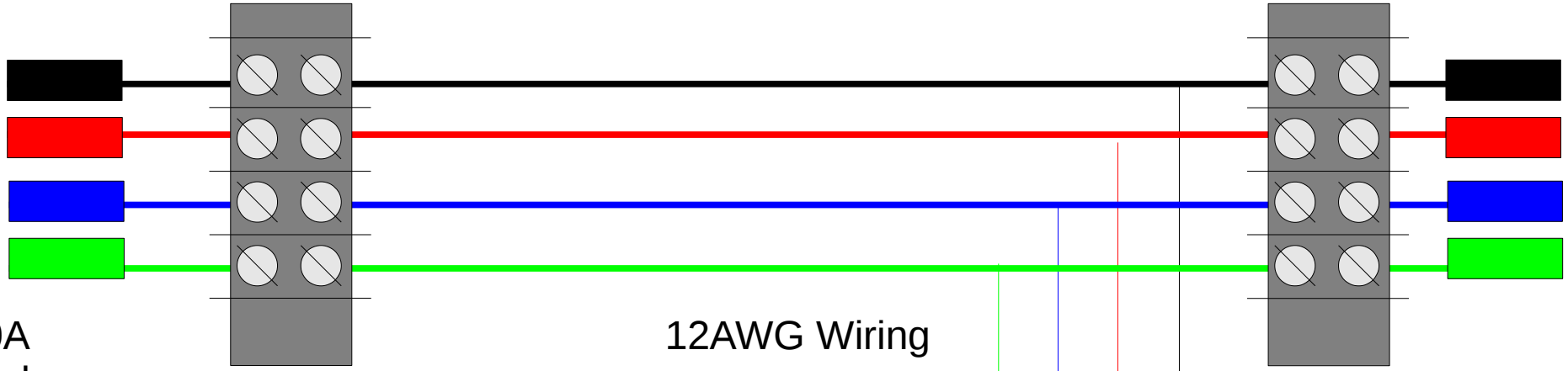
Module Wiring Standard

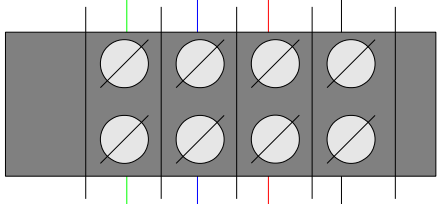
Concord Model Railroad Club
May 3, 2017

CMRC DCC V2.0 – Power Bus



30A Andersen Powerpole Connectors

12AWG Wiring

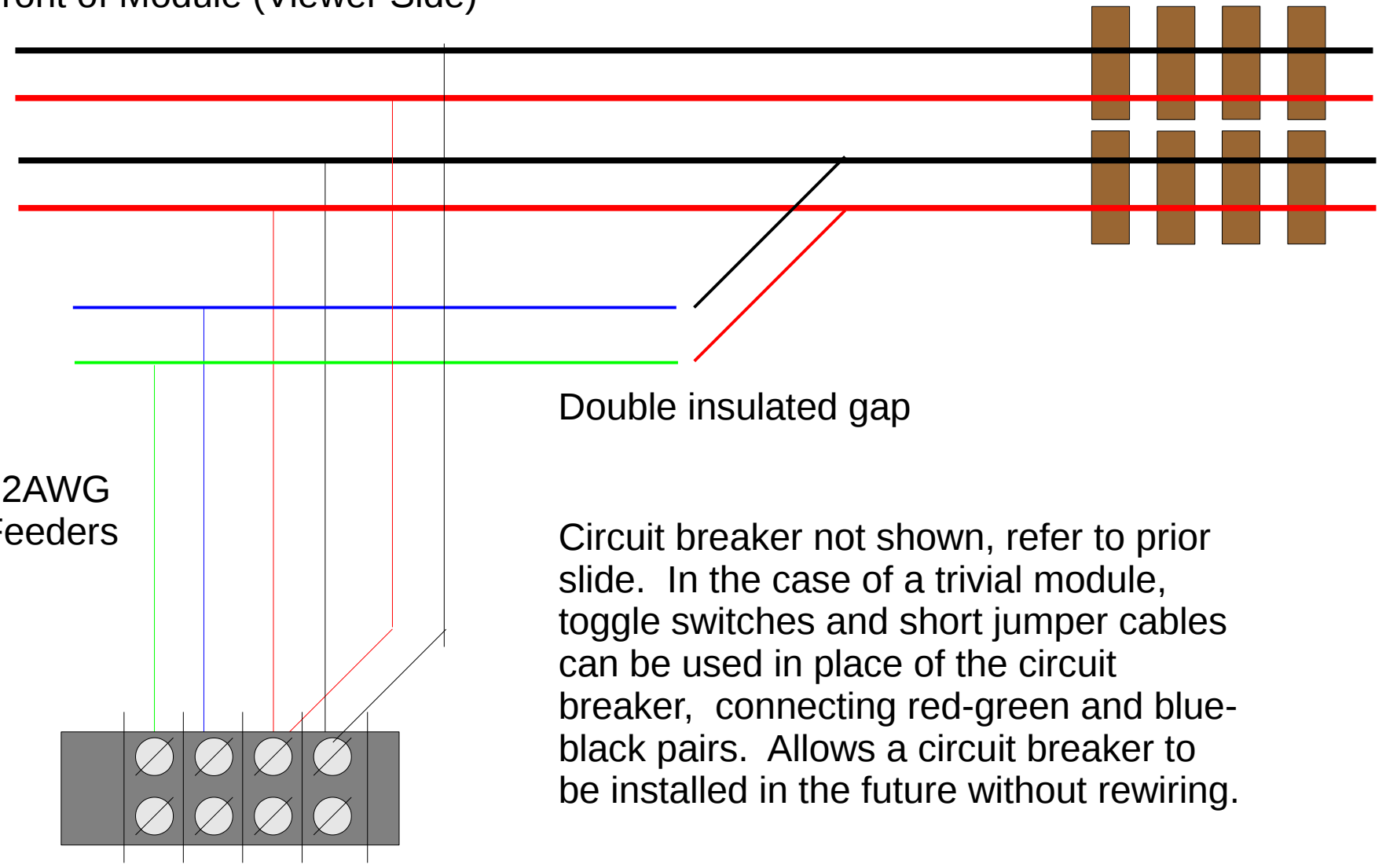


DCC Circuit Breaker

Non-mainline tracks are electrically isolated from the mainline and fed via a separate power bus. A DCC circuit breaker is used to connect the module power bus to the mainline power bus. A single circuit breaker can used for a multi-module set.

CMRC DCC V2.0 – Track Feeders

Front of Module (Viewer Side)



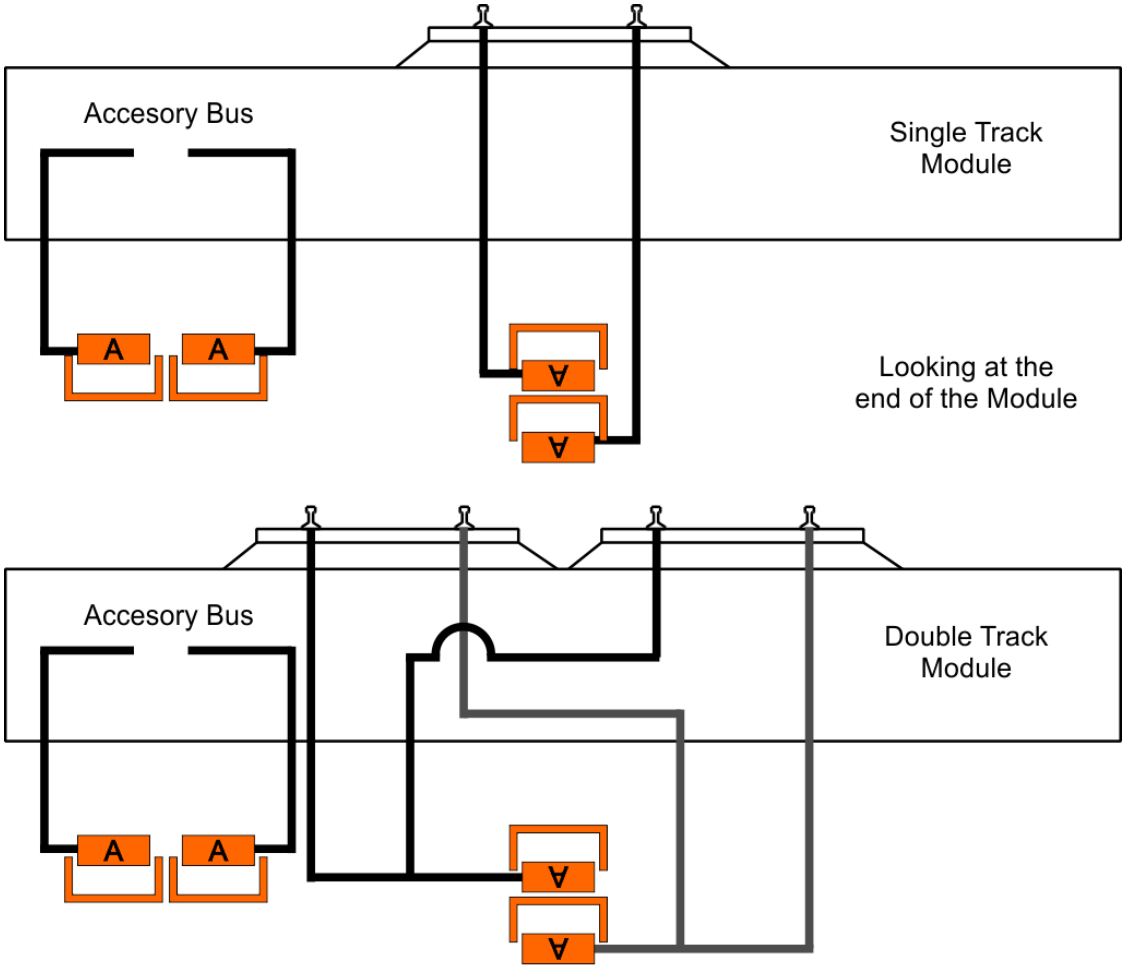
Double insulated gap

22AWG
Feeders

Circuit breaker not shown, refer to prior slide. In the case of a trivial module, toggle switches and short jumper cables can be used in place of the circuit breaker, connecting red-green and blue-black pairs. Allows a circuit breaker to be installed in the future without rewiring.

CMRC DCC V2.0 – Module Ends

Adopted from the FreeMo standard. The Anderson Powerpole connectors can be mated together forming a single plug, and modules can be connected in either direction without changing wires, or worrying about track polarity.



S4.5 & S4.6 - Free-mo Anderson Powerpole Standards for Accessory and Track Buses (colors of housing are optional)

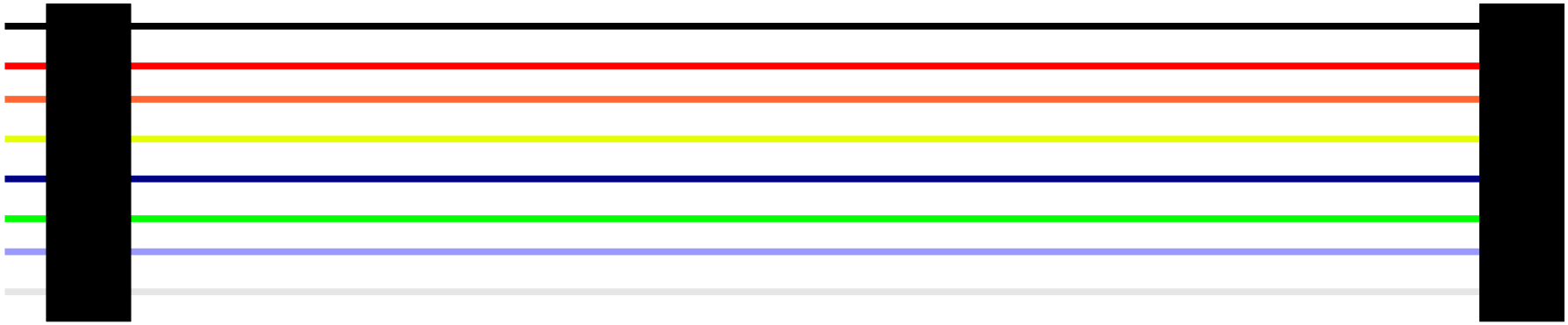
Evolution of Module Wiring

Concord Model Railroad Club

~~June 29, 2013~~

April 29, 2014

Quad Cab / Triple Main



8-pin Cinch-Jones connectors. Male of east end, female on west end. All wires run straight all modules. Track is electrically gaped with insulated rail joiners between modules.

Modules can not be turned backwards.

Eight bus wires:
1. Common
2. East Power
3. West Power
4. Local Power
5. Cab #1
6. Cab #2
7. Cab #3
8. Cab #4

This style wiring was used by the CMRC and CVMRC prior to DCC conversion.

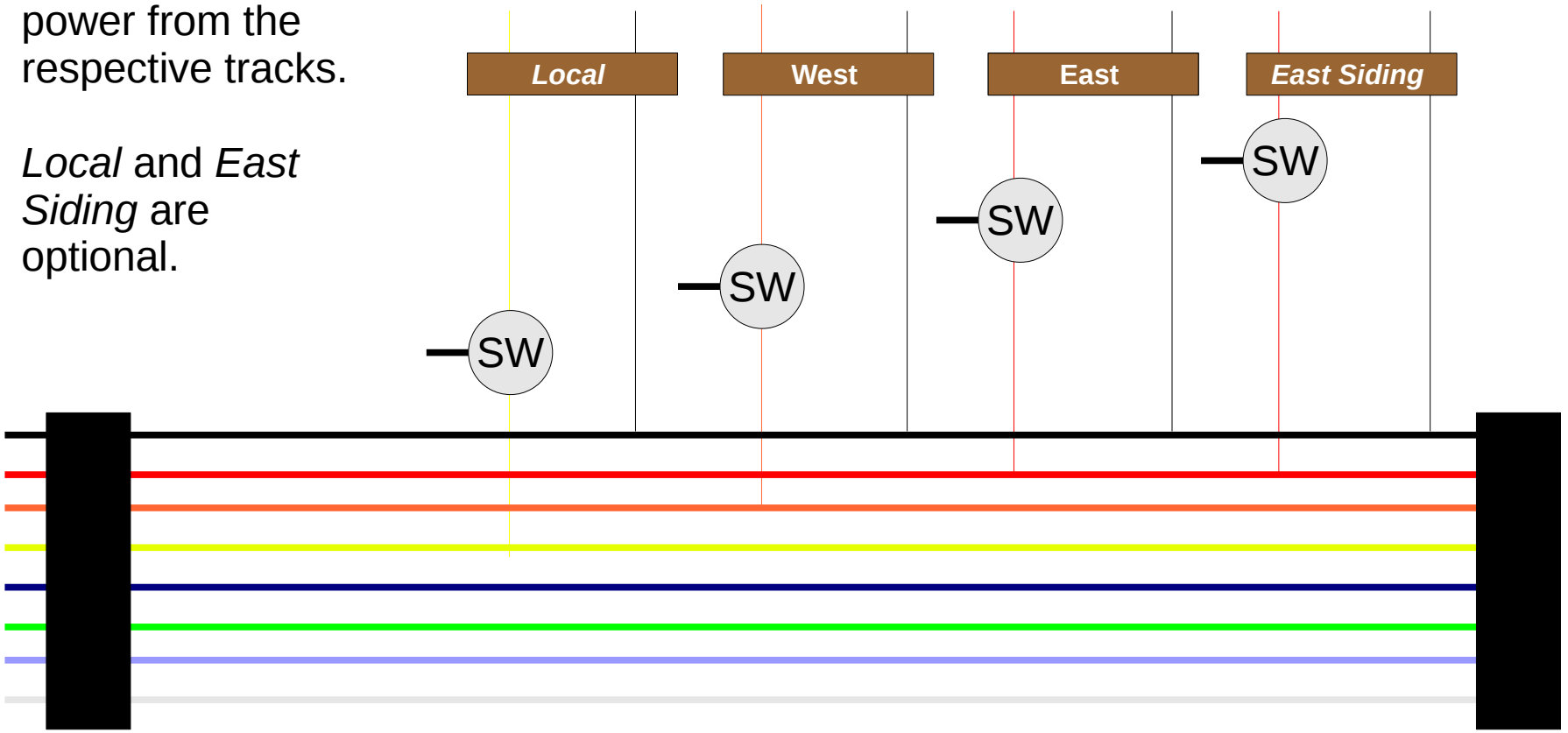
Over time, the Cinch-Jones connectors lose their conductivity.

Track Connections

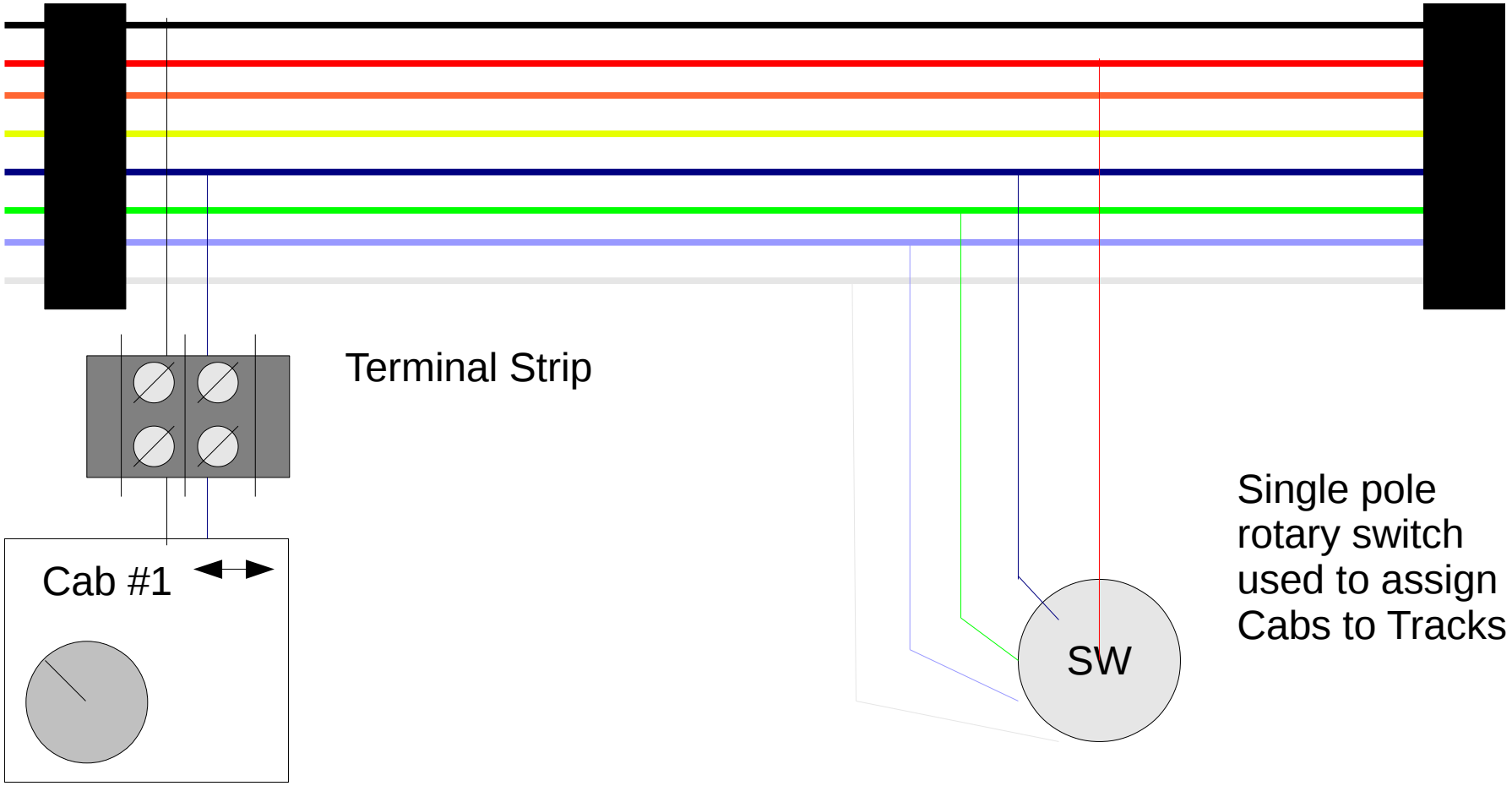
Front; toward viewer.

Single Pole, single throw “kill” switches are used to disconnect power from the respective tracks.

Local and *East Siding* are optional.



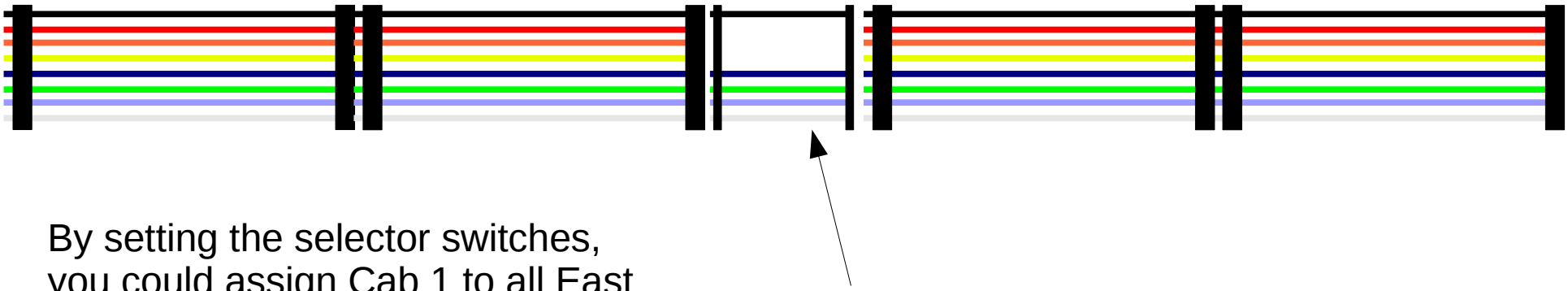
Cab Connections



Cabs 2, 3 & 4 not shown.

West and Local Selectors not shown

Blocking a Layout



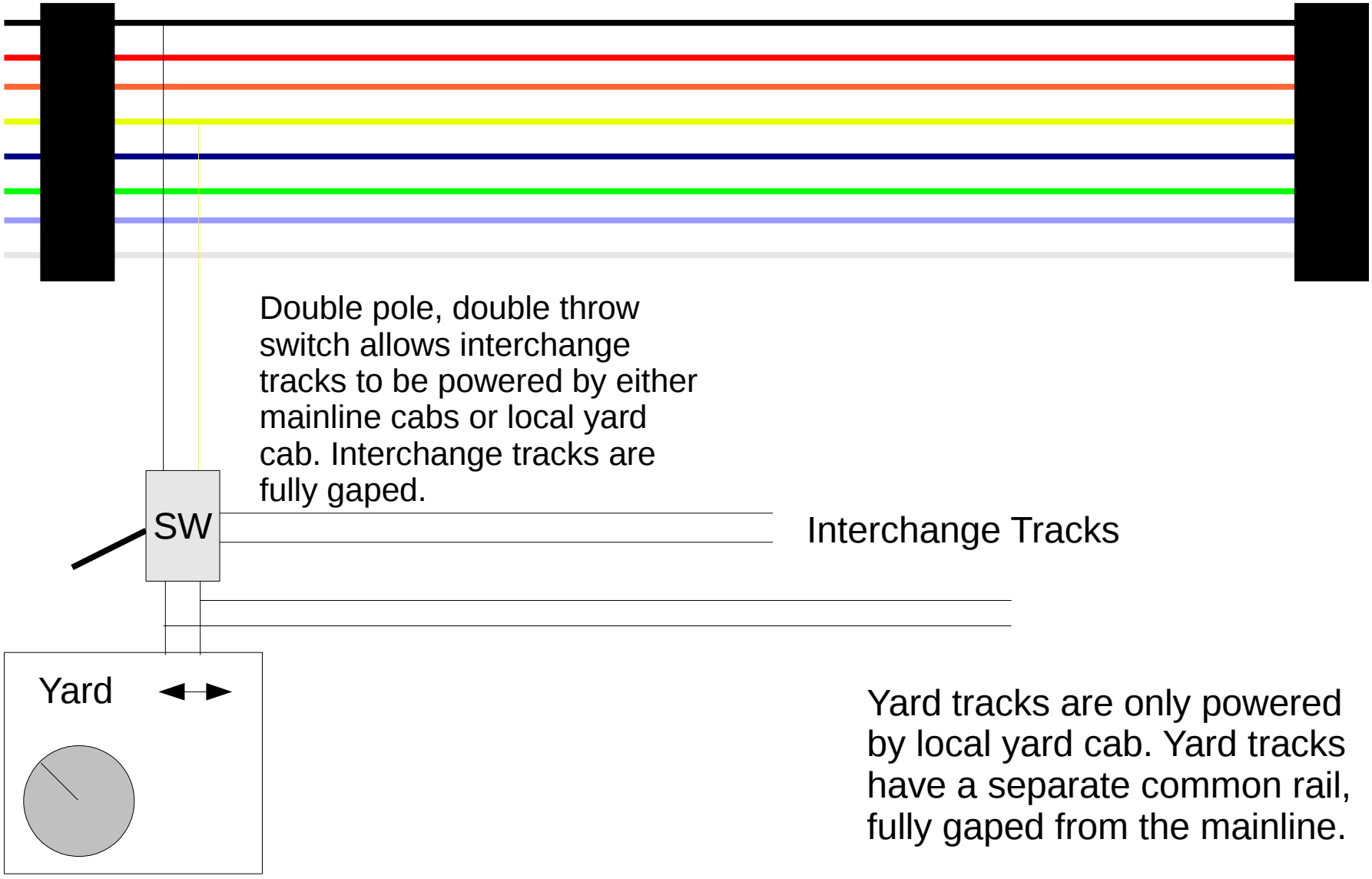
By setting the selector switches, you could assign Cab 1 to all East tracks, Cab 2 to West tracks, Cab 3 and 4 to Local tracks.

More common would be to assign Cabs 1 and 2 to the East/West mainlines on the left, and Cabs 3 and 4 to the right-hand mainline tracks.

Gap Cable, only connects Common, and Cab power. This allows any cab to be connected to any track, but creates a mainline electrical gap.

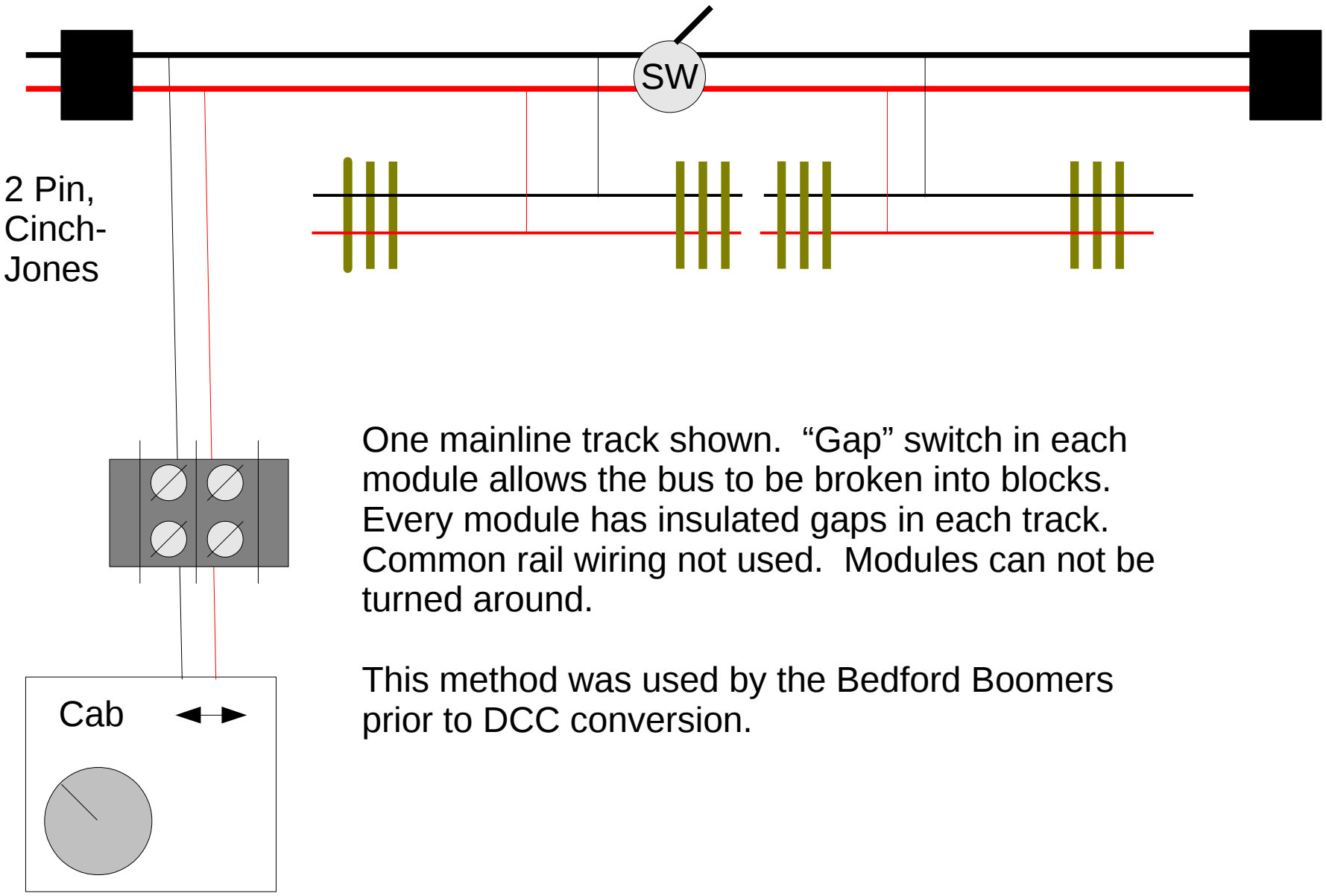
CMRC DCC v0.0: The first usage of DCC meant setting the cab selectors to one cab, and connecting the DCC booster to that cab. Blocks between boosters had to be completely isolated, no common rail. This meant just leaving the plugs disconnected at the gaps. (But people seeing dangling plugs can't resist the urge to plug them in!)

Yard Connections



Yard tracks are only powered by local yard cab. Yard tracks have a separate common rail, fully gaped from the mainline.

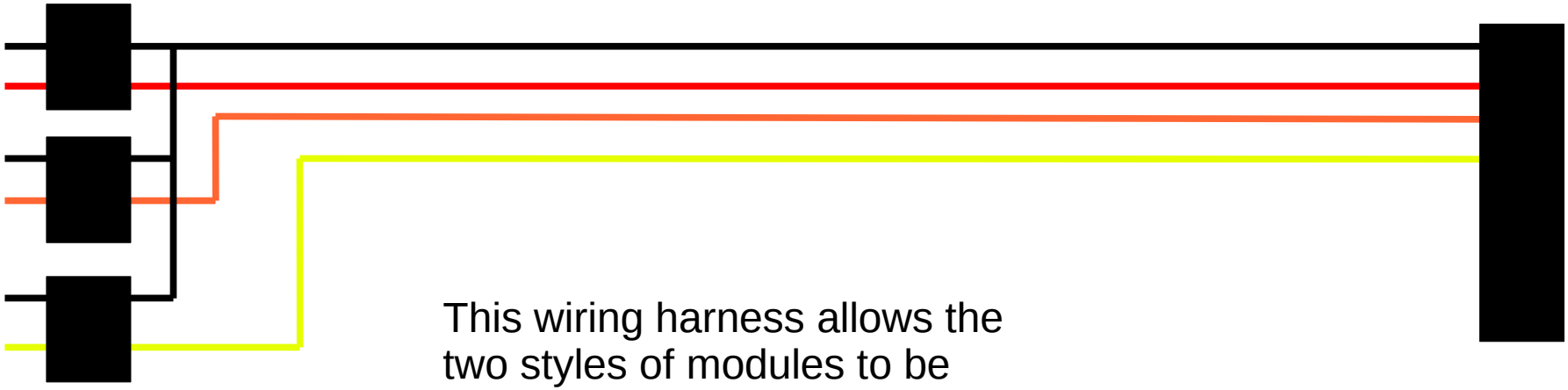
NMRA Style Wiring



One mainline track shown. “Gap” switch in each module allows the bus to be broken into blocks. Every module has insulated gaps in each track. Common rail wiring not used. Modules can not be turned around.

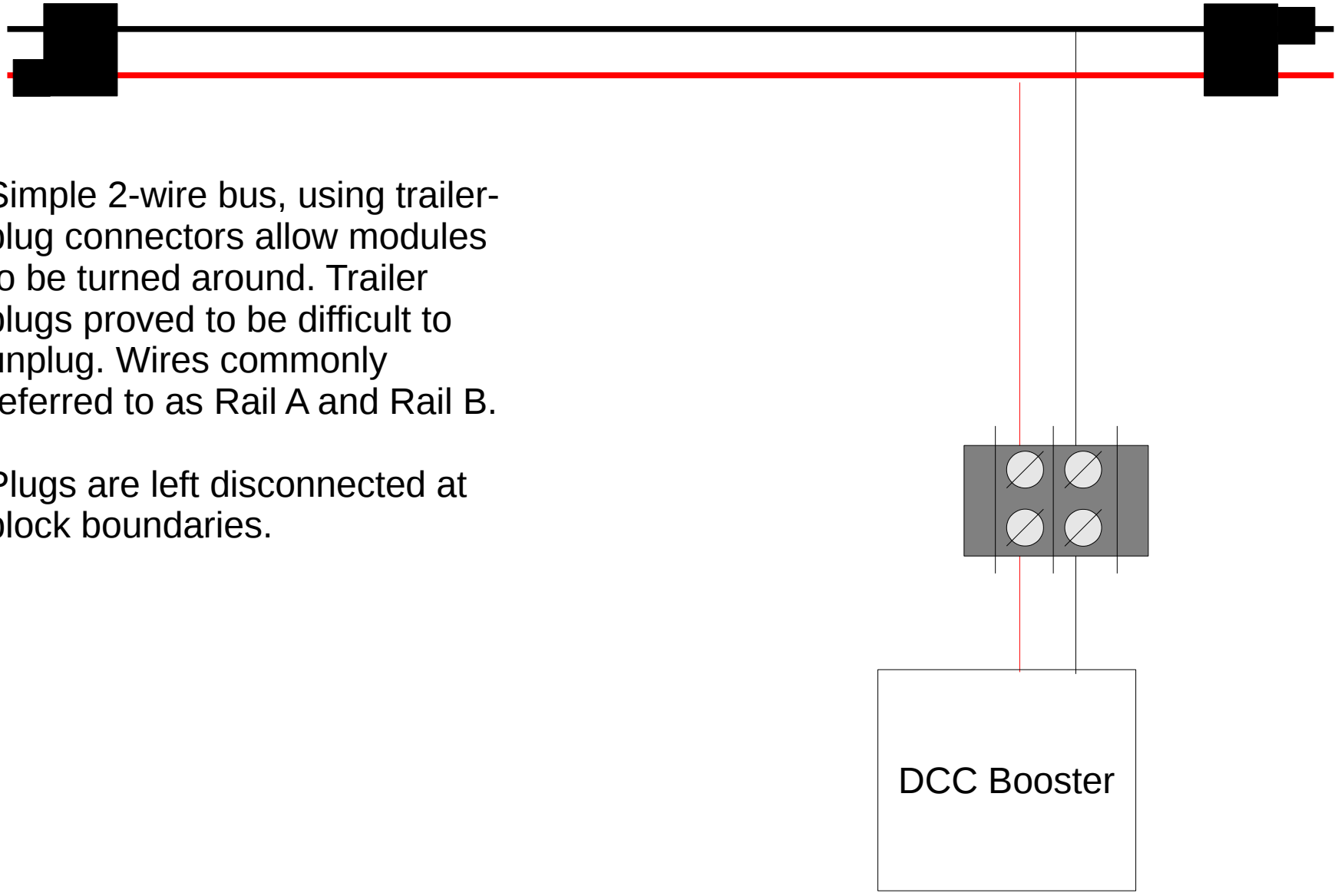
This method was used by the Bedford Boomers prior to DCC conversion.

Mixing Modules



This wiring harness allows the two styles of modules to be mixed, but problems can arise due to the combination of common rail modules with isolated rail modules. Cab buses are not needed.

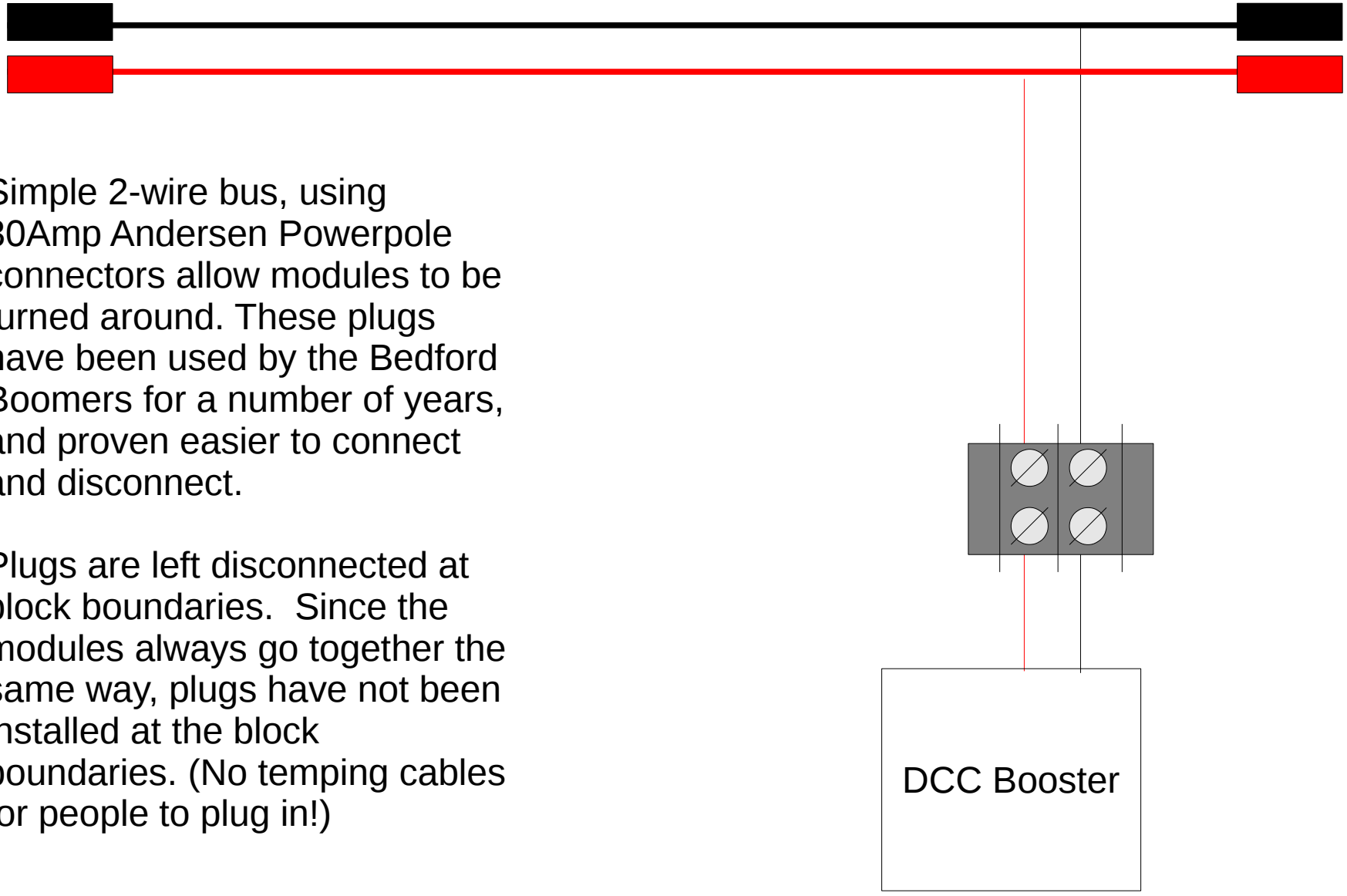
CMRC DCC V1.0



Simple 2-wire bus, using trailer-plug connectors allow modules to be turned around. Trailer plugs proved to be difficult to unplug. Wires commonly referred to as Rail A and Rail B.

Plugs are left disconnected at block boundaries.

CMRC DCC V1.5



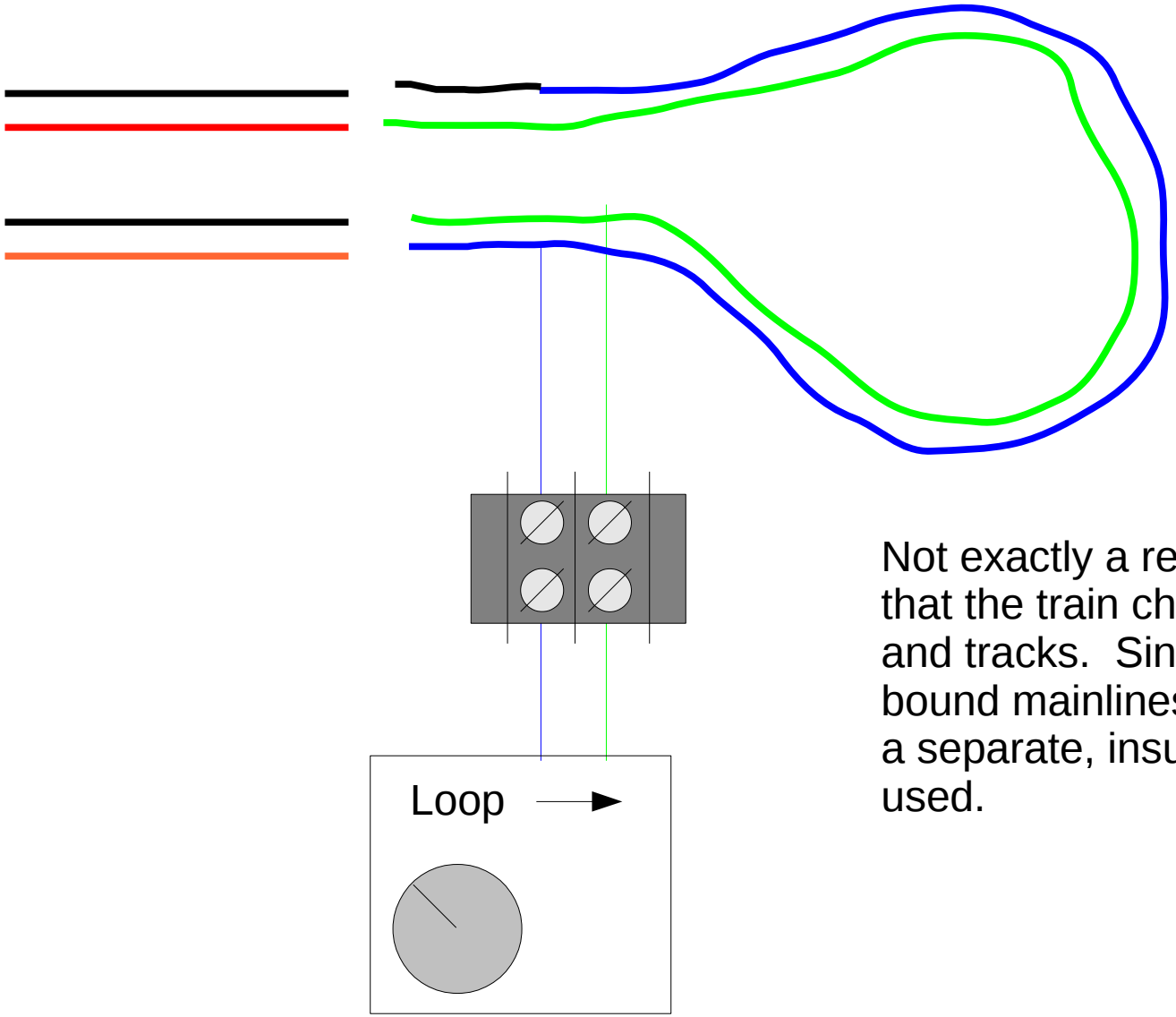
Simple 2-wire bus, using 30Amp Andersen Powerpole connectors allow modules to be turned around. These plugs have been used by the Bedford Boomers for a number of years, and proven easier to connect and disconnect.

Plugs are left disconnected at block boundaries. Since the modules always go together the same way, plugs have not been installed at the block boundaries. (No temping cables for people to plug in!)

Special Track Work

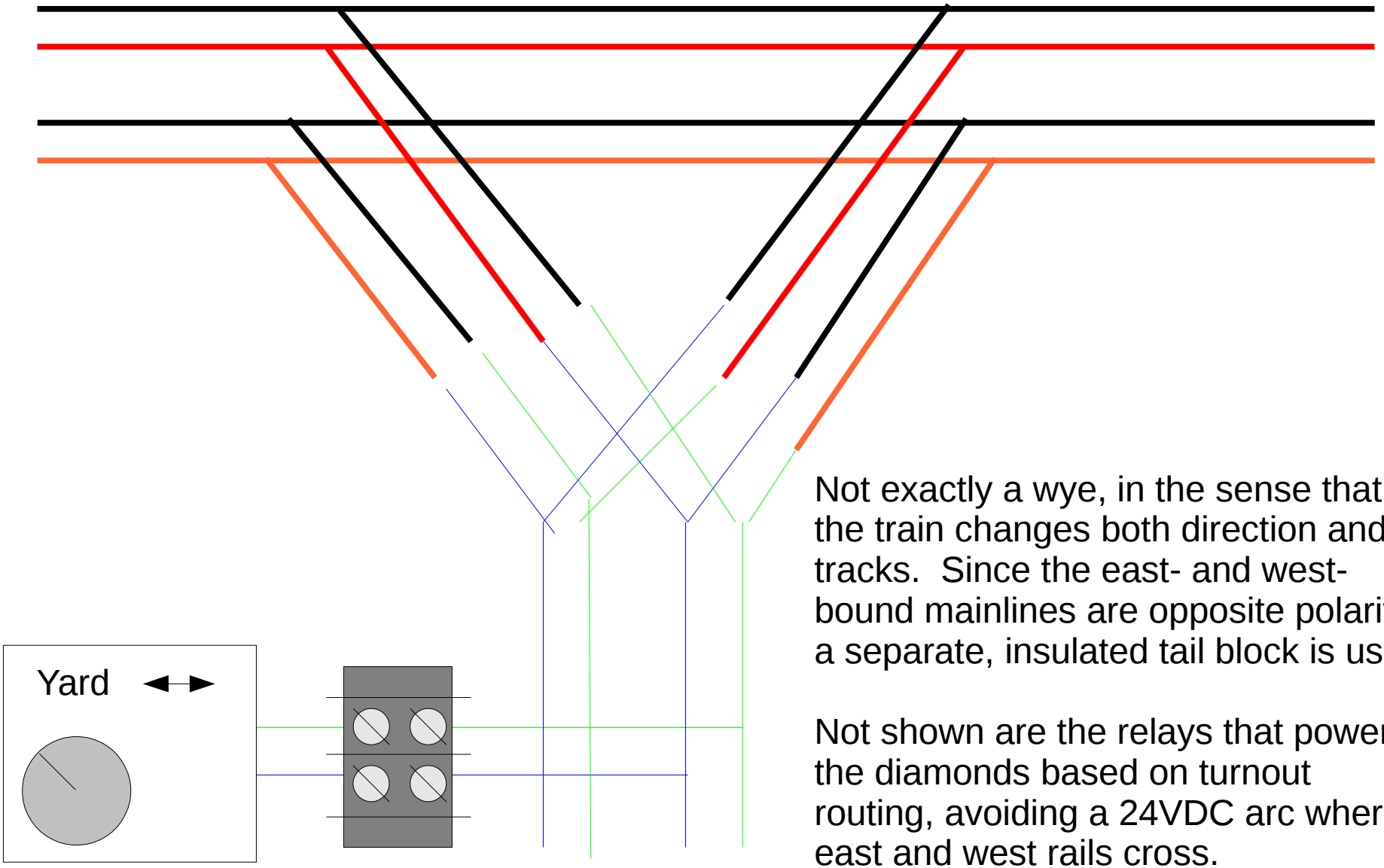
Unique usage with DC and DCC examples

Return Loops - DC



Not exactly a return loop, in the sense that the train changes both direction and tracks. Since the east- and west-bound mainlines are opposite polarity, a separate, insulated loop block is used.

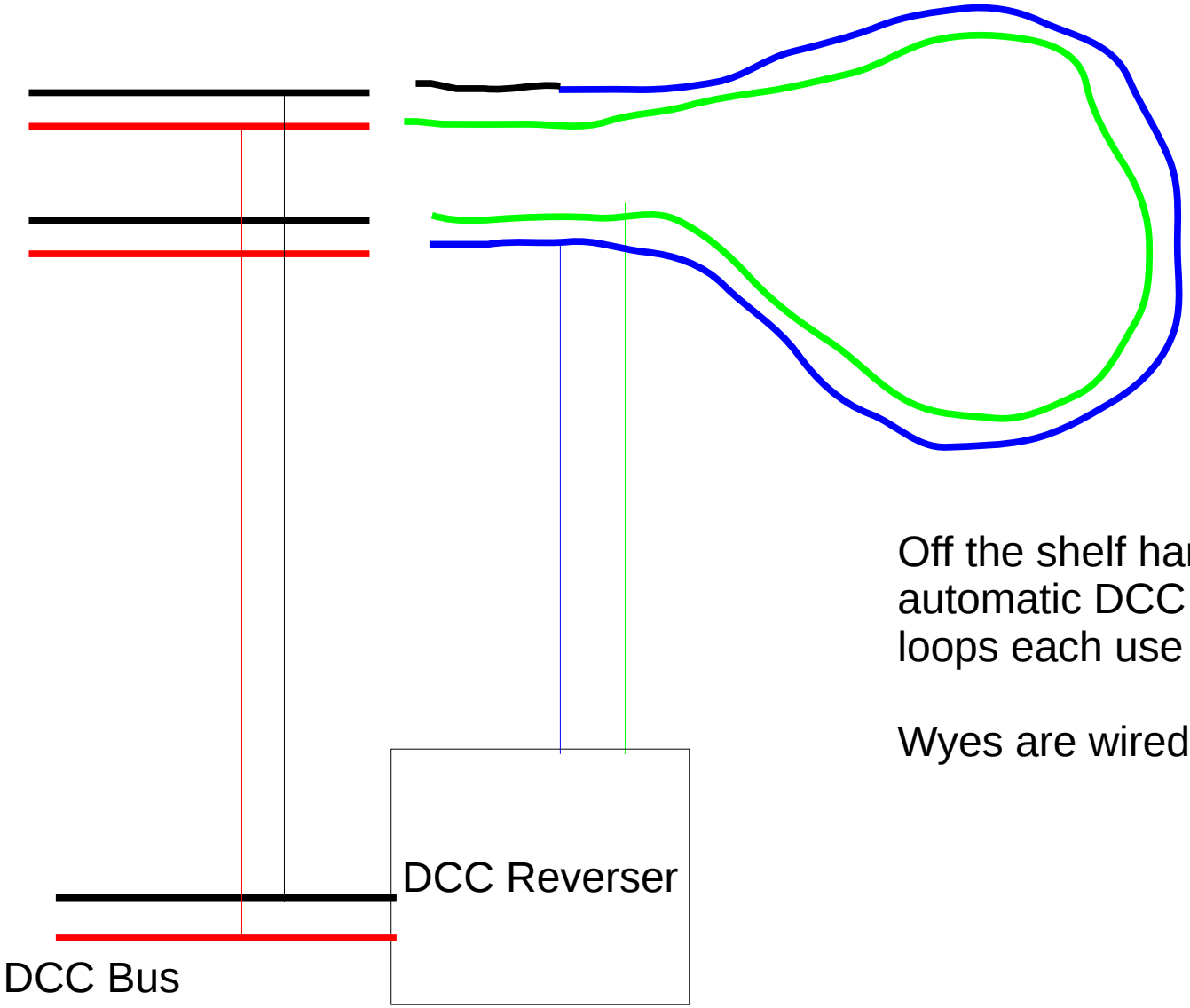
Wye - DC



Not exactly a wye, in the sense that the train changes both direction and tracks. Since the east- and west-bound mainlines are opposite polarity, a separate, insulated tail block is used.

Not shown are the relays that powered the diamonds based on turnout routing, avoiding a 24VDC arc where east and west rails cross.

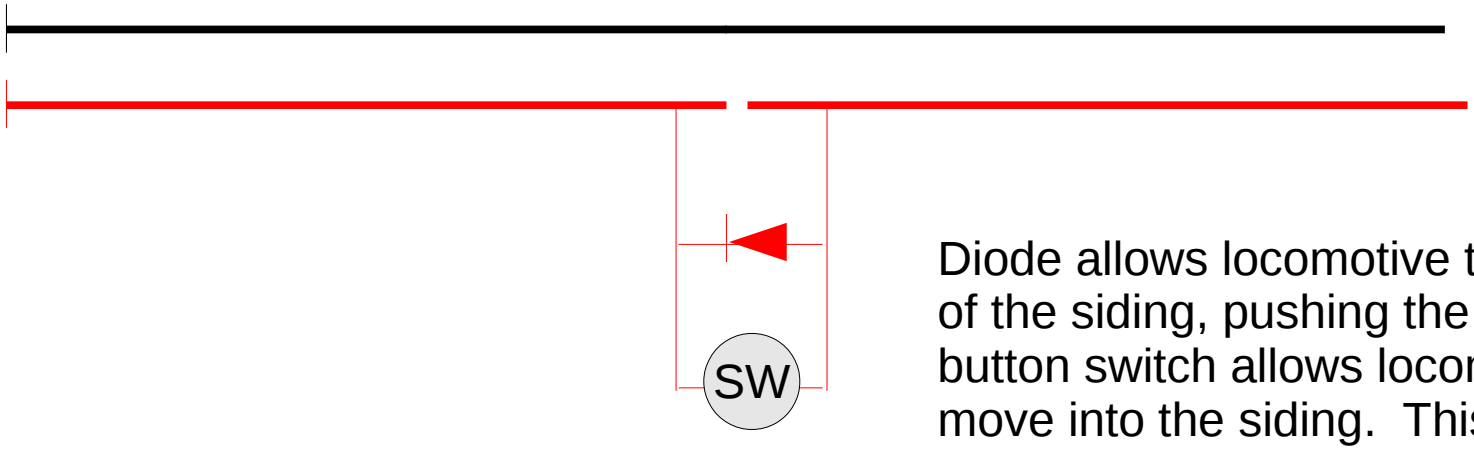
Return Loops - DCC



Off the shelf hardware is available for automatic DCC reversing. Jon's two loops each use a Digitrax AR-1.

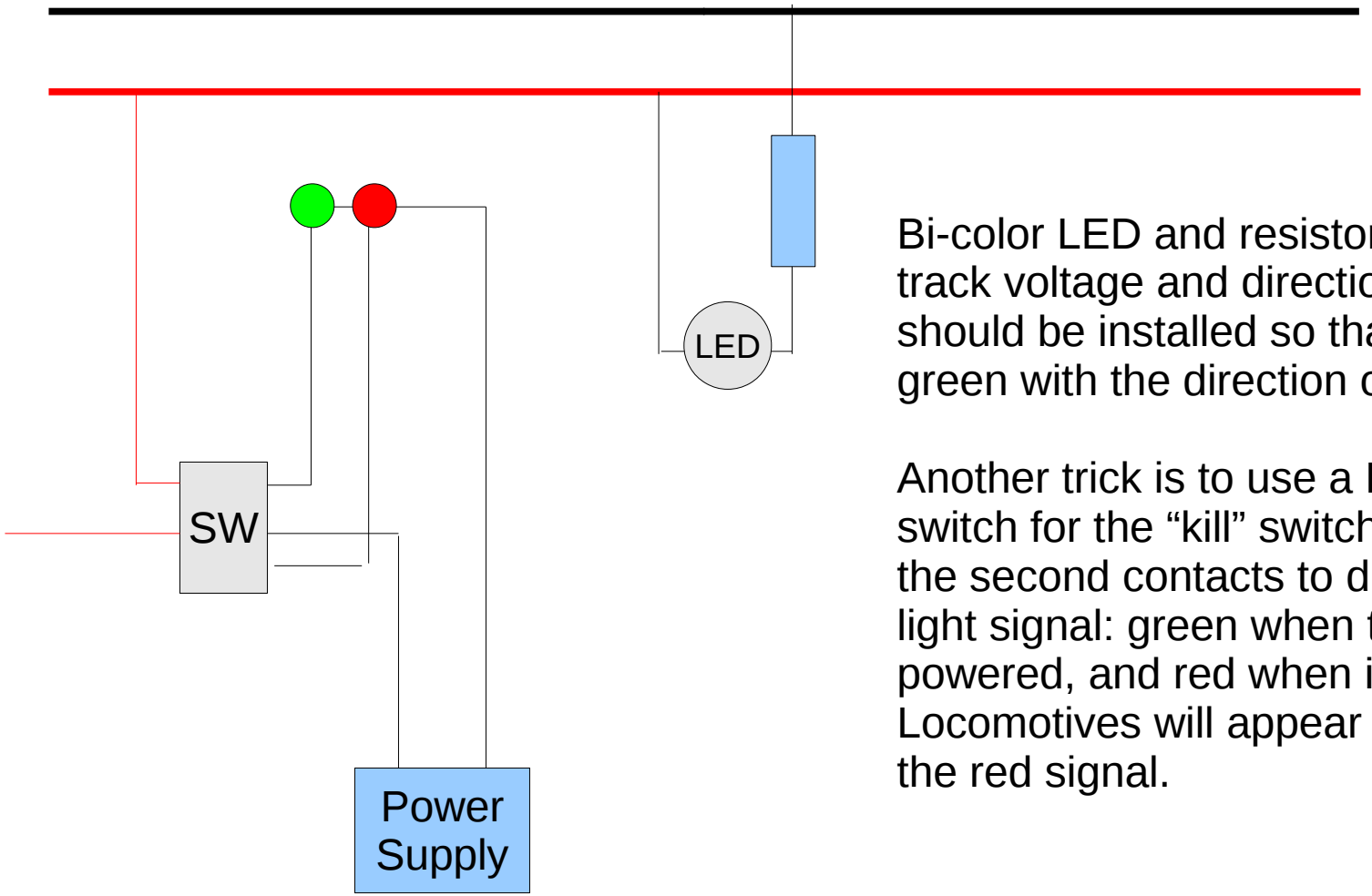
Wyes are wired in a similar manner.

Pushbutton Sidings - DC



Diode allows locomotive to move out of the siding, pushing the push-button switch allows locomotive to move into the siding. This technique was used to prevent trains from driving off the staging yard. Gaped section must be longer that train length, otherwise you can still back a train off the siding until the locomotive gets to the gap!

Signals - DC



Bi-color LED and resistor indicate track voltage and direction. Signal should be installed so that it displays green with the direction of travel.

Another trick is to use a DPDT switch for the “kill” switch, and use the second contacts to drive a two-light signal: green when the track is powered, and red when it's off. Locomotives will appear to stop at the red signal.