

BlockMaster™ Application Note #2 Signaling a passing siding

One of the most common track arrangements found on model and prototype railroads is the passing siding. Using two *BlockMaster* boards you can signal your passing sidings in a prototypical way. This application note should be used as a **supplement** to the *BlockMaster* Installation Guide.

You will utilize *BlockMaster* Track Configurations 3 & 4. These are illustrated in Figure 1 below for your reference.

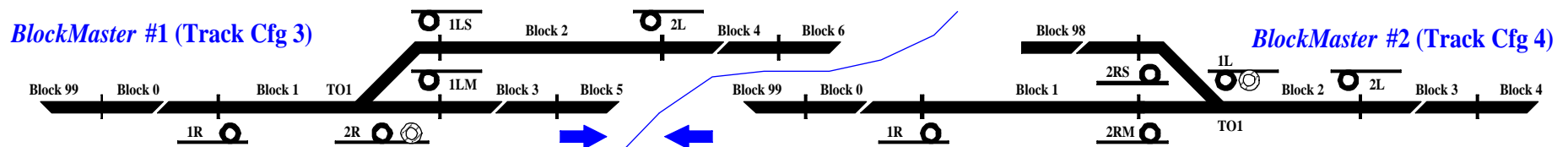


Figure 1 – *BlockMaster* configurations

Hopefully you can visualize “joining” these two configurations together to create the passing siding shown in Figure 2. In Figure 2 we’ve done this and have added some labels to indicate the blocks and signals associated with each *BlockMaster*. Where you see [BM1] it indicates that *BlockMaster* #1 handles the block or signal. Likewise, where you see [BM2] it indicates that *BlockMaster* #2 handles the block or signal.

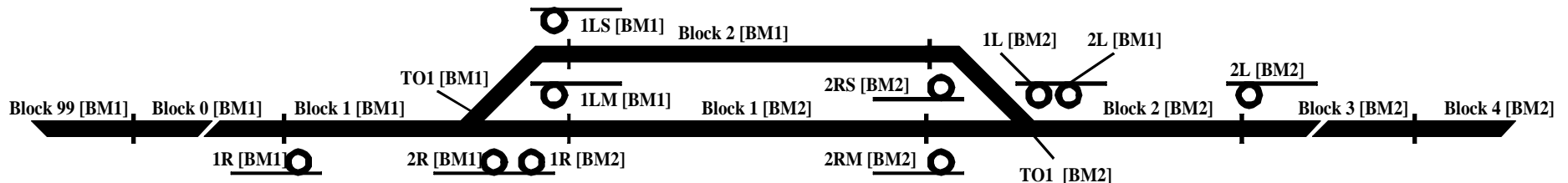


Figure 2 – Merged *BlockMasters*

In Figure 3 we've renumbered the blocks and signals to reflect the combination. Really all that we've done is renumber those blocks and signals associated with **BlockMaster #2**.

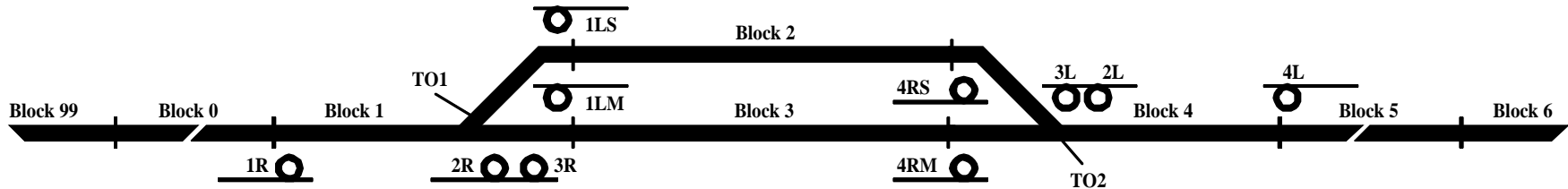


Figure 3 – Combined *BlockMaster* labeling

We will now attempt to take some of the mystery out of the interconnections required to make this all work. First, make your power connections per the **BlockMaster** installation manual. We've illustrated the detection diode, track and ground connections in Figure 4. If you're using conventional DC throttles you'll need to wire the S rails as described in the **BlockMaster** installation manual. If you're using command control you don't have to cut the gaps between rails S1 & S3 and S3 & S4. However, you will have to add the gaps to isolate rail S2 if you're using power routing turnouts.

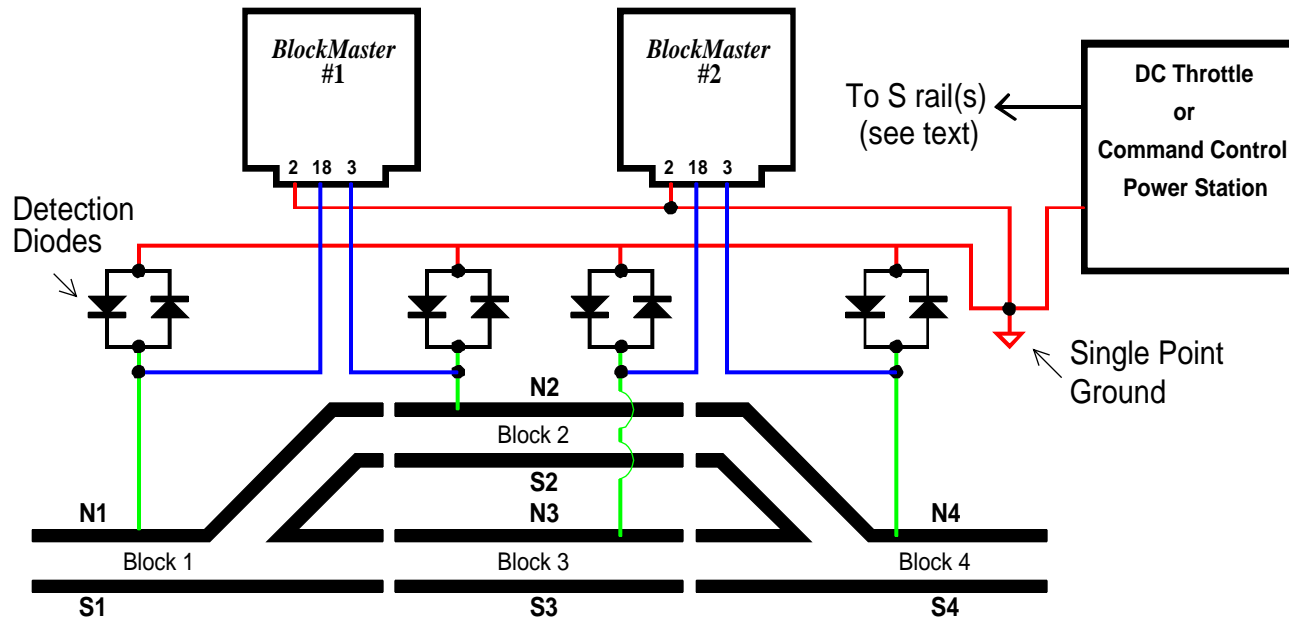


Figure 4 – Track connections

Interlocking Connections

For the sake of simplicity we'll assume that the only interlocking function of interest is the position of the turnouts. In other words, we won't consider things like control panel direction switches, etc. For interlocking with the turnout positions you'll need to use a full set of SPDT (Single Pole Double Throw) auxiliary contacts on each switch machine/motor. When the turnout is aligned for the straight/normal route (mainline) then the center pole of the contacts will be connected to the normally closed (N.C.) terminal. Since the center pole is connected to ground (see *BlockMaster* manual) this will cause the N.C. contact to also be connected to ground. Conversely, the normally open (N.O.) terminal will be disconnected from the center pole so it will be an open-circuit. When the turnout is aligned for the reverse route (siding) then the center pole of the contacts will be connected to the normally open terminal. Since the center pole is connected to ground this will cause the N.O. contact to also be connected to ground. Conversely, the normally closed terminal will be disconnected from the center pole so it will be an open-circuit. These two cases are illustrated in Figure 5 below.

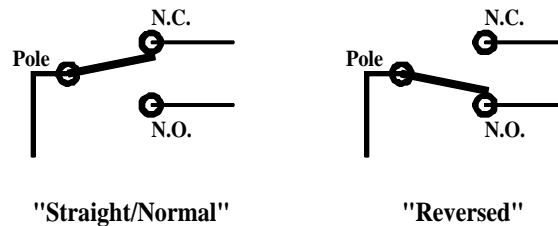


Figure 5 – Switch machine/motor auxiliary contacts

For example, if you're using Circuitron's **Tortoise**™ switch motor then you should consider its terminal #4 as the center pole (connect to *BlockMaster* ground), terminal #3 as the N.C. contact and terminal #2 as the N.O. contact. Depending upon how you mount the Tortoise you may have to switch the connections to terminals 2 & 3; if possible use an ohmmeter to determine which contact is normally closed. Since the Tortoise has two sets of SPDT contacts you could alternatively select terminals 5, 7 & 6, respectively.

Tables 1 & 2 list the interlocking status connections for each of the two *BlockMasters*. The nomenclature TO1NC means the Normally Closed terminal on the auxiliary contacts for the switch machine/motor that is handling turnout 1; TO1NO is the Normally Open terminal.

Description	<i>BlockMaster</i> #1	Switch machine/motor
Interlocking status for signal 1LM	J1-22	TO1NO
Interlocking status for signal 1LS	J1-23	TO1NC
Interlocking status for signal 2R	J1-10	TO1NC
Interlocking status for signal 2L	J1-25	TO2NC

Table 1 – Interlocking status connections for *BlockMaster* #1

Description	BlockMaster #2	Switch machine/motor
Interlocking status for signal 3R	J1-23	TO1NO
Interlocking status for signal 3L	J1-22	TO2NO
Interlocking status for signal 4RM	J1-24	TO2NO
Interlocking status for signal 4RS	J1-10	TO2NC

Table 2 – Interlocking status connections for BlockMaster #2

Next Block Connections

Tables 3 & 4 describe the Next Block connections for each of the two *BlockMasters*. For each row in the table make the connections shown in columns 2 or 3 to the appropriate edge connector pin on the *BlockMaster* in column 1. If there are entries in both columns 2 & 3 then you’ll have to use some inexpensive diodes (such as the popular 1N914; Radio Shack #276-1122). This is illustrated for the first row (Table 3) in Figure 6 below.

Description	BlockMaster #2	Switch machine/motor	Use diodes?
Next Block status for signal 1R (<i>BlockMaster #1</i> , pin J1-28)	J1-19	TO1NO	YES
Next Block status for signal 2R (<i>BlockMaster #1</i> , pin J1-29)	J1-4	TO2NC	YES

Table 3 – Next Block status connections for BlockMaster #1

Description	BlockMaster #1	Switch machine/motor	Use diodes?
Next Block status for signal 3L (<i>BlockMaster #2</i> , pin J1-27)	J1-19	TO1NO	YES

Table 4 – Next Block status connections for BlockMaster #2

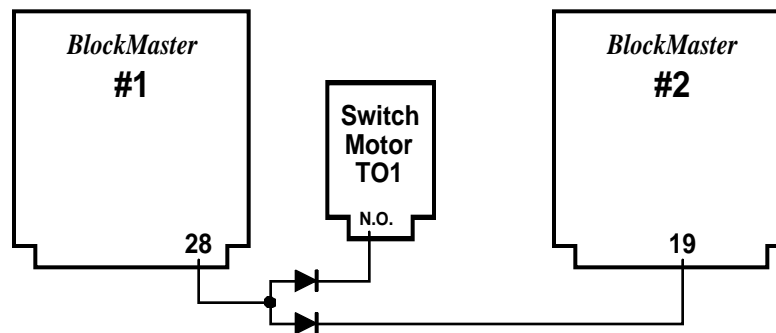


Figure 6 – Diode logic example

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The Next Block status input for signal 2L is handled internal to **BlockMaster** #1 since it is exclusively based upon the state of signal 1LS (which is handled by the same board). The Next Block status input for signals 1LM and 1LS is not shown in Table 3 since it will come from the **BlockMaster** handling Block 0.

Similarly, the Next Block status inputs for signals 3R & 4L are handled internally to **BlockMaster** #2 since they are exclusively based upon the state of signals 4RM and 3L, respectively (which are handled by the same board). The Next Block status input for signals 4RM and 4RS is not shown in Table 4 since it will come from the **BlockMaster** handling Block 5.

Additional Features

If you aren't interested in the Flashing Yellow (i.e. Approach Medium) or Approach Lighting features of the **BlockMaster** you can skip to the section on signal head connections. However, if you are interested in either or both features you'll need to make more connections.

Flashing Yellow

Table 5 addresses the 2nd Next Block connections necessary to support Flashing Yellow.

Description	BlockMaster #2	Switch machine/motor	Use diodes?
2 nd Next Block status for signal 1R (BlockMaster #1, pin J1-15)	J1-4	TO2NO	YES

Table 5 – 2nd Next Block status connections for **BlockMaster #1**

The 2nd Next Block status input for signal 2R is not shown in Table 5; it should use the same connections as the Next Block status input for signal 4RS. The 2nd Next Block status input for signal 2L is handled internal to **BlockMaster** #1 since it is exclusively based upon the Next Block state of signal 1LS (which is handled by the same board). The 2nd Next Block status input for signals 1LM and 1LS is not shown in Table 5 since it will come from the **BlockMaster** handling Block 99.

The 2nd Next Block status input for signal 3L is not shown; it should use the same connections as the Next Block status input for signal 1LM. The 2nd Next Block status inputs for signals 3R & 4L are handled internally to **BlockMaster** #2 since they are exclusively based upon the Next Block state of signals 4RM and 3L, respectively (which are handled by the same board). The 2nd Next Block status input for signals 4RM and 4RS is not shown since it will come from the **BlockMaster** handling Block 6.

Approach Lighting

Tables 6 & 7 describe the Previous Block connections for each of the two **BlockMasters**. For each row in the table make the connection shown in column 2 to the appropriate edge connector pin on the **BlockMaster** in column 1.

Description	BlockMaster #2
Previous Block status for signal 1LM (<i>BlockMaster #1, pin J1-8</i>)	J1-19
Previous Block status for signal 2L (<i>BlockMaster #1, pin J1-9</i>)	J1-4

Table 6 – Previous Block status connections for BlockMaster #1

Description	BlockMaster #1
Previous Block status for signal 3R (<i>BlockMaster #2, pin J1-7</i>)	J1-19
Previous Block status for signal 4RS (<i>BlockMaster #2, pin J1-8</i>)	J1-4

Table 7 – Previous Block status connections for BlockMaster #2

The Previous Block status input for signal 1R is not shown since it will come from the *BlockMaster* handling Block 0. Similarly, the Previous Block status input for signal 4L is not shown since it will come from the *BlockMaster* handling Block 5.

Signal head connections

Table 8 describes the signal head connections (using the ribbon cables) for the two *BlockMasters*. Don't forget current limiting resistors!

Pin #	BlockMaster #1	BlockMaster #2
1	Red, signal 1R	Red, signal 3R
2	Grn, signal 1R	Grn, signal 3R
3	Red, signal 1LS	not used
4	Grn, signal 1LS	not used
5	not used	not used
6	not used	not used
7	not used	not used
8	not used	not used
9	Red, signal 1LM	Red, signal 3L
10	Grn, signal 1LM	Grn, signal 3L
11	not used	Red, signal 4RS
12	not used	Grn, signal 4RS
13	Red, signal 2R	Red, signal 4RM
14	Grn, signal 2R	Grn, signal 4RM
15	Red, signal 2L	Red, signal 4L
16	Grn, signal 2L	Grn, signal 4L

Table 8 – Signal head connections

If you have any questions about this application note please contact us via email, fax, or phone.