TRAIN CONTROL SYSTEMS

LT-50

QUICK START GUIDE

LT-50 Quick Start Guide

Table of Contents

What's In The Box

- LT-50 handheld command station
- LT Panel (fascia panel)
- LT Panel fascia cover plate
- LT Panel assembly screws (2x)
- LT Panel mounting screws (4x)
- 2-pin screw terminal plug (Green) for DCC Track output
- Option jumpers (3x)
- RJ-45 Cable (7ft/2.13M)
- LT-50 power supply (15V, 36W)

Specifications

DCC System

- 1.4A continuous, 2.8A peak current limit with soft start, configurable current limit, and load reporting
- Integrated RailCom® detector
- Programming Track over main output with automatic switchover, supporting Direct, Paged, and Register modes
- DCC accessory control for addresses 1 - 2044
- Up to 20, 10-step Macros, including LCC accessory control
- Configuration through on-screen menu

Throttle Features

- Handheld design based on the lightweight and ergonomic UWT-50
- Nine user-programmable buttons for convenient operations
- Encoder knob for throttle control and menu navigation
- Plain English configuration through menu
- On-sceen help function
- Can be used as a throttle on LCC and NCE layouts

NMRA Layout Command Control (LCC) Features

- LT-50-specific RJ-45 jack (1x)
- RJ-45 jack for LCC communication through CAN-bus (3x)
- Expandable with additional LCC throttles (sold separately)
- 400ma LCC power injection points (2x)
- Low-power DCC passthrough (optional with configuration)
- Configuration through CAN-bus interface to PC (sold separately)
- Firmware updates via LCC interface

More information than can fit into this guide can be found online.

To read our comprehensive documentation, visit docs.tcsdcc.com/wiki/LT-50 or use this QR code:

Connections

The LT-50 has the following external connections and indicators.

(See the graphics on the next page to see where you can find each of these connections listed on the LT-50.)

"LT": RJ-45 jack (1x)

This jack must be used in order to allow the LT-50 to provide power to the track output. Using any other jack on the LT Panel with the LT-50 will not power the track output.

The fascia cover plate has been designed so that it is not possible to be screwed to the fascia board upside-down. If the fascia panel board is installed with the RJ-45 connectors facing towards the floor, you can flip the fascia cover plate to correctly show the LT-50 jack position.

Track Output: 2-pin green detachable screw terminal

Connect one wire from each rail of your Mainline track. This output also doubles as the Programming Track which you may use to read and write the address and other settings (CV's) of DCC decoders.

Power In: 2.5mm*5.5mm barrel jack

Connect the TCS-provided power supply here. Do not use any other power supplies.

WARNING: *Use only the TCS-provided power supply with the LT-50. This requirement guarantees device performance as certified.*

LCC Connectors: RJ-45 jack (3x)

These connectors support LCC CAN-bus. The current rating of each jack is marked on the fascia panel board, and has an arrow noting whether it is a supplier/passthrough, or consumer. Up to 400 mA of power can be provided to certain sockets by connecting the configuration jumpers. Use the front-facing jack only for wired LCC throttles.

"Track On" LED:

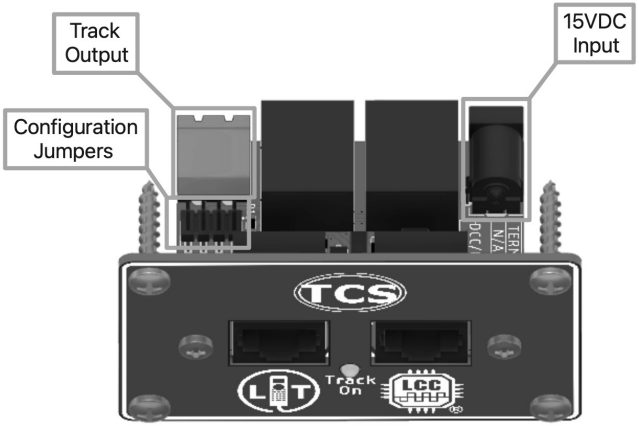
The Track On LED will be lit RED when the fascia board has incoming power from the power supply.

The Track On LED will go GREEN when power is being provided to the Track Output.

The Track On LED will go RED again if the system is put into E-OFF.

Configuration Jumpers:

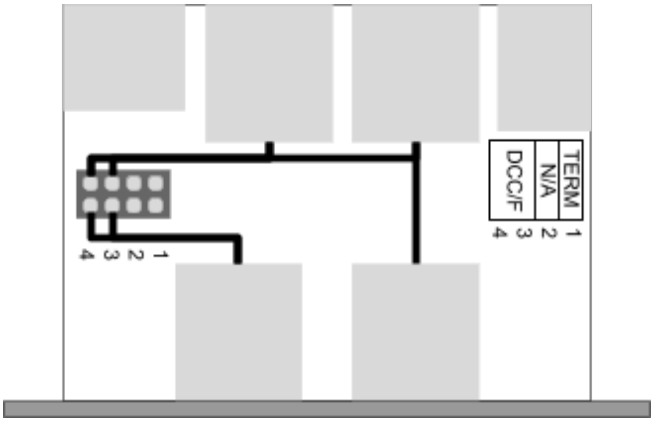
There are three jumpers provided with the LT Panel. These jumpers can be used to connect circuits using the header on the LT Panel board. See the table and diagrams to the right for more information.



Configuration Jumpers

Jumper Position	Description
(1) TERM	Insert this jumper to add termination to the LCC-CAN bus. An LCC-CAN bus should have **exactly two** terminators, with one at each end of the bus. This jumper can (optionally) provide for one of the required terminators. In practicality, a very short (less than 10ft or 3m) LCC-CAN bus can still work reliably with one terminator.
(2) N/A	Not used.
(3 & 4) DCC/F	Insert these two jumpers to pass the low power DCC signals through the LCC panel (pins 4 & 5 of the LCC-CAN standard). Remove these jumpers to disconnect the low power DCC signals from passing through the panel. The LT Panel uses the NMRA S-9.1.2 Full Scale Interface

DCC/F Simplified Diagram



Getting Started

The LT-50 is a next-generation NMRA DCC and Märklin/Motorola command station featuring full support for NMRA LCC features with a plug-and-play design, allowing you to get set up and running trains in just a few minutes.

Setting up the LT-50

Remove all of the parts from the box. Set the bag of parts, LT Panel, and Fascia Cover Plate aside. Do not connect the power supply yet.

Fascia Board Assembly

1. Decide how you would like to orient the LT Panel (jacks up or jacks down). If you have not done so already, drill holes in your fascia to accept the LT Panel and cover plate. *Note, a print-able templete can be downloaded from the LT-50 product page on our website*.
2. Connect the wires for your DCC track into the detachable 2-pin green screw terminal block.
3. Install the fascia cover plate onto the front of the LT Panel using the two included black machine screws. Flip the cover plate if needed to match the orientation of the board as mentioned in step 1. The holes for the screws will only line up when the cover plate is oriented properly. DO NOT force the screws into the holes.
4. Connect the detachable 2-pin green screw terminal into the Track Power output on the LT Panel.
5. Connect the provided power supply to the DC in connector.
6. Place the completed assembly into your fascia, and secure in place using the four included black wood screws.

LT-50 Setup

1. Remove the twist tie from the included RJ-45 cable.
2. Plug one end of the RJ-45 cable into the jack on the LT Panel labeled with the LT logo.
3. Plug the other end of the RJ-45 cable into the bottom of the LT-50.

If everything is connected properly, the LT-50 handheld will boot up in approximately 3 seconds, and the Track Power LED should go Green to indicate that track power is online. At this point, you are ready to place locomotives on your tracks and run!

*For additional setup instructions on how to connect the LT-50 to a PC, see the **Computer Interface** section of this manual.*

Using the LT-50

Power On/Off

Plug the LT-50 into the LT-50 jack on the LT Panel to power up the throttle into command station mode. If you would like to use the LT-50 as a normal LCC throttle, connect it into any other LCC port. Once powered up, the throttle will display the main Drive Window - your dashboard for locomotive operations.

In order to completely power down the LT-50, you must unplug it from the fascia panel board, or unplug the power supply.

Track power can be managed using the E-STOP button as described in the *Emergency Stop* section of this manual, or can be controlled via the menu. To view the current track power status, or to turn the track power on or off, navigate to *Menu* > *Settings* > *Track Power*

Menu Navigation

The menu button will open the LT-50 main menu. There are functions and options in the menu that can customize your user experience and are helpful for throttle operations.

Navigating the main menu can be performed in a variety of ways. Using the thumb switches or the knob (encoder version only) will navigate up or down through menu items one at a time. The current menu item will be highlighted.

Each menu option corresponds to a numeric keypad button. Pressing the corresponding button will immediately select that numbered menu option, even if that menu option is not visible on screen. If you choose to scroll for a menu option, press the Enter , the Select button or push either thumb switch inward. If you would like to know what a menu option does, press to consult the help text.

When you are in a submenu, you can press the menu button to navigate back up to the previous menu.

The “Help” Button

The LT-50 menu structure contains on-screen information that explains most menu options and operations. To access these tips, you may press the button at any time to access the help text for the currently highlighted menu option.

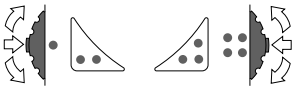
A scroll bar will appear on the right side of the screen if more text is available. Scroll up or down to see additional text by using the knob or either thumb switch.

Pressing the help [?] button on the Drive Window will bring up the Function Help Window. This screen displays all available function buttons, what they do, and their status (on/off). This feature will only display named functions for each function number if the selected locomotive has a roster entry whose functions have been defined in [≡] *Menu* > *Settings* > *Roster Settings* > *Functions*.

Programmable Buttons

There are nine buttons on the LT-50 that can be assigned operations by the user. These buttons can be customized to perform an operation different from their default assignment. The one, two, three, and four “dot” buttons will always identify their action with an on-screen description. If the description is blank, no action is assigned to that button.

You can access button configuration options via the “Throttle Settings” menu ([≡], 8, 1, 1). The programmable buttons will adjust based on the settings in your throttle and selected locomotive’s roster entry (if the selected loco has a roster entry). If you select a locomotive without roster data, the buttons will return to their defaults and/or will not display function names.



The ninth programmable button is used by pressing down the knob.

Maximum Number of Locos

The nominal current limit of the LT-50 is 1.4A continuous. The LT-50 will shut off automatically once a set thermal cutout is reached, and will automatically resume once it has cooled down. Below, we have included a table for some examples of exaggerated load values which can help you determine approximately how many individual locomotives you can operate simultaneously. Note that you will likely be able to run more than the specified Maximum. Your loads/results will vary.

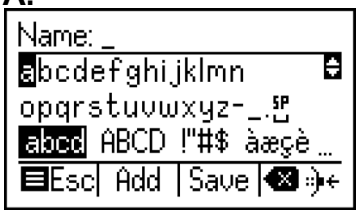
Loco Scale & Status	Typical Current Draw	Maximum Loco Count
(All Scales) Idle/Stationary	0.05A - 0.10A	15 - 25
(All Scales) Idle/Stationary With Sound	0.15A - 0.25A	5 - 10
(N) Under Heavy Load	0.15A - 0.35A	5 - 10
(N) Under Heavy Load w/Sound	0.30A - 0.50A	3 - 5
(H0) Under Load	0.25A - 0.75A	3 - 6
(H0) Under Load w/Sound	0.35A - 1.00A	2 - 4

Text Entry

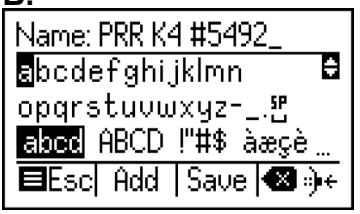
The LT-50 has a text entry interface that is used to fill out text-based fields. Whenever the throttle requires text input, it will display the text entry interface. An example for naming a loco in the roster is shown **(A)**.

Within the text entry interface, the knob or left thumb switch adjusts the position of the highlighted character. Move the cursor to the first character you want to enter, then use the button to 'Add' that character. If you make a mistake, you can delete a character using the backspace thumb switch button. You may navigate through your entered text using the direction button.

A.



B.



The right thumb switch moves the cursor up or down one whole line at a time. The right thumb switch also advances the cursor to other pages of characters. To quickly switch between uppercase and lowercase letters, use the Shift key.

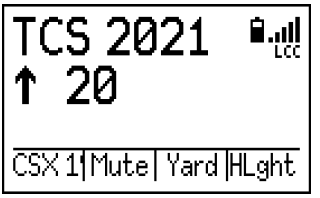
A fully-entered loco name is shown above **(B).** Letters and special characters can all be entered with the text entry interface. Numbers do not display within the text entry screen and can be entered directly with the throttle keypad.

When you have finished entering text, press Save or Enter.

Flashlight

The LT-50 features a built-in flashlight with two ultra-bright LEDs. To turn the flashlight on and off, press menu then button 0. The flashlight feature can also be programmed to any of the *Programmable Buttons*.

Operations



The Drive Window provides an overview of your currently selected locomotive and other important status indicators.

When no locomotive is selected, an “E” will be displayed in the top left corner which stands for “Empty”. If you had previously acquired a locomotive address prior to powering down, the throttle will attempt to re-acquire it. In order to operate a locomotive, use the Select Locomotive button. By default, pressing the left thumb switch inwards defaults to the quick recall function which will swap between the two most recently used locomotives.

Select A Locomotive

Press the button on the keypad to access the locomotive selection screen. Users are given two options for selecting a locomotive.
1. Enter the cab number manually using the numerical keypad.
2. If you have a roster stored in the LT-50, you can start entering the address to filter your available options. Use the thumb switches or knob to navigate to the desired locomotive, then press the Enter button or a thumb switch inwards to select it and return to the Drive Window.

To assume control of a different locomotive, press the locomotive button on the keypad again.

Pro Tip: If you would like to relinquish control of your currently selected address, enter the Menu and select “Operations” followed by “Release”. Once a locomotive address has been released, it will become the first option available in the recall list.

Reverse Direction

The direction of the locomotive is indicated by the arrow displayed under the cab number. The upward facing arrow ↑ indicates the unit will travel in its forward direction, and the downward facing arrow ↓ indicates it will travel in reverse. Users may change the direction of the unit by using the Reverse Direction button directly below the knob.

Using Loco Functions

Pressing the numerical buttons on the keypad will operate the function assigned to that number on your locomotive. When a function is turned on, the function number will be displayed on the screen.

To select higher function numbers than 9, press the Shift button. The new function page selected will “persist.” You must press the Shift button again in order to continue through function pages. This was designed to allow for easy repeated operation of higher-number functions. On the left side of the screen, a small “1” or “2” will indicate that you are controlling higher functions: 1 for F10 - F19, or 2 for F20 - F28.

Change Speed

When the command station is powered up, all locomotives will be set to speed zero, forward, with all functions off. To begin running a train, select a locomotive as described in the *Select A Locomotive* section. To adjust the speed of the active locomotive, rotate the knob clockwise to increase speed, and counter clockwise to decrease the speed. The throttle will always display 128 speed step mode but can still control locomotives operating in 28 speed step mode. Rotating the knob more quickly will change the speed more quickly.

Emergency Stop

The LT-50 has a unique 3-Stage Emergency Stop function. These three stages are described below:

Stage 1: Press the E-Stop button once to bring your current locomotive to a stop.

Stage 2: Quickly press the E-Stop button again to stop all of the locomotives on the layout.

Stage 3: Quickly press the E-Stop button a third time to turn track power off completely.

When E-STOP is initially pressed, a small countdown timer will appear in the drive window. Pressing the E-STOP button again before the timer runs out will escalate the E-STOP to the next stage. To release any of these stages of E-STOP, wait until the countdown has finished and press the E-STOP button again.

You can choose to enable or disable any of these three stages from being operable. For example, you may wish to use the E-STOP button for track power only. To configure this feature, navigate to:
Menu > *Settings* > *Throttle Settings* > *E-Stop Settings*

Consisting

It is common for operators to create and disband Multiple Unit “MU” consists during operating sessions. The LT-50 features a simple method for quickly creating and managing consists that is completely self contained in the LT-50. The consist will be saved in the internal storage of the LT-50, and will be available even after powering down the system. Any LCC throttle can select a locomotive in a consist, and will automatically drive all consisted engines.

Function buttons can be sent either to the currently selected locomotive (Current Cab), or all locomotives in the consist. This can be configured as described later in the *Locomotive Roster* section.

The LT-50 consisting system is capable of controlling the speed, direction, and functions for all locomotives within a consist. The internal consisting system can be used in conjunction with or independently of decoder-based CV19 consists.

The TCS consisting system features “in-cab control” which allows the user to select the lead locomotive of the consist, effectively putting you “in the cab” as an operator. The Enter  button can be used to quickly page through consist members and select the active cab.

Managing Consists

When a consist is created, the current cab address will become the first member of that consist. The following options in the “Consisting” menu can be used to manage consists.

Add Loco To Consist
Enter the address of the locomotive to be added, or select from the Recall/Roster list. Pressing the  button while entering the address changes the direction of the locomotive being added within the consist.

View Current Consist
Shows all members of current consist and their direction within the consist. Selecting a locomotive from the consist provides options to switch to that cab, remove that member, or change direction.

Clear Current Consist
Disbands the consist, returning all locomotives to independent operation.

Consist Functions
Determines what functions are assigned to the consist or to the selected cab.

Yard Mode

Yard Mode is a special operations mode of the LT-50 that is suited especially for switching movements. By default, the three dot button is configured to enable/disable yard mode from the main Drive Window. Yard Mode allows users to quickly and conveniently switch between a forward speed, a stopped locomotive, and a backwards speed using only the thumb switches. When in yard mode, the direction indicator on the Drive Window will show a letter “Y” instead of an arrow.

To drive the locomotive forward, press and hold either thumb switch in the up position. The locomotive will drive forward as long as the thumb switch is held in the up position. To drive in reverse, press and hold the thumb switch in the down positions. Releasing the thumb switch will return the speed to zero and the locomotive will come to a stop.

Latching Speed
Users may “latch” or lock in the current directions and speed of the locomotive by quickly double pressing either thumb switch in the up or down position. This can be useful if an operator needs to drive for a longer distance. The locomotive will maintain speed and direction until either thumb switch is pressed up or down again, releasing the latch.

Speed Adjustment
Yard mode default speeds can be changed during operation. Use the knob while holding either of the thumb switches in the up or down position, or when the locomotive is in the “latched” state. The speed for the left and right thumb switches can be adjusted independently. The speed adjustments will be retained until the throttle is powered off.

The default speed is the same as the Fast Increment/Decrement setting, which can be modified if desired. (, 8, 1, 3, 1)

Locomotive Roster

The LT-50 can store information and settings for each locomotive (by DCC address) in its internal memory. To view and edit these settings, use the following procedure:

1. Select the locomotive on a throttle (e.g. by address).
2. On the LT-50, navigate to *Menu > Settings > Roster Settings*

   Alternatively, if connected to JMRI, go to Menu > LCC > Configure Nodes Select the entry from the new window with your locomotive's DCC address or name, then select "Open Configuration Dialog".

The Roster Settings are saved for the given locomotive in the LT-50, and applied to every throttle that selects that locomotive. In the Roster Settings, you can specify the following information:

- ***Name:*** When specified, this text will appear on the throttles instead of the DCC address. You can set a road and cab number, or a type designation.
- ***User Description:*** You can put additional notes here, such as the owner's name (for a club layout). The TCS throttles do not display this text, but it is visible when going into the Roster Settings or in JMRI.
- ***Speed Step Mode:*** Choose between 28/128-speed-step-mode for DCC decoders, or between protocol version I and II for Märklin/Motorola decoders. *Note: Throttles will always display 128 speed steps, independently of the speed step mode used for the track*.
- ***Functions > F1 to F28***: Configuration per function button.
  - You can specify what each function does to help the operators. Select "Display" to pick from a list of common functions, or if you don't find your function there, then enter any text into the "Description" field. Operators can see the function list on TCS throttles by pressing ? on the drive screen or selecting *Menu > Operations > Loco Function List*.
  - ***Momentary*** functions are active so long as the button is pressed, and turned off when the button is released (default for F2/Horn). ***Latching*** functions (default for all other functions) turn on for a press, then turn off for the next press.
  - ***Consist*** functions are activated on all engines when running a consist. This is the default setting for F3-F28. Functions such as Brake, Notch Up, or Momentum should be set like this to influence all engines in the consist. ***Current Cab Only*** functions (default F0-F2) activate only on one locomotive, the first in the display on the throttle. Functions such as Horn, Bell, or Ditch Lights should be set like this for prototypical operations.
- ***F0 > MU Switch:*** Automatically controls your locos' headlights for prototypical operation in MU's/consists. More information can be found in the CS-105 Complete Guide.

DCC Decoder Programming

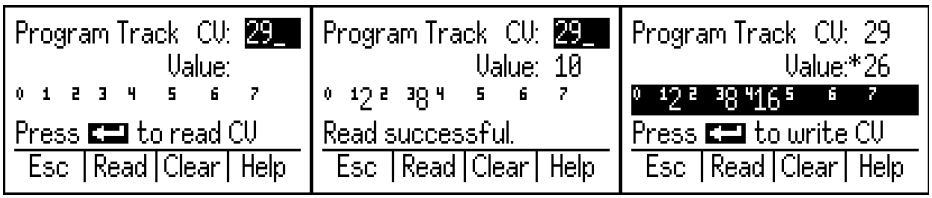
The CV Programming menu on TCS throttles allows you to change the settings of DCC decoders, such as the DCC Address or Configuration Variables (CV's).

After choosing the programming screen, enter the CV number (1 to 1024), **(A)** then press the Read button to view the current setting in your decoder **(B)**.

Scroll down once to edit the Value field, or scroll down twice to highlight the bit decomposition of the current value. Use buttons 0 to 7 to turn on and off the individual bits. The throttle will automatically add up the individual numbers **(C)**.

Finally, press the [↵] key to write the new value to the decoder.

A. **B.** **C.**



Mainline Programming

In this mode the currently selected locomotive will be programmed while it is on the layout. This is also called "Operations" mode programming or "Ops" for short. The LT-50 uses RailCom® to read the current value of variables, which is very fast and convenient. However, if the DCC decoder does not support RailCom, or RailCom is disabled, then an error message will be shown. New values can be written into the decoder even without RailCom support, but cannot be read back.

Programming Track

To use the programming track, enter the Menu, and choose *CV Programming* from the list of options. If you choose *Programming Track* or *DCC Address* from the CV Programming menu, The LT-50 automatically switches the Track Output from Mainline to Programming Track. Locomotives usually move slightly forward or backwards when reading and writing variables.

!!!WARNING!!! *When using the programming track, you must remove all locomotives from the track except the one you intend to program.*

DCC Address

From the CV programming menu of the TCS throttle, choose "DCC Address" from the list of options. The throttle will guide you through the process. This feature can be used to conveniently check or set the DCC Address of a decoder. To use this feature, the locomotive has to be placed on the Programming Track. The TCS throttle will first read and display the current address(es). Select "Set Short Address" if the desired address is between 1 and 127. Select "Set Long Address" to set the DCC address to a 4-digit format (typically a number between 128 and 9999). You can also clear a CV19 consist address by using the "Clear Consist Address" option.

RailCom®

RailCom is a bi-directional data communications technology defined by NMRA Standard S-9.3.2 and RailCommunity RCN-217. RailCom enables bi-directional communication between the command station and decoders, unlike in traditional DCC where the communication is exclusively in one direction (from the Command Station to the Decoder). The inclusion of RailCom opens up significant opportunities for future features and expansion. For example, the use of RailCom allows for real-time read-back of CV's while programming on the mainline. In traditional DCC, you would only be able to write to a CV, whereas with RailCom, writing and reading on the mainline are both possible.

Some other possibilities such as live feedback on a throttle for fuel or water level, temperature, and many other statistics are also unlocked with RailCom technology. Block detection becomes more integrated with RailCom as well, including the possibility of knowing who or what is occupying a block, rather than just knowing a block is occupied. This data could be used further to aide in automation setups and macros. A fleet of rolling stock could also be equipped with basic RailCom decoders to keep track of cars in yards or trains. The potential applications for RailCom are still being explored, and is an untapped wealth of possibilities!

RailCom is a highly-responsive system as well, allowing up to ~126 individual operations per second (depending on the available DCC bandwidth) at a bit-rate of 250Kbps by introducing a very brief interruption to the DCC track power. During this interruption, the RailCom detector on the Command Station will send or receive information to and from the decoder.

!!! IMPORTANT !!! "RailCom®" and "RailComPlus®" are not the same thing! RailCom® is standardized by the NMRA and RailCommunity. RailComPlus is an expanded version or RailCom which was modified and expanded upon by ESU (Electronic Solutions Ulm GmbH & Co.). The expanded featureset created by ESU is not available in any published documentation or standards. As such, TCS is not capable of developing our products to incorporate these unpublished features. Similarly, TCS cannot guarantee that all features of an ESU decoder featuring RailComPlus will operate correctly on a TCS command station with RailCom such as the LT-50.

RailCom® Requirements

In order to make use of RailCom, some requirements have to be met:

1. The Command Station must provide a RailCom cutout and have a way to handle RailCom communication traffic. (The LT-50 does this.)
2. RailCom Cutout must be enabled. You can find this in the settings: *DCC System Settings > Advanced > RailCom Cutout > Enabled*
3. The decoder must support RailCom.

   A) Supporting hardware is physically on the decoder. Check your decoder literature, or our online wiki resources: docs.tcsdcc.com For non-TCS decoders, ask your manufacturer.

   B) RailCom enabled in CV29, Bit 3 (see below)
4. RailCom-addressed feedback must be enabled in the decoder. CV28 bit 2 must be set. (Typical values are CV28=3 or CV28=131) If you're unsure, you can place the locomotive on the Programming Track to read the value of CV28. A TCS UWT will show you which bits are set.
5. The locomotive must be on the track directly connected to the LT-50's Mainline track output.

CV29 RailCom® Configuration

To enable RailCom on a TCS decoder, start by reading the value of CV29. Compare the value to the chart shown below and reprogram as necessary. More info can be found on the TCS Wiki Support - RailCom®

Note: Support for RailCom® via CV29, as well as the default value of CV29 will vary based on the specific decoder and the decoder manufacturer. Use this information only as a guide.

CV29 Configuration			
Bit	*Feature*	*Description*	*Value*
0	"Forward" Direction	This setting can be used to invert the polarity of the motor when the decoder receives a "forward" direction command (in DCC mode only)	1
1	Speed Step Mode	When enabled, 128 speed step mode is active	2
2	Analog (DC) Mode	The decoder will operate when DC power is applied only if this setting is enabled	4
3	Enable RailCom®	This setting determines whether the decoder will send or receive information over RailCom	8
4	3-Point Speed Curve	This setting will disable CV 5 and CV 6 if enabled	16
5	Address Type	When this setting is enabled, the decoder will use a 4-digit "long" address	32

Settings

To access the LT-50's Settings in JMRI, use the following steps:

1. Connect JMRI to the LCC network as described in the *Computer Interface* section below.
2. In JMRI, select the "LCC" menu option, then "Configure Nodes".
3. Expand the line that shows the LT-50 with your serial number, and click "Open Configuration Dialog"
4. Open or close the segments individually as needed.
5. Each individual setting comes with an accompanying help text.
6. After changing a setting, press the Write button to save the new value.
7. Changes come in effect when you close the dialog, or press in the bottom field "More…" > "Update Complete".

Select *Menu* > *Settings* > *DCC System Settings* to access the LT-50's Settings on a TCS throttle, To see the help text for any menu item, highlight it and press the ? button.

User Info Settings: Customizes the name of the LT-50 as it appears in the JMRI dialog.

Macros: View and edit command station macros. Macros execute a series of actions such as setting turnouts for a given route, and can be triggered from TCS throttles or LCC messages.

Status: Displays various information and measurements about the LT-50, such as track voltage, current load and number of locomotives in use. The values are read-only and changing them has no effect.

System Settings > Track Output: Customizes the short circuit detection current limit and delay to balance between safety and the needs of certain DCC circuit breakers. An LCC indicator, such as a light or buzzer, can be linked to the LT-50 to alert when there is a short circuit.

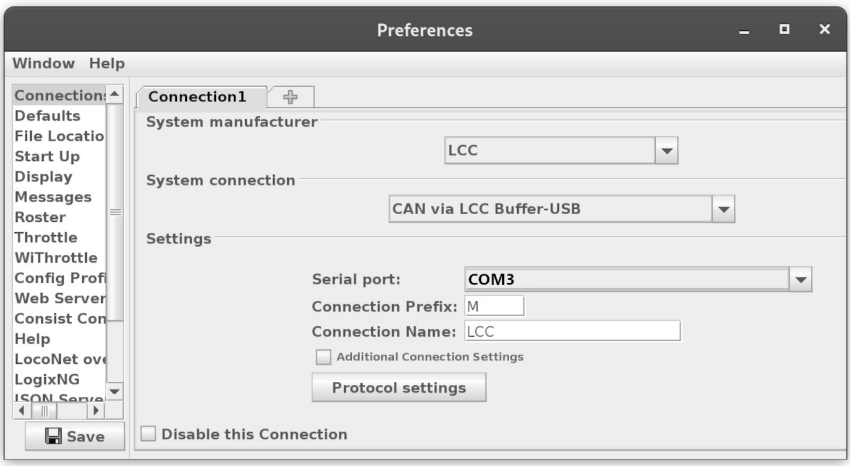
System Settings > Advanced: Customizes the command station and DCC-related functionality, such as enabling or disabling the Programming Track or the RailCom® Cut-out feature. Throttle heartbeats can be configured here. The Heartbeat feature will stop a running locomotive when a wireless throttle runs out of battery or out of signal range.

Computer Interface

To update device firmware, or do configurations via JMRI, you will need to connect the LT-50 to a PC. To do this, you need to purchase a USB-LCC adapter, such as the RR-CirKits LCC Buffer-USB™ and connect a RJ-45 cable between one of the open LCC ports on the LT-50 fascia board and the USB-LCC adapter. Refer to the manual of the USB interface for driver installation instructions for your computer.

Using the wired LCC cabling and a USB-LCC adapter, configure JMRI as shown in the screenshot on the next page

WARNING: *Do not wire your computer's network port directly to the connectors marked with the LCC logo!*



NOTE: the Serial port field will likely be different on your computer This example shows typical settings. Your configuration may vary.

Factory Reset

If for any reason the device encounters a problem that it cannot recover from, the LED flashlight blinks a diagnostic code, which may be helpful to TCS support. If you encounter this condition, it can be cleared by removing power.

In the event that a power cycle of the LT-50 does not solve the problem, a factory reset may be performed. Navigate to *Menu* > *Settings* > *Factory Reset*. Performing a factory reset will erase all user settings and roster data. If you want to back up your roster data, see the Complete Guide for instructions.

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Warranty Information

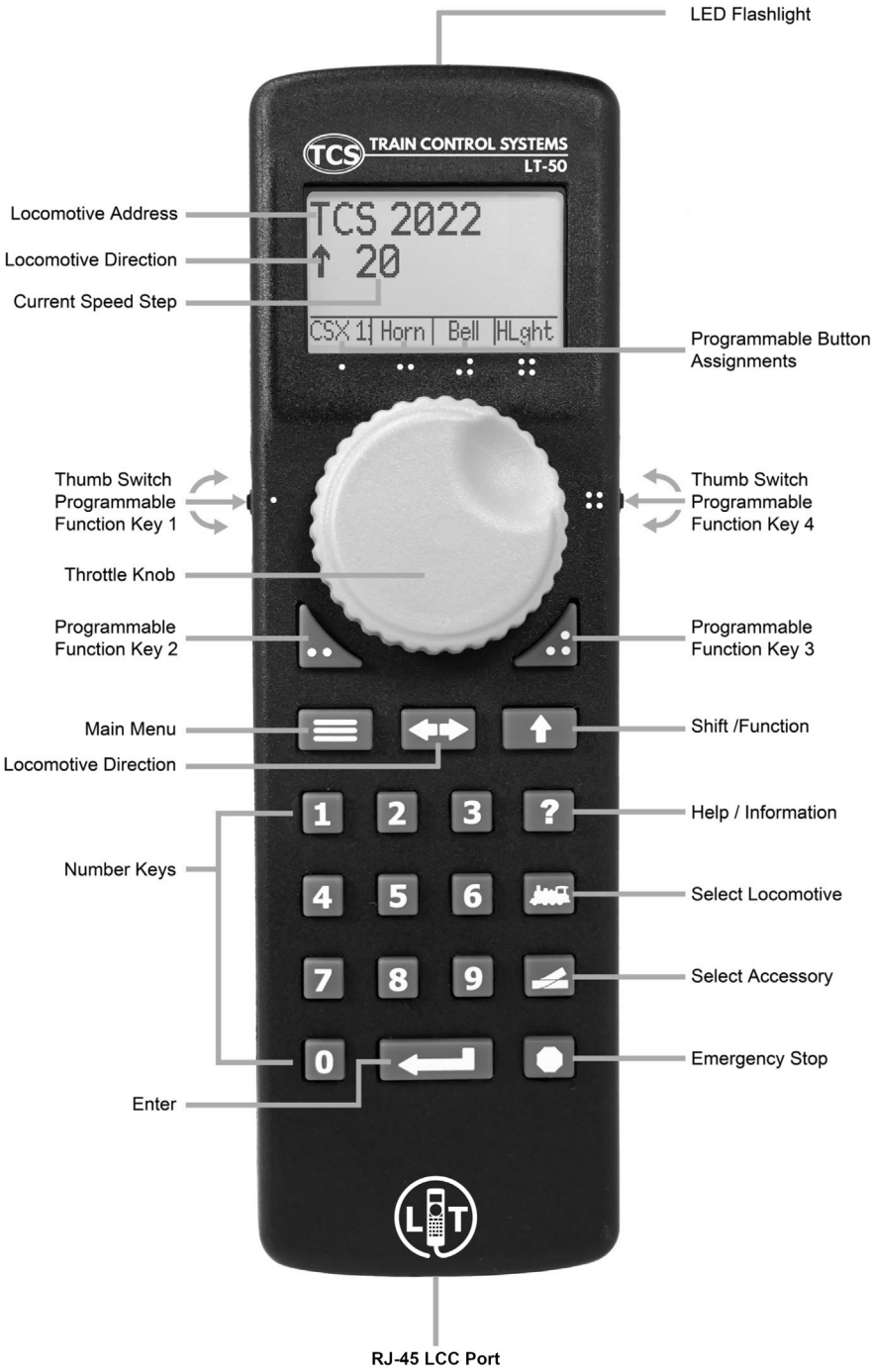
Train Control Systems, Inc. warrants this product to be free from defects in workmanship and materials, under normal use and conditions, for a period of one (1) year from the original invoice date. Please visit our website for additional warranty information.

Support and Contact

If you experience issues with your LT-50, or would like to speak with a technical support representative, please contact us.

techsupport@tcsdcc.com
(267) 733-3408

LT-50 DIAGRAM



For more information about your LT-50 device, please visit our website.