



StationMaster - 5

Reversing Train Controller

This manual contains detailed hookup and programming instructions for the StationMaster - Reversing train controller.

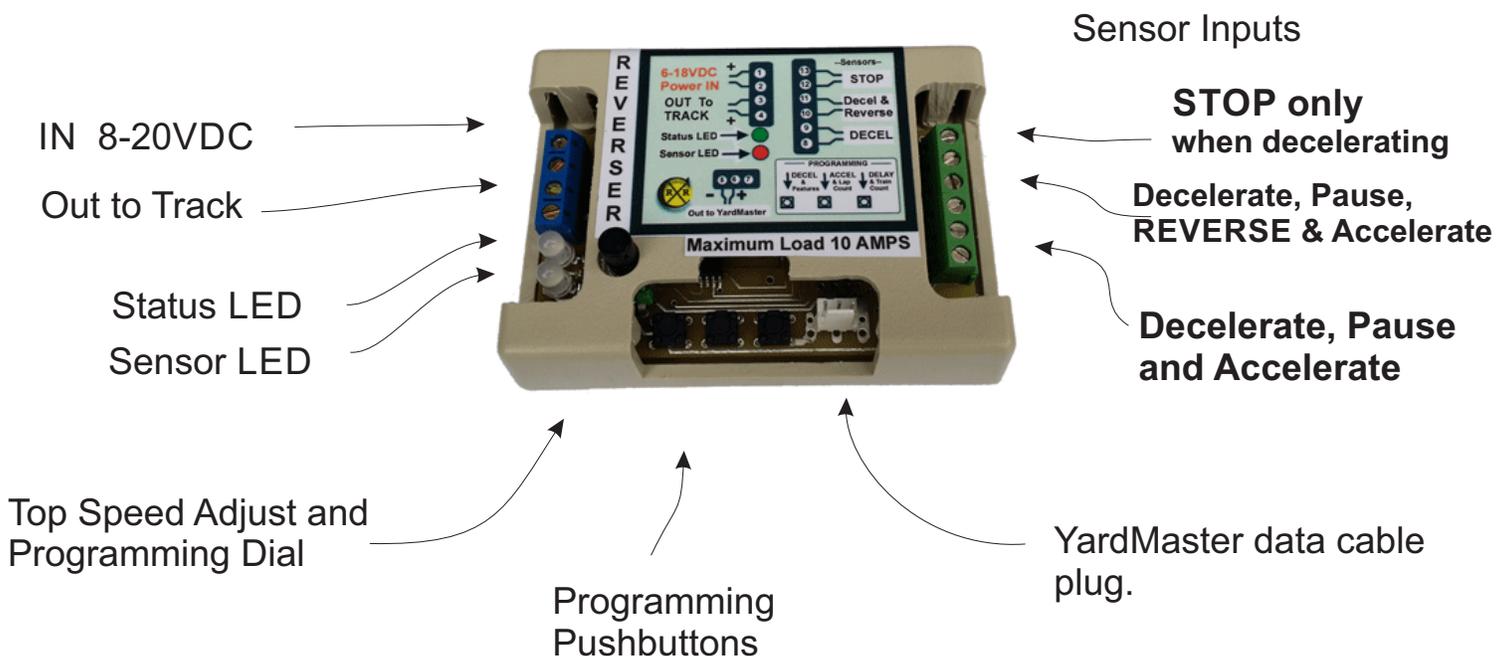
The Reversing StationMaster is similar to a standard StationMaster however it contains software to provide a no-sensor automatic back-and-forth operation.

The standard StationMaster can provide a basic reversing operation only by using sensors, and is recommended if sensors will be used.

Before we Start- Please do not attach power wires (from your power pack or transformer) to any other terminals except the designated inputs.

Your StationMaster will be damaged if power is put on any of the sensor terminals.

ONLY ATTACH WIRES WHILE THE POWER IS OFF.



Reversing Operations - No Sensors, acceleration, deceleration.

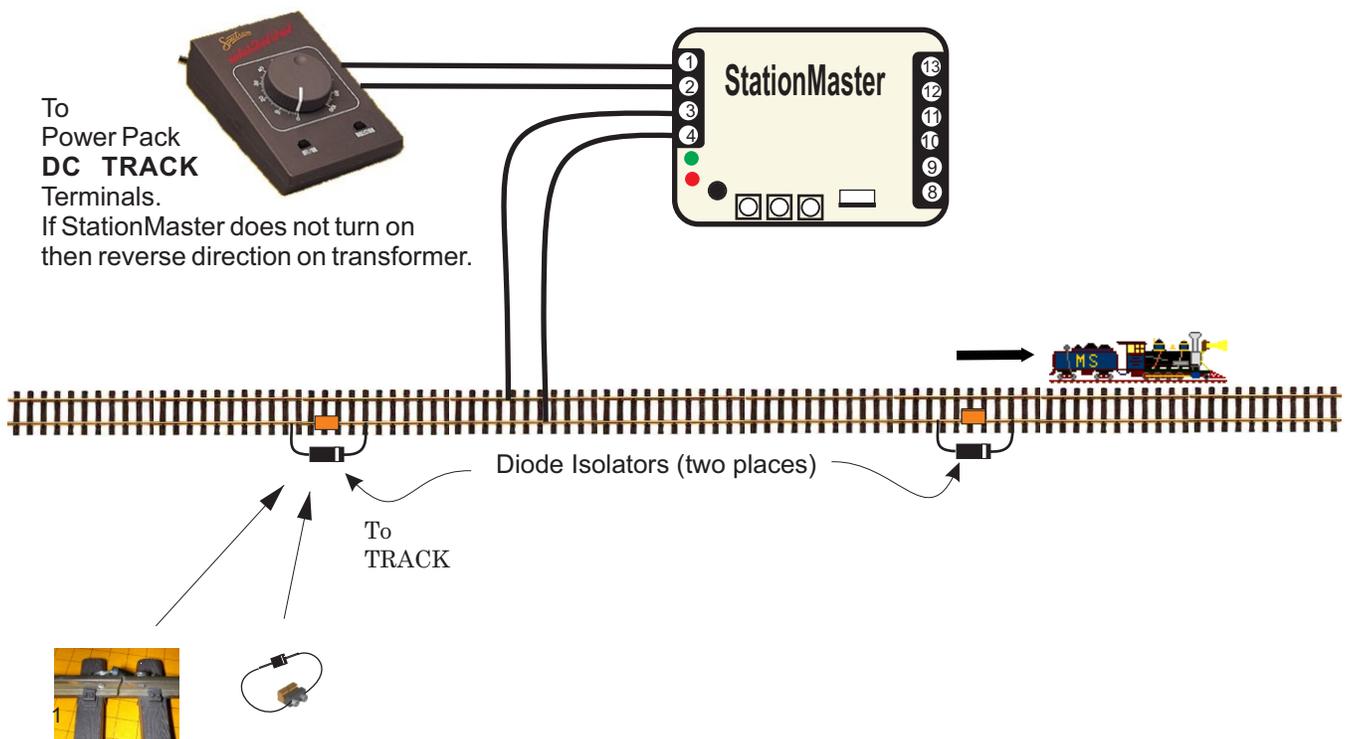
The default hookup uses diodes at the ends which will stop the train when it crosses the boundary. If desirable, LGB 10151 units can be use in place of diodes.

PROGRAMMING:

Best performance is achieved with the **factory default settings**. (See factory default programming instructions) If desired the acceleration rate and time delays can be changed.

Here is the hookup:

- * 2 wires from the transformer to the Reverser.
- * 2 wires from the Reverser to the track.
- * Diodes on the ends where the engine will stop.



Diodes can be wired to the track using self-tapping screws or attached to an isolator. A 1 or 2 AMP diode is usually sufficient.

continued...

Reversing Operations - No Sensors Continued...

OPERATIONS:

- The Reverser has a 2 step speed profile. Speed #1 is the top speed of the train set by the transformer. Speed #2 is a “creeping” speed which allows the train to always reach the diode isolators on the ends.
- The Reverser will accelerate using the programmed acceleration rate, maintain a top speed, and then decelerate down to Speed #2 when the TIME TO DECELERATE time is reached.
- Once the deceleration has completed, Speed #2 will be maintained for the duration of the “pause time”. This provides a very realistic and smooth operation. After a reverse, the operation is repeated.

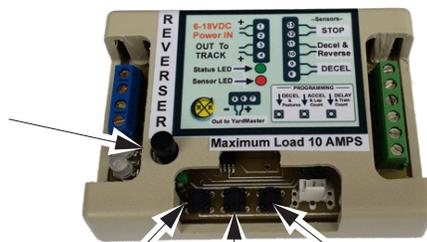
HOW TO SET OR RESET THE AUTOMATIC DECELERATION REVERSING:

1. **Set the transformer for the desired top speed of the train.** Turn the StationMaster top speed dial fully clockwise.
2. **Press programming buttons #1 and #2 at the same time OR perform a factory reset.** This will erase any programmed TIME TO DECELERATE values. Note that this is not always necessary since the TIME TO DECELERATE can be changed at any time. (see below, pressing button #1 will also reset)
3. **Watch the train and press BUTTON #3 when the train reaches the TIME TO DECELERATE location.** This is typically 3 feet from the ends, but depends on the speed of the train and the programmed deceleration rate. The train will blink red and decelerate. After decelerating, the Reverser will blink RED/GREEN while the train creeps into the stops. After reversing, repeat for the other direction. Notice that the Reverser will store different TIME TO DECELERATE values for each direction since trains don't always go the same speed in forward and reverse.

That's it!

Pushbutton Operations

Dial: - optional -
Turn counter-clockwise
to decrease “creep speed”.
Note: Turning too far will enter
programming mode.



Button 1:
Reset TIMETO DECELERATE
for this direction. (start over)

Button #3:
Set the TIME TO DECELERATE
for this direction NOW.

Button #2: - optional -
Terminate the time delay operation
and reverse as soon as possible.
(Convenience during programming)

Continued...

Reversing Operations - No Sensors Continued...

Notes

Most important- Always allow the trains to enter the stops on the ends before setting the TIME TO DECELERATE value (button #3). We need to record the time to start the deceleration for the full length of track.

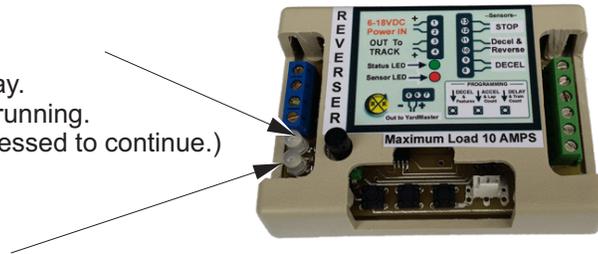
LED Indications

This LED will:

Flash GREEN when accelerating,
Flash RED when decelerating,
Slowly flash GREEN/RED during the time delay.
Blink ORANGE when an infinite time delay is running.
(When in this condition button #2 MUST be pressed to continue.)

This LED will:

Turn RED when a TIME TO DECELERATE value is **NOT** set for this direction. Button #3 **MUST** be pressed to set the deceleration time or the train will never reverse.



Pushbutton and Dial Operations - a few more details

All recorded values are stored in flash memory and retained after a power cycle. For consistent operation day after day the transformer throttle setting should be the same. Sometimes trains will run a different speed after operating for awhile, and this is expected. To always creep into the ends set the TIME TO DECELERATE location sooner to allow more creep time.

The duration of the creep time comes from the programmed delay time. The delay time is actually "wait this long before reversing". If a very long creep is done, then the pause at the ends will be shorter. Increase the time delay if a longer pause time at the ends is desired.

When the Reverser is running, button #3 can be pressed at any time to set the TIME TO DECELERATE. When pressed, the deceleration will start and this time is recorded.

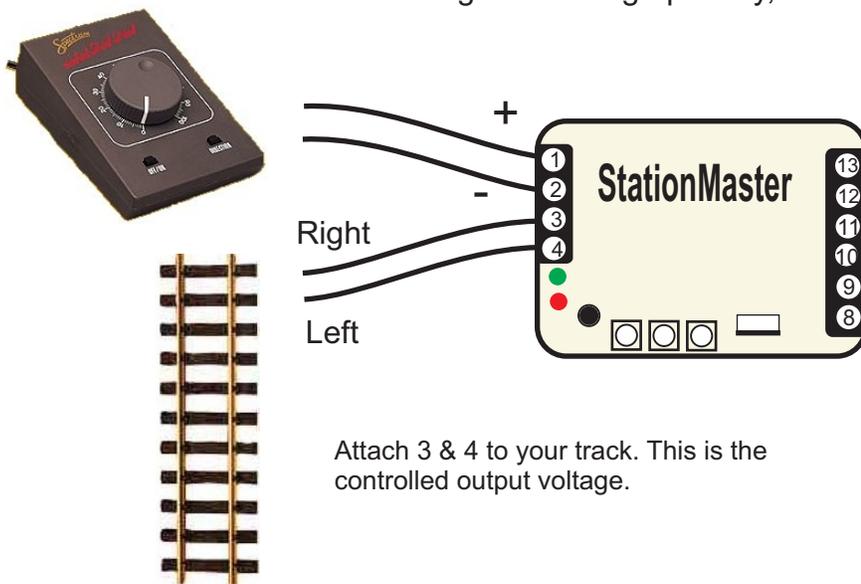
If the deceleration is starting too soon and a different time is desired, then press BUTTON #1 to erase the stored value. This will cause the Reverser to set an infinite time delay to allow the train to creep into the stops (orange blink). Once the train enters the stops, press button #2 (terminate the time delay) to continue. Set the TIME TO DECEL again after the train reverses and comes back in this direction.

The default creep speed is relative to the transformer throttle setting. If a slower creep speed is desired, then turn the top speed dial counter-clockwise to slow the train down. Note that the creep speed will be the same for both directions. Some trains will creep faster in forward than in reverse. Note that the StationMaster requires at least 8 volts to operate.

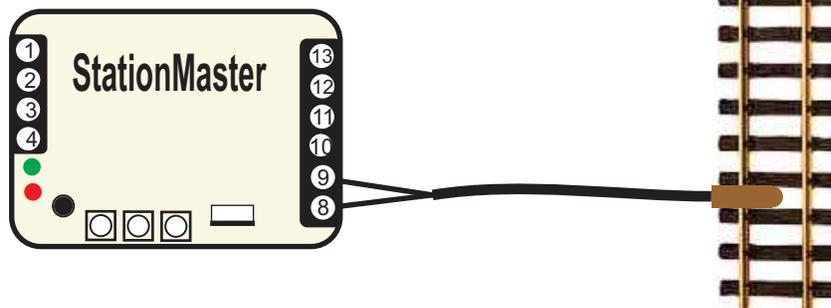
StationMaster Basic Hookup Description

The StationMaster is designed to be installed between the train transformer, and the track.

Attach 1 & 2 to your transformer's DC output (Sometimes labeled as TRACK). Set your transformer's throttle position to the desired top speed of the train. If the StationMaster does not "light up", then reverse the direction on the transformer to change the voltage polarity, or swap these two wires.



Attach 3 & 4 to your track. This is the controlled output voltage.



DECEL Sensor - only when programmed to use sensors.

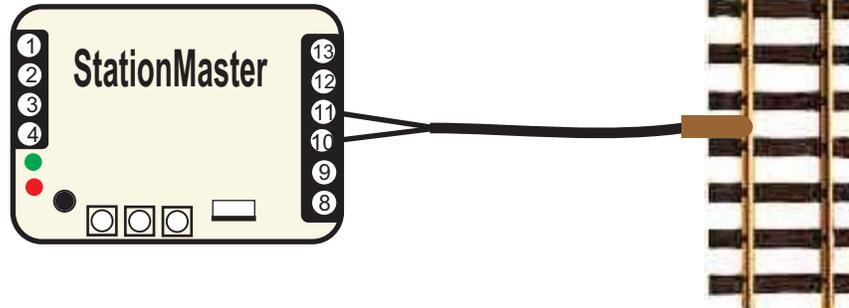
Terminals 8 & 9 are the start DECEL sensor.

When this sensor detects a magnet the StationMaster will begin a decelerate, pause, and then accelerate sequence. The sensor LED will light up when this sensor is detected. By placing multiple DECEL sensors wired in parallel, you can stop at multiple stations on your railroad.

***This sensor can be simulated by pressing programming button #1.**



Sensor Descriptions

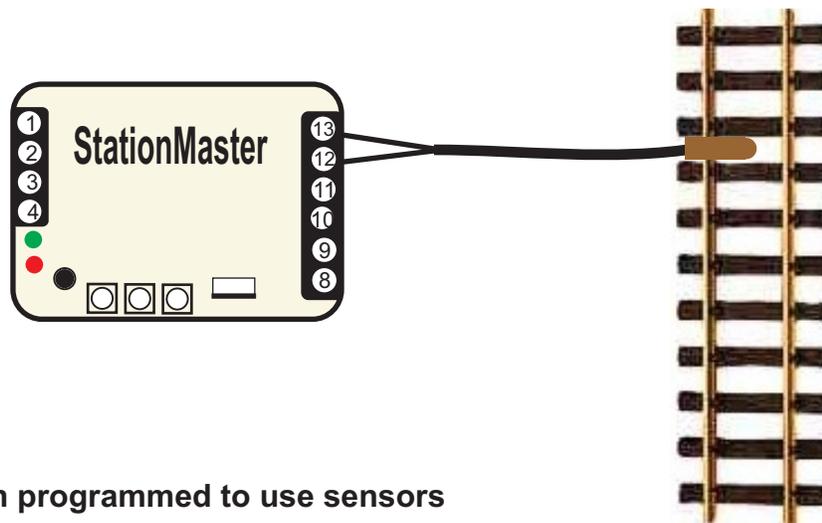


Decelerate and Reverse Sensor - Only when programmed to use sensors

Terminals 10 and 11 are the Decelerate/Reverse sensor.

When this sensor detects a magnet the StationMaster/Reverser will decelerate and then reverse after the time delay.

***This sensor can be simulated by pressing programming button #2.**



Optional

STOP Sensor - Only when programmed to use sensors

Terminals 12 and 13 are the optional STOP sensor.

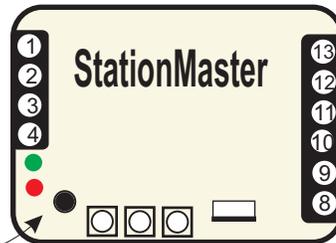
When the train is decelerating and this sensor detects a magnet, the train will immediately STOP. This sensor is not necessary unless an exact stopping position is desired.

When in self-programming mode this sensor will force an “END-OF-TRACK” and disable the current sensor.

***This sensor can be simulated by pressing programming button #3.**

Speed Dial

Speed Adjust
and
Programming Mode



Full counter-clockwise will enter Programming Mode.
When not full counter-clockwise, this dial does the following:

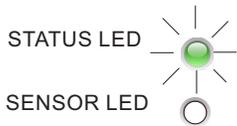
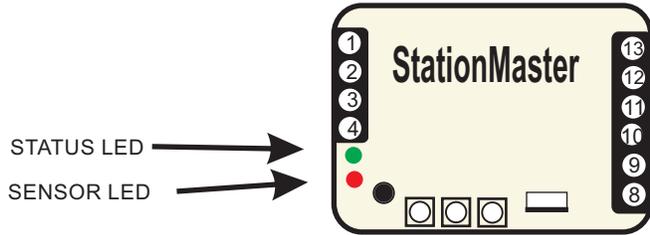
Operation when programmed to use sensors:

The top "cruising" speed of the train can be adjusted by turning the "top speed" dial. "Full speed" is clockwise. Turn this dial down as necessary to set the desired cruising speed. **Typically, this dial is set fully clockwise and the transformer is used to set the speed of the train.** If you have a fixed DC power supply, then use this dial to set the top speed of your trains.

Default condition:

Reduce the "creep speed" of the train into the diode stops after the deceleration has finished.

LED indicators



Green flashing: train is ACCELERATING.



Green NOT flashing: Train is AT TOP CRUISING SPEED.



Orange NOT flashing, StationMaster will ignore next DECEL sensor



1. Quick Red flashing: Train is DECELERATING.

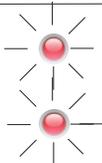
2. Red/GREEN flashing at 1 second rate: StationMaster is performing a time delay, or possibly creeping into the stops.



Default mode: The TIME TO DECELERATE is not set for this direction.



Sensor mode: A sensor is detected.



Two Red Blinking LED's indicate a SHORT CIRCUIT condition. Turn the top speed dial to zero and then back to 100%, or turn off power to recover. If condition returns after recovery re-program shutdown threshold by entering and exiting program mode, or locate the short circuit.



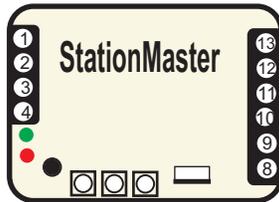
Sensor LED GREEN twinkling indicates secondary Programming mode.



Sensor LED orange twinkling indicates programming mode.



Programming:
Deceleration Rate



1. Make sure all three sensor inputs are open.
2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) The sensor LED will turn ORANGE and twinkle.
3. Push and hold programming button #1.
4. Watch the TWO COLOR led. Each RED blink will increase the deceleration distance. The shortest deceleration Distance will be with one flash. (**TRAIN Stops fastest**) Release the pushbutton when the desired number of blinks have occurred. A typical number is 3. Repeat this procedure if you want a different value. The LED will flash orange when the longest Deceleration rate is set.

When finished with all programming, increase the top speed dial clockwise to maximum clockwise. All programming values are stored in flash memory and are retained until re-programmed.

Programming:
Acceleration Rate



1. Make sure all three sensor inputs are open.
2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) The sensor LED will turn ORANGE and twinkle.
3. Push and hold programming button #2..
4. Watch the TWO COLOR led. Each GREEN flash will decrease the acceleration rate. The fastest acceleration will be with one blink. Release the button when the desired number of blinks have occurred. A typical number is 4. Repeat this procedure if you want a different value. The LED will blink orange when the longest **acceleration** rate is set (about 25 counts). A very short deceleration is not recommended for the no-sensor reversing mode.

When finished with all programming, increase the top speed dial clockwise to maximum. All programming values are stored in flash memory and are retained until re-programmed.



Programming: Pause Time

1. Make sure all three sensor inputs are open.
2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) The sensor LED will turn ORANGE and twinkle.
3. Press and hold programming button #3.
4. Each ORANGE flash will increase the waiting time after a station stop by 5 seconds. A wait time of zero will be with one flash.

Release the button when the desired number of flashes have occurred.
Repeat this procedure if you want a different value.

When finished with all programming increase the top speed dial clockwise to maximum
All programming values are stored in flash memory and are retained until re-programmed.

The number of red blinks will correspond to the following time delays:

- 1: 0 seconds, no wait.
 - 2: 5 seconds,
 - 3: 10 seconds,
 - 4: 15 seconds,
 - 5: 20 seconds,
 - 6: 25 seconds,
 - 7: 30 seconds,
 - 8: etc... each blink adds 5 seconds.
- The maximum delay is 200 blinks which is over 16 hours.



Programming: Operating Modes

Please go to RRconcepts.com to view an informational video on programming operating modes.

The operating modes of the StationMaster can be programmed as shown:

1. Enter Secondary Programming mode: (Skip this step if already in secondary programming mode)

- * Turn the Top Speed dial fully counter-clockwise to enter programming mode (Skip this step if already in programming mode).
- * Turn the Top Speed dial clockwise until the sensor LED turns green. This indicates secondary programming mode.

2. Press and hold programming button #1 until the desired number of blinks have occurred. Each blink will set or clear a different feature. Each feature is independent of the others. Any combination can be programmed.

The programming modes (features) correspond to the blink count as shown:

StationMaster / Reverser Programmable Modes

- blink 1 = Never reverse.
- blink 2 = Trigger YardMaster after train has stopped.
- blink 3 = Trigger YardMaster before acceleration.
- blink 4 = Use Sensors

When the button is released the StationMaster will echo the currently programmed features (modes) by blinking the red/green LED 4 times. For example, if "Trigger after train has stopped" has been programmed (button pressed for 2 blinks) and nothing else is programmed the StationMaster will blink:

- blink 1 RED: Never Reverse is OFF
- blink 2 GREEN: Trigger YardMaster after stopping ON
- blink 3 RED: Trigger YardMaster before acceleration OFF
- blink 4 RED: Use sensors OFF. Time based start of deceleration enabled (default).

Example #2, if "Trigger before acceleration" has *also* been programmed, the StationMaster will blink RED - GREEN - GREEN - RED. (#3 is now green)

Each time the operating feature is programmed that function (and only that function) will toggle on or off. (Toggle means the feature will go OFF if currently ON, or ON if currently OFF)

To view the currently programmed operating modes quickly press and release button #1 before the RED/GREEN LED blinks. (Must already be in secondary programming mode) The StationMaster will then echo the currently programmed features.

Note that a factory reset will clear all programmed modes.



Programming: Train Count

The train count is needed for to send proper signals to attached YardMasters to correctly fire turnouts. **It is not needed for simple back-and-forth reversing.**

For example, a 3 track siding hookup using 2 YardMasters wired in parallel would have a train count of 3, since 3 trains will be controlled.

Programming:

1. Make sure all three sensor inputs are open.
2. If not already in programming mode turn the top speed dial to zero. (fully counter-clockwise.) The sensor LED will turn ORANGE.
3. Turn the top speed dial to about **half position**. This enables the secondary programming options. The sensor LED will turn GREEN to indicate secondary programming mode. (Skip this step if already in secondary programming mode)
4. Press and hold button #3.
5. Watch the status led. Each orange flash counts the number of running trains.

Release the button when the desired number of flashes have occurred. The number will be echoed back when the button is released.. Repeat this procedure if you want a different value.

To verify the programmed number, briefly press button #3 one more time and count the number of blinks that are echoed back.

When finished with all programming, increase the top speed dial clockwise to maximum. All programming values are stored in flash memory and saved until re-programmed again.



Programming: Factory Reset

To set the StationMaster back to factory defaults perform the following:

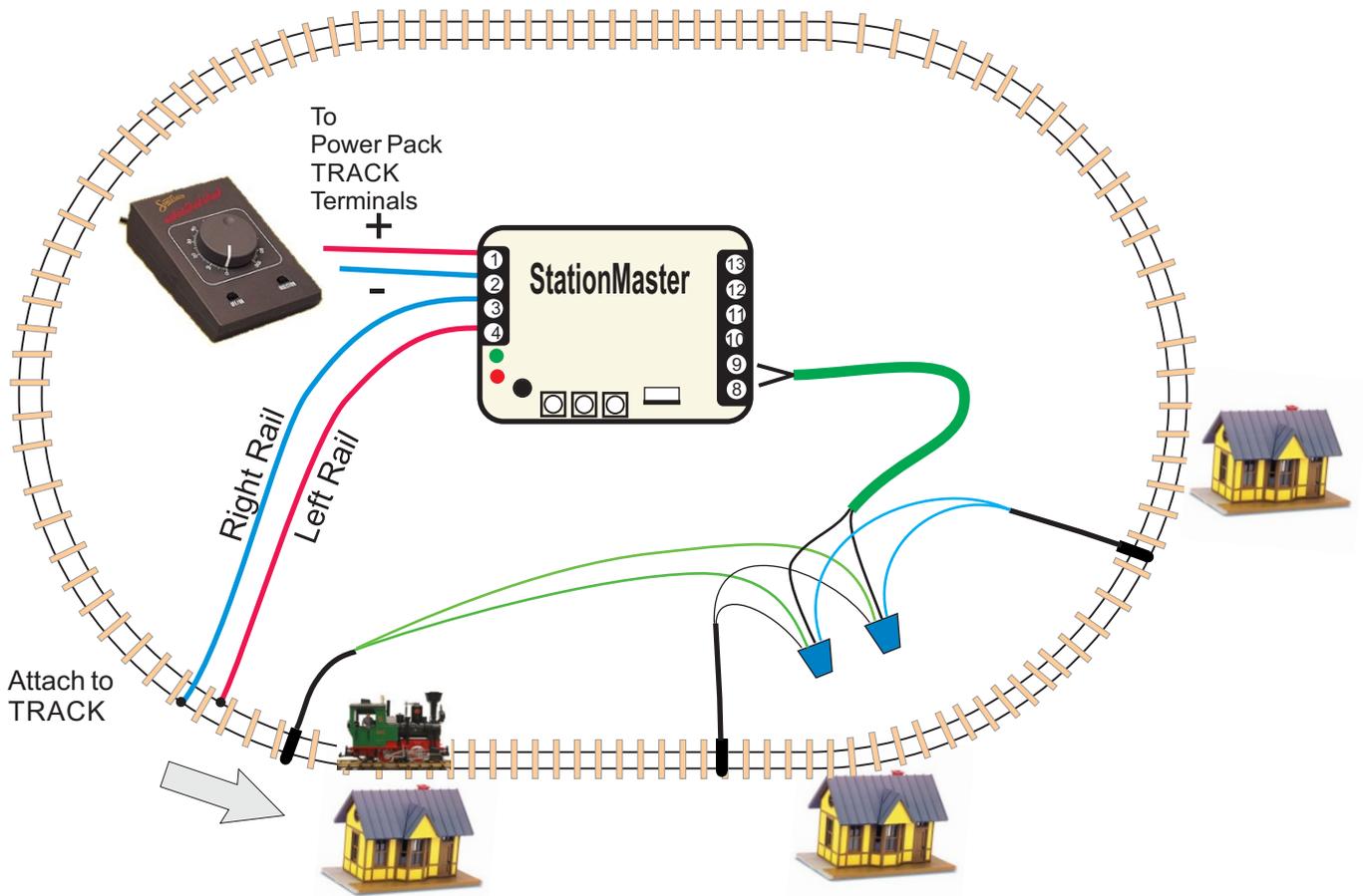
- 1: Enter programming mode by turning the top speed dial fully counter-clockwise
2. Press and hold both button #1 and button #3
3. The StationMaster will blink orange to indicate factory reset. Release the buttons.
4. Exit programming mode by turning the top speed dial clockwise.

The factory default settings are:

- * Acceleration rate 2 blinks
- * Deceleration rate 4 blinks.
- * Time delay 0 seconds.
- * Train count 1
- * All programming features off:
 - Blink 1 = RED, always reverse.
 - Blink 2 = RED, do not fire YardMaster before accelerating
 - Blink 3 = RED, do not fire YardMaster before decelerating
 - Blink 4 = RED, do not use sensors. Perform self-adjusting train sensing using diodes.

Multiple Station Stops

Your train can stop at many stations on the loop by adding DECEL sensors in parallel.



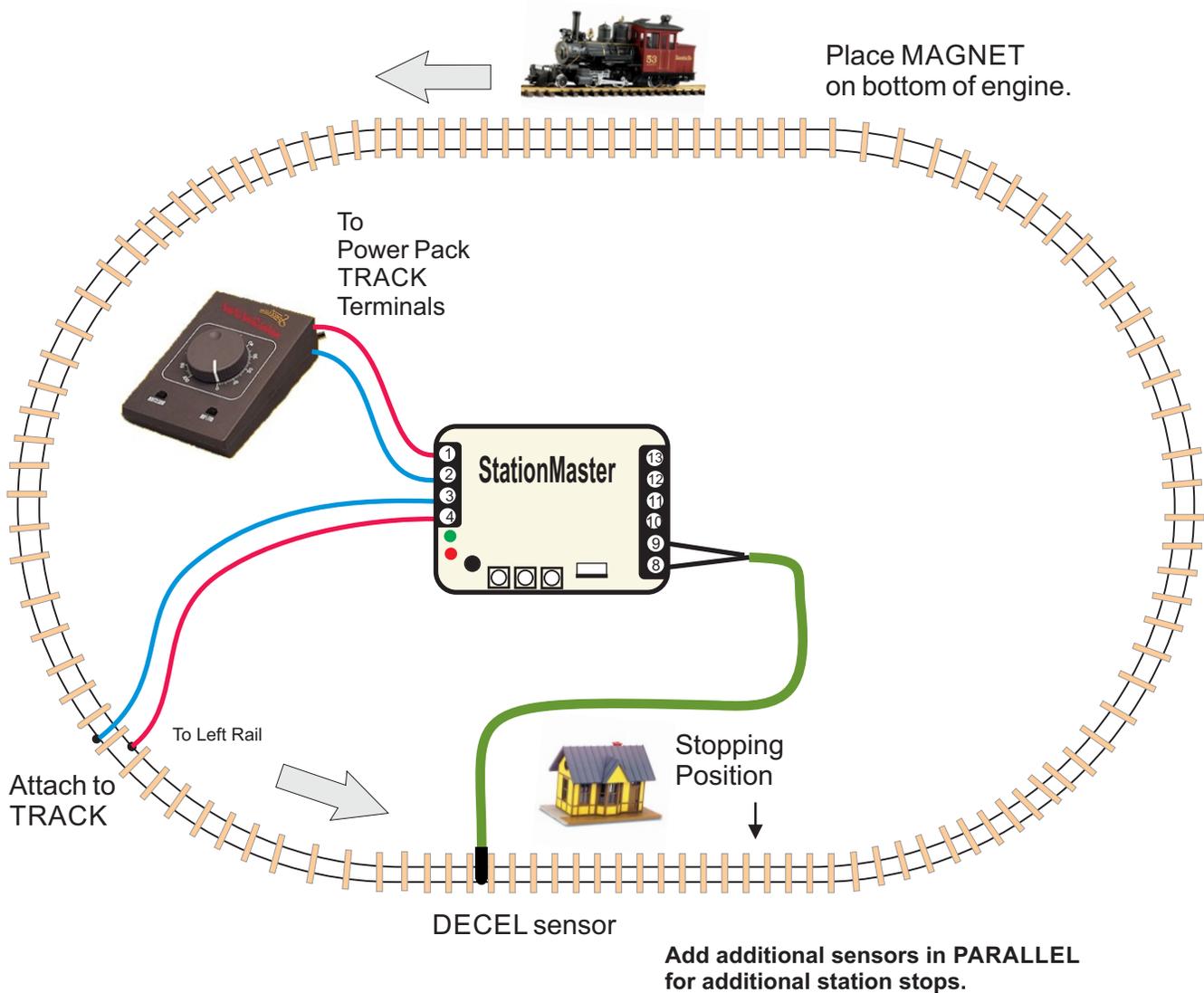
Program blink 1 for "Non-reversing mode".

Program blink 4 for "Use sensors".

Programming mode should echo GREEN-RED-RED-GREEN.

Every sensor that the train passes over will cause a decelerate/pause/accelerate sequence.

Basic Hookup Diagram for Automatic Station Stops with Deceleration/Acceleration



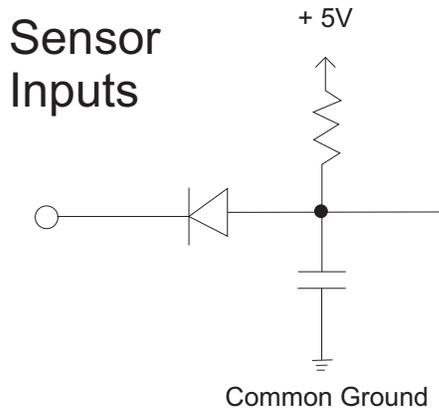
Program blink 1 for "Non-reversing mode".
 Program blink 4 for "Use sensors".
 Programming mode should echo GREEN-RED-RED-GREEN.

For a simple station stop, this is all you need to do!

Electrical Details

For reference only

The locations of the common grounds could be useful for some wiring harnesses.



Troubleshooting

Problem:

The StationMaster goes into shutdown mode when it should not.

Background:

When exiting programming mode the StationMaster turns on internal relays to short circuit the track for a brief amount of time. During this time the power entering the current sensor is measured. This is then stored as the “shutdown” current. When the StationMaster detects this amount of current flowing thru the track it will shut down assuming that there is a short circuit due to a derail, mis-wire, etc. Sometimes a low shutdown value can be recorded if the transformer is set to a low value during programming operations. If the transformer throttle is then turned up while running the StationMaster will sense an over current and shut down.

Solution:

During programming mode turn the transformer throttle up to full speed.

To exit programming mode (as normal) turn the StationMaster dial fully clockwise and allow the relays to click. At this time the true shutdown current is measured and recorded. When the green LED starts flashing turn the transformer throttle back down to the desired top speed of the train.

Problem:

The trains stops before reaching the ends.

Background:

The time to start decelerating is set by button #3 and retained in memory, however the speed of the train could have changed due to a change in the transformer throttle position, change of train engine, or change in programmed acceleration or deceleration blinks.

Solution:

Any one of the following will allow the train to run farther before stopping:

1. Turn the top speed dial clockwise to increase the creep speed.
2. Turn up the transformer throttle.
3. Increase the programmed time delay.
4. Change the START DECELERATION spot to be closer to the ends. (Press button #1 to clear the programming for this direction and press button #3 again to set the point where deceleration starts after the train reverses and comes back.

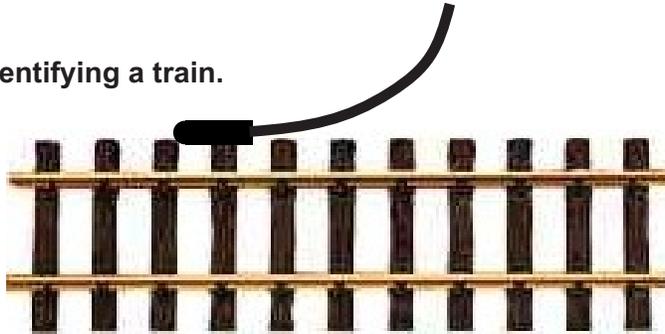
Sensor Placements on Track

The suggested sensor placement on track is shown below with the train magnet installed in the center of the train. Best sensing is done with the magnet passing over the tip of the sensor.



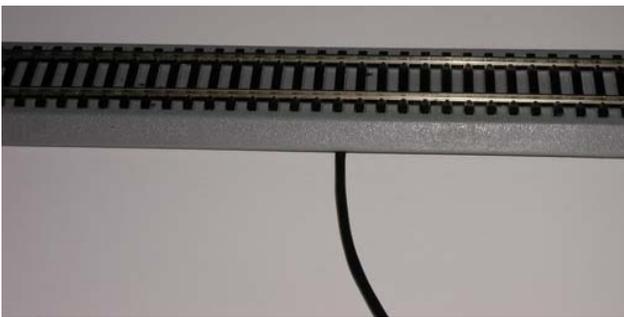
Sensor Placement for identifying a train.

Offset the train's magnet to the same side as the sensor as shown.



For example, passenger trains have the magnet offset to the right and freight trains have the magnet offset to the left side.

Sensor placement for HO EZ track is under the roadbed.



Other scale trains can place the sensors where appropriate. Very small sensors are available which do not have the waterproof housing. These smaller sensors can be used for N, HO, etc. Contact RR Concepts for these sensors.

WARRANTY

Your StationMaster is warranted, and guaranteed operational for 1 year. It will be repaired or replaced at no charge within that time period. Contact <http://www.RR-Concepts.com> for additional information.