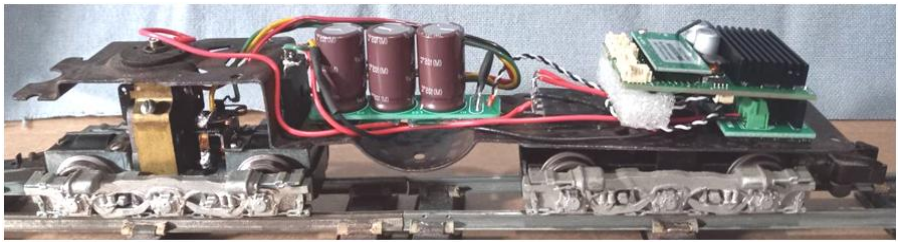
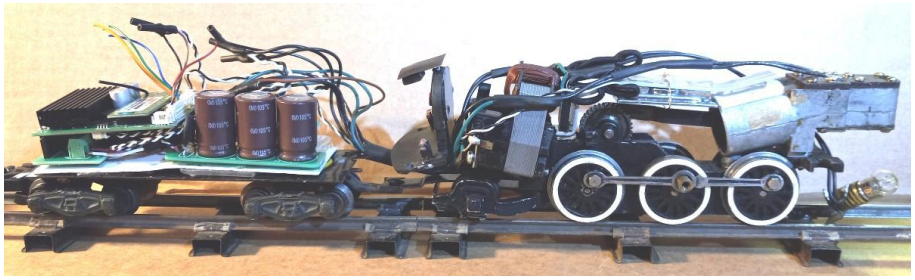
2025 S-Fest Workshop Presentation

Revolution 2.4GHz Controls





Am Flyer Cab Build

My name is Doug, & how did I get to this point?

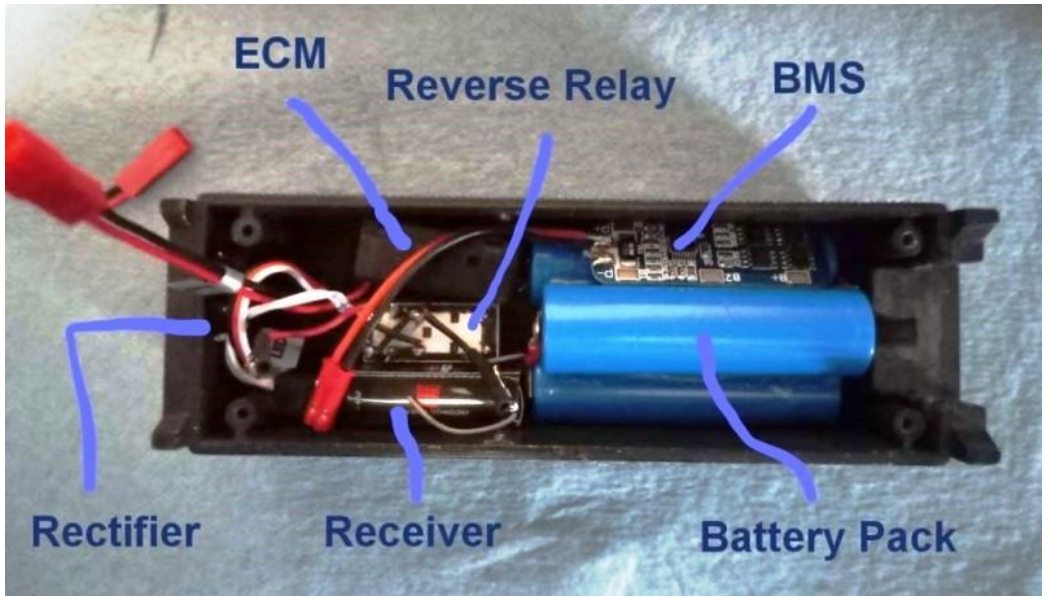
Power for Accessories

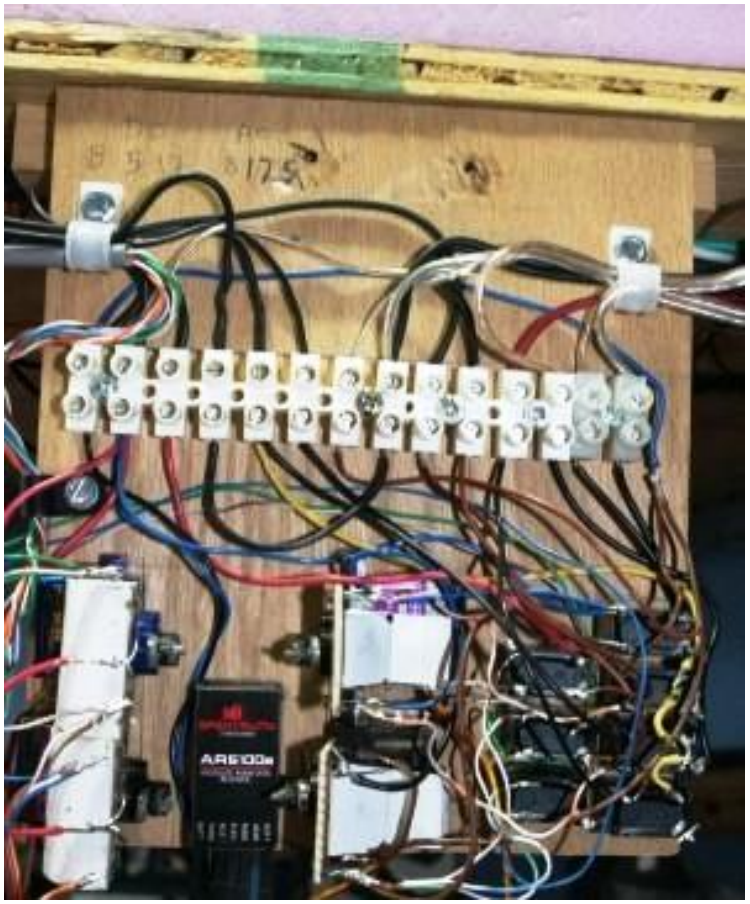
- I needed 5 volts DC (filtered) to run receivers, servos and relays to switch accessories on and off.
- I also had two reverse loops that needed to be automated to prevent derailing considering 5 male grand children and now three great grandchildren.
- Investigation yielded PC transformer would give me 3V (orange), 5V (red), and 12V (yellow) filtered DC. Just had to modify one. Cut off plug and connect green wire to a black wire to turn it on and It has it's own internal cooling fan.
- I had up to 25 separate models I could program in with reverse (flap toggle) and up to 15 amp load.
- Did not have sound, so I wired AF horn, whistle, and bell (with flasher) to relays.

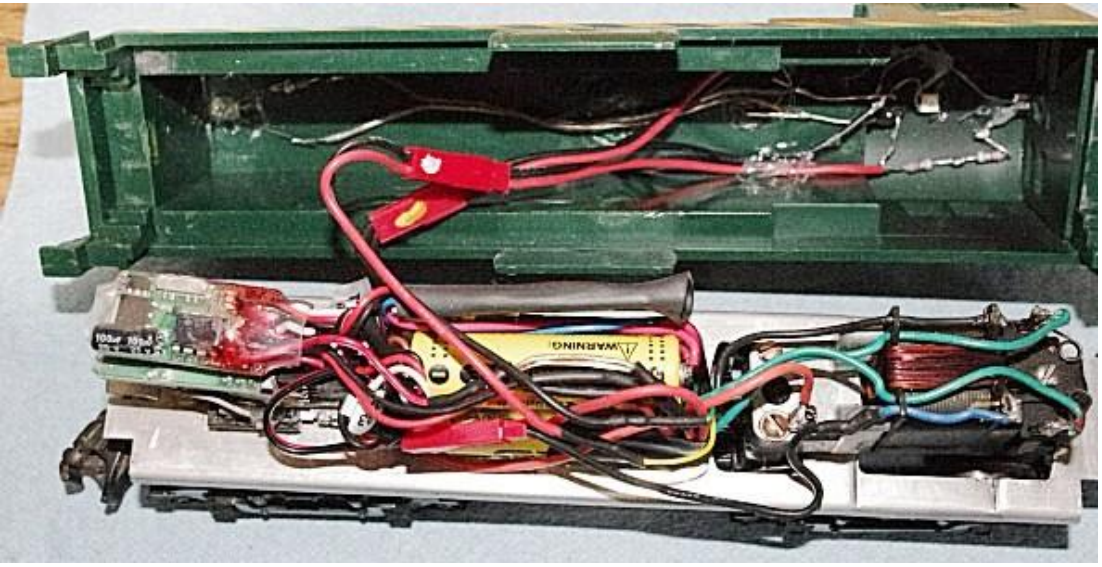
The Transition

Started with RC Planes, N, HO, & G scale trains. Got into AF S gauge. Got tired of tender thumping and going backwards to go forward. Had extra hardware and old laptop battery so turned S models into 2.4 GHz RC including ACCs then discovered Crest RC, now known as Revoelectronics, designed for G & O scale, but it worked for me.

Original 2.4 RC Aircraft Set-up







And then came….

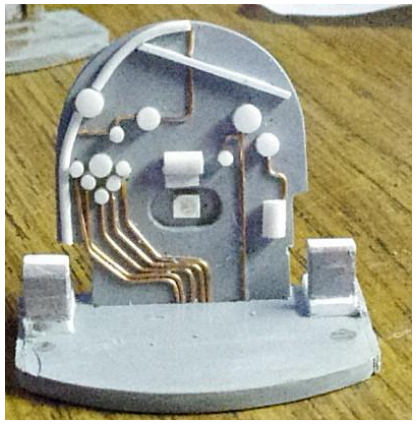
Cab Upgrade for Steam Units

- The area left for imagination was the rear of the boiler in the cab.
- There is no common ground in Gilbert AF cab width but fastener holes are available for the draw bars
- It was possible to render a fair representation of a cab using plastic sheet, add some lights for cab, firebox and chairs for Artista characters.
- A real cab looks not much different that what AC approved as seen on right. Very busy…

Making a Master (Casting or Single)

- Print copy of boiler and floor plan, cut them out then attach them with white glue to pieces of the .100 thick sheet.
- Cut second Boiler back from .060 (1/16”) sheet to mount boiler light.
- When dried, cut out the outline of the parts with scroll saw, or sand/file them to the outline of the drawing.
- Use drill and file to remove material from the firebox allowing the firebox light to show. Cut hole for boiler LED in center of firebox if you do not plan on casting cab inserts. The light would then be glued on.
- Floor plans vary in width per model series and material Gilbert used.
- 280 is 1.525”, 290 is 1.600”, 300 is 1.575” (metal) and 1.525” (plastic), 310 is 1.570”, 320 is 1.560”, 330 (unknown for now), 340 is 1.670” and 350 is 1,600”.
- Also the seat location varies in position as well as height. Allow room for Artista characters’ legs. You would need to trial fit your cab and your character before casting any amount.

Add Detail to the Master



- Once the boiler back is sanded smooth around the parameter, hole punch gauges (plastic disks) cut from .030” (1/32) stock.
- Plumbing can be created from wire art wire, plastic rod or 22-24 wire with insulation stripped.
- Create a riser under the firebox door cylinder to allow light to reflect around during operation.
- Also create a brake cylinder for brake lever and vertical cylinder for water level (on fireman’s side or center above door cylinder)
- Sand bevel on base and glue boiler back to floor 3/8 inch space
- Trial fit, mark for fastener holes, drill, mount and glue seats in.

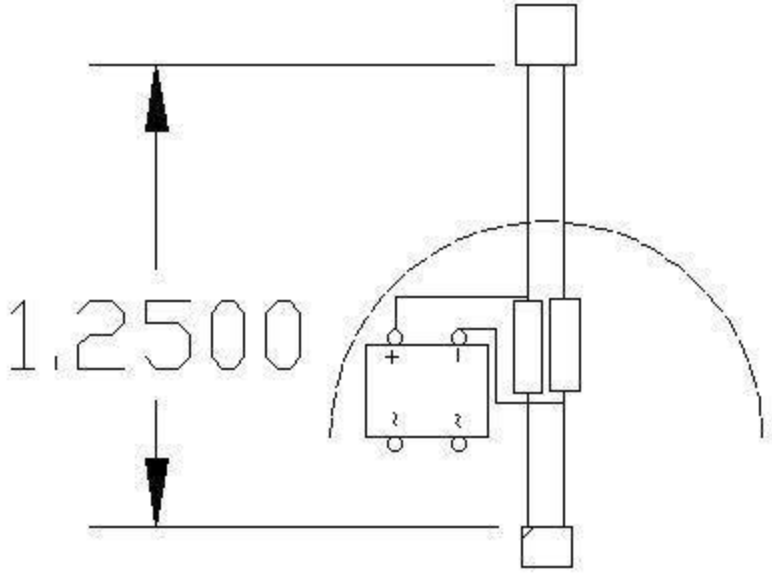
Prepare The Master for Casting

- When using resin for casting, it does try to fill as well as possible. Short-comings or voids occur when master detail does not contain fillets such as pipes glued to a flat surface.
- It is good to coat the master with paint or glue at the joint to fill in the sharp crevasses making the mold easier to accept resin. If you do not, the resin will not enter the cavity and cause a void in the casting.
- Glue the rear of the firewall to the front. Glue a firebox light to the opening in the firebox so the casting will have an opening for the led.
- Place the master (cab and firebox door) in the mold box (available on Amazon) and secure with thin double sided tape or caulking on the surface you are pouring on.
- Pour the silicon mix inside after the caulk is set.
- After the cure period, the mold is set.
- If you choose the widest floor plan, the cab can always be sanded on both sides to fit.

Create the LED Lighting Assembly

- The lighting is comprised of two LEDs that are activated by separate wire feed or from the brush posts of most engines.
- Solder the LEDs to each other using resistors as the wiring.
- If the cab is metal, you may wish to insulate the overhead cab light with insulation stripped from a 28 gauge wire Telephone wire works great) preventing a short circuit.
- Distance is somewhat critical for presentation after assembly

Note: Choice of resistors results in brightness of the LED. I typically use 1000 for overhead and 1500 for firebox. You will have to judge what you like when your sample is built.



Attach LED Assembly Insert & Wire

- Drill a 3/16” hole in the rear of the firewall in the center of the firebox opening for the red LED light.
- Paint the assembly Front and base prior to gluing the LED assembly. Do not paint the rear due to adhesion of the epoxy.
- If using DC for track power, a rectifier will need to be added if there is not constant polarity in power supply. 1 Amp would be adequate.
- Attach wire leads to the diode wires or rectifier adequate length for the power supply and safe removal during loco disassembly
- When paint is cured, Use 5 minute epoxy (like JB kwik) due to lack of metal dust in the mix. Ferrous material create issues between the wires.
- When epoxy has cured, Attach the wire leads to the power source keeping in mind, the cab assembly will need to be removed when servicing the locomotive drive train.

Formerly Crest RC for “G” Scale

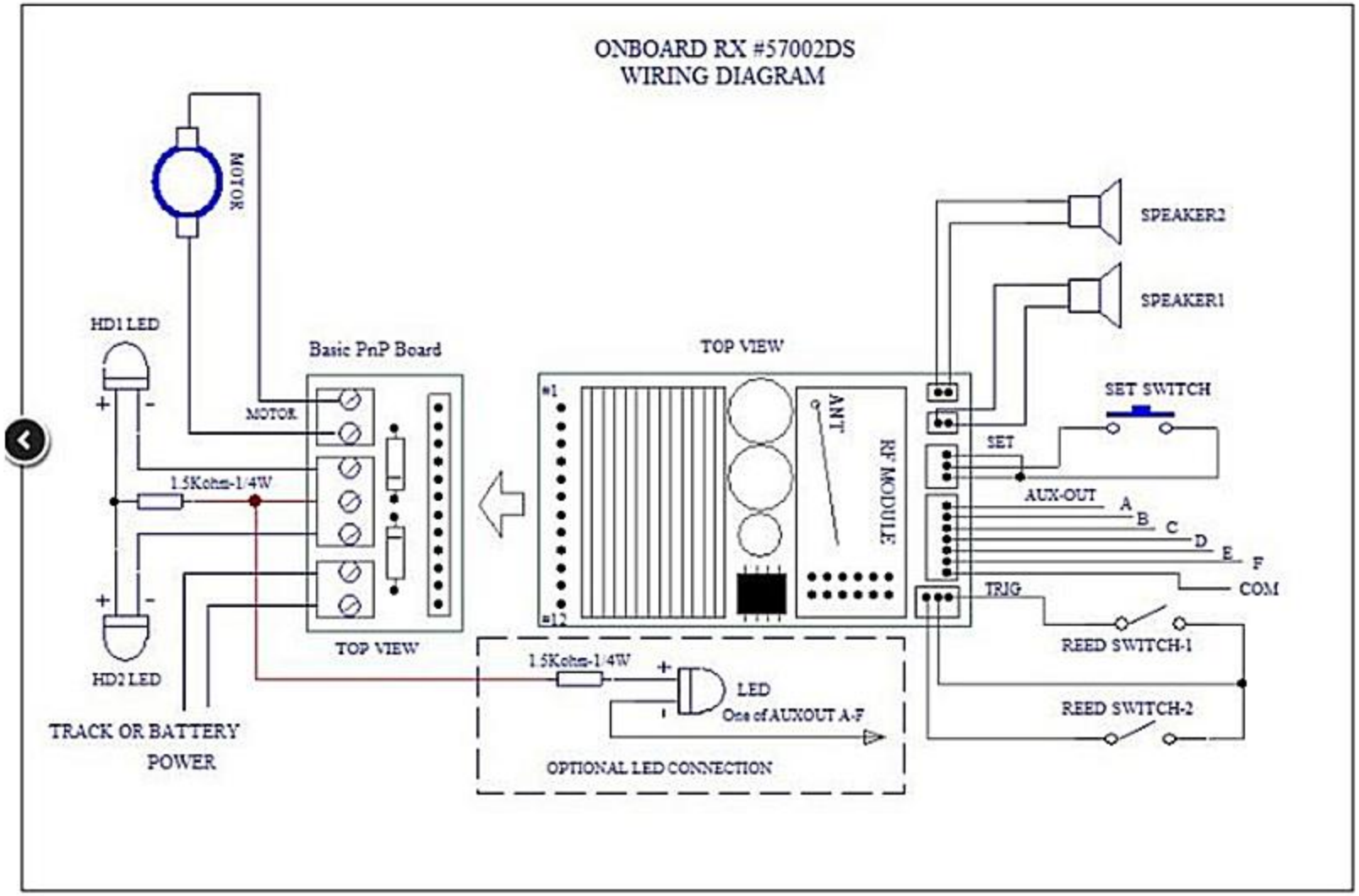
- Holds up to 50 Units
- Uses 2.4 GHz Radio Frequencies with range of 200-300 yards
- Able To Change Frequency Band Spectrum to use multiple transmitters
- Sound effects are programmable with alternate locos
- Can be used to remote switches (5/unit)
- Can be used to operate 6 accessories from each receiver
- Loco can be activated from track power (AC/DC) or batteries
- Link (lash) up to 6 locos in a consist
- Lightweight Hand-Held walk around powered by 3 AAs
- 5 amp (8 peak load) or 2 amp (5 peak load) receivers
- Installation does not affect original design or components (non-evasive)
- Loco ID, Bell, Whistle, Horn, Volume, Speed, Direction, & 2+ acc on hand held
- Automatic Horn/Whistle option for entering towns & grade crossings
- Synchronized Chug option to perform 2 per main wheel revolution

Transmitter & 5 amp Receivers

Remote Functions

- Data at top screen controller/receiver
- <<T + T>> selects unit to control. Others remain active
- Arrow left/right direction of movement of loco (forward/reverse) or switches (mainline/siding)
- Arrow top/bottom controls speed of locomotive
- Center Button stops loco on display
- When switch unit is selected #1-6 selects switch to operate and left & right arrows for direction
- #1= sound off/on, #2= bell, #3= whistle/horn in grade crossing, #4 Whistle/Horn, #5 & #6 Optional momentary or latched circuits for Auxiliary lighting or smoke, #7 high volume, #8 medium volume, & #9 low volume.
- # 0 stops all locos in motion in order of listing

Wiring Diagram for 5 amp Receiver



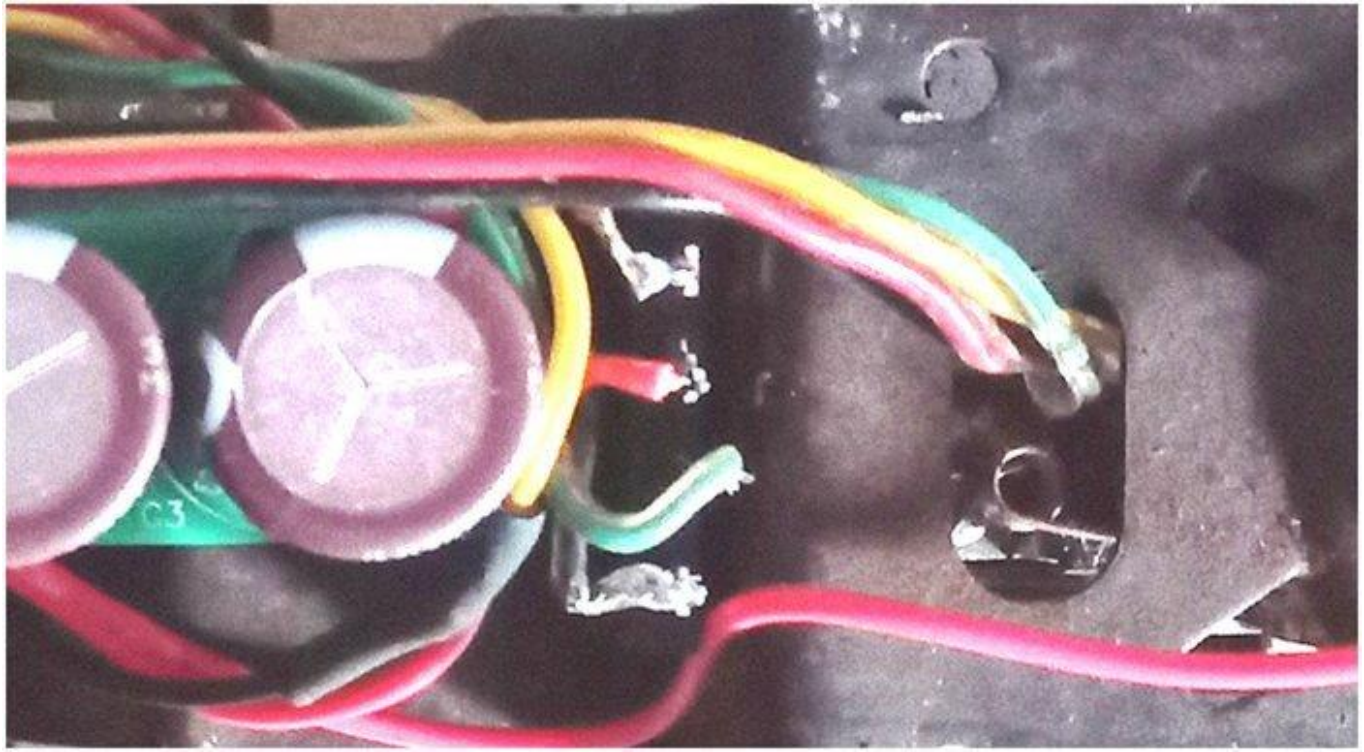
Remove Gilbert Hardware and Identify Which Model It Came From (should you wish to return)

Converting Diesel Motors to DC

Remove original switching hardware from Gilbert, unsoldering connections at E-unit. Place in plastic zip-lock for safe keeping with loco ID written on bag.

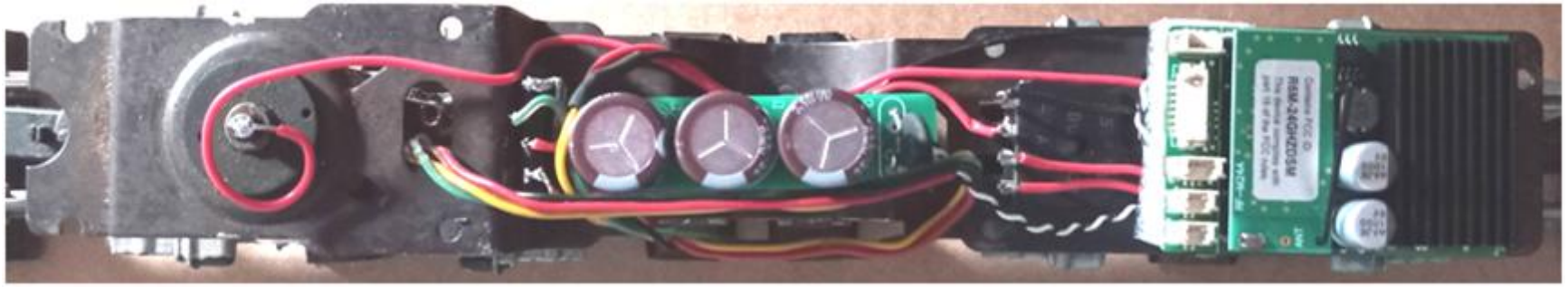
Install rectifier for DC operation behind enclosure for motor using 2-side Tape.

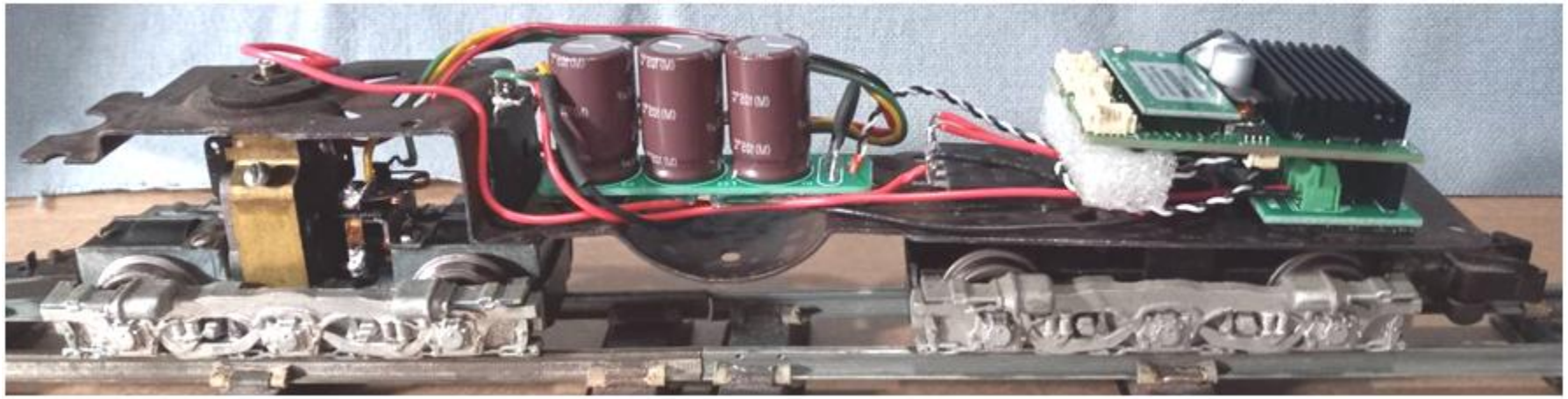
Positive lower pin (rectifier) on right field (black wire) and negative upper pin on left field (hidden red wire on top). Second lower rectifier AC pin to left field (green wire). DC inputs are remaining left (red wire) AC rectifier pin input and right brush input (yellow wire).



Location of Alcos' Components Using Track Power (W/Capacitor Bank)

Remove original Gilbert Components. Disconnect E-unit by unsoldering wires at E-unit and wires from front and rear truck posts. Place in zip lock bag identified with cab number.





Add Components to Alcos' Step 1

Keep in mind where mounting posts are located inside plastic tender shell allowing clearance for shell installation during assembly.

Mount motor rectifier on vertical portion of frame behind motor. Wire as defined earlier.

Mount main electrical components (Module Base, 8A Track Rectifier, and Capacitors) to Alco base with Scotch double sided tape protecting solder from PCB contacting metal base.

Solder 8 inch 24 gauge wire to front post over motor and 4 inch 24 gauge wire to rear truck post. Connect other ends to rear truck rectifier AC inputs allowing unit to run on AC or DC track.

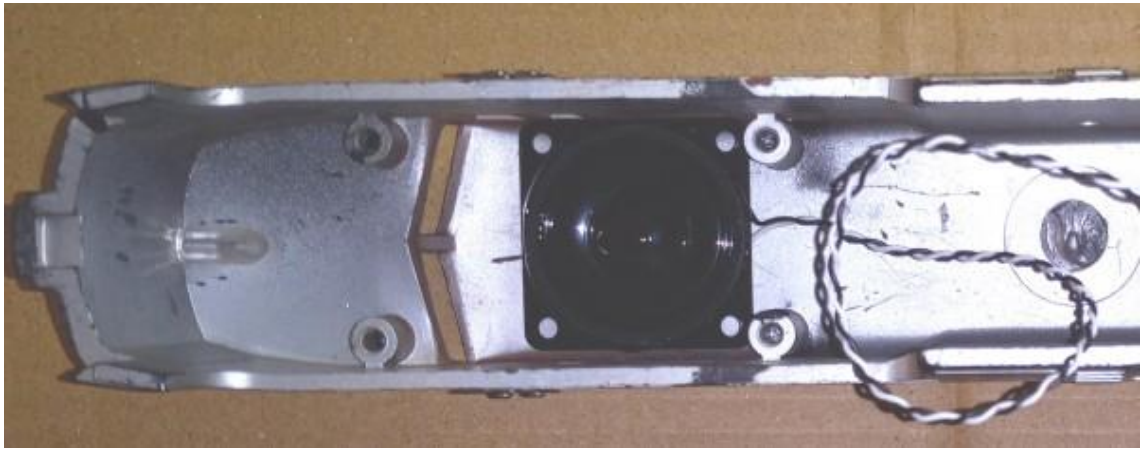
Solder 3 inch 24 gauge wire to DC outputs from track rectifier to module base inputs.

Add Components to Alcos' Step 2

Connect wire for LED Headlamp to module base. Head lamp was soldered to original socket with jumper wire to wire behind socket. 26-28 gauge wire was connected to headlamp output with 1500 ohm resistor as recommended. (hint) Leads from ¼ watt resistors were sometimes used to extend wires allowing base insertion.

Mount Speaker 40x40 mm in shell. Plug speaker wire into module. Plug capacitor bank into underside of module**.** **Never** misalign pins when plugging Revolution circuit board back in or feed power into motor output. If you do, You **will** burn out a 5 amp fuse. Trust me, I know.

Reattach shell over components.



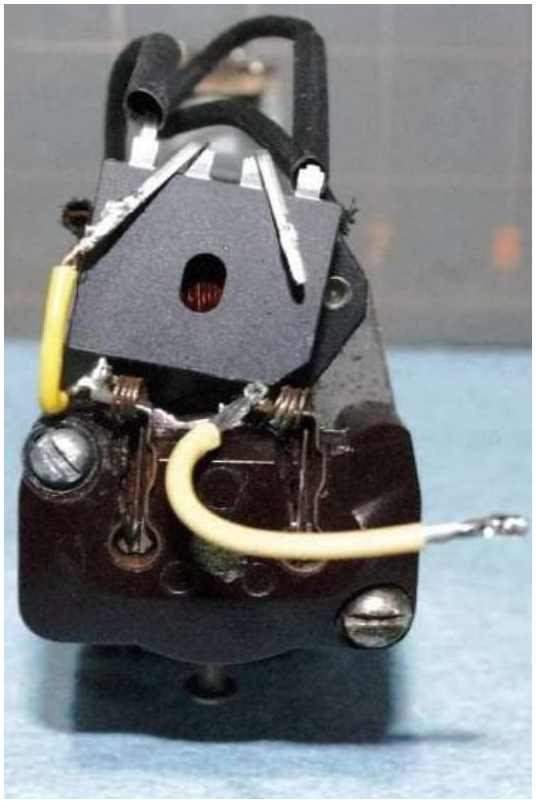
Converting Steam Motors to DC

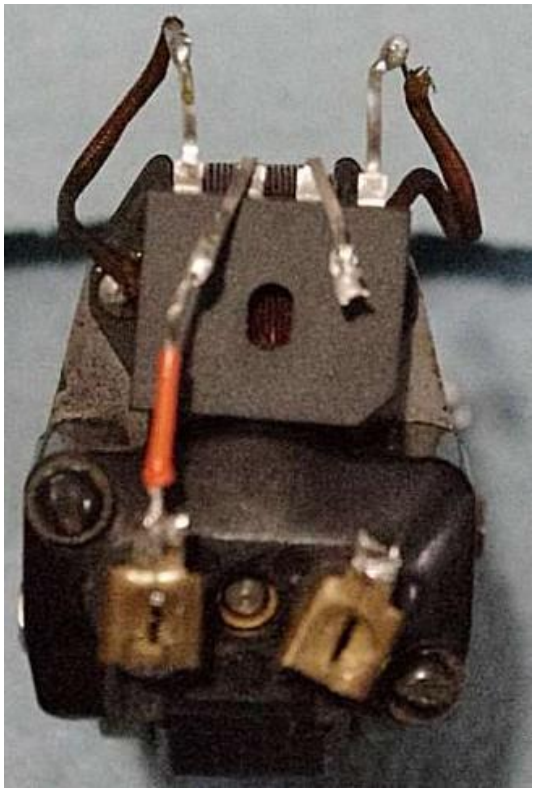
Remove original switching hardware from Gilbert. Place in zip lock bag w/ID.

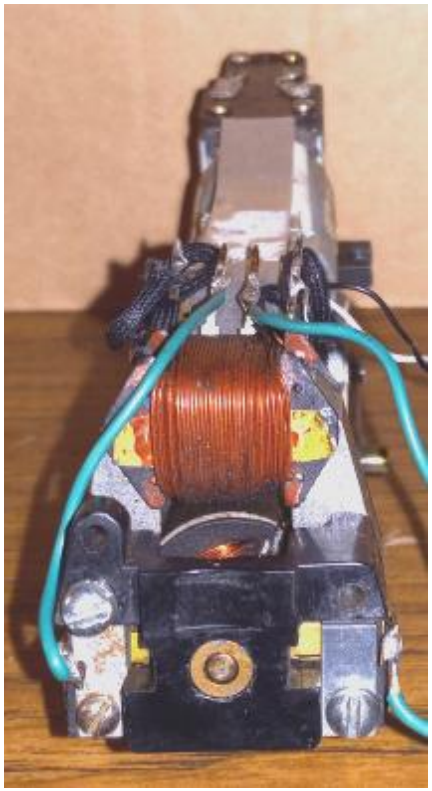
Install rectifier for DC operation above armature or in front of field on bracket.

Positive on right field and negative on left field. Left AC input to left brush.

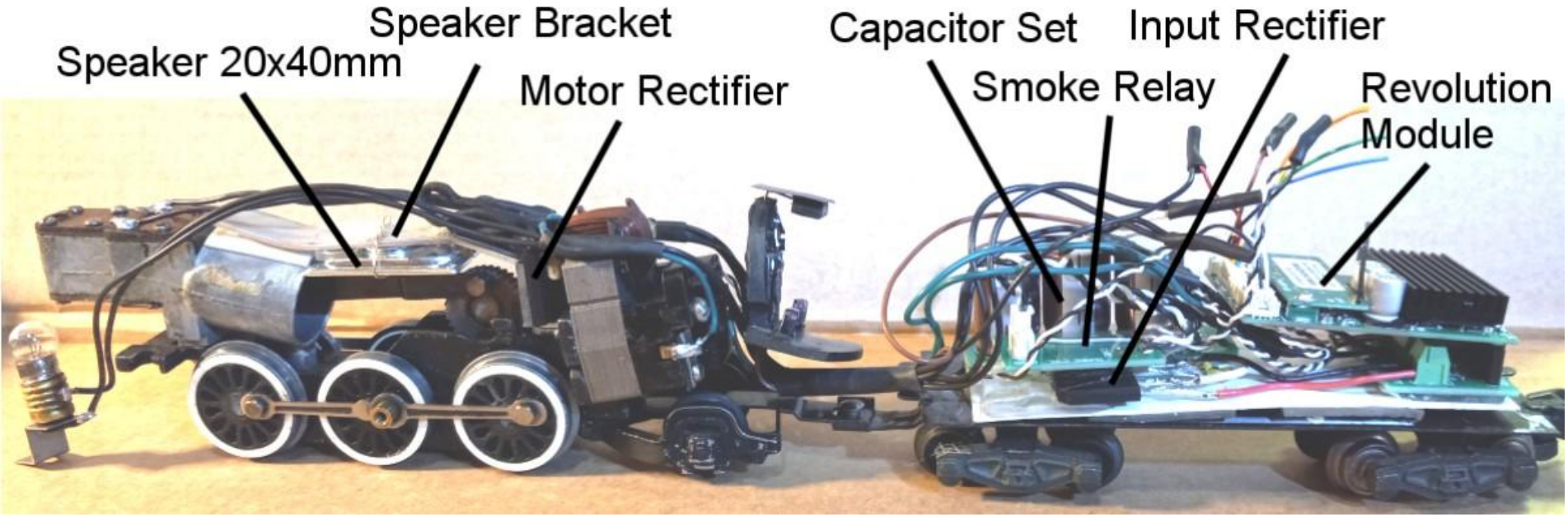
DC inputs are remaining right rectifier AC input and right brush input.





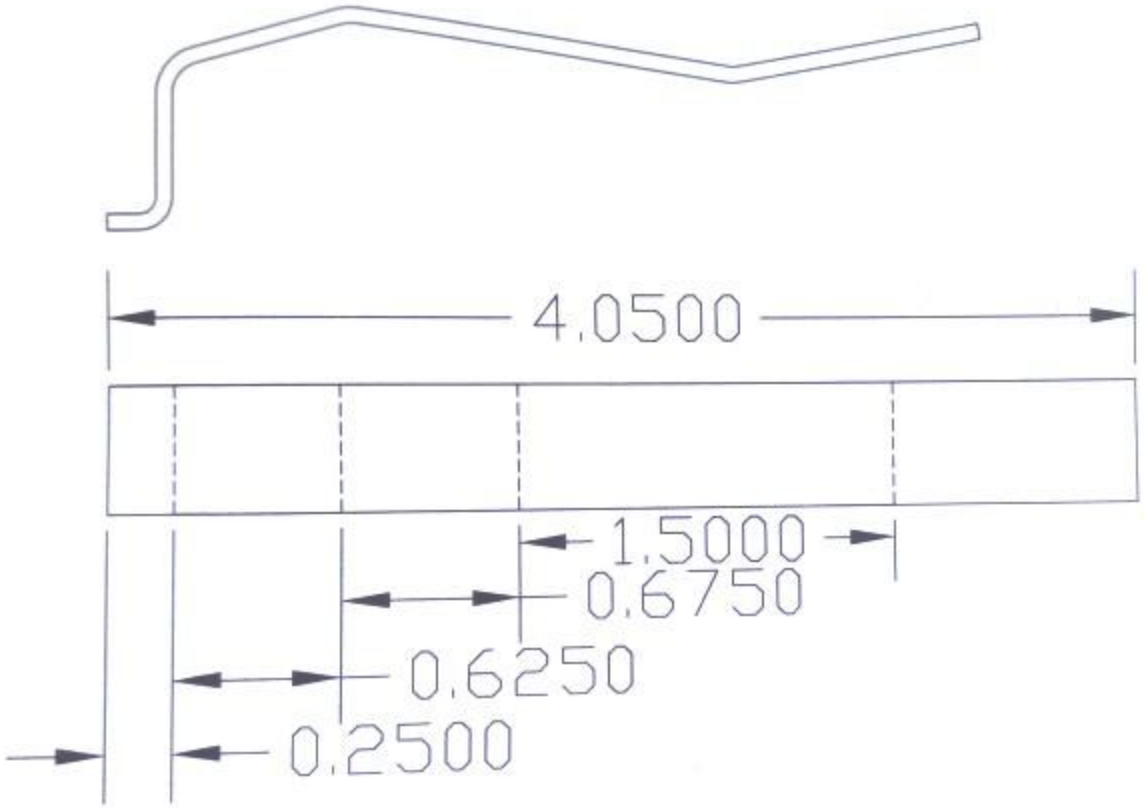


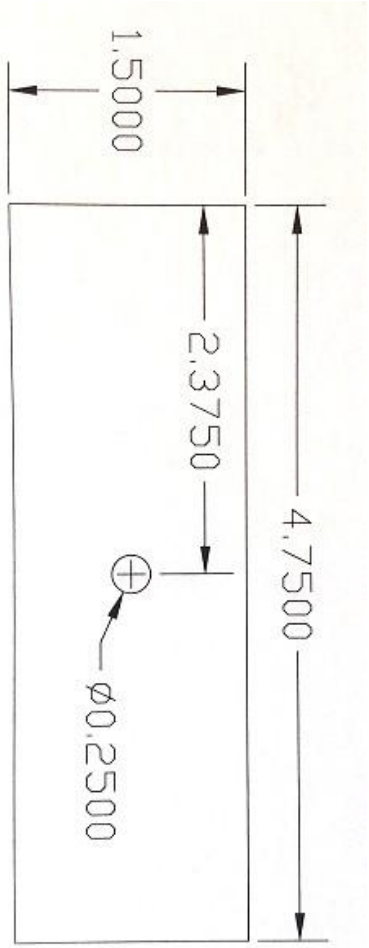
Location of Steam Components Using Track Power (W/Capacitor Bank)



Create speaker and tender mount

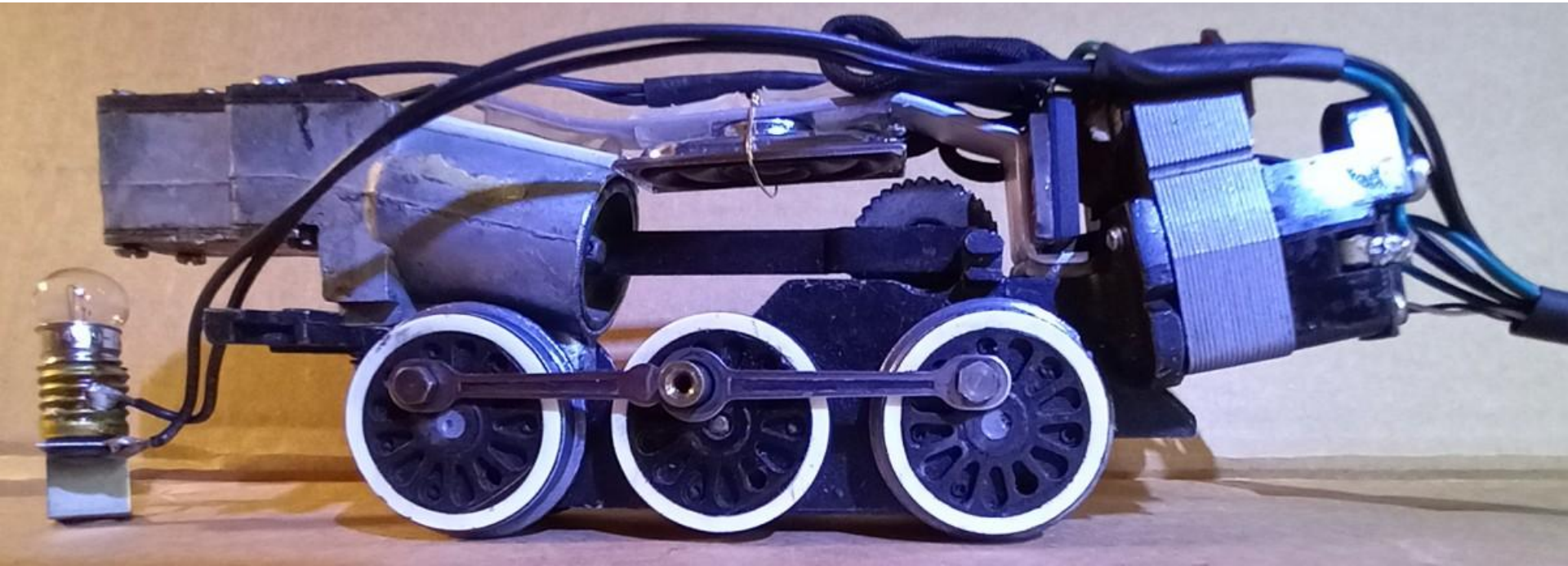
- Using Aluminum strip ½ wide inch by 1/16 inch thick, mark and bend per drawing.
- Using 1/32-1/16 plastic or vinyl sheet stock i.e. purchased, donut box, old soffit panel, etc… cut tender base 4.75 x 1.5 inch and drill ¼” center hole.





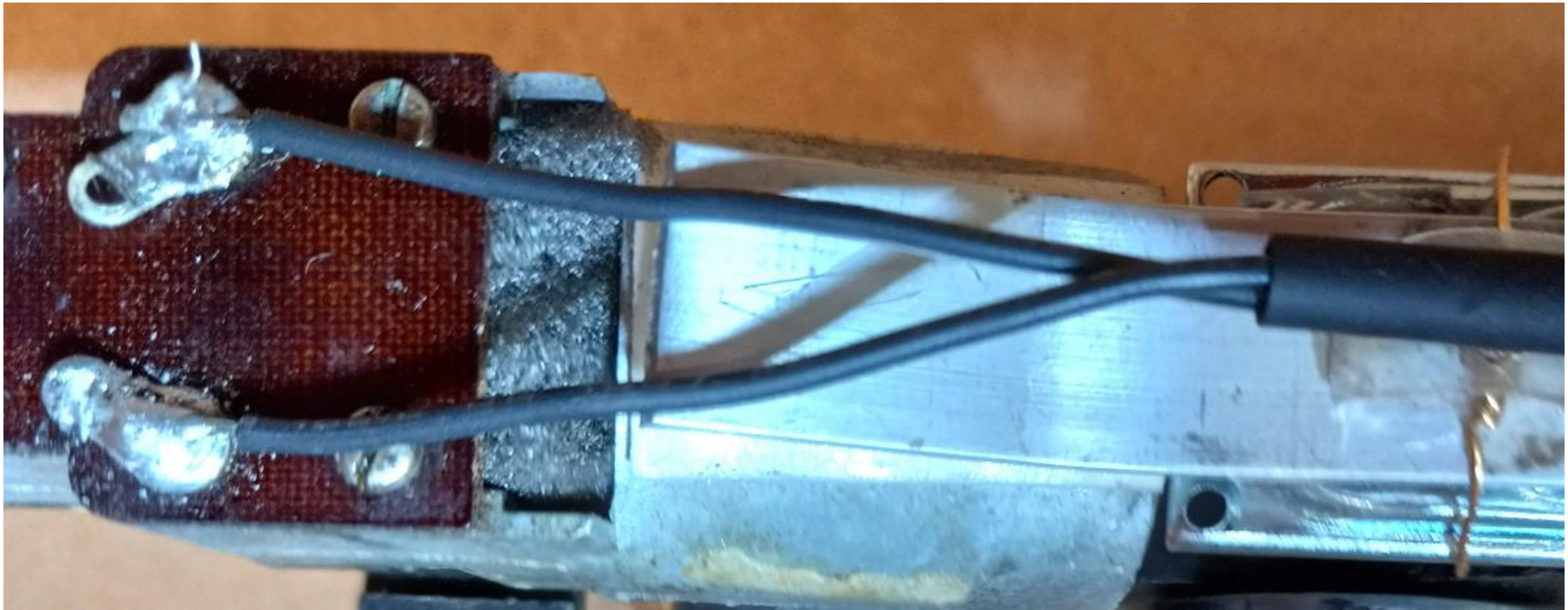
Sound Effects (Step 2)

- Bend and install speaker bracket with 8A rectifier taped to rear of bracket. Apply tape to ¼ inch wide portion of bracket and top of smoke cylinder.
- Using supplied speaker wire with small plug, solder open ends of wire to 20x40 speaker.
- Attach speaker with tape under the bracket and insure security with twist tie or wire.
- Make sure clearance is available for crank travel and motion.
- Wire Headlamp holder with 24 Gauge wire 16+ inches long



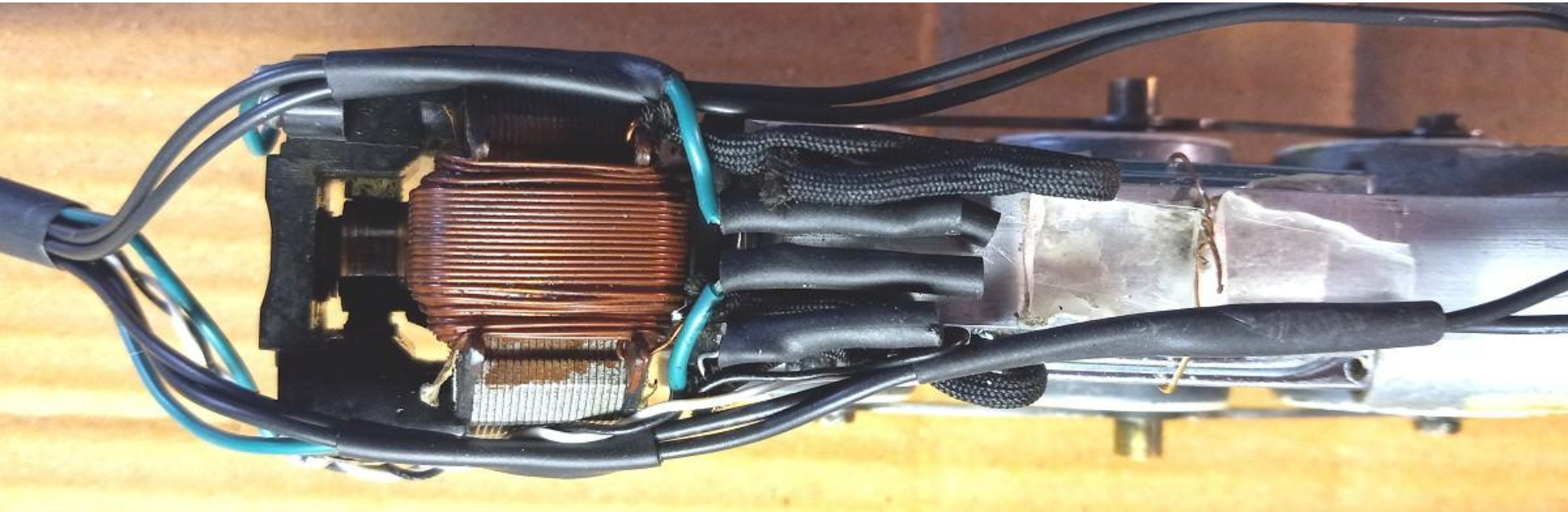
Gilbert Chuff or No Chuff?

- If you wish to silence the Gilbert “chug”, and only use the Revolution sound supplied with the module, place piece of foam in chamber in front of the cylinder.
- To create the insert, cut ¾ x ¾ x ¼ soft foam in that is similar to surround air conditioners gap that you can blow through. Cut or melt a center hole for air to pass into the smoke chamber. Cut insert in half and tuck bottom in, then insert the top preventing a restriction at the hole.
- Add wires to the smoke unit. 24 gauge and 12 inches long to run to tender switch.
- Check smoke box and remove any connection from smoke wire to mounting screw as some later model units used chassis ground as one wire smoke power feed



Wiring the Motor (step 3)

- If you have can motor conversion, cut 24 gauge wires to 7 inches and solder to motor terminals.
- If you have original flyer motor, cut 24 gauge wires to 9 inches. Solder wires to open lead on rectifier and right brush post.
- (reminder) make sure rectifiers right plus (+) goes to right field, Left rectifiers negative (-) goes to left field, Left AC input goes to Left armature brush.
- Collect wires around field coil in two groups and pass them through a 3/16 inch heat shrink tube 1 inch long to protect them from field coil heat.
- If metal engine shell, good idea to mask (heat shrink) over rectifier pins preventing shorts.



Finish Loco Set-up &
Set-up the Tender (step 4)

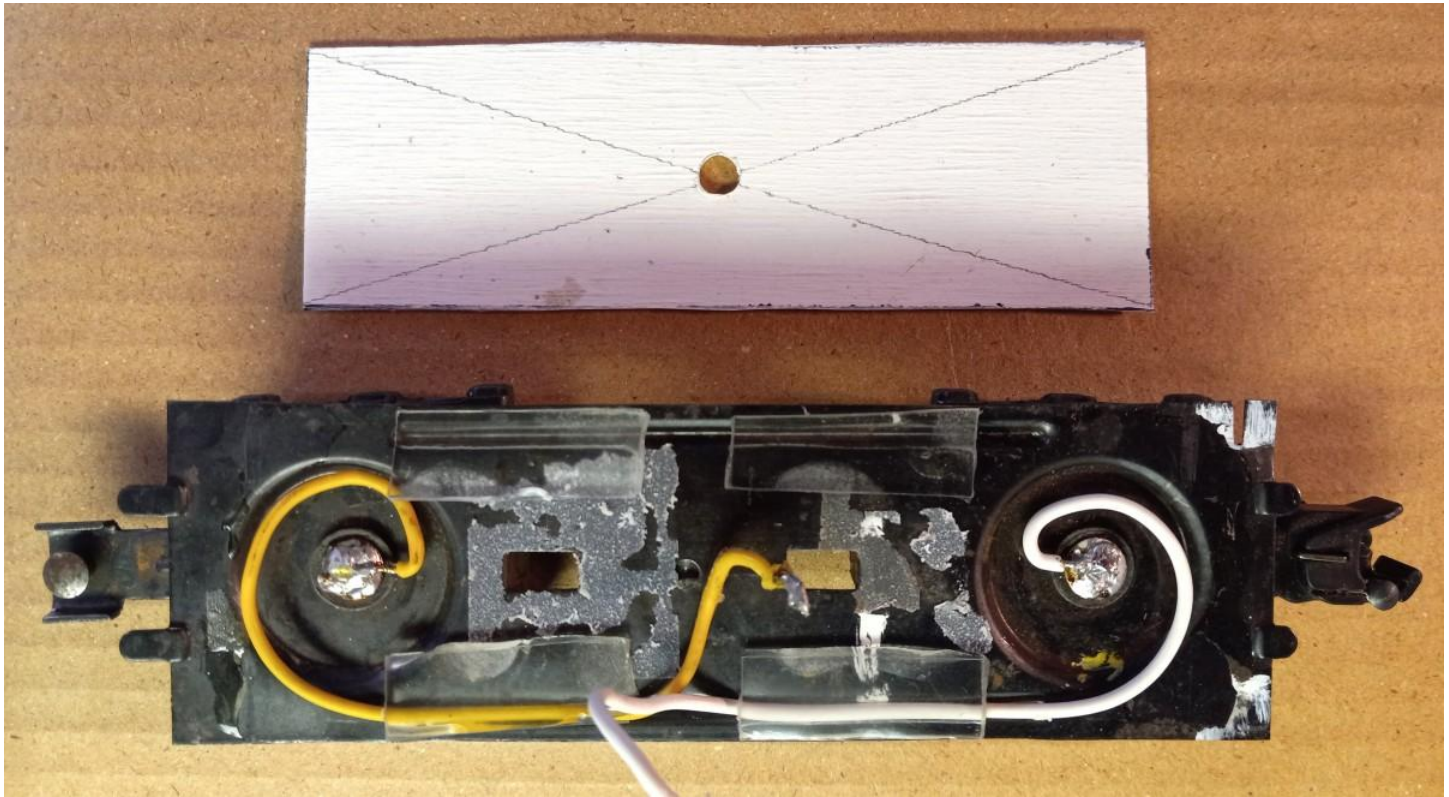
- Feed wires from loco through 3/16 to ¼ inch heat shrink tube for tender based on wires diameter.
- Install cab or cab light in loco if available.
- Install shell over chassis on loco and secure. Assemble front truck and linkage. Insert smoke stack. Install rear truck assembly
- Physically connect tender to loco. Cut heat shrink to size. Do not shrink tube over wires as they will bind.

Add Components to Steam Tender (Step 1)

Remove original Gilbert Components. Disconnect E-unit by unsoldering wires at motor and wires from front and rear truck posts. Remove any connectors as well. Place in zip lock bag identified with cab number.

Cut plastic base (1-1/2” x 4-3/4” x 1/16 or 1/32”) for components from stock to isolate them from tender base. Drill 1/4 inch hole in center.

Cut 2 wires of 24 gauge 7 inches long. Solder them to posts with curves.



Add Components to Steam Tender (Step 2)

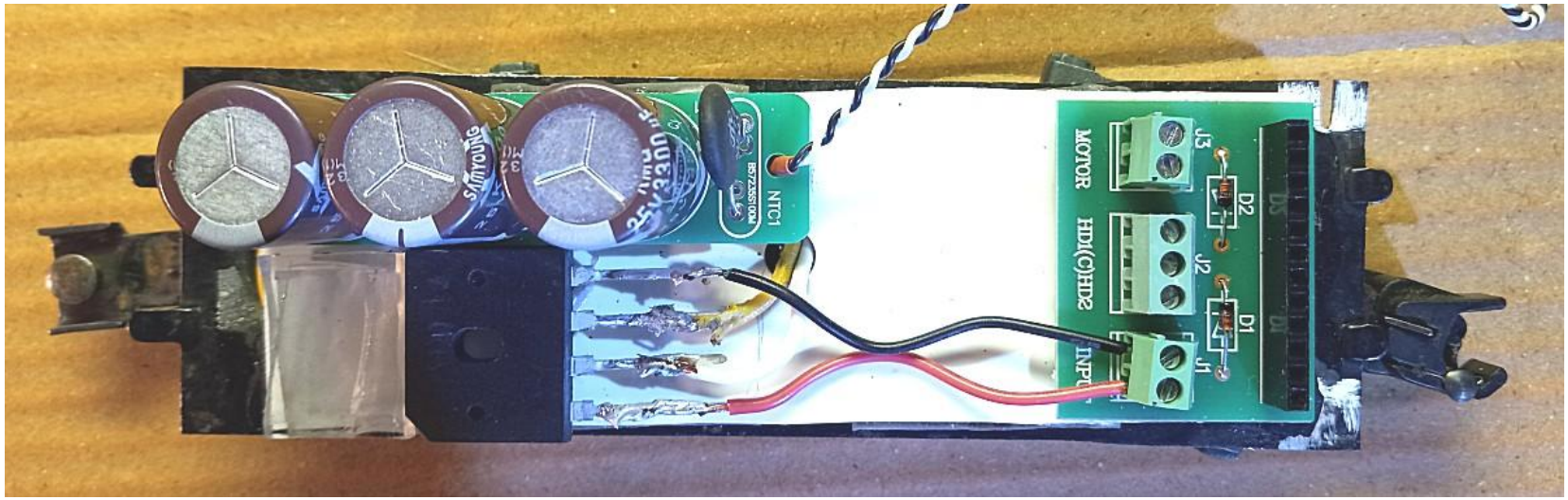
- Feed truck wires through center hole and attach base 3/8 inch back from front edge allowing shell installation.
- Using double sided tape perform the following:

  Mount Revolution base - centered at rear coupler edge of plastic insulator.

  Mount capacitor set at front edge with wire to rear.

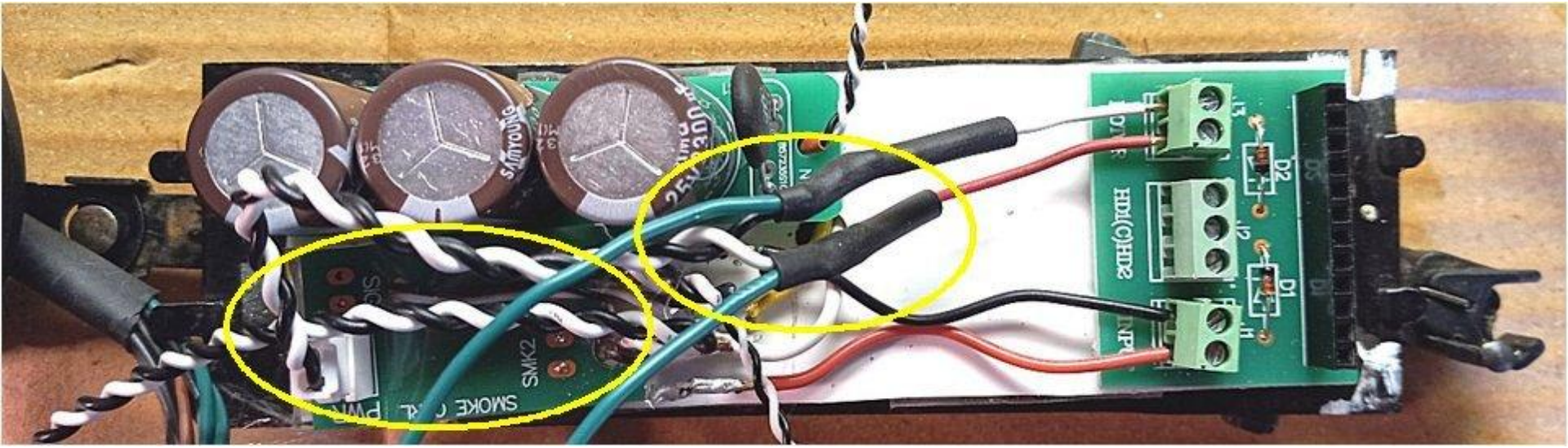
  Mount 8A rectifier at left side of capacitors at edge.

- Solder tender feed wires to AC inputs and rectifier outputs to input terminals of Revolution base. (5A is non specific polarity)



Add Components to Steam Tender (Step 3)

- Mount smoke relay beside capacitor set. Cut one heavy output wire off for input power use.
- Plug cut wire into smoke relay to use to feed power to relay (same size plug and only need one for loco).
- Cut two wires preferably from solid core (thermostat) and insert into motor output on revolution base board. Slip 1” x 3/16 heat shrink over wire
- Attach loco to tender.
- Cut smoke relay wires input to length plus about 1” to connect to motor feed wires and motor output. Slip heat shrink tubes over connections.

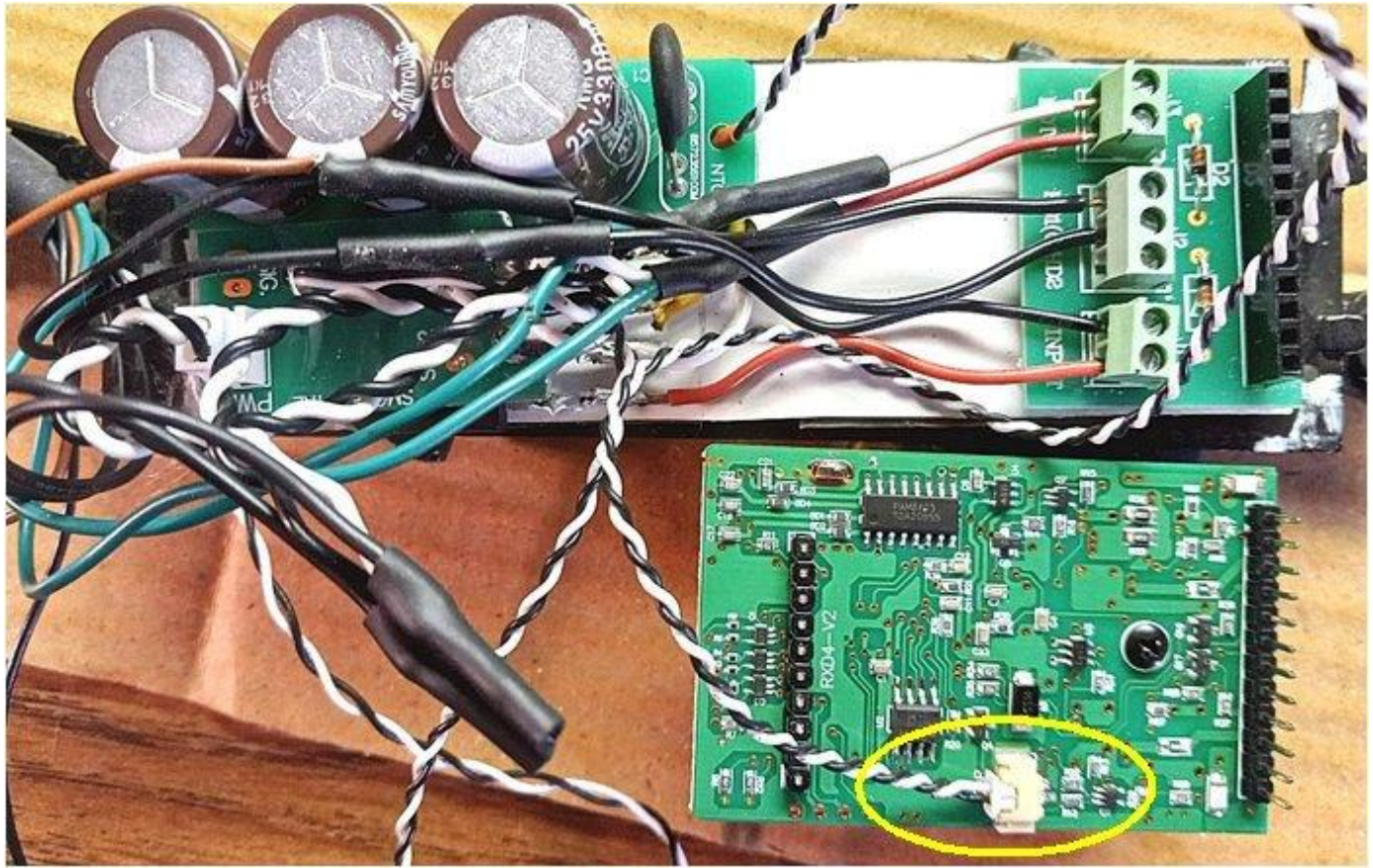


Add Components to Steam Tender (Step 4)

- Attach headlight wires to Headlight output. Positive (+) to to center and negative (-) to HD1 with 1000 ohm resistor if LED. Standard incandescent bulb would use 100 ohm resistor. Center terminal is hot continuous 12+ volts. If cab light is used, connect positive lead to center headlight terminal with resistor 1000 ohm after splice if LED.
- Cut smoke out wires at 3 inches from smoke module and solder to smoke unit input wires from locomotive output. Slip 1/8 heat shrink over solder joint.

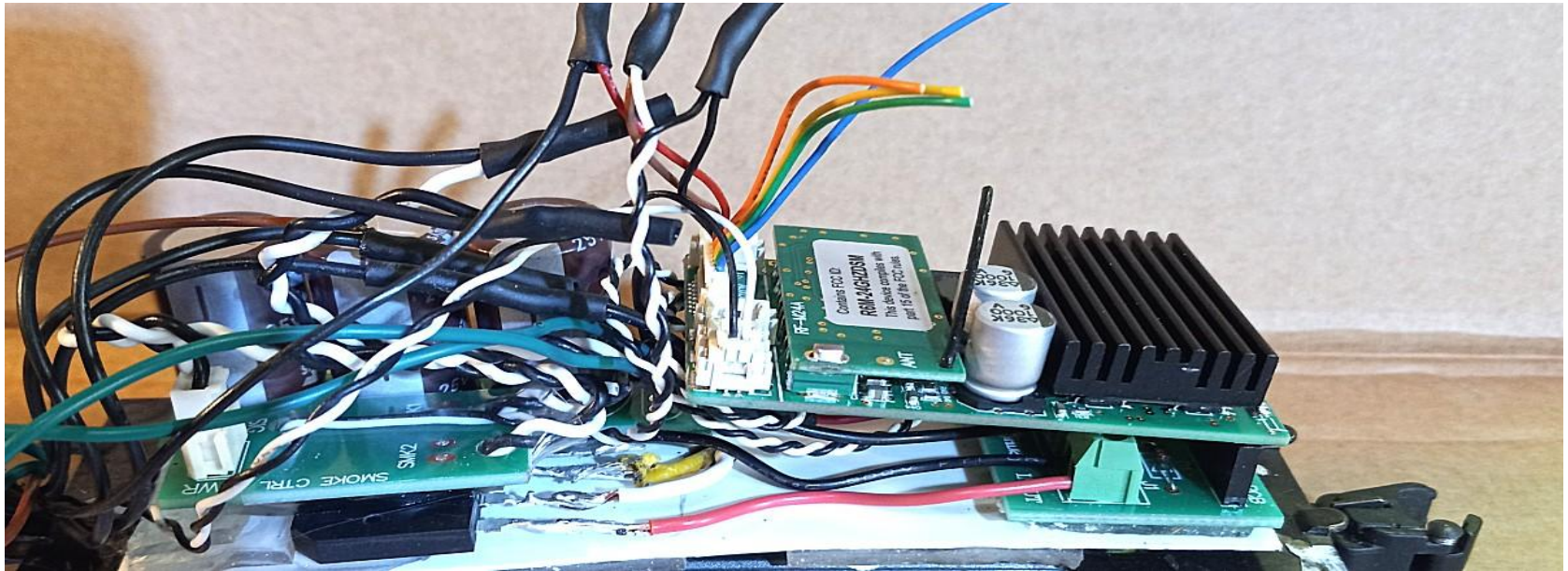
Add Components to Steam Tender (Step 5)

- Plug capacitor bank into lower receptacle under board.
- Insert revolution module into module base.
- Never misalign pins when plugging Revolution circuit board back in or feed power into motor output. If you do, You **will** burn out a 5 amp fuse when you attempt to run.



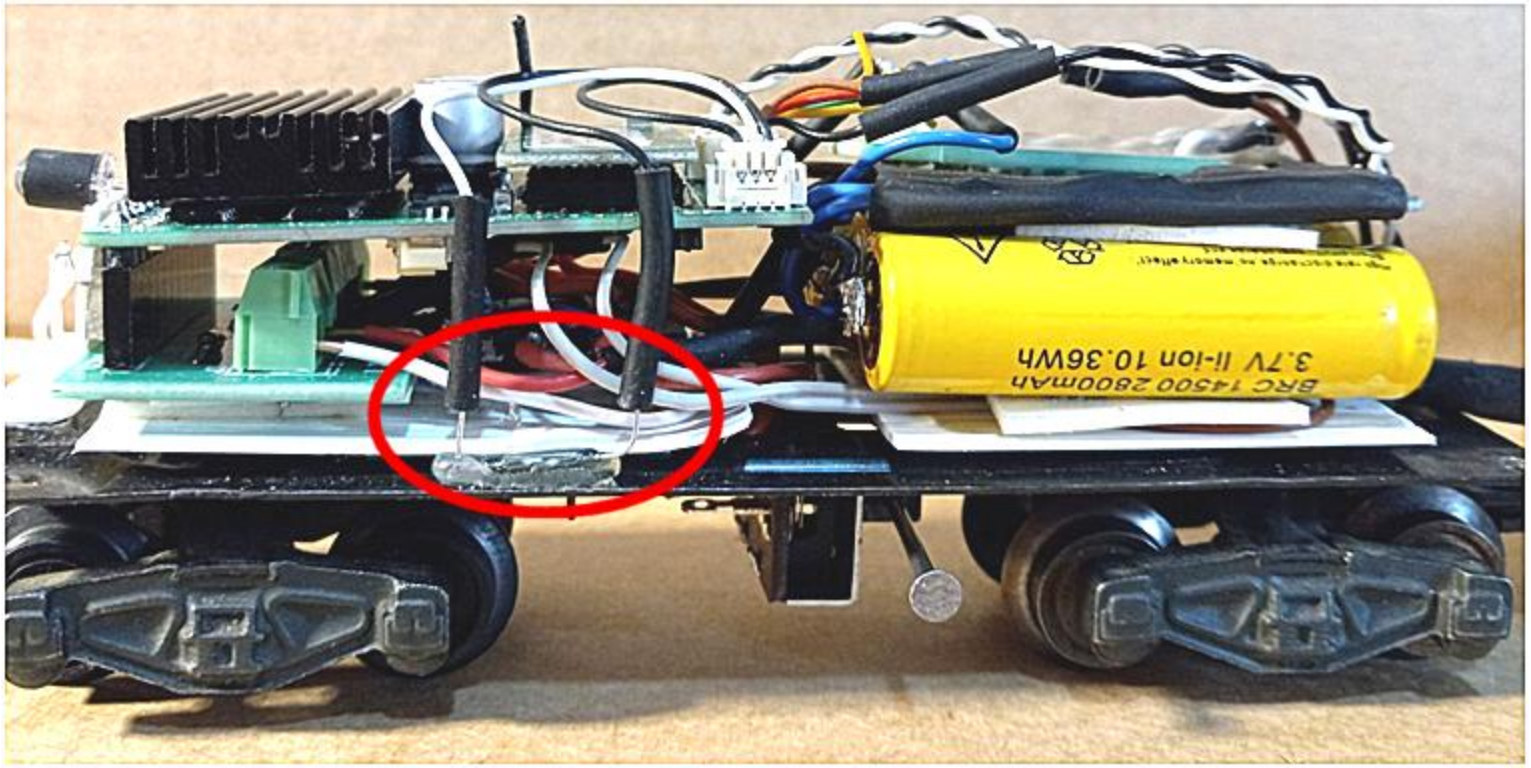
Connect Wires Into Module

- Plug speaker wire into either speaker jack. (two are available)
- Plug 7 colored wire accessory lead into receptacle. Black is common power wire for set. The seven wire set is signal power only which created the need for a smoke relay. Power is very low, less than 1 volt on black common.
- Other color wires are ground which can be used in conjunction with headlight positive output for lights for cab, classification and so forth. Activation is number (1-6) keys. I use #6 (brown)for smoke and #5 (red) for cab lights so I do not interfere with pre-programmed sounds.
- Connect black wire to either input for smoke module. Insulate with heat shrink. Brown wire connects to other smoke module input.
- Connect remaining cab light wire to headlight common for power and insulate.



Optional Wire for Automatic Whistle/Horn

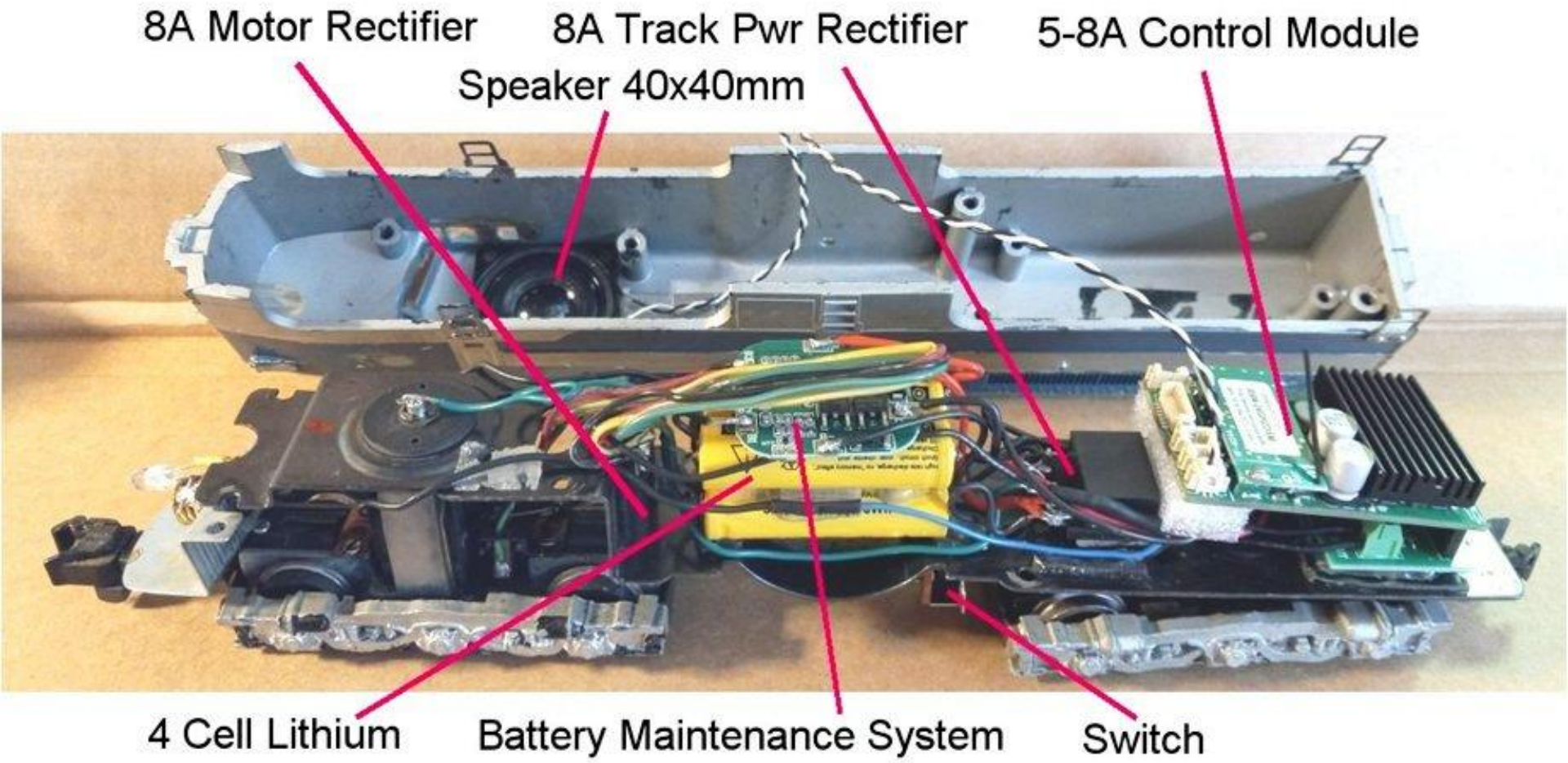
- Need to determine placement of magnetic reed switch for grade crossing activation by trackside magnet if positioned on post or between rail magnet for grade crossing.
- Magnet for synchronized chug is placed on tender axle or piston rod in loco (optional).
- Wire to use is supplied from an extra set-switch. One comes with each receiver or purchase separately. Plug into module defined as TRIG on diagram.
- Cut push-button switch from wire after length is determined. Solder white common wire to one end of a reed trigger switch. Solder other of the reed switch to front black wire for grade crossing of the from the extra set switch assembly. Rear wire is for synchronized chug. Position reed switches for prior activation of crossing event.



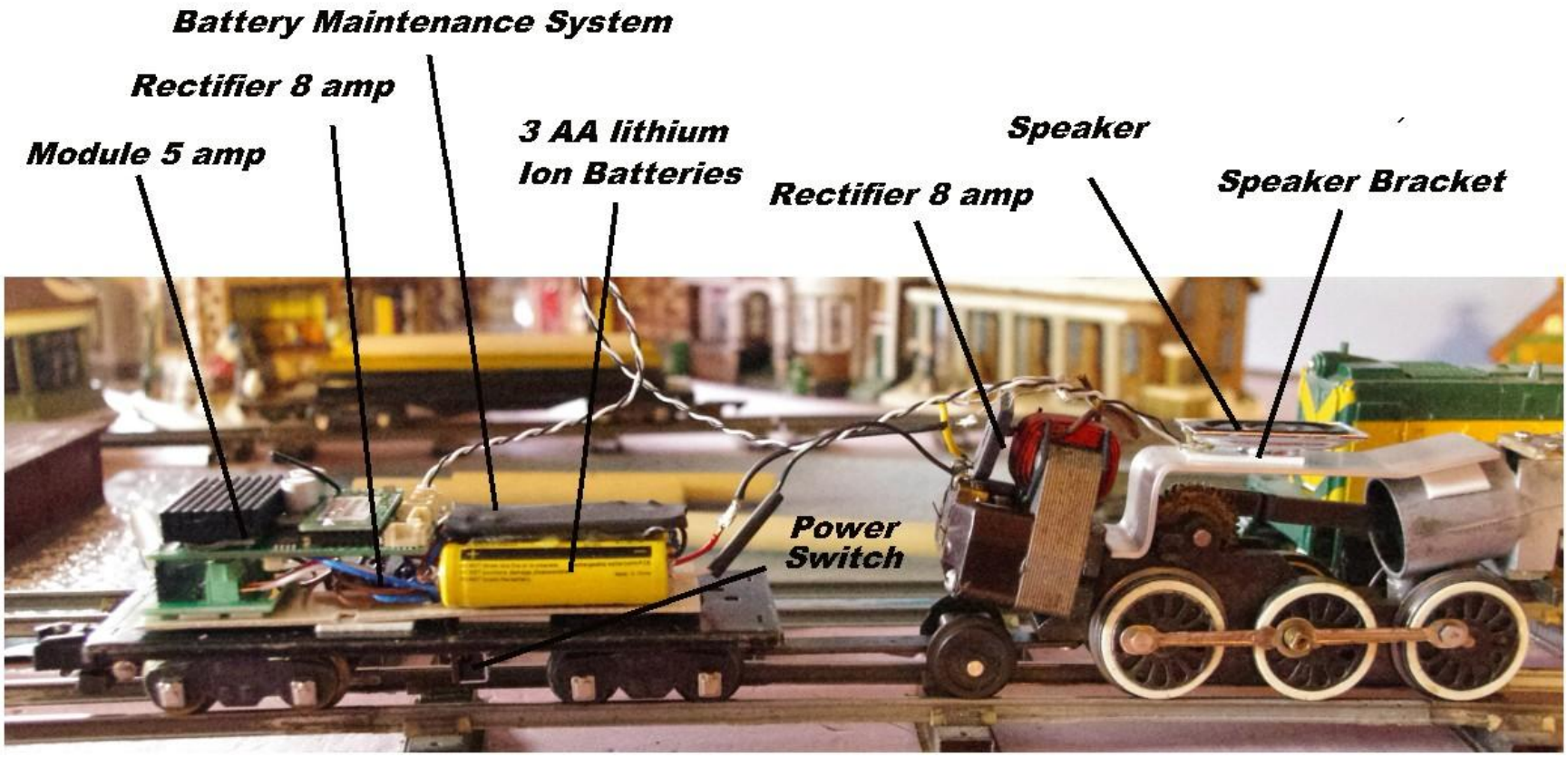
Optional Battery Placement

- Components are placed same as Capacitor version with the exception of replacing the capacitor set with lithium battery assembly.
- The Alcos can use a 4 cell set with a 4S Battery Maintenance System board while the Steam locos would receive a 3 cell pack with a 3S BMS due to tender available space.
- The BMS allows the cells to receive no more than 5 volts during charge and will cut out when the reach 3.2 volts per cell preventing the cell from being damaged.
- The power to feed the BMS/battery cell comes from the track input that will tolerate 12 to 20 volts allowing the Gilbert motors to run at maximum efficiency.
- The onboard rectifier allows the operation of the cells and motor to run on DC regardless of track operating at DC, DCC, or AC.
- A switch is needed to maintain battery integrity during periods of no track power. (Dead Rail)

Location of Alcos' Components Using Track Power (W/4S Battery Bank)



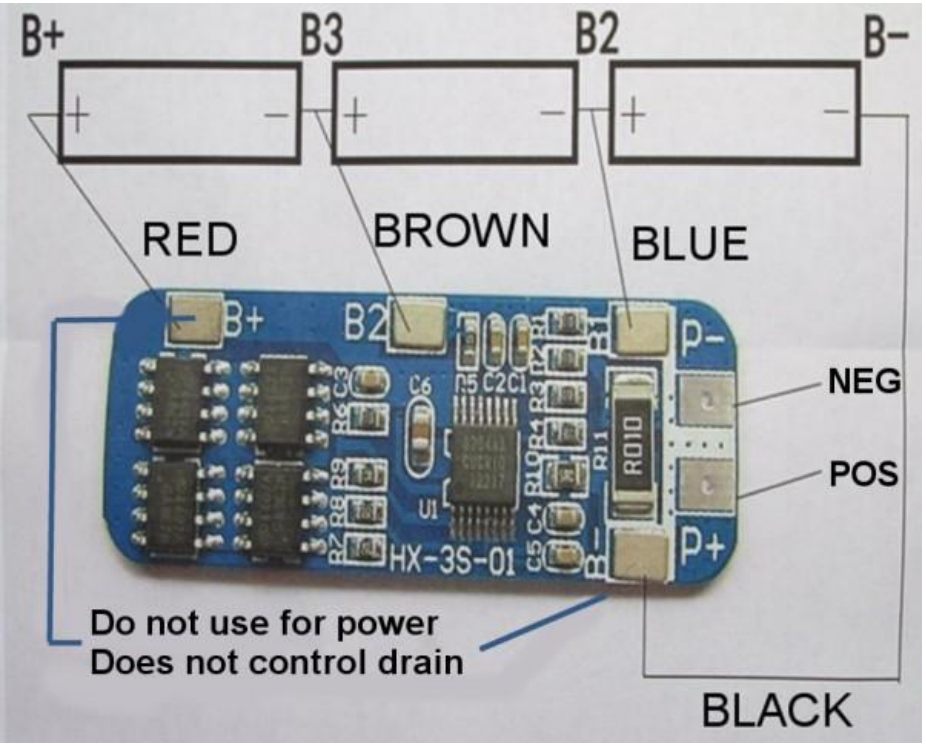
Location of Steam Components Using Track Power (W/Battery Bank)



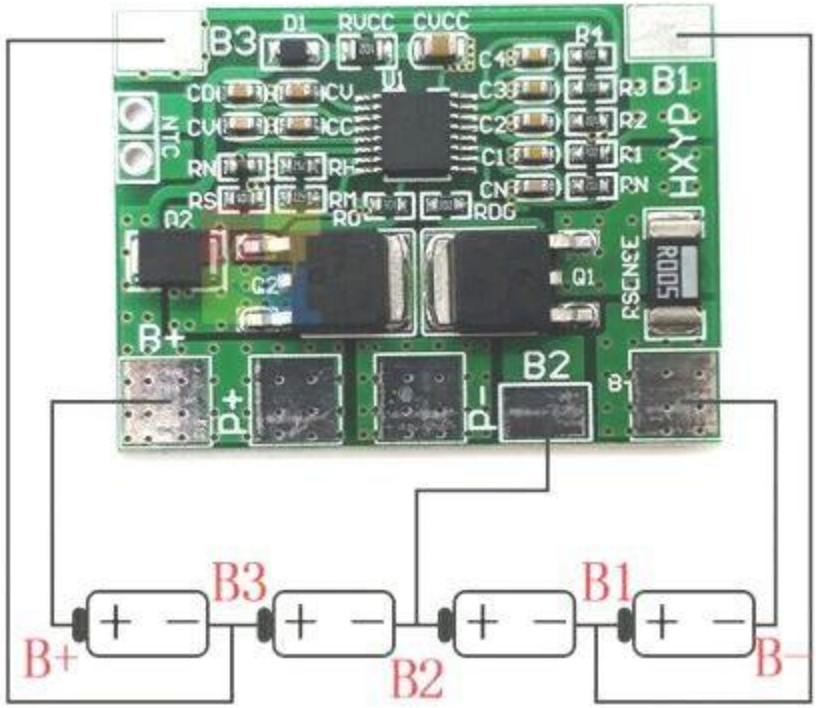
Battery Wiring Diagrams

! Always draw power from the P+ and P- terminals !

3 Cell Wiring Diagram



4 cell Wiring Diagram



Inspect and Trial Run

- View tender and locos from sides and ensure that no wires are shorted before shells installed.
- Program loco while access remaining to module. Similar units can be copied from unit to unit.
- Insulate well if metal shells are involved avoiding short circuits.
- Place on track and rock and roll.
- Instructions for programming are at Revolution website.

www.precisionrc.org

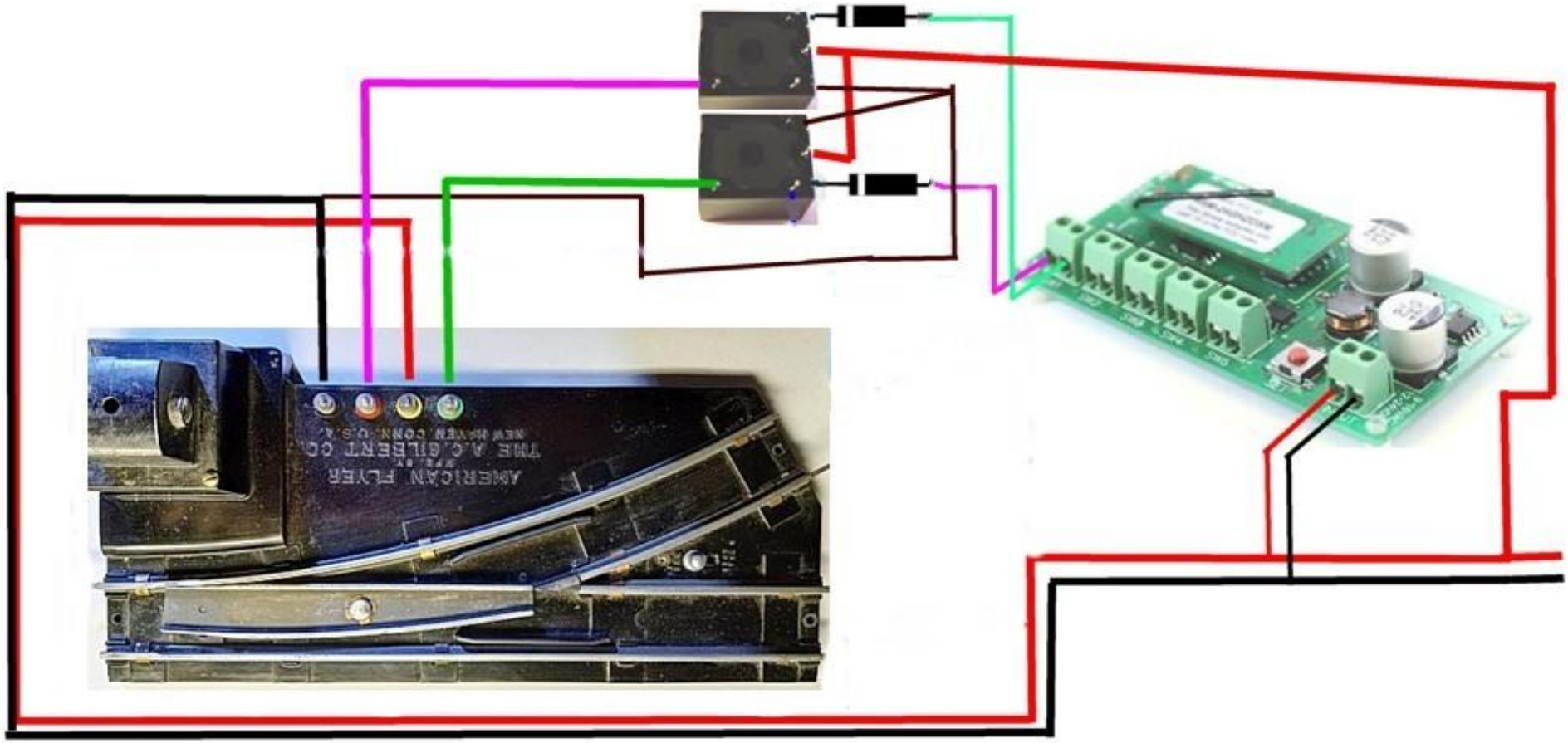
Enjoy your upgrade

Wire Switches for Remote Activation

- Use your remote control for operation of switches.
- Find switch set of up to 5 on unit selector <<T T>>.
- Press number desired (2 for second switch etc…)
- Use Unit Direction (< or >) for switch direction.
- 1-1/2 amp rating max. AF Switches need relays to operate. (4 Amp+)

Remote Switch Wiring Example

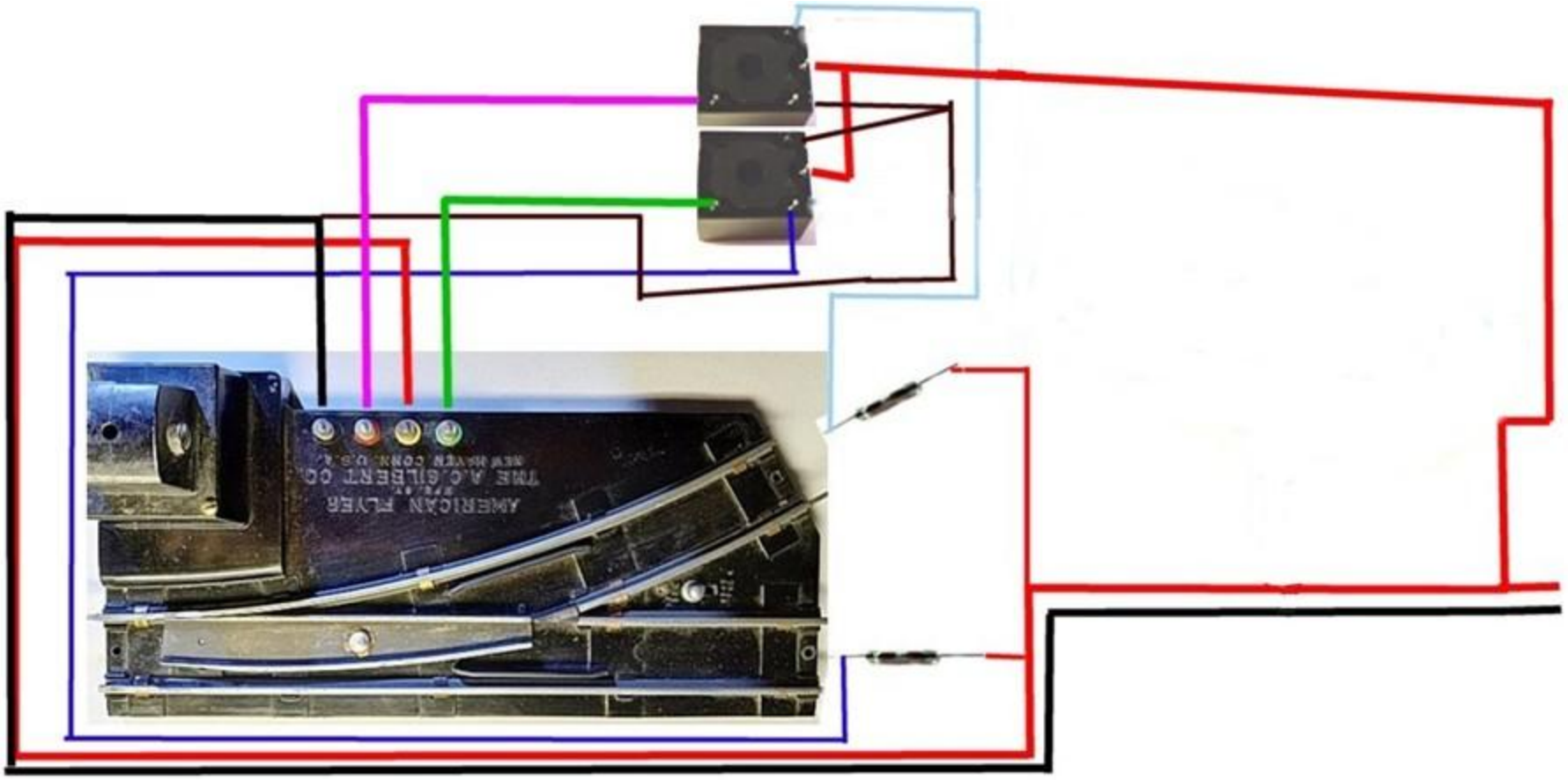
(Not To Scale)



16-20V DC in only. Use diodes at relays preventing voltage entering output. Module is limited to 1.5 amps load. Use relays to allow 4 amp load from flyer switches. 16-20V DC in only. Use diodes between relays and modules preventing voltage entering module output.

Never apply voltage to module outputs, damage to module WILL occur.

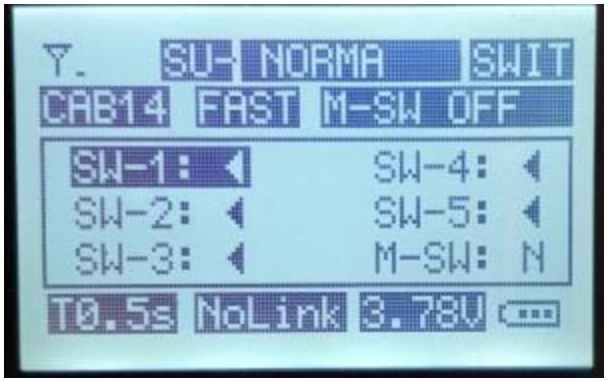
Auto Switch Diagram



- Reed switches (activated by magnet on front and or rear truck) are positioned at opposite entrance allowing auto switch preventing derailment. Small magnet on truck is required to activate switch throw.

Setup Transmitter for Switches

- Treat switches as a new cab
- Add the unit to your transmitter by menu/assign functions/enter/link address(next one on profile/right arrow (link address should change)
- Down arrow to RxType, pick ACESS.
- Add description of switch location
- Use 1-5 to select switch- arrow to select fast (AF) or slow (Turtle drive) then set time for delay
- Down arrow to Link the receiver
- Add the CAB to the SU-MU before exit
- Setup is complete. MENU until main screen appears
- Press 1-6 to identify switch. Use let right arrow to throw

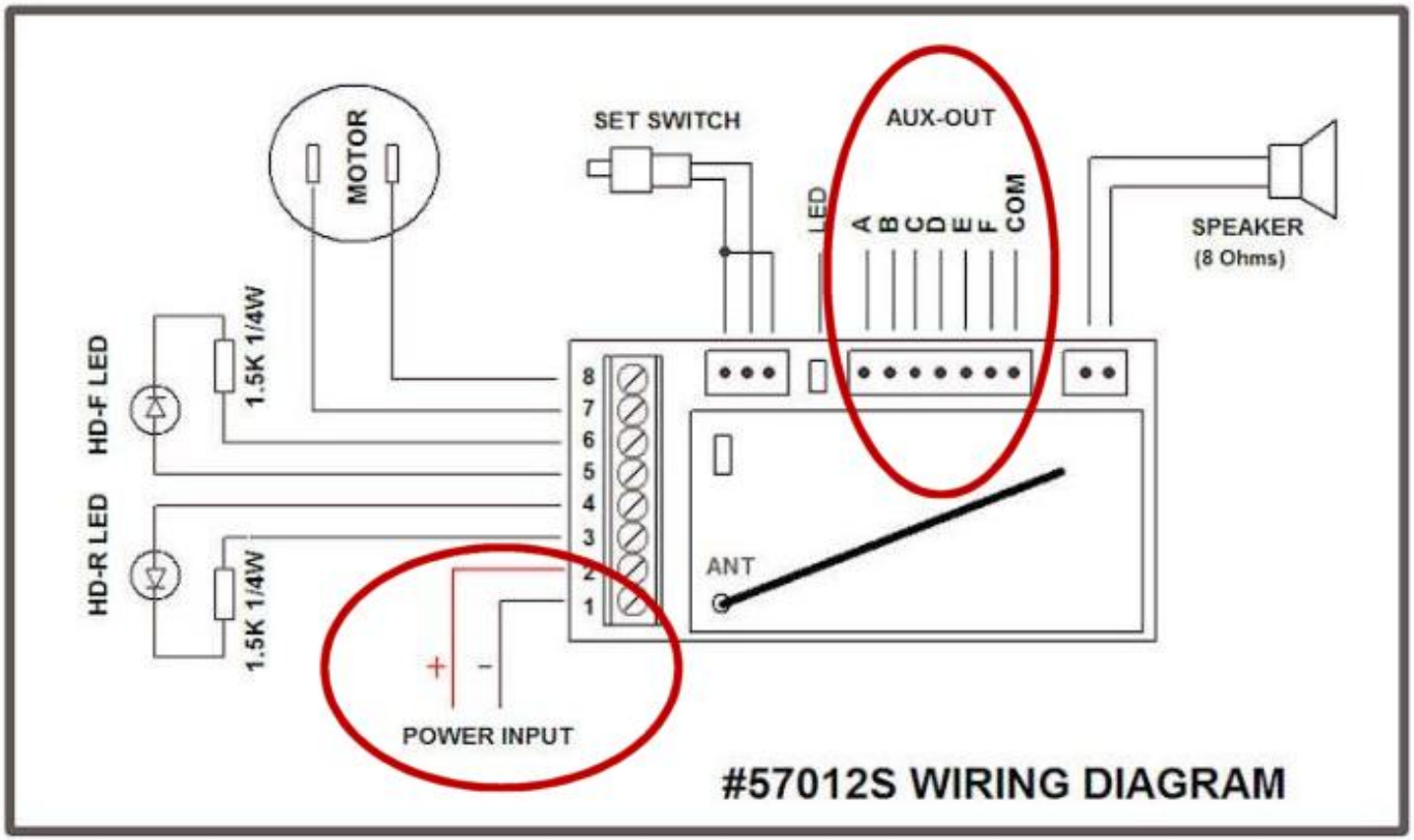


Wire accessories for Hands-Off Operation

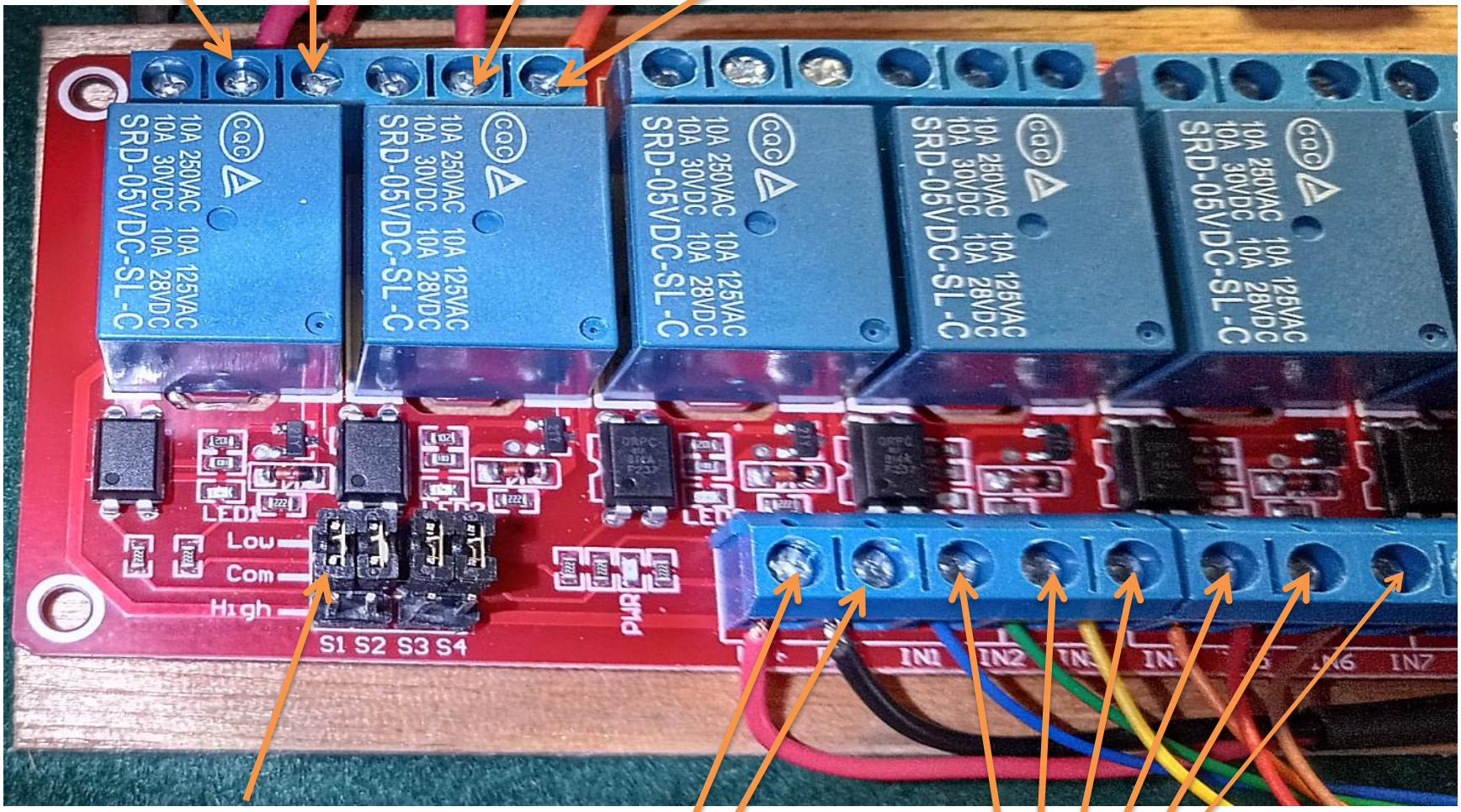
- You will need a locomotive receiver for up to 6 accessories. Smaller 2A receiver will work well. If using a 5A board, a plug and play base is available.
- You will also need a relay bank to handle heavier current demand from accessories.
- Output is either AC or DC based on accessory requirement.
- Works with all accessories including track trips for dumps and un-couplers.
- Output is choice of normally open NO (does not provide power until activated) or normally closed NC (provides power then drops when activated. Remote has option of momentary or latched.
- Loco module also allows train throttle for powered accent like scenic back yard train in N scale or Ferris Wheel control.

Requirements To Wire Receiver & Relay

- The smaller 2A receiver module is DC and polarity specific for operation. Output is the accessory plug for signal output (7 wire). Power input **IS polarity sensitive** on 2 amp receiver.



Relay Module Wiring Illustration



Move Jumpers To Low Voltage Input For Revolution Module

5 Volt DC Input

6 Wires From Module labeled A-F. A is Blue, B is Green and so forth in order. COM wire (black) is not used.

Set up Transmitter for Accessories

- Treat accessories as a locomotive unit
- Identify in the name to recognize as an accessory group at a specific location
- Add the unit to your transmitter by menu/assign functions/enter/link address(next one on profile/right arrow
- Fill out the description. I put ASSY in ROAD NO. ACESS in RxType is for switch module
- In AUX FUNC SETUP is definition for mode
- Link the receiver module
- Add the CAB to the SU-MU
- Setup is complete. MENU until main screen appears
- Press 1-6 to operate each accessory

Parts List & Sources

Item	Quantity req/unit	Supplier	Stock Number (search)	Cost / 2025
Transmitter	1	Revoelectronics	57001	$ 195.50
5 A receiver (Gilbert Motor)	1	Revoelectronics	57002	$ 125.50
2 A receiver (Can Motor)	1	Revoelectronics	57012	$ 105.50
Switch Module (for 5 switches)	1	Revoelectronics	57008B	$ 119.00
Capacitor set (10 Farad)	1	Revoelectronics	57077A	$ 24.50
20x40mm speaker (steam)	1	Digikey	668-1235-ND	$ 4.97
40x40mm speaker (diesel)	1	Digikey	2056-K40SQ-8OHM-ND	$ 8.13
1000 ohm resistor	2	Digikey	CFR-25JB-1K0	$ 0.10
8 Amp Rectifier	2	Digikey	GBU8K-BP	$ 1.17
1 Amp Rectifier	1 (opt)	Digikey	DB107S	$ 0.44
Magnetic reed switch	2	Digikey	ORD 211/10-15 AT	$ 0.99
15A Relay	2	Digikey	AZ943-1AH-5DE	$ 0.85
1A Diode	2	Digikey	1N4004B-G	$ 0.13
LED cabin light (amber)	1	Digikey	JE2835APA-N-0001A0000-N0000001	$ 0.22
LED firebox (red)	1	Digikey	LR G6SP-CBEA-1-1-140-R18-Z	$ 0.69
Heat Shrink Tube 3/16	1 foot	Hardware Store	3/16 heat shrink tube	
Heat Shrink Tube 1/4	6 inches	Hardware Store	1/4 heat shrink tube	
24 Gage multi-strand wire	3 foot	Amazon	TUOFENG 24 AWG	$ 7.60
28 Gage multi-strand wire	2 foot	Amazon	TUOFENG 24 AWG	$ 7.99
1mm Plain Polystyrene Sheet	1	Hobby & Craft	Plain Polystyrene Sheet	$ 3.99
3mm Plain Polystyrene Sheet	1	Hobby & Craft	Plain Polystyrene Sheet	$ 3.99
1/2" x 1/16"(.062) aluminum flat bar	1	Hardware Store	Aluminum flat bar 1/16	$ 3.98
Double Stick Transparent Tape	1	Amazon	Alien tape	$ 9.97
Relay bank	1	ebay	Relay Module Ardunio	$ 9.33