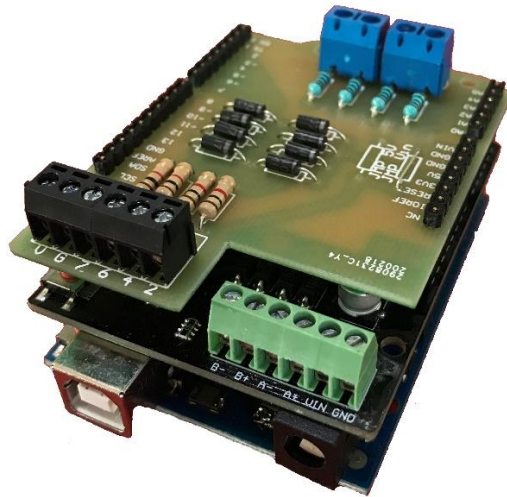


# JTElectronics DCC++ Base Station Back and Forth Controller Module

## Model: JTEDCC-BF



We have advanced our original DCC++ controller configuration to this upgraded model, the JTEDCC-BF which gives automatic back and forth (shuttle) control for up to two locomotives. Once the JTEDCC-BF module is connected to your mainline track **and you attach a sensor near each end of the track**, the DCC enabled locomotive will travel back and forth automatically under DCC control. The JTEDCC-BF can even control two DCC enabled locomotives on separate back and forth tracks!

The JTEDCC-BF module comprises of an Arduino based microcontroller board with updated firmware to add automated back and forth functionality, a motor driver board to power the DCC tracks, and the JTEDCC-BF sensor connection board. You will need to provide whatever sensors you want to use. The JTEDCC-BF module will operate as a back and forth DCC controller totally standalone or can be connected to your computer via a USB cable to configure the back and forth locomotive settings eg. locomotive DCC address, throttle speed, and random delay range at each end of the track.

If the JTEDCC-BF module is connected to a power supply, your track(s), and your computer you can **use the JMRI software program your DCC Decoders (CV's) and to run trains on the track** like a normal layout. Also, you can setup the computer as a JMRI network server and control your DCC layout over WiFi from a phone or tablet.

Since the JTEDCC-BF controller also incorporates **all of the original fully functional JTEDCC Base Station controller**, you can still use it to program CV values into the locomotive DCC decoders on a separate programming track! You can also use this JTEDCC-BF Base Station controller with the free JMRI DecoderPro software and write automation scripts to control your own layouts and even very complex control of all DCC devices eg. locomotives, turnouts, sensors, outputs and other DCC accessories! You can use Google and/or YouTube for instructions on how to do this... To disable the back and forth functionality all you need to do is delete the DCC basestation configuration for that particular locomotive DCC address and its associated sensors.

All documentation and software for both the original DccPlusPlus controller and the JMRI software is available online for free. You are paying for the hardware boards and their configuration, so the system is ready to use.

The JTEDCC-BF module is supplied with a 300mm USB cable for connecting to your computer if required. You will need to provide your own DC power supply to the "Motor Driver" board. Beware that a lot of Arduino boards similar to this one

will fail if you apply more than 15 volts due to component substitution. The JTEDCC module has been modified to work on up to 20VDC (absolute maximum) input as most small-scale train layouts will work on a DCC supply voltage of 12 or 15 volts DC. A 15VDC 5Amp Toshiba laptop charger will work well as a power supply for “N” scale locomotives, wired to the VIN and GND terminals on the Motor Driver board 6-Way terminal strip. You could also use a 12V 1Amp DC power adapter from an old internet modem to get you going.

The DccPlusPlus firmware in the Arduino board is continually monitoring track current of both tracks and will turn off power to both tracks when a threshold level is reached. This is to prevent a short on the track from destroying the Motor Driver board, or your power supply. We have increased the current limit threshold to approximately 1600mA which should be plenty to run a couple of N-Scale locos with sound... The JMRI software will also give an indication of the mainline track current and the current limit trip threshold will be around a reading of “59%” which corresponds to approximately 1600mA.

## **WHAT YOU DON'T GET...**

I can only provide very basic help on getting the JTEDCC-BF 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.

**This JTEDCC-BF module is a DIY solution for DCC control and as such is not recommended for beginners in DCC control or track wiring.**

**This JTEDCC-BF module is supplied as preassembled Arduino compatible shields like in the photos. It will be damaged by shorting out the pins, connections, or components, or by any of the shields (boards) coming into unusual contact with external voltages or metal/conductive objects.**

**The JTEDCC-BF module will also be damaged by incorrectly connecting power to the wrong terminals of the motor driver shield. Make sure you connect your DC power supply to the VIN and GND terminals ONLY and with the correct polarity. Make sure you connect ONLY your tracks to the A-, A+ and B-, B+ terminals and that no other power supply or train controller is connected to the tracks.**

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

**Like most electronic equipment the JTEDCC-BF circuit boards contain static sensitive devices and may be damaged by high voltages present during electrostatic discharge. Avoid electrostatic discharge by handling the JTEDCC module as little as possible. To prevent damage, we suggest you put the JTEDCC module into an enclosure or locate it somewhere protected from contact with random external objects...**

## SOFTWARE LINKS

JMRI Computer Control Software

<http://jmri.org>

DccPlusPlus BaseStation

<https://github.com/DccPlusPlus/BaseStation/wiki/What-is-DCC--Plus-Plus>

Wireless Throttles with JMRI

<http://www.nmra.org.au/Clinics/WiThrottle%20Clinic%202012%20handout.pdf>

General DCC Information

<https://dccwiki.com/>

## MODULE DIMENSIONS (APPROX)

LENGTH 77mm

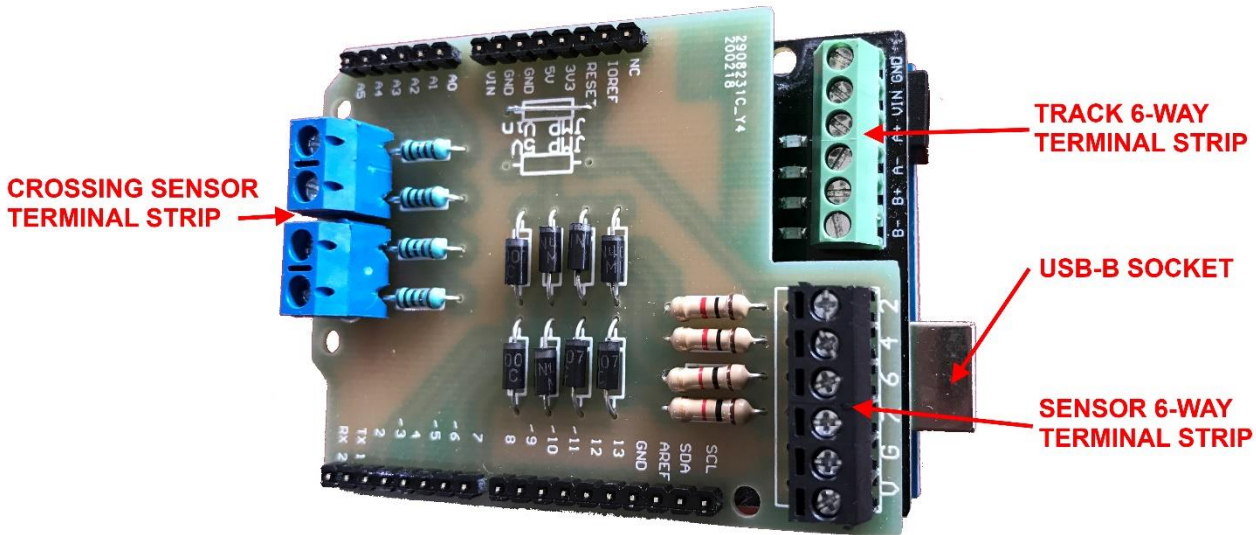
WIDTH 53mm

HEIGHT 36mm

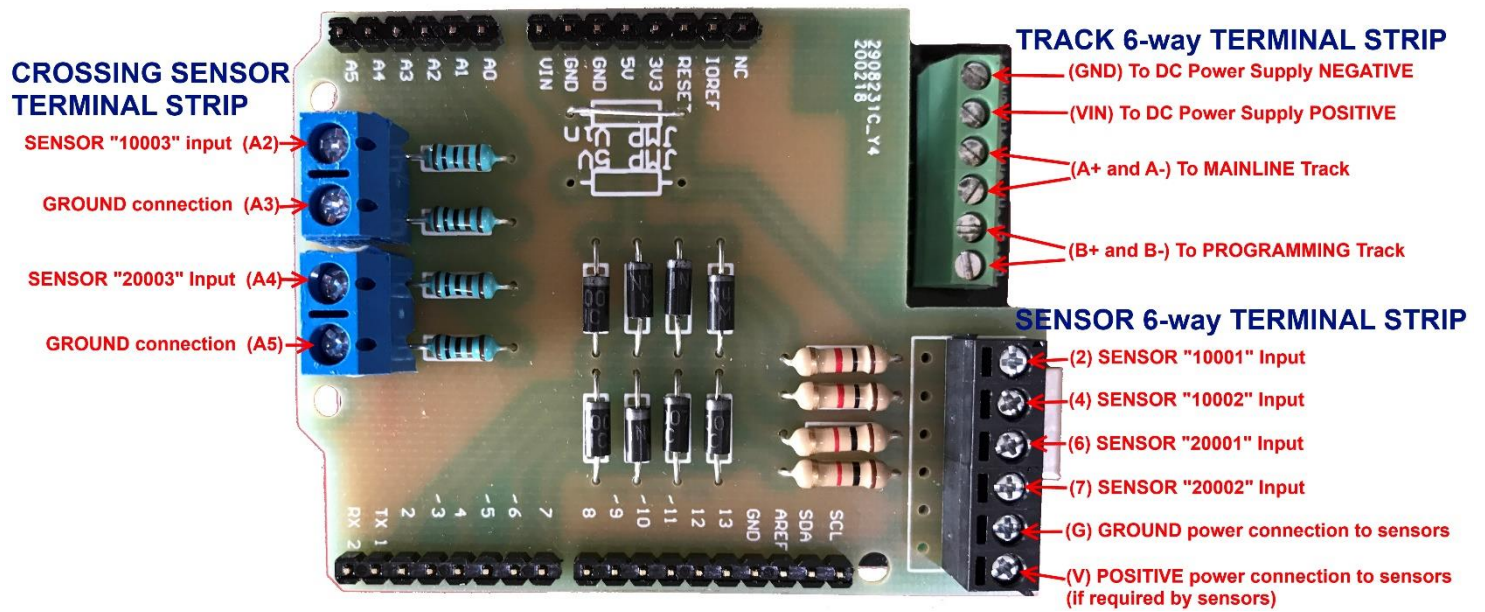
This document is updated from time to time as new information becomes available – usually due to people asking relevant questions regarding usage or configuration. The “Document Updated” date in the bottom-right corner of each page shows what document date you have. The latest version of this datasheet document can be downloaded from

<http://www.jtelectronics.co.nz/products/documents/> or Google “JTEDCC-BF”...

## JTEDCC-BF MODULE - TOP VIEW



## WIRING CONNECTIONS



## TRACK 6-WAY TERMINAL STRIP WIRING CONNECTIONS

B-	Programming Track	
B+	Programming Track	
A-	Mainline Track	
A+	Mainline Track	
VIN	Power Input Positive Connection	12 to 20VDC
GND	Power Input Ground/Negative Connection	

**NOTE:** 20VDC is the maximum the JTEDCC board will handle. Your system will use a lower voltage. Please check the "Power Supplies" section below for power supply voltage recommendations!!

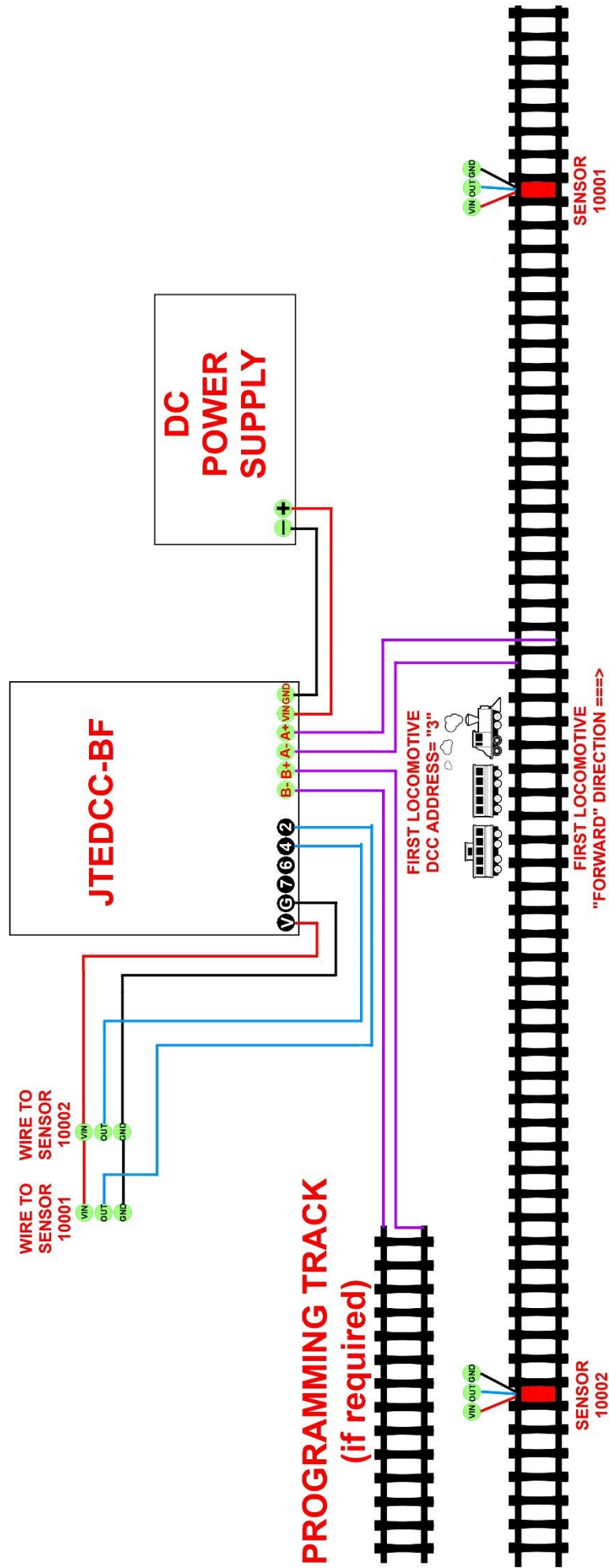
## SENSOR 6-WAY TERMINAL STRIP WIRING CONNECTIONS

V	Power output to sensors. This "V" terminal is connected internally to the "Vin" terminal of the "Track 6-way Terminal Strip" and could be used to supply DC power to your sensors if required
G	Ground output to sensors. This "G" terminal is connected internally to the "GND" terminal of the "Track 6-way Terminal Strip" and is used to supply a "ground" connection to your sensors
7	Sensor "20002" input (if running a second locomotive on a second track)
6	Sensor "20001" input (if running a second locomotive on a second track)
4	Sensor "10002" input
2	Sensor "10001" input

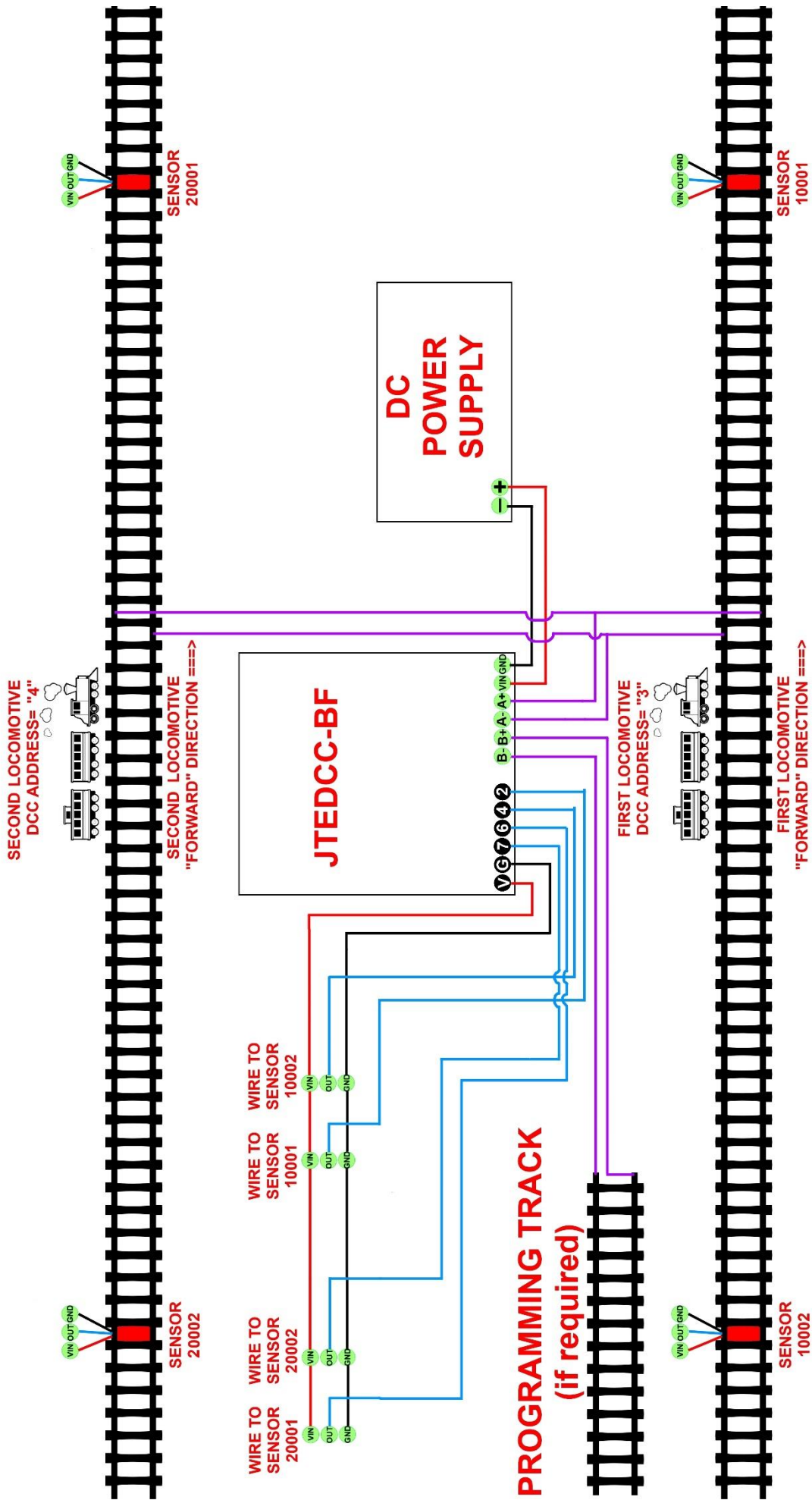
## CROSSING SENSOR TERMINAL STRIP WIRING CONNECTIONS

A2	Sensor "10003" input for first locomotive Crossing Sensor (if used)
A3	GROUND connection from sensor 10003
A4	Sensor "20003" input for second locomotive Crossing Sensor (if used)
A5	GROUND connection from sensor 20003

# WIRING DIAGRAM FOR SINGLE LOCOMOTIVE



# WIRING DIAGRAM FOR TWO LOCOMOTIVES



## SENSORS

You will need TWO sensors when running a single locomotive, and FOUR sensors when running two locomotives. More sensors will be required if you use “Crossing Detection”. The sensors are NOT supplied so you will need to provide these sensors as there are many options...

The sensors can be an electronic infra-red type, such as the IRLD1 locomotive detector mounted below the track, or maybe you could use reed switches mounted just below the track and magnets attached to the bottom of the locomotive and the last rolling stock. The sensor must send out a low resistance ground / 0 volts signal when activated and this will be detected by the JTEDCC-BF controller module.

The sensors are placed near each end of the track as indicated in the wiring diagrams. When the locomotive (and/or rolling stock) activates the sensor, the JTEDCC-BF will send out the appropriate DCC command for the locomotive to stop, wait, and change direction. The locomotive may take a while to slow down and stop before it changes direction (maybe because of the DCC decoder’s inertia or deceleration setting) so you may have to place the sensors some further distance from the ends of the track to allow the locomotive to decelerate and stop. There is also a programmable random delay between the time the locomotive is sent the STOP command and sent the CHANGE DIRECTION command at the ends of the track.

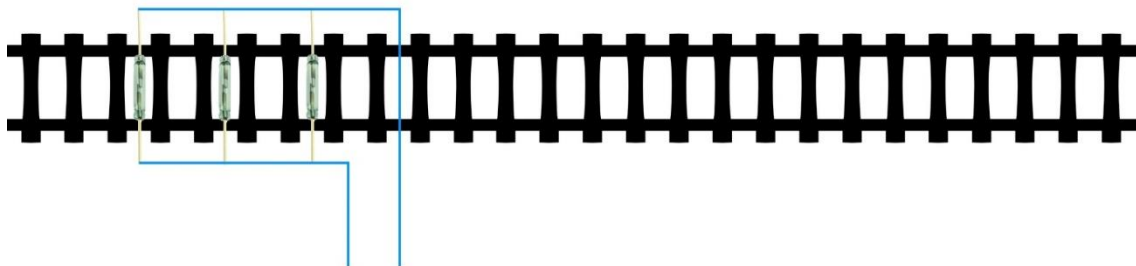
Correct sensor operation is critical to the back and forth operation. The sensors must operate, which is send out a ground signal, for at least 300ms to be detected correctly. If you have a very short locomotive (like a LNER 3972 with no tender or rolling stock) at full speed it may pass by your sensor in a tiny fraction of a second and not be detected – in this case the locomotive will carry on and run off the end of the track.

**Note: If you are powering the sensors from another power supply, make sure you connect the negative/ground terminal of the power supply to the ground (G) terminal of the JTEDCC-BF controller, which will complete the electrical circuit to the sensor inputs.**

Sensor reliability issues may be mitigated by the following:

1. If you are using an electronic sensor, eg. the IRLD1, adjust the output pulse delay so the output pulse is extended to about 1 second. This will ensure the longer sensor pulse is detected reliably
2. If your electronic sensor output is not adjustable, try adding rolling stock to the locomotive. A longer target will likely give a longer detection pulse from the electronic sensor
3. If you are using reed switches as sensors, add more magnets to the underside of the locomotive (and last rolling stock for reverse direction!) to give more and/or longer detection pulses
4. Add more sensors in parallel, maybe placed a couple of centimetres apart. This will have the effect of sending a more/longer sensor pulses making sensor pulse detection much more likely

### **3x REED SWITCH SENSORS WIRED IN PARALLEL**



**Make sure you follow the wiring diagrams in this datasheet carefully as it is important to connect sensors to the correct sensor inputs on the JTEDCC-BF controller module!**

## Programming Decoder CV's

You can use the JTEDCC controller and the free JMRI Decoder Pro software to easily program the CV values in your decoder. It is very simple to use – just open your locomotive in the roster, select the tab containing the required CV settings, adjust the setting and click the “Write changes on sheet” button

Below is a screenshot of the “Basic” tab where you can set the decoder’s DCC address (either Long or Short address)

Roster Entry Basic Motor Basic Speed Control Speed Table Function Map Lights Analog Controls Consist Advanced Sound Sound Levels CVs

Short (one byte) address  
 Long (two byte) address

Active Address:  
3

Primary Address 3  
Extended Address 3972  
Address Format Short (one byte) address ▾

Locomotive Direction normal ▾  
Speed Steps 28/128 speed step format(recommended) ▾  
Power Source Conversion NMRA Digital only ▾

Manufacturer ID: 48  
Decoder Version: 131  
Decoder sound ID: 0

Read changes on sheet Write changes on sheet Read full sheet Write full sheet

Read changes on all sheets Write changes on all sheets Read all sheets Write all sheets

Below is a screenshot of the “Motor” tab settings for this particular model of decoder

Roster Entry Basic Motor Basic Speed Control Speed Table Function Map Lights Analog Controls Consist Advanced Sound Sound Levels CVs

Acceleration Rate 5  
Deceleration Rate 5

Back EMF Cutoff 128

Motor Algorithm 1 ▾  
P(1) adjustment 50  
I(1) adjustment 50  
P2 adjustment 215  
I2 adjustment 129

Read changes on sheet Write changes on sheet Read full sheet Write full sheet

Read changes on all sheets Write changes on all sheets Read all sheets Write all sheets



The CV's tab will show you the actual CV numbers read from the decoder:

CV	Value (Deci...	State	Read	Write	Compare
1	3	From file	Read	Write	Comp...
3	5	From file	Read	Write	Comp...
4	5	From file	Read	Write	Comp...
7	131	From file	Read	Write	Comp...
8	48	From file	Read	Write	Comp...
10	128	From file	Read	Write	Comp...
17	207	From file	Read	Write	Comp...
18	132	From file	Read	Write	Comp...
29	2	From file	Read	Write	Comp...
150	1	From file	Read	Write	Comp...
151	50	From file	Read	Write	Comp...
152	50	From file	Read	Write	Comp...
153	215	From file	Read	Write	Comp...
154	129	From file	Read	Write	Comp...

Read changes on sheet	Write changes on sheet	Compare changes on sheet	Read full sheet	Write full sheet	Compare full sheet
Read changes on all sheets		Write changes on all sheets		Write all sheets	

## POWER SUPPLY

Being a DIY controller solution, there's many possibilities to use an old DC power supply you have.

Some information on DCC power requirements is here: [https://dccwiki.com/Power\\_supply](https://dccwiki.com/Power_supply) which recommends a maximum power supply voltage of 15V for HO scale and 12V for N scale.

**NOTE: You must power the JTEDCC-BF module using the VIN and GND terminals on the "Track 6-way Terminal Strip". You should not use the DC power socket (beside the USB socket) to supply power. You will need to cut the plug off the power supplies shown below, use a multimeter to determine exactly what wire is Positive and what wire is Negative, and connect the wires to the appropriate VIN and GND terminals on the "Track 6-way Terminal Strip".**

You can try hooking up a 12V DC 1Amp power supply from an old internet modem (like in the picture to the right) to get you started with running a single locomotive. This type of power supply should be fine to run a HO or N scale locomotive.



For HO scale use I have seen good results with using an old Toshiba laptop charger like in the picture to the right, and these are usually rated for 15V DC at 5Amps. You will need to carefully check the label to make sure it's rated at 15V DC as **some laptop chargers are 18V or 19V DC and this will be too high! ie. Will damage the DCC Decoder and/or motor in the locomotive!**



Jaycar sell a 15V DC 2Amp power supply (Cat. No MP-3492) which will also be suitable for a couple of HO scale locomotives with sound but at \$36.90 it's a bit pricey...

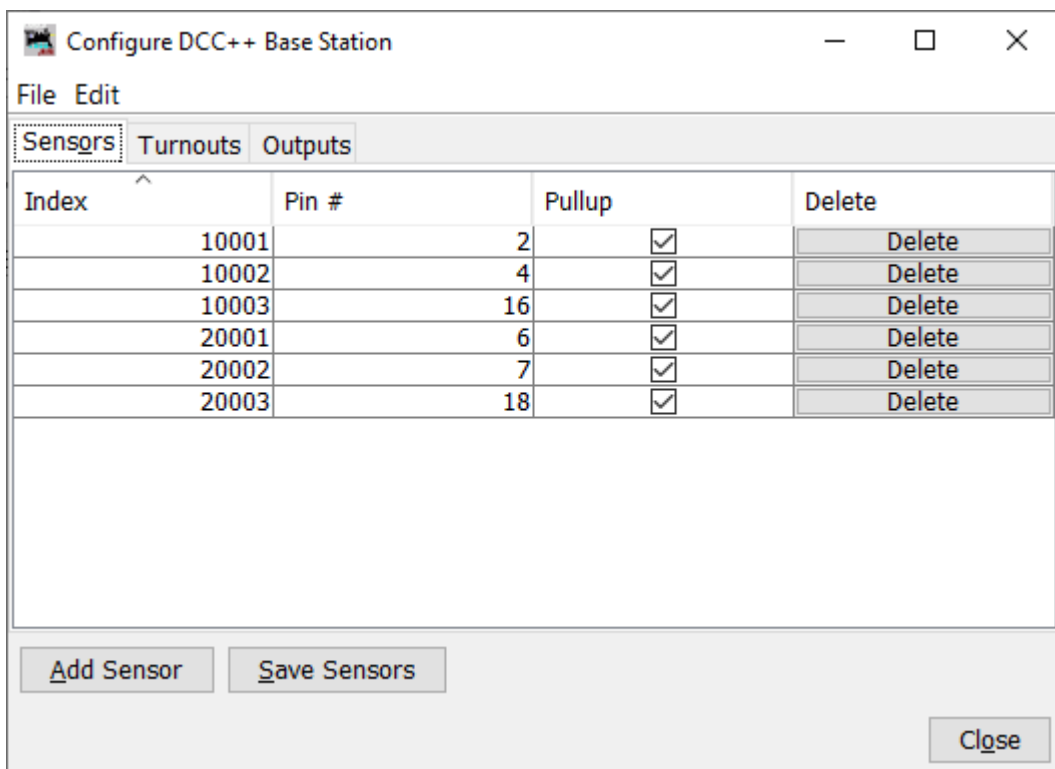


## JTEDCC-BF CONFIGURATION

1. Configuration is done using JMRI DecoderPro software which you can download from [www.jmri.org/download](http://www.jmri.org/download) and install onto your computer. Since it's a Java application it will work on Windows, Mac and Linux computers!
2. Before you get too carried away reconfiguring settings, make sure the back and forth system operates as expected.
  - a. The default DCC address for the first locomotive is "3"
  - b. The default DCC address for the second locomotive is "4"
  - c. Below are pictures of the default settings programmed into the JTEDCC-BF module so if you mess something up, you can reprogram it back to these default settings
3. Plug the JTEDCC-BF module into a USB port on your computer
4. Start the JMRI DecoderPro software, and initially configure the "System Manufacturer" as "DCC++", the "System Connection" as "DCC++ Serial Port", and select the required serial port so that DecoderPro will communicate with the JTEDCC-BF module. **Don't adjust any other settings in DecoderPro as the defaults should work OK.**
5. Click on menu **DCC++**
6. Select menu option **Configure Base Station**
7. You will get a list of configured Sensors as in the picture below and there will be eight sensors pre-configured

### **DON'T CHANGE ANY OF THE SENSORS SETTINGS.**

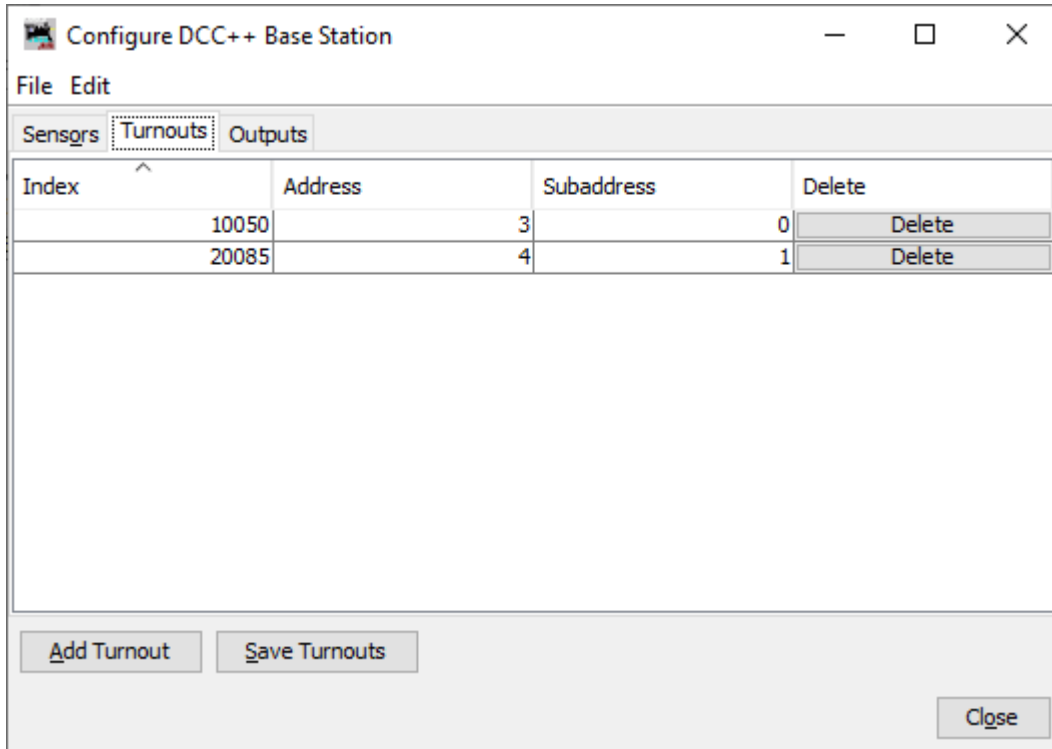
### **THE SENSORS WILL NOT WORK PROPERLY IF YOU CHANGE THESE SETTINGS**



8. The sensors with index **10001** to **10003** are for the “first” locomotive on the track
  - a. The sensor with index 10001 is used to command the first locomotive to go backward
  - b. The sensor with index 10002 is used to command the first locomotive to go forward
  - c. The sensor with index 10003 & 10004 are used to command the first locomotive to temporarily “stop”.  
See the Crossing Detection section later in this document.
  
9. The sensors with index **20001** to **20003** are for the “second” locomotive on the track
  - a. The sensor with index 20001 is to command the second locomotive to go backward
  - b. The sensor with index 20002 is to command the second locomotive to go forward
  - c. The sensor with index 20003 & 20004 are used to command the second locomotive to temporarily “stop”.  
See the Crossing Detection section later in this document.
  
10. The Pin# setting is where the sensor is eventually connected to the Arduino control board
11. The PullUp setting was designed to turn on the Arduino internal pull-up resistor. This setting is currently ignored as the DCC++ controller firmware always enables all pull-up resistors.

## CONFIGURING LOCOMOTIVE CONTROL

12. Click on the Turnouts tab at the top and you will see a list of configured turnouts as in the picture below. The settings in this Turnouts screen are used to control the locomotives – yes its weird but true. These “turnout” settings allow you to modify the locomotive address and speed configuration as shown below, and write this configuration back to the JTEDCC-BF controller



13. Turnout index 10xxx is used to control the first locomotive on the track
14. Turnout index 20xxx is used to control the second locomotive on the track
15. The last three digits of the Index are used to set the throttle/speed of the locomotive as a percentage of the maximum throttle.
16. In the picture above, the first locomotive control entry has Index “10 050”. The settings are explained as below:
- It has “10” as the first two digits meaning it will control the first locomotive
  - It has “050” as the last three digits of the index so the first locomotive will have its throttle set to 50%. You can set the throttle speed between 0% and 100% but it must be entered as three digits padded with zeros at the beginning as required (The index setting must always be 5 digits in total).
  - The Address field has the value of “3” so it will control the locomotive with DCC decoder address “3”
  - The SubAddress field has a value of “0” so the delay between Stopping and Starting the locomotive at the ends of the track will be between 1 and 10 seconds.
- The random range of the shuttle delay is controlled as in the following table:
- SubAddress Value 0      Delay Random 1 to 10 seconds
  - SubAddress Value 1      Delay Random 10 to 20 seconds
  - SubAddress Value 2      Delay Random 20 to 30 seconds
  - SubAddress Value 3      Delay Random 30 to 40 seconds
17. The second locomotive control entry has Index “20 085”. The settings are explained as below:
- It has “20” as the first two digits meaning it will control the second locomotive
  - It has “085” as the last three digits of the Index so the second locomotive will have its throttle set to 85%. You can set the throttle speed between 0% and 100% but it must be entered as three digits padded with zeros at the beginning as required (The index setting must always be 5 digits).
  - The Address field has the value of “4” so it will control the locomotive with DCC decoder address “4”

- d. The SubAddress field has a value of "0" so the delay between Stopping and Starting the locomotive at the ends of the track will be between 1 and 10 seconds.

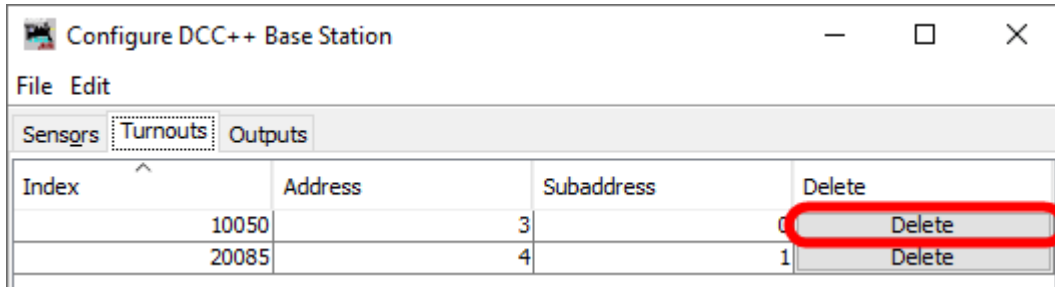
The random range of the shuttle delay is controlled as in the following table:

- |      |                    |                               |
|------|--------------------|-------------------------------|
| i.   | SubAddress Value 0 | Delay Random 1 to 10 seconds  |
| ii.  | SubAddress Value 1 | Delay Random 10 to 20 seconds |
| iii. | SubAddress Value 2 | Delay Random 20 to 30 seconds |
| iv.  | SubAddress Value 3 | Delay Random 30 to 40 seconds |

- 18.** To change the JTEDCC-BF throttle, address or delay configuration, click on the appropriate Delete button to delete the required "turnout" entry and add a new "turnout" entry with the required settings. This process will change the configuration settings in the JTEDCC-BF controller – it does NOT change any settings in the actual locomotive DCC decoder

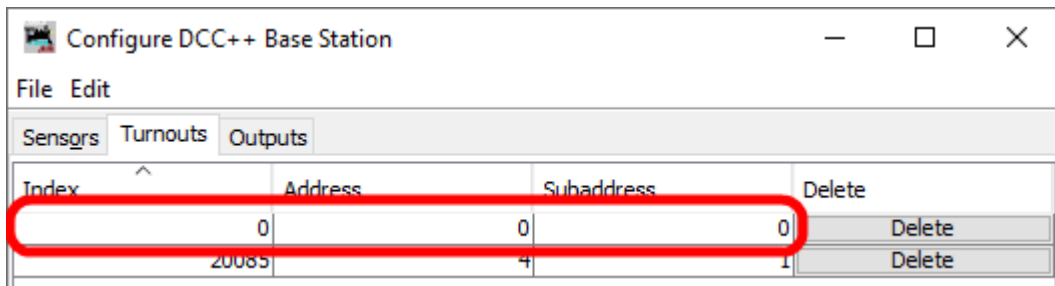
## CONFIGURING LOCOMOTIVE CONTROL EXAMPLE

- In the example below we will change the first locomotive throttle to 75% to give a realistic speed, and also change the DCC address to 72 to match the DCC decoder address that had been set in the actual locomotive.
- Delete the existing 10xxx “turnout” entry by clicking on the Delete button on the right-hand end of that line, and confirm the deletion



- Click the “Add Turnout” button near the bottom.

A new entry will be added with Index 0



- Since we are adding an entry for control of the first locomotive and the desired throttle setting is 75% the Index needs to be set to 10 000 + 75 which is 10075 (The index setting must always be 5 digits)
- The locomotive’s DCC decoder address had been previously set to 72, so we need to set the Address field here, so it matches the locomotive DCC decoder address 72.

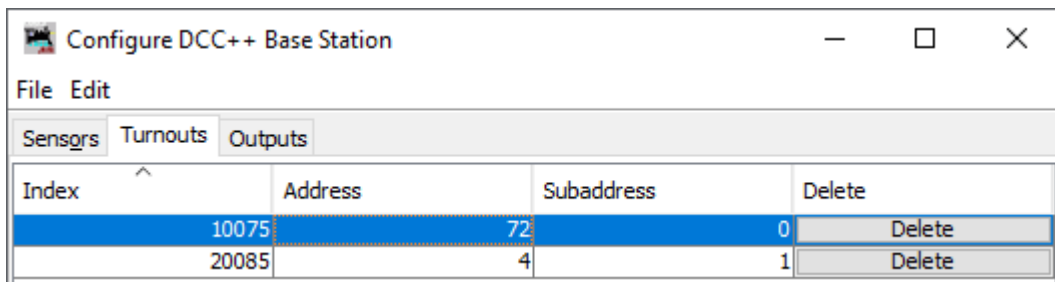
**Note that the JTEDCC-BF will only work with “short” DCC addresses not “long” DCC addresses so ensure you use a locomotive configured with a short address in the range of 1 to 127!**

- The SubAddress field has a value of “0” so the delay between Stopping and Starting the locomotive at the ends of the track will be between 1 and 10 seconds.

The random range of the shuttle delay is controlled as in the following table:

- SubAddress Value 0 Delay Random 1 to 10 seconds
- SubAddress Value 1 Delay Random 10 to 20 seconds
- SubAddress Value 2 Delay Random 20 to 30 seconds
- SubAddress Value 3 Delay Random 30 to 40 seconds

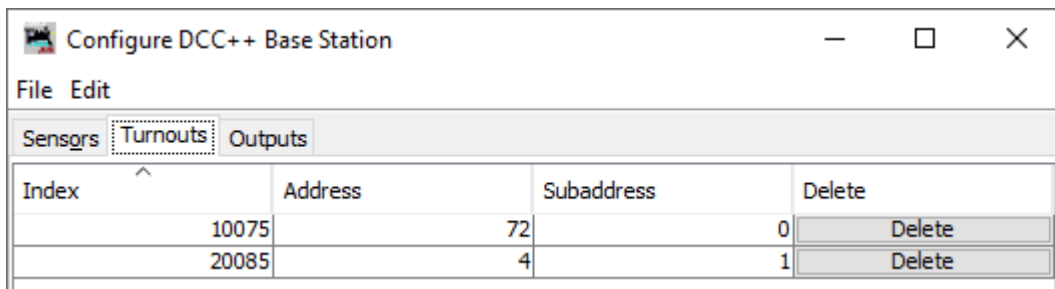
- You should now have a “Turnouts” configuration screen with new locomotive control configuration that looks like this:



- Click the “Save Turnouts” button near the bottom, click all Yes buttons to save the configuration
- Click the “Close” button near the bottom, click all Yes buttons to save the configuration

That’s it, you have updated the JTEDCC-BF controller with new locomotive control configuration. You should **ALWAYS check** the correct configuration has been written to the JTEDCC-BF controller so in JMRI DecoderPro, click

on menus **DCC++ / Configure Base Station** and it will read in the current configuration from the JTEDCC-BF controller. Click on the **Turnouts** tab and you should now see updated settings for the first locomotive with index 10075 and address 72



Index	Address	Subaddress	Delete
10075	72	0	Delete
20085	4	1	Delete

**28.** Go ahead, check it out!

- a. Close the DecoderPro software and unplug the USB cable
- b. Put your locomotive on the mainline track
- c. Unplug power to the JTEDCC-BF module and unplug the USB cable, wait 10 seconds, and plug the power back in to restart the system

**29.** The locomotive(s) will operate back and forth with the new settings

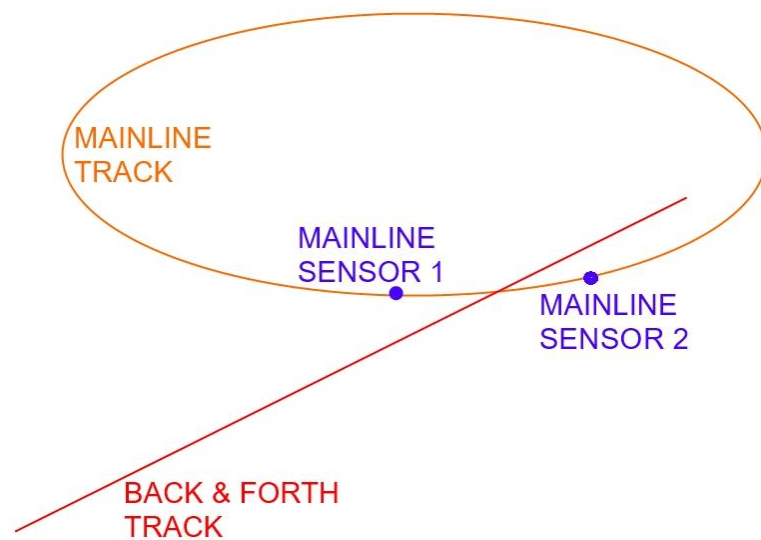


## CROSSING DETECTION

Sometimes you may have your back and forth track crossing a mainline so there is potential for a collision between two trains as the back and forth locomotive would otherwise not stop... The “Crossing Detection” sensors are there to help and will halt the back and forth locomotive when a crossing sensor is activated and restart the locomotive when the sensor is deactivated.

You would ideally place two sensors on the mainline track, one on either side of the back and forth track, so a train on the mainline will activate the crossing sensors and the JTEDCC-BF module will instruct the back and forth locomotive to stop while the mainline train is passing over the mainline track sensors. The JTEDCC-BF module will instruct the back and forth locomotive to start again once the mainline track sensors are clear, and the back and forth locomotive will continue normally.

Below is a simplified diagram of the tracks and back and forth crossing sensors on the mainline:



### Important points to note regarding Crossing Detection:

1. You will need **two** sensors on the mainline track to ensure the mainline train is clear on **both sides** of the crossing
2. The two mainline track sensors will need to be wired in **parallel**, ie. To the **same sensor input** on the JTEDCC-BF controller
3. Sensor input “10003” will control the first back and forth locomotive, and is labelled as “A2” on the JTEDCC-BF module
4. Sensor input “20003” will control the second back and forth locomotive, and is labelled as “A4” on the JTEDCC-BF module

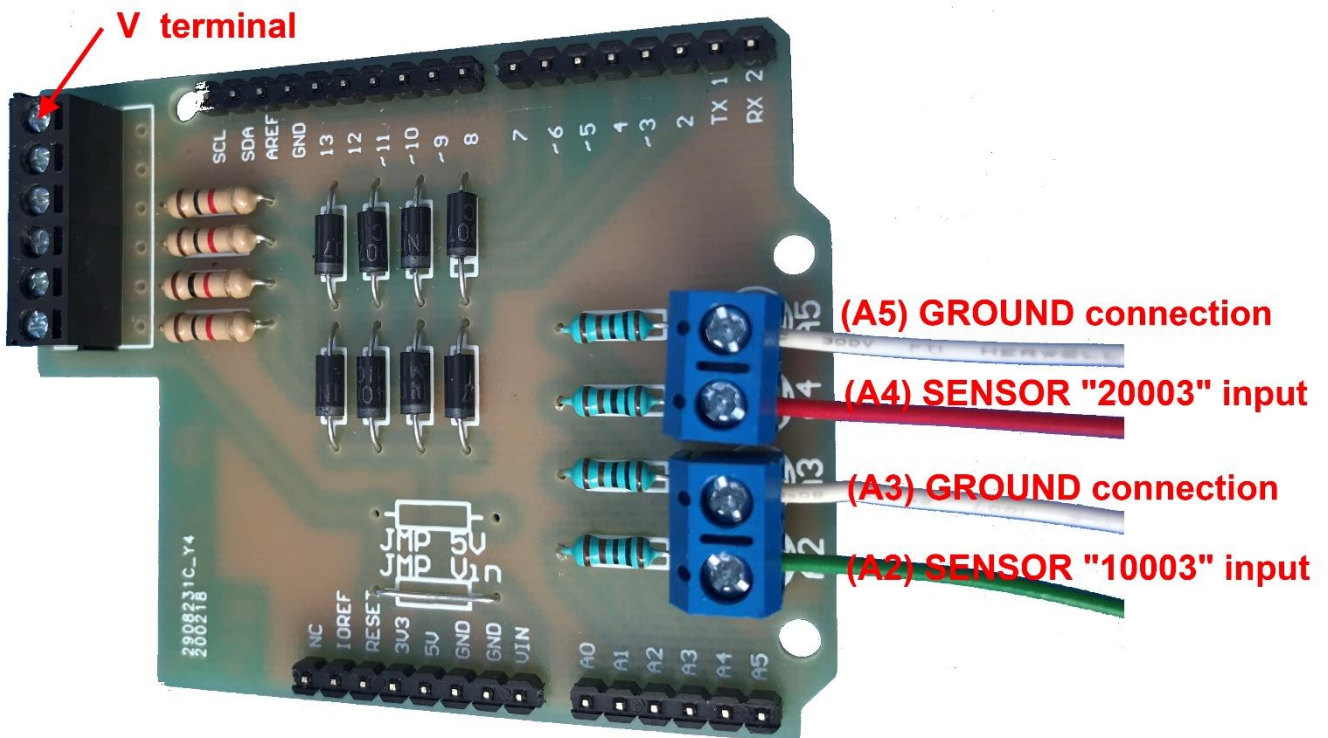
**Note:** If you are powering the sensors from another power supply, make sure you connect the negative/ground terminal of the sensor power supply to the ground (G) terminal of the JTEDCC-BF controller, which will complete the electrical circuit to the sensor inputs.



## CROSSING DETECTION – CROSSING SENSOR WIRING

Below is a diagram of the Crossing Sensor wiring.

1. Sensor **input 10003** controls the **first locomotive** and sensor **input 20003** controls the **second locomotive**.
2. For each back and forth locomotive, you will need **two** crossing sensors wired in parallel to the **same** sensor input. In the picture we show one wire going into each sensor input, but the wire is connected to two sensors.
3. You will need to **connect both the sensor input and ground** for each sensor to the JTEDCC-BF module, and (if needed) a separate power wire from each sensor to the "V" terminal to power the sensor.



### 30. HAVING PROBLEMS?

There is a lot that can go wrong with the DCC system if you don't pay careful attention to the above instructions. If the back and forth operation not working as expected you can try the following troubleshooting steps:

#### 31. Locomotive doesn't move at all

- a. Dirty Tracks? Try cleaning the tracks for a good connection between the locomotive and the track. Often when the track is dirty you can give the locomotive a gentle "push" and it will probably start moving. Also don't forget to clean the wheels of the locomotive as well!
- b. Incorrect Wiring? Check you have connected the back-forth track to the JTEDCC-BF centre "Mainline Track" terminals (labelled as A+ and A-), and you have not connected it the outside "Programming Track" terminals
- c. Bad Wiring? Use a small 12V lamp to test power is getting to the track(s) as a meter will often give inaccurate results when there is no electrical load the track. A lamp from a car dashboard will work fine, it is probably something like a 12V 5Watt type. Solder some wires to it and connect them to the track – if the lamp lights up you will have power to the track!
- d. Remove power from the JTEDCC-BF controller and unplug the USB cable (if used), wait 10 seconds, reconnect power and try it again
- e. Use the JMRI DecoderPro software and the "Programming Track" to check the locomotive DCC address is correct and matches the address set in the "Configuring Locomotives" section above
- f. Use the JMRI DecoderPro software to check you can operate the locomotive correctly from the roster using a Throttle. **This is very important as it will confirm you are using the correct locomotive DCC address, and that your track wiring and connections are good**
- g. Ensure the four red LED's on the JTEDCC-BF Motor Driver board (just behind the Track 6-way Terminal Strip) are brightly lit. They should turn about 1 second after your DC power supply is turned on. If they are not brightly lit, check your power supply is at least about 12V DC and not greater than 15V DC at the JTEDCC-BF "VIN" and "GND" power terminals. Also check for track wiring errors and for short-circuits on your track(s)
- h. Use DecoderPro menu DCC++/DCC++ Traffic Monitor to check for the correct locomotive address and speed messages as described below:
  - i. If you activate sensor 10001 you should see, amongst others, the following message line:  
[RX: T1 3 60 0] Throttle Reply:  
Where T1=This is a Throttle command, **3=Locomotive DCC address**, 60=Throttle speed, **0=Reverse direction**
  - ii. If you activate sensor 10002 you should see, amongst others, the following message line:  
[RX: T1 3 60 1] Throttle Reply:  
Where T1=This is a Throttle command, **3=Locomotive DCC address**, 60=Throttle speed, **1=Forward direction**
  - iii. To check the other two sensors (on a 2-locomotive setup) replace 10001 and 10002 with the appropriate sensor numbers 20001 and 20002

### 32. Backwards and Forwards doesn't work as expected – locomotive runs off the end of track

- a. Try moving the sensor a bit further towards the middle of the track. The locomotive deceleration inertia may make it travel further than expected before stopping and changing direction
- b. Check you have wired the correct sensors to the correct JTEDCC-BF sensor terminals
- c. Check you have the correct sensor configuration in section JTEDCC-BF CONFIGURATION above
- d. Try turning the locomotive around. You may have the sensor connections transposed which will cause the locomotive to travel in the wrong direction. On power up it should start in the "forward" direction.
- e. Ensure your sensors send a low resistance Ground / 0volts signal to the JTEDCC-DF sensor input terminal when activated
- f. Use DecoderPro menu DCC++/DCC++ Traffic Monitor to check for the correct sensor ID number And Active/Inactive messages as below:
  - i. If you activate sensor 10001 you should see, amongst others, the following message lines:  
[RX: Q10001] Sensor Reply (**Active**) :
  - ii. If you deactivate sensor 10001 you should see, amongst others, the following message lines:  
[RX: Q10001] Sensor Reply (**Inactive**) :
  - iii. For other sensors replace 10001 with the appropriate sensor number eg. 10002, 20001 and 20002
- g. If using two locomotives check you have the correct locomotive (DCC address) operating with the correct pair of sensors

## ADVANCED INFORMATION

You will not normally need this advanced information. It is here for reference purposes.

You can communicate with the JTEDCC-BF controller using a serial terminal program connected at 115200 baud. Apart from commands listed in the DCC++ documentation, we have added the commands below to assist with support and testing:

1. **<J>** ERASE EEPROM
  - a. All EEPROM contents is erased
  - b. The JTEDCC-BF controller will respond with **<Wiping EEPROM>**
  - c. If the JTEDCC-BF controller is restarted, the default sensor and turnout configuration will be recreated
2. **<X>** REBOOT
  - a. The JTEDCC-BF controller will be restarted as if you have reset the power
  - b. The JTEDCC-BF controller will respond with **<REBOOT>**
  - c. Useful after making changes to sensors and turnouts