# Tip: The Diode Trick and s88-n Improvements
Date: 06-07-2014

Hi All,

At long last I've had some time to implement the "Diode Trick" on my layout. I first discovered this information on Friedel Weber's web site http://www.moba-tipps.de/index.html and the diode article can be found at http://www.moba-tipps.de/steuerung.html with the heading Tipp: - Der Diodentrick zum sicheren Anfahren: which translates as The diode trick on safe driving.

The reason for my interest is I have a few four wheeled locomotives that I want to run on my layout using TrainController. With computer controlled 3 rail layouts you have to isolate one rail as an occupancy sensor for feedback to the computer and the other rail remains as the Ground (Masse) power supply through the locomotive wheels. With most four wheeled locomotives there is one traction tyre on the locomotive and depending how the locomotive is placed on the track you can get poor power supply to the locomotive by only one wheel being in contact with the Ground (Masse) rail. Rotate the locomotive 180 degrees and you will have two wheels being in contact with the Ground (Masse) rail. This results in better running of the locomotive in one direction as there is more ground pick up from the two wheels.

## Diode Trick
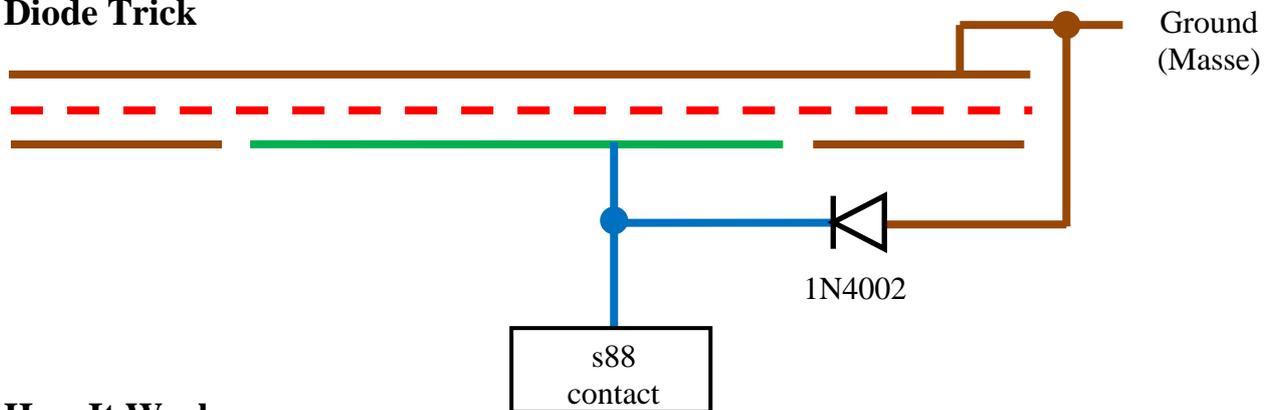


## How It Works
The occupancy sensor (green track) is isolated using Peco PL-11 nylon insulated rail joiners for k-track. For c-track the running rails are electrically isolated by cutting the metal joiners under the track (two places) and then using the standard Märklin c-track insulators.

The isolated track is wired to an s88 contact and as the train runs over the isolated track, the s88 contact is turned on with power through the wheels from the Ground (Masse) power supply. This is normal s88 track sensing and you can see that the ground pickup through the wheels is halved while in the occupancy sensor section.

When the 1N4002 power diode is added with the anode wired to the common Ground (Masse) and the cathode wired to the sensor track and the s88 contact, half wave DCC power is applied to the isolated track all the time and when there is no train present in the isolated section the s88 contact doesn't see the power so isn't switched on. When a train runs over the isolated track the s88 contact is switched on as normal. The benefit is now there is power on both rails in isolated occupancy sensor sections and this improves power pick up to the locomotive wheels.

## Simple Test
In the region of the occupancy sensor stick some thin insulating tape on the normal ground rail which is longer than the locomotive being tested. Now drive the locomotive through the sensor and you will see that the locomotive will keep running at a reduced speed but it won't stop. Another benefit is if you have dirty track in sensing areas it will help to keep the train running.

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## Diode Trick Implementation
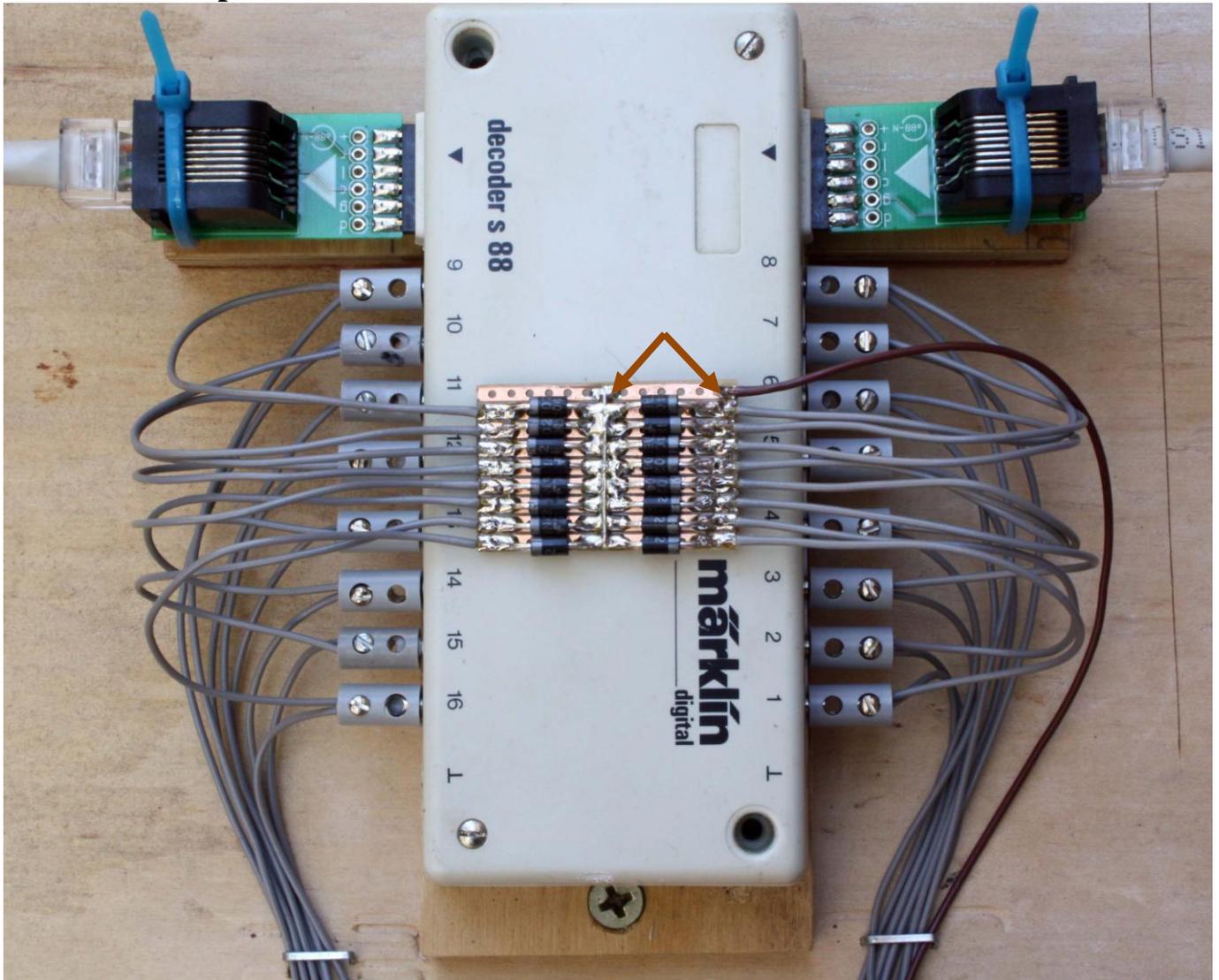


The above photo shows how I wired the 1N4002 power diodes to each individual s88 contact. The sixteen diodes are mounted on a small section of Vero board and held in place by double sided tape to the s88 decoder. The wire length from the diodes to the s88 contact is 100mm. All diode anodes are connected together then connected to the common Ground (Masse) see brown arrows.
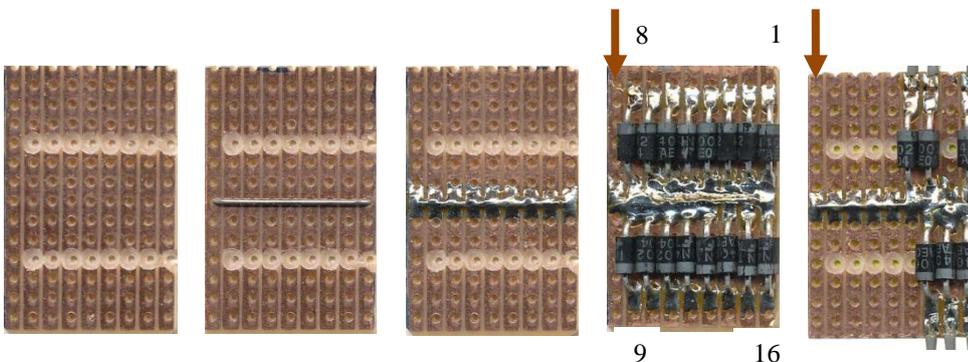


I hope the pictures to the left show the process.

The numbers show the diode layout order to match the s88 module. The last assembly shows some diodes missing as the s88 contacts are used to monitor the centre rail contacts for turntable/transfer table monitoring. The diodes should only be used for isolated rails. The process took me 3 days to complete the diode trick on my layout.

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## s88-N Improvements

The original Märklin s88 was only designed to have a maximum buss length of 6m. If you have a large layout and tried to extend the 6m length you would encounter problems with the s88 units giving false indication so reliable computer control would be compromised. The problem is the flat cable used to connect the s88 modules together are very susceptible to electrical interference as it is electrically unscreened and with the options of other manufacturers making similar units they have chosen to use the new s88-N standard which use cat5/6 data cable with RJ45 connectors.

If you have already made an investment in standard s88 modules you can buy add on connector conversion kits for the new s88-N standard shown below.
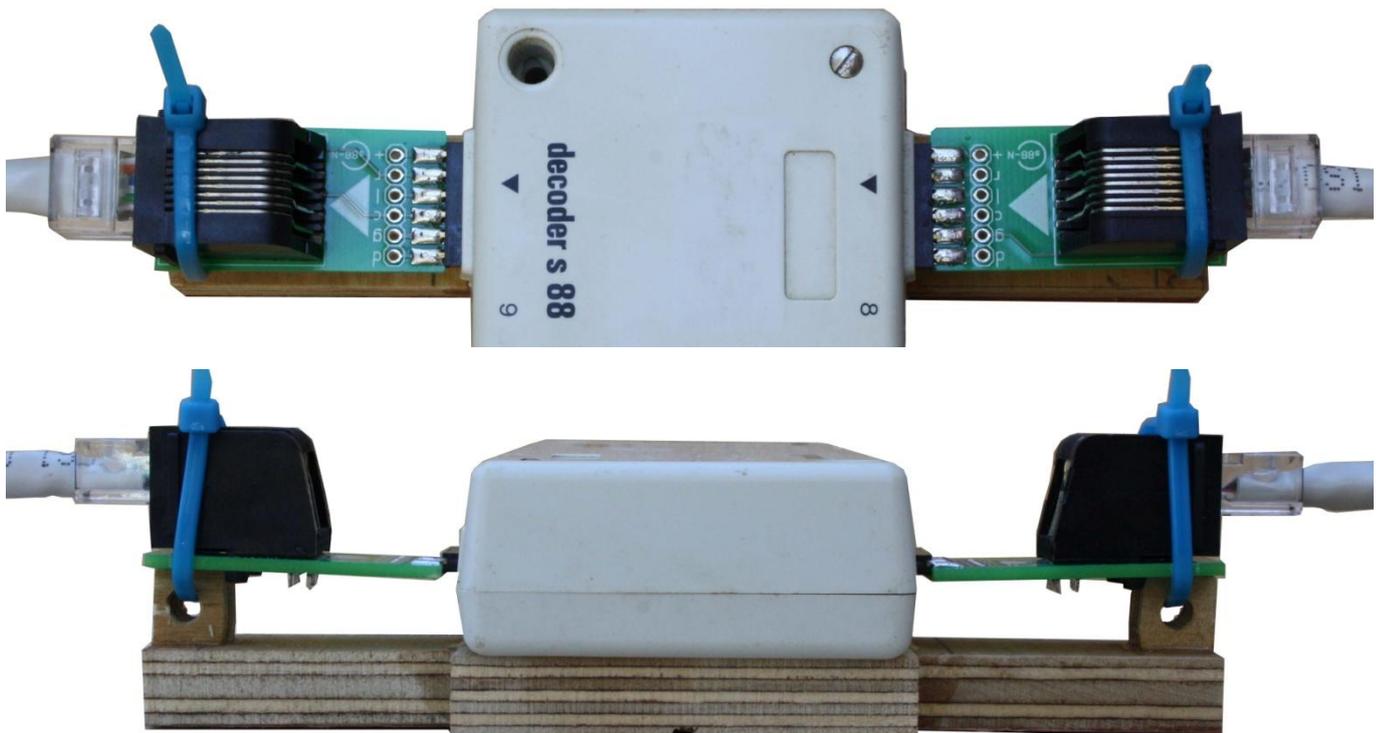


I used Huib Maaskant's design to upgrade my s88 modules. See this link where he explains how it works.
http://www.floodland.nl/aim/info_s88_kabels_en_1.htm

Other manufacturers also offer these conversion kits.

Important Note: to use these connector conversion kits you need to provide stress relief for the connector mounted on the s88 so you don't bend the connector pins on the s88 module or the conversion connector kit as the data cables can be very stiff. In the photos above you can see I have mounted the s88 module on a block with extension arms to help support the conversion connector held in place with a tie wrap. By raising the s88 module it is also easier to plug the track sensor wires into the s88 module.

Tip Opinion
From now on, only buy s88 modules that support the s88-N standard


As always enjoy your model trains.