Crane Commander

Instruction Manual

The Electric Railroad Co.
939 Wood Duck Avenue
Santa Clara, Ca. 95051

Table of Contents

1 Features

Simple Operation

The Crane Commander allows simple CAB-1 or DCS control of the Lionel Gantry Crane. The Throttle controls the crane motion, with Dir, Boost, and Brake keys selecting the direction of motion.

100 or 32 Speed Step Throttle

The throttle sports a 100-step increment for ultimate realism and smooth operation. Selectable 32 speed step control is provided for DCS compatibility.

Jog Control on Hook Down

During rotation, the hook may be jogged down to prevent jamming with the boom.

Fail-Safe Bucket / Magnet control

During operation, the bucket / magnet can get very hot and if left unattended may overheat to a point of failure. The Crane Commander will de-energize the bucket / magnet after a configurable delay of one (1) to nine (9) minutes of inactivity.

Soft Set Technology™

The Mini Commander utilizes exclusive Soft Set Technology[tm] which allows you to change the unit ID (1-99) and the voltage / pulse settings without complicated program / run switches or power on / off sequences.

This feature set is only applicable to version 020C firmware, first available in January '2005.

2 Operation

Gantry Crane Operation

- **Throttle knob – Controls rotation or hook**
- **DIR (<>) Key – Selects rotation direction**
- **Boost Key – Selects Hook Up motion**
- **Brake Key – Selects Hook Down motion**
- **AUX1 Key – Latch / Un-Latch Bucket or Magnet**
- **AUX2 Key – Jog Hook Down (while rotating)**

The Throttle knob operates the selected motion proportionally. When the Hook is operated, the last rotational direction is memorized. Selecting rotational motion after hook control by pressing the DIR key will send the crane the last direction it was turning. To reverse rotational direction, press DIR again.

The bucket/magnet control (AUX1) is on a timer. This timer de-energizes the bucket/magnet after a configurable delay of one (1) to nine (9) minutes of inactivity. The feature is a fail-safe to prevent overheating of the bucket/magnet.

The Aux2 key may be configured to set the jog amount. The default is usually correct, however depending on the voltage supplied to your accessories, the setting is changeable.

Notes for DCS: (use 32 speed steps only)
AX0 is used for AUX1; **HDLT** is used for AUX2

3 Tools required for installation

The tools listed below should help to get you organized for the installation. The mini commander 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

4 What's supplied

The Mini Commander kit consists of:

- Mini Commander II circuit board
- Bucket Driver circuit board
- Motor connection cables
- Two (2) suppression caps
- Extension antenna wire
- Configure / Run jumper
- Two (2) small wire ties
- Double stick tape
- Manual

5 Overview

The installation process requires you to make extensive modifications to your crane. All existing wiring is removed and replaced with the connections to the Crane Commander circuit boards. It is suggested you read through the manual, look at the figures, and then proceed to the installation.

The sequence of instructions will guide you through each step to install the Crane Commander kit. Refer to the Figures noted in each installation sequence. When removing parts and their mounting screws, organize the parts in groups to ease reassembly.

The most difficult portion of the install is connection of the wires the control the bucket / magnet terminals. These connections are located underneath one of the motors, and it is suggested to remove one motor to make those connections. There is a small spacer on the gear shafts, so be certain to watch for this when removing the motor assembly.

After installation, the Crane ID and bucket / magnet output need to be configured prior to use. The configuration will need to be an ENG (engine) ID, as the Throttle knob is not active for ACC (accessory) ID's.

Note: If the motors do not have the small caps on them, please use the included caps across the motor. The cap are 1.0uf @ 50v ceramic caps and are to be placed across the motors.

6 Installation Steps

STEP 1: Remove the crane base

To get started, remove the 4 screws that hold the base on the crane. These are located on the top in each corner. You may need to rotate the crane under power with the **old controls** to provide access to these screws.

Step 2: Remove the old wiring (Figure 1)

Disconnect the old wiring from the crane by cutting the wires in a convenient location close to the point of attachment. If you wish, make a drawing of where the old wires were attached for later restoration. The old wires are secured in a small cable clamp and the clamp is held in place with a small screw. We will be reusing the screw, so place it aside for later.

Step 3: Remove the hook motor assembly (Figure 1)

The removal of one motor is recommended to solder the connections to the bucket / magnet terminals. There are 2 screws that attach each motor to the metal frame. In figure 1, notice the old cable clamp mounting point, this is the side where the motor must be removed.

After removing the two motor mounting screws indicated, carefully remove the motor watching that you do not lose the small spacer that is on the end of the gear shaft. Set the motor assembly and mounting screws aside for later reassembly.

Step 4: Attach the driver wires (Figure 2)

The bucket / magnet driver wires are soldered to the terminals indicated. The white wire is attached to the insulated terminal, the black to the non-insulated terminal. Route the white wire so as not to interfere with the gear as shown.

Step 5: Attach the driver card (Figure 3)

Attach the bucket driver card to the original cable clamp mounting post using the screw that was removed from the original cable clamp assembly. Orient as shown, and tighten the screw enough to hold the card securely. Do no over-tighten, or the screw may strip.

Step 6: Attach the Mini Commander (Figure 3)

Using a piece of double-stick tape (1.75" x 0.75"), attach the Mini Commander card to the crane as shown. Position the Mini Commander roughly centered on the side shown, about 1/16" away from the edge.

Step 7: Connect the wires (Figure 3)

Connect the white wire from the Driver Card to the Mini Commander HOT, and the black wire to the GND terminal. The remaining black wire with connector from the driver card goes to the Mini Commander P1 connector pin 4. Pin 4 is the pin that is closest to the jumper shunt on the P1 connector (all the way left).

Route the wires as shown. The final placement of the wiring will be done when we connect the motor wire harness.

Step 8: Motor Wiring Phase 1 (Figure 4 & 4A)

There are two (2) wiring harnesses for motor connections. Each harness is identical. Attach one harness to the motor as shown in Figure 4. The black wire goes to the motor terminal closest to the bottom of the crane base. After the connections to the motor are made, plug the two connectors into the Mini Commander as shown in Figure 4A.

Step 9: Motor Wiring Phase 2 (Figure 5 & 6)

Reinstall the removed motor assembly and secure with the original mounting screws. Once installed, attach the remaining wire harness to this motor. The black wire goes to the motor terminal closest to the bottom on this motor as well. After the connections to the motor are made, plug the two connectors into the Mini Commander as shown in Figure 5.

Route wires as shown in Figure 6, and place a wire tie around the wiring bundle as shown to secure. Check for gear clearance after final wire placement.

Step 10: Antenna Connection (Figure 7)

Cut the antenna wire to about 9 inches, and place in the crane base as shown in Figure 7. Use a couple pieces of double stick tape or hot glue to secure the wire in the channel. It is helpful to secure the wire additionally as indicated in the figure.

The channel provides an ideal place to hide the antenna, however it is not required to place the antenna in the channel if you prefer not to do this. Optionally you can locate the antenna down the corner leg of the base on the left side.

Step 11: Power Connection (Figure 8 & 9)

Attach power to the Crane at the driver card as shown in figure 8. Be certain the GND or Common is attached to the U terminal of the power source. Route the power wires down through the base, attach the antenna to the Mini Commander, and secure the base with the original screws.

Refer to the "Illustrated Views" section for pictures of the above steps as you start the installation.

Congratulations!

You have completed the installation!

7 Checkout

After attaching power, you need to configure the ID and optionally the bucket / magnet control voltages. It is easiest to use Soft Set Technology for this, however you may place the jumper or use the supplied switch on the Mini Commander card (pins 1&2) to set the ID.

If you choose to go the jumper route, you can use a pair of needle-nose pliers to facilitate the jumper placement. Use caution to place the jumper on the correct pins. If you feel that using a jumper or switch is your preferred method to configure the crane, it is recommended to just install the switch. The switch may be fastened with the provided double stick tape to any convenient place under the crane. I have placed them on the motor / gear assembly and they are not noticeable.

Initially the Mini commander in the Crane kit has an ID of ACC #1. With power supplied and selecting ACC #1, press the AUX1 key. The bucket / magnet should energize very briefly. If you have a bucket model, a lamp across the magnet circuit will flash. Optionally hold a small metal object near the magnet and feel the attraction.

If this fails to work, the system may still be operational, and only the bucket / magnet is not quite right. Proceed to the configuration stage, and determine if setting the voltages solves the problem. Usually the bucket cranes will snap the bucket closed for a brief period, which is a good sign. Magnet cranes are harder to checkout unless you added the lamp in the crane cab to indicate the magnet is energized.

8 Configuration (with Soft Set)

Select ACC #1 to start the process of configuration. Next, we set an ENG class device, and then optionally set the voltages. Enter the following sequence on your CAB-1:

ACC + 1 + SET + SET + SET + SET + SET (+ SET*)
ENG + ## + SET
WAIT - 10 seconds without pressing any CAB-1 keys

You must press the **ENG + ## + SET** within 6 seconds of entering Soft Set. This seems long, but in reality is not. Plan ahead, and press the keys firmly and with resolve.

Optional Sequence:
New in version 020C firmware allows for optional programming of the bucket voltage & timeout, and also the jog setting voltage and pulse time**. In previous firmware versions, this was not optional.**

ACC + 1 + SET + SET + SET + SET + SET (+ SET*)
ENG + ## + SET
AUX1 + 9 + BRAKE + 2 (2 = minutes timeout, range 1 to 9)
AUX2 + 4 + BRAKE + 1 (jog settings, voltage and time)
WAIT - 8 seconds without pressing any CAB-1 keys

* Press SET a minimum of 5 times; a few extra does not hurt!
* Wait at 1 second between presses of the SET key.
= ENG ID selected for the Gantry Crane.

The above settings appear to work nicely for 18v supply on the accessory bus. Contact us at support@electricrr.com for recommendations on how to adjust the above numbers for different accessory voltages.

9 Configuration (with Jumper)

1. Power off the crane, wait about 10 seconds.

2. Activate configure mode by adding the jumper to pins 1&2 of the Mini Commander.

3. Power on the crane and enter the following sequence on your CAB-1:

4. **ENG + ## + SET**

5. Power off the crane, remove the jumper, and wait about 10 seconds.

6. Crane is now ready to power on and use on the new ENG ID.

Optional Sequence:
New in version 020C firmware allows for optional programming of the bucket voltage & timeout, and also the jog setting voltage and pulse time**. In previous firmware versions, this was not optional.**

In step 4 above press the following:
ENG + ## + SET
AUX1 + 9 + BRAKE + 2 (2 = minutes timeout, range 1 to 9)
AUX2 + 4 + BRAKE + 1 (jog settings, voltage and time)

= ENG ID selected for the Gantry Crane.

10 Checkout and Operation

This is where all the hard work pays off! Your Gantry Crane should now be easy to operate from your CAB-1. Let's try it!

1) Select the ENG ## assigned above. Slowly turn the throttle up. The Crane should rotate. Press DIR, and slowly operate the throttle, the Crane should now rotate the opposite direction.

2) Press BRAKE. Slowly turn the throttle up. This should operate the hook down. If the hook goes up, press BOOST to let the hook down. Take up the slack, and allow the hook to bottom out and start up. The BOOST should now select raising the hook, and BRAKE should now select lowering the hook..

3) Press AUX1, the Bucket should close. Press AUX1 again, and the Bucket should open. If your crane has a Magnet, the energizing of the magnet should operate similarly.

4) Press AUX2, the hook should burst downward. The AUX2 jog operation activates even when the crane is in rotation.

CAUTION: The Bucket or Magnet will become very hot during normal use. De-energize the Bucket or Magnet when possible. The Crane Commander will de-energize the bucket/magnet after the selected delay as a fail safe to prevent overheating in case of unattended operation. On the Magnet version, some visual indication is highly recommended to prevent damaging over-heating of the Magnet coil. Placing a lamp in the cab is a great idea, and should be soldered across the wires leading to the Magnet.

11 Illustrated views

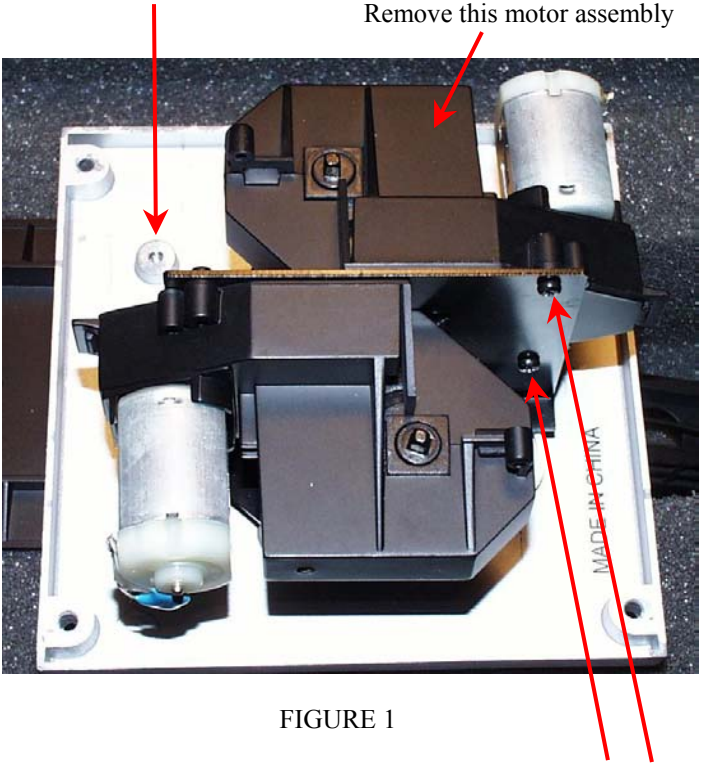

FIGURE 1

Crane with all of the wiring removed. Note the motor mounting screws to be removed, and the location of the original cable clamp mount in relation to the motor that needs removed. Under this motor assembly are the 2 terminals that supply power to the bucket / magnet.

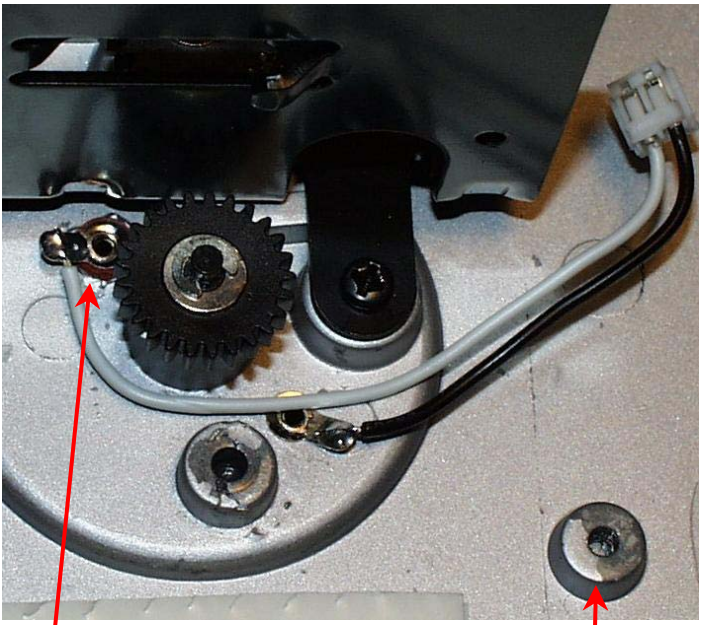

FIGURE 2

Insulated connection

Driver card mount hole

Motor is removed for soldering of the Attachment of the bucket / magnet wiring assembly. Note the white wire is going to the terminal that is insulated. Do not overheat the connections while soldering, as they could loosen by overheating.

Driver card

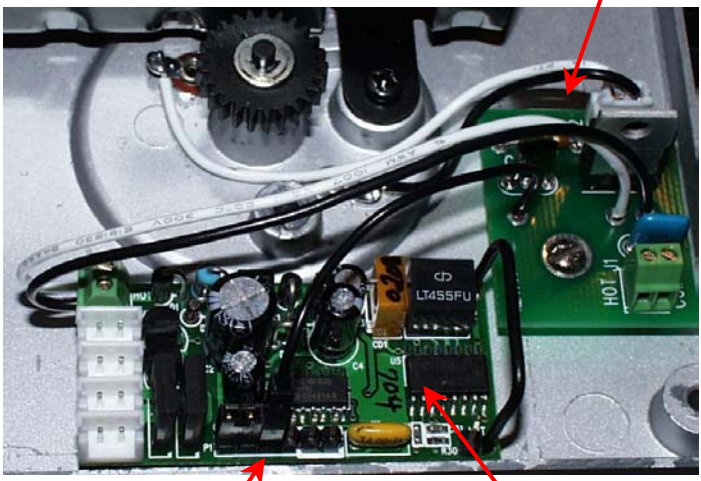

FIGURE 3

Pin 4 connection (from driver card)

Mini Commander card

Shown here are the Crane Commander cards installed. Note the position of the Mini Commander and the Driver card. The wiring must be routed clear of the gears when the motor assembly is replaced. General wiring position is shown here, but we will finalize them when the motor is re-installed.

FIGURE 4

Wiring of the rotation motor. The inset below shows the connections to the Mini Commander for the rotation motor.

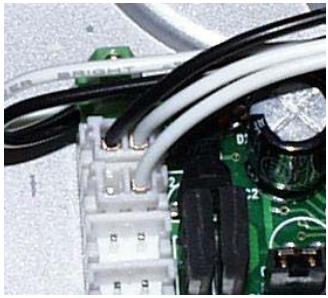

FIGURE 4A

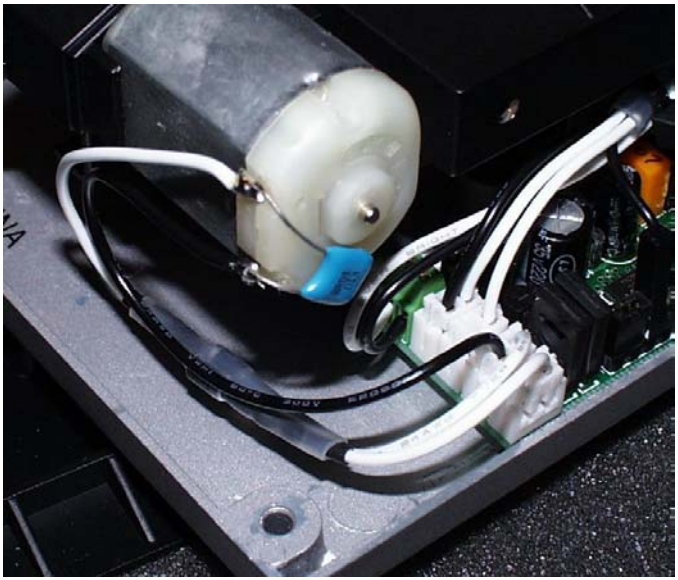

FIGURE 5

Close up view of the reinstalled hook motor and the attached wiring harness. Notice the positions of the connectors that have both the white and the black wire attached.

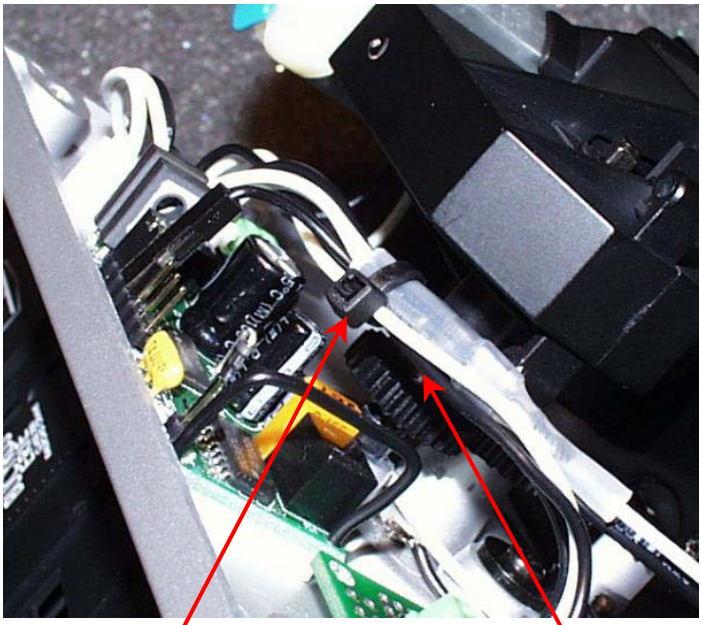

FIGURE 6

This is a close-up of the final wiring placement. Check there is no interference with any of the gears in the crane. Once you complete this step, only the antenna and power need attached. We are almost ready to have fun !!!

Additional fastening point - if desired

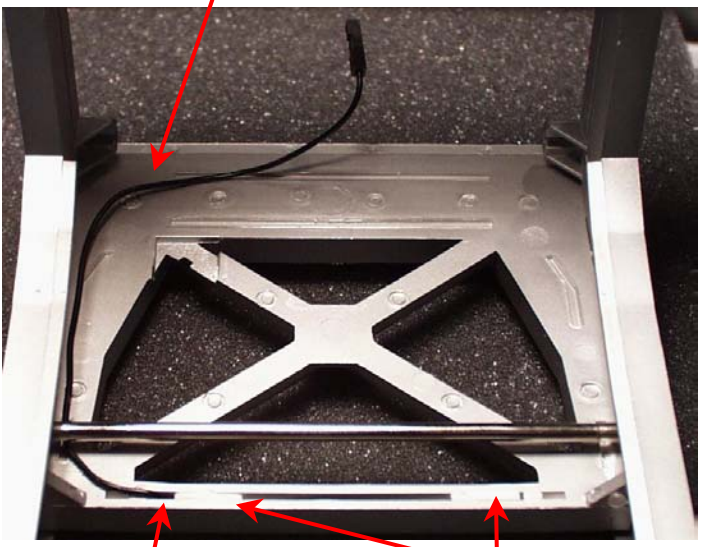

FIGURE 7

Wire in groove

Double Stick tape

Cut the antenna wire to about 9” and place in the groove on either side that has the metal rod. Route the antenna on the left side as the power will come down the right side.

Use small pieces of double stick tape to hold the wire in the channel. An optional small piece of electrical tape at the “additional fastening point” will hold the antenna wire from external view. Hot glue works equally as well in place of the double stick or electrical tape.

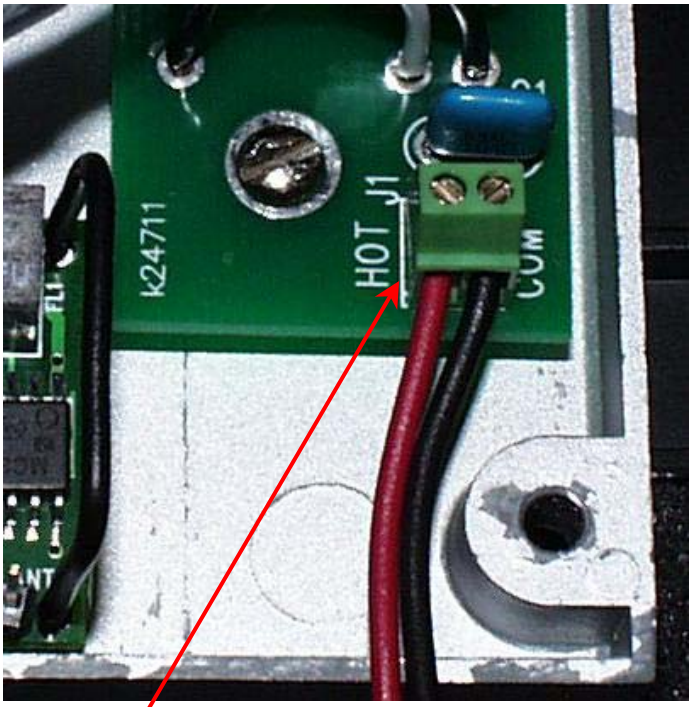

FIGURE 8

Power connection: HOT is Red, COM (common) is Black

This is the only power connection needed for the Gantry Crane. The black wire goes to the Common ("U" terminal) on the power source. The configuration phase assumes a supply voltage of 16-18 volts AC.

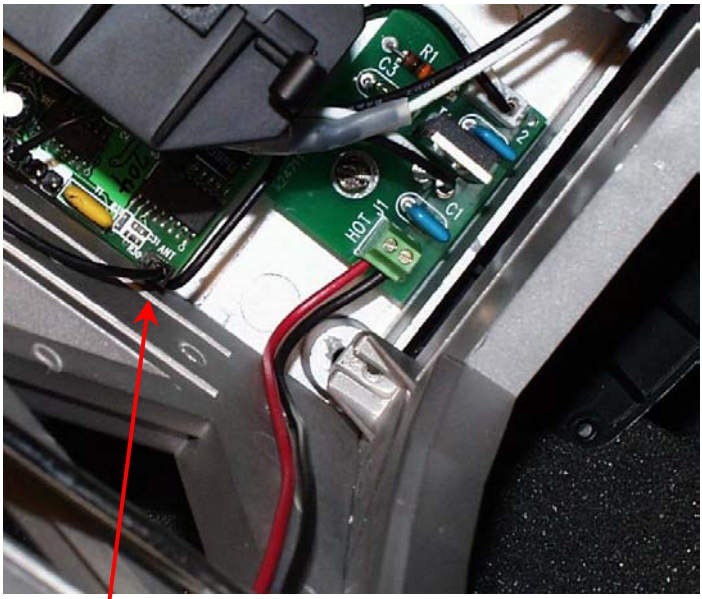

FIGURE 9

Connect Antenna here

Figure depicting the routing of the power down the corner of the crane base. Before securing the base to the crane, plug in the antenna lead on the Mini Commander.

Locate the power wires in the corner, and secure with small pieces of electrical tape. If the supplied wires are too short, you may extend / replace them with 24 gauge wires to reach your accessory power source.

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.

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

14 Disclaimer

Improper installation or configuration of the Mini Commander 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 to prevent malfunction. If you are unsure of your planned installation's compatibility, please contact us first before taking any risks!