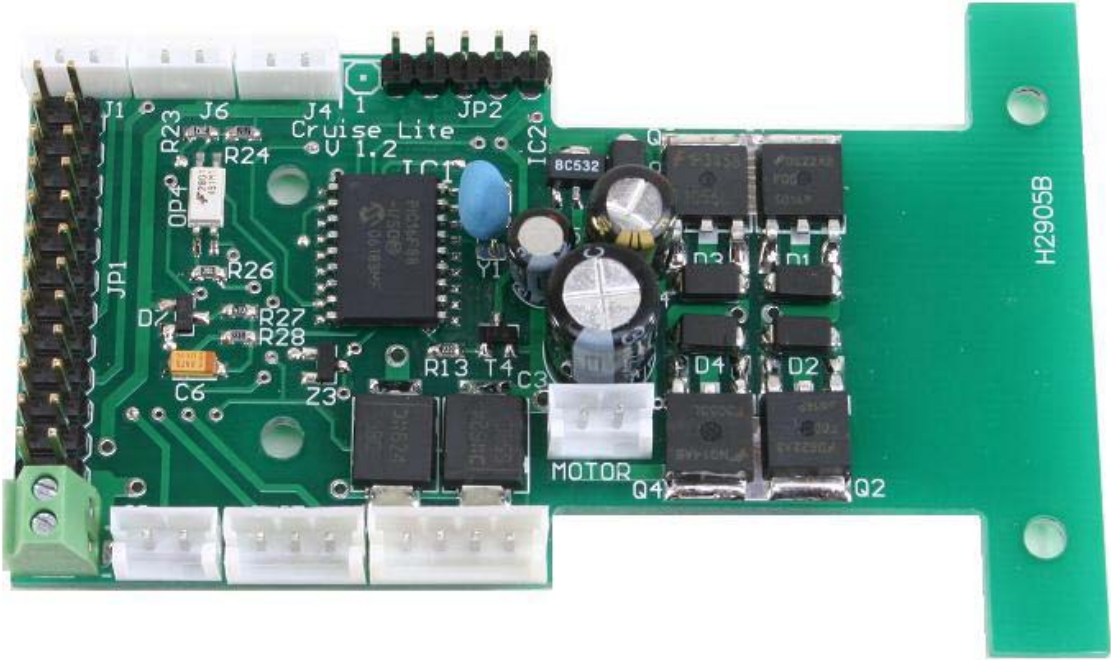




Cruise Commander DS™

Installation & Operation Manual



The Electric Railroad Co.
939 Wood Duck Avenue
Santa Clara, Ca. 95051
Revised: November 2006

Cruise Commander DS Kit

Overview

The patented Cruise Commander DS with SMS* Technology™ is a breakthrough in cruise control technology for 3-rail. The Cruise Commander product line uses motor commutation and back-EMF to monitor the speed of the motor(s) attached instead of an external tachometer sensor. This method of motor control is easier to install than attaching an optical tachometer and timing tapes, and does not require a flywheels on the motor. This integrated kit adds TMCC and Sound control functionality for the Lionel 0-6-0 Dockside Switcher locomotive.

Additional circuitry is designed into the Cruise Commander DS to operate the existing whistle in command mode. This will require a wire to be soldered onto the whistle board to allow command operation.

The Cruise Commander has a lash-up feature, referred to as “nudge mode”. The mode allows a person to match the locomotives in a lash-up. Once the speeds are matched, they dynamically adjust with throttle position. The “nudge” settings are saved for future operating sessions; they may, however, may be easily reset.

The Cruise Commander product line is capable of operating in 32 - speed step mode for speed profile compatibility with most existing engines. The default setting for the Cruise Commander Lite is 100 speed steps. The Cruise Commander product line uses the sound system to indicate configuration changes by blowing the whistle/horn for acknowledgement.

SMS* - Speed Management System

Enhanced Features:

- Simple “Tach-Less” installation
- Conventional and Command mode operation
- CAB-1™ selectable 32 or 100(default) speed steps
- Engineer figure seat tabs provided on the circuit board
- Coil Couplers, Smoke, Strobe / Cab / Marker Lamp supported
- Uses Lionel R2LC to be fully compliant with TMCC standards
- Complete Kit, Simple Installation, Fully Integrated

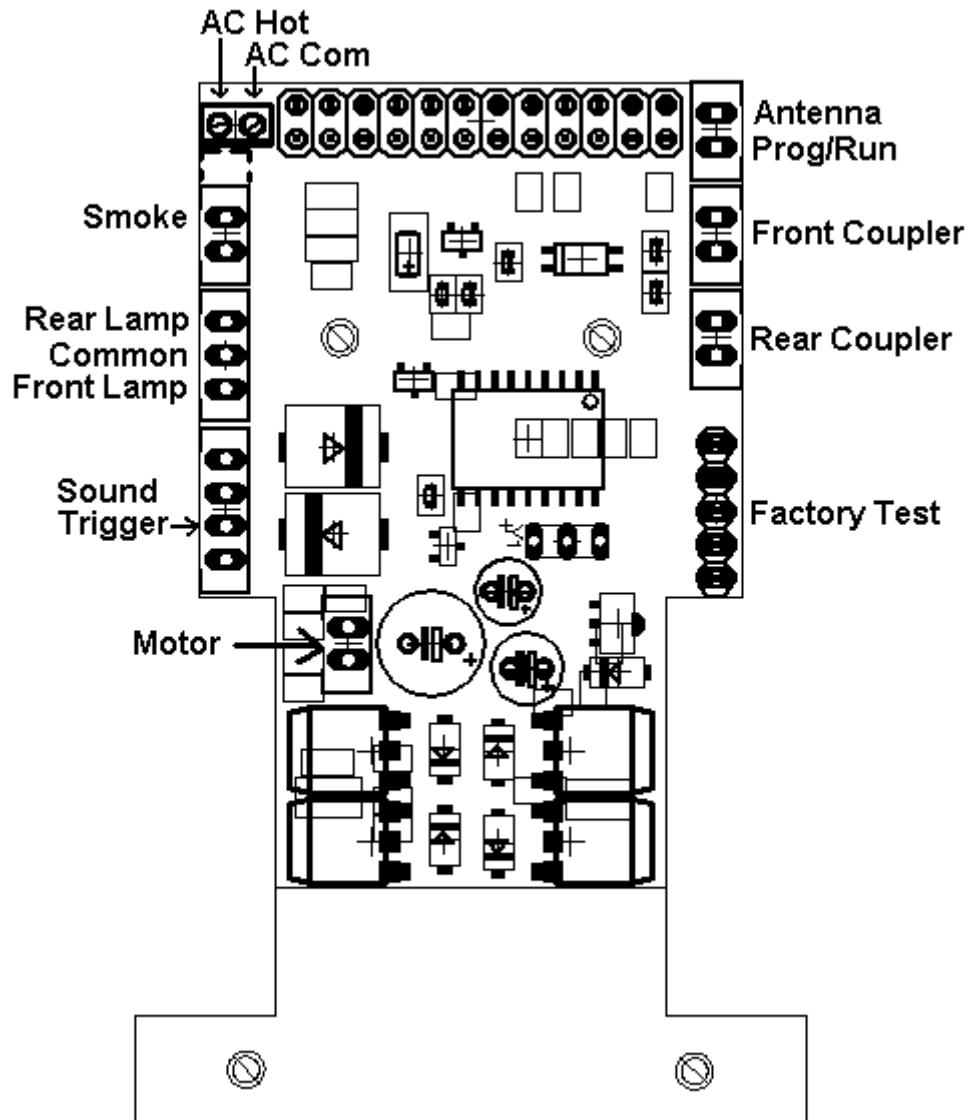
Included with Board

Antenna, hook-up wires, lighting harness, sound card trigger wire

Please Note:

Installation pictures of products may vary from actual products received. The Electric Railroad Company reserves the right to improve the products on successive manufacturing cycles.

Cruise Commander DS Connector Pin Designations



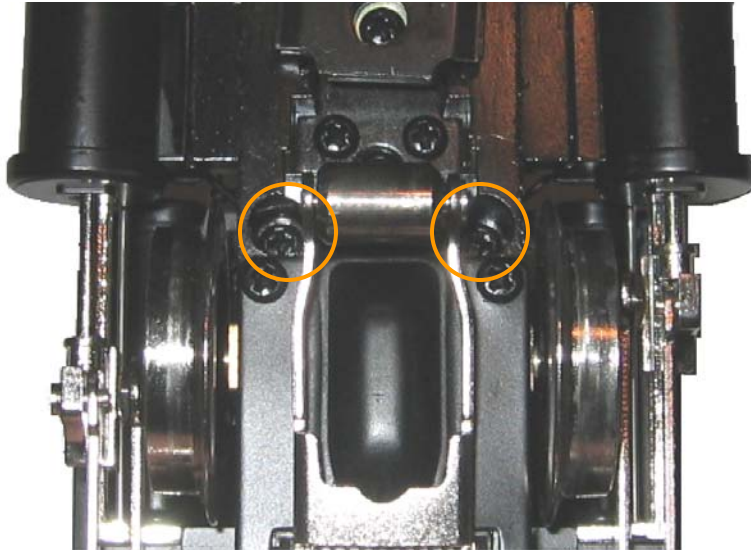
Installation Overview

Tin the wires that go into the mini screw terminals to prevent stray strands of wire. Do not over tighten terminal screws when attaching the wires.

The front and rear coupler connections and unidentified terminals are not used in application; they may, however, be active. Please contact support@electricrr.com for details on these connections.

Installation, Preparation Phase

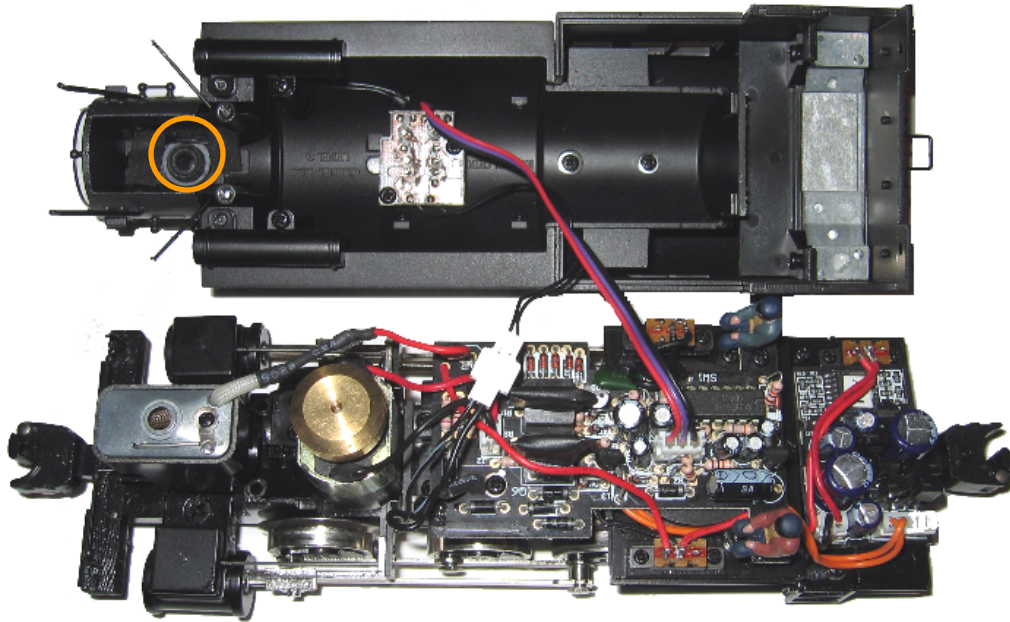
- The first task is to remove the shell from the loco. There are 4 thin wire “pipes” extending from the bottom front of the shell. Use care not to lose the parts when removing the shell. Four screws release the shell as shown below. Remove these screws and set them aside for later assembly.



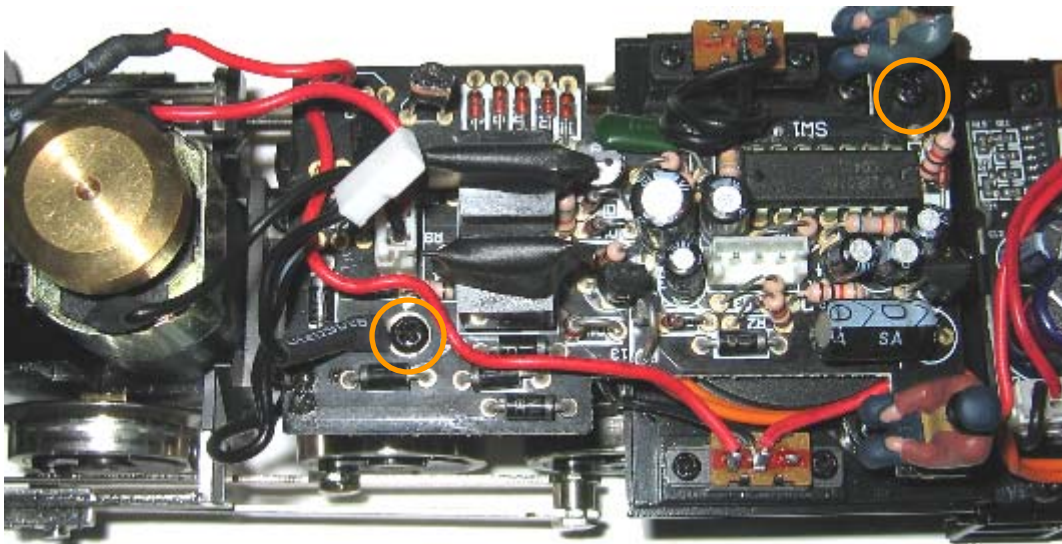
- The front shell mounting screws are recessed, as shown above. Remove these first and set them aside.



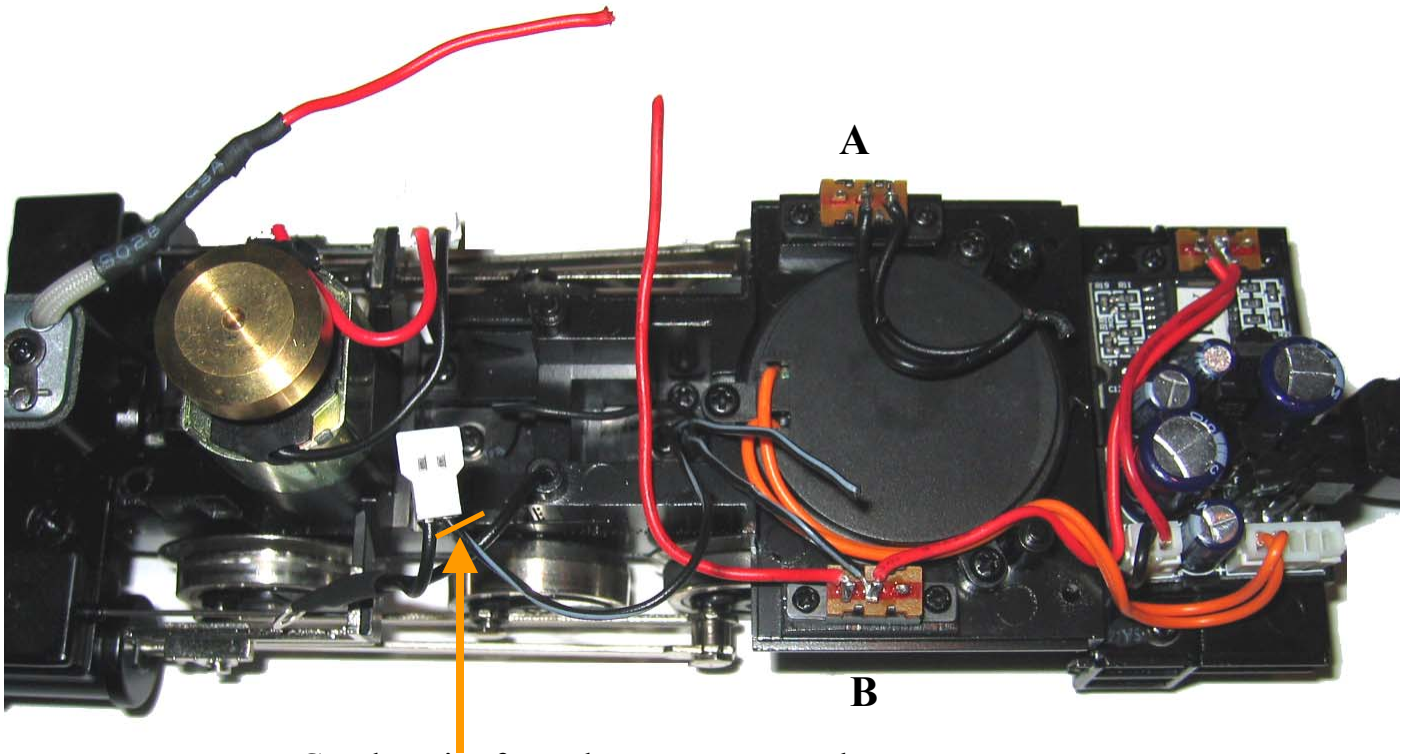
- The rear shell mount screws are on the back panel, as shown above. Remove these next and set them aside with the others.



- Carefully lift off the shell and unplug the lighting connector. Some locos have an additional cab lamp connector to be unplugged. Use caution not to lose or damage the “pipes” and the smoke unit gasket (identified above at the base of the smoke stack)

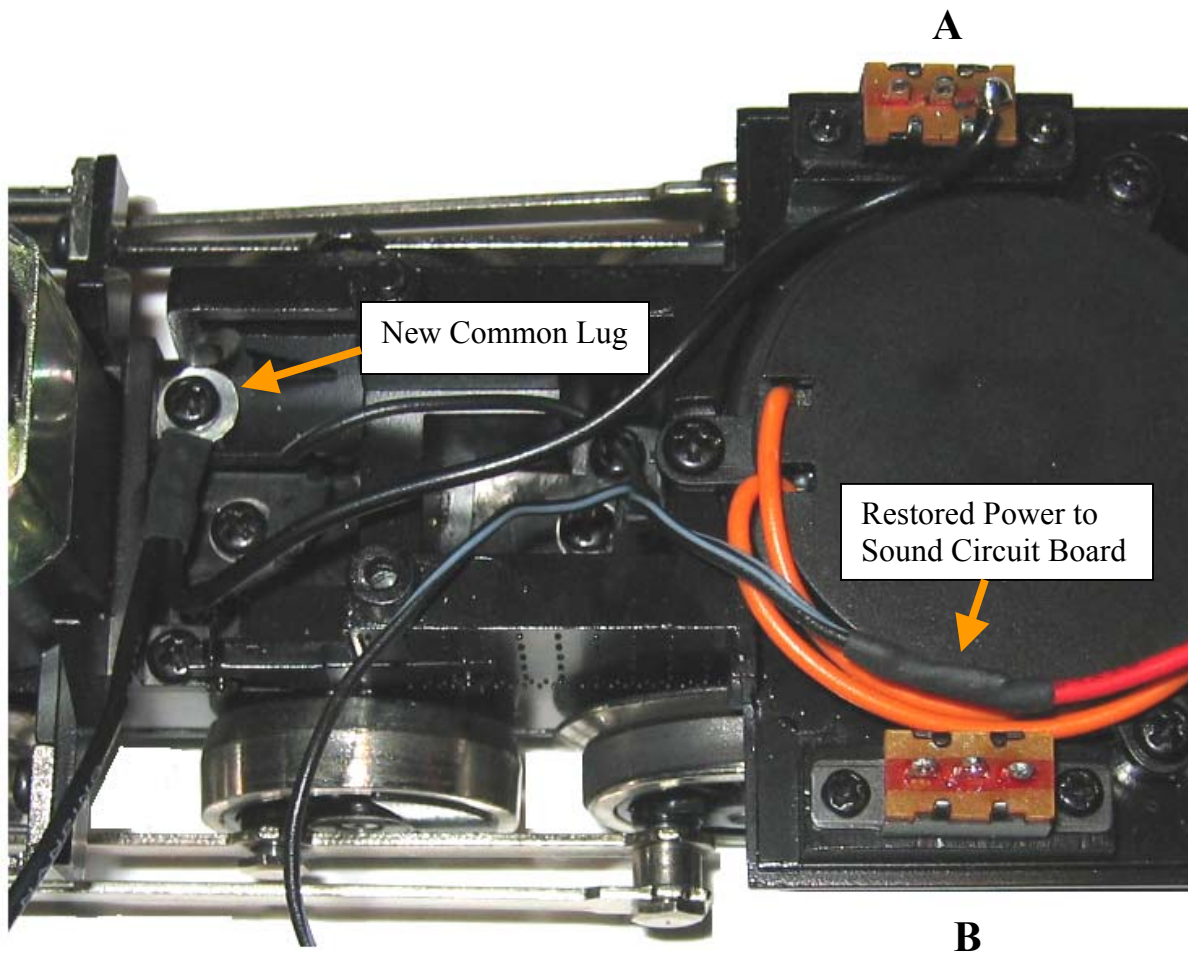


- Unplug the motor wires / connector from the circuit board.
- Remove the circuit board mounting screws identified above, lift the circuit board and clip all wires as close as possible to the circuit board to free it.
- Set the circuit board mounting screws aside for later use.



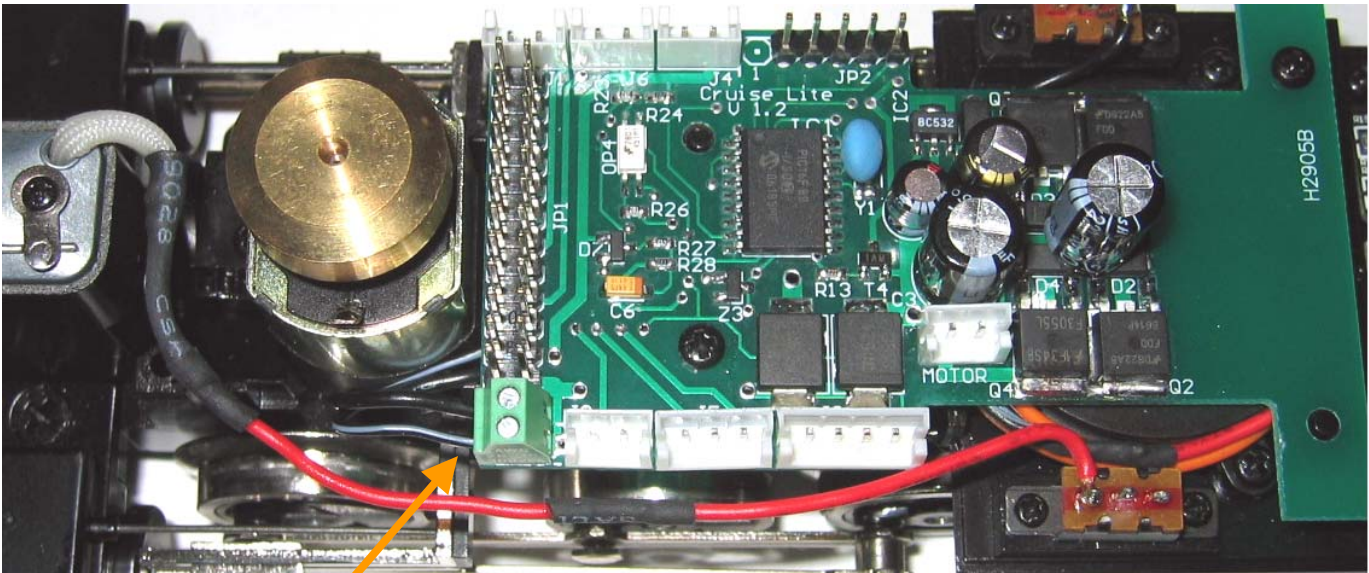
Cut the wire from the connector as shown

- Prepare the chassis by unsoldering all wires from switches “A” and “B” above. Use care not to damage the switches from excessive heat. The center wires on switch “B” will need to be joined, so do not damage the insulation on them.
- Cut the power connection (black with white tracer) from the cab light connector. This wire will be the HOT connection to the Cruise Commander DS circuit board.
- Remove the wires from the motor by sliding back the heat shrink and de-soldering them.
- ***Note the placement of the wires near the speaker going to the sound circuit board at the rear of the loco. These need to be placed in this exact spot when the shell is replaced or the boiler bulkhead will pinch them.***



- Restore power to the sound circuit board by attaching the 2 short black wires (with white tracer) to the red wire. One of these short power wires was originally attached to this red wire on the center lug of the smoke control switch “B”. We are simply restoring this connection. The other short power wire is best attached here as well - to simply find a “home” for it.
- Attach the supplied common lug with 2 black wires to the screw as shown above. One wire is for the common connection to the Cruise Commander DS. The second wire is for the program / run function. Attach one wire from the common lug to the “reverse” switch “A” as shown above. The “Reverse” switch will now operate as the program / run switch. Run will equate to “ON”.

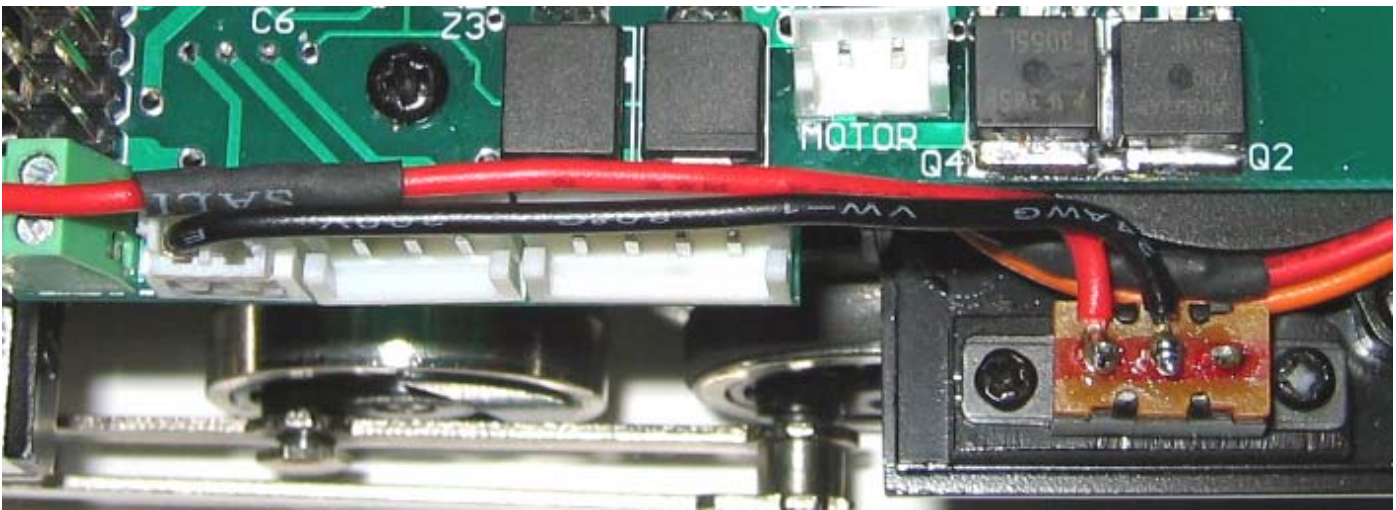
Installation, Wiring Phase



Power Connections

B

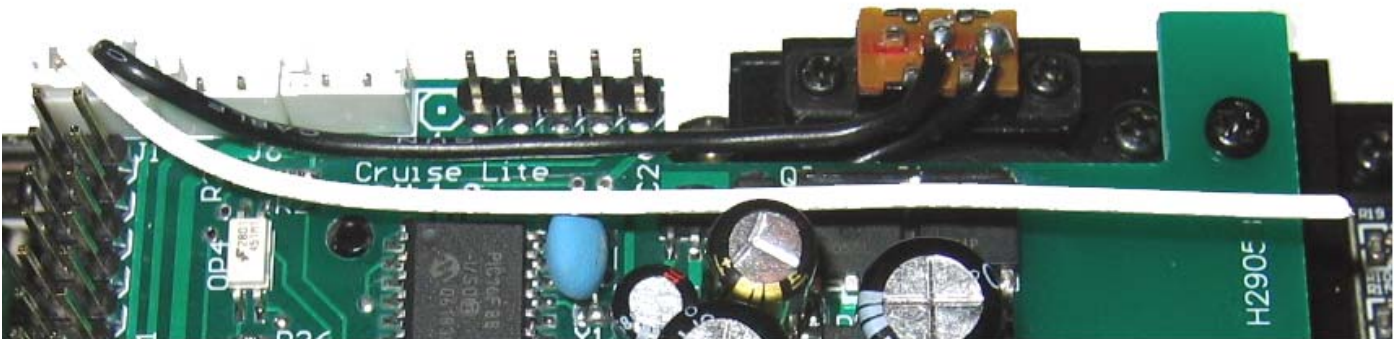
- Mount the Cruise Commander DS on the loco chassis lining up the holes in the Cruise Commander DS circuit board with the posts on the frame. Secure with the screws that held the original electronics.
- Attach the Hot and Common power wires to the Cruise Commander DS power terminals. The black wire with the white tracer is the HOT wire. Refer to the Cruise Commander pin designations on page 3 of this manual to identify the HOT terminal.
- Extend the red wire from the smoke unit with the red wire removed earlier. Route the wire as shown, and attach this wire to the smoke switch “B”.



B

- Locate the 2-pin connector in the kit with just the black wire. Plug this wire into the connector labeled “J2” (next to the power connector). Cut the black wire to attach to the center terminal of the “Smoke” switch “B” as shown.

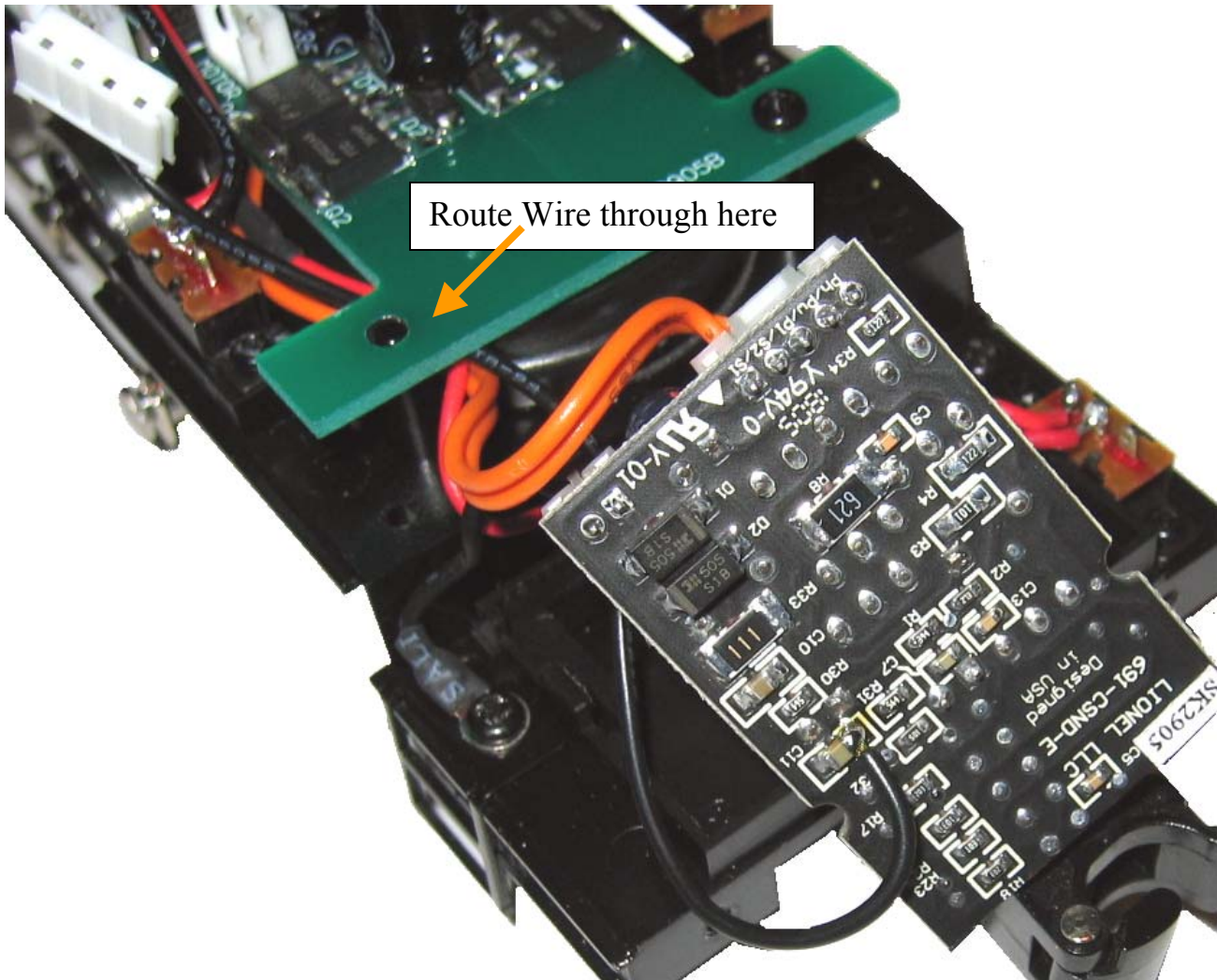
A



- Locate a 2-pin connector in the kit with the white and black wires. Plug these wires into the connector labeled “J1”. Cut the wire to length to attach to the center terminal of the “Direction” switch “A” as shown.
- Route and cut the white wire as shown. This is the antenna connection, and connects to the shell fitted antenna with a wire nut.
- Remove the engineer figures from the original circuit board if present, and use hot melt glue or CA adhesive to attach them to the Cruise Commander DS.

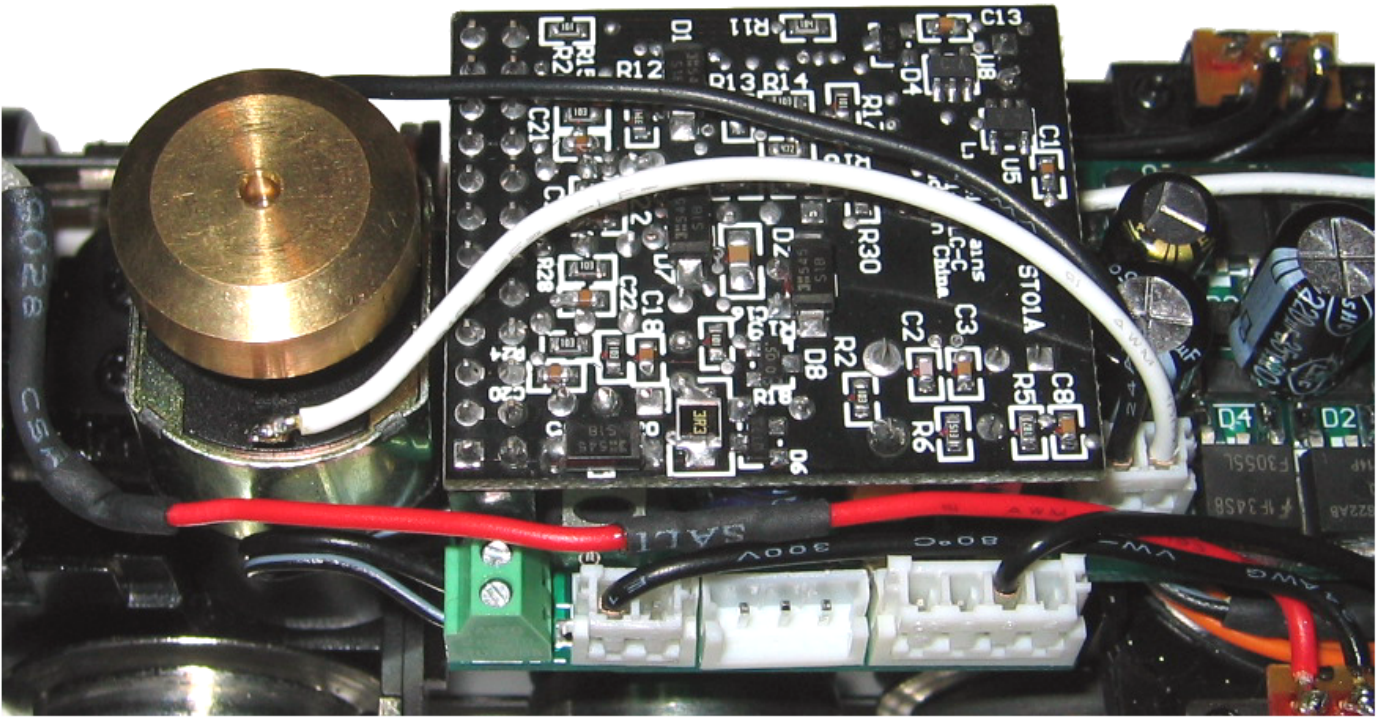
Installation, Optional Sound Control

Disclaimer: This phase of the installation involves modification of the Dockside Switcher Sound Board. Done incorrectly, the board may be irreparably damaged. Proceed at your own risk! The Electric Railroad Company does not warranty this modification, and any damage done by making this modification is the sole responsibility of the user.



- Locate the 4-pin connector in the kit and route the wire under the Cruise Commander DS with the Sound Board power and speaker (orange) wires.
- Carefully remove the Sound Board from the plastic mount. Attach the wire from the 4-pin connector by re-flow soldering to C11 as shown. Excessive heat on C11 will probably dislodge it from the sound circuit board – if needed get a helper to hold the board while the connection is made.

Installation, Preliminary Checkout



- Install the R2LC receiver on the Cruise Commander DS as shown.
- Locate a 2-pin connector in the kit with the white and black wires. Plug these wires into the connector labeled “Motor”. Dress the wires *exactly* as shown and solder them to the motor lugs. The position of the wires keeps the motor leads away from the receiver section of the R2LC. If this is not done correctly, the Dockside Switcher may not respond well in command mode.

PRELIMINARY CHECKOUT

At this time the loco should operate in command and conventional modes. It is a good time to give it a test run on the track. The antenna wire may need lifted up a bit into the air to help with signal reception. All functions should be operational: items to check out include the program / run switch, the smoke unit, and the horn (if the optional horn wiring was done). Now is the time to fix any problems with the operation.

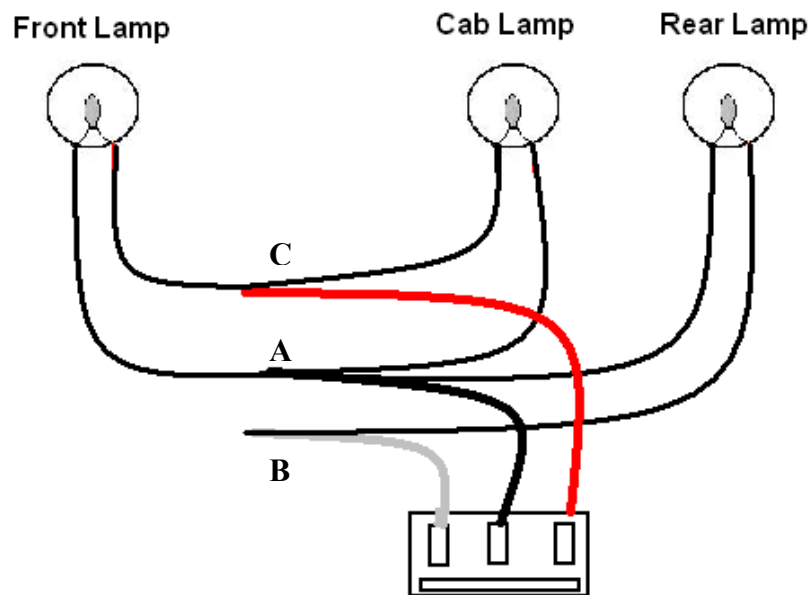
Installation, Shell Wiring



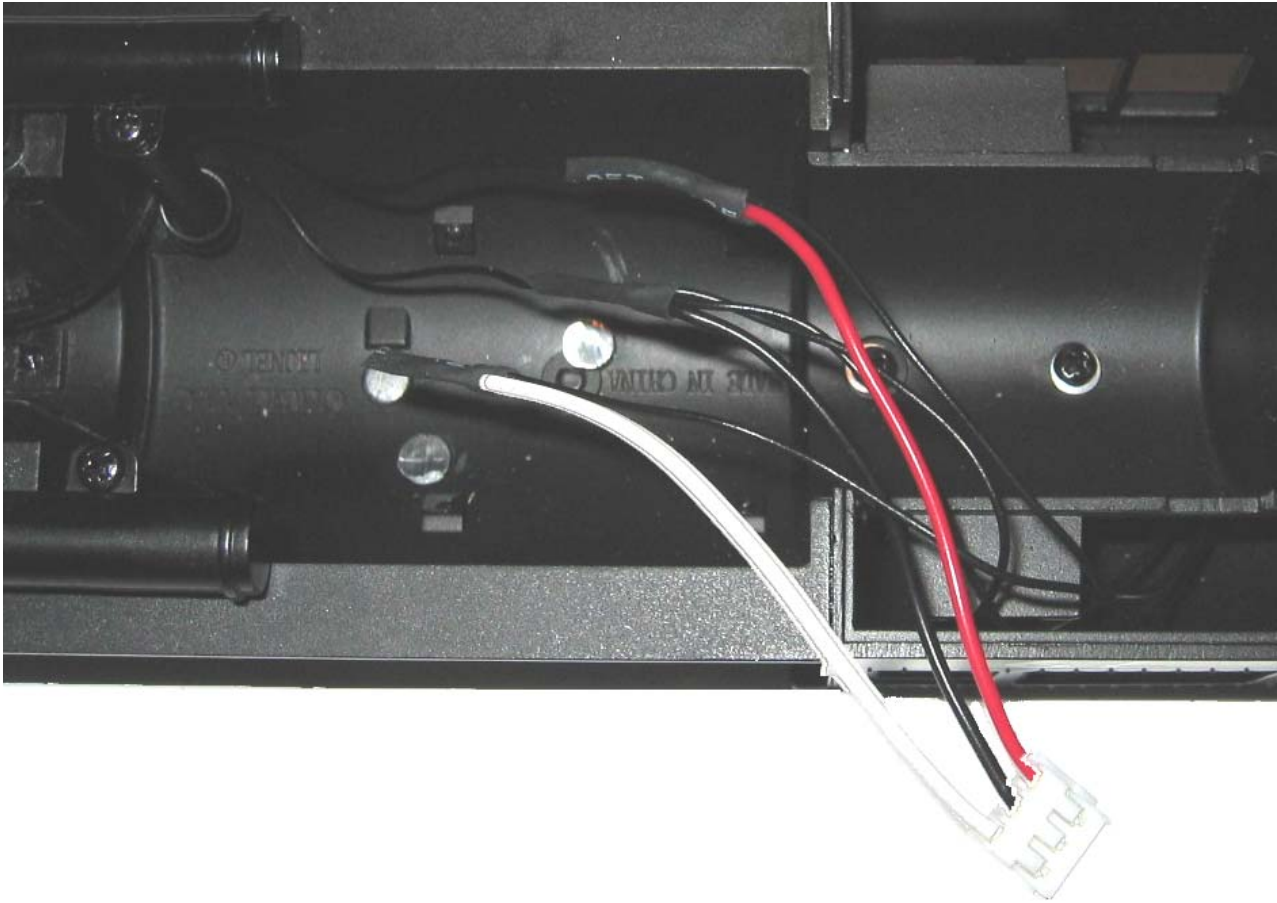
- Remove the 2 screws that hold the lighting circuit board to the shell. Carefully cut both sets of the wires to the front and rear lamps as close to the lighting circuit board as possible. This board will not be reused.
- Next it is necessary to remove the mounting posts that held this board in place to make room for the Cruise Commander DS. These posts are **removed** in the shell shown above. A Dremel or similar rotary tool will cut these posts out fairly easily.
- In doing these, experience had proven that cutting through the post about ½ way is enough to allow them to snap off with a good pair of pliers. Still it is best to cut into them as deep as you can. Additionally, cut them as close to the shell roof as possible to provide the most room for the new electronics.
- Be careful as to not lose the smoke unit gasket and 4 “pipes” stuck into the front of the boiler. Also watch out the tool does not damage the lighting wires that were cut loose from the lighting circuit board.
- Clean the metal dust after the posts are removed to prevent contamination inside the loco. A paper towel with a bit of Windex applied works well.

Warning: The removal of the posts can be hazardous. Lots of metal dust will be created when cutting the posts off, so wear a breathing mask and use eye protection. Take your time, and be careful. Nothing ruins an upgrade more than getting injured doing the task.

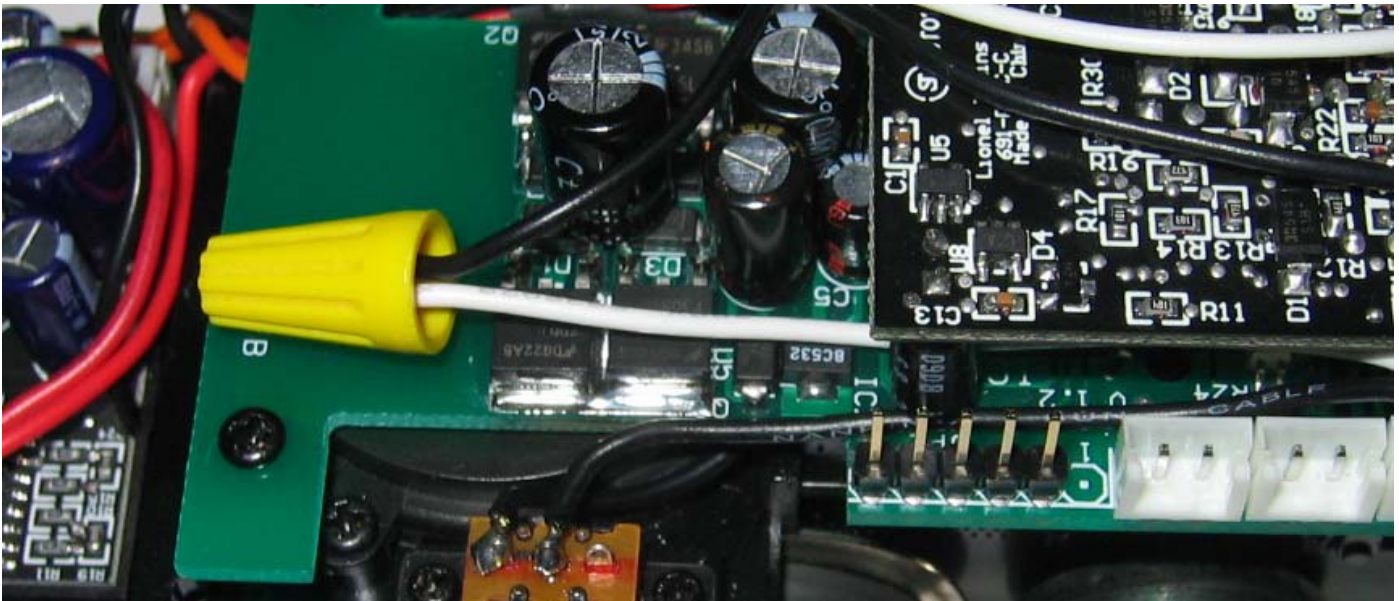
Reference the diagram below and the picture on the next page while wiring the lighting assembly. It is easy to get confused what leads go to the cab lamp, so follow these directions exactly !!!



- Unwind the front lamp wires until only one turn remains around the post they are wrapped on, you will need all the wire length possible to wire the lights.
- Locate the 3-pin connector with the white-black-red wires. This assembly is pre-cut to the correct length of 2.5”.
- Connection “A” above: Strip **one** wire on the rear lamp. On the connector going to the cab lamp, cut **one** wire free of the 2-pin connector and strip the end. Twist the black wire on the 3-pin connector with the rear lamp and cab lamp wires. Solder these 3 wires together. Slip a piece of heat shrink tubing over the wires **behind** the soldered area. Strip **one** wire on the front lamp. Solder the stripped front lamp wire to the connection. Slide the heat shrink over the connection and shrink the tubing using caution not to burn the wire insulation.
- Connection “B” above: Strip the remaining wire going to the rear lamp. Twist this to the white wire, solder them together and heat shrink the connection.
- Connection “C” above: Cut the remaining wire from the 2-pin cab lamp connector and twist this wire with the red wire. Solder them together. Slip a piece of heat shrink tubing over the wires **behind** the soldered area. Strip the remaining front lamp wire and attach to this connection. Slide the heat shrink over the connection and shrink the tubing using caution not to burn the wire insulation.



Above is a photo of the completed lighting wiring harness in the loco shell. When the wiring is completed, the front lamp and the cab lamp are wired in parallel. When the feature code is set for “steamer” on the R2LC, the front lamp will always be on; hence the cab lamp will always be on. The rear lamp will come on when reversing. Pressing AUX2 will toggle all lamps on or off.

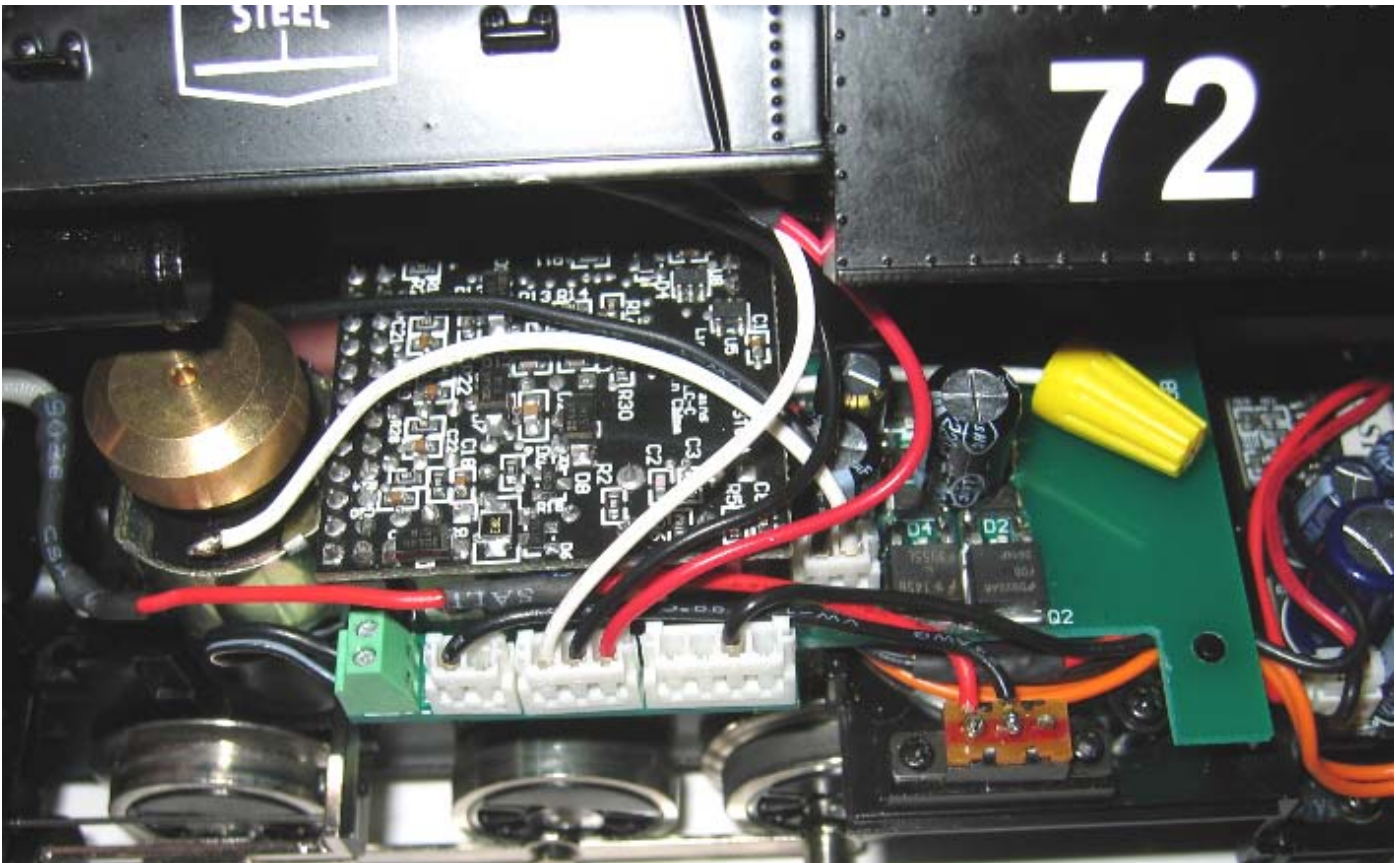


- Locate the black wire and wire nut. Strip both wires about $\frac{1}{4}$ " and attach the black wire to the white antenna wire with the wire nut as shown. The wire nut will release the shell – should it be necessary to remove it in the future.



- Feed the black wire up through the window as shown when the shell is re-attached.

Installation, Shell reattachment



- Start the shell reattachment by connecting the lights to the 3-pin connector as shown above. The wires need to be routed as shown, looping towards the rear of the loco.
- Take the time to insure you do not pinch any wires when placing the shell back on. The wires near the sound card are easily pinched, as well as the wires to the lamps.
- As you place the shell on, remember to locate the 4 “pipes” on the front of the boiler into their respective holes in the chassis. This is a tedious process, and a small pair of tweezers may help to get everything situated.
- Once the shell looks like it is in place, secure it in place with one of the screws up through the bottom to keep things from coming apart again.
- Look at the back of the loco and check the alignment of the shell mounting screw holes. If the alignment is off, it is possible the wires near the sound card are pinched.

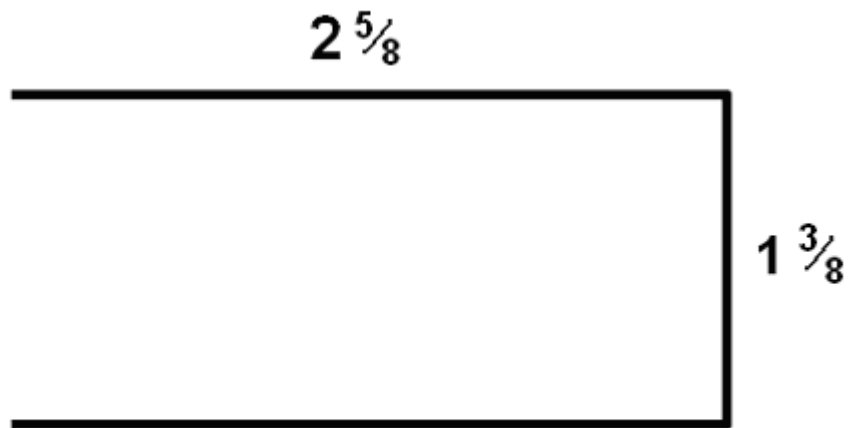
Installation of the Antenna

- Due to the fact this loco is die cast, the antenna poses a special problem. Two methods may be used to create an antenna.
 - The easiest is to route the black wire hanging out the window to the bell and tack it there. This simulates a Bell Rope, but it looks a bit out of place – *however it has superior reception of the TMCC signal.*
 - The other method is credited to Ernie of TAS, and may be employed here to create a more realistic antenna by replacing the handrails with a bus wire.

Handrail Antenna Method



- The existing handrails around the fat portion of the boiler are steel, and will not solder; so they must be removed. Simply slide them out of the 3 plastic stanchions on each side of the boiler.
- Next, remove the stanchions from the shell on the *same side of the boiler as the antenna wire exits* from the window. They are usually not glued in and can be pulled out in most cases, however use caution not to snap them off. There are 3 stanchions on this side to remove as shown above.



- Locate the #20 bus wire in the kit. Bend the wire as shown above. After cutting and bending the wire, straighten the wire as much as possible for a realistic presentation.



- Slip the formed bus wire antenna into the 3 stanchions still attached to the loco as shown, and slide the remaining 3 stanchions removed earlier on the bus wire antenna to the far corner.



- Pull the black antenna wire snug, and cut it about 1 ½” from the window opening. Strip the insulation about 1/8” and tin the end of the wire.
- Solder this wire to the bus wire antenna, attaching as close to the end as possible as shown above.



- Use the stanchions to secure the bus wire antenna, and route the black antenna wire into the window as shown above. Make sure the new handrail antenna does not touch the boiler shell or it will degrade the TMCC signal to the loco electronics.

INSTALLATION COMPLETED!

Operation

Speed Step Selection

The default speed step selection is 100 as shipped. The 100 speed steps are linear. The 100 speed steps start at a lower threshold, thus the motor is operating at a lower initial voltage with fine adjustment as the throttle is advanced. The momentum and stall features are not applicable, and do not operate.

To switch Speed Steps do the following:

Activate 32 Speed Steps: AUX1 + 0 + AUX1 + 0 + BRAKE

Activate 100 Speed Steps: AUX1 + 0 + AUX1 + 0 + BOOST

Note: The speed step selection is stored until changed, and survives power cycling.

Motor Type Selection

Motors are classified as small or large. Selecting the wrong motor size won't hurt anything, but operation is best when matched. The default motor type is "small motor" for the Cruise Commander DS. This is set at the factory and should be correct.

To switch Motor Type do the following:

Activate Small Motor: AUX1 + 0 + AUX1 + 1

Activate Large Motor: AUX1 + 0 + AUX1 + 2

Note: The motor type selection is stored until changed, and survives power cycling.

Cruise On/OFF Selection

The Cruise feature may be turned on or off. This setting is stored and affects command and conventional mode operation.

To turn the Cruise OFF or ON, do the following:

Cruise Off: AUX1 + 0 + AUX1 + BRAKE + 7 + BRAKE

Cruise On: AUX1 + 0 + AUX1 + BRAKE + 9 + BRAKE

Note: The cruise off/on selection is stored until changed, and survives power cycling.

Operation Continued

“Nudge Mode” Operation

The Cruise Commander has a bit of “play” to allow locos to operate in a lash-up. At times the “play” is not optimal, so it is possible to match locos a bit closer with the “Nudge” mode feature. Remember to lash-up only very similar locos, and it is a requirement the gear ratios match.

First, simply try the locos together in a lash-up at slow speeds. If they buck each other, use the Cruise Commander “nudge” mode to try to match the locos a bit closer. Nudge mode basically increases the slower loco to match the speed profile of the faster loco. Although similar to a “stall” setting, the nudge mode is a bit more complex as it calculates the speed profile dynamically to hold the locos in sync throughout the throttle range.

First create a “TRain” with the Cab-1. Once the locos are operating in TRain mode do the following:

- Test run the locos (not coupled) to find the slower loco
- Place the slower loco behind the faster one
- Get them moving as a train, around 10 speed steps on the throttle
- Select the **slower** loco ENG ID
- Press AUX2 4 times, with a 1 second pause between each press
- The lights should blink off twice, confirming the loco to be “Nudged”
- Use the Boost and Brake keys to adjust the slower loco to match the faster one
- Press “HORN” to lock the setting in the slower loco.
- Couple the locos together and run as TRain.

To operate the “Nudge” mode on an ENG ID, do the following:

Activate: AUX2 + AUX2 + AUX2 + AUX2

Nudge: BOOST to speed up, Brake to slow down

Save: Horn

To clear the nudge settings, select the speed step (32 or 100) on the “nudged” loco.

Note: the “nudge” selection is stored until changed, and survives power cycling.

Setting the R2LC ID and feature code

Setting the engine ID Number:

The R2LC Receiver comes with its engine ID set to ENG '1'. To change the engine ID, follow this procedure.

1. Make sure the Command Base is connected to the track
2. Set the engine PROGRAM / RUN switch to "PROGRAM"
3. Place the engine on the track and apply power
4. On the CAB-1, press [ENG] then the number (1 - 99) for the engine desired
5. Press [SET] (the engine ID is saved until you need to change it again)
6. Press [AUX1] [4], where 4 = the engine feature code (this must be done!)
7. Remove power from the track and place the switch back into the 'RUN' Position

Feature Code information:

The R2LC receiver module can be programmed to operate different features for different engines. The correct code for the Cruise Commander DS installation is "4".

Code	Engine Type	Feature Terminal
0	Steam w/ Signal sounds	Smoke Unit
1	Diesel w/ Signal sounds	Strobe Light
2	Diesel w/ Signal sounds	Cab / Marker Light
4	Steam w/ Rail sounds	Smoke Unit
5	Diesel w/ Rail sounds	Strobe Light
6	Diesel w/ Rail sounds	Cab / Marker Light
8	Diesel w/ Rail sounds	Smoke Unit

Why is it necessary to set the Feature Code?

The Cruise Commander DS uses the serial data from the R2LC receiver to detect the throttle settings. This serial data signal is dependent on the feature code. If this is not properly set, the loco will not respond to throttle commands and may even enter into conventional mode and rocket down the rails! Additionally, features like the smoke unit in this loco, will not operate until the feature code is set. It is always a good idea to know your loco feature codes for proper operation of smoke/strobe/cab/marker lighting effects. This is true of your entire TMCC loco stable.

When running in Conventional mode:

Cycling of engine direction can be overridden by placing the programming switch in the 'PROGRAM' position. This will lock the engine direction to the last operating direction. You must replace the switch back to the 'RUN' position if you wish to run the engine in Command mode.

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 \$50.00 at our option.

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

Disclaimer

Improper installation or configuration of the Beep Commander Board 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 to prevent malfunction. If you are unsure of your install, please contact us first before taking any risks!

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