Mini Commander EX

Instruction Manual

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1 Features

Operates as ENG and TR

The Mini Commander EX™ is specifically tailored for dummy engine operation. Train assignment is supported for lash-up functionality.

Supports Directional / Ditch Lighting

The Mini Commander EX had several lighting modes, supporting LED's on all outputs. Mode is selected by the AUX1 + # key when configuring the engine ID.

Supports Smoke / Strobe / Cab

The LC-2 output will re-purpose to Smoke (with boost), Strobe lamp, or Cab / Marker lamp(s).

Supports Coil Couplers

The Mini Commander Ex will support front and rear coil couplers triggered from the CAB-1.

Supports RailSounds™

Full RailSounds integration with a single wire interconnect to the sound system. Tested with all the most popular 3rd party sound kits.

Soft Set Technology™

The Mini Commander Ex has exclusive "Soft Set Technology"; which allows you to change the unit ID (1-99) and the AUX1 + # mode setting without complicated program / run switches or power on / off sequences.

A Built in Antenna

The built in antenna will suffice for many applications. A connector is provided for an extension antenna when the signal exposure to the built in antenna is not sufficient.

2 Tools required for installation

The tools listed below should help to get you organized for the installation. The Mini Commander EX is mounted with double stick tape, and therefore the installation can be reversed at a later time if desired.

- Small screwdrivers, Phillips and Slotted
- Small wire cutters
- Small long-nose pliers
- Wire strippers
- Low power soldering iron
- Rosin core solder
- Electrical tape

3 What's supplied

The Mini Commander EX kit consists of:

- Mini Commander EX circuit board
- Two (2) wire connectors with leads
- Ditch Lamp connector with leads
- Extension antenna wire
- Configure / Run switch
- Two (2) 1N400x diodes
- Two (2) small wire ties
- Heat shrink tubing
- Double stick tape
- Manual

4 Overview

The Mini Commander EX was designed for easy installation into any AC 3-Rail dummy engine or rolling stock. The unit measures only 1" wide x 2" long x .5" high in size and will fit in almost any environment you want to add command control operation.

The Mini Commander EX features four (4) outputs that can be operated from your CAB-1 control. These four (4) outputs can be thought of as five (5) outputs, as the LC-1 output can control both directional lights. The selection of LC-2 as the rear lamp or LC-1 as the rear lamp driver is done be the AUX1 + # selection at configuration time.

Exclusive to the Mini Commander EX are ditch LED outputs. These LED's are directly connected to the Mini Commander EX, and alternately flash when the HORN button is pressed. They are also directional, on only when the forward direction is set. Lash-ups also control the ditch lamps in the same manner as the front lamp.

Full support for lash-ups is implemented, allowing the lighting and couplers to activate based on "position" within the lash-up. Sounds are also muted for non-head engines in the lash-up, for compatibility with current products.

The Mini Commander EX features "Soft Set Technology" to enter the configuration mode. While the use of a configure / run switch is supported and installation is recommended, it is not necessary to use as long as you know the ID of the Mini Commander EX. The configuration sequence is the same no matter how you enter configuration mode. When used, no programming track or complex power-sequencing requirement is needed to setup your Mini Commander EX.

5 Mini Commander EX Operation

The Mini Commander EX outputs are controlled from the CAB-1 key sequences the same as you control any engine.

- Direction lamps are sequenced in synchronization with the DIR (<>) key in both command and conventional modes.
- The “F” and “R” keys will trigger the front and rear couplers respectively.
- Ditch lamps “follow” the front lamp and will flash alternately when the HORN key is pressed. The flashing will continue for about 8-10 seconds.
- AUX2 will turn off all lamps, including the ditch lamps.
- When LC-2 is opted to Smoke, Strobe, or Cab functionality; the AUX1 + 8 turns off the feature, while AUX1 + 9 turns on the feature.
- Smoke “boost” is triggered by pressing AUX1 + 9 while the Smoke feature is selected and on. The “boost” applies full track voltage to the smoke unit.
- Conventional mode is supported, with the exception of strobe, which will remain off in conventional mode.

Note: While in conventional mode, the internal “E” unit will always start in “N”, keep this difference in mind for conventional mode lash-ups.

6 Soft Set Technology

The use of Soft Set technology will allow you to configure the ID and engine code without operating the configure / run switch. While operating the configure / run switch is supported and even necessary at times (forgotten ID); the configuration sequence is entered the same when you use Soft Set or the configure / run switch.

To enter Soft Set, you must know the current ID of your Mini Commander EX. When shipped, the setting is accessory (ENG) one (1). Enter Soft Set by pressing ENG + 1, then the "SET" key 5 times minimum, with a one second pause between presses. When a lamp is connected to the Mini Commander EX on LC-1, it will start to flash. This is your feedback that you have entered Soft Set. Typically 5 presses of "SET" will be sufficient, but if you have no feedback, simply pressing "SET" a few extra times will insure you have indeed entered Soft Set.

To leave Soft Set, you must not press any CAB-1 key for six (6) seconds. This also means you need to complete a key press every six (6) seconds to keep the Mini Commander EX in configure mode.

Plan your keypad sequence in advance, and you will have ample time to configure the Mini Commander EX. Once you master the Soft Set capability, we believe you will tend to use it to do configuration.

If this seems cumbersome, simply fall back to placing the jumper on or switching the configure / run switch to "configure" to complete any configuration needed.

7 Mini Commander Configuration

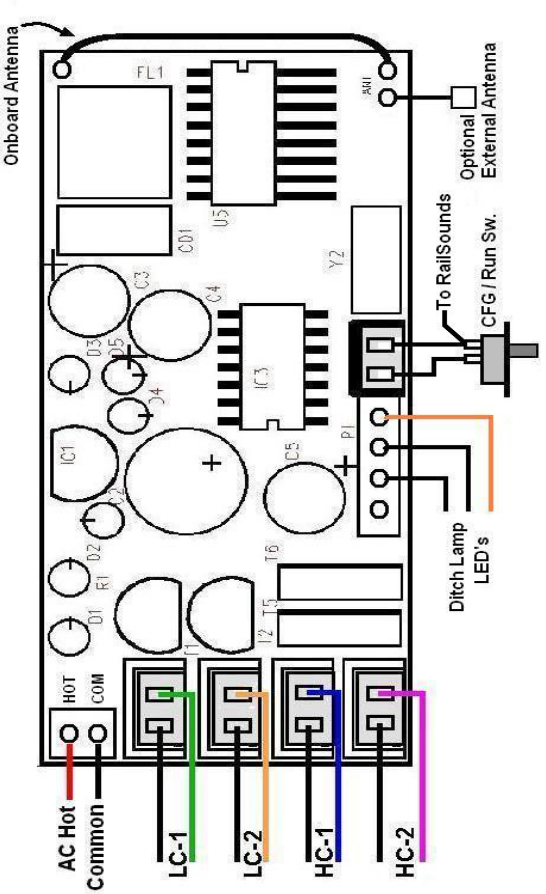
To Enter Soft Set Technology™ Configuration mode
Class (ENG) + **Number** (ID) + **SET** key Five Times

To set Class and ID Number
ENG + **Number** (up to 2 digits) + **SET**

To select Output Options (engine code)	
	+ **Number** sets LC-1 / LC-2 **Mode**
Engine Codes for LC-1 as front light only	
0	LC-2 operates as Smoke Unit
1	LC-2 operates as Strobe Light
2	LC-2 operates as Cab / Marker Light
3	LC-2 operates as rear directional light
Engine Codes for LC-1 as directional lights	
4	LC-2 operates as Smoke Unit
5	LC-2 operates as Strobe Light
6	LC-2 operates as Cab / Marker Light

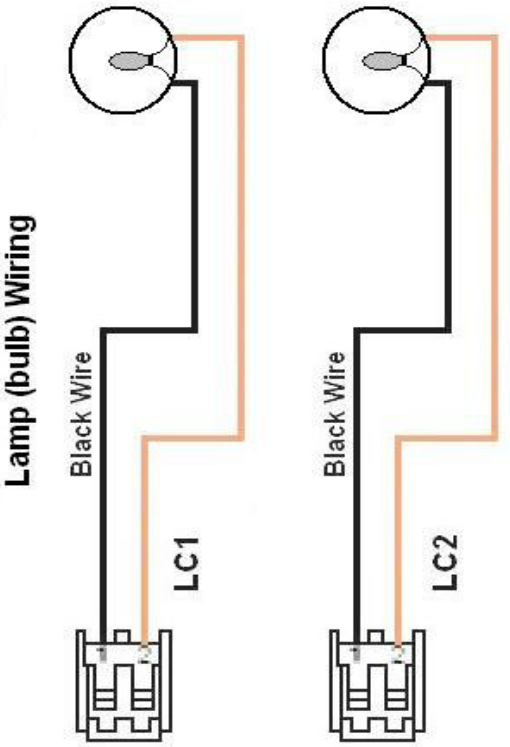
8 Connections

While reading through the following installation section, refer to the below diagram for connections.



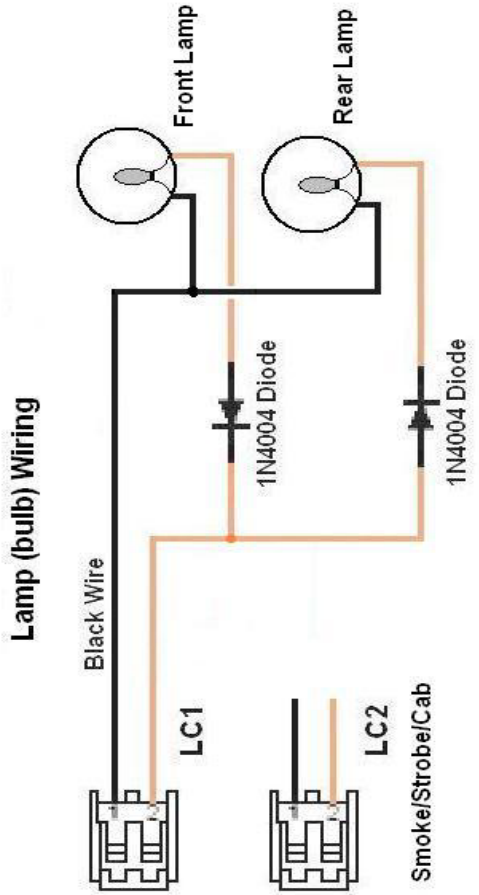
Connections continued

Basic directional lamps are supported by connection to LC-1 and LC-2. This configuration does not provide for Smoke, Strobe, or Cab / Marker Lamp features. When a rear lamp is not required, LC-2 may be used for those optional features.



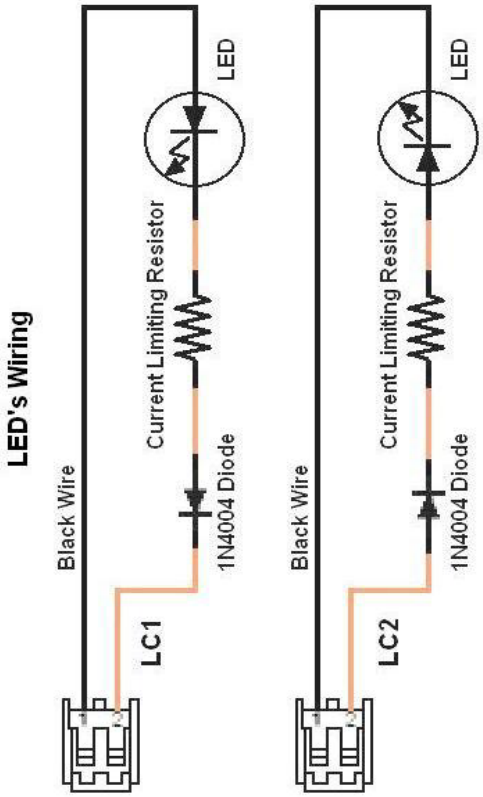
Connections continued

When it is required to have directional lamps *and* an optional feature (Smoke, Strobe, or Cab), the addition of two (2) diodes (included) moves the rear lamp to LC-1.



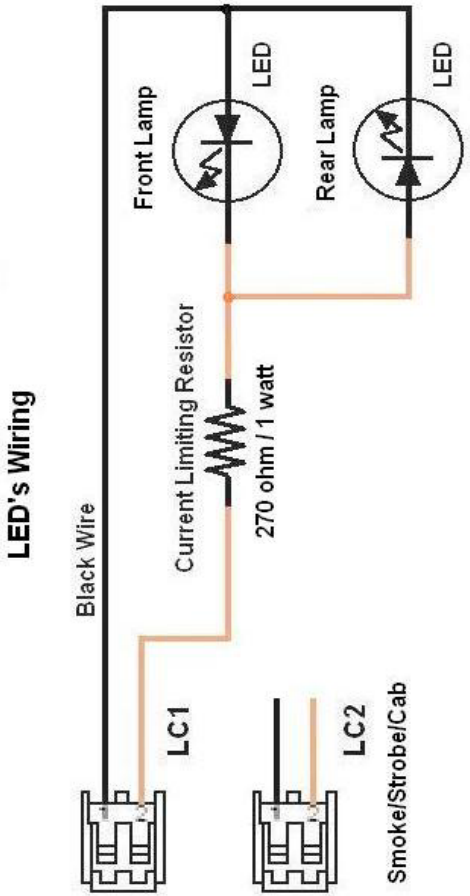
Connections continued

The Lamps may be replaced with White LED's for optimal realism. This configuration shows directional lamps on LC-1 and LC-2.



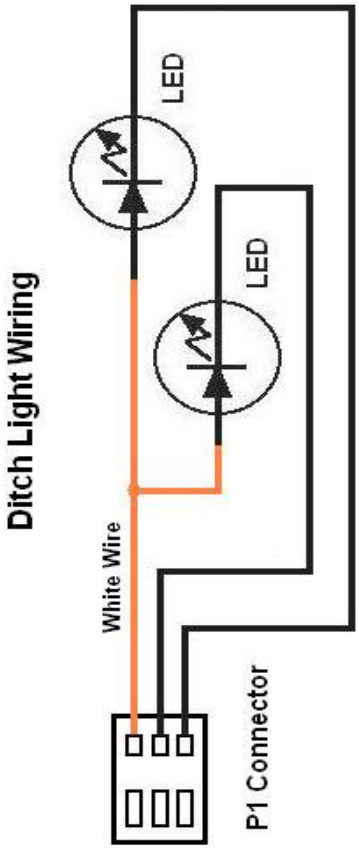
Connections continued

Similarly LED's may be used when LC-1 is operating both the front and rear lamps.



Connections continued

The ditch lamp LED's are connected as follows. No series resistor is needed for this connection. Be sure to use white LED's or excessive current may damage the output drivers.



Connections continued

Primary connections to the Mini Commander EX are power, the four (4) outputs to the lamps and couplers, ditch lamps, and the antenna.

Connector	Usage	Ratings
Hot/Com	AC power connection	12 to 20 VAC
LC-1	Front Lamp and optionally Rear Lamp	400ma continuous 800ma peak
LC-2	Rear Lamp or optionally the Smoke / Strobe / Cab	400ma continuous 800ma peak
HC-1	Front Coil Coupler connection	800ma continuous 1.6 amp peak
HC-2	Rear Coil Coupler connection	800ma continuous 1.6 amp peak
ANT	Optional Antenna	6 to 10 inch wire
P1 1&2	Configure / Run switch	Close to Configure
P1 3, 4, & 5	Ditch lamp LED's	15ma to 18ma max

P1 Connector connection details	
Pin 1	Configure / Run switch and RailSounds signal
Pin 2	Ground – only connect configure / run switch
Pin 3	Regulated 5v for Ditch LED's
Pin 4	Ditch LED connection 1 (cathode)
Pin 5	Ditch LED connection 2 (cathode)
Pin 6	VPP – do not use

A minimum amount of skill is required in some installations. If you feel that you need help, refer the installation to your dealer or directly to us. If needed, we can be reached at support@electricrr.com for technical advice.

9 Starting your installation

Please take time to plan out your installation. Since there are so many different products and manufacturers of dummy engines, it is impossible to describe an exact installation procedure in each case. For the most part however, there will be common areas to all installations. Before you begin, examine the wiring already present in the dummy engine – taking notes or digital pictures for reference is a good idea.

The installation will involve connecting the Mini Commander EX to the various lights and/or couplers and perhaps a RailSounds system.

The LC-1 and LC-2 outputs are usually connected to lamps. Use the supplied leads to splice into the lamp leads. If the lamp only has one lead (return is connected to chassis), then connect the white wire from the Mini Commander EX to the lead going to the bulb. You may remove the black wire from the connector and discard as appropriate.

Coil couplers come with a connector that is compatible with the Mini Commander EX HC-1 and HC-2 outputs. Simply route the wires after their installation, and plug them in.

The RailSounds requires splicing into the configure / run switch for the serial signal. The signal will only operate in the configuration mode when Soft Set Technology is used.

10 General installation notes

Since the Trainmaster system operates on a constant track voltage of 18 volts, the low current outputs will deliver half wave-rectified voltage of 9 volts. Most lamps are 12v or 14v and will be directly connected to the Mini Commander EX.

In some instances the lamps will be lower voltage, or perhaps LED's. If so, they usually have voltage-limiting circuitry present. It is possible to activate these voltage-limiting circuits from the Mini Commander EX, however in many cases you may remove them and add a series resistor and a diode to save space.

For example, if the bulbs are 1.5v, install a series dropping resistor rated at 330ohm - ½ watt. For other voltage bulbs, use the formula below to calculate the value of the resistor:

$$R = (18-V) / I$$

Where:

R = the value of the resistor in ohms
V = the lamp rated voltage
I = lamp current

As a rule, lower voltage bulbs have large operating currents. For example 1.5V bulbs require about 50mA for rated brightness. For a 6V bulb, the operating current is less, about 12mA. Keep this in mind when calculating the appropriate resistor values to sanity check your calculation.

When operating smoke units, it is recommended to use one of the high current outputs. If the resistance of the smoke unit is less than 30 ohms, you should replace it, preferably to a modern type designed to use liquid smoke fluid.

General installation continued

For LED's to be driven from the LC-1 or LC-2 output, you will need to add resistor in series with the LED to limit its current and a series diode (included) to protect it from damaging peak reverse voltage. The value of the resistor depends on the efficiency of the LED's and the level of brightness desired.

Another important consideration is how the engine code is set. When the code is set to 0, 1, 2, or 3; then it is possible for track voltage to be passed to the output in conventional mode. When the code is set to 4, 5, or 6, then ½ of track voltage is present in all modes.

For cases when full track voltage is present, set the value of the series resistor to about 620 ohms - ½ watt. This set the current to about 25ma for white LED's. The value is chosen to operate on command and conventional modes. The current is calculated at about 25ma for this recommendation.

When the voltage is limited to ½ track, 240 ohms - ¼ watt is a good choice. When in this mode, note there is no series diode required, as the two back-to-back LED's provide the peak reverse voltage protection.

11 Troubleshooting

- A rapid alternating flashing of the LC-1 and LC-2 outputs indicates TMCC signal loss. When the TMCC signal is restored, the Mini Commander EX will reset and resume operation.

- When in Configuration Mode, the LC-1 output will flash slowly (about once per second). This occurs during Soft Set or when setting the "Configure / Run" switch to Configuration. When no lamp is connected to LC-1, simply press the SET key a few additional times to be sure Soft Set was activated.

- LED polarity is important when connecting to the LC-1 and LC-2 outputs. If the LED fails to light, check the LED and series diode polarity.

- When operated on a Power Master, some voltage settings may cause some lamp flickering. This flickering is due to the fact that the output of the Power Master in conventional mode is not a pure sine wave. This only occurs when the Power Master is in conventional mode. Moving the throttle slightly will usually stop the flickering if it is objectionable.

- When the Mini Commander Ex does not detect a command signal for 1.8 seconds, it will enter conventional mode. Once in this mode, it will not operate in command mode unless powered off for greater than five seconds to allow a reset to occur.

12 Limited Warranty

The Electric Railroad Company warrants to the original consumer purchaser that this product will be free of defects in materials and workmanship for a period of 90 days from the date of original purchase. This warranty does not cover service, repair, or replacement to correct any damage caused by improper installation, improper connection, external electrical fault, accident, disaster, misuse, abuse, or modifications to the product. All other express or implied warranties, including the implied warranty of merchantability and fitness for a particular purpose, are hereby disclaimed. If this product is not in good working order as warranted, the sole and exclusive remedy shall be repair or replacement. In no event shall The Electric Railroad Company, or any dealer, distributor, or authorized installation and/or repair service provider be liable for any damages in excess of the purchase price of the product. This limitation applies to damages of any kind, including but not limited to, direct or indirect damages, lost profits, lost savings or other special, incidental, exemplary or consequential damages whether for breach of contract, tort or otherwise, or whether arising out of the use of or inability to use the product, even if The Electric Railroad Company, or any dealer, distributor, or service provider has been advised of the possibility of such damages or any claim by any other party. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. During this warranty period, the product will either be repaired or replaced (at our option) without charge to the purchaser, when returned either to the dealer with proof of the date of purchase or directly to The Electric Railroad Company when returned prepaid and insured with proof of date of purchase. Some states do not allow limitations on how long an implied warranty lasts, so such limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

13 Repairs

Each and every product is thoroughly tested before it is shipped. The likelihood that it is not working when it reaches you is very small. However, if after troubleshooting it yourself you cannot get it to work properly, you should contact us to help determine the problem.

Should your product ever need repair, you should return it postpaid directly to The Electric Railroad Company. If the product is within the warranty period, it will be repaired or replaced and returned to you free of charge. Units out of warranty will be repaired or replaced for a service charge of $25.00 at our option.

Please email to support@electricrr.com for return authorization before returning any product.

14 Disclaimer

Improper installation or configuration of the Mini Commander EX can cause overheating and fires! Since it is not possible to understand every installation, it is the consumer's responsibility to verify proper operation of the Mini Commander EX to prevent malfunction. If you are unsure of your planned installation's compatibility, please contact us first before taking any risks!