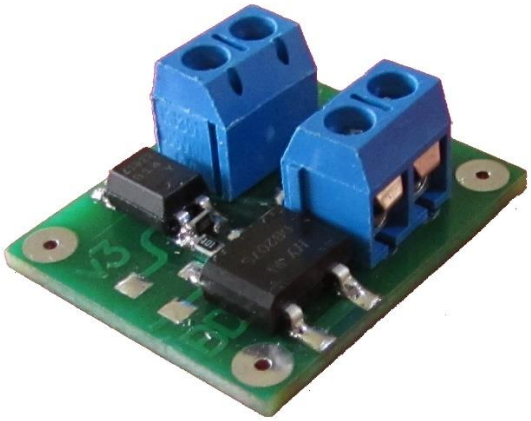
JTElectronics Block Occupancy Detector Module

Model: JTEBD1



By following and improving on well published designs of bridge rectifier-based block occupancy detectors, we bring you the JTEBD1 – a cheap and easy to use block occupancy detector. The JTEBD1 is wired in series with ONE track feeder wire to the block of track. It does not matter which feeder wire you use, and the JTEBD1 will detect the presence of a locomotive or rolling stock on that block of track due to the small increase in current drawn from your track controller. You can then use this block detection sensor signal as an input to your lighting control system, as a sensor input to the JMRI Panel Pro system, or many other uses. The JTEBD1 works very well with DCC systems. Any of our JTEDCC series of modules can pass the block occupancy information on to JMRI Panel Pro for further action...

This block detector will also work with DC track control systems due to the bi-directional optocoupler used but there are a few issues as described here:
http://www.gatewaynmra.org/1997/easy-block-detection-2-color-signals-detection-systems-circuits/
or a PDF snapshot of this web page here:
http://www.jtelectronics.co.nz/products/documents/Easy_Block_Detection_Gateway_NMRA.pdf

The JTEBD1 is cheap and easy to use for a reason – the block occupancy detection is done by sensing a voltage drop across two diodes in a bridge rectifier which means the actual voltage applied to your locomotive may be about 1.4 Volts lower than without the block detector. While some model railroad operators may say “well this voltage drop is just unacceptable” in practical situations we have noticed no great change in locomotive operation. Ideally you will want a block detector connected to ALL track section so the voltage drop will be consistent around your whole track.

Like with all block detectors, you will need rolling stock with either internal lights or axle resistors so every part of your train will draw current from the track and be detected. The JTEBD1 will detect a 10k Ohm resistor on the track and detection current is about 1.1mA. You will need to do some Google-ing on how to check and/or install “axle resistors” or “wheelset resistors” and measure the resistance as being 10k Ohm or less to ensure the rolling stock will draw over 1.1mA track current. DCC locomotives should work fine without modification as their internal DCC decoder will draw over 1.1mA of track current even when totally idle.

WHAT YOU DON'T GET…

I can only provide basic help on getting the JTEBD1 module wired up and working. I am no expert on track layouts or operating the JMRI software so if you are having issues try some google searches and you will find the solution.

Like any electronic device the JTEBD1 module may be damaged by incorrectly connecting wires to the wrong terminals. Make sure you connect the JTEBD1 in SERIES with only ONE track feeder wire and connect the track feeder wiring to ONLY the track (T) terminals on the JTEBD1 board.

PLEASE REFER TO THE WIRING DIAGRAMS IN THIS DATASHEET FOR CORRECT WIRING INFORMATION

The maximum current allowed through the track feeder terminals in either a DCC or DC system is 2 Amps. Exceeding this current (like when there is a short on this block of track) for any length of time is likely to destroy the JTEBD1 module. Ensure your DCC controller system will either turn off track power, or limit the track current to under 2 amps, under shorted track conditions.

This document is updated from time to time as new information becomes available – usually due to people asking relevant questions regarding usage or configuration. The "Document Updated" date in the bottom-right corner of each page shows what document date you have. The latest version of this datasheet document can be downloaded from http://www.jtelectronics.co.nz/products/documents/ or Google "JTEBD1"…

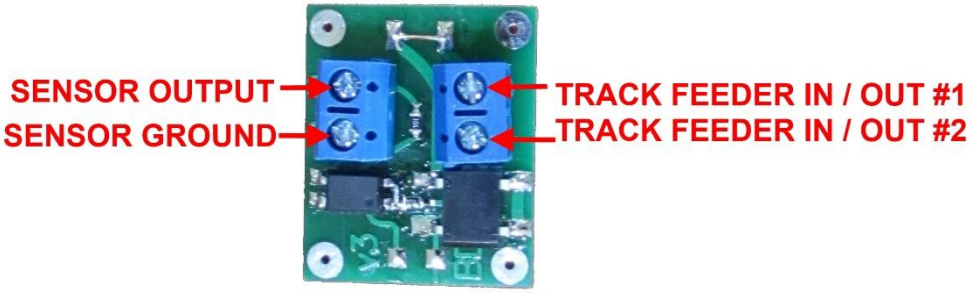
SOFTWARE and INFORMATION LINKS

Model Railroad Hobbyist	https://model-railroad-hobbyist.com/node/31270
GatewayNMRA.org	http://www.gatewaynmra.org/1997/easy-block-detection-2-color-signals-detection-systems-circuits/
DccWiki "Block Detection"	https://dccwiki.com/Block_Detection
JMRI Computer Control Software	http://jmri.org

JTEBD1 MODULE SPECIFICATIONS

Board Length:	31mm
Board Width:	25mm
Board Height:	12mm
Track Controller Type:	DC or DCC
Max Track Current:	2 Amps
Track Trigger Current:	About 1.1mA track current which corresponds to about 10k Ohm resistor across the track

JTEBD1 MODULE - TOP VIEW

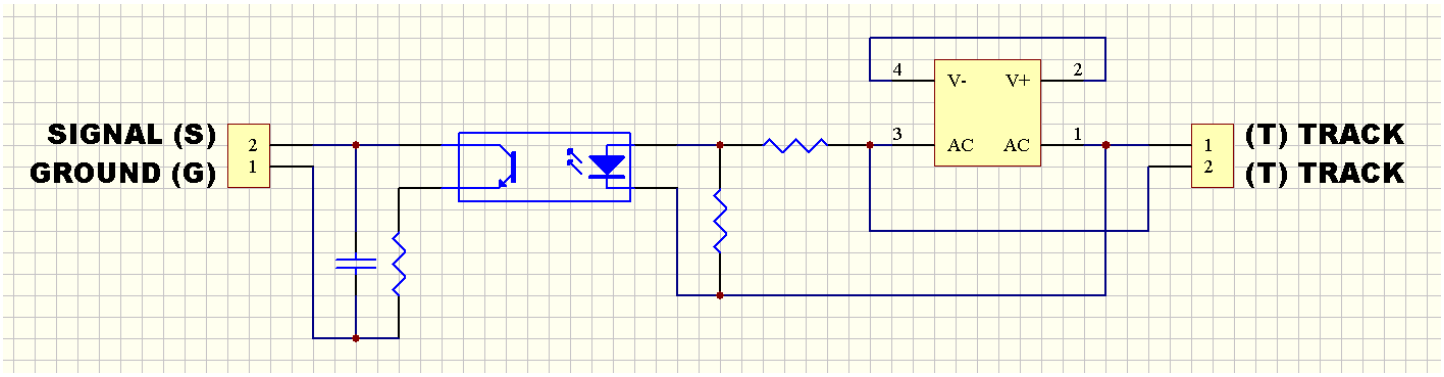


WIRING CONNECTIONS

- **TRACK FEEDER IN/OUT #1 & #2**
  Wire in series with ONE of the track power bus wires for the block of track – it does not matter which bus wire you connect in series with just keep it the same around your track layout to avoid confusion. It also does not matter which terminal is the power Input or Output, you can wire it either way around.
  Do NOT connect the JTEBD1 board to both track wires or you will destroy it!
- **SENSOR GROUND**
  Wire to the Ground connection of your control system
- **SENSOR OUTPUT**
  Wire to the Sensor Input of your control system

NOTE: The maximum current allowed through the track feeder terminals in either a DCC or DC system is 2 Amps. Exceeding this current (like when there is a short on this block of track) for any length of time is likely to destroy the JTEBD1 module. Ensure your DCC controller system will either turn off track power, or limit the track current to less than 2 amps under shorted track conditions.

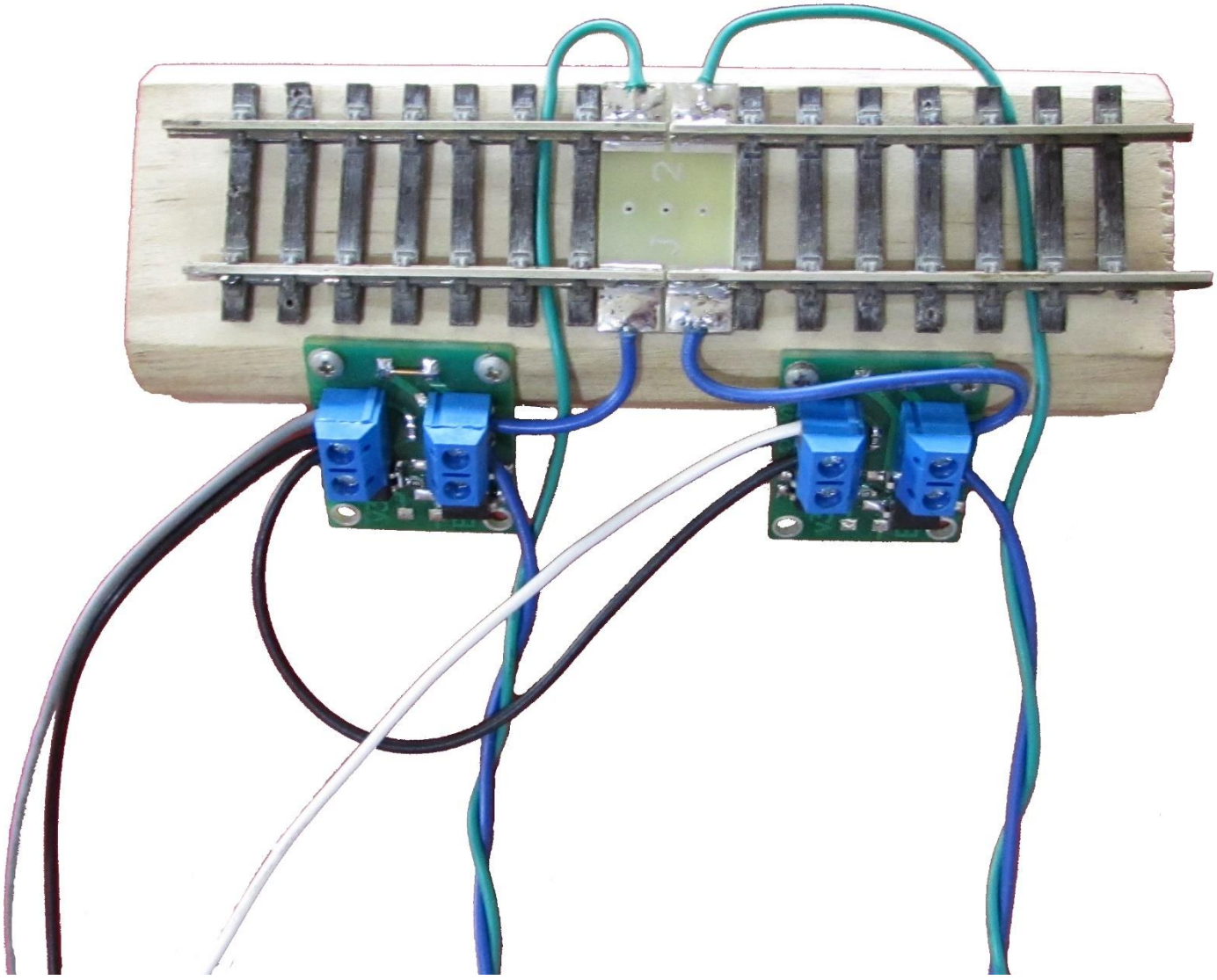
SCHEMATIC DIAGRAM



WIRING EXAMPLE #1

This wiring example shows the simplified wiring layout of two blocks with all wiring visible. On your layout you will hide the block detectors and all wiring below the track! In this example, the top track rail is common to both blocks.

- The GREEN and BLUE wires are for the track power bus feeders and come from your DCC (or DC) controller bus wires.
- The GREEN track power feeder wires are connected to the top track rail. This picture shows the top track rail cut, but it does not necessarily have to be cut.
- The BLUE track power feeder wires are wired in series with the relevant JTEBD1 board. The track MUST be cut between every block to electrically separate the blocks of track.
- The BLACK wire is connected to the "G" terminal on all JTEBD1 boards and is the common "Ground" sensor output connection. This will likely be wired to the Ground terminal of a JTEDCC controller module or wired to the ground of your own block occupancy detection control system.
- The GREY and WHITE wires are each connected to one of the JTEBD1 "S" terminals and are the block detection sensor output. These will likely be wired to the sensor input terminals of a JTEDCC controller module or wired to your own block occupancy detection control system sensor inputs.



WIRING EXAMPLE #2

This wiring example is from one of my test tracks where a locomotive on the red block of track would be detected and the block occupancy signal gets sent back to a JTEDCC-BF module which causes the locomotive to reverse direction back onto the green section of track.

- One track power wire is connected to all top track rails
- The other track power wire is connected to a block detector “T” terminal
- The bottom track rail gets track power from the other block detector “T” terminal
- The bottom track rail on ALL live track sections is connected via a block detector

The blue section of track has no power connections and if a locomotive gets here it will stop – before landing on the floor…