sound" with train still in motion at Trans -

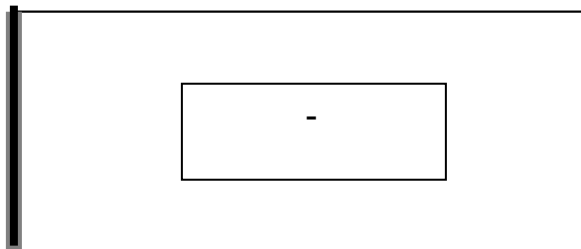


diagram 113 A&D display screen "Target line and Grey bar at trans -"

A&D Stop

Insert diagram 35 A&D stop (bottom 15 steps magnified) here

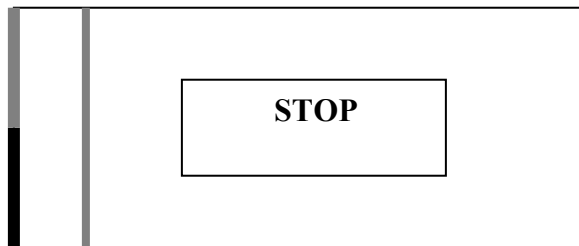
Decrease from trans - to Stop (speed step 0)

A&D Arrival STOP effects

- 1 Crew talk dialog SCENE “have arrived” (Legacy engines only)
- 2 A Smoke burst (absolute max element after 3 seconds and apply max fan after 6 seconds, with 2 second duration) (Legacy engines only) and
- 3 A simultaneous Blow-down sound in synch with fan (absolute Rail-Sounds command) (Legacy engines only)

A&D Arrival STOP effects play when

- 1 The grey-bar is at 0 from trans – condition
- 2 Grey-bar has passed through arrival trigger since last stop.



*diagram 114 A&D display screen “STOP”
note departure trigger grey-bar signifies next event*

FINE TUNING VELOCITY THROTTLE SEQUENCES

Dec6 06 ny changes to text

Dec 12 06 ny text changes

Insert diagram 72 velocity throttle sequenced control here

Your TMCC 2 Velocity Throttle has a series of sequences that it can reproduce any time you move it a certain way. You “load” a sequence by making a certain move with the throttle. One example of this is when you have a train moving along the track with momentum engaged and you move the speed-graph target line to speed step one. The brakes come on. You have loaded the auto-brake with Velocity Throttle Control. You did that just by moving the target line to speed step one. You didn’t have to watch the speed graph to know this because you heard the brake sounds. They only are engaged when the target line is at speed step one on the Velocity Throttle. When you hear the brake sound stop, your train is at speed step one or ‘ROLL” condition. Now the engine will roll along at its slowest speed with its bell ringing. That’s what it does in speed step one, “ROLL” condition.

You are not limited to hearing brake sounds while your train is braking towards speed step one. Just moving the Target line to speed step 2 will stop the brake sound, although your train may *still be slowing down* to speed step 2. You control the brake sound as your engine slows down. Just keep the target line below the grey-bar (train speed) for deceleration and you can add brake sound effects any time just by moving the target line back to speed step one.

When the train arrives at speed step one, “Roll” Condition, brakes stop, and bell starts.

As we have seen earlier, between Roll and Stop, there is a condition called Trans- on the speed-graph. You get to Trans- just by turning the throttle down one notch from “Roll”. It doesn’t affect the speed. You are still rolling, but now the brake sounds are back on. One more turn of the throttle counter-clockwise takes your train from Trans- to Stop. Now the brake sounds stop and your train is right where you want to be. The bell stops too, letting you know motion has stopped.

Now you take one more trip with your train. It is rolling along at more than half speed through your layout.

Your train is traveling at a speed that is above the A&D GATE, (default speed step 100 or half-speed). That automatically loads the Arrival-Departure sequence. Stop your train at a station. Now that your engine has stopped and finished a high-speed trip, after a few seconds at stop, it will perform an automatic “Blow-Down sequence”. A blow down sequence is

a large plume of smoke coming from the stack and a loud blow down sound. It lasts a few seconds. That sequence wouldn't have happened if your engine had not been above the Gate (default speed step 100), on its last trip.

All of these sequences of events have events that start the sequence off, and effects that are triggered in the sequence. You can change behavior of each locomotive by tuning in the sounds and effects that you would like to respond and the speed step (event) that you would like to trigger the sequence. You can also set exactly when the effects will happen by adjusting the Trigger. Just set a new speed step for that Trigger in the Sequence Options section of INFO. If you then like the old setting better, just press default and you're right back to factory settings. You can't hurt anything by making a mistake.

Once your engine is addressed, these "SEQUENCE TUNING" adjustments are all made in the INFO menu, and they stay with your engine until you change them again. You have the choice to adjust them if you like. You can just turn them off and run your train directly with the standard controls by touching the Sequence Control soft-key on the touch-screen. You can even use both methods at the same time.

When you run your engines in a lash-up, the head-end engine sequences will be the default setting for all the lashed-up engines. Sequenced sound effects like Whistle/Horn, brakes, bell and crew-talk only come from the head end unit.

ACCESSING SEQUENCE OPTIONS

Dec 6 06 ny created

Insert diagram 72 sequence options menu choices here

In Sequence Options, you can disable parts of sequences and operate the Velocity Throttle without them. You can elect to disable the whole sequence. In arrival and departure sequences, the trigger and gate can be reset. Trans + and - settings can not be reset. Roll Condition can not be reset.

To adjust sequence options:

Press Engine

1 Enter ID#

Press INFO

- 3 scroll to sequence options
- 4 choose from A&D, Dialog, Warning sounds

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. Use the “Notes” pages in the back of this manual to keep up to date on the latest 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”. Another appropriate example would be “Prophecy” products, which will introduce more and more features to the Lionel Legacy Control system. Manuals that come with future controllers will be updated to reflect these advances, both in the text, and the Options tables.

ENGINE OPTIONS

Dec 2 06 ny added REL...moved speed control to near control types

Control Types:(choose one)

TM1	TMCC 1	Original Lionel	32 absolute steps Speed Graph Naming
TPC	TPC	Track Power Control	200 relative steps, Speed Graph
LEG	Legacy	Legacy engines	200 absolute steps Speed Graph Naming
REL	Relative	OEM and Accessories	name and info no graph

Speed Control

SPD	Servo motor	Legacy and Odyssey	Toggle servo on and off
-----	-------------	--------------------	-------------------------

Engine Types (choose one)

DSL	Diesel	Diesel engine Control	Legacy RPM monitoring
STM	Steam	Steam engine Control	Legacy Chuff monitoring
ELC	Electric	Electric engine Control	??
TBN	Turbine	Turbine engine Control	??
SUB	Subway	Subway control	special L&R door commands
<i>SPC</i>	<i>Special</i>	<i>Station-sounds/crew-talk Rolling stock in consist</i>	<i>Special addressing for dialog</i>

Name

Dec 3 06 nychanged ABC to NAM

NAM	Name	Assign name	Brings up naming screen
-----	------	-------------	-------------------------

Sound types: (choose one)

RS	Railsounds	RS1 RS2.5 engines	Basic functions
RS4	Railsounds4	RS4 engines	<u>Additional Crew Talk</u> <u>Aux 1 qualifier pos/neg</u>
RS5	Railsounds5	RS5 engines	<u>Additional laboring(on timer)</u> <u>3 & 6 blow-down /let-off</u> <u>Additional Crew Talk</u> <u>Aux 1 qualifier pos/neg</u>
LRS	Railsounds5+	Legacy engines	Real time whistle/horn

Enhanced laboring (on timer)
3&6 same efx as RS-5
Additional Crew Talk
Aux 1 qualifier pos/neg

PRS Railsounds Prophecy engines TBA

Sequence Options

GAT	VTSC	All types	Adjust A&D Gate
TRI	VTSC	All types	Adjust A&D Trigger
TLK	VTSC	All types	Crew Talk on /off toggle
DEF	VTSC	All types	Return to default settings
H&W	VTSC	All types	Horn/Whistle blows at Triggers and Gates

Direct Controls

BRK	Auto-brake	All types	Enable brake sounds When target is 0
DIR	Legacy Dir	All types	Three-step direction control <u>1st Auto-brake</u> 2 nd Fast-brake to stop (if Rolling at any speed) 3 rd Direction change (if stopped)

Speed Displays: (choose one)

SP1	Speed Graph	All types xxxxxx	Large Graph, Train-Brake/Name at top
SP2	Numeric	All types xxxxxx	<u>Large MPH</u> Train-Brake/Name at top
SP3	Combination	All types xxxxxx	<u>Large Graph and MPH box</u> Train-Brake/Name at top

TRAIN OPTIONS
Dec 3 06 ny created doc

View

VU	View	View Lashup	Brings up lash-up view Screen
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Build Lashup

BLD	Lash-up	Build Lashup	Brings up Lashup screen
-----	---------	--------------	-------------------------

Train Types (choose one)

PAS	Passenger	Passenger train	traffic priority
FRT	Freight	Freight train	traffic priority

Clear

CLR	Clear	Clear Train address	Brings up cleared lash-up Screen
-----	-------	---------------------	-------------------------------------

Name (assign name)

NAM	Name	Assign name	Brings up naming screen
-----	------	-------------	-------------------------

ACCESSORY OPTIONS

**dec 3 06 ny.....created*

Control Types:(choose one)

LEG	Legacy	Legacy ACC controller	200 absolute steps
REL	Relative	TMCC ACC controller	Relative speeds

Speed Control

SPD	Servo motor	speed control Relative control	Toggle servo on and off
-----	-------------	-----------------------------------	-------------------------

ACC Types (choose one)

ENG	Engine	ACC with motor
LIT	Light	Lighting accessory

Name

NAM	Name	Assign name	Brings up naming screen
-----	------	-------------	-------------------------

ROUTE OPTIONS view, edit, clear, name, SPD

View

VU	View	View Route	Brings up Route View screen
----	------	------------	-----------------------------

Edit

EDT	EDIT	Edit Route	Brings up Route Build screen
-----	------	------------	------------------------------

Name

NAM	Name	Assign name	Brings up naming screen
-----	------	-------------	-------------------------

Clear

CLR	Clear	Clear Route	Brings up empty Route Build screen
-----	-------	-------------	------------------------------------

Throw rate

SPD	Throw rate	Set throw rate	Choose rate that switches throw in a route
-----	------------	----------------	--

SWITCH OPTIONS
Dec 4 06 ny created

Name

NAM	Name	Assign name	Brings up naming screen
-----	------	-------------	-------------------------

"NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Changes or modifications not expressively approved by the party responsible for compliance could void the user's authority to operate the equipment. The term "IC" before the radio certification number only signifies that Industry Canada technical specifications were met."

WORK AREA...HARD HAT REQUIRED

DIRECT CONTROL OPTIONS

Direction

Choose Direction Control methods

VEL (Default) Velocity Throttle Direction Control

OFF Normal (one press) Direction Control only

DEF Return to Factory Default

Stall

SET Set stall by turning rotary and using graph while pressing

SET softkey
Release SET soft-key to save

SPEED GRAPH OPTIONS

Speed graph

Choose “Look” of Speed Graph

SP1 (Default) Large graph, no name

SP2 Large numeric output instead of graph

SP3 Large graph with additional numeric readout

SP4 Big name with train-brake graph

DEF Return to Factory Default

ROUTE OPTIONS

SWITCH OPTIONS

ACCESSORY OPTIONS

SYSTEM OPTIONS

ENGINE OPTIONS

Stall

Insert diagram 43.5 stall set sequence (set button and graph) here

Introduction

“Stall” is used to establish the amount of power required as a locomotive first starts moving. Once “stall” is set, it ignores any speed steps below that threshold. Engines without speed control (Odyssey or Legacy Speed Control) may benefit from a new “stall” setting.

Press SET (headlight will blink)
Operate your engine on a straight piece of level track, decelerating until it just stalls (stops moving).
Press SET again (headlight will stop blinking)
STALL condition is set. Now decelerating will take your engine to this new STALL condition. Your engine will always start motion right from the STALL condition.

CAB MODES

Your CAB 2 is already in its default CAB 2 MODE.

Insert CAB 2 diagram with CTC button and Cab Mode screen here

You can go to the CAB MODE section of the Central Train Control menu by pressing the CTC button and scrolling to the CAB Mode screen.

There you can select between Cab 1 and Cab 2 operation.

Cab 1 is just like the traditional TMCC Cab 1 operation, with the addition of the display screen.

Cab 2 operation contains all the Legacy features.