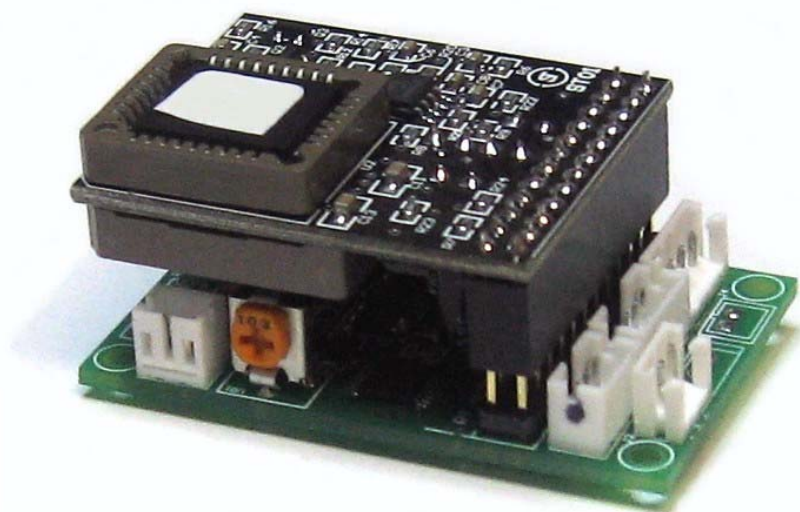




Railsounds Commander

Instruction Manual



Revised: October 2009

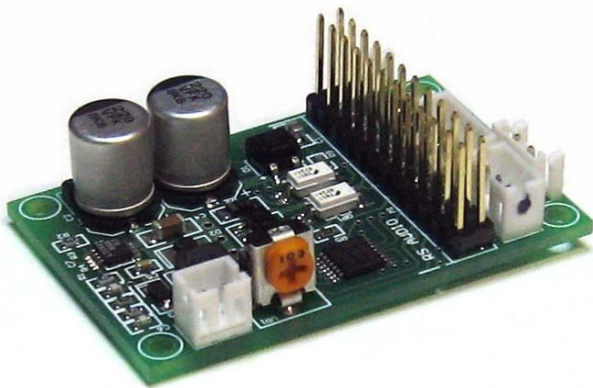
Railsounds Commander Kit

Cool Features

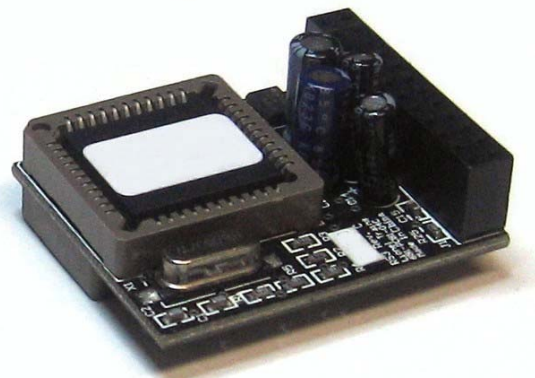
- Combines Railsounds 4.0 standard hardware with next generation technology
- Compact size, uses Railsounds Audio Board only, no Power Board required
- Multiple trigger options for chuff and diesel ramp up/down
- No adjustments required
- Provisions for battery and Railsounds/Signalsounds switch
- Fully compliant with TMCC standards
- Conventional and Command mode operation
- Easily interfaced with other Electric Railroad Company products
- Only 1.95" L x 1.25" W x 0.95" H

Overview

The Electric Railroad Company RailSounds Commander is the smallest, most full featured, highest performance RailSounds 4.0 upgrade available for your locomotives. This innovative upgrade utilizes Lionel Railsounds 4.0 technology, combined with a single power controller that supports Command and conventional mode, including battery backup. The RailSounds Commander operates standalone, or in conjunction with the full product line of Electric Railroad's TMCC upgrades. The small size and interface flexibility is unparalleled in the marketplace, so just about every locomotive can have a high performance sound system.



Railsounds Commander



Railsounds Audio Board

Parts Included

- Railsounds Commander circuit board
- Railsounds audio circuit board
- Speaker & baffle
- 3 Position to 4 position power & data cable assembly
- 4 Position Battery & RS/SS switch cable assembly
- Mounting hardware
- Heat shrink tubing
- Cable ties (2)
- Instruction manual

Additional Parts in Diesel Kit:

- 2 Position VCO cable assembly

Additional Parts in Steam Kit:

- 3 Position trigger cable assembly
- Reed switch assembly
- Magnet

Recommended Tools

- Low wattage soldering iron
- Rosin core solder
- Heat gun
- Small screwdrivers - phillips & flathead
- Small wire cutters
- Small long-nose pliers
- Wire strippers
- Zap-A-Gap CA+ glue or equivalent (for steamer installations)

Reference Diagrams

At the rear of this manual are the following diagrams which may be removed and placed nearby for easy reference while performing the steps in the instructions:

- Railsounds Commander Connector Pin Designations
- Wiring Diagram for Conventional Diesel & Electric Units
- Wiring Diagram for Conventional Steamers
- Wiring Diagram for Cruise Commander in Powered Diesel & Electric Units
- Wiring Diagram for Cruise Commander in Powered Steamers
- Wiring Diagram for AC / DC Commander in Powered Diesel & Electric Units
- Wiring Diagram for AC / DC Commander in Powered Steamers
- Wiring Diagram for Mini Commander 2 in Powered Diesel & Electric Units
- Wiring Diagram for Mini Commander 2 in Powered Steamers

Important Notes

- ⊕ If the project will involve drilling, cutting, or filing of metal parts, it is important to protect any installed electronics from metal debris. De-burr holes that will contain wires to prevent chaffing. Special precautions should be taken when working on and around Magne-Traction equipped units that will attract and collect metal debris.
- ⊕ Leave circuit boards in their anti-static packaging until ready to be installed. Dissipate any static electricity before handling by touching a grounded metal object. Avoid working on carpeted floors in cool dry areas and, if possible, use an antistatic wrist strap. It's best to hold circuit boards by the edges and avoid touching contacts and components.
- ⊕ Take care when connecting or disconnecting cables and plug-in circuit boards. When disconnecting a cable, always pull on the cable connector, not on the cable itself.
- ⊕ The wire colors used in locomotive production may vary over time and differ from what is pictured in this manual. Tracing individual wires to their end point to verify identity is highly recommended.
- ⊕ Pictures of products may vary from actual products received. The Electric Railroad Company reserves the right to improve the products on successive manufacturing cycles.

Installation

Before beginning, please take time to read through all the instructions and plan out your installation. If other Electric Railroad Company products are being installed together with the Railsounds Commander, familiarize yourself with each one, as well as how they connect together.

Overview

The installation process involves mounting the Railsounds Commander circuit board, mounting and connecting the speaker, and then making the other necessary connections: power, serial data, as well as trigger or motor sensing. Most important of all the steps, is placement of the speaker and use of a baffle. These are absolutely essential in order to obtain the highest quality sounds.

Preparation

If existing hardware is being replaced, begin with an examination of the unit to determine what to keep and what parts will not be needed. For some projects, existing parts may still be useful. Although this will vary, depending on the project, possible candidates include slide switches, triggering mechanisms/switches, and mounting brackets. Note that existing speakers will generally be lower quality than the one provided with the Railsounds Commander kit. However, a larger oval, unusual design, or recently manufactured speaker may be acceptable if still in good condition and rated at 8 ohms and at least 0.5 watts. When handling existing wires, be careful not to flex soldered connections excessively.

Mounting

Before mounting the new parts, it's important to spend some time trying out different placement options. Consider where chassis holes exist or could be drilled if needed. Don't forget to check the shell for obstructions and, of course, ensure it can be reinstalled without coming into contact with newly installed parts or wiring.

1. A high quality speaker and matching baffle are included in the Railsounds Commander kit. As shown in Figure 1, the baffle may be mounted in a variety of ways, using the mounting ears, with double stick tape, or a small hole may be drilled and a self-taping screw used.

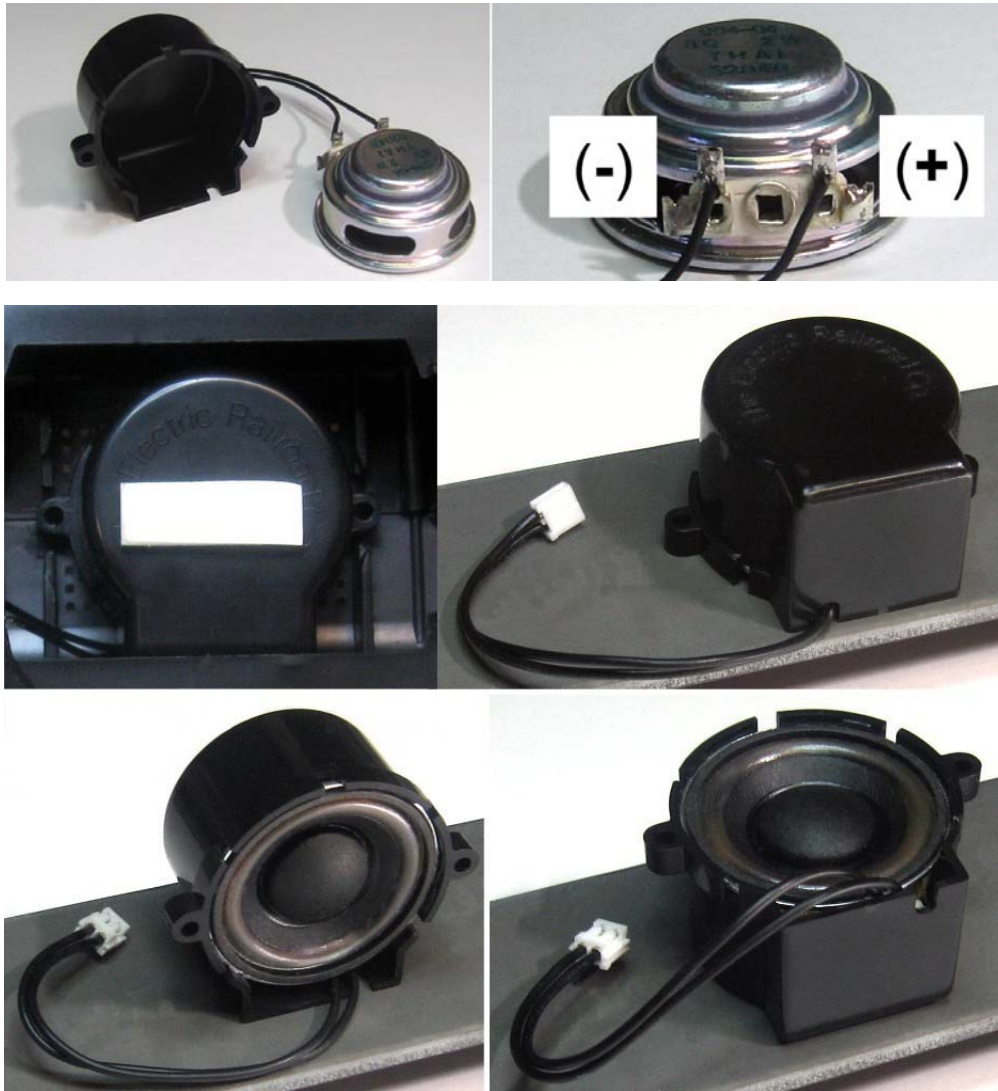


Figure 1 – Speaker & baffle with mounting options

If possible, mounting options that direct the sound downward will give the best results. Ensure that there are plenty of holes in front of the speaker to enable sounds to be radiated outward. With other mounting options, ensure that there is an opening in the shell, such as open windows.

Carefully install the speaker in the baffle, ensuring that wires are routed through the cut-out and will not be pinched. Snap the speaker into the baffle by applying pressure on the rim of the speaker only.

2. After test fitting the Railsounds Commander & Railsounds Audio Board together, carefully unplug the Railsounds Audio Board and set it aside before permanently mounting the Railsounds Commander circuit board. Refer to Figure 2 and, when ready, use two layers of double stick tape 1 ½ inches by 1 inch to mount the Railsounds Commander circuit board.

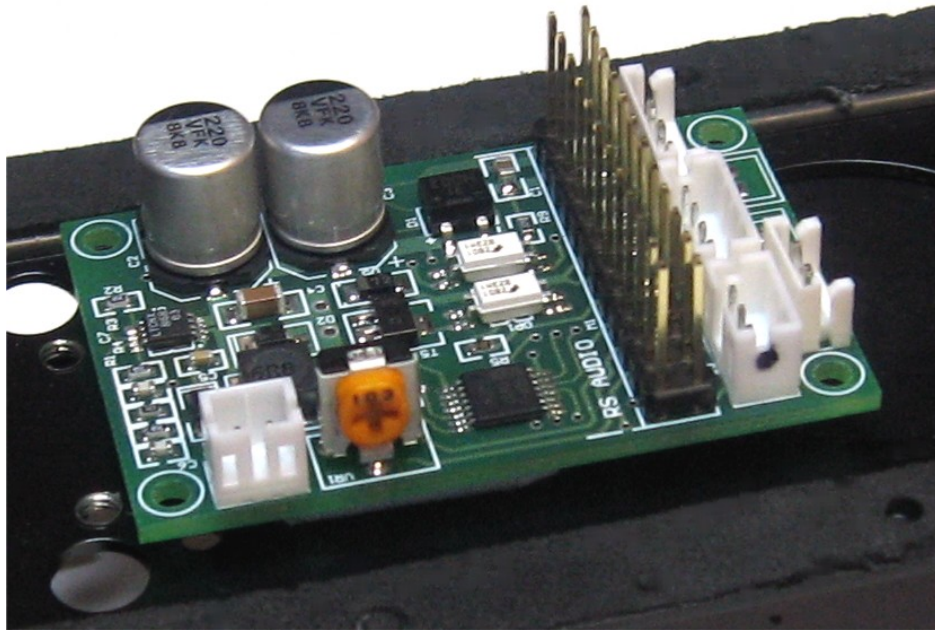


Figure 2 – Circuit board mounted

Wiring

The appropriate wiring diagram and connector pin designation drawing may be removed from the rear of this manual for easy reference while performing the following steps. Take your time while wiring. Wires may be trimmed to remove excess length, but don't overdo it. Strip wire ends $\frac{1}{4}$ inch and then twist the exposed strands before making connections.

The Railsounds Commander is a very flexible design that can be used in a wide variety of applications. As a result, all of the steps that follow will not be required to successfully complete a specific project. Therefore, each step includes 'Applies To' information to help you determine the appropriate steps that apply to your project.

1. Speaker connection.

Applies To: All powered, un-powered, conventional, and TMCC applications.

Refer to Figure 3 and plug in the 2 position connector at the designated point on the Railsounds commander circuit board.

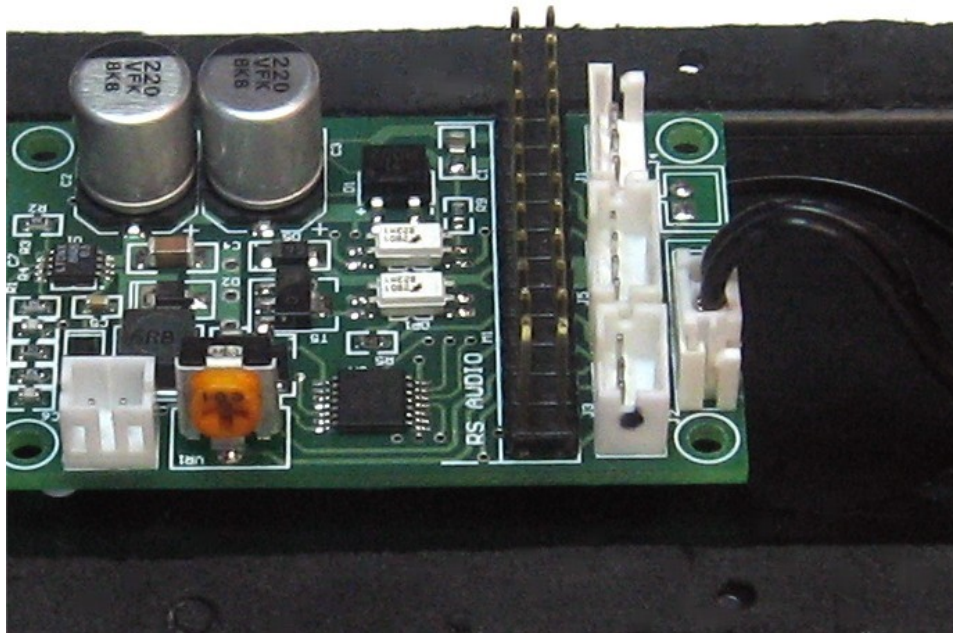


Figure 3 – Speaker connection

2. Motor Sense (VCO) connections.

Applies To: Powered diesel and electric units, conventional and command (TMCC), with AC or DC motors. This step is not needed for Steamers or un-powered diesel & electric units that require an external trigger for chuffing or to detect motion.

Locate the 2 position VCO cable assembly which has two gray wires. Refer to Figure 4 and connect each wire to one of the motor brush wires or connections. It does not matter which wire goes where. Plug in the 2 position connector at the designated point on the Railsounds commander circuit board.

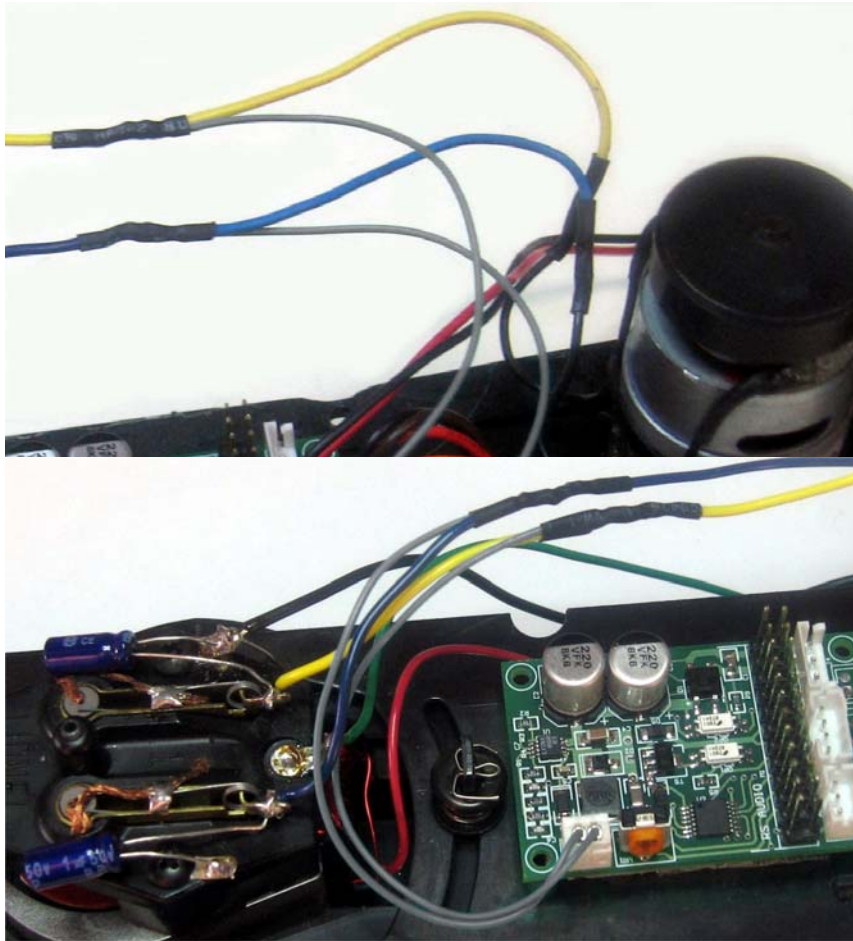


Figure 4 – Motor sense (VCO) connections

3. Battery and RS/SS switch connections

Applies To: All powered, un-powered, conventional, and command (TMCC) applications.

A 9 volt battery will enable sounds to keep playing when the power is low or is interrupted. This is recommended when some or all operations will be in conventional mode. For command mode operations, use of a battery is optional.

The RS/SS switch enables selecting between full Railsounds (RS) and Signalsounds (SS), which includes only horn & bell sounds. Installation is optional and a switch is not included. Without the switch, the full compliment of Railsounds is always enabled.

To use these features, refer to Figure 5 and locate the 4 position Battery & RS/SS switch cable assembly. Plug in the 4 position connector at the designated point on the Railsounds commander circuit board.

Use only a standard (non-rechargeable) 9 volt battery and do not allow the metal case to contact circuit boards or other electrical connections. To provide for future use of a battery, install the cable assembly and then cover the battery clip, as shown in Figure 5, so that the contacts do not accidentally touch other internal parts.

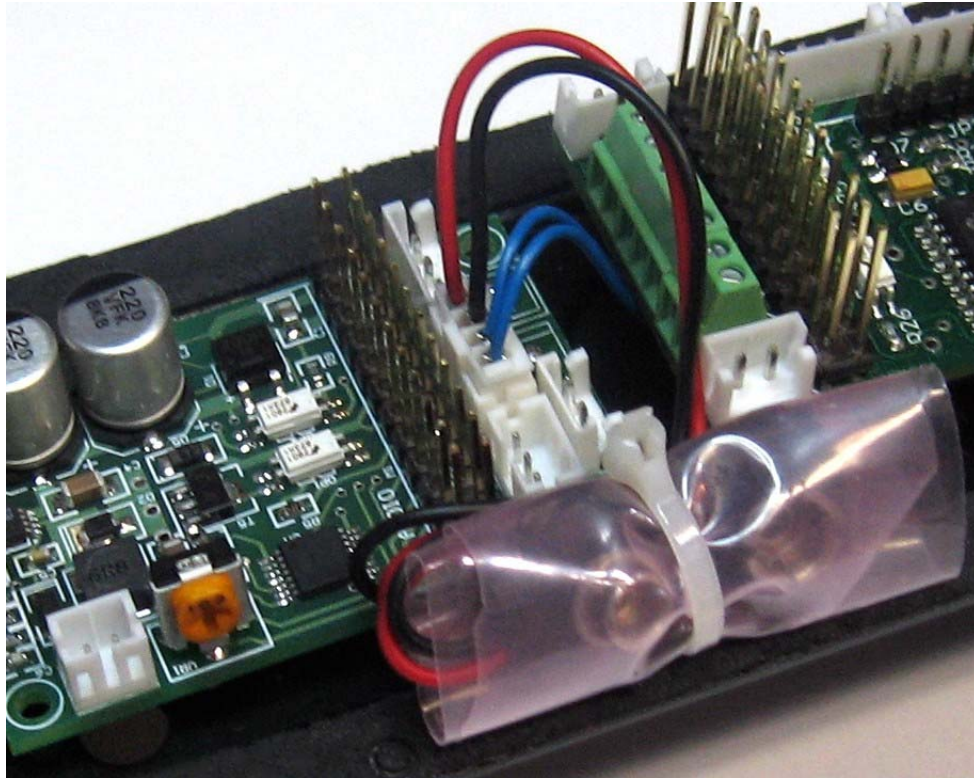


Figure 5 – Battery clip installed with protective cover

If installing an RS/SS switch (not included), connect the blue wires to the switch. When the two wires are connected together (SS - switch closed) the Railsounds Commander will be in Signalsounds mode and only horn and bell sounds will be played. In the opposite position (RS - switch open), the full compliment of Railsounds will be played.

Caution - If installing an RS/SS switch, both of the blue wires must be connected directly to the switch. Any connection from the switch to the chassis or to a chassis (AC) common connection will result in a destroyed Railsounds Commander.

If no switch is being installed, either cut the blue wires at the connector or take measures to ensure no exposed wires will come in contact with other internal parts.

4. Trigger connections.

Applies To: Steam locomotives, as well as un-powered diesel & electric units, conventional and command (TMCC). This step is not required for powered diesel units.

Steamers require a sensor switch to trigger the chuff sounds. Un-powered diesel & electric units can also benefit from this set-up to determine whether or not they are in motion, so diesel ramp down/up and other motion dependent sounds occur at the proper time.

For steamers, the Railsounds Commander will typically be mounted in the tender and the chuff trigger installed on a tender truck. To have synchronized chuffing, the chuff sensor switch will need to be installed in the locomotive, either on a wheel or the smoke unit lever on a piston type smoke unit. A tender truck installation is shown in Figure 6.

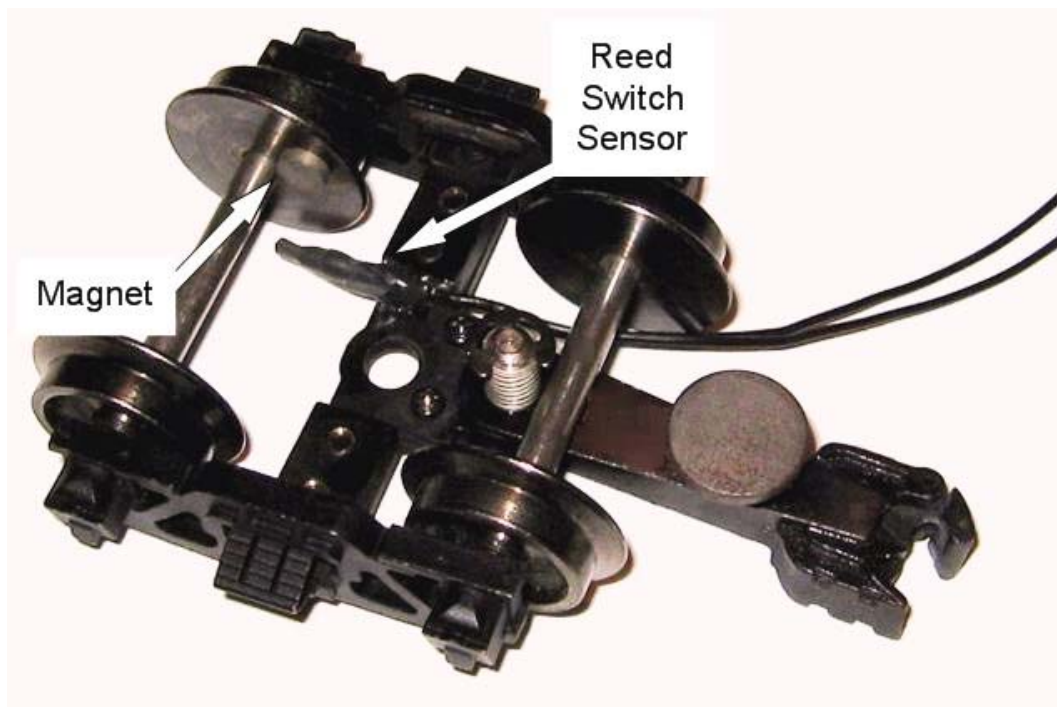


Figure 6 – Chuff trigger installation

Note that the magnet on the wheel is located inward from the flange edge, almost touching the axel in order to provide the clearance needed for switches and crossovers. Allow about ¼ inch clearance between the magnet and the sensor, as the wheel set will normally have some lateral play.

For best results the sensor switch should be positioned slightly off center from the magnets path, otherwise a double chuff may be generated as the magnets north and south poles move past the sensor switch. Use Zap-A-Gap or similar adhesive to mount the sensor and magnet.

Locate the 3 position trigger cable assembly and connect the orange wires to the wires from the reed switch sensor. It does not matter which wire goes where. While referring to Figure 7, plug in the 3 position connector at the designated point on the Railsounds commander circuit board.

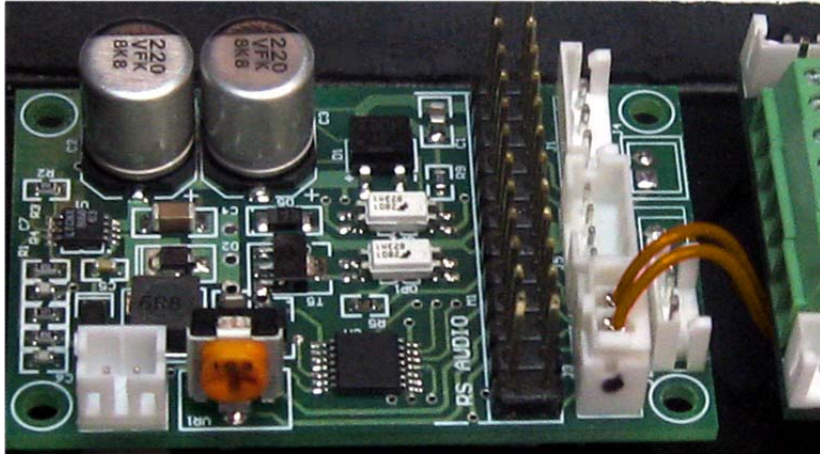


Figure 7 – Trigger connection

Caution - Both of the orange wires must be connected directly to the reed switch sensor wires. Any connection from the reed switch sensor to the chassis or to a chassis (AC) common connection will result in a destroyed Railsounds Commander.

5. Power and Serial Data connections.

Applies To: All powered, un-powered, conventional, and command (TMCC) applications. Track power must be available in the unit where the Railsounds Commander is being installed. Serial data is only used during TMCC operations.

Refer to Figure 8 and locate the 3 position to 4 position Power & Data cable assembly. This provides a simple direct connection between the Railsounds Commander and other Electric Railroad Company products that have a 4 pin connector for power and serial data output.

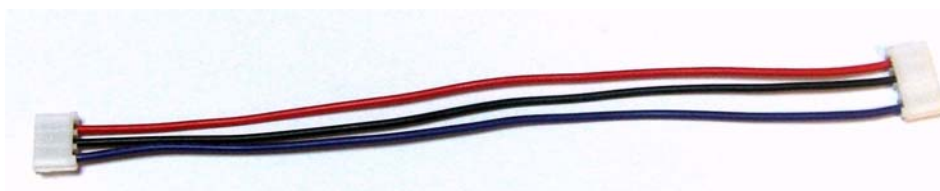


Figure 8 – Power & Serial Data cable

NOTE: If interfacing the Railsounds Commander with an Electric Railroad Company Cruise Commander, please refer to Addendum 1 (located after the installation instructions) that describes installation of an alternate cable assembly for board version 3.4 (V 3.4) or earlier. Addendum 1 does not apply to Cruise Commander boards that are revision 4.0 and later.

For other TMCC projects, such as interfacing with the Electric Railroad Company Mini Commander 2 , simply remove the 4 pin connector and connect the red (AC Hot), black (AC Common), and violet (Serial Data) wires to the appropriate points.

For conventional-only projects, the serial data (violet) wire is not needed and may be removed. Figure 9 shows the original Power & Data cable assembly modified for use in a conventional only project.



Figure 9 – Power cable for conventional only

After the power and, if needed, the serial data connections are made, plug in the 3 position connector at the designated point on the Railsounds commander circuit board. Figure 10 shows an example conventional only connection and Figure 11 shows a typical Railsounds Commander to TMCC driver board connection.

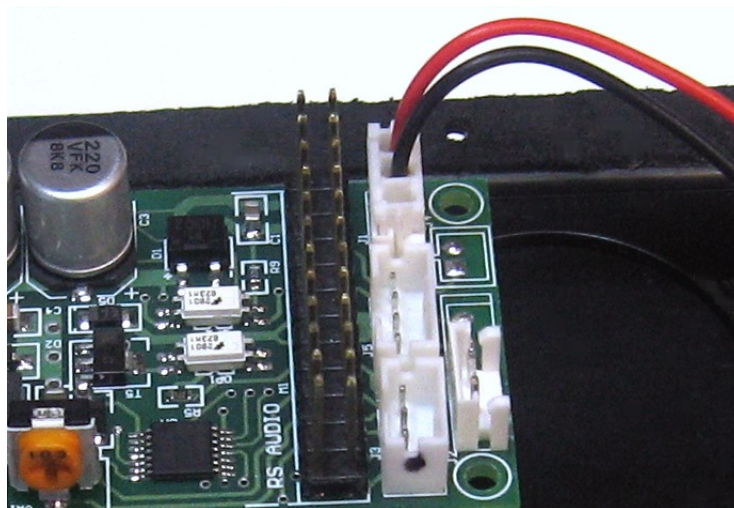


Figure 10 – Conventional-only power connection

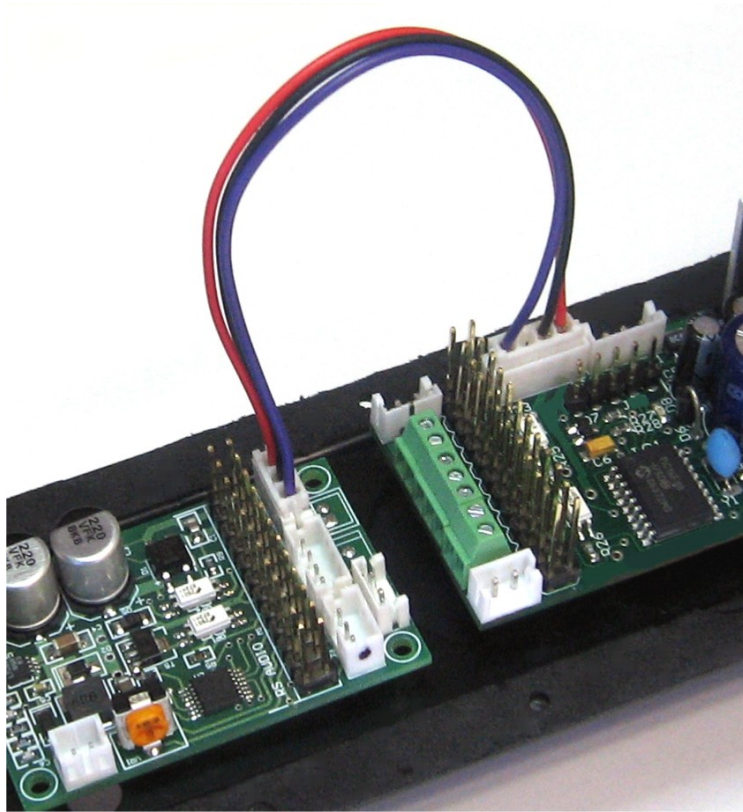


Figure 11 – Power & serial data connection

Caution – Do not connect the AC Common (black) wire in this cable assembly to any other common connections on the Railsounds Commander circuit board. This will result in a destroyed Railsounds Commander.

6. All necessary connections to the Railsounds Commander should now be complete. Before continuing, double check all wiring and verify that there are no exposed wire strands that could cause a short circuit.

Final Assembly

1. Locate the Railsounds Audio board and, while referring to Figure 12, gently place it on the double row of pins on the Railsounds Commander circuit board. Take care to ensure that the Railsounds Audio board is properly aligned with all the pins before pressing into place.

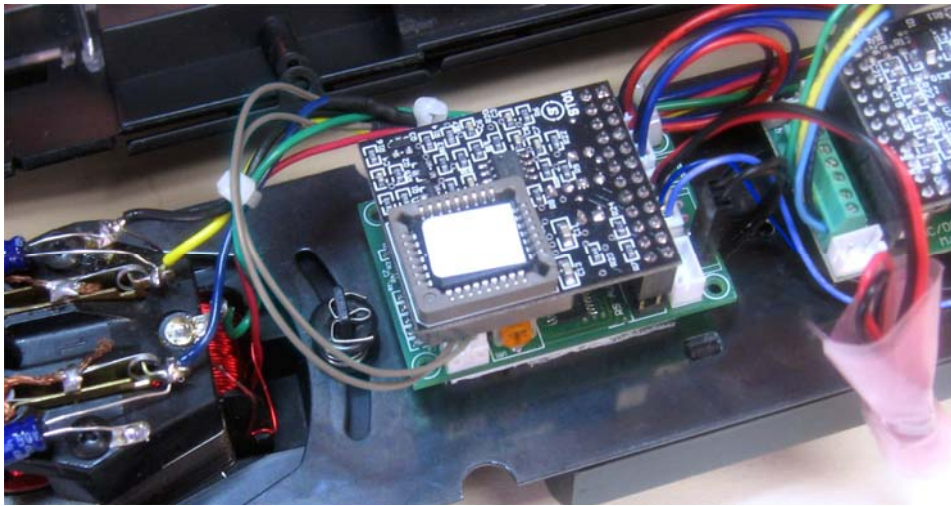


Figure 12 – Railsounds Audio board installed

2. Locate the provided cable ties and, while referring to Figure 13, use them to secure the chassis wiring. Wires should be positioned so they will not be pinched between the chassis and shell or other parts. Avoid placing wires where they will be directly in front of windows for a better appearance. When complete, cut the cable ties to remove any excess length.

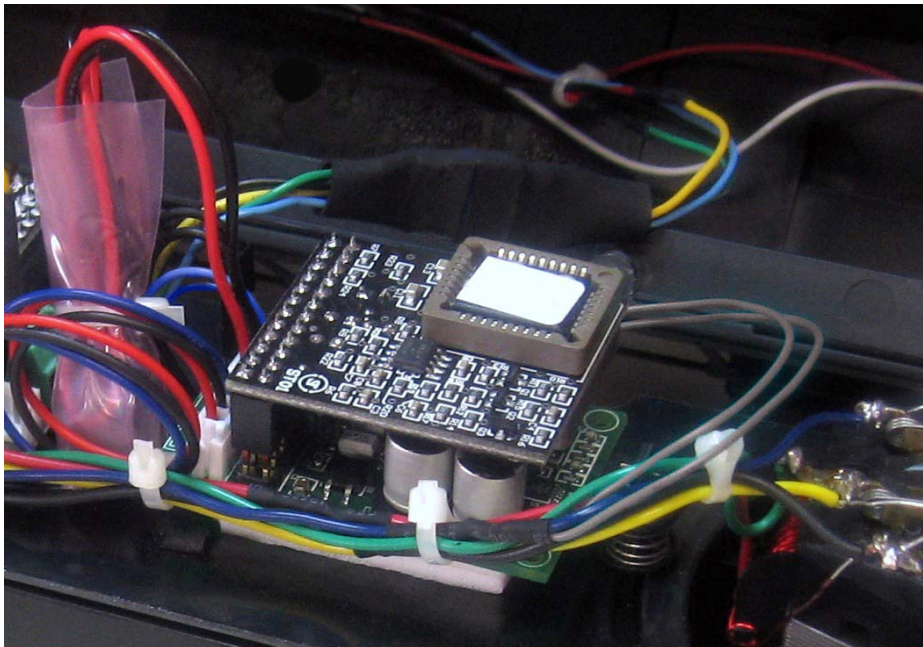


Figure 13 – Installation complete

3. Adjust the on board volume control to the fully clockwise position. Since the volume can still be adjusted using a CAB controller during command (TMCC) operations, this should suffice for most installations. However, if desired or if operation will be primarily in conventional mode, test run the unit with the shell temporarily in place. If adjustment is needed, remove the shell, adjust the volume control, and re-test. Repeat until the desired level is reached. When running in command mode, a CAB controller can be used to adjust the volume between this (maximum) level and no audible sound.

The Railsounds Commander kit is now completely installed.

Addendum 1

Interconnecting Railsounds Commander And Cruise Commander V 3.4

If interfacing a Railsounds Commander and a Cruise Commander, refer to Figure 1 and locate the Cruise Commander board version information. If the Cruise Commander is board version 3.4 or earlier then follow the instructions below. This Addendum does not apply to Cruise Commander boards that are version 4.0 and later.

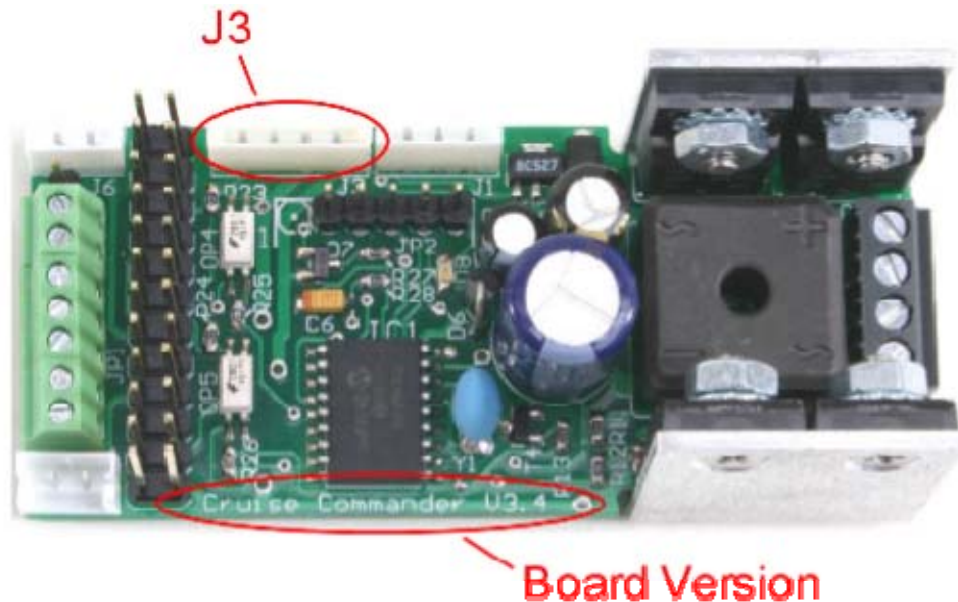


Figure 1 – Cruise Commander circuit board

1. Interconnecting the Railsounds Commander and a Cruise Commander, board version 3.4 or earlier (like the one shown in Figure 1), requires a special buffer cable assembly as shown in Figure 2.

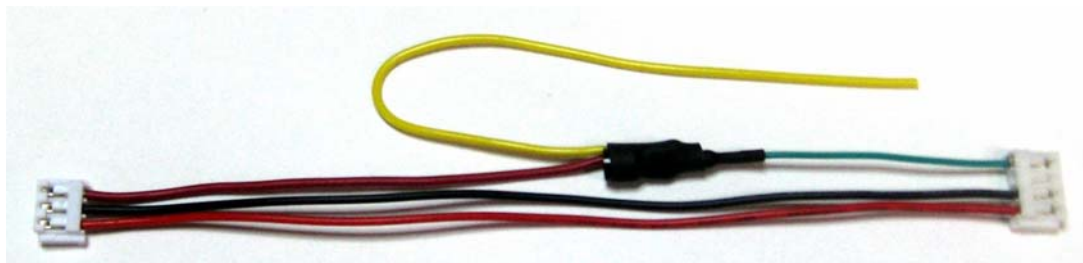


Figure 2 – Buffer cable assembly

The yellow wire must be connected to + 5 volts, which is available at Pin 19 on the R2LC board. While referring to Figure 3 and Figure 4, carefully solder the yellow wire on the back side of the board. Notice that Pin 19 is the second pin under the “C” in C21 and the third pin from the left edge of the board. Make sure that no excess solder or wire strands touch other pins or traces as this will damage the board.

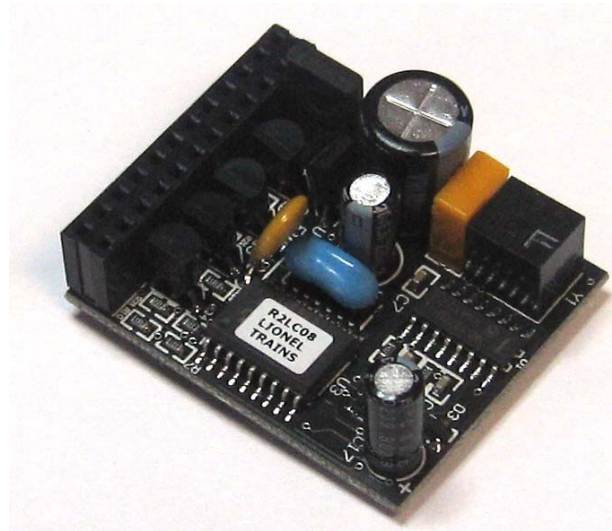


Figure 3 – R2LC board

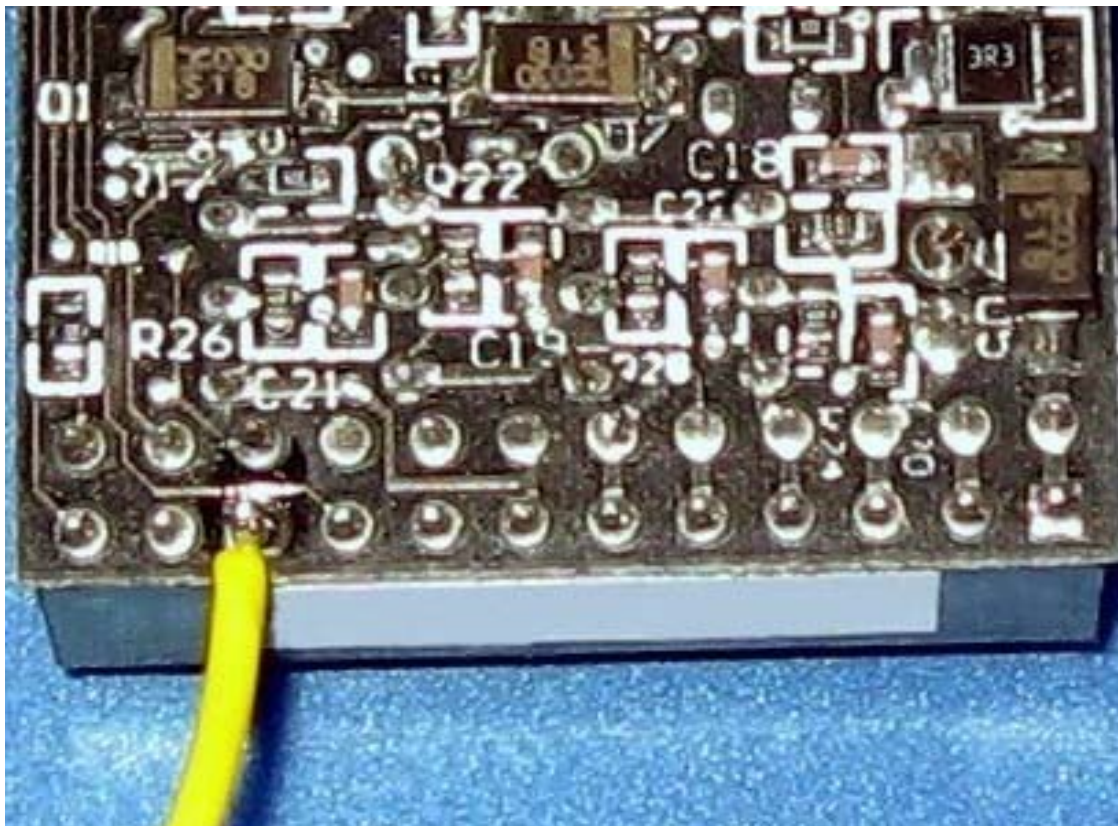


Figure 4 – Connection to R2LC board Pin 19

2. While referring to Figure 5, plug in the buffer cable assembly 3 position connector at the designated point on the Railsounds commander circuit board. Next, plug in the 4 position connector at J3 on the Cruise Commander circuit board.

Gently place the R2LC board on the double row of pins on the Cruise Commander circuit board. Take care to ensure that the board is properly aligned with all the pins before pressing into place.

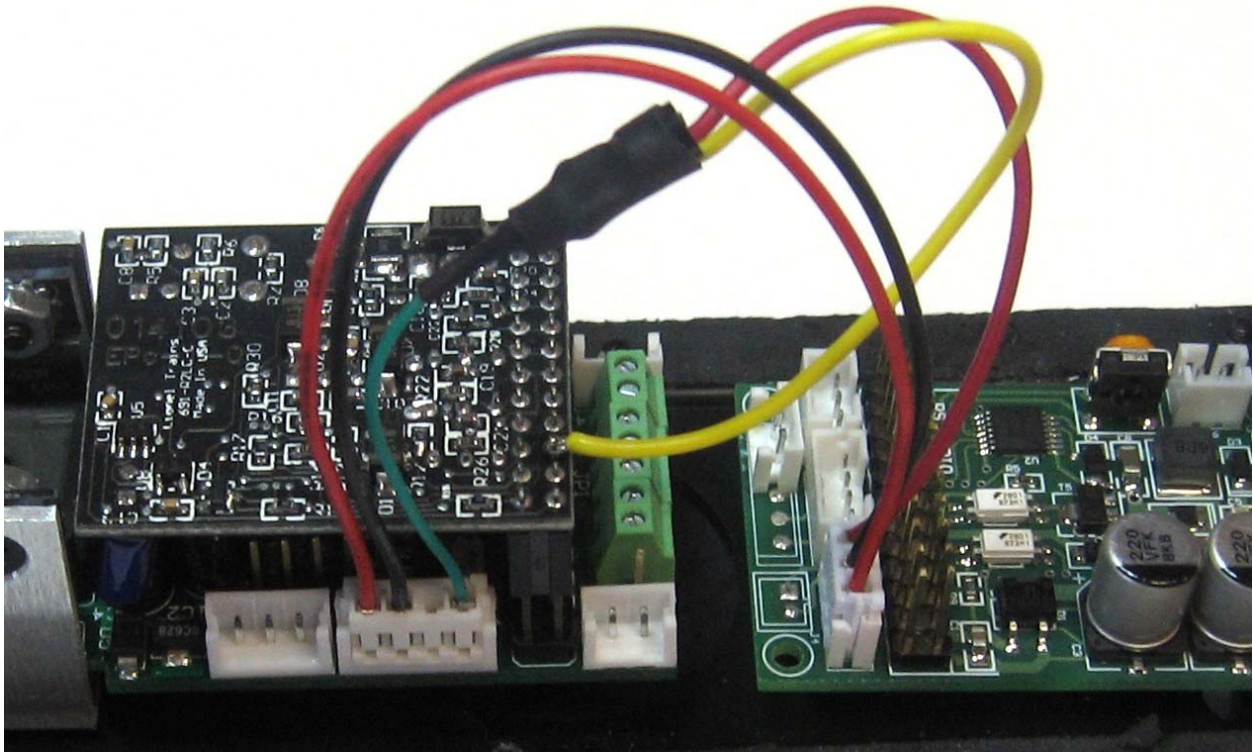


Figure 5 – Buffer cable installation complete

3. Once the buffer cable is installed, continue to follow the remaining steps in the Installation section of the Railsounds Commander Instructions.

Operation in Command Mode

The Railsounds Commander will normally remain silent when power is applied to the track and a solid TMCC signal is present. If a TMCC signal is not detected within 0.5 seconds then the Railsounds Commander may start up on its own. This is normal behavior.

Sound Features & Commands:

- Whistle/Horn
- Bell
- Brake Squeal
- Coupler Release
- Air Release

- **AUX 1** +
 - 1 - Sound volume increase
 - 2 - CrewTalk
 - 3 - Commence start-up sequence / Steam blow off / RPM increase
 - 4 - Sound volume decrease
 - 5 - Commence shutdown sequence (if at idle)
 - 6 - Steam release / Air horn / RPM decrease
 - 7 - TowerCom announcement

If the optional RS/SS switch is installed, it should be set to the RS position to enable the full compliment of Railsounds . In the SS (Signalsounds) position, only horn/whistle and bell sounds will be produced.

Although not required for command operations, installing the 9 volt battery will enable sounds to continue in the event of momentary power interruptions. Additionally, when track power is turned off, the shutdown sequence will start and play to completion.

Operation in Conventional Mode

The Railsounds Commander will start up and operate when the power applied to the track reaches 10 volts AC. Installing the 9 volt battery is recommended for conventional operations since it enables sounds to continue during track power interruptions. Additionally, when track power is turned off for more than a few seconds, the shutdown sequence will start and play to completion.

The sounds available in conventional mode are the prime mover rev's, horn/whistle, and bell.

The Horn/Whistle and Bell buttons on the transformer operate the respective sounds on the Railsounds Commander. The horn or whistle will sound as long as the button is pressed. The bell will stay activated until the Bell button is pressed again.

If the optional RS/SS switch is installed, it should be set to the RS position to enable the full compliment of Railsounds. In the SS (Signalsounds) position, only horn/whistle and bell sounds will be produced.

Notes

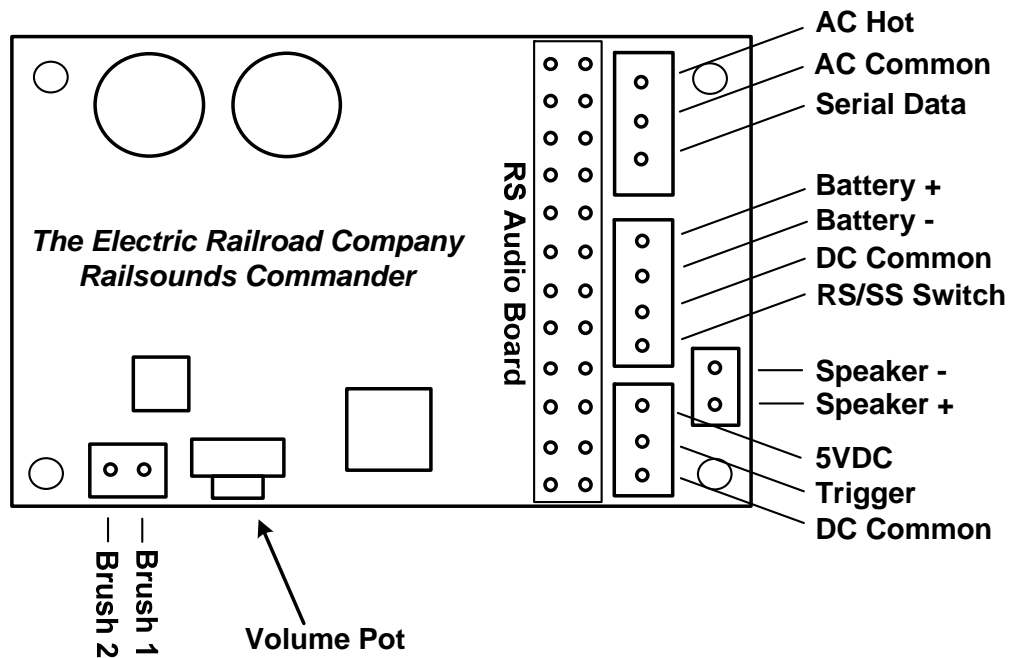
● The MTH MTH Z4000 is capable of outputting excessive track voltage. Applying greater than 20 volts AC will result in a destroyed Railsounds Commander.

* The Lionel PM-1 will not develop sound control signals at full throttle. To operate the sounds, simply back off from full throttle slightly.

* Sufficient load must be present on the transformer for the offset voltage, necessary for proper horn & bell operation, to be developed. If the horn or bell does not operate, try adding a lighted caboose to the "consist" to increase the transformer load.

* If the horn and bell sounds are reversed from the activation buttons then the track power is reversed. Switch the connections on the transformer power terminals to correct this condition.

Railsounds Commander Connector Pin Designations



Connector Pin Description

- AC Hot** - 3rd rail (pickup roller) power connection
- AC Common** - Outer rails power connection
- Serial Data** - Railsounds serial data input

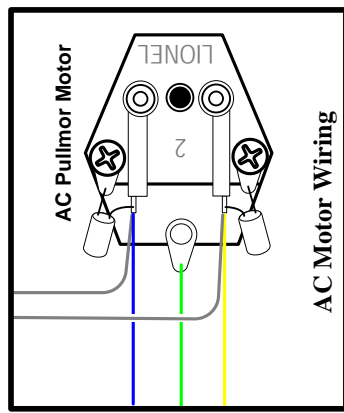
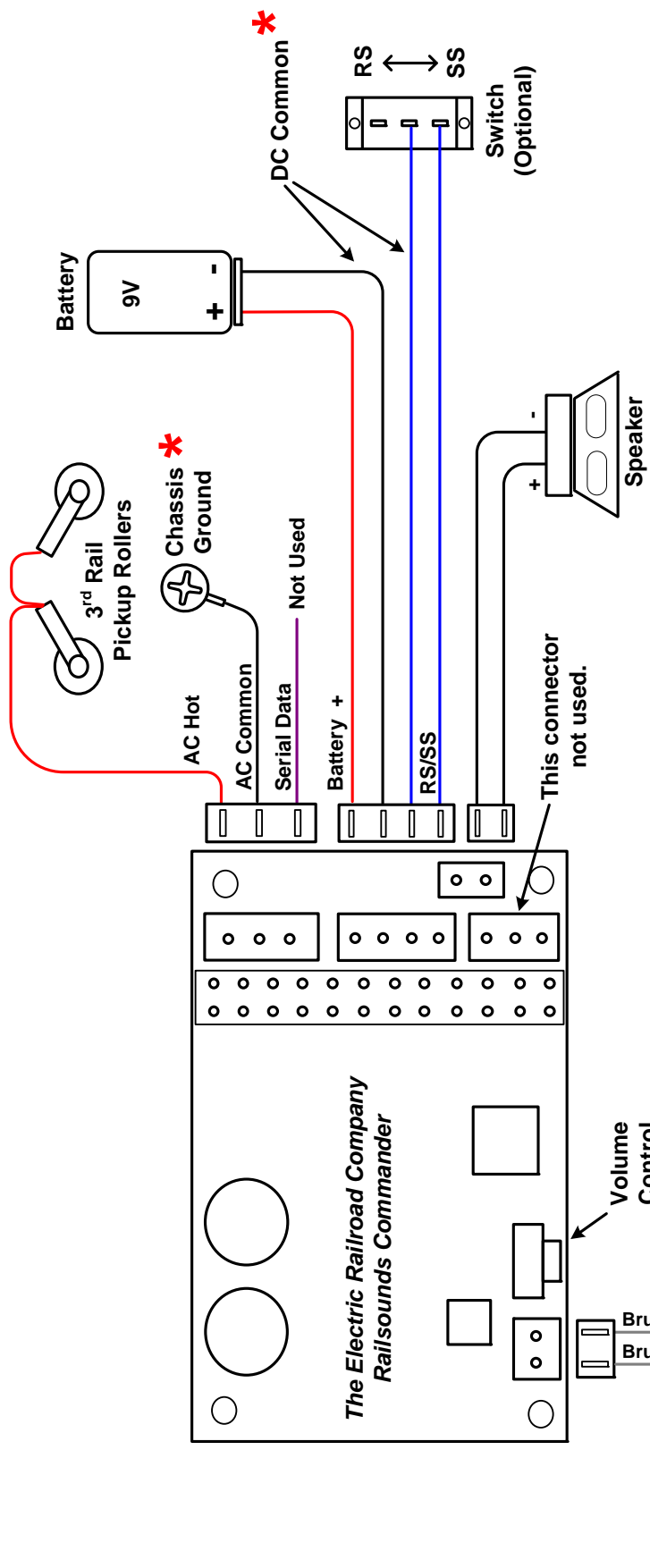
- Battery +** - 9 Volt battery positive terminal
- Battery -** - 9 Volt battery negative terminal (DC Common)
- DC Common** - Optional Railsounds/Signalsounds switch return connection
- NO SND** - Optional Railsounds/Signalsounds switch connection

- Speaker -** - Speaker (-) connection
- Speaker +** - Speaker (+) connection

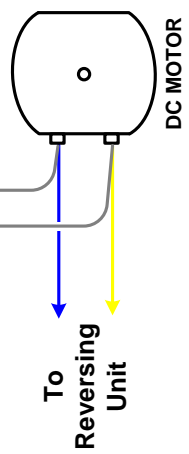
- 5 VDC** - 5 Volts DC (not used)
- Trigger** - Chuff trigger switch connection
- DC Common** - Chuff trigger switch return connection

- Brush 1** - Motor sense (VCO) input (Diesels)
- Brush 2** - Motor sense (VCO) input (Diesels)

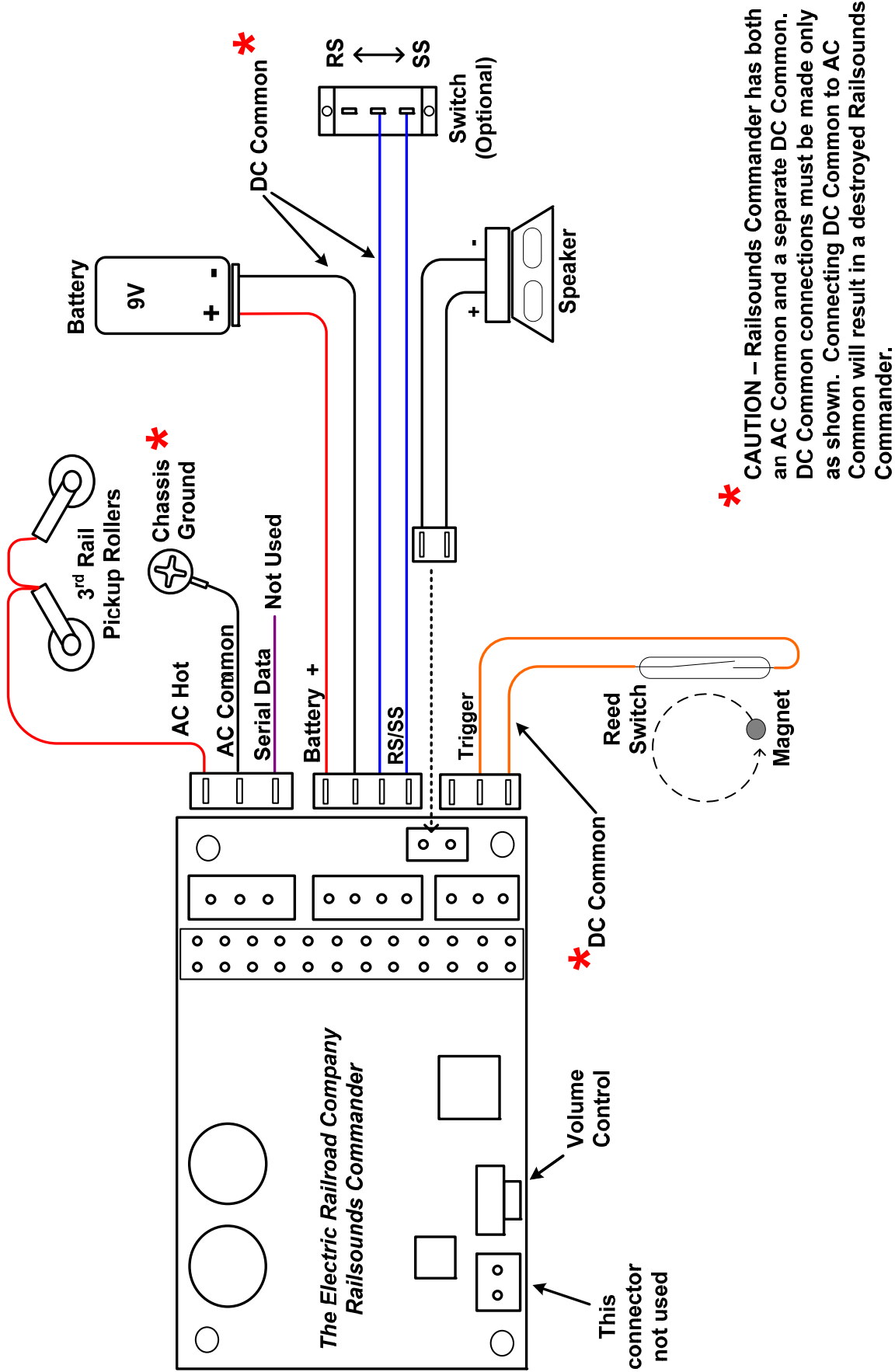
CAUTION – Railsounds Commander has both an AC Common and a separate DC Common. Connecting DC Common to AC Common will result in a destroyed Railsounds Commander.



* CAUTION – Railsounds Commander has both an AC Common and a separate DC Common. DC Common connections must be made only as shown. Connecting DC Common to AC Common will result in a destroyed Railsounds Commander.

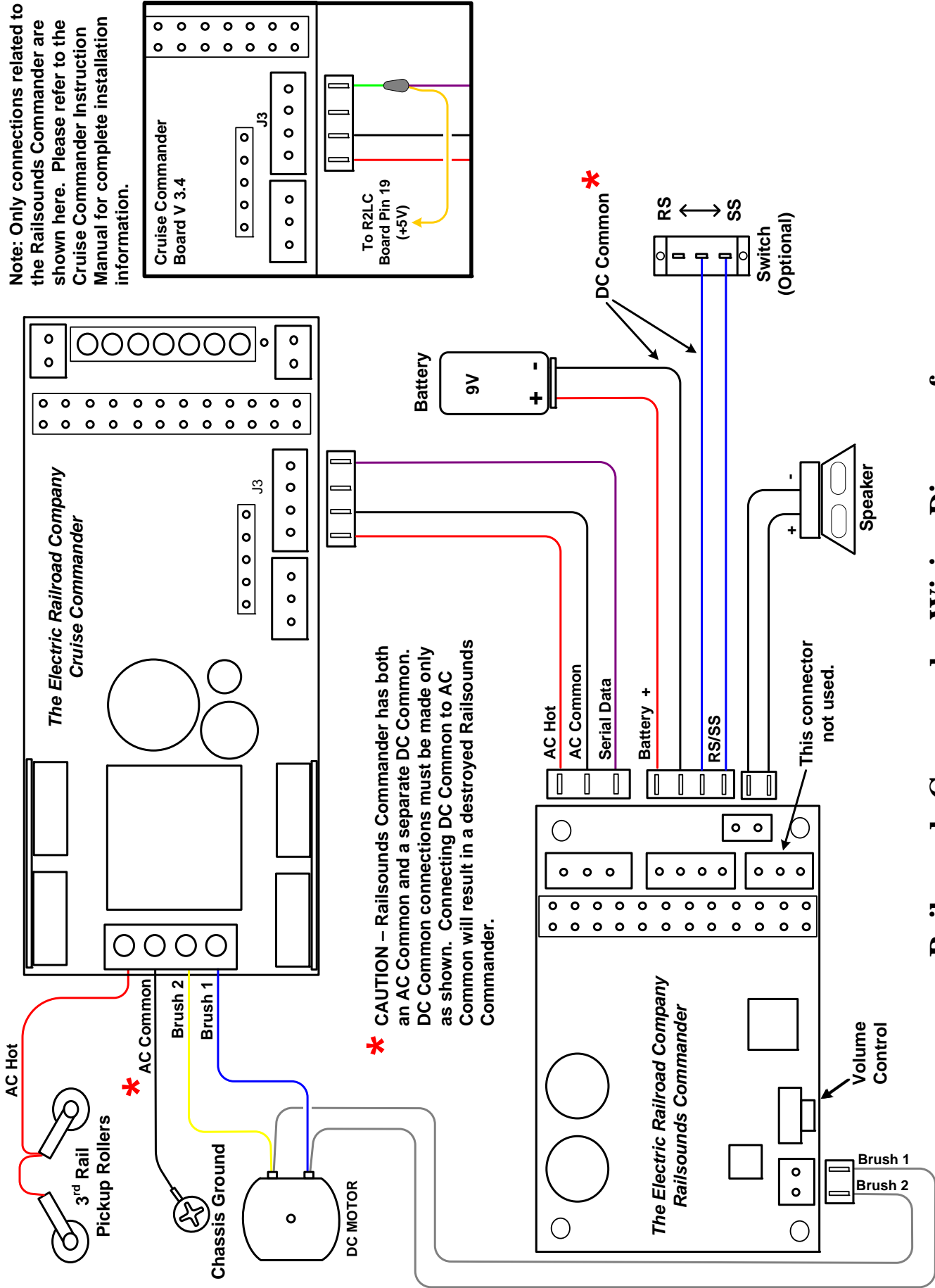


Railsounds Commander Wiring Diagram for Conventional Powered Diesel & Electric Units



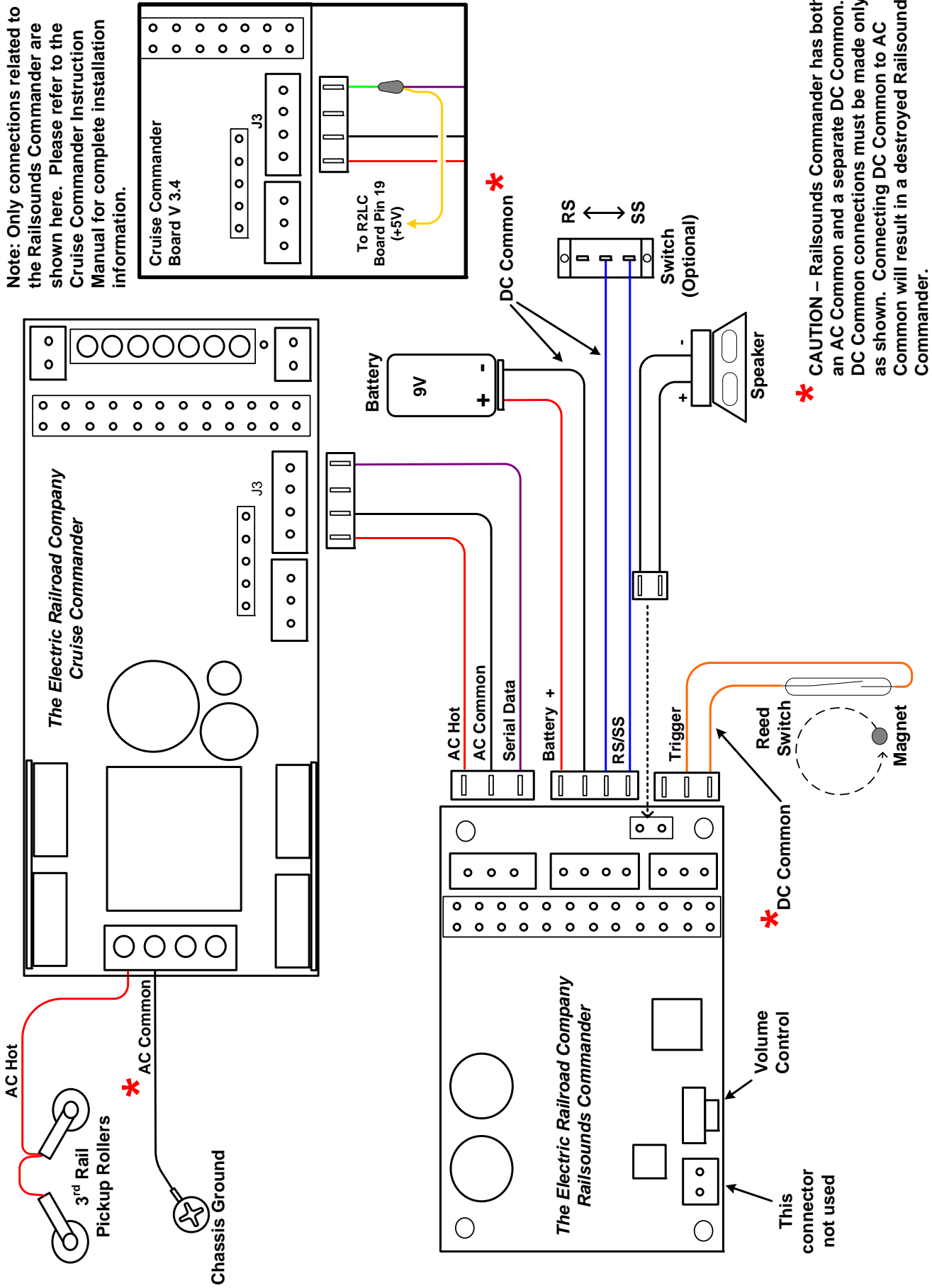
**Railsounds Commander Wiring Diagram for
Conventional Powered Steamers**

Note: Only connections related to the Railsounds Commander are shown here. Please refer to the Cruise Commander Instruction Manual for complete installation information.



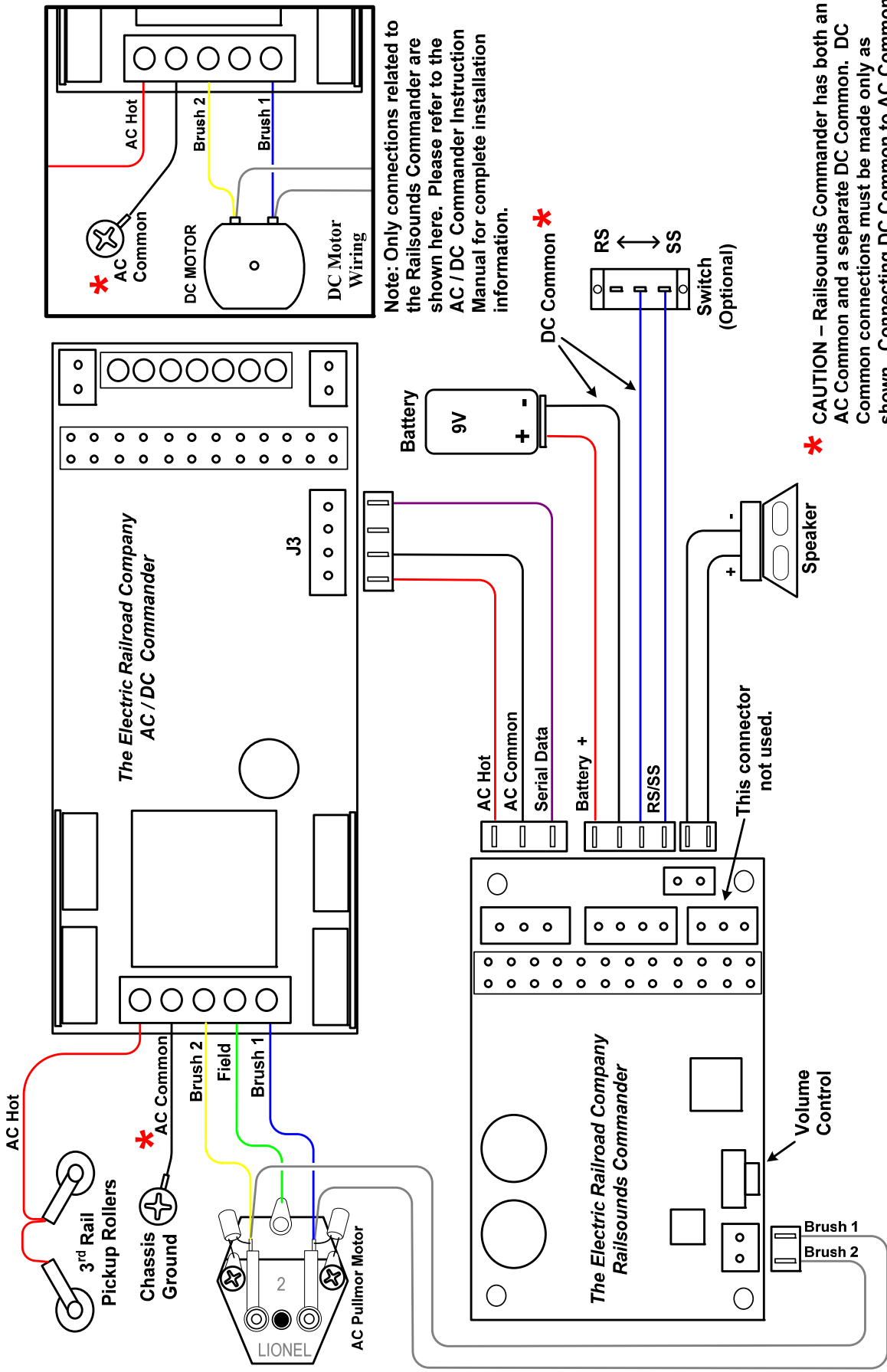
Railsounds Commander Wiring Diagram for Cruise Commander in Powered Diesel & Electric Units

Note: Only connections related to the Railsounds Commander are shown here. Please refer to the Cruise Commander Instruction Manual for complete installation information.

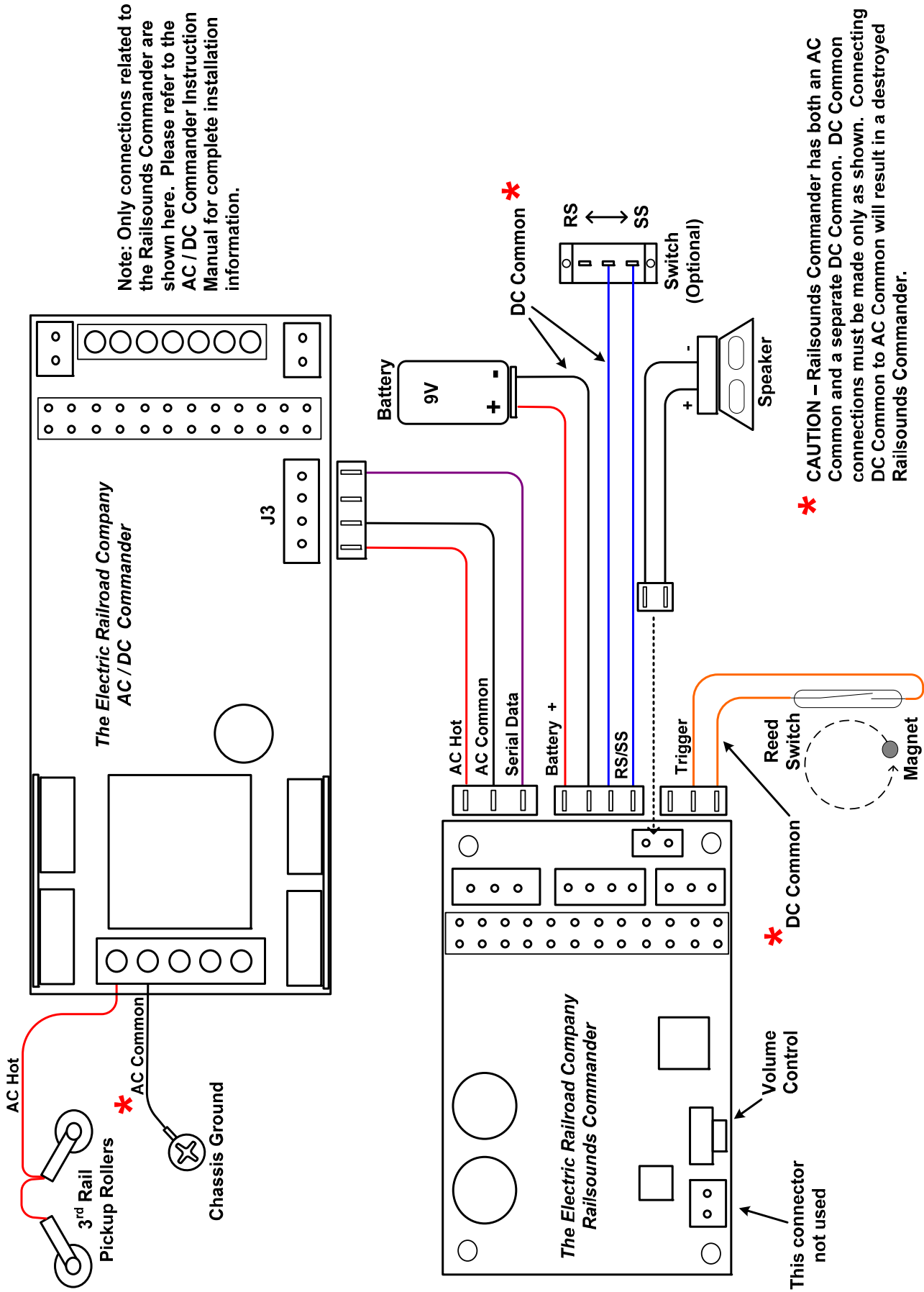


*** CAUTION – Railsounds Commander has both an AC Common and a separate DC Common. DC Common connections must be made only as shown. Connecting DC Common to AC Common will result in a destroyed Railsounds Commander.**

Railsounds Commander Wiring Diagram for Cruise Commander in Powered Steamers

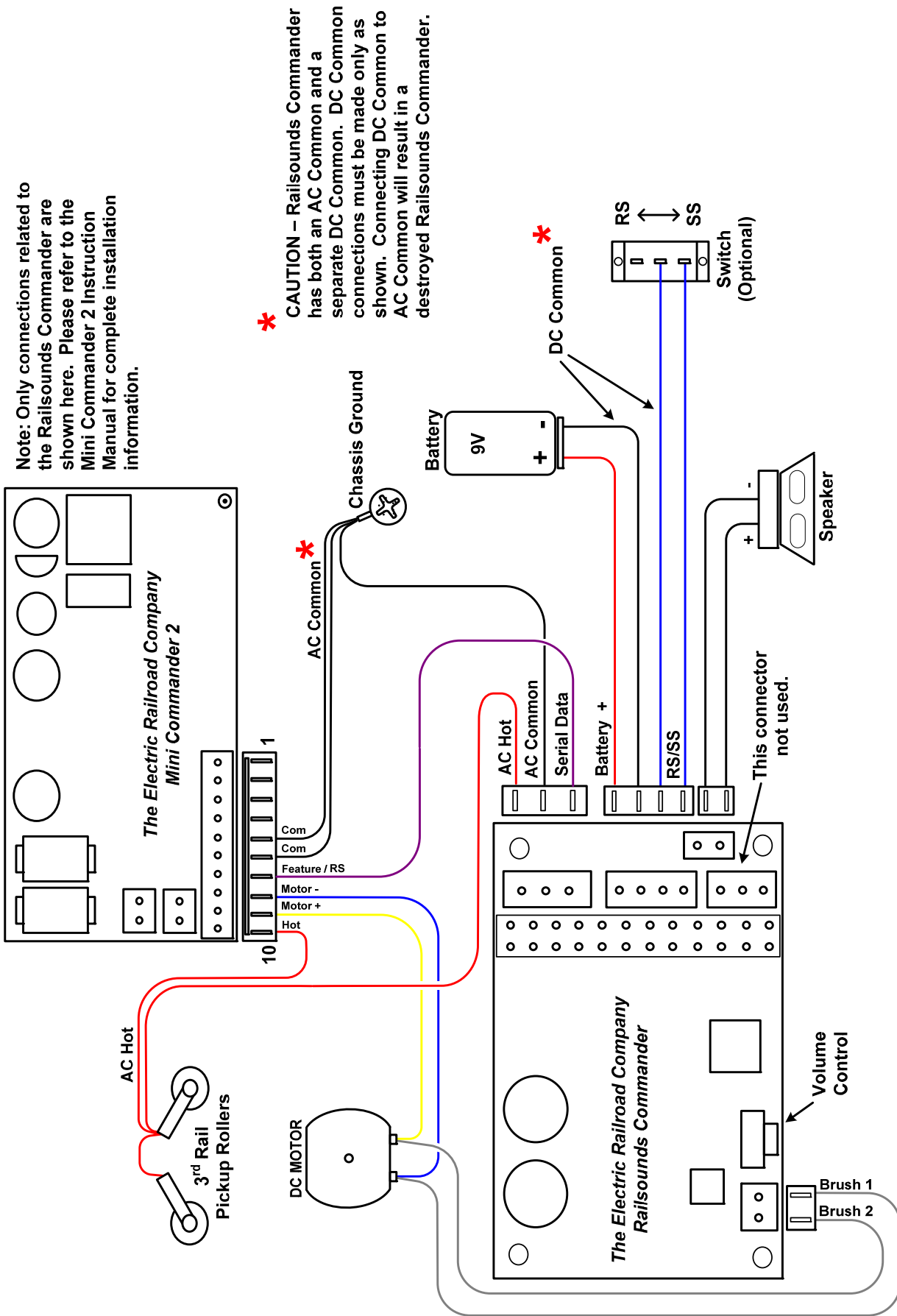


Railsounds Commander Wiring Diagram for AC / DC Commander in Powered Diesel & Electric Units



Railsounds Commander Wiring Diagram for AC / DC Commander in Powered Steamers

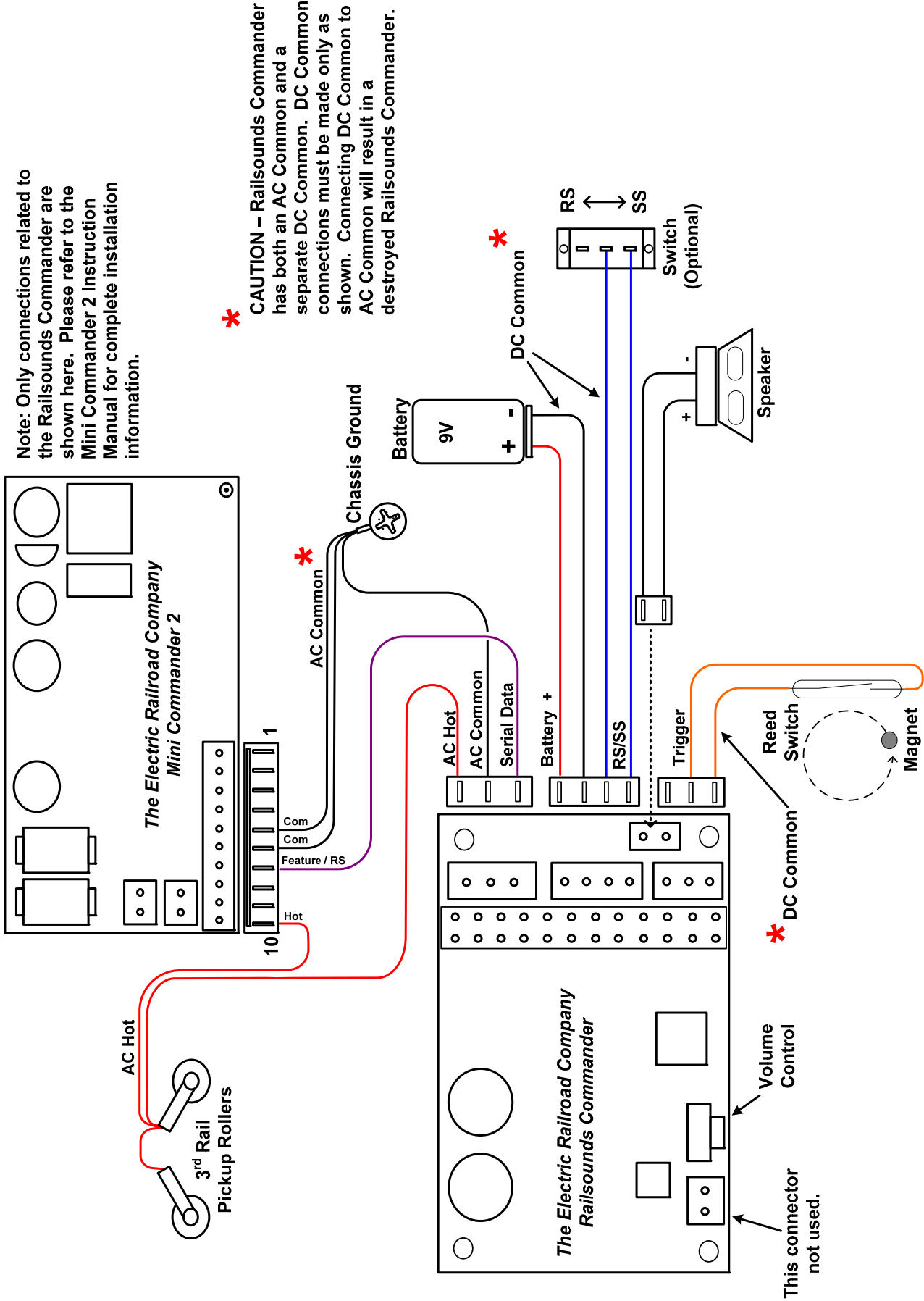
Note: Only connections related to the Railsounds Commander are shown here. Please refer to the Mini Commander 2 Instruction Manual for complete installation information.



* CAUTION – Railsounds Commander has both an AC Common and a separate DC Common. DC Common connections must be made only as shown. Connecting DC Common to AC Common will result in a destroyed Railsounds Commander.

Railsounds Commander Wiring Diagram for Mini Commander 2 in Powered Diesel & Electric Units

Note: Only connections related to the Railsounds Commander are shown here. Please refer to the Mini Commander 2 Instruction Manual for complete installation information.



*** CAUTION – Railsounds Commander has both an AC Common and a separate DC Common. DC Common connections must be made only as shown. Connecting DC Common to AC Common will result in a destroyed Railsounds Commander.**

Railsounds Commander Wiring Diagram for Mini Commander 2 in Powered Steamers

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.

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 \$30.00 at our option.

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

Disclaimer

Improper installation or configuration of Railsounds Commander and Railsounds Audio boards 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 upgrade kit parts to prevent malfunction. If you are unsure of your installation, please contact us first before taking any risks!

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