

The Un-Official

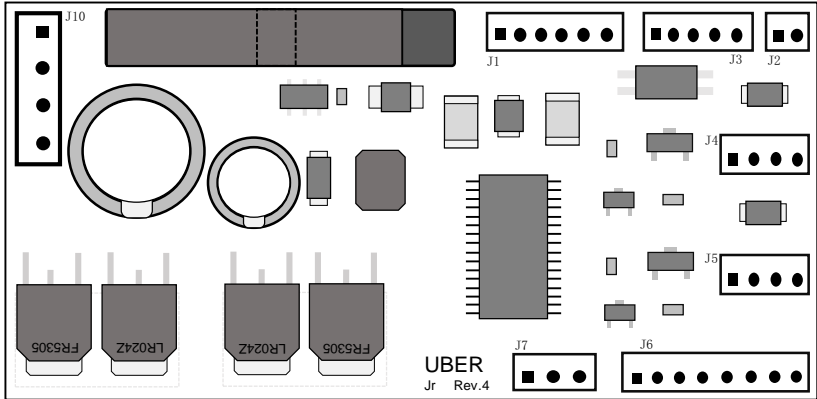
BEMC & RCDR Guide

Covers basic wiring information about the BEMC and RCDR boards.

Info & Discretion

- The guide covers basic pin out and wiring information about the BEMC and RCDR boards. Also including connection between the RailSounds LITE board.
- This does not cover technical troubleshooting.
- This has **not** been looked at by Lionel. It is unclear how accurate the wiring diagrams are. I warn you to always trace your wires and use a meter to double check! Some wiring will vary from model to model.
- Colors shown **are not** 100% accurate. Grey wire apparently is the “new fad” with Lionel. The diagrams are colored for your visual help.
- Lighting outputs will vary from model to model. Trace your wires.
- **NOT ALL the “common” outputs on the BEMC are common to the chassis ground.** You will damage the board if grounded to chassis. Use test meter to verify your pin out.
- If your engine is equipped with Lit number boards, they are powered off track power not the BEMC board.
- **‘RET’ Pin** on the BEMC must go to the common for track ground/frame. The BEMC board will not see the incoming Serial Data from the RCDR and the board will start up. “RET is the serial data return reference. It provides the same ground ref as the source of the serial signal.”
- When connecting/verifying connection. the power input wires between the RCDR/BEMC must match. Common must go to Common...3rd rail must go to 3rd rail. If not connected properly it will mess with the Input Serial Data signal between the RCDR and BEMC.
- There are **2 versions of the RCDR currently**. Rev 1 of the RCDR came in (S01)-(S08) codes, this is out dated now. Rev 2 is the current board being used and there are no “S codes” But the part numbers are specific to each product they are assigned too. RCDR is used in many applications just by itself, I was able to create diagrams for those set ups. Also included are Rev 1 Pin puts for the early O & S scale.
- BEMC board **does not** support the Odyssey Optical sensor or 200 speed steps. It uses the similar technology used in Electric Railroad Company’s Cruise Commander Series and DCC decoders available today. (EMF) The system monitors the voltage/amp draw from the motor and maintains it for that speed step. These boards are pre-programed in the software for that specific loco/motor size.
- The way the BEMC and RCDR are wired/setup is very similar to the set up I’ve seen in the early Vision Line locomotive’s. First seen in the CC2 ending in the Challengers. This setup was used into the transition to the RCMC. Most other legacy equipped engines still used the modular set up with a R4LC. The 700e Hudson was the first VL engine to have the RCMC. (But no RS-LITE yet) This setup was also used in a few Non-vision engines such as the 4-4-2 Atlantics with whistle steam, LionMaster T1 with the whistle steam feature and the Die cast ES44ac’s.
- The BEMC boards are used in applications where the RCMC will not fit or the Odyssey optical sensor is not feasible. They are found in a few O scale items currently (late 2016) such as the LEGACY Heislars, LionMaster Class A, and 0-8-0’s with a tether. But mostly found in the American Flyer LEGACY equipped models.

BEMC

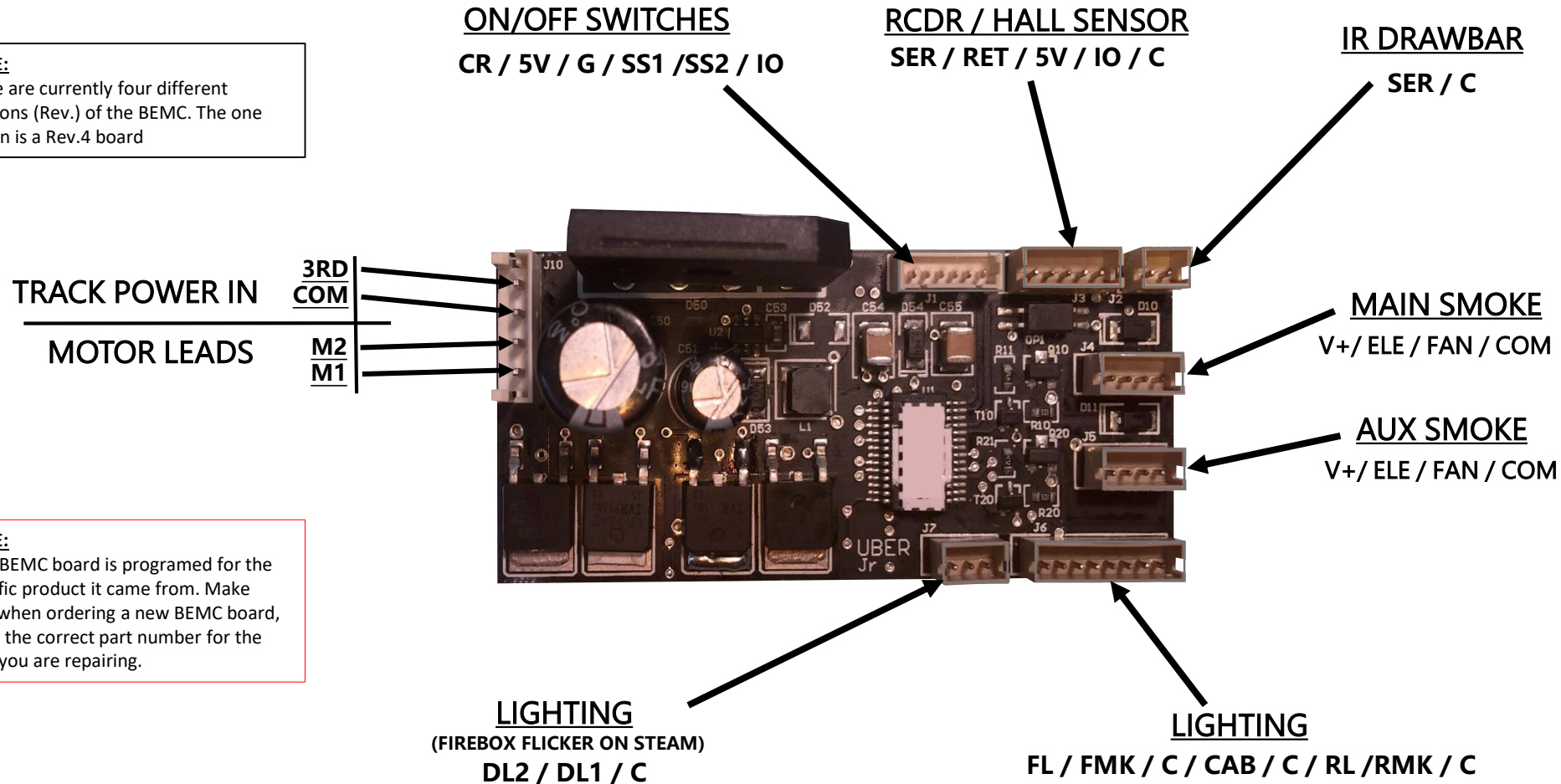


BEMC PLUG BREAK DOWN

(FIGURE A)

NOTE:
There are currently four different revisions (Rev.) of the BEMC. The one shown is a Rev.4 board

NOTE:
Each BEMC board is programmed for the specific product it came from. Make sure when ordering a new BEMC board, it has the correct part number for the item you are repairing.



BEMC PIN BREAK DOWN	
ABRV	TERM
3RD	HOT (CENTER RAIL PICK UP)
COM	COMMON GROUND
M1	MOTOR LEAD 1
M2	MOTOR LEAD 2
SS1	SMOKE SWITCH 1
SS2	SMOKE SWITCH 2
ODY	ODYSSEY SWITCH
PRG	PROGRAM/RUN SWITCH
RS	RAIL/SIGNAL SOUNDS SWITCH
5V	5 VOLTS +
V+	POSITIVE OUTPUT VOLTAGE
ELE	HEATING ELEMENT
FAN	SMOKE FAN MOTOR
FL	FRONT LIGHT
FMK	FRONT MARKER LIGHTS
RMK	REAR MARKER LIGHTS
CAB	CAB LIGHT
RL	REAR LIGHT
SER	SERIAL DATA LINE
DL1	DITCH LIGHT 1
DL2	DITCH LIGHT 2
C	COMMON GROUND
RET	SERIAL-GROUND RETURN
G	GROUND
IO	?
CR	?

BEMC & RCDR Wiring Diagram

(Steam with IR Connection)

WIRE COLOR WILL VARY

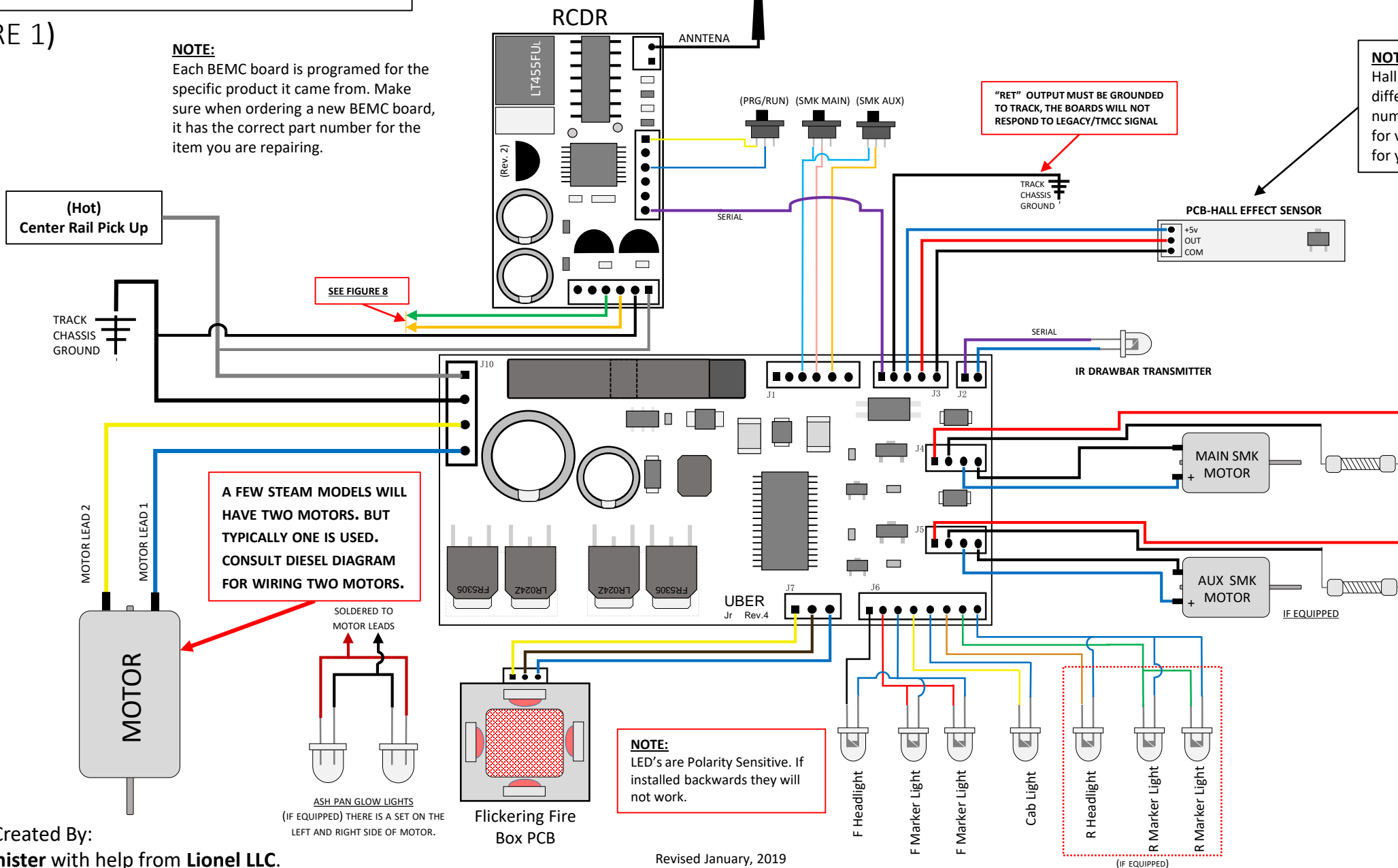
(FIGURE 1)

NOTE:

Each BEMC board is programmed for the specific product it came from. Make sure when ordering a new BEMC board, it has the correct part number for the item you are repairing.

NOTE:

Hall Effect Sensors come in different shapes, sizes and part numbers. A generic shape is used for visual aid. Check the parts site for your specific item.



SEE FIGURE 8

"RET" OUTPUT MUST BE GROUNDED TO TRACK, THE BOARDS WILL NOT RESPOND TO LEGACY/TMCC SIGNAL

A FEW STEAM MODELS WILL HAVE TWO MOTORS. BUT TYPICALLY ONE IS USED. CONSULT DIESEL DIAGRAM FOR WIRING TWO MOTORS.

NOTE:
LED's are Polarity Sensitive. If installed backwards they will not work.

- "Special" Lighting Output location may vary per model for certain lighting features such as:
- MARS Lights
 - Strobe Lights
 - Emergency Lights
 - Warning Lights
 - Flashing Beacons
 - Ground Lights
 - Work Lights
 - Number Boards
 - Lit Gauges

IT IS RECOMMEND TO TRACE THE WIRES FROM THE LED TO THE PIN OUTS ON THE BOARD

BEMC & RCDR Wiring Diagram

(Steam with Wired Tether)

(FIGURE 2)

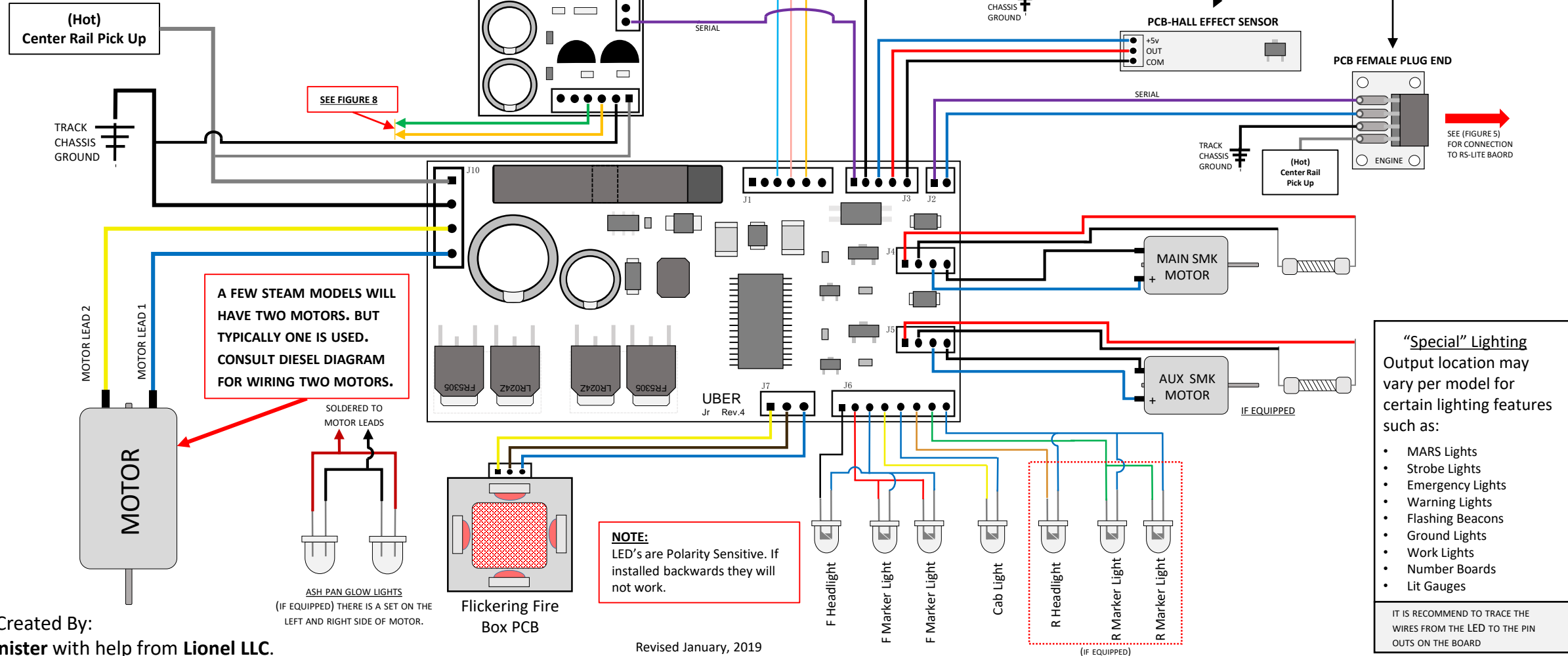
WIRE COLOR WILL VARY

NOTE:
Hall Effect Sensors come in different shapes, sizes and part numbers. A generic shape is used for visual aid. Check the parts site for your specific item.

NOTE:
The "PCB female Plug end" is used for a visual reference only, the wire location on PCB might vary. Always test pin outs with a meter to avoid damage to both the BEMC board and RS-LITE board.

NOTE:
Each BEMC board is programmed for the specific product it came from. Make sure when ordering a new BEMC board, it has the correct part number for the item you are repairing.

"RET" OUTPUT MUST BE GROUNDED TO TRACK, THE BOARDS WILL NOT RESPOND TO LEGACY/TMCC SIGNAL



A FEW STEAM MODELS WILL HAVE TWO MOTORS. BUT TYPICALLY ONE IS USED. CONSULT DIESEL DIAGRAM FOR WIRING TWO MOTORS.

NOTE:
LED's are Polarity Sensitive. If installed backwards they will not work.

"Special" Lighting Output location may vary per model for certain lighting features such as:

- MARS Lights
- Strobe Lights
- Emergency Lights
- Warning Lights
- Flashing Beacons
- Ground Lights
- Work Lights
- Number Boards
- Lit Gauges

IT IS RECOMMEND TO TRACE THE WIRES FROM THE LED TO THE PIN OUTS ON THE BOARD

BEMC & RCDR Wiring Diagram

(Diesel or Electric)

WIRE COLOR WILL VARY

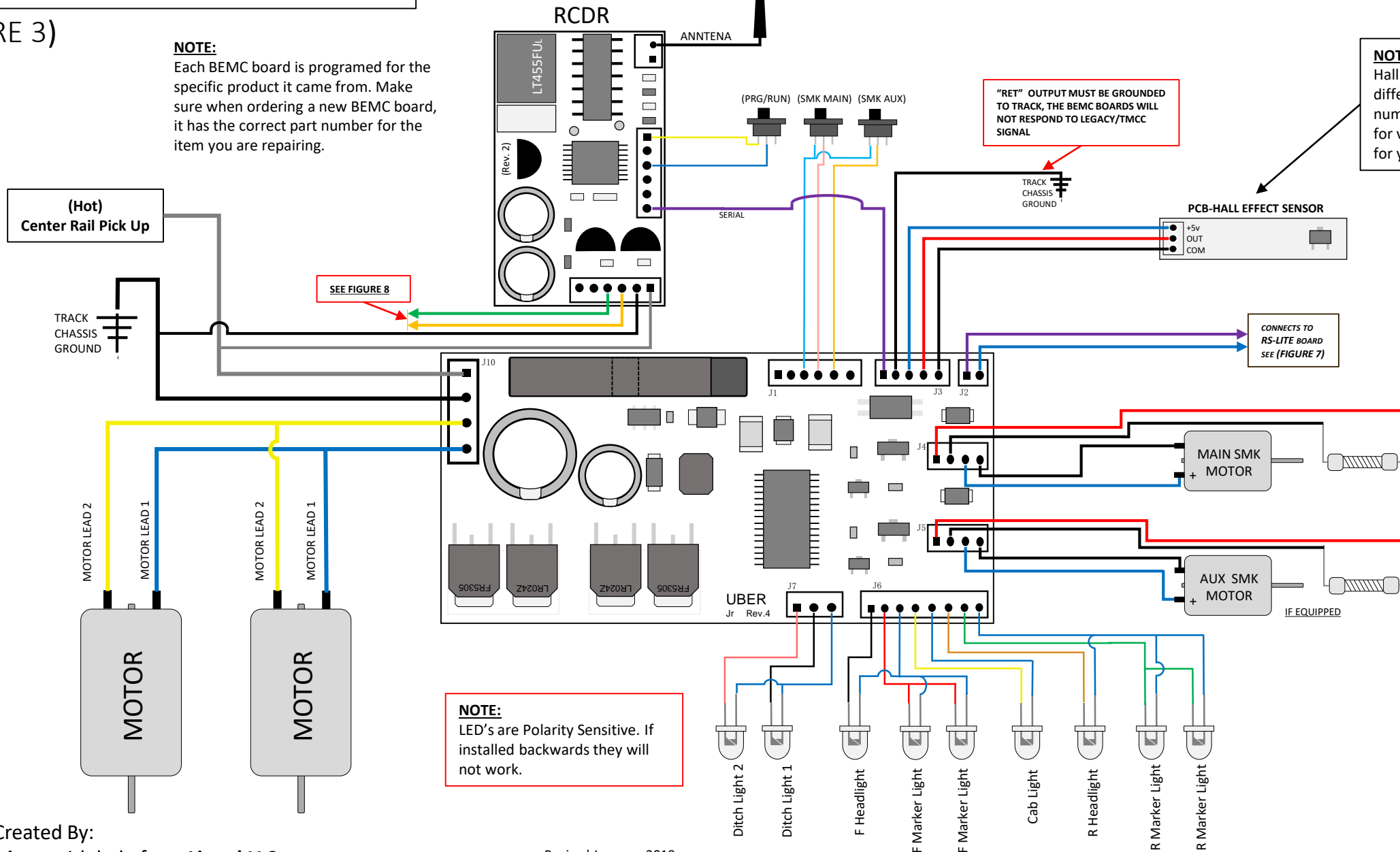
(FIGURE 3)

NOTE:

Each BEMC board is programmed for the specific product it came from. Make sure when ordering a new BEMC board, it has the correct part number for the item you are repairing.

NOTE:

Hall Effect Sensors come in different shapes, sizes and part numbers. A generic shape is used for visual aid. Check the parts site for your specific item.



SEE FIGURE 8

"RET" OUTPUT MUST BE GROUNDED TO TRACK, THE BEMC BOARDS WILL NOT RESPOND TO LEGACY/TMCC SIGNAL

CONNECTS TO RS-LITE BOARD SEE (FIGURE 7)

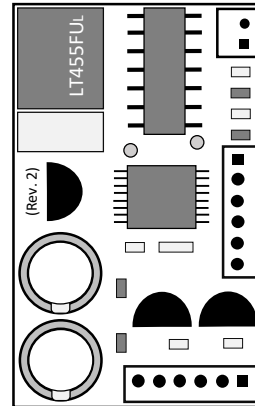
NOTE:
LED's are Polarity Sensitive. If installed backwards they will not work.

- "Special" Lighting Output location may vary per model for certain lighting features such as:
- MARS Lights
 - Strobe Lights
 - Emergency Lights
 - Warning Lights
 - Flashing Beacons
 - Ground Lights
 - Work Lights
 - Number Boards
 - Lit Gauges

IT IS RECOMMEND TO TRACE THE WIRES FROM THE LED TO THE PIN OUTS ON THE BOARD

RCDR

(Rev. 2)



RCDR (Rev 2) PLUG BREAK DOWN

RCDR PIN BREAK DOWN	
ABRV	TERM
3RD	HOT (CENTER RAIL PICK UP)
COM	COMMON GROUND
CP1	FRONT COULPER
CP2	REAR COULPER
PRG	PROGRAM SWITCH
LC1	LIGHTING CONTROL #1
LC2	LIGHTING CINTROL #2
F	Lighting/ Hall Sensor
R	Lighting / Hall Sensor
SER	SERIAL DATA

FIGURE B

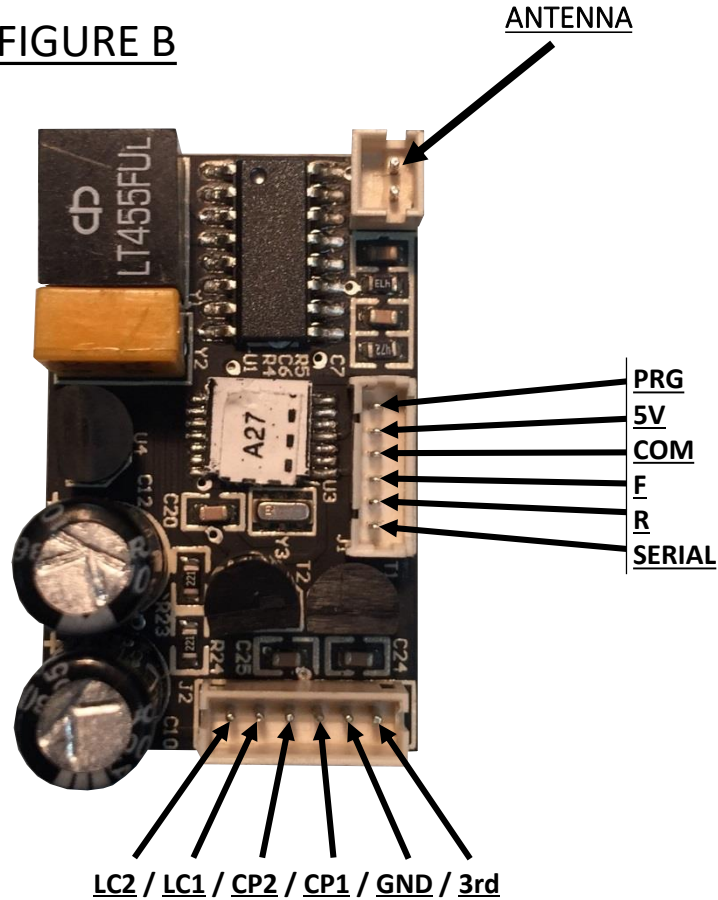
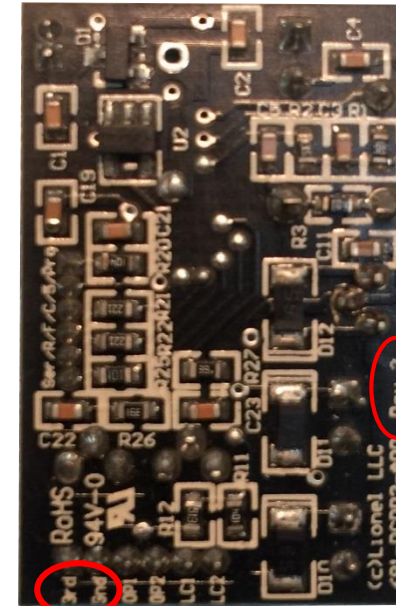


FIGURE C



NOTE:
Each RCDR might be programmed for the specific product it came from. Make sure when ordering a new RCDR board, it has the correct part number for the item you are repairing.

NOTE:
The RCDR & BEMC is mainly used in "S" gauge. (S gauge is 2 rail) make sure the pick up wires are consistent with each other or it will short out the power supply and may damage the boards as well.

NOTE:
This is Rev. 2 or Version 2 of the RCDR. This is current version of the RCDR that is being used.

RCDR Wiring Diagram

(FIGURE 8)

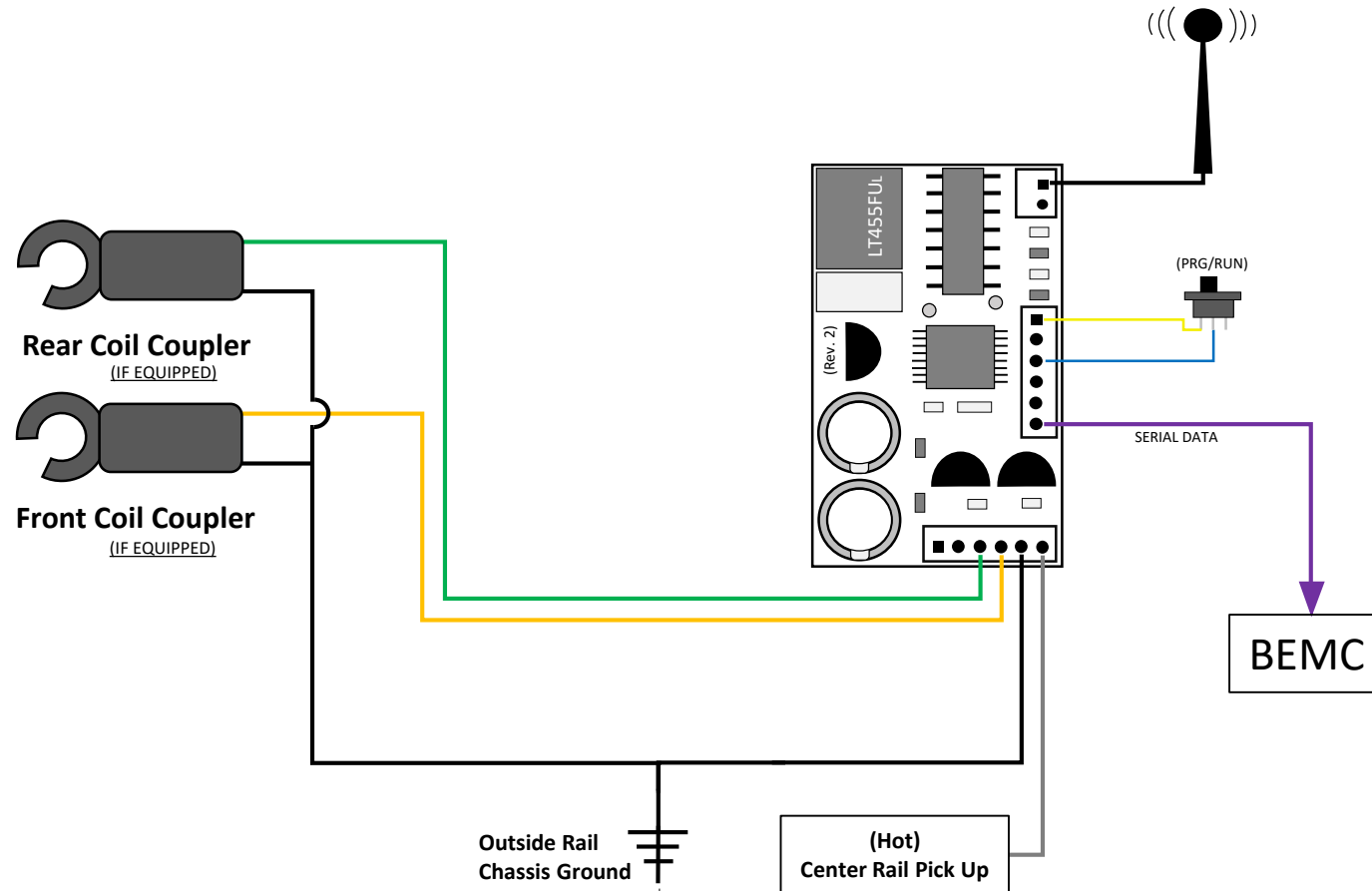
WIRE COLOR WILL VARY

NOTE:

There are two different revisions (Rev.) of the RCDR currently. The one shown in the diagram is Rev.2

NOTE:

RCDR is mounted externally from the BEMC. It isn't mounted directly to the board like the RCVR board is on the RCMC. This is a similar set up used in the early Vision Line locomotives.



NOTE:

Each RCDR might be programmed for the specific product it came from. Make sure when ordering a new RCDR board, it has the correct part number for the item you are repairing.

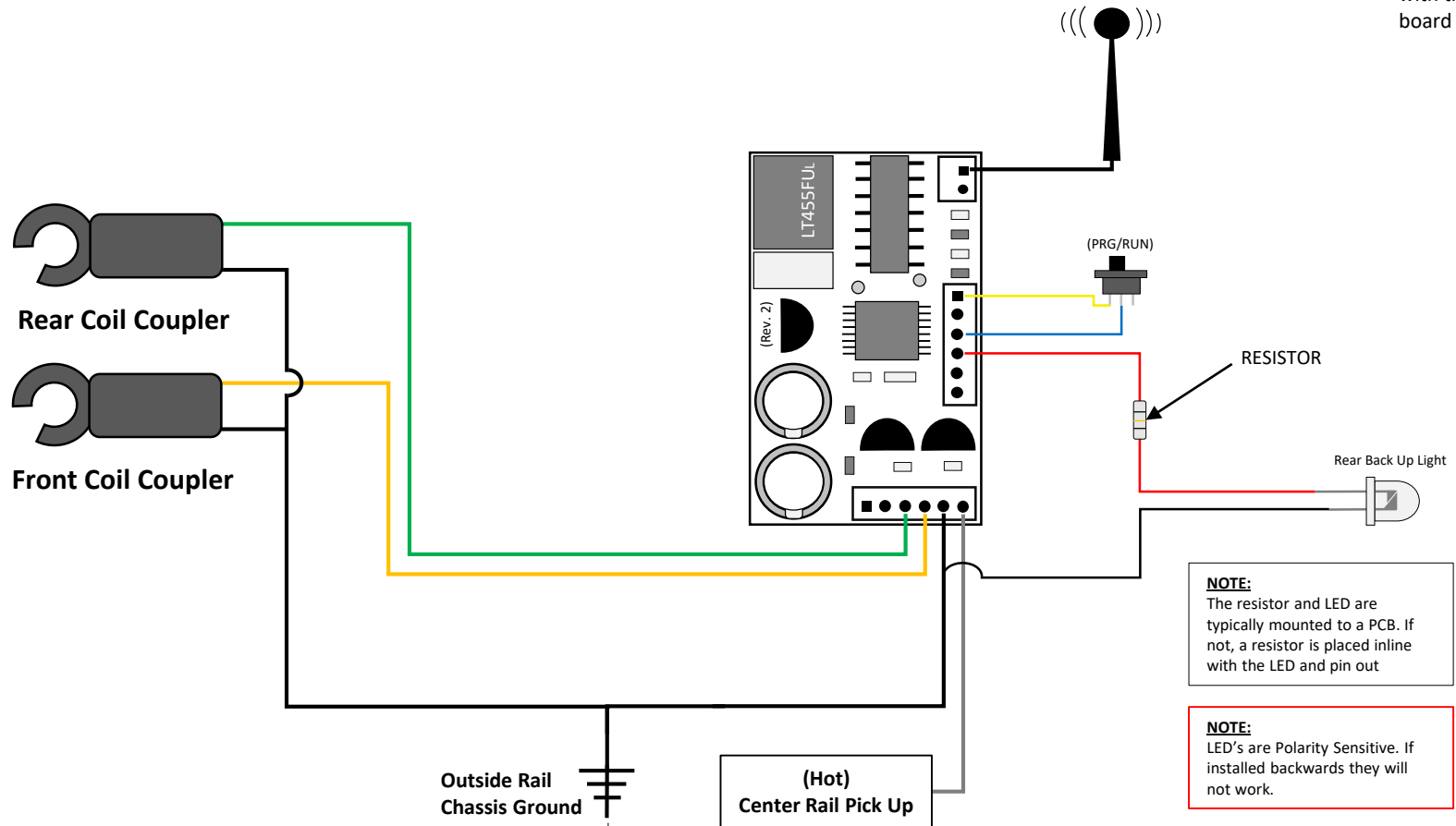
WIRE COLOR WILL VARY

RCDR Wiring Diagram

Aux Tender

NOTE:

There are two different revisions (Rev.) of the RCDR currently. The one shown in the diagram is Rev.2



WIRE COLOR WILL VARY

NOTE:

RCDR Rev 2. Is used in the most recent LEGACY equipped Water Tenders. Such as the (6-82394) The Early LEGACY water tenders such as the (6-11227) offered with the Vision Challengers, had a R4LC board installed.

NOTE:

Each RCDR might be programmed for the specific product it came from. Make sure when ordering a new RCDR board, it has the correct part number for the item you are repairing.

NOTE:
The resistor and LED are typically mounted to a PCB. If not, a resistor is placed inline with the LED and pin out

NOTE:
LED's are Polarity Sensitive. If installed backwards they will not work.

WIRE COLOR WILL VARY

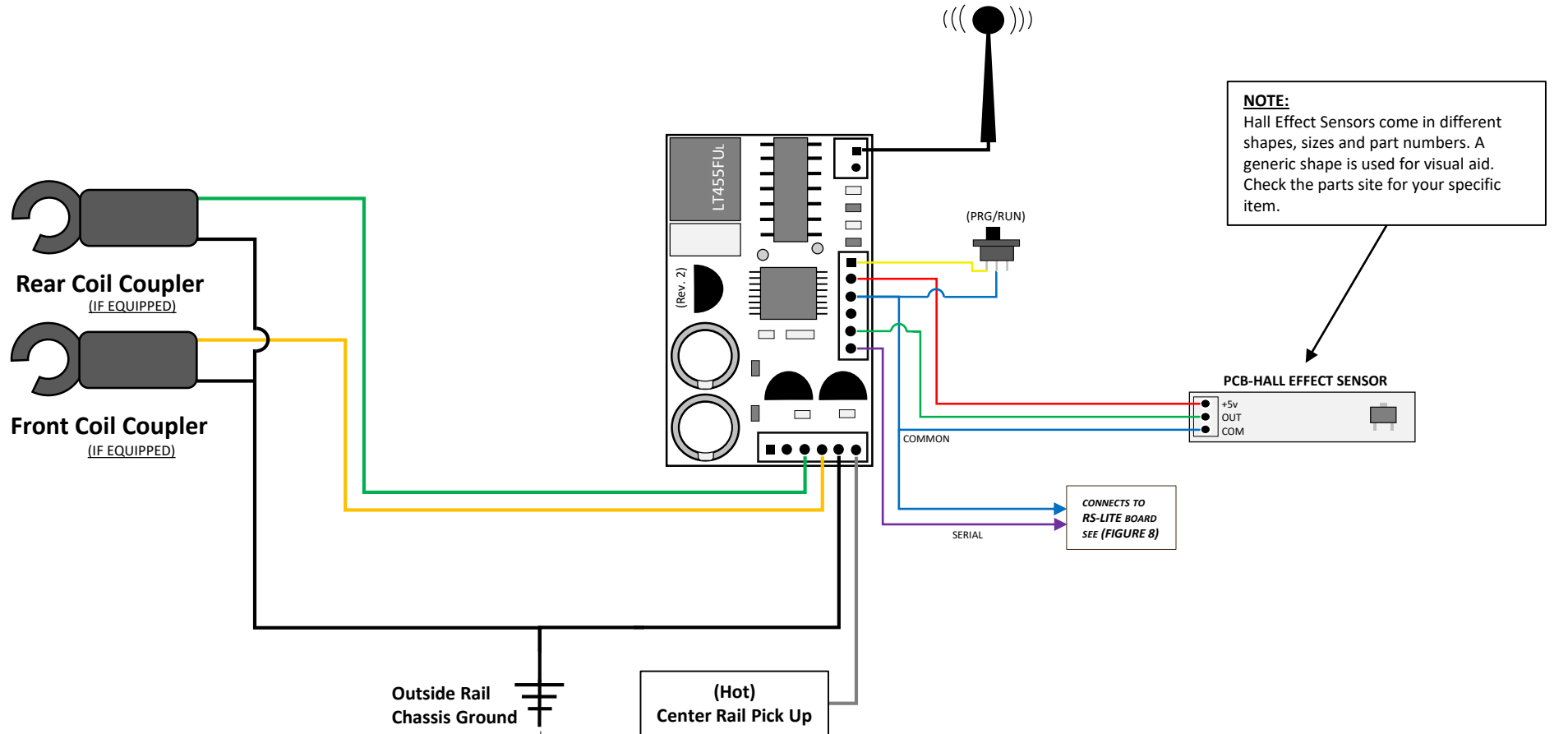
RCDR Wiring Diagram

VISION Reefer & 21" Station Sounds Diner Cars

WIRE COLOR WILL VARY

NOTE:

There are two different revisions (Rev.) of the RCDR currently. The one shown in the diagram is Rev.2



NOTE:

Remember to always trace your wires. There might be a slight variation in wire placement on future items.

NOTE:

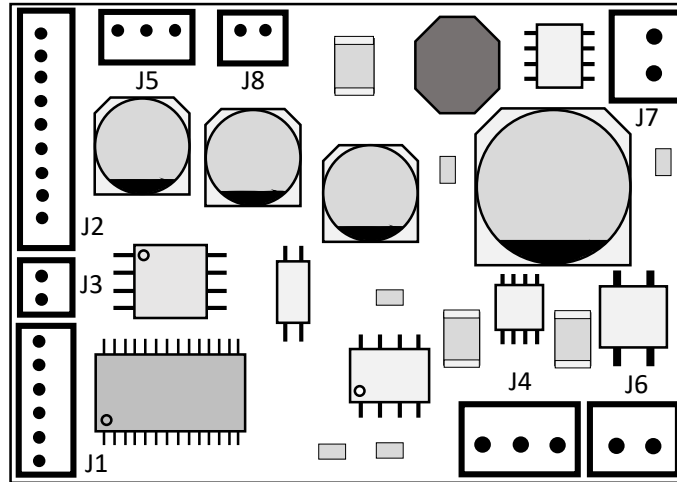
Hall Effect Sensors come in different shapes, sizes and part numbers. A generic shape is used for visual aid. Check the parts site for your specific item.

NOTE:

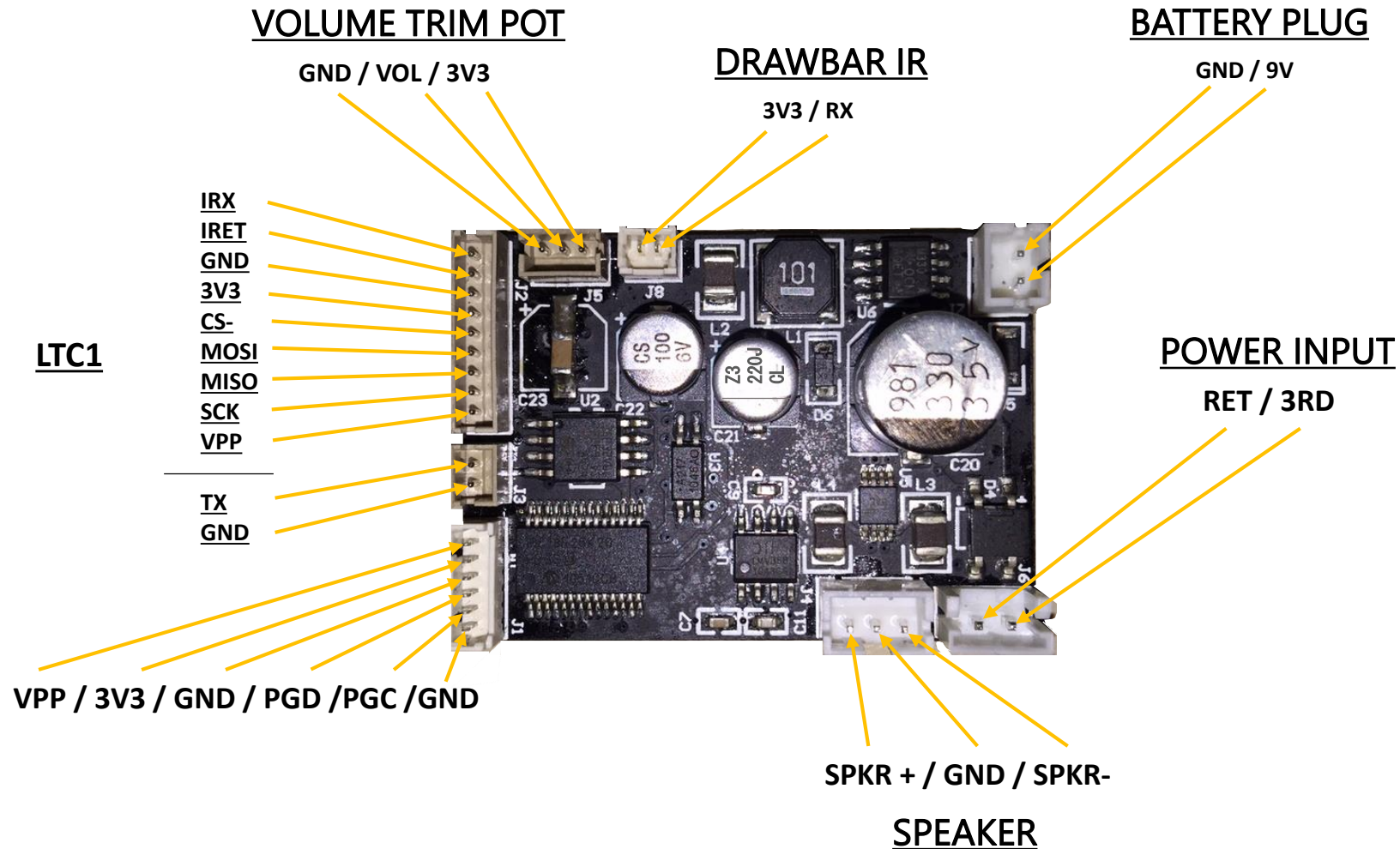
Each RCDR might be programmed for the specific product it came from. Make sure when ordering a new RCDR board, it has the correct part number for the item you are repairing.

WIRE COLOR WILL VARY

RailSounds LITE



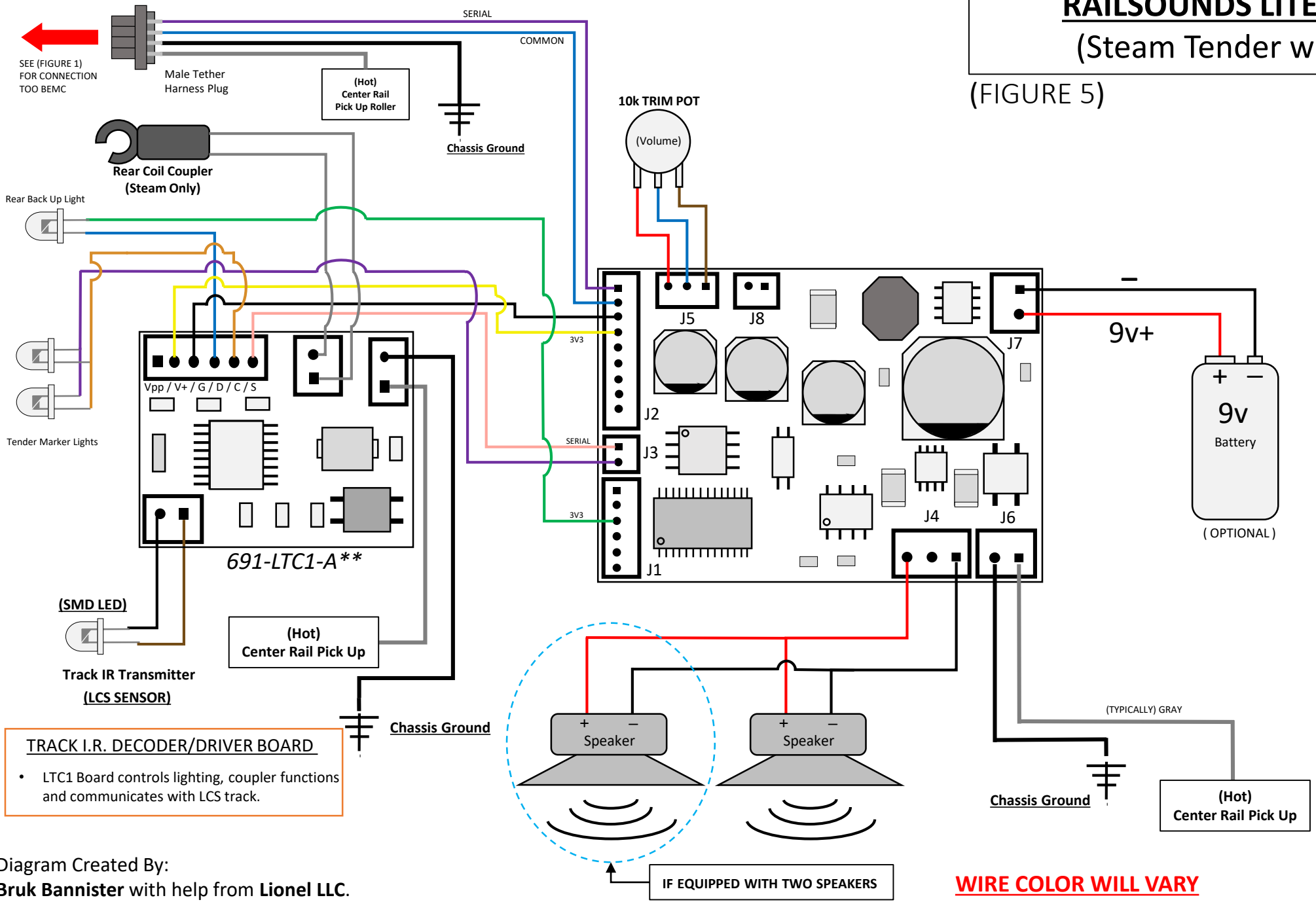
RAILSOUNDS LITE PLUG BREAK DOWN



WIRE COLOR WILL VARY

RAILSOUNDS LITE Wiring Diagram (Steam Tender with Wire Tether)

(FIGURE 5)

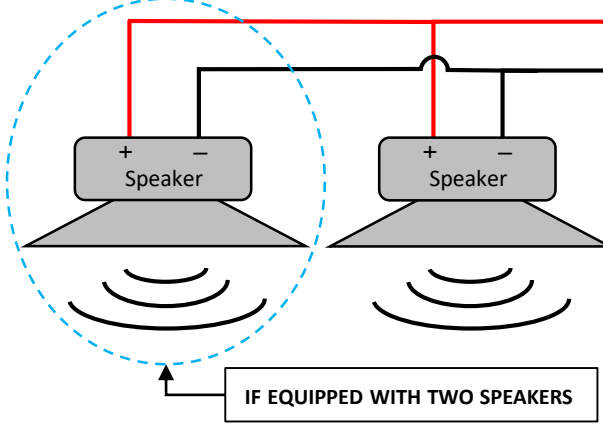


NOTE:
The "Male Harness plug" is used for a visual reference only, the wire location might vary. Always test pin outs with a meter to avoid damage to both the RCMC board and RS-LITE board.

NOTE:
Each sound board is programmed for the specific product it came from. Make sure when ordering a new sound board, it has the correct part number for the item you are repairing.

TRACK I.R. DECODER/DRIVER BOARD

- LTC1 Board controls lighting, coupler functions and communicates with LCS track.



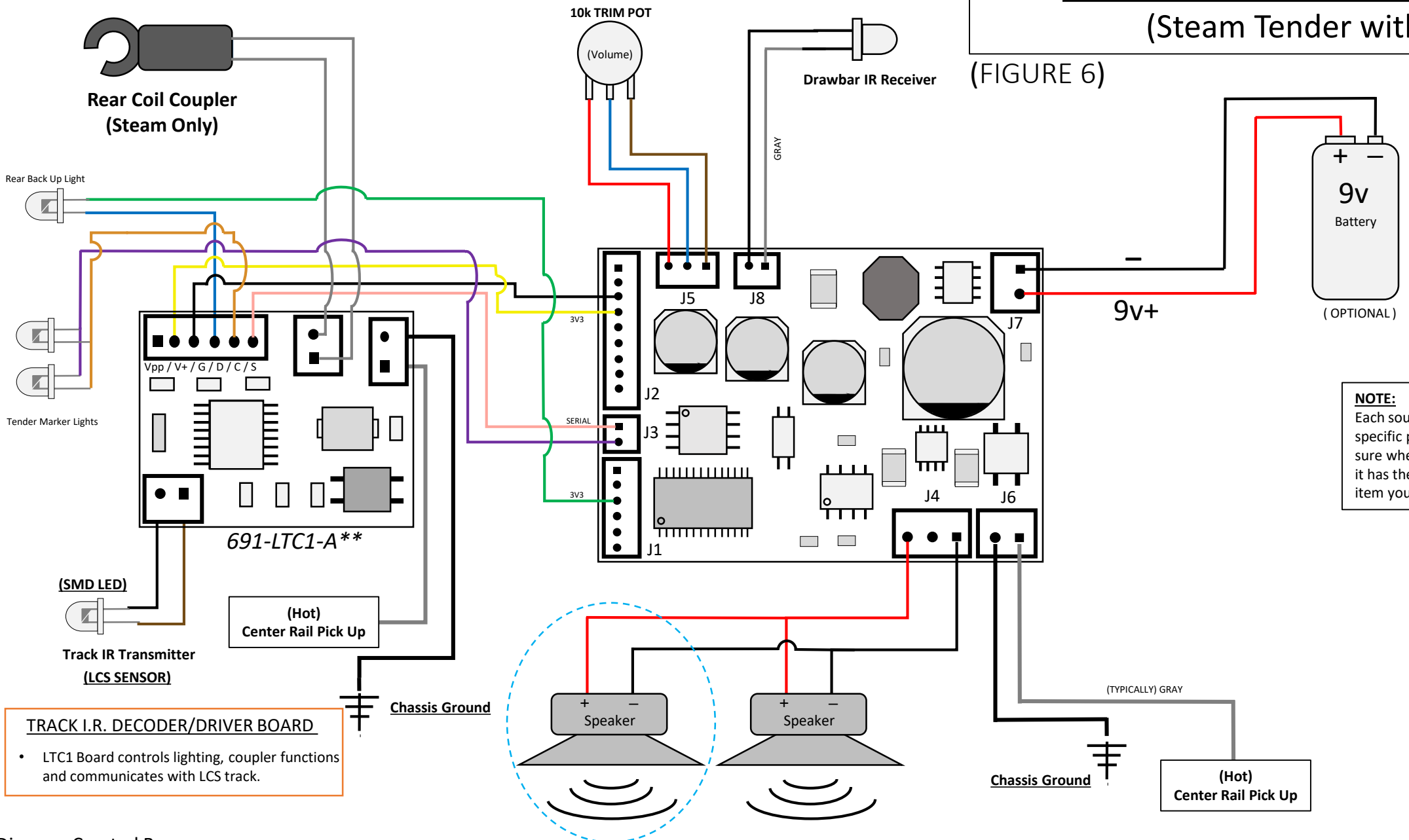
WIRE COLOR WILL VARY

WIRE COLOR WILL VARY

RAILSOUNDS LITE Wiring Diagram

(Steam Tender with IR)

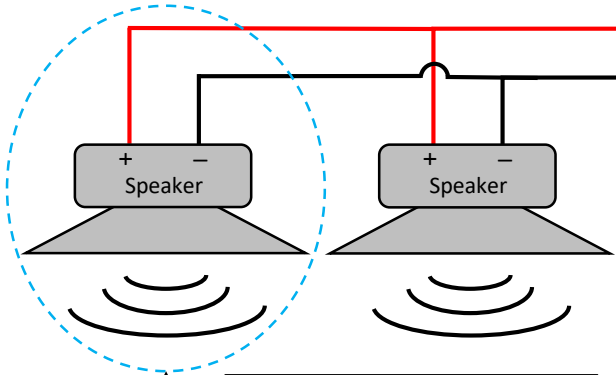
(FIGURE 6)



NOTE:
 Each sound board is programmed for the specific product it came from. Make sure when ordering a new sound board, it has the correct part number for the item you are repairing.

TRACK I.R. DECODER/DRIVER BOARD

- LTC1 Board controls lighting, coupler functions and communicates with LCS track.

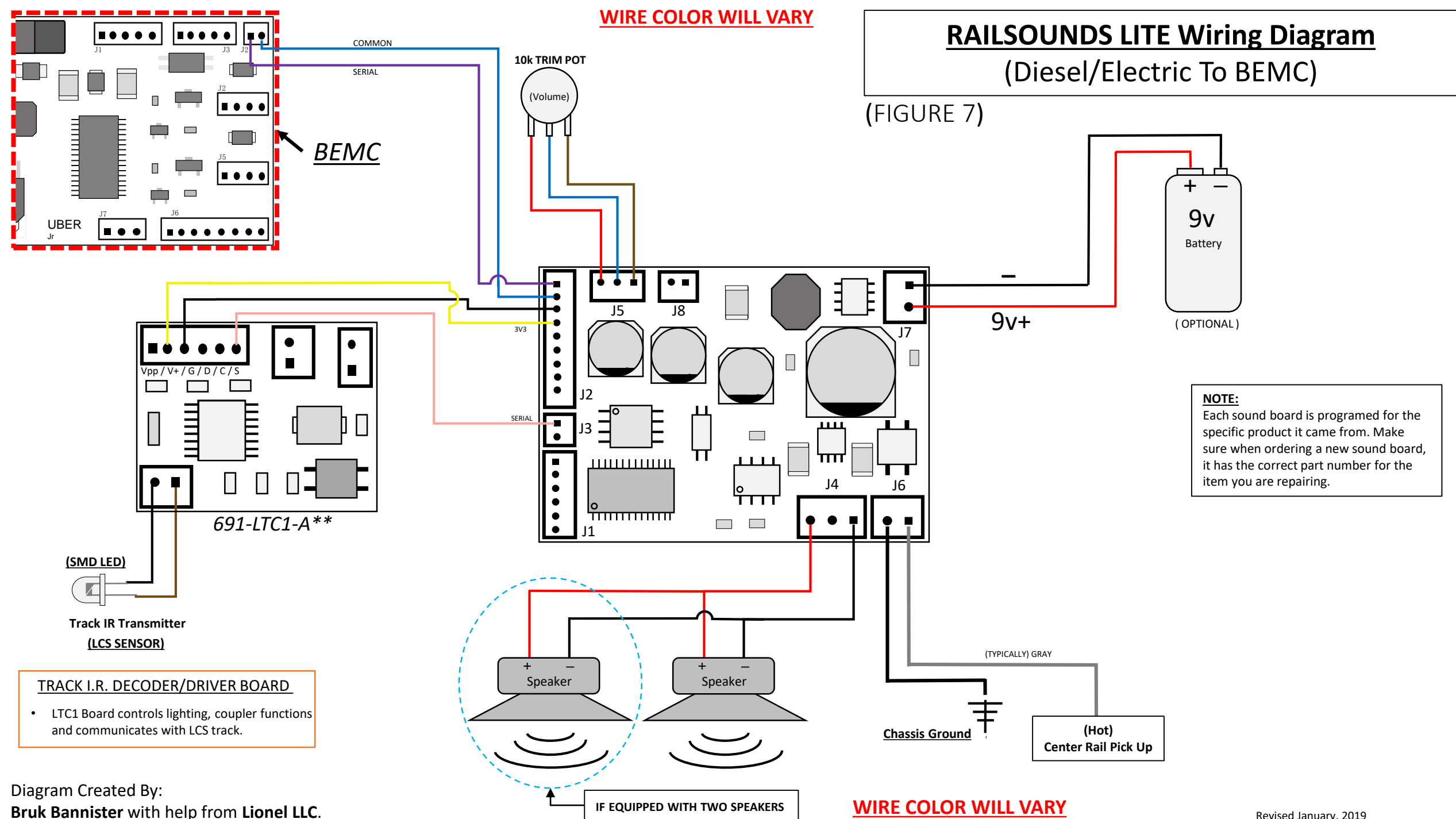


WIRE COLOR WILL VARY

WIRE COLOR WILL VARY

RAILSOUNDS LITE Wiring Diagram (Diesel/Electric To BEMC)

(FIGURE 7)



TRACK I.R. DECODER/DRIVER BOARD

- LTC1 Board controls lighting, coupler functions and communicates with LCS track.

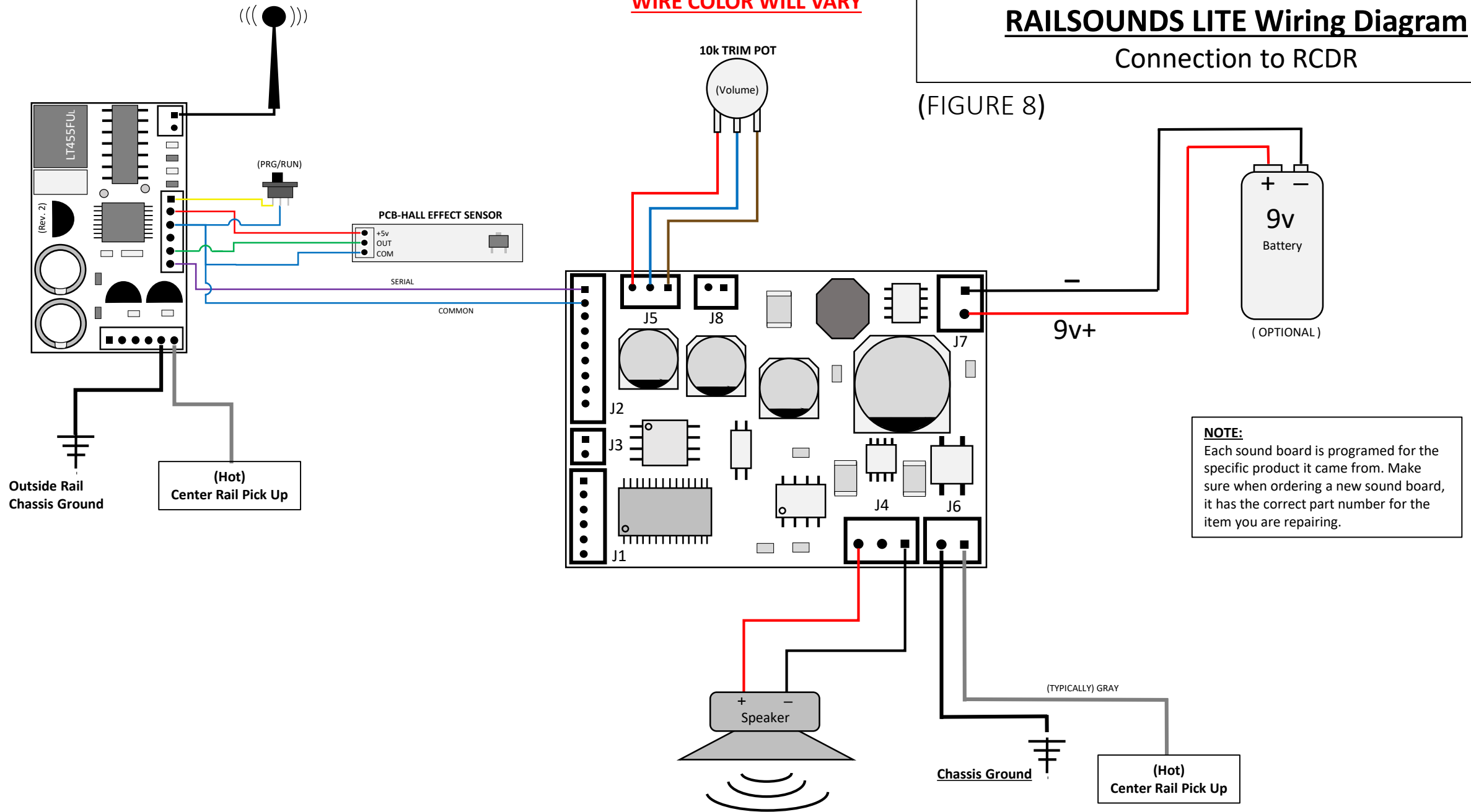
WIRE COLOR WILL VARY

WIRE COLOR WILL VARY

RAILSOUNDS LITE Wiring Diagram

Connection to RCDR

(FIGURE 8)



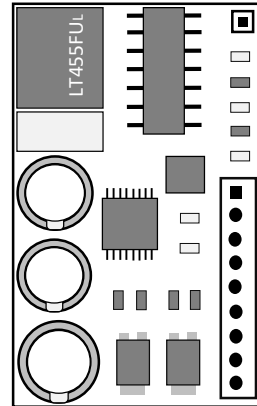
NOTE:
Each sound board is programmed for the specific product it came from. Make sure when ordering a new sound board, it has the correct part number for the item you are repairing.

WIRE COLOR WILL VARY

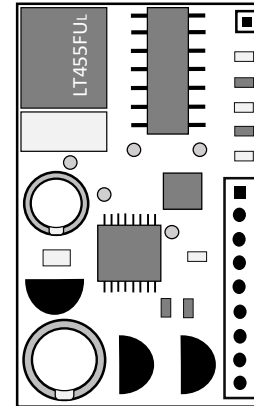
RCDR

(Rev. 1)

(S01, S02, S04, S05, S06, S08, S09 Code)



(S03 code)

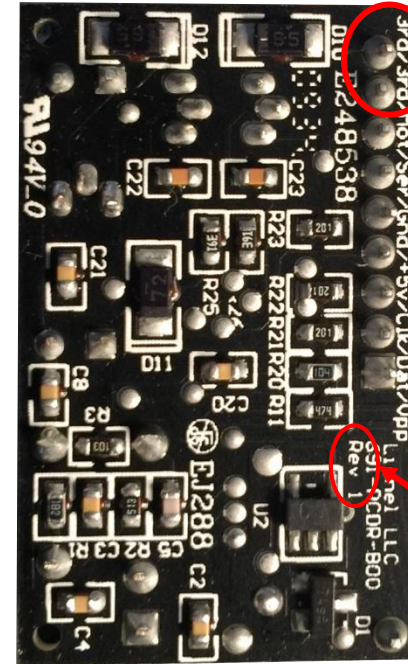
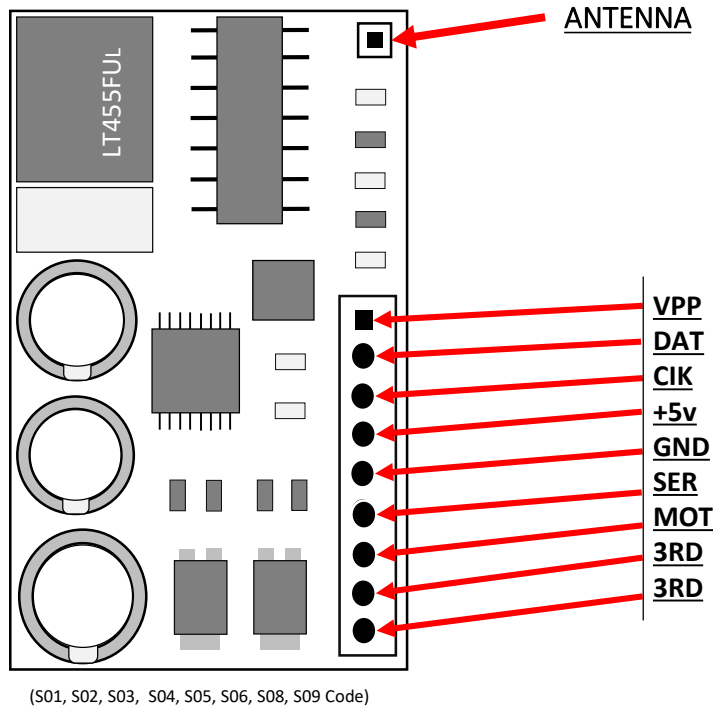


RCDR (Rev 1) PLUG BREAK DOWN

NOTE:

Each RCDR might be programmed for the specific product it came from. Make sure when ordering a new RCDR board, it has the correct part number for the item you are repairing.

RCDR PIN BREAK DOWN	
ABRV	TERM
3RD	HOT (CENTER RAIL PICK UP)
MOT	?
CP1	FRONT COULPER
CP2	REAR COULPER
VPP	PROGRAM SWITCH
DAT	DATA IN
+5V	5 VOLTS POSITIVE
CLK	?
GND	GROUND
SER	SERIAL DATA



NOTE:

The RCDR & BEMC is mainly used in "S" gauge. (S gauge is 2 rail) make sure the pick up wires are consistent with each other or it will short out the power supply and may damage the boards as well.

NOTE:

This is Rev. 1 or Version 1 of the RCDR. This is current version of the RCDR that is being used.

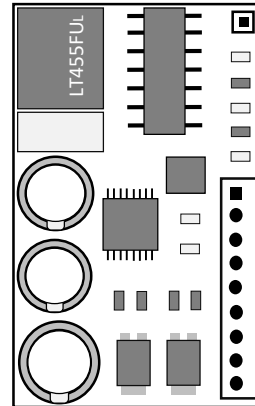
INFO:

Rev. 1 of the RCDR is used in many early LEGACY O scale and S scale applications. These are found in the first Vision Line Products before the RCMC. This is also found in early LEGACY steam locos that were not Vision Line but had the 'Whistle Steam' effect. But the setup this board was used in was replaced by the RCMC. You will find a version RCDR in small LEGACY/TMCC equipped motorized/accessories items as well.

RCDR

(Rev. 1)

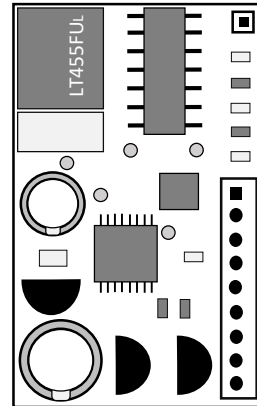
(S01, S02, S04, S05, S06, S08, S09 Code)



DIAGRAMS COMING SOON

RCDR

(S03 code)



DIAGRAMS COMING SOON