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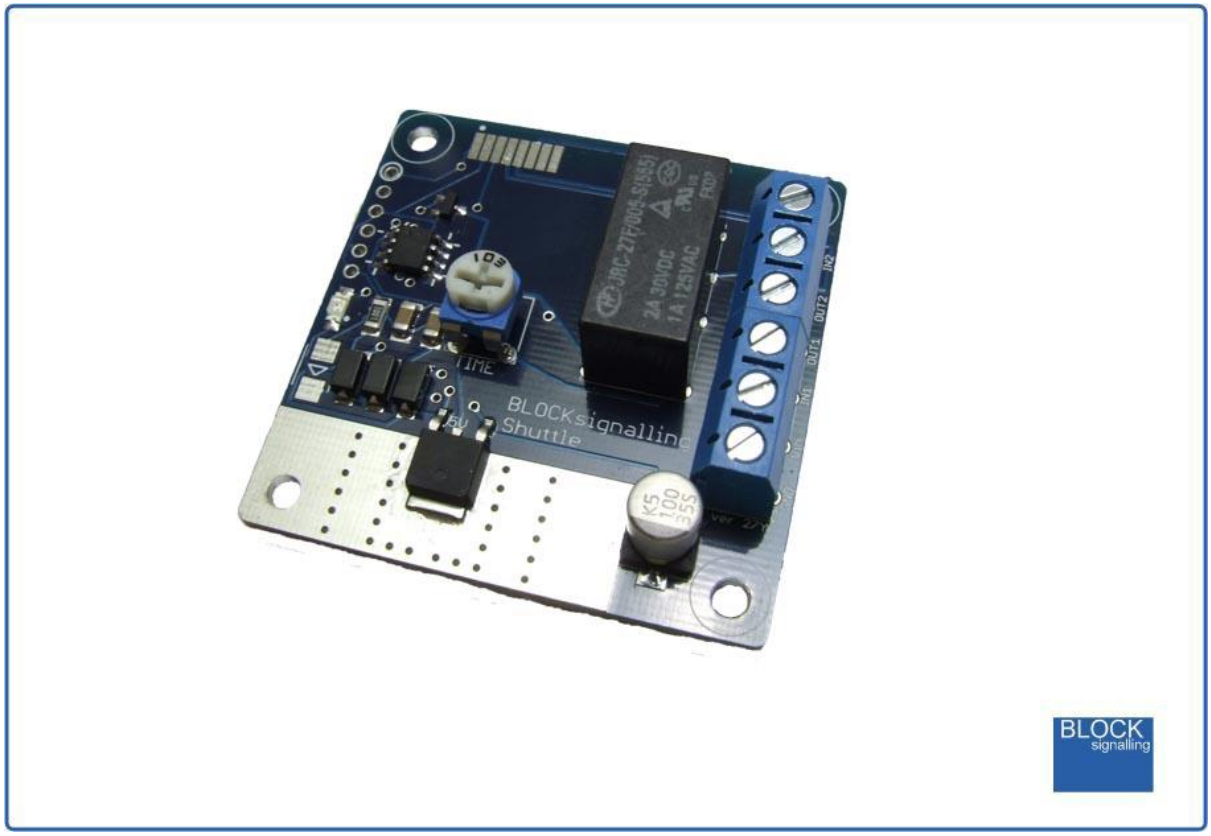
DC SHUTTLE SS1



Simple Shuttle Train Controller with Adjustable Delay

- Automatically operates a train backwards and forwards along a single line
- Waiting time at the ends can be varied with a simple screwdriver adjustment
- An led on the PCB shows when the relays are energised
- Microprocessor controlled for accuracy
- Simple wiring and operation

The BLOCKsignalling Simple Shuttle is designed to automate a DC model train running backwards and forwards along a single length of track.

At each end of the track, a diode is fixed across an insulated rail gap to stop the train until the track current is automatically reversed by the module and the train will start traveling in the opposite direction.

The time between each change in direction can be changed by a simple screwdriver adjustment. The delay time for each direction is adjustable between 1 second and 10 minutes.

Each of the relays are rated at 10A for long life (traction current is typically 0.5A to 1A).

Power Supply

The module operates from any DC supply in the range 7V DC to 25V DC, or any AC supply in the range 8V AC to 16V AC.

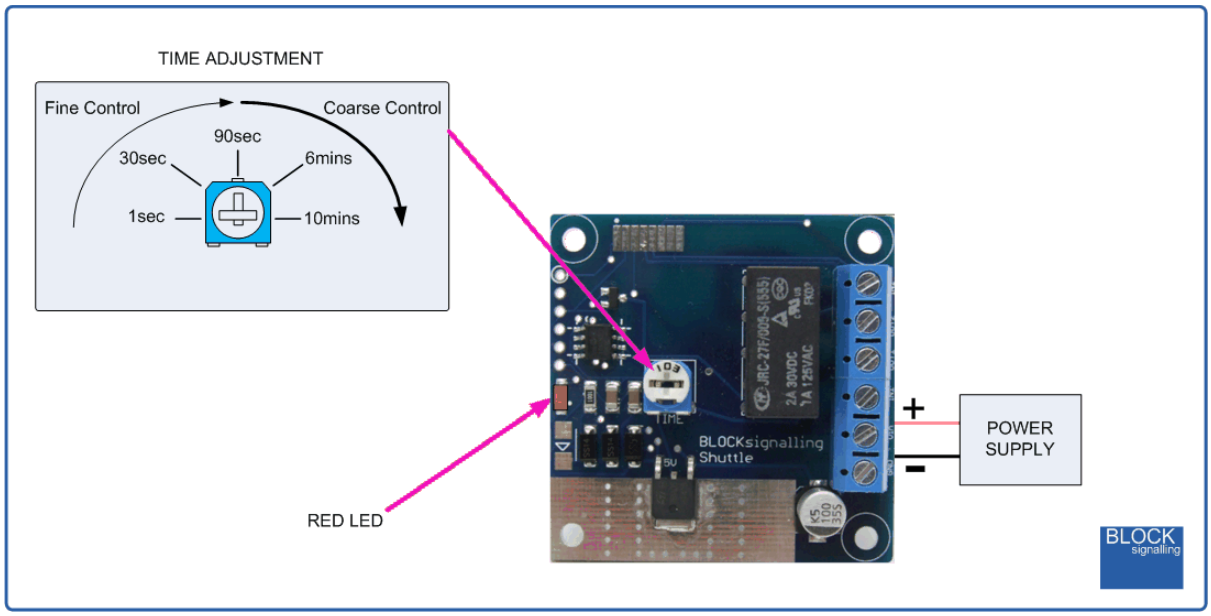
If the track voltage is above 7V DC, then the module can be connected to the track power supply. Please see wiring diagrams below for details.

DCC track power can also be used to feed the module.

Timing Adjustment

The timing is adjusted with a small screwdriver, which fits into a slot in the adjuster mounted on the PCB.

The adjustment is very fine for the first half of the rotation, setting the timing between 1 second and 90 seconds, then becomes more coarse up to the maximum setting of 10 minutes.



The module reads the setting when the power is applied, and each time the relays are switched.

Generally, it is easiest to set the approximate time using the diagram above, then switch off the power for 10 seconds or so. When the module is re-powered, it will read the setting and commence its operation.

Minor adjustments can be made whilst the unit is running, and they will be used at the next opportunity.

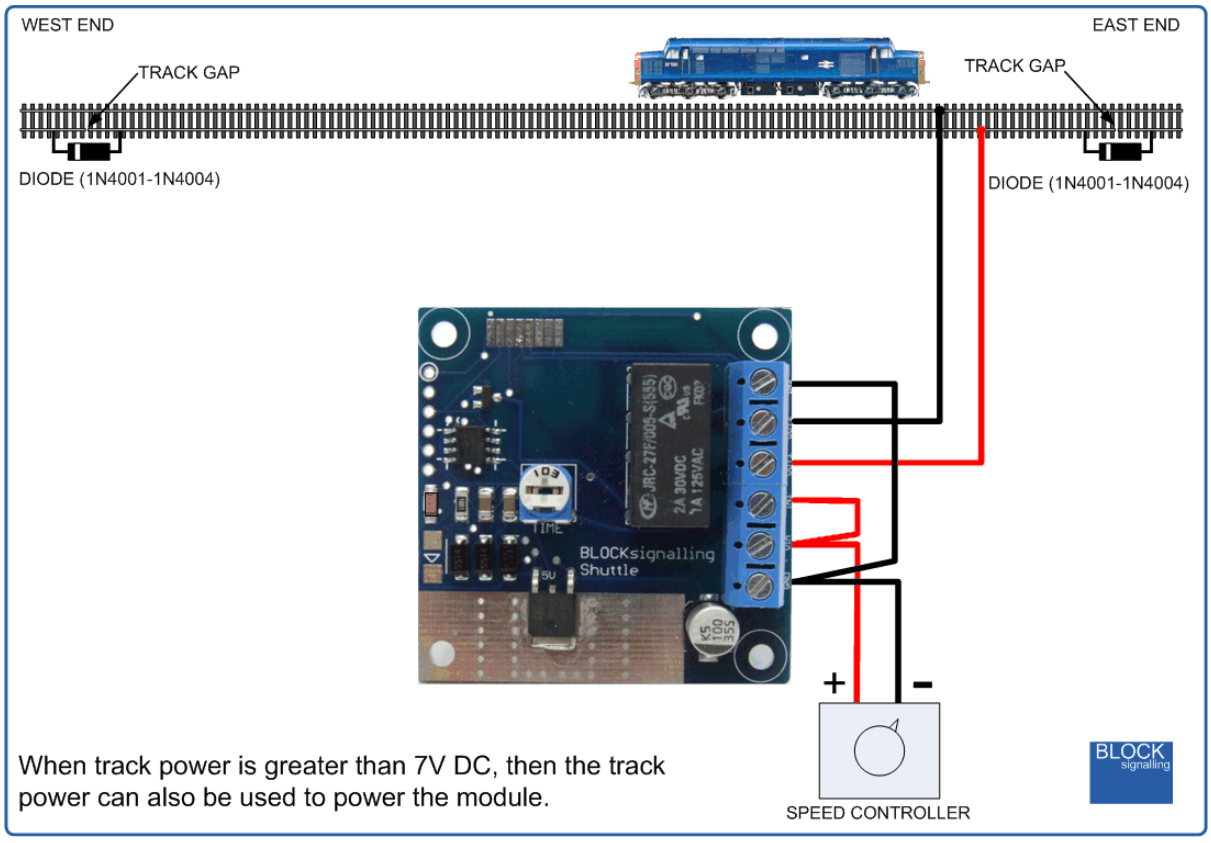
Connecting Up

At each end of the track, a small break is required, to allow diodes to be connected (these are included with the module).

When the train passes the break in the track, the diode prevents traction current reaching the train until the polarity is reversed by the module.

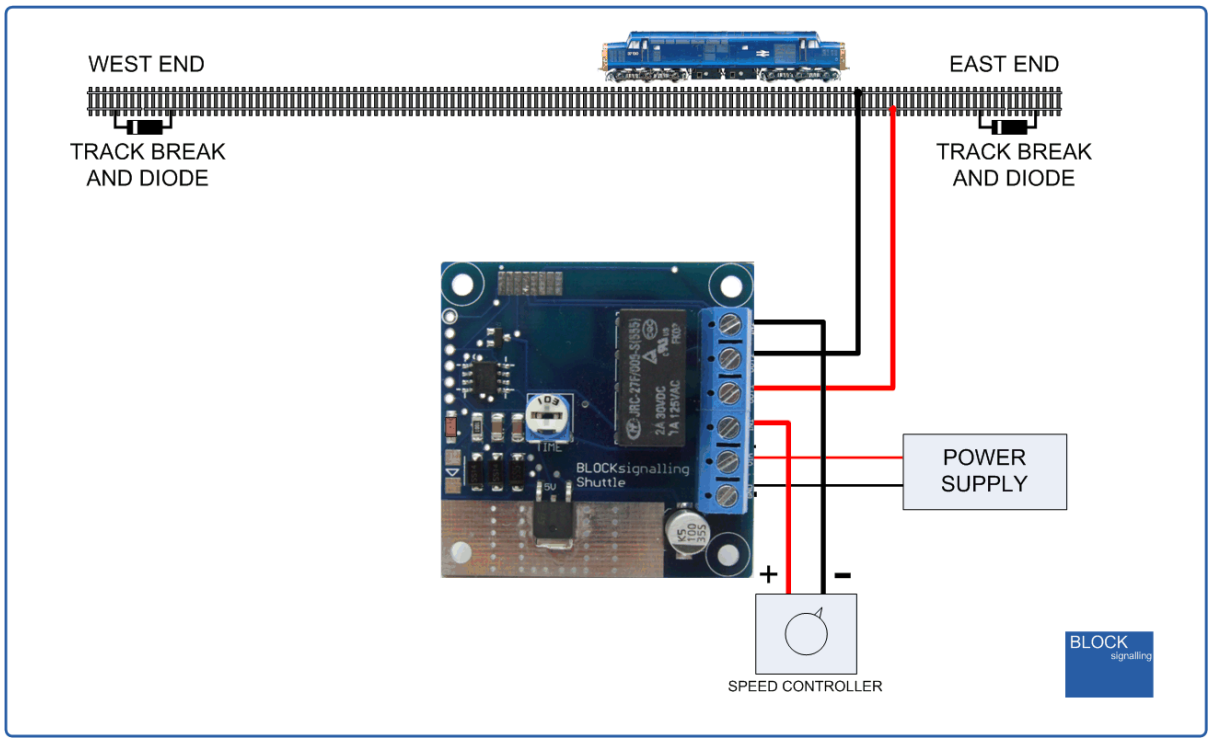
The led on the pcb lights when the relays are energised, and the train is moving from west to east.

If the train is operated on a feed of greater than 7V DC, then the module can use the same supply as the track feed.



For smaller models, where the track supply is below 7V DC, a separate power supply is required for the module. This can any DC supply in the range 8V DC to 25V DC, or any AC supply in the range 8V AC to 16V AC.

The power controller 16V AC auxiliary supply output is suitable. If there is a DCC supply available elsewhere on the layout, then this could also be used to power the module.

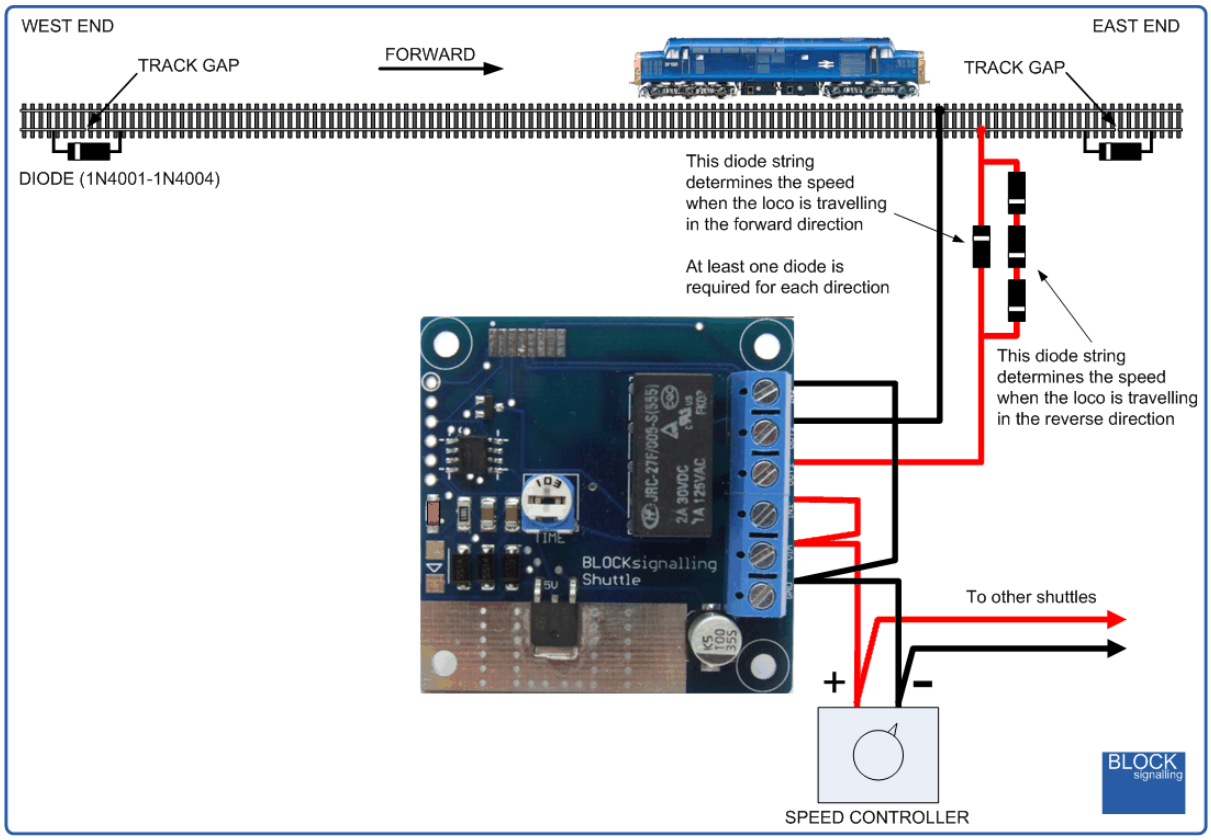


Other Ideas

You can use one low cost speed controller to run several shuttle units, providing they are within the capacity of the controller.

Trains can be operated at different speeds by inserting one or more diodes in the feed to the track. Each diode has an approximate 0.7V voltage drop.

Use a different number of diodes in each direction to create different speeds in each direction. You need at least one diode for each direction.



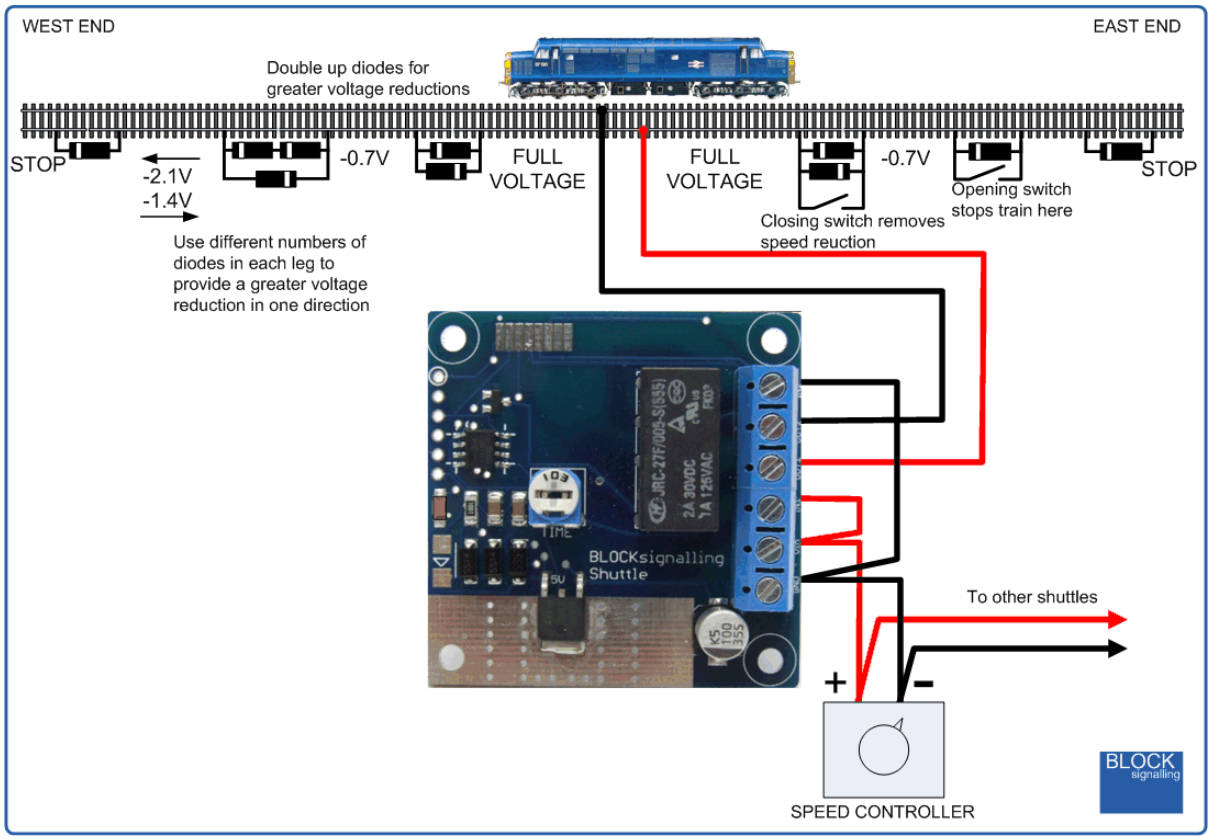
Creating additional track gaps, with associated diodes, allows differing voltages along a length of track, and so different operating speeds in each section.

Use one diode in each direction to drop the speed in the following section by equal amounts.

Use a different number of diodes in each direction to create different speeds in each direction. You need at least one diode for each direction.

Speed reductions can be removed by shorting across the diodes with a switch.

Different stop points can be created by inserting additional single diodes, and shorting across them when they are not required.


WEST END
EAST END
Double up diodes for greater voltage reductions
STOP
-2.1V
-1.4V
-0.7V
FULL VOLTAGE
FULL VOLTAGE
-0.7V
Opening switch stops train here
STOP
Closing switch removes speed reuction
Use different numbers of diodes in each leg to provide a greater voltage reduction in one direction
BLOCKsignalling Shuttle
To other shuttles
+
-
SPEED CONTROLLER
BLOCK signalling

Troubleshooting

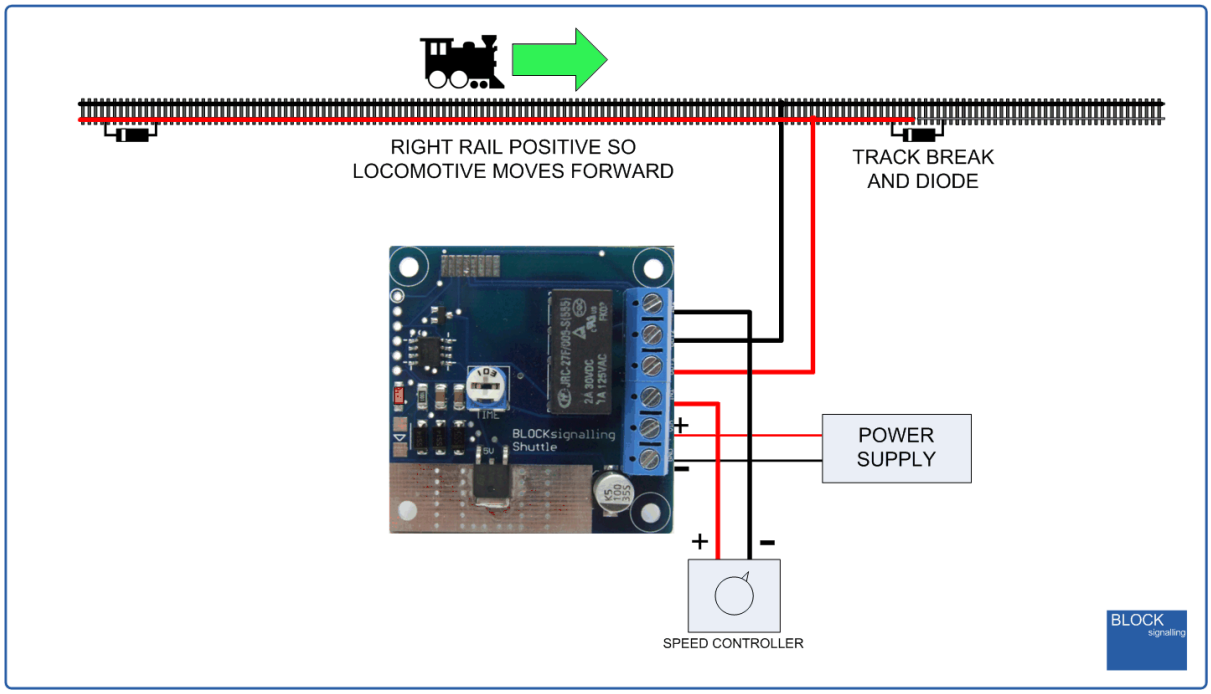
If you encounter problems getting up and running with the SS1, this section should hopefully help solve your problems.

The function of the SS1 is to periodically reverse the polarity of the tracks. This will cause any DC locomotive on the tracks to move forwards and backwards.

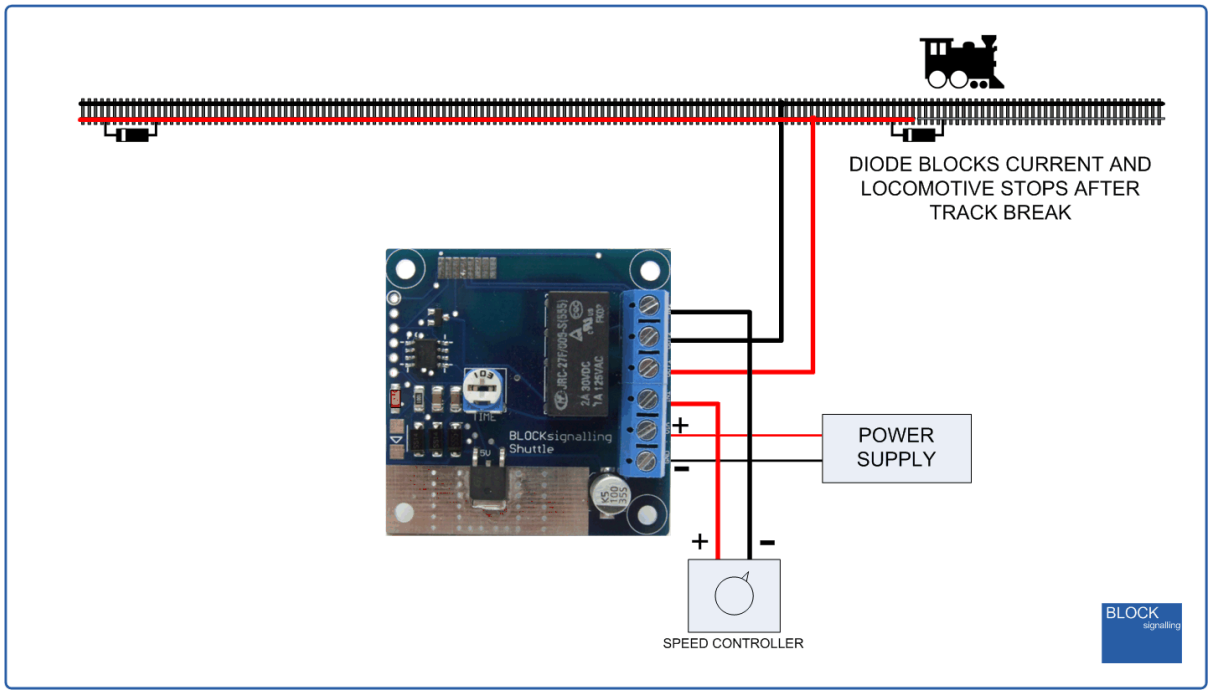
The convention is that a DC locomotive will more forwards when the right hand rail is positive and the left hand rail is negative when viewed from the drivers position.

When the output of the SS1 feeds positive volts to the right hand rail, the whole right hand rail will be positive, up until the track break and diode. When the side of the diode with the white stripe is more positive than the side without the stripe, the diode will block current flow.

When the power is first applied to the SS1, the red led lights and the relays can be heard to click. The module will now pass current directly to the track, so if the controller is set to forward, the train will move forwards.



When the train passes the diode, such that there is no longer a positive feed reaching its wheels, it will stop.



After some time, settable by using the adjuster on the SS1, the module reverses the current. You can tell this has happened, because the led on the module will go out and the relays will be heard to click again.

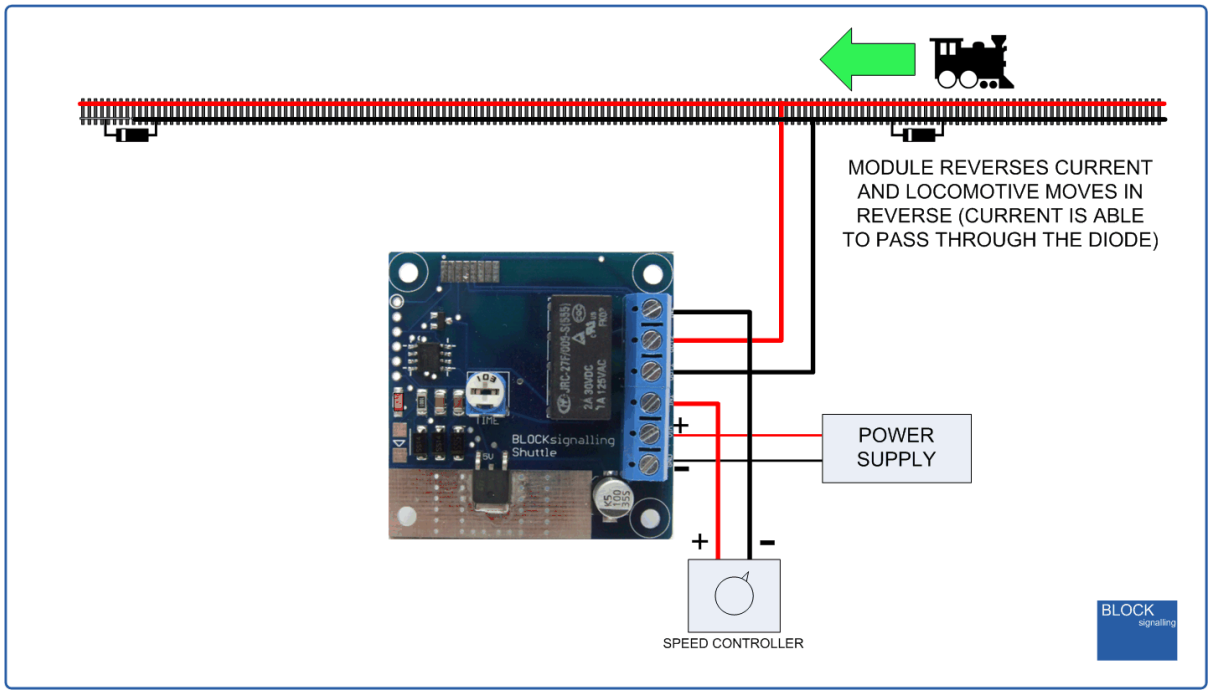
The module now switches the polarity of the supply to the track, swapping the positive feed for negative and the negative feed for positive.

Now the whole left rail is positive.

The right rail is negative, up until the second diode.

The locomotive now receives power from two rails, and runs in reverse.

The process repeats at the other end.



Things can get confusing, as the controller has a forward and reverse switch, and the module can change the polarity of the track. With diesel locomotives, it is not always easy to tell which is the front.

If the locomotive overruns the diodes at the end of the tracks, we recommend checking the diodes are connected the correct way around, and then swap the polarity of the connections to the rails. This should cure any overrunning problems.

If you are still having problems, take the SS1 out of circuit, and feed the controller direct to the track. Select forward and check the locomotive travels forward. When it crosses the diode, it should stop. If it doesn't, it is likely the motor connections inside the locomotive are incorrectly swapped.

If the locomotive reverses before it reaches the end of the track, then increase the setting on the adjuster by turning it clockwise.

If you want to confirm the track polarity, and the direction the locomotive will travel, then our Mini Trackmeter will quickly confirm the polarity.