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Lionel

SER2 User's Guide



Congratulations!

Your layout has always been more than the sum of its parts. But until now, combining those parts into a complete system could be a challenge. Lionel's new Layout Control System or "LCS," fulfills the LEGACY promise of integrated locomotive and layout control.

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What is Lionel's Layout Control System?

LCS doesn't replace your existing Lionel Legacy Control system. It adds to it! You can control your layout from Lionel Cab Remote controllers or from smart devices like an Apple iPad and run locomotives, operate track switches, accessories and lighting. Create automatic events to control passing locomotives and other layout accessories or switches.

LCS is a modular system, with each product offering unique features. No single LCS product will do everything and not every layout will require every type of LCS device. But a fully realized LCS system will likely include the following:

- A Lionel Command Base (Legacy or Base-1L) for locomotive control
- LCS WiFi so you can control your layout from smart devices like an iPad®
- LCS ASC2, to operate switches, lighting and accessories
- LCS BPC2 for block power control
- LCS SensorTrack (one or more) which adds a new level of interactivity with compatible Lionel Legacy and Vision locomotives
- LCS SER2 for computer control and use of existing Lionel serial devices like the TPC-300 and TPC-400

How it works!

As you know, your Lionel Cab Remote sends commands to your Command Base. In turn, the base controls your locomotives via a one-way communication link. LCS works in parallel with your existing command base, adding a wired network of control modules. Spread across your layout, these LCS modules operate switches, lighting, accessories and track power blocks. LCS is bidirectional, meaning modules can send and receive commands.

And here's where it all comes together: Since LCS can also send commands back through the command base, LCS devices can operate your locomotives as well as your layout! For example, a module like SensorTrack™ can make a loco blow a grade-crossing signal as it passes. And the LCS WiFi module connects devices like an Apple iPad® to your layout so you and your friends can easily operate switches, locos and more.

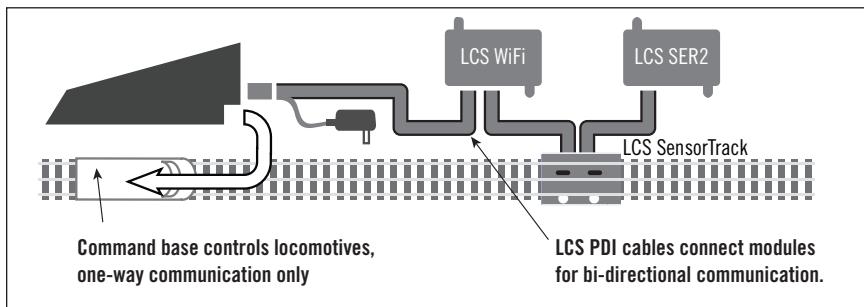


Figure 1. TrackLink vs. LCS PDI

LCS SER2 Module

The SER2 module converts the wired LCS PDI protocol connectivity to the familiar RS-232 serial port. A DB9 port and a 3 position screw terminal attachment are provided for ease of connection to older Lionel/ICC controls technology modules, such as the TPC, ASC, etc. SER2 also provides ample serial drive current to all connected devices, eliminating the need for an additional “serial booster.”

The SER2 module allows Legacy and TMCC commands to be injected into the Legacy Base and sent out to the TrackLink. Finally, multiple SER2 modules may be connected, so one LCS system can have many DB-9 connections.



Figure 2. LCS SER2 Module

Installing Your First LCS Device

Installing Your First LCS Device

The following section describes installation of a new LCS system. If you already have installed your first LCS component, please skip ahead to the next section titled “Installing additional LCS devices.”

When installing a new LCS system, the process you will follow depends on which (if any) Lionel Command Base is to be connected to your LCS system. Following sections describe starting a new LCS installation with a Legacy Base, a Base-L1 or without any command base.

The LCS “Starter Cable”

Every LCS system requires exactly one 6-81499 LCS Power Supply with DB9 Cable. This special cable has three connectors: (A) a DB9, with a “pig-tail” cable-mount power supply connector (C) and also a 10-foot cable with an “LCS PDI” connector at its end (B). See below:

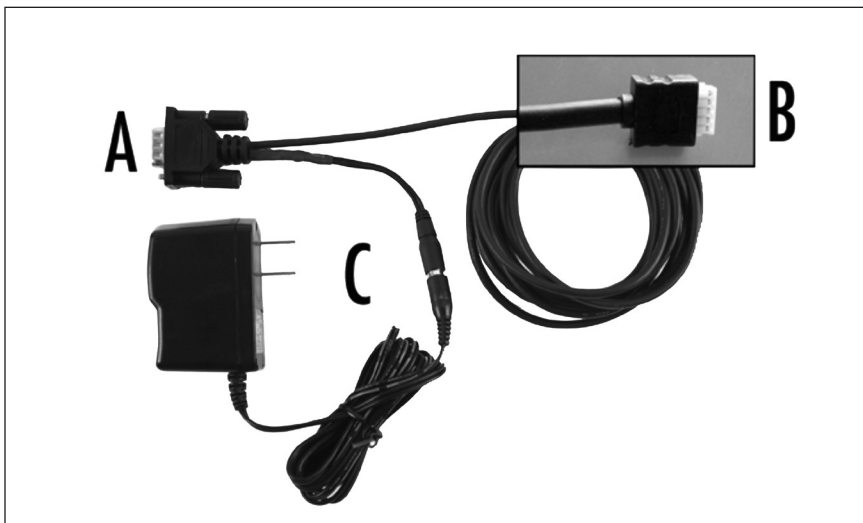


Figure 3. LCS starter cable

The cable receives power from the included DC wall-pack (12VDC at 1A). Power for each LCS device is supplied through the single LCS data cable. The “Starter cable” wall-pack is capable of powering dozens and dozens of LCS devices, depending on type. An additional power booster/cable extender is available for extremely large LCS installations.

Installing a new LCS system with a Legacy Base

To install a new LCS system on a layout with a Legacy Command Base:

1. Turn off power to your layout and Legacy Base
2. Connect the DC wall-pack to the female cable-mount connector of the 6-81499 “LCS Starter Cable.”
3. Connect the DB 9 connector of the 6-81499 “LCS Starter Cable” to your Legacy Command Base.
4. Connect the LCS PDI cable end of the 6-81499 “LCS Starter Cable” to either connector on your LCS device, such as an LCS WiFi or LCS SensorTrack or any other Layout Control System product.
5. Restore power to your layout and Legacy Base.
6. Plug in the LCS wall-pack power supply.

Note! If using a Legacy command base, it must have software rev 1.52 or higher installed.

Your system should resemble the figure below.

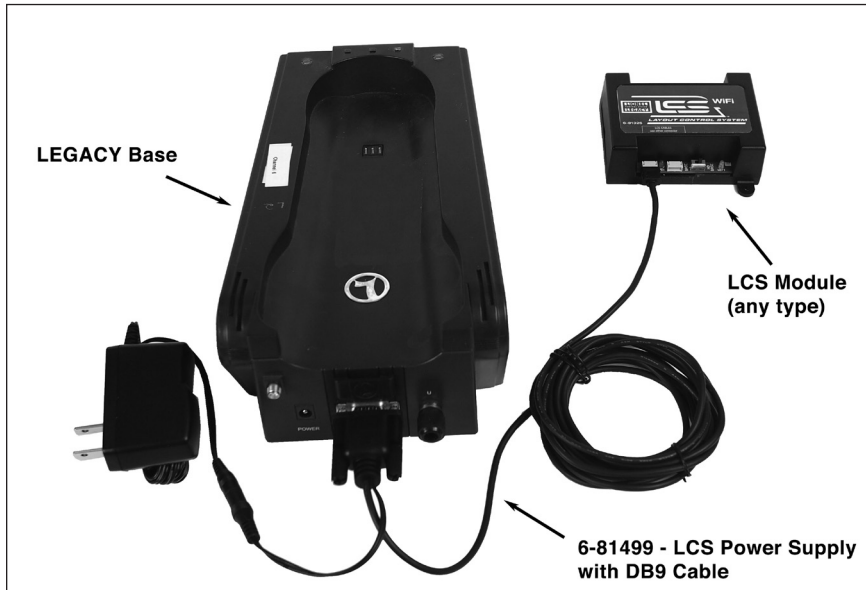


Figure 4. Installing a new LCS system with a LEGACY Base

Once connected and powered-up, the yellow LED on the Legacy Base will blink once every second. With this setup, you can control Lionel locomotives and Layout Control System products using a Legacy Remote(s) and optionally CAB-1L remote(s).

If you have additional LCS devices to install, see “Installing additional LCS devices.” If not, skip ahead to the next section of this manual, “Configuring your LCS Device.”

Installing a new LCS system with a Base-1L

To install a new LCS system on a layout with a Base-1L Command Base:

1. Turn off power to your layout and Base-1L.
2. Connect the DC wall-pack to the female cable-mount connector of the 6-81499 “LCS Starter Cable.”
3. Connect the DB 9 connector of the 6-81499 “LCS Starter Cable” to your Base-1L.
4. Connect the LCS PDI cable end of the 6-81499 “LCS Starter Cable” to either connector on your LCS device, such as an LCS WiFi or LCS SensorTrack or any other Layout Control System product.
5. Restore power to your layout and Base-1L.
6. Plug in the LCS wall-pack power supply.

Your system should resemble the figure below.

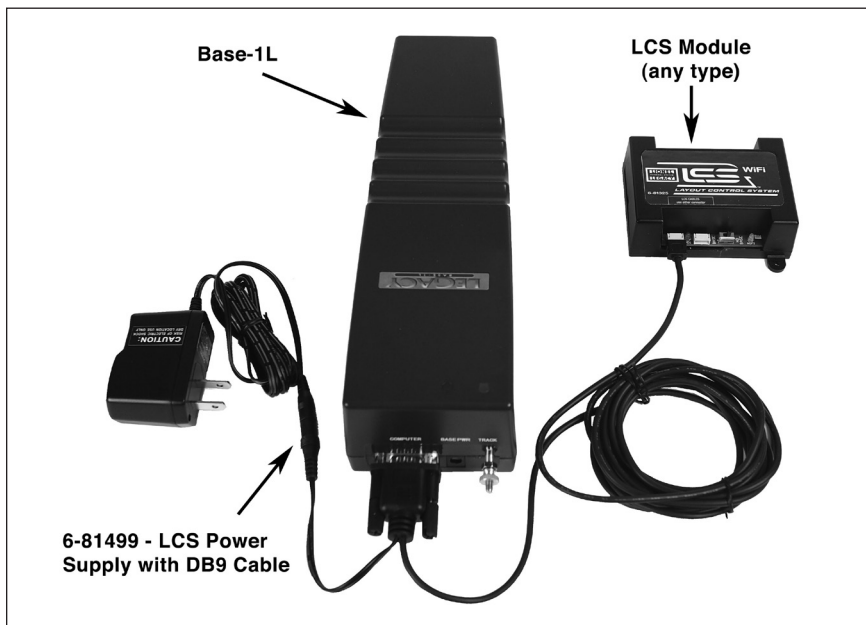


Figure 5. Installing a new LCS system with a Base-1L

Once connected and powered-up, the red LED on the Base-1L will blink once every second. With this setup, you can control Lionel locomotives and Layout Control System products using a CAB-1L remote(s).

If you have additional LCS devices to install, see “Installing additional LCS devices.” If not, skip ahead to the next section of this manual, “Configuring your LCS Device.”

Installing LCS with Legacy AND TrainMaster Command Bases

The following instructions apply ONLY if you are using one or more original CAB-1 remotes with a Legacy command base. It is not necessary to follow these instructions to use the CAB-1L remote with a Legacy command base.

In order to complete this installation, you will need a CAB-1 remote, an original TMCC Trainmaster command base, a Legacy Command Base with Legacy CAB-2 remote and the Legacy serial Y cable (included with the Legacy command base).

Note! This is the ONLY supported application for the Legacy Y cable. The “Command base” end of the Legacy Serial Y cable cannot be directly connected to accessory other than the original TMCC TrainMaster command base.

To install a new LCS system on a layout with a Legacy Command Base, an original TMCC Command Base and a Legacy Serial Y Cable:

1. Turn off power to your layout, Legacy Base and TMCC TrainMaster command base.
2. Connect the DC wall-pack to the female cable-mount connector of the 6-81499 “LCS Starter Cable.”
3. Connect the DB9 connector of the Legacy Serial Y cable to your Legacy Command Base.
4. Connect the “Command Base” end of the Legacy Y cable to the DB9 connector of your TMCC Trainmaster Command Base.
5. Connect the DB9 end of the 6-81499 “LCS Starter Cable” to the “Serial Comm” connector of the Legacy Y cable.
6. Connect the LCS PDI cable end of the 6-81499 “LCS Starter Cable” the either connector on your LCS device, such as an LCS WiFi or LCS SensorTrack or any other Layout Control System product.
7. Restore power to your layout, Legacy Base and TMCC TrainMaster command base.
8. Plug in the LCS wall-pack power supply.

Note! If using a Legacy command base, it must have software rev 1.52 or higher installed.

Installing LCS with Legacy AND TrainMaster Command Bases (continued)

Your system should resemble the figure below.



Figure 6. Installing LCS with Legacy AND TrainMaster Command Bases

Once connected and powered-up, the yellow LED on the Legacy Base will blink once every second. With this setup, you can control Lionel locomotives and Layout Control System products using any combination of LEGACY Remotes, CAB-1L remotes and original CAB-1 remotes.

If you have additional LCS devices to install, see “Installing additional LCS devices”. If not, skip ahead to the next section of this manual, “Configuring your LCS Device.”

Installing a new LCS system with NO Command Base

The Layout Control System can be used without a Lionel Command base. This would be appropriate for a layout which only uses “conventional” or “transformer-controlled” locomotives or a different type of locomotive control system such as DCC. An LCS WiFi is required, as are one other LCS module (such as ASC2 or BPC2).

To install a new LCS system on a layout that does NOT include Lionel Command Base:

1. Connect the DC wall-pack to the female cable-mount connector of the 6-81499 “LCS Starter Cable.”
2. Connect the LCS PDI cable end of the 6-81499 “LCS Starter Cable” the either connector on your LCS WiFi.
3. Set the Base/No Base switch to “NO BASE.”
4. Leave the DB9 connector of the 6-81499 “LCS Starter Cable” unconnected.
5. Plug in the LCS wall-pack power supply.

With this setup, you can control other Layout Control System products using compatible software on smart devices connected via WiFi or from a computer using a wired serial connected via an LCS SER2. Since this configuration does not include a command base, you will not be able to use Lionel Cab Remotes, command-controlled locomotives or wireless command controlled switches or accessories in conjunction with this LCS system.

If you have additional LCS devices to install, see “Installing additional LCS devices”. If not, skip ahead to the next section of this manual, “Configuring your LCS Device.”

Installing additional LCS devices

This section describes adding a new device to an existing Layout Control System installation. If you are installing a brand new LCS system, please refer to the previous section of this document, “Installing Your First LCS Device.”

Adding additional LCS devices to an existing Layout Control System requires an additional cable for each new device. These “LCS PDI Cables” come in a variety of pre-made lengths. They are not included with LCS devices, and must be purchased separately. LCS PDI Cables are available in a variety of lengths:

6-81500 - LCS PDI 1ft Cable

6-81501 - LCS PDI 3ft Cable

6-81502 - LCS PDI 10ft Cable

6-81503 - LCS PDI 20ft Cable

Each new device is connected via LCS PDI cables in a “daisy-chain” fashion (one to the next, and so on). The order of devices in the “chain” is up to you. The only exception is that an LCS WiFi must be the first device in the chain if no Lionel Command Base is present.

To connect each additional LCS device:

- 1 Find the “last” LCS device in the chain. One of its two LCS PDI connectors will be in use, the other will be empty.
- 2 Using your chosen length LCS PDI Cable, connect one cable end to the unused LCS PDI connector of the last LCS device in the chain.
- 3 Connect the second cable end to either of the LCS PDI connectors on your new LCS device (see figure below). Your new LCS device is now the last one in the chain.

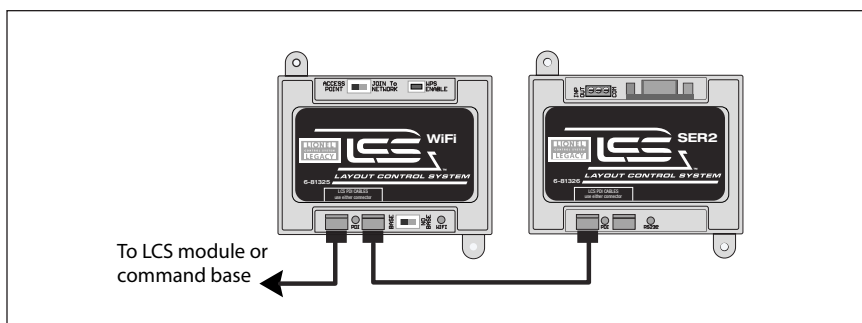


Figure 7. Installing additional LCS devices

Configuring your LCS Device

Your SER2 can be connected to a variety of serial devices. The following section will illustrate connections to the following:

- an original Lionel ASC control module.
- an MTH® DCS® Track Interface Unit (TIU)
- a complex layout using several SER2 modules

Note! You may use either the three screw terminal connector or the DB9 connector on one SER2. You may use both the DB9 and the comm/output screw terminals simultaneously. However, if your configuration requires using the SER2's INPUT screw terminal as well as the output, you cannot simultaneously use the DB9 connector. In this case, add an additional SER2 module to your layout.

Connecting Original TPC or ASC to an LCS SER2

If your existing layout includes older Lionel wired-serial modules, connect them to your SER2. The screw terminal connections are usually the most convenient, although the DB9 connector can also be used. Follow the wiring diagram below, with the LCS SER2's OUTPUT terminal connected to the other devices DAT connection. Also connect the COMMON terminal between the SER2 and the next device.

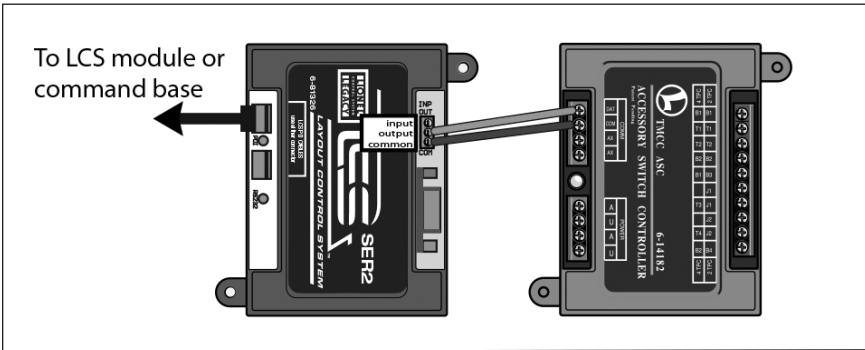


Figure 8. Connecting Original ASC to an LCS SER2

Wiring Guide for SER2 and older Lionel IC Controls devices

SER2 Terminal	goes to...	Lionel/IC Controls Terminal
OUT	<—>	DAT
COM	<—>	COM
INP	<—>	TXC (not used on all products)

Connecting an MTH® DCS® Track Interface Unit to an LCS SER2

If your layout includes an MTH® DCS® Track Interface Unit, it should be connected to your SER2's DB9 connector. Both the TIU and the cable shown must be purchased from an MTH dealer. Connect the two devices as shown below:

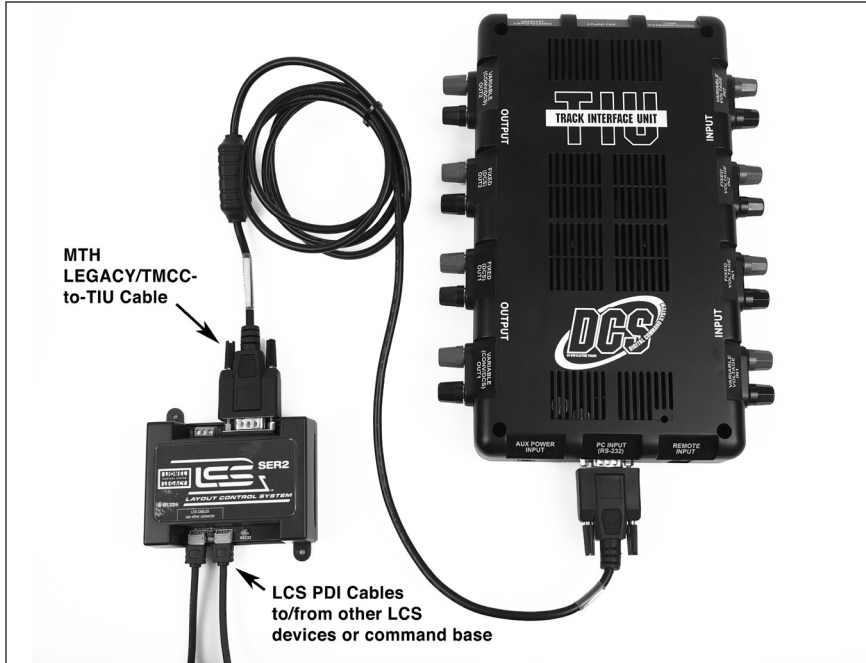


Figure 9. Connecting an MTH® DCS® Track Interface Unit to an LCS SER2

Using multiple SER2's in a complex layout

Your layout can include multiple serial ports simply by adding additional SER2 modules to your LCS system. Each new module should be connected from one to the next using LCS PDI cables (shown below left). Then, the 3 terminal connector or the DB9 connector should go to your various serial devices. A sample configuration is shown below, adapt it as necessary to meet your needs.

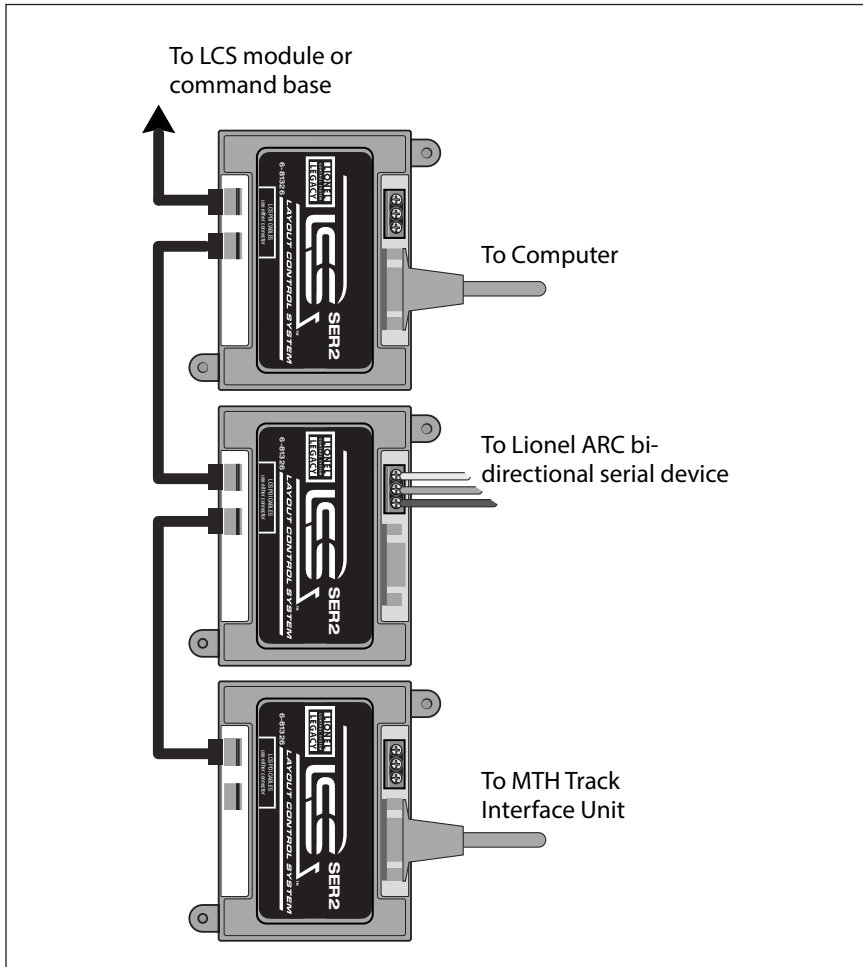


Figure 10. Using multiple SER2's in a complex layout

Operation of LEDs

On power up, the Red LED on your SER2 will turn on for 1 second. If it remains on continuously, this indicates a problem with the PDI cabling or your command base.

During operation, the Green LED flickers when commands are passing through the serial input and output of the SER2.

During operation, the Red LED flickers when commands are passing through the LCS PDI bus.

Specifications of the LCS SER2

Mechanical

- Size: 3.7" x 2.7" x 1.2"
- Mounting: Two #4 pan head sheet metal screws

LCS PDI Power Draw

- Idle power consumption: 10ma
- Operating power consumption: up to 150ma max.

Lionel Limited Warranty Policy & Service

This Lionel product, including all mechanical and electrical components, moving parts, motors and structural components, with the exception of **LIGHT BULBS, LED's & TRACTION TIRES** are warranted to the original owner-purchaser for a period of **one year from the original date of purchase** against original defects in materials or workmanship when purchased through a **Lionel Authorized Retailer***.

This warranty does **NOT** cover the following:

- Normal wear and tear
- Light bulbs or LED's
- Defects appearing in the course of commercial use
- Damage resulting from abuse/misuse of the product

Transfer of this product by the original owner-purchaser to another person voids this warranty in its entirety. Modification of this product in any way; visually mechanically or electronically, voids the warranty in its entirety.

Any warranted product which is defective in original materials or workmanship and is delivered by the **original owner-purchaser** (this warranty is non-transferrable) to Lionel LLC or any Lionel Authorized Service Station **MUST** be accompanied by the original receipt for purchase (or copy) from an **Authorized Lionel Retailer***, will at the discretion of Lionel LLC, be repaired or replaced, without charge for parts or labor. In the event the defective product cannot be repaired, and a suitable replacement is not available, Lionel will offer to replace the product with a comparable model (**determined by Lionel LLC**), if available. In the event a comparable model is not available the customer will be refunded the original purchase price (requires proof of purchase from the **Authorized Lionel Retailer*** it was originally purchased). Any products on which warranty service is sought must be sent freight or postage prepaid (Lionel will refuse any package when postage is due).

Transportation and shipping charges are not covered as part of this warranty.

NOTE: Products that require service that do not have a receipt from an LIONEL AUTHORIZED RETAILER* will be required to pay for all parts required to repair the product (labor will not incur a charge) providing the product is not older than 3 years from date of manufacture and is within 1 year from date of purchase. A copy of the original sales receipt is required.

In no event shall Lionel LLC be held liable for incidental or consequential damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

Instructions for Obtaining Service

If service for this Lionel LLC product is required; bring the item, along with your DATED sales receipt and completed warranty information (at the bottom of this page) to the nearest Lionel Authorized Service Station. Your nearest Lionel Service Station can be found by calling 1-800-4-LIONEL or by accessing the website at www.lionel.com.

If you prefer to send your Lionel product directly to Lionel, for repair you must FIRST call 586-949-4100 extension 2 or FAX Lionel at 330-286-4146 or write to Lionel Customer Service, 6655 Seville Drive, Canfield, OH 44406. Please have the 6-digit Lionel product number, the date of original purchase, the dealer where the item was purchased and what seems to be the problem. You will receive a return authorization (RA) number to ensure your merchandise will be properly tracked and handled upon receipt at Lionel LLC.

Once you have your Return Authorization (RA) number, make sure the item is packed in its original Styrofoam inner container which is placed inside the original outer display box (this will help prevent damage during shipping and handling). This shipment **MUST** be prepaid and we recommend that it be insured with the carrier of your choice.

Please make sure you have followed all of the above instructions carefully before returning any merchandise for service. You may choose to have your product repaired by one of Lionel LLC's Authorized Service Stations after its warranty has expired. A reasonable service fee should be expected once the product warranty has expired.

Warranty Information

Please complete the information below and keep it, along with your **DATED ORIGINAL SALES RECEIPT**. You **MUST** present this form **AND** your **DATED SALES RECEIPT** when requesting warranty service.

*A complete listing of Lionel Authorized retailers can be found by calling 1-800-4-LIONEL or by visiting our website at www.lionel.com.

Products that are more than 3 years old, from date of manufacture, are not applicable for warranty coverage, even if they have never been sold prior to this date. (Under no circumstance shall any components or labor be provided free of charge.)

Name _____

Address _____

Place of Purchase _____

Date of Purchase _____

Product Number _____

Product Description _____



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