Dec. 1, 2013

RR-Concepts

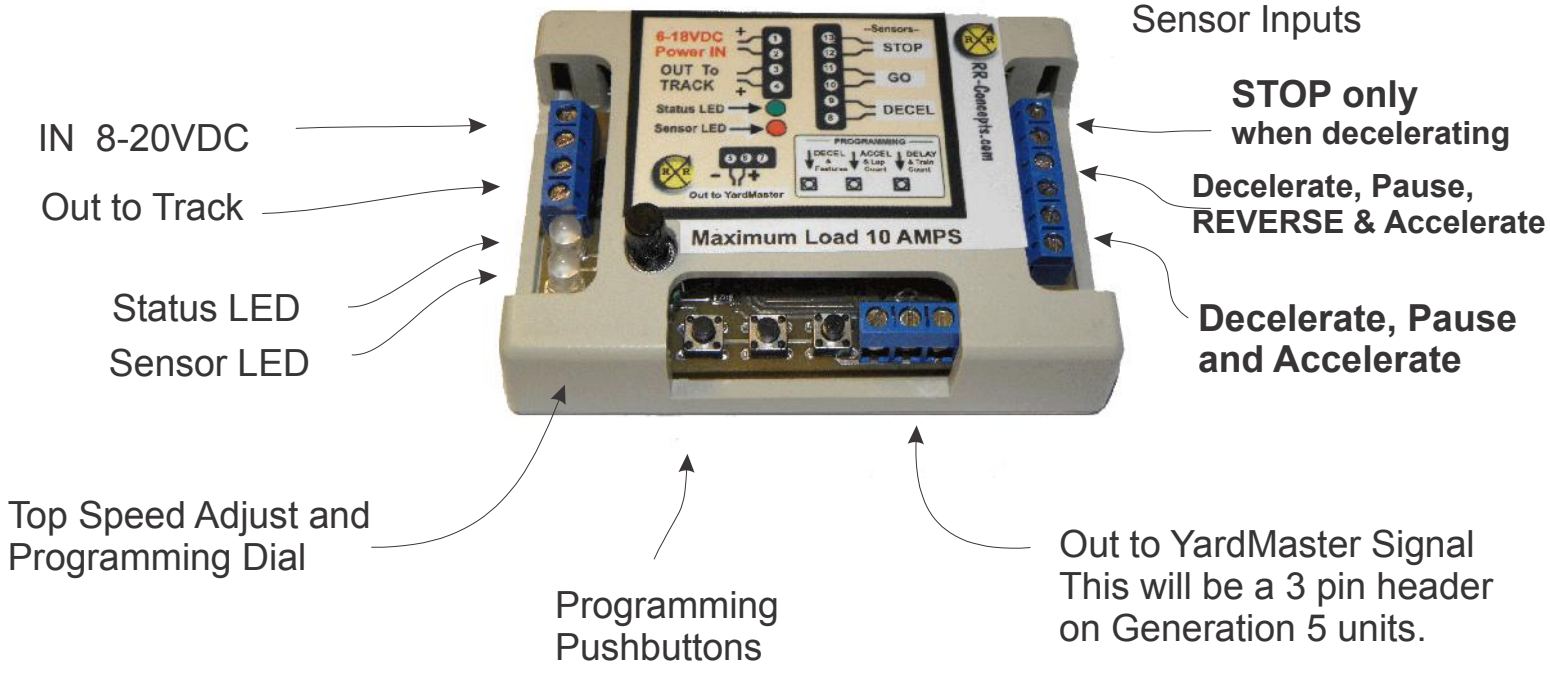
StationMaster

Reversing Train Controller

This manual contains detailed hookup and programming instructions for the StationMaster - Reversing pushbutton 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; and in-between station stops which the standard StationMaster cannot do.
The standard StationMaster can provide a basic reversing operation only by using sensors.

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.



StationMaster

Reversing Train Controller

The StationMaster / Reverser is the ultimate solution for reversing train control. The acceleration and deceleration realism gives your trains museum like operations which in the past could only be done with computer control.

The Reverser uses out-of-the box trains with NO modifications of any kind.

The Reverser allows reversing operations with *or without* using sensors and magnets.

All StationMaster systems (not just the Reverser) can provide reversing operations with sensors and magnets, however the Reverser can self-detect the end of track and will self-determine when to start the deceleration without using any sensors or magnets.

While the StationMaster has the unique “self-adjusting deceleration” feature to provide incredible realism for station stops, the Reverser has the “no-sensor self-adjusting” reversing feature.

The no-sensor operation is the default state for the Reverser since that is it’s main purpose. Please see the programming section if sensors will be used.

Have Fun!!!

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Reversing Operations - No Sensors acceleration, deceleration.

This is the default operation for the StationMaster/Reverser. The train will accelerate and decelerate into and out of the ends of the track without using sensors.

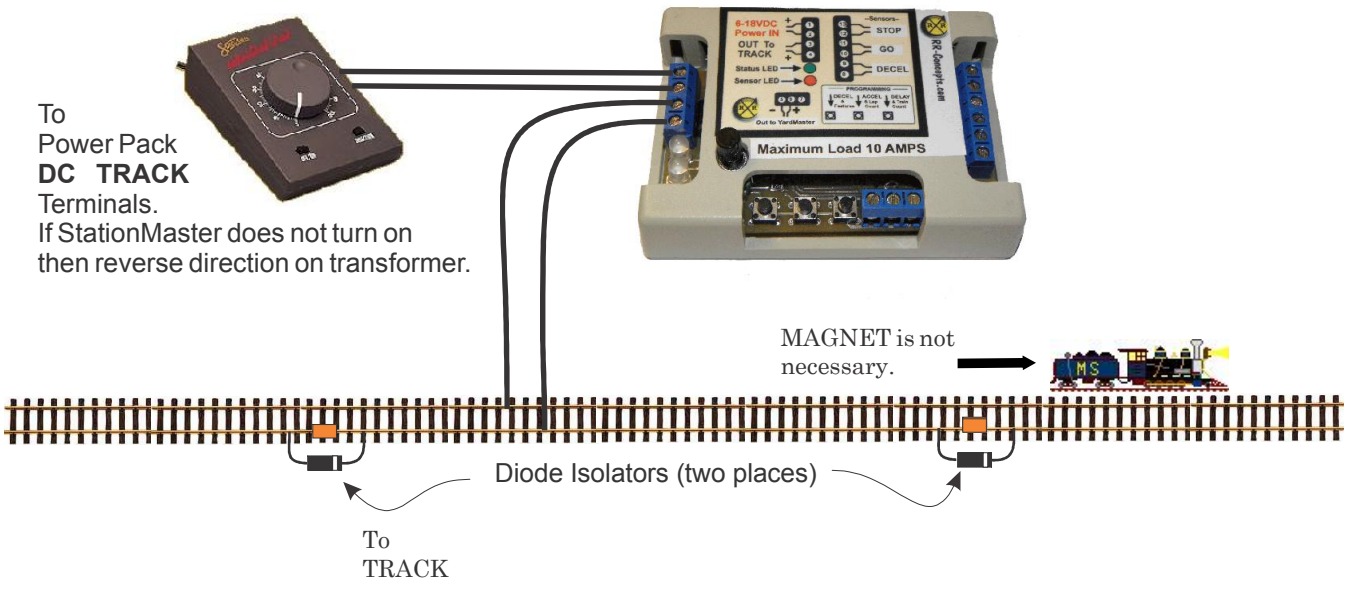
The Reversing StationMaster has logic which can perform an automatic reversing operation without using sensors. Train detection is used to determine when the end of track has been reached.

This hookup uses diodes placed at the extreme ends which will stop the train when it crosses the boundary. If desirable, LGB 10151 units can be use in place of diodes. These are electrically the same. See note below for attaching diodes to ends.

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. A large deceleration rate is suggested so that the trains creep into the ends.

Continued on next page of manual..

Reversing using Diodes



NOTE: Some ways to attach the diodes to the track are shown here:

http://www.trainelectronics.com/autoreverse/track_diodes/track_modification.htm

A 1 or 2 AMP diode is usually sufficient for trolleys. Bachmann trolleys typically run at less than ½ AMP.

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Reversing Operations - No Sensors Continued...

OPERATION:

- When in programming sequence the train will accelerate and travel end-to-end 2 or 3 times at full speed to determine the approximate time required to travel to the ends.
- Once this time is recorded an approximate deceleration time is then calculated. The train will then accelerate and automatically decelerate at the calculated time.
- Once the deceleration time is determined it is stored in flash memory and retained until re-programmed.

HOW TO SET OR RESET THE AUTOMATIC DECELERATION:

1. **Set the transformer for the desired top speed of the train.** Keep the top speed dial fully clockwise.
2. **Press programming button #1.** This will begin a new back-and-forth programming sequence where the Reverser will look for the ends. This can be done at any time the Reverser is running back and forth. A factory reset will also begin the programming procedure.
3. **Let the train run back and forth 2 or 3 times until it starts to decelerate and run automatically.**

If the train goes into the stops but does not reverse, or reverses before reaching the ends then press programming button #3 as soon as the train enters the stops. Once button #3 is pressed it must be pressed again when the train enters the stops on the opposite end. You are manually telling the Reverser when the train has entered the diode section. **(see note 1)**

4. **Slightly turn the top speed dial to "dial in" a perfect stop**.

Once the back and forth is operating the top speed dial will allow a ***longer travel distance*** before stopping. The Reverser will purposely stop short since most trains travel different speeds in forward and reverse. This will also allow different speed trains to be run on the track by only adjusting the dial. In addition, slight changes to the transformer (train speed) can be dialed in to keep the deceleration perfect without resetting the deceleration times again.

To have the trains creep into the diode sections slightly turn the top speed dial counter-clockwise. A very brief blinking will occur as the dial is moved. Each blink will adjust the ***start deceleration time*** by 1 second. Once the dial is set no further adjustments are needed.

Rule of thumb:

If the train stops too soon, turn the dial counter-clockwise one blink.
Do a complete end-to end before adding another blink.

Continued...

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Reversing Operations - No Sensors Continued...

Note 1:

The train detection on the ends is using current sensing technology. This works well with trains which draw over 1 AMP and a transformer which can deliver over 4 AMPS. The StationMaster /Reverser may have difficulty detecting trains with very small motors or with smaller transformers. If the train does not reverse after entering the stops, or the train stops short of the ends and reverses too soon then the train has not been reliably detected and the Reverser cannot determine when the end of track has been reached.

To run with these small trains or small transformers press the programming button #3 as soon as the train reaches the ends. This is exactly the same as the self-detection and the Reverser will determine the deceleration time after traveling back and forth 3 times. Make sure to press the button when the train has stopped in the diode section.
Notice that the sensor LED will turn ORANGE when the Reverser is waiting for the button to be pressed. Once the programming operation is complete the LED will turn off.

Of course any train of any size will operate when using sensors. Make sure to program blink #4 when sensors will be used.

Adjustment notes and some FYI details

1. **For reversing lengths less than 8 to 10 feet the train will not move before reversing.** This is okay! Just slightly turn the top speed dial counter-clockwise until the train moves and decelerates properly. Please wait for a complete back-and forth before each adjustment. The Reverser tried to calculate a 5 second deceleration based on top cruising speed however cruising speed was never reached with a short track section. The adjustment dial will allow perfect decelerations with all track lengths.

2. Sometimes a train will run more realistically when the transformer speed is high. When the acceleration rates are slow (factory default settings) the train will probably not reach top speed before starting to decelerate depending upon the length of track. This usually gives a very realistic acceleration and deceleration into the stops.

As previously mentioned the factory default acceleration and decelerations work well however these can be changed at any time if desired.

FYI
At any time when the status LED is flashing red (decelerating or time delay) pressing programming button #2 will instantly change the direction and accelerate. This is a convenience function. Be careful not to press button #1 unless a re-programming of the decelerate time is desired. Programming button #3 has no affect while running unless the Reverser is hunting for the end of the track. (LED is orange)

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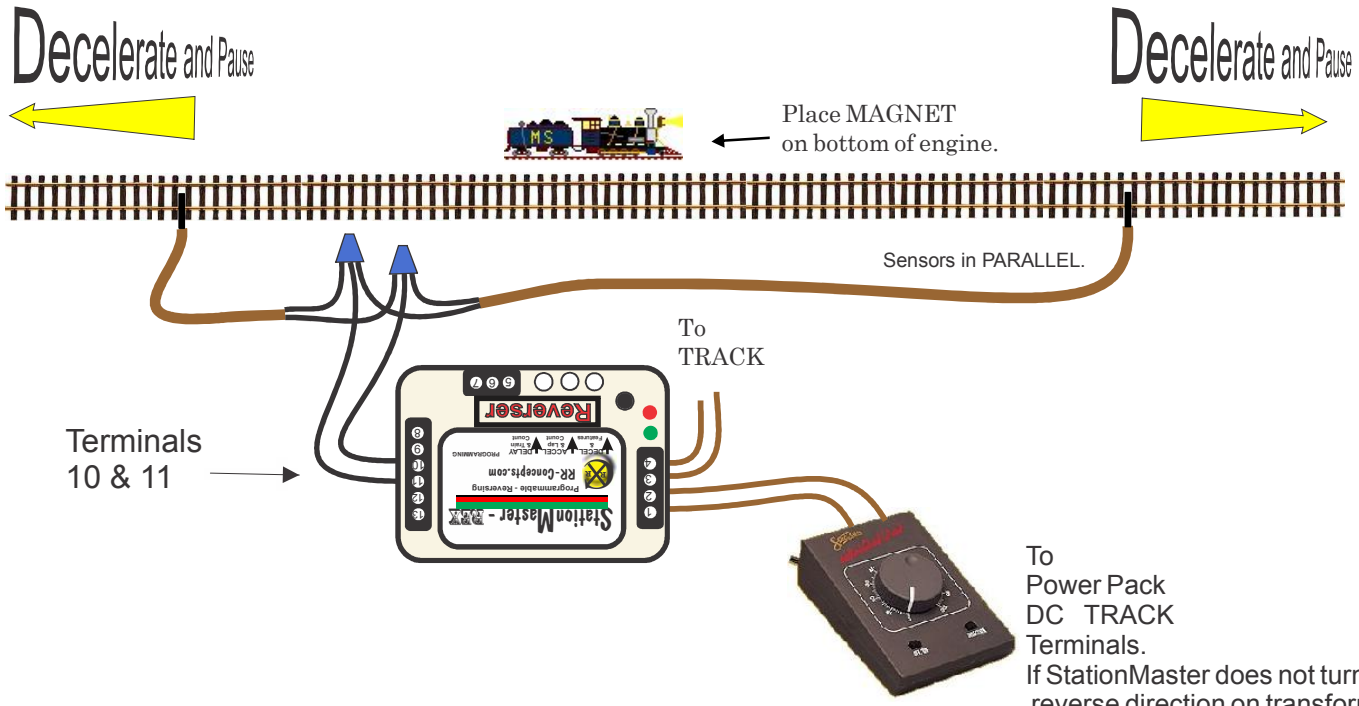
Reversing Operations using Sensors

When sensors are used the StationMaster will reverse before every acceleration and ignore the next DECEL sensor it encounters after a reversal. This will allow reversing operations with full acceleration and deceleration.
This hookup requires a sensor to be placed on the extreme ends to signal the StationMaster to begin the deceleration/pause/acceleration sequences.

Reversing using Sensors



PROGRAMMING:
Set programming blink 4 to use sensors.
Programming mode should echo RED-RED-RED-GREEN.
(See programming instructions for more info)
Set acceleration and deceleration rates as desired.
Set time delay on ends as desired.

<u>In-Between Station Stops</u>
For in-between station stops add sensors to terminals 12 & 13 wired in parallel. Note that 2 sensors must be used for each stop. Place sensors so that the train stops between these sensors. This will allow the train to stop at the same position regardless of direction. There is no limit to the number of stops that can be added.

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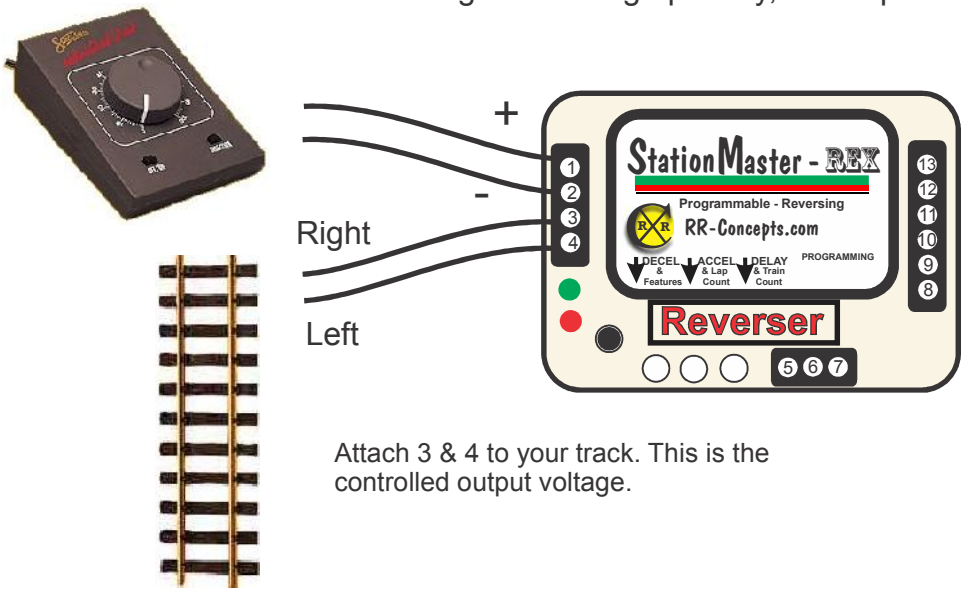
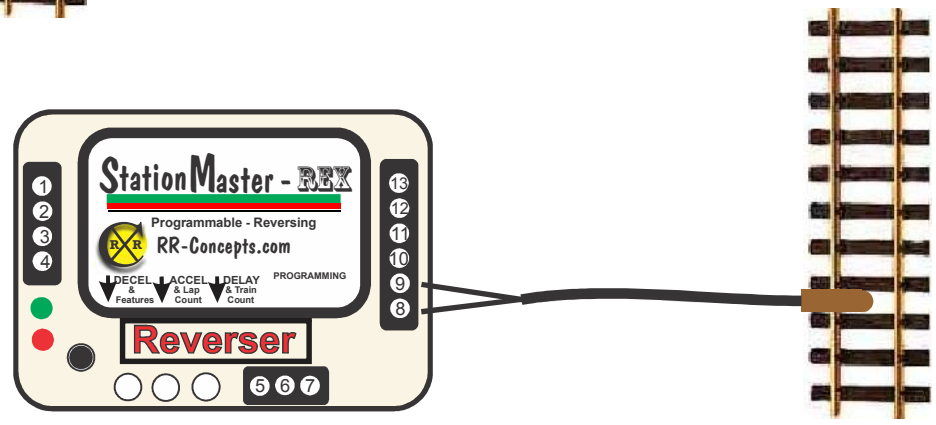
StationMaster Basic Hookup Description

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 active when programming blink 4 is GREEN.
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.**

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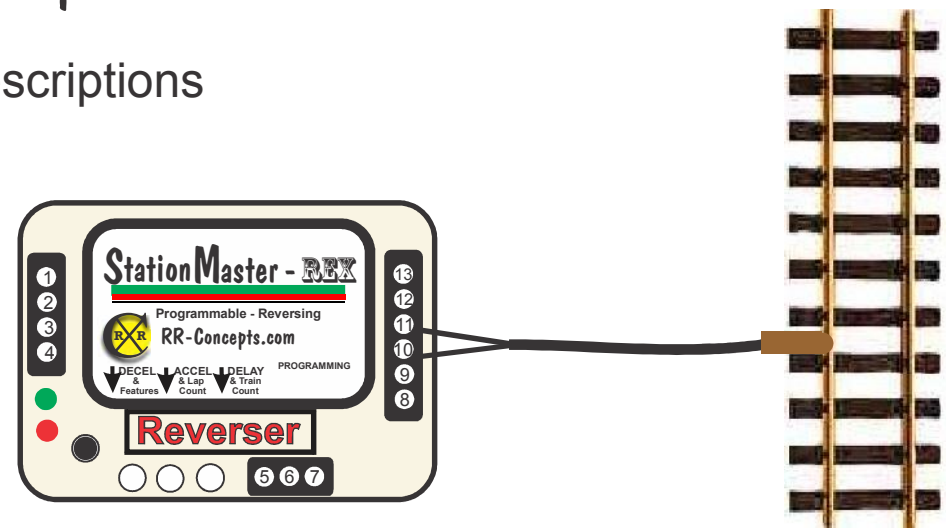
Sensor Descriptions

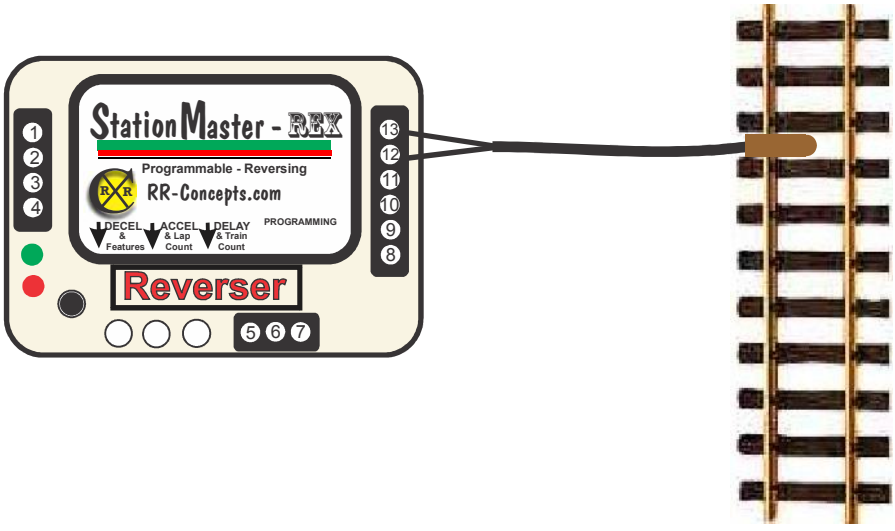


Decelerate and Reverse Sensor

Only active when programming blink 4 is GREEN.
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 active when programming blink 4 is GREEN.
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.

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

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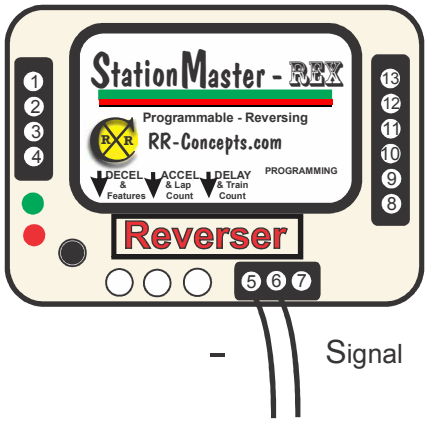
TRIGGER Output Signal

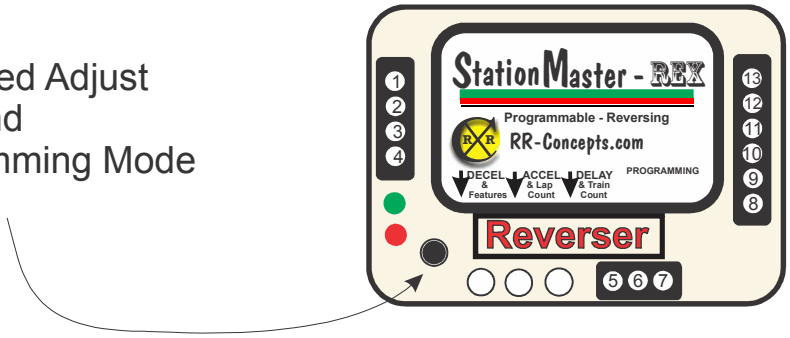


Pins 5 and 6 are the TRIGGER Output signals.

These pins provide a very low voltage **OUTPUT** used to trigger the sensor input of another module.
These terminals should only be attached to a YardMaster, SIM, or to another StationMaster's sensor terminals. Note that the polarity of these wires is important. If the trigger does not occur, then reverse these two wires.

These terminals are used for advanced hookups, and are not necessary for simple installations. Never touch these terminals to track power.

Top Speed Adjust and Programming Mode



When SENSOR mode is **ON** (Programming bilnk 4 is GREEN)

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.

When SENSOR mode is **OFF** (Programming blink 4 is RED) *Default condition*

This dial changes the time when a deceleration occurs. (See reversing mode, no sensors)

To program your StationMaster, turn this dial fully counter-clockwise to enter "programming mode". (See below)

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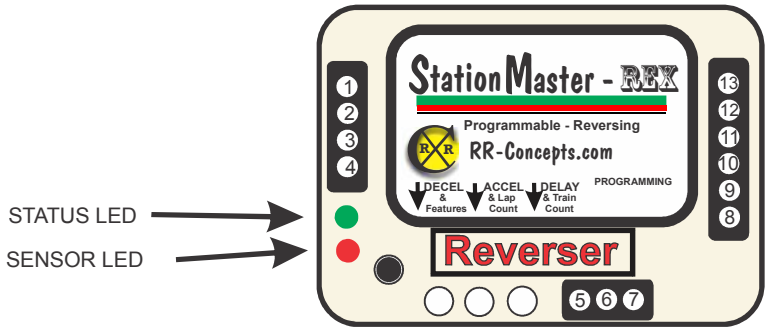
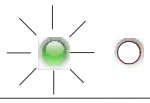
LED indicators



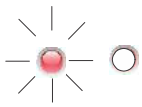
STATUS LED SENSOR LED



Green flashing: train is **ACCELERATING**.

Green NOT flashing**:** Train is **AT TOP CRUISING SPEED.**

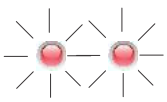
Orange NOT flashing, StationMaster **will ignore next DECEL sensor**



1. Quick Red flashing: Train is **DECELERATING.**

2. Red flashing at 1 second rate: StationMaster is performing a **time delay.**

Sensor LED RED indicates “Train sensed” and traveling REVERSE direction .



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.

1. Sensor LED GREEN indicates secondary Programming mode.

2 Sensor LED GREEN indicates “Train Sensed” and traveling FORWARD direction.

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Programming: **Deceleration Rate**

1. Make sure all three sensor inputs are open. (Red LED is off)

2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) All LED'S will turn off.

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 5. Repeat this procedure if you want a different value. The LED will flash orange when the longest Deceleration rate is set (15 counts).

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

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Programming: Acceleration Rate

1. Make sure all three sensor inputs are open. (Red LED is off)

2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) All LED'S will turn off.

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 5. Repeat this procedure if you want a different value.
The LED will blink orange when the longest **acceleration** rate is set
(about 25 counts).

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

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Programming: **Pause Time**

1. Make sure all three sensor inputs are open. (red Led is off)

2. If the top speed dial is not already at zero, then turn the top speed dial to zero. (fully counter-clockwise.) All LED'S will turn off.

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.**

Open the terminals 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 MAX or to a desired top speed. 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.

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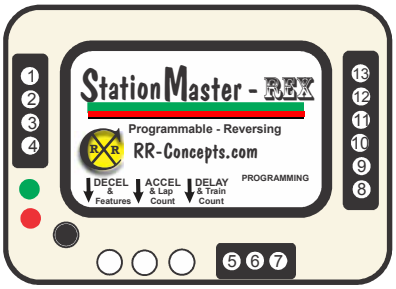

Programming: Operating Modes

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.

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. Do not sense end of track.

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, self-adjusting train sensing mode is on.

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.

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Programming: **Train Count**

The train count is needed for 2 reasons:
1. Perform the self adjusting deceleration for up to 5 trains.
2. Send proper signals to attached YardMasters to correctly fire turnouts.

For example, a 3 track siding 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.) All LED'S will turn off.

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 MAX, and then down to a desired top speed. All programming values are stored in flash memory and saved until re-programmed again.

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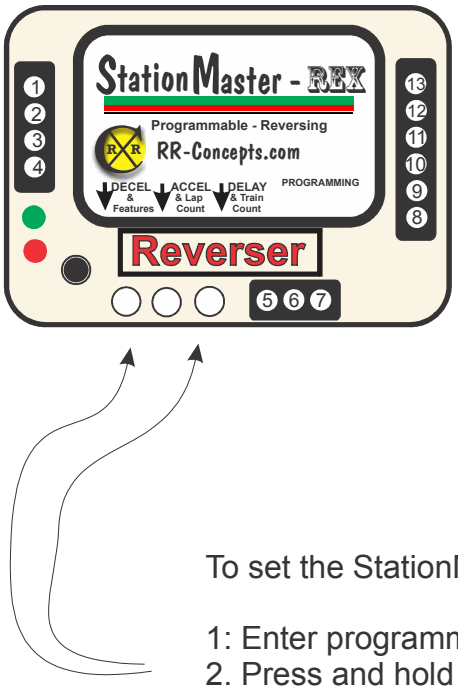

Programming: **Factory Reset**

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.
4. Exit programming mode by turning the top speed dial clockwise.

The factory default settings are:

* Acceleration rate 5 blinks
* Deceleration rate 16 blinks.
* Time delay 5 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.

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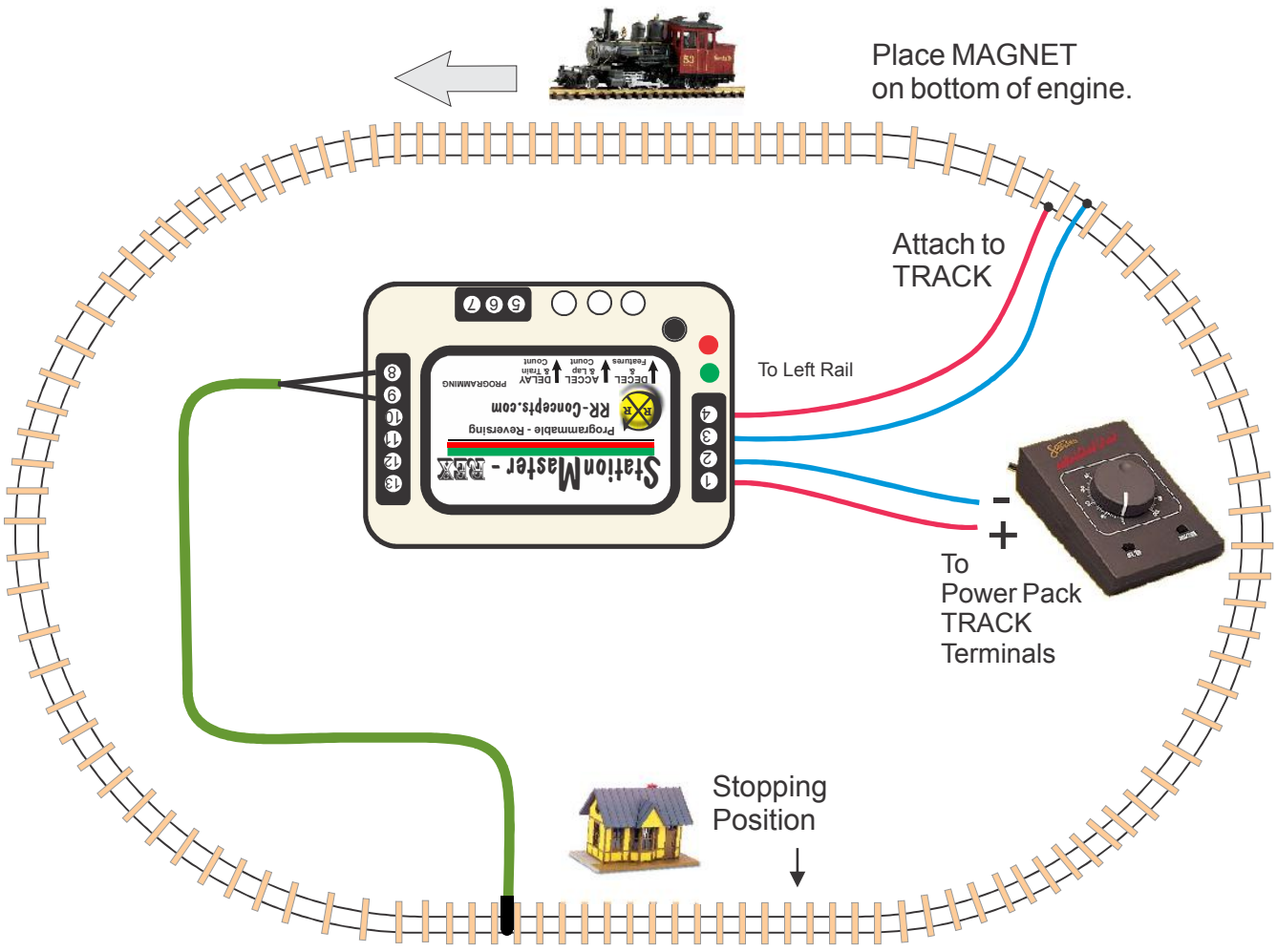
Basic Hookup Diagram for Automatic Station Stops with Deceleration/Acceleration



Add additional sensors in PARALLEL for additional station stops.

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!

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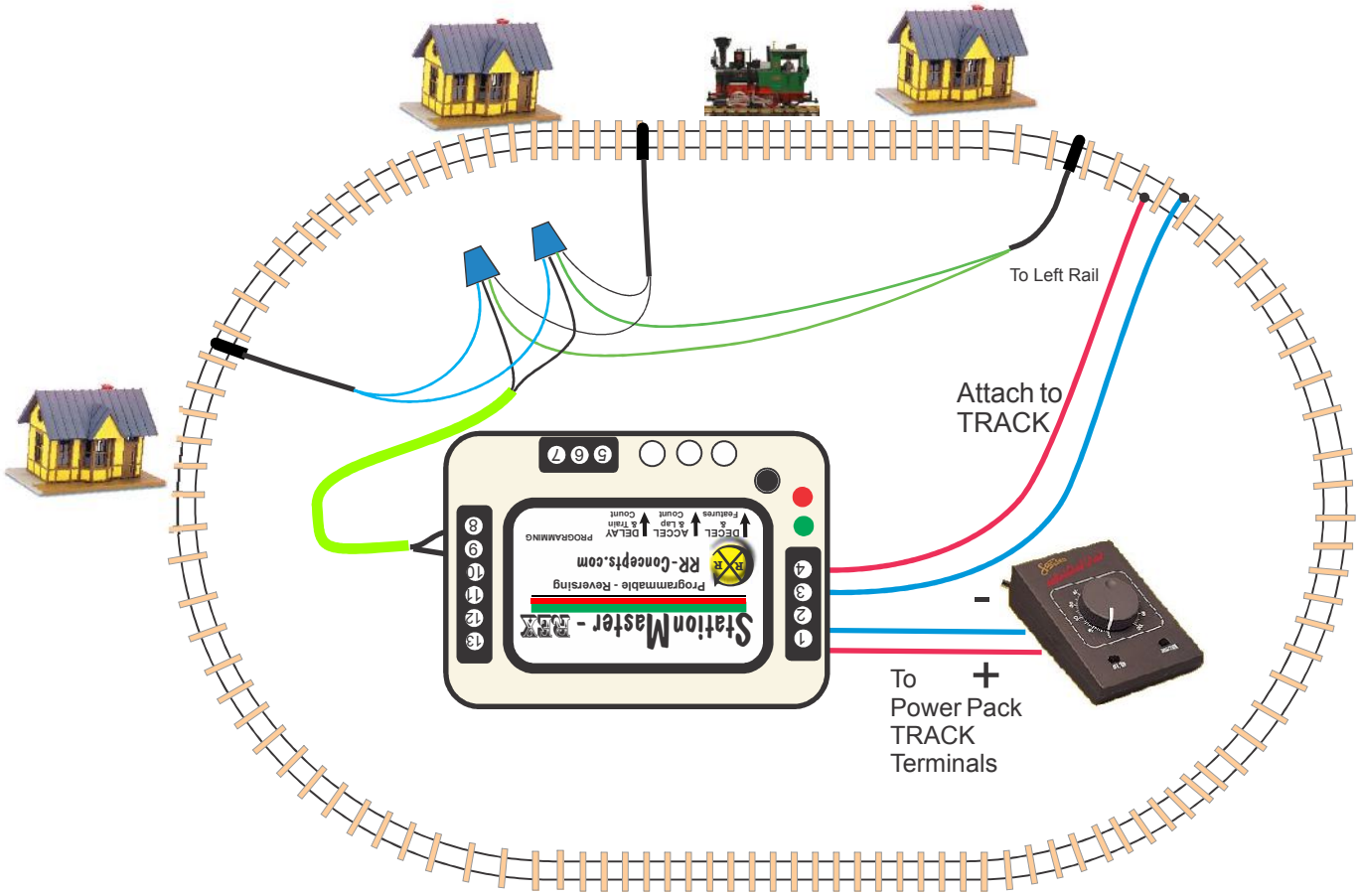
Multiple Station Stops

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 declerate/pause/accelerate sequence.

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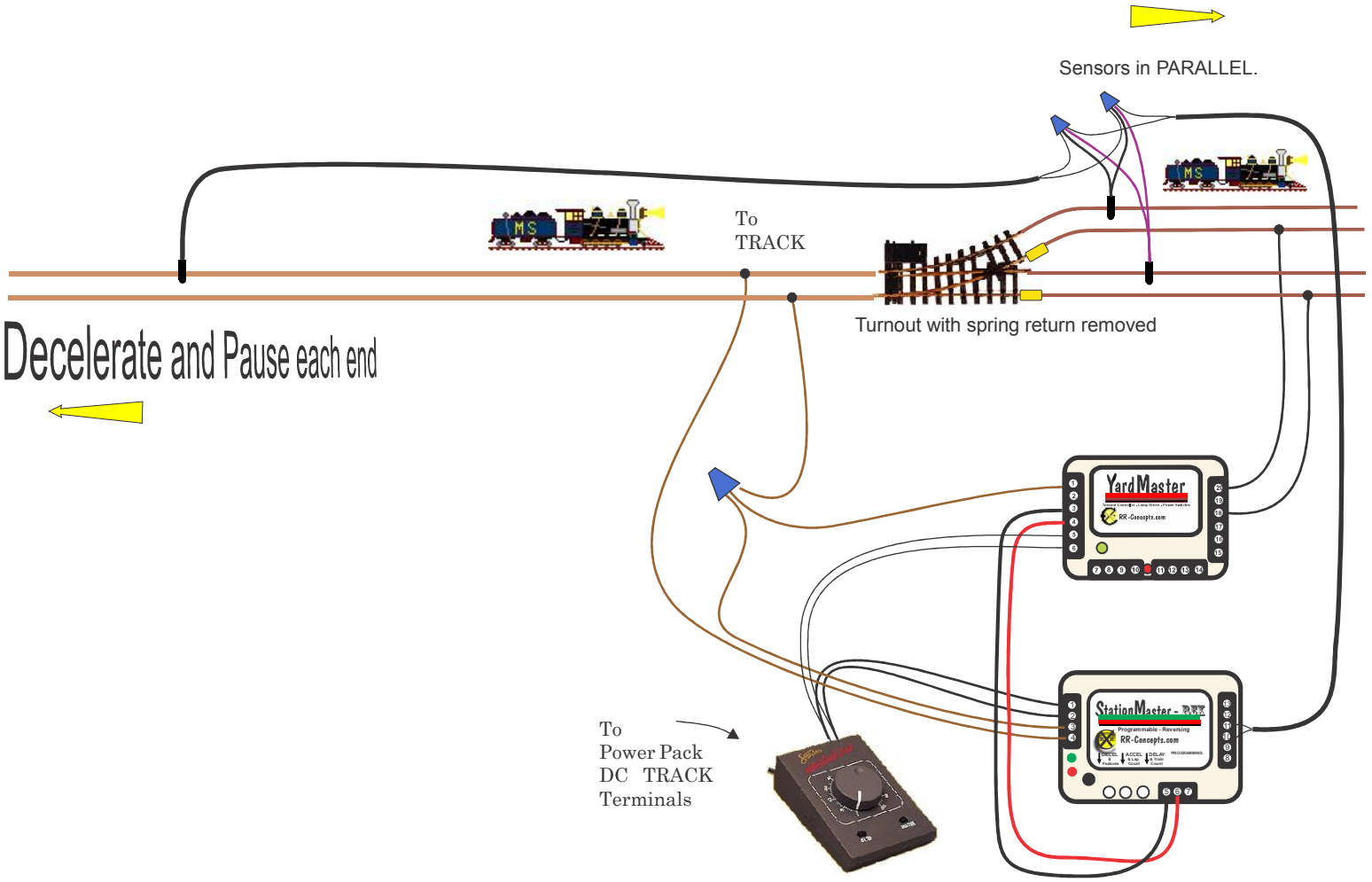
Point to Point Reversing With a Siding on One End

2 Trains Alternate running



NOTES:
1. Place MAGNET on each engine.
2. Powered turnout and signal lights are optional.
3. Reverser can be used in sensor or non-sensor mode. Sensor mode is shown.
5. Program Reverser for 2 trains.

YardMaster LED Indicator:
GREEN: Upper track has power.
RED: Lower track has power.

First time start up: (only do this once)
Place1 train in center and power up.
- If train enters siding and YardMaster switches, GOOD.
- If train goes to far end and YardMaster switches then reverse wires in StationMaster terminals 3 and 4.

See RRconcepts.com for additional hookup details.

Notice that the Reverser has sensor connections in terminals 10 and 11 while the StationMaster uses 8 and 9. The StationMaster hookup also has programming details which do not apply to the Reverser.

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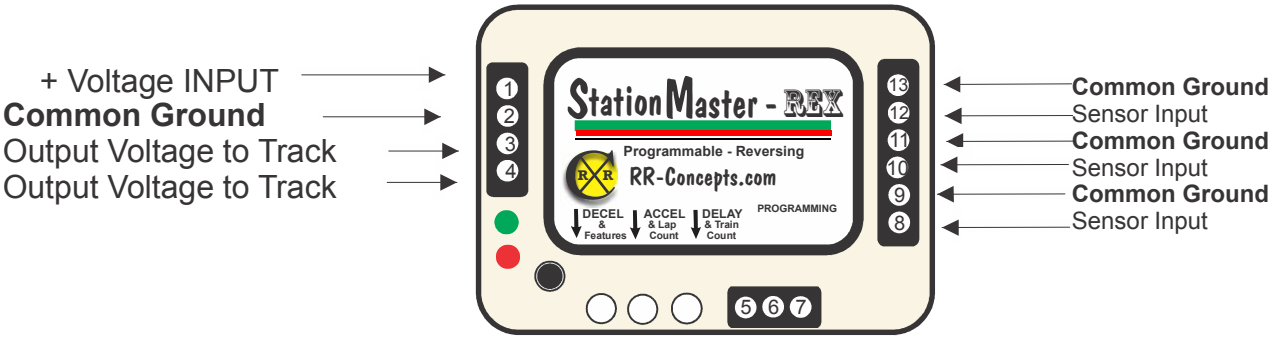
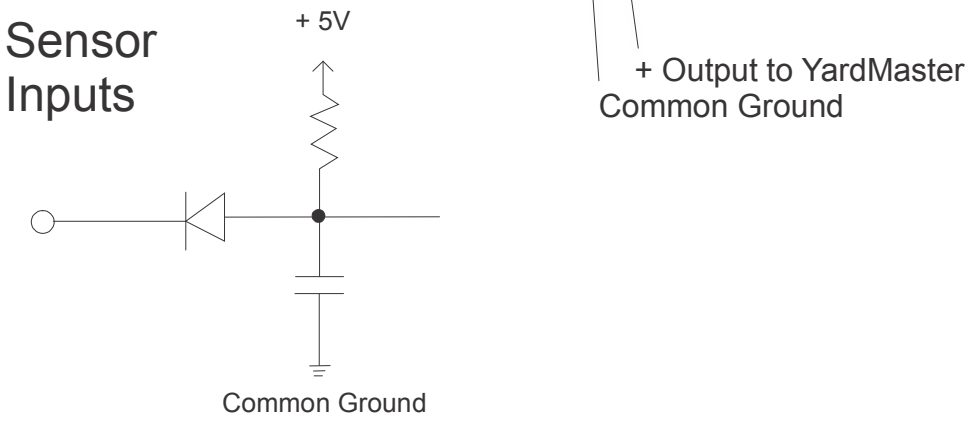
Electrical Details

For reference only

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





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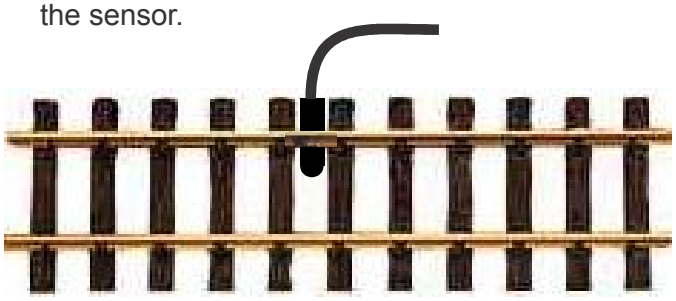
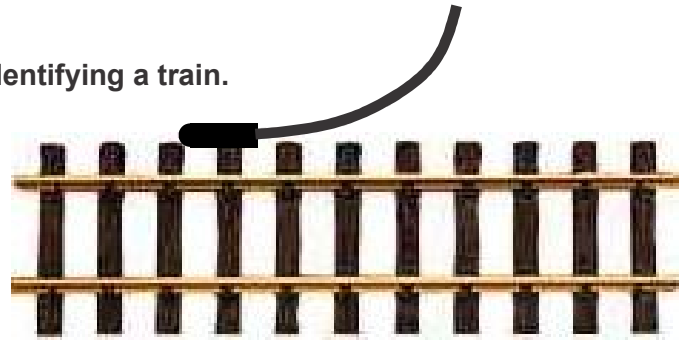
Sensor Placements on Track

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.



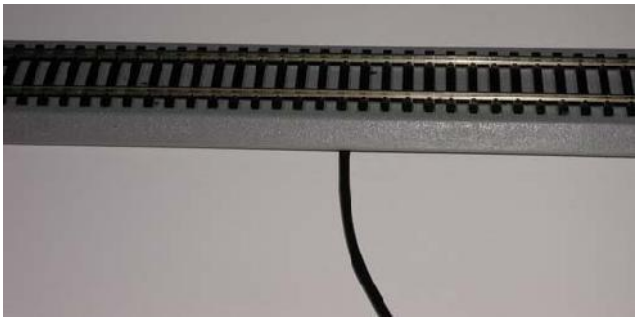
Sensor Placement for identifying a train.



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.