Control Point Occupancy Detector
cpOD©

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Model Railroad Control Systems
www.modelrailroadcontrolsystems.com

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1. CPOD SYSTEM OVERVIEW

The cpOD is a DCC only, current sense block occupancy detector for model railroads. It is intended to be inserted inline with one block feeder wire and provide a signal indicating a track block has current flowing in it. The output signal is logic low and can be tied to a computer input port or current limited LED.

2. KEY FEATURES

- Two versions: cpOD with screw terminal block, cpOD-M with 5 pin Molex connector.
- All electronic components on the cpOD are rated to support up to 60A of track current.
- Surface Mount Technology (SMT)
- Small footprint, may be placed close to the detected track section
- 5 and 12 vdc (regulated) operation
- Single turn track feeder wire through toroid coil
- Sensitivity adjustment with onboard LED indication
- Vacant block hold timeout
- Pin compatible with the Chubb ODMB and MRCS ODX4 motherboards

3. COMPONENT LOCATIONS

3.1. CPOD

The standard cpOD configuration operates at 5 vdc and can be mounted in remote locations close to the detected track section. One turn of the block feeder wire is wrapped through the toroid coil. Convenient mounting holes are provided to attach the cpOD directly to bench work.

Power, ground, and the output are connected to the 3-position screw terminal block.

The sensitivity adjustment pot and Occupied LED are used to set the detector sensitivity.

The Vacant Timeout is 2.5 seconds at 5v.

Installing the pull-up resistor jumper will connect an onboard pull up resistor to the Occupied output. This would provide correct function for I/O cards needing a known state. cpOD's connected to cpNode or IOX inputs have an in chip pull-up enabled in software.

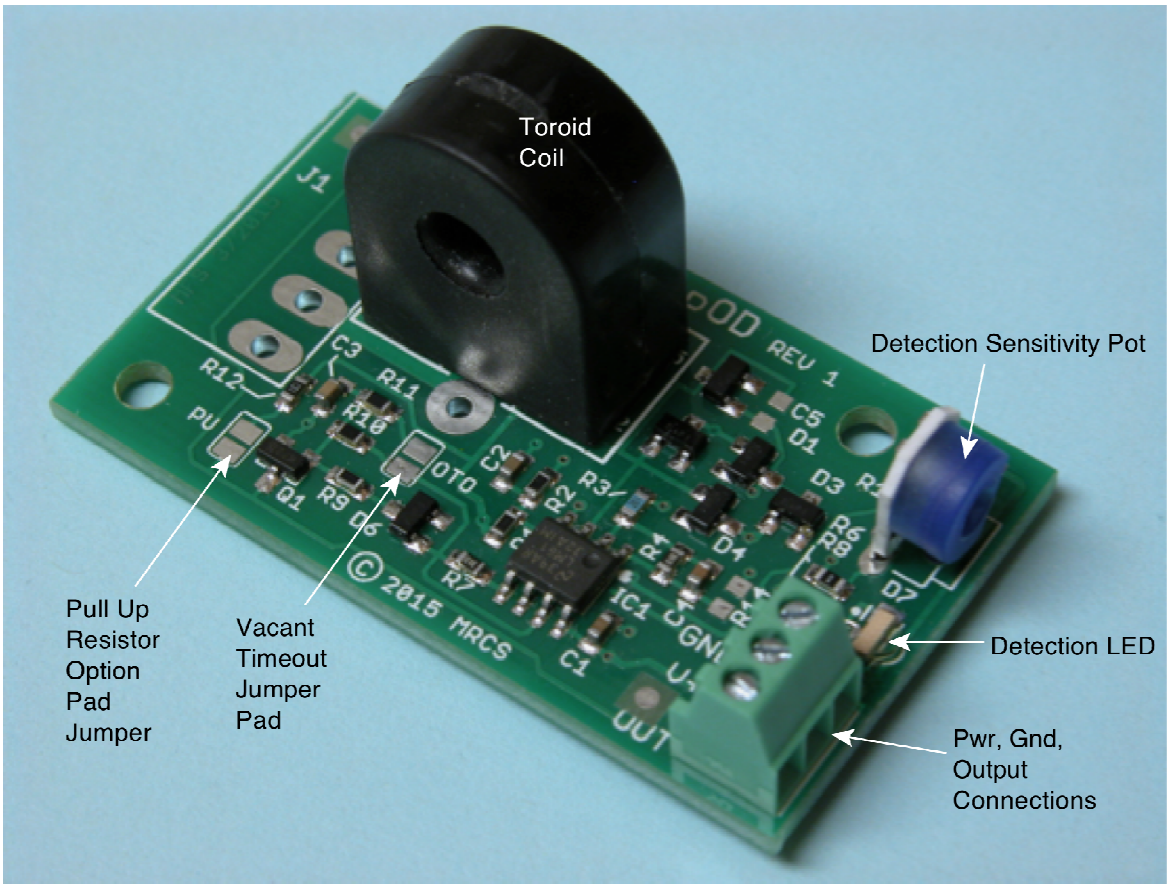

Figure 1 cpOD

3.2. CPOD-M (MOLEX CONNECTOR VERSION)

The cpOD-M configuration normally operates at 12 vdc and connects to a motherboard through the 5 pin female Molex connector. This configuration provides DCCOD pin out compatibility.

One turn of #20 wire is fed through the coil and soldered to the PCB. The block feeder wire connects to pin 2 and pin 4 of the Molex connector.

Power is connected to pin 3, ground to pin 5. The occupied signal is pin 1.

The OTO (Vacant Timeout) jumper should be installed if a 2.5 second vacant timeout is desired. Without the jumper, the timeout is 5 seconds running with 12v.

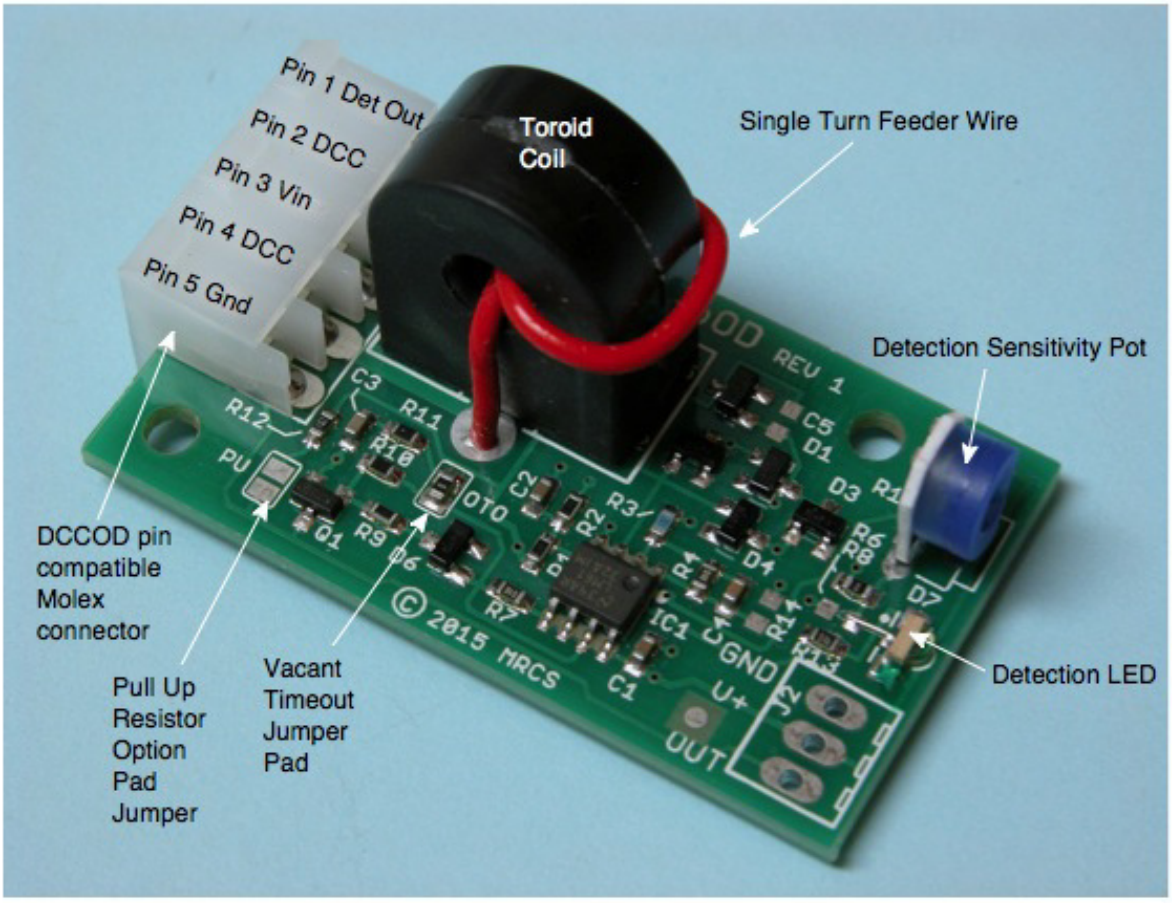

Figure 2 cpOD-M

4. INSTALLATION

4.1. cpOD

For the cpOD, wrap one turn of the block feeder wire through the toroid coil. Connect 5v and ground to the three-position screw terminal block, following the silkscreen designation. Connect the Out pin to an input pin on the cpNode or IOX. No pull-up resistor is needed.

4.2. cpOD-M

The cpOD-M is intended to be plugged into an ODX4 or ODMB motherboard. The Molex connector pin out is compatible with the DCCOD.

5. SENSITIVITY ADJUSTMENT

Occupied block sensitivity is adjusted using the onboard potentiometer and detection LED. When the block is occupied, the LED is on.

With track power on in the connected track section, and no detectable rolling stock in that section, turn the adjustment pot clockwise until the LED turns on. Then turn the adjustment pot counter-clockwise until the LED turns off plus another quarter turn.

Move a detectable piece of rolling stock into the track section, the LED should turn on immediately. Move the car out of the detected section, the LED will turn off immediately, and the Occupied output signal will stay on for the occupied timeout period, then go off.

5.1. BLOCK OCCUPIED LED BEHAVIOR

The observed behavior of the Occupancy LED is as follows. The LED monitors the state of the current sense circuit. When current is flowing in the connected block, the LED will be on. When no current is flowing, the LED is off. Intermittent wheel to track contact will cause the LED to flicker.

The occupied (or detected) signal turns on a timer, which holds the detected signal low for the vacant time out period, set by OTO jumper. Intermittent wheel to track contact occurring during the hold period will not be seen at the Detected output. Only when the occupied signal is off and the vacant timer has expired, will the Detected output go high, indicating the block is vacant.

6. OPTIONS

There are two jumper pad options on the cpOD, OTO and PU. Applying a solder bridge across the solder pads enables these options. A zero ohm SMT resistor or a small piece of bare wire can also be used.

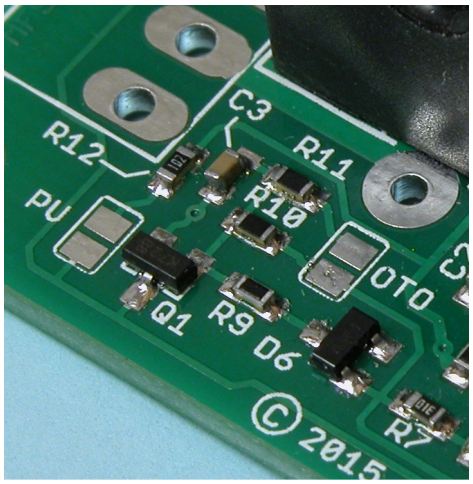

Figure 3 Options Solder Pads

6.1. OTO - OCCUPANCY TIME OUT

The detected signal will be held on for a short period of time after the track block goes vacant. The supply voltage to the cpOD determines the timeout value. The normal timeout value is 2.5 seconds. When operating the cpOD at 5 v, no jumper is required. To obtain 2.5 seconds at 12v, the OTO jumper needs to be applied. If no jumper is used at 12v, the timeout will be about 5 seconds.

	Vacant Timeout	
Supply Voltage	OTO Shorted	OTO Open
5v	1.25 Sec	2.5 Sec
12v	2.5 Sec	5 Sec

6.2. PU - DETECTED SIGNAL PULL UP

Enabling the PU jumper applies a 10k pull up resistor to the detected output line.

7. CONNECTION DIAGRAMS

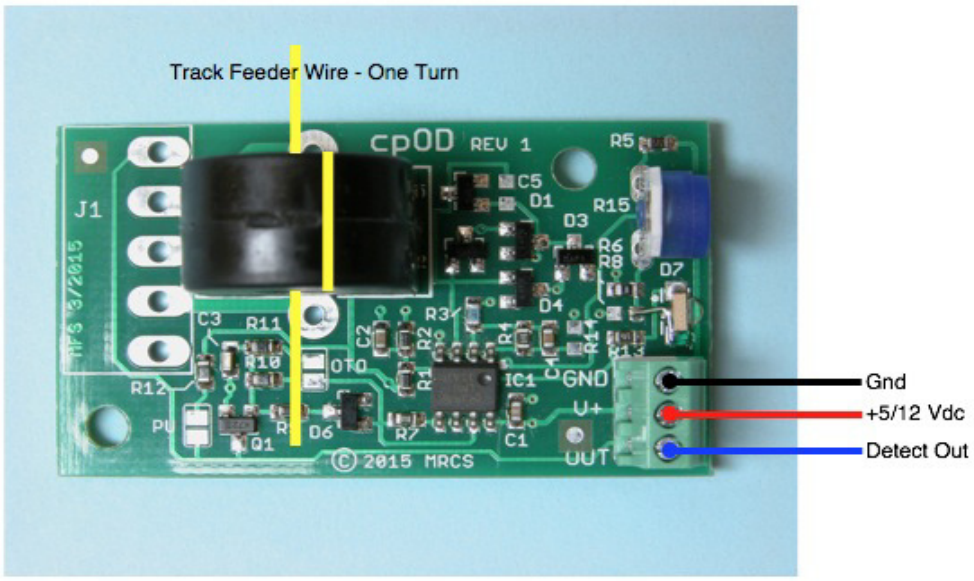

Figure 4 cpOD Connections

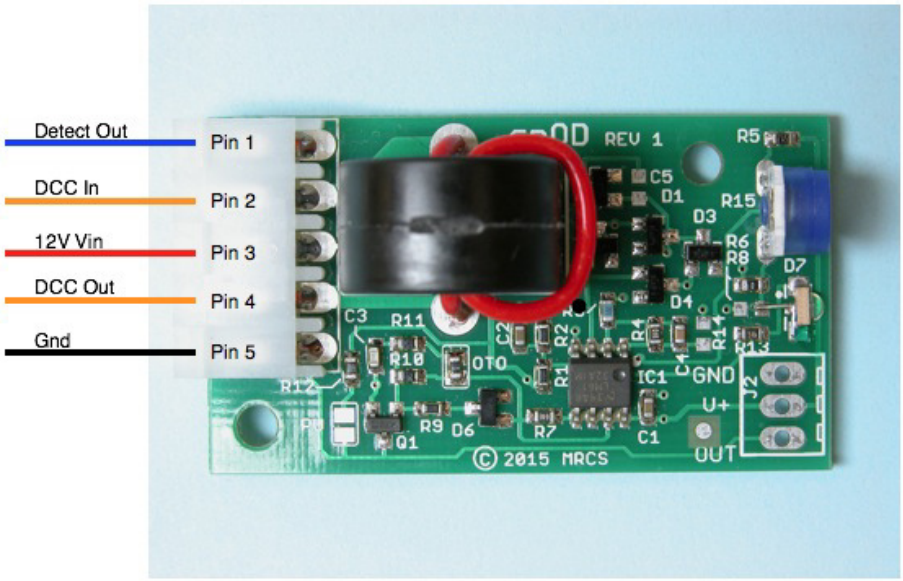

Figure 5 cpOD-M Connections