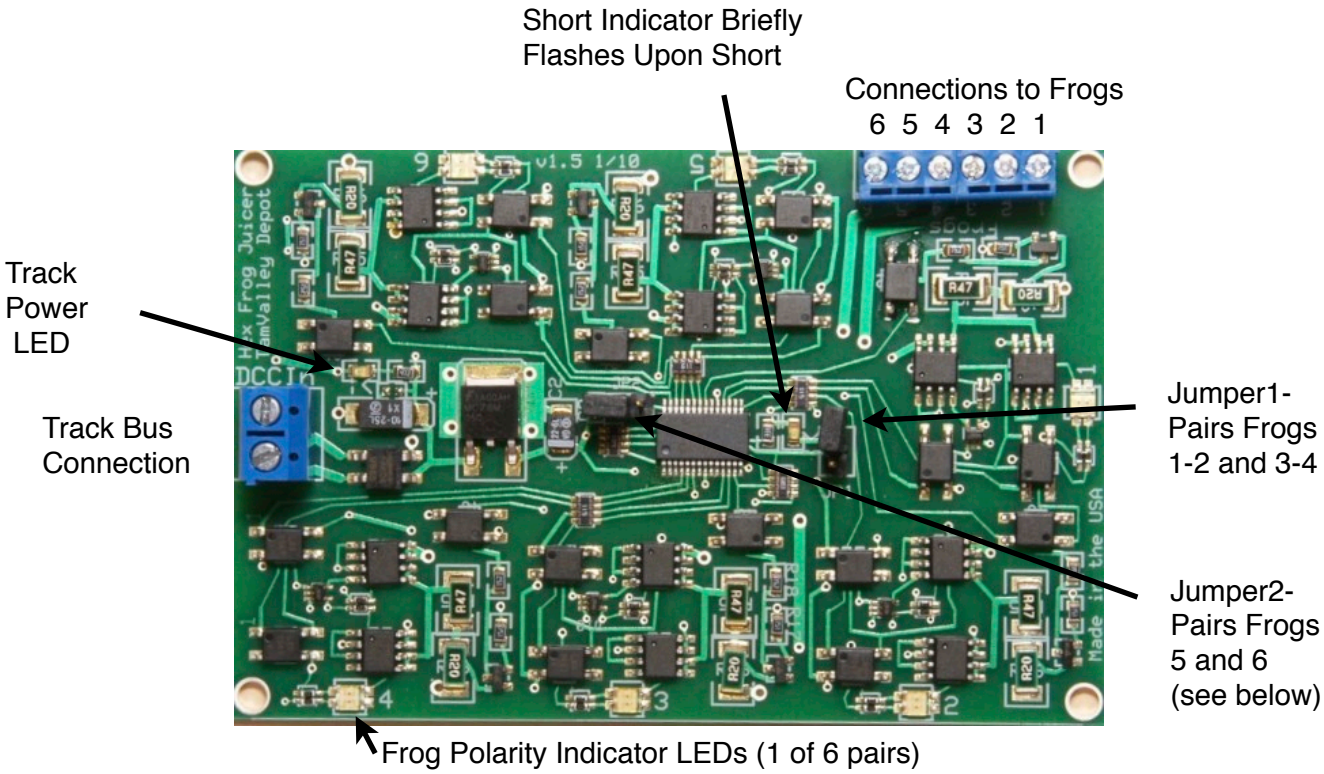
Hex Frog Juicer v1.5 - Automated Frog Control

Installation of the Hex Frog Juicer (HFJ) is simple. Place the board on a non-conducting surface (wood or wallboard). Connect the 2 pin terminal block to the track bus. It should be in the same power block as the frogs will be (but not necessarily if you are powering frogs across the layout). Connect a single wire from each frog to any one of the pins on the 6-pin terminal block - it doesn't matter in which order. You are done.

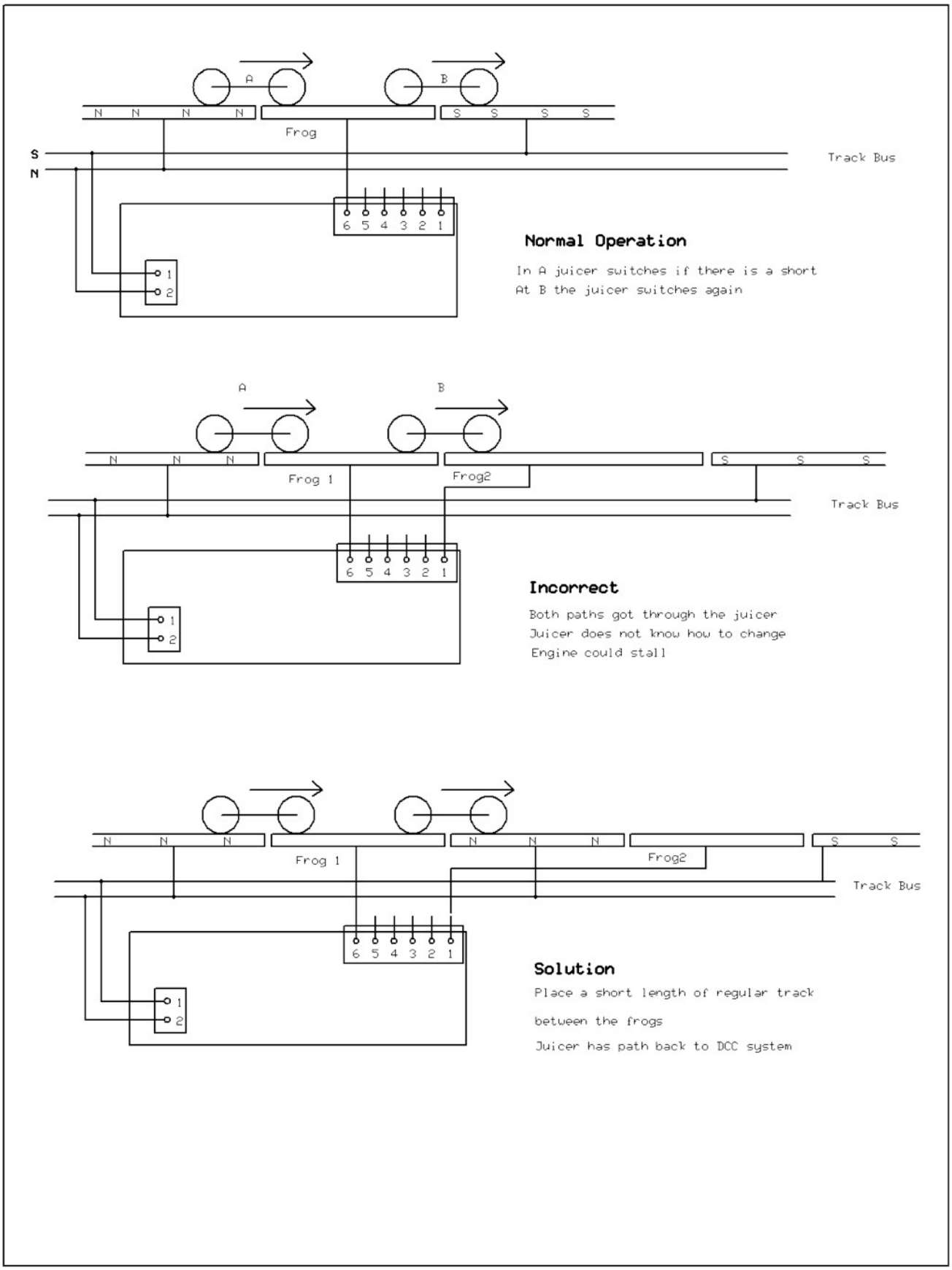


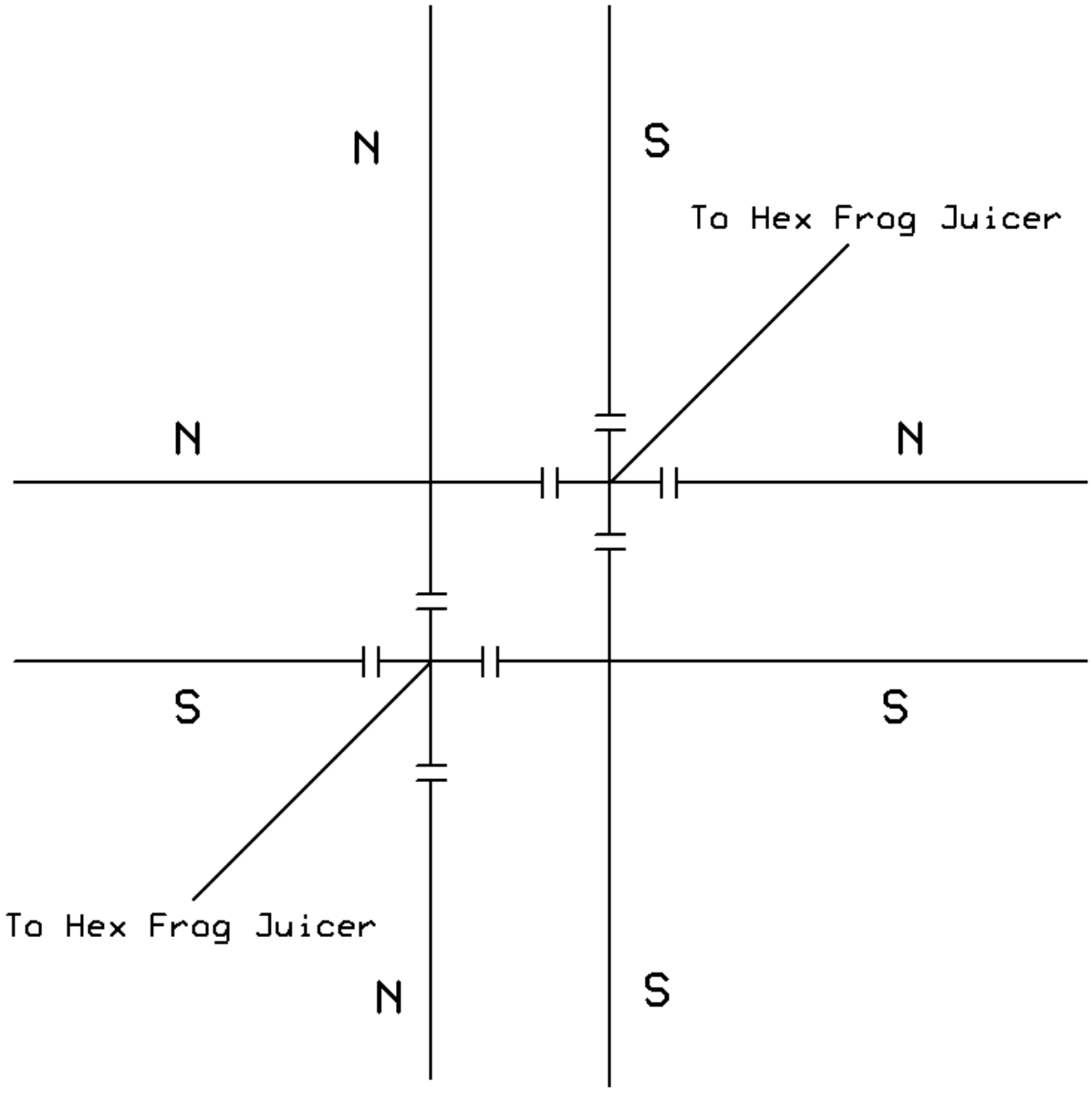
Use #22 or bigger wire on the input side of the board and between the frogs use #28-26 ga. wire if the run is under 10 feet (telephone or CAT-5 wire works well) and #24 if over 10 feet. (The small amount of resistance in the frog wires actually makes the board work better.) The track power LED indicates that the board is powered up. Note the 6 pairs of LED indicator lights around the periphery of the board. When a frog is changes polarity, the indicator lights for that circuit will switch also. The Short Indicator light will flash briefly when a train crosses a frog that needs to be switched. There should be no interruption of sound or movement when this occurs (unless the track is dirty - sorry - the HFJ can't automatically fix this problem).
There should be no resistors or lamps between the booster and the DCC input. If there are they will prevent the HFJ from switching properly. The solution is to run the wires directly to the booster.

Pairing Tracks together sections
You can pair the frogs together so that if one changes polarity the other will also. This is especially useful on a crossing. Jumper1 pairs frogs 1-2 and 3-4 together as 2 pairs (each pair is independent of the other pair) and Jumper2 pairs frogs 5-6. To use on a reversing section connect one of the pair to one side of the rails and the other to the opposite rail. This will force the board to change both rails when a short is detected on one. This is not intended for long stretches of track which may have a full consist of locomotives on it but is useful for a single O scale or 1-2 N/HOO locomotives.

Addendum

Multiple frogs in a row can present a problem if the total length of the frogs is greater than the locomotive wheelbase. The problem and its solution is illustrated below.





Crossing Wiring Diagram

A crossing requires 2 diagonal opposed frogs to be isolated and powered as shown in the diagram.

More connection diagrams at www.tamvalleydepot.com/hexfrogjuicer.html

How It Works

In the center of the board is a microcontroller (PIC16F722 for those who are curious) which controls the operation of the board. It is connected to 6 independent electronic SPDT switches and a current sensor (the big green resistors). The microprocessor polls the current sensors every 15 microseconds. The SPDT MOSFETs are capable of switching on and off within a few microseconds. When the microprocessor senses a current greater than 2 A at a given frog, it briefly turns off both MOSFETs to let the MOSFETs settle and then turns it back on in the opposite orientation (i.e. the equivalent of a break-before-make switch but much faster). The short indicator LED flashes each time a short occurs - although the flash has been stretched to make it visible, the actual short is resolved within 300 microseconds. Each Hex Frog Juicer draws just 80 mA (.08 Amp) from your DCC system - mostly to drive the LED indicators.