March 2020

RR Concepts

StationMaster - 5

STATION STOP - Train Controller

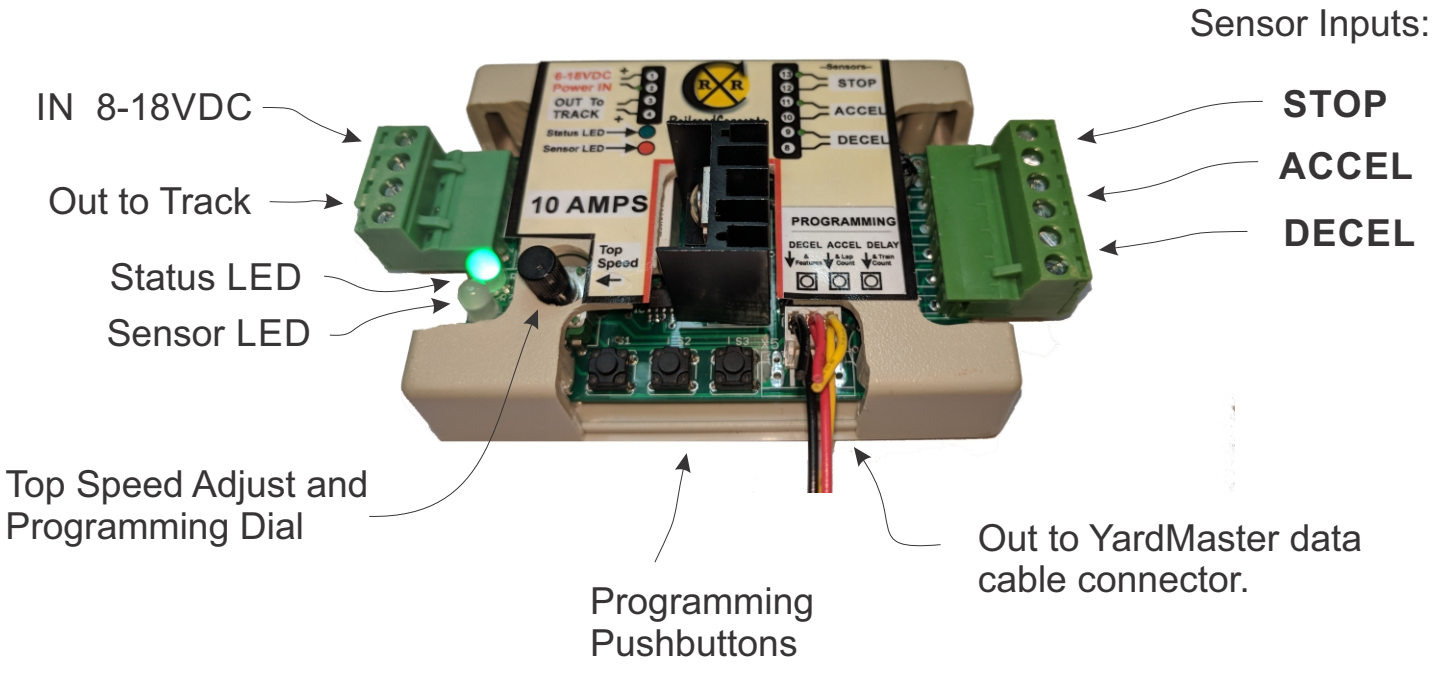
This manual contains detailed hookup and programming instructions for the StationMaster train controller available in a 4 AMP or 10AMP configuration. The StationMaster-5 *STATION STOP* will control trains in one direction.

The StationMaster can control DC trains or DCC equipped trains set to linear mode.

Before we Start- Please do not attach power wires (from your power pack or transformer) to any other terminals except the designated input pins 1 and 2. Your StationMaster will be damaged if power is put on any of the sensor terminals.

ONLY ATTACH WIRES WHILE THE POWER IS OFF.
Quick-connect terminals allow easy swap-out and removal of the electronics while leaving the wires in place. The RR Concepts Magnet/Screwdriver tool is recommended for wire-up and testing of operations.

See decal on bottom for optional programming information



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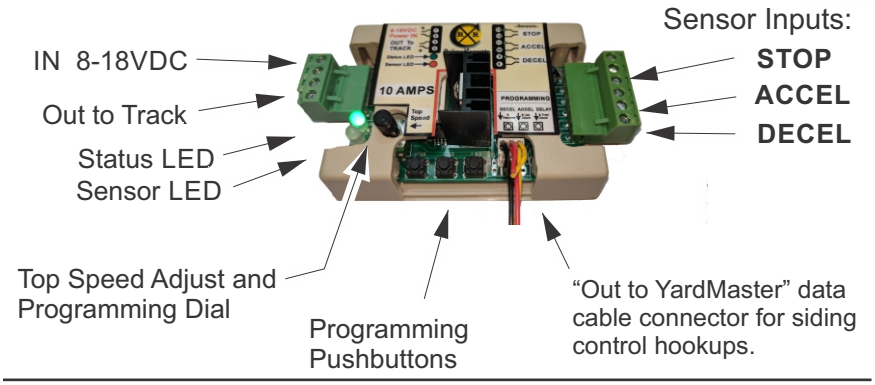
Quick Hookup Instructions

How to do
Realistic Station Stops &
Realisitic Reversing (More details in manual)

The StationMaster works with DC (out of the box) or DCC trains set to linear mode. (N, HO, G, etc.) AC trains cannot be controlled.

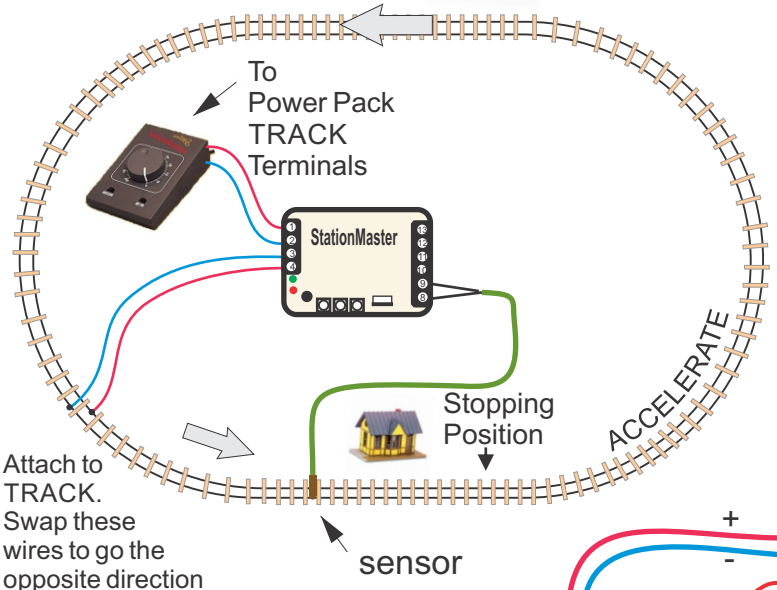
StationMaster CONNECTIONS and CONTROLS



See the label on the bottom for programming and additional information.

10 AMP Version shown, Also available in 4 AMP configuration.

Station Stop Hookup

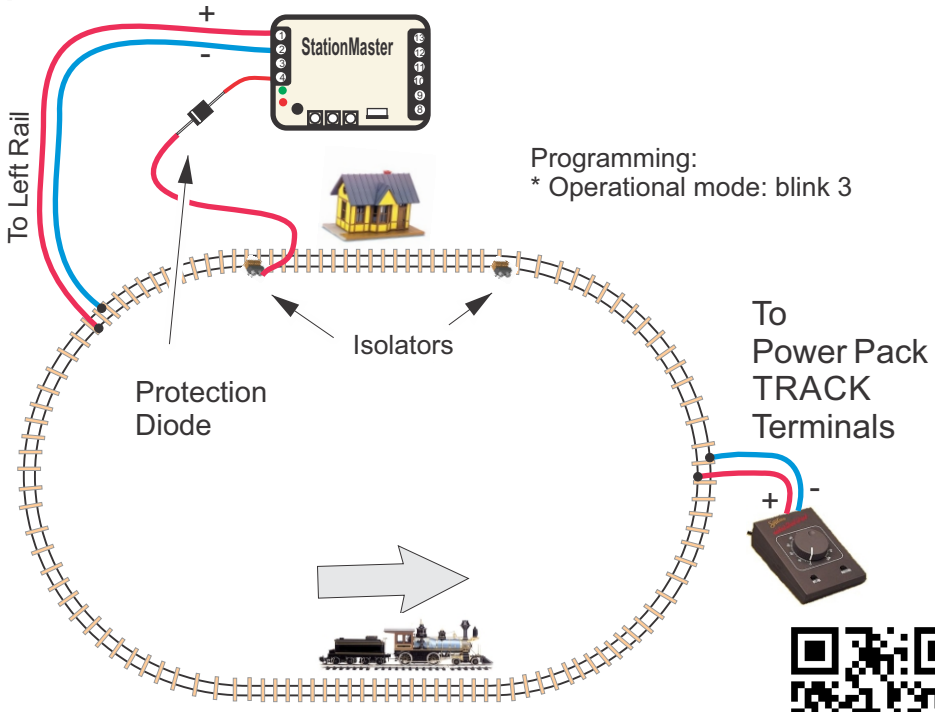


Accelerate + Decelerate Station Stop Hookup

1) Attach terminals 1 & 2 to the transformer.
2) Attach terminals 3 & 4 to the track.
3) Attach terminals 8 & 9 to a train sensor. (No polarity)
4) Mount a magnet on an engine or car.
Set the transformer to the desired top speed. That's it!

See the online manual for optional additional features:
* Change acceleration rate,
* Change deceleration rate,
* Add additional station stops,
* Do multiple laps before stopping,
* Run 2 trains on the same track.
* Change station stop pause duration, (Default 10 seconds)
* Perform "Creep-Stop" deceleration for enhanced realism and exact stopping location. (Requires STOP sensor)

Station Stop Without using Magnets or Sensors



Go to ***StationMaster.net*** (bottom of page) and download the 25 page user manual for more info.
Visit **RailroadConcepts.com** for more fun, advanced hookups, and ordering parts.

SCAN FOR INFO

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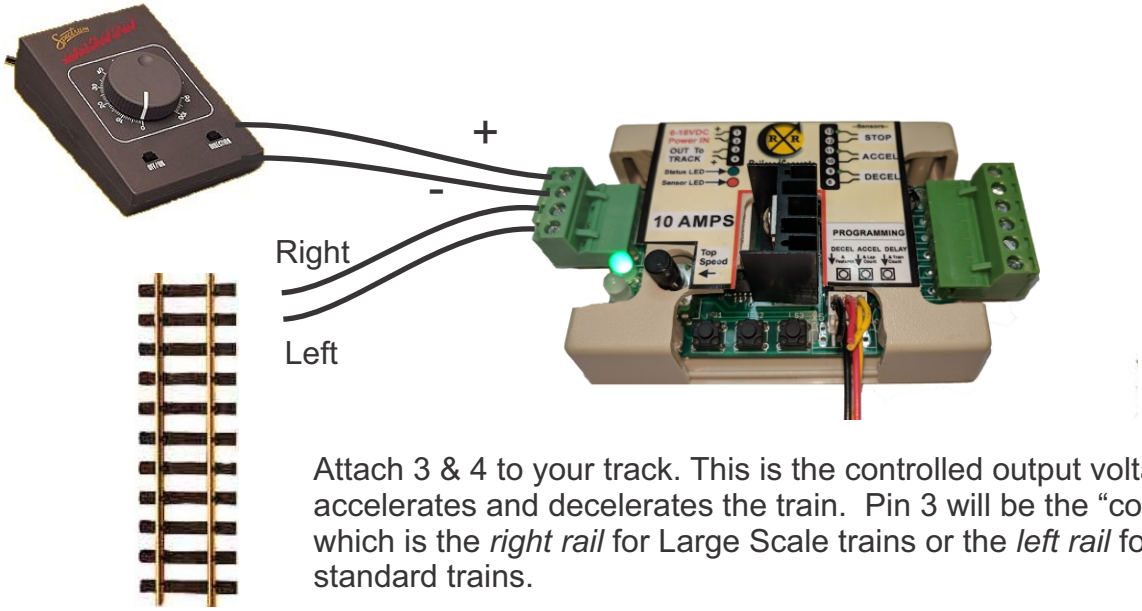
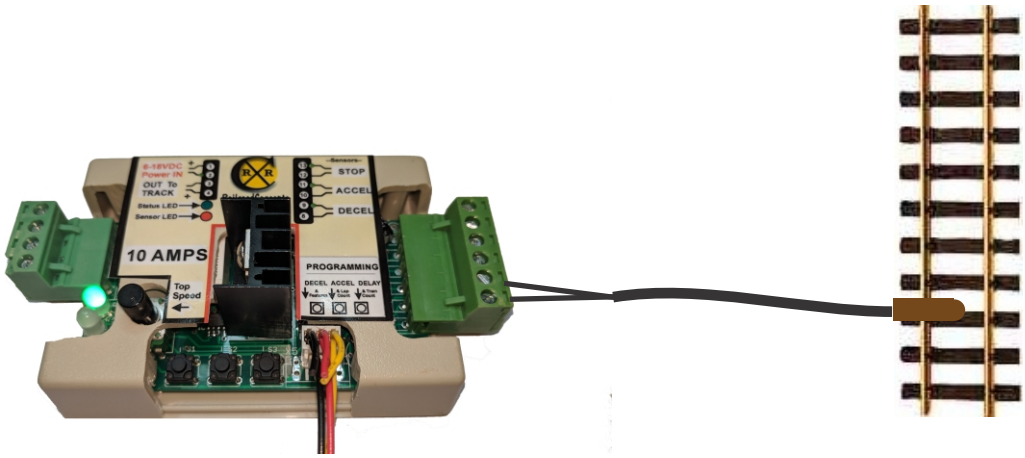
StationMaster Basic Hookup Description

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

Attach terminals 1 & 2 to your transformer's DC output (Sometimes labeled as TRACK) or to a constant 12 volt power source. If using a train transformer set the 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 that accelerates and decelerates the train. Pin 3 will be the “common” wire which is the *right rail* for Large Scale trains or the *left rail* for NMRA standard trains.



DECEL Sensor

Terminals 8 & 9 are the start DECEL sensor input.
When these terminals are closed (sensor detects a magnet) the StationMaster will begin a decelerate, pause, and then accelerate sequence. The RED “Sensor LED” will light up for as long as this sensor is detected. By placing multiple sensors wired in parallel, the StationMaster can stop at multiple stations on your railroad.

Pressing button #1 will simulate the DECEL sensor operation.

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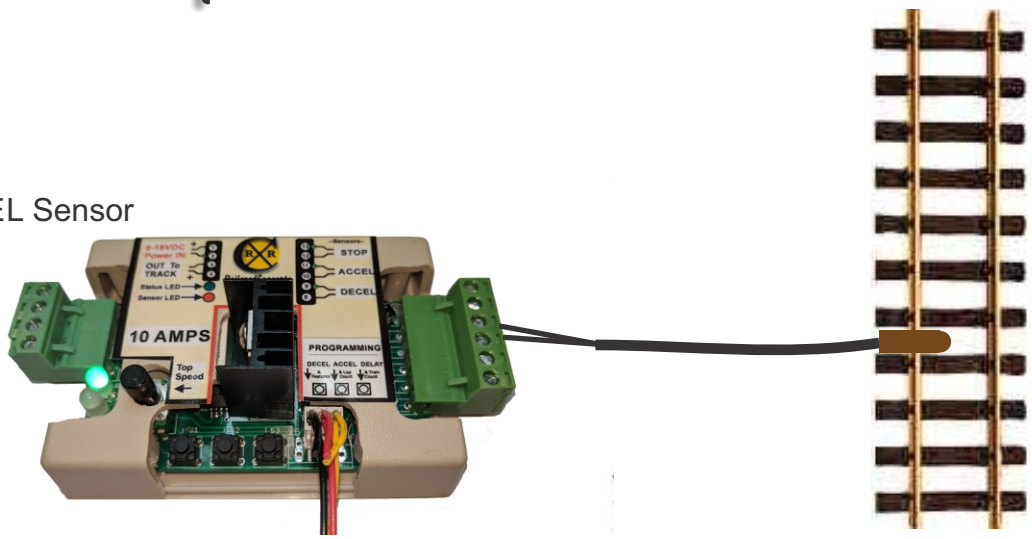
ACCEL Sensor



Terminals 10 and 11 are the *optional* **Start Acceleration** sensor inputs.

When these terminals are shorted (sensor detects a magnet) the train will start to accelerate.

This sensor is **not** necessary unless using “Block Control” or the **time delay** is set for maximum blinks. (See below).

Pressing button #2 will simulate the ACCEL sensor.

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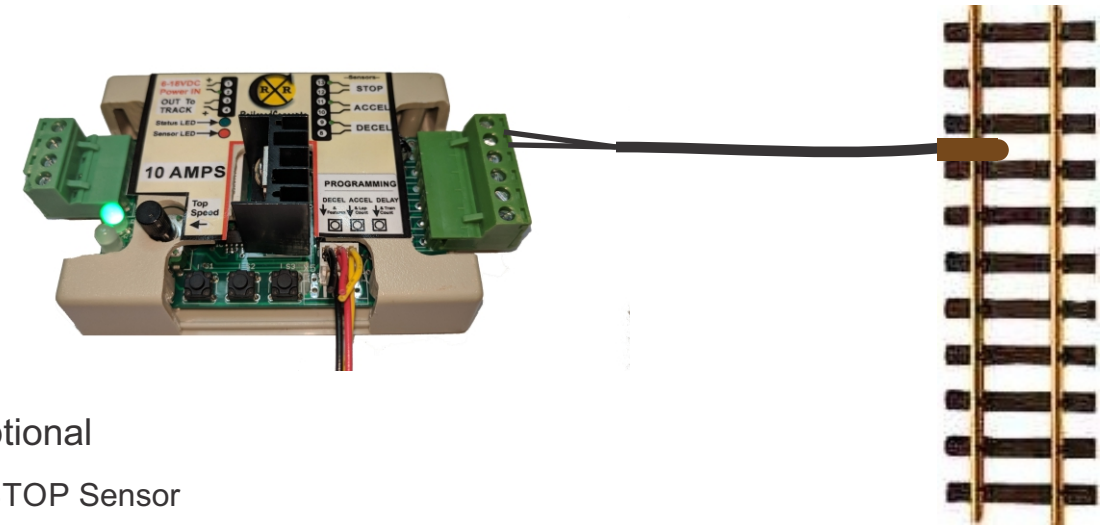

Optional

STOP Sensor

Terminals 12 and 13 are the optional STOP sensor inputs.

When the train is decelerating and these terminals are shorted (sensor detects a magnet), the train will immediately STOP. This sensor is not necessary unless using the “Creep-stop” mode in which case it is mandatory.
The STOP sensor will have no affect unless the train has already passed over the DECEL sensor.

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Pressing button #3 will simulate the STOP sensor.

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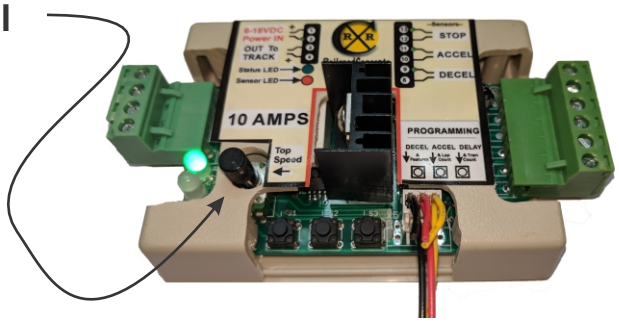
Top Speed and Programming Mode Dial



The Top Speed dial provides 2 functions:

1: Adjust the top "cruising" speed of the train.
2: Enter programming mode.

Top speed adjustment

“Full speed" is clockwise. Turn this dial down as necessary to set the desired cruising speed of the train. This is only necessary when using a “fixed voltage” power supply or when a YardMaster is attached and a slower top speed is desired.

Typically, this dial is set fully clockwise and the train throttle (transformer) is used to set the speed of the train.

Programming Mode

To enter programming mode turn this dial fully counter-clockwise. The Sensor LED will display orange to indicate “programming mode”.

The acceleration rate, deceleration rate and time delay can be programmed in this state. See the programming details or decal on bottom of the StationMaster for additional information.

To exit programming mode turn the dial fully clockwise.

When exiting programming mode the following will automatically occur:
1. The shutdown current will be programmed. (Relays will briefly short the track and measure the amperage consumed)
2. All “creep-stop” values will reset.

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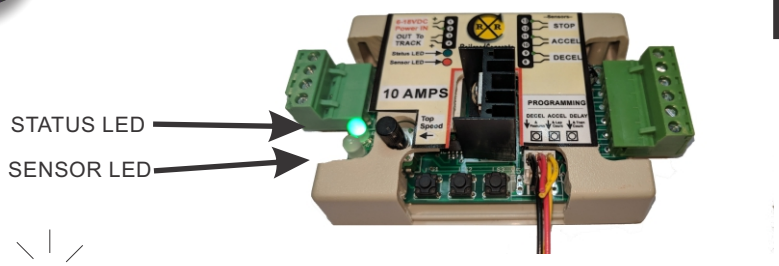
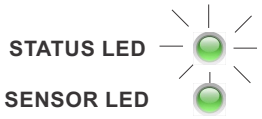
LED indicators

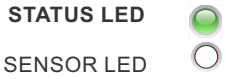
For Information only



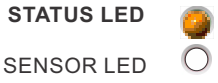
Green flashing: train is **ACCELERATING**.



Green flashing with green solid: Train is creeping out of station. After a delay the train will continue to accelerate up to top speed.

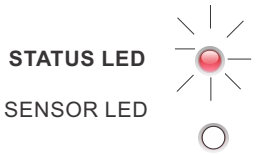


Green NOT flashing**:** Train is **AT TOP CRUISING SPEED.**



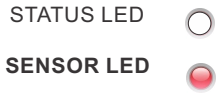
1. Orange NOT flashing, The StationMaster **will ignore next DECEL sensor** due to lap counting or block control.

2. Orange Flashing, The StationMaster is performing a time delay.

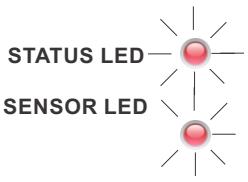


1. Quick Red flashing: Train is **DECELERATING.** Flash rate indicates the rate of deceleration.

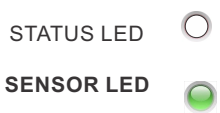
2. Two quick RED flashes at 1 second rate: StationMaster is **waiting for the ACCEL sensor** before accelerating**.** (StationMaster Is programmed for infinite time delay)



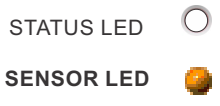
Sensor RED LED ON or flash: The STOP sensor is detected.
The LED will remain on for as long as the sensor is detected. *If a train is parked on the STOP sensor then the deceleration sensor will be ignored.*



Two Red Blinking LED's indicate a **SHORT CIRCUIT** condition.
Turn the top speed dial to zero and then back to 100%, Push button 3, or turn off power to recover. If condition returns after recovery check for a short circuit on the track or re-program the shutdown threshold. (Set throttle to full speed, enter and exit programming mode, then set throttle to running speed)



Sensor LED solid GREEN indicates secondary Programming mode.



Sensor LED orange flickering: Indicates programming mode. The top speed dial is full counter-clockwise.

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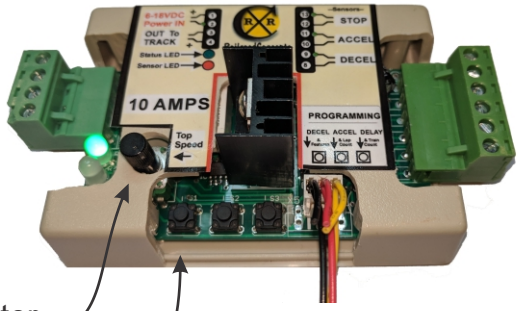
Programming: **Deceleration Rate**



Fully counter clockwise

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.

3. Push and hold programming button #1.

4. Watch the status led. Each RED blink will decelerate slower. The fastest deceleration will be with one blink. (TRAIN Stops sooner) 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.

One blink corresponds to a 3 second deceleration rate. Each additional blink adds 1 second. For example, a blink count of 5 would result in a deceleration rate of 8 seconds.

When finished with all programming turn the top speed dial fully clockwise and then turn down to a desired top speed if needed.

All programming values are stored in flash memory and are retained until re-programmed.

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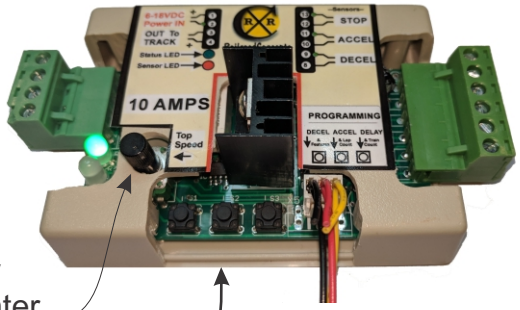


Fully counter clockwise

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.) The sensor LED will turn orange.

3. Press and hold programming button #2.

4. Watch the status led. Each GREEN flash will accelerate slower.
<u>The fastest acceleration will be with one blink.</u>
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.
One blink corresponds to a 3 second acceleration time. Each additional blink adds 1 second. For example, a blink count of 5 would result in a deceleration rate of 8 seconds. A factory default will set to 5.

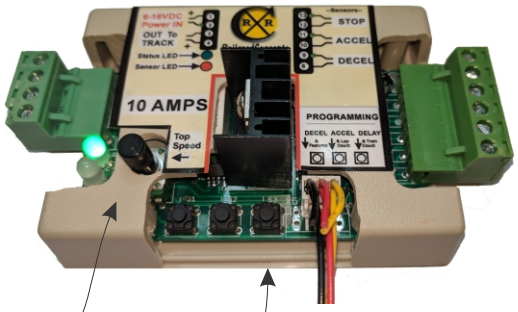
When finished with all programming, increase the top speed dial clockwise to MAX and then down to a desired top speed. All programming values are stored in flash memory and are retained until re-programmed.

<u>A Note on Realistic Accelerations:</u>

* For blinks 1 thru 9 the train will accelerate linearly with the programmed value. This may be required for some block control operations where a second train is approaching and the first train needs to quickly accelerate to get out of the way, or for a trolley which accelerates quickly.

* For blinks 10 and above the train will creep very slowly out of the station and then continue accelerating as it continues down the main line. This provides a very realistic operation as a train creeps out of a siding or station and shows off sound systems with incredible realism.

* 10 blinks will creep for 5 seconds.
* 11 blinks will creep for 10 seconds.
* 12 blinks and up will creep for 15 seconds.



Fully counter clockwise

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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.
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.

The LED will turn orange when an infinite delay is set (after 10 counts).
When infinite delay is set, then the ACCEL sensor is required to start up the train after a station stop. A fun thing to do would be to connect the ACCEL terminals to a doorbell switch. Your train would patiently wait until someone pushed the button! Motion sensors are another possible way to start the train.

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

The number of orange FLASHES 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: 30 seconds
7: 1 minute
8: 2 minutes
9: 5 minutes
10: 10 minutes
11: 30 minutes
12: 60 minutes
13: Infinite, wait for GO sensor. This is for block control operations.

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

Programming: Operating Modes

HOW TO PROGRAM: (Perform a factory reset to clear everything)

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 slowly clockwise until the sensor LED turns green. This indicates secondary programming mode. This should be about half-way.

2. **Press and hold programming button #1** until the desired number of blinks have occurred. Each blink will set or clear a different feature. If currently ON it will turn off. If ON it will turn OFF.

When finished do not power off without first turning the dial fully clockwise.

Programmable Modes: (Any or all of these or all can be programmed independently)

Hold button for 1 blink = Fire YardMaster before acceleration. (Used for passing sidings)

Hold button for 2 blinks = Fire YardMaster after train has stopped. (Default ON after a factory reset)

Hold button for 3 blinks = Use automatic train detection to start deceleration. (No-sensor station stops)

Hold button for 4 blinks = Shut off current sensor. This could cause damage to the StationMaster unless the transformer can provide short-circuit shutdown. This is sometimes necessary when running with very small transformers. (1 AMP or less)

Hold button for 5 blinks = Turn on “creep stop”. The train will decelerate then creep until reaching the STOP sensor. LEDs will flash RED/GREEN when creeping.

When the button is released the StationMaster will echo the currently programmed features (modes) by blinking the red/green LED 6 times. *For example*, if “Fire YardMaster after train has stopped” has been programmed and nothing else is programmed then the StationMaster will blink:

blink 1 GREEN: Fire YardMaster after stopping ON
blink 2 RED: Fire YardMaster before acceleration OFF
blink 3 RED: Use train sensor to start deceleration OF
blink 4 RED: Disable current sensor: OFF
blink 5 RED: Creep-stop mode : OFF

Each time a feature is programmed that feature will toggle on or off. (Toggle means the feature will go OFF if currently ON, or ON if currently OFF). A factory reset will clear all values and set bit 2.

To view the currently programmed operating modes quickly press and release button #1.

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Additional Information on Programming Modes. The hookup diagrams will identify which of these need to be set.

Blink 1 = Fire YardMaster before acceleration.

If programmed for more than 1 train the YardMaster will fire to the next siding before accelerating This is used for passing sidings where a train will stop and allow a train to pass by on the other siding.

Blink 2= Fire the YardMaster after the train has stopped.

If programmed for more than 1 train the YardMaster will fire to the next siding after the train has stopped. Note that the StationMaster will automatically set this blink after a factory reset.

Blink 3 = Use automatic train detection to start deceleration.

When a train is sensed entering the track section the StationMaster will start a deceleration sequence.

Blink 4 = Disable current sense shutdown.

If a double RED blinking shutdown condition occurs too often then the power supply may be too small to provide sufficient current and is not reliably sensed by the StationMaster. The shutdown can be disabled however damage could occur if the transformer does not have short-circuit protection.

Blink 5 = Turn on “CREEP STOP” mode.

The train will decelerate using the programmed deceleration rate, then creep until reaching the STOP sensor. If the STOP sensor is not reached within 25 seconds then the creep speed is increased.

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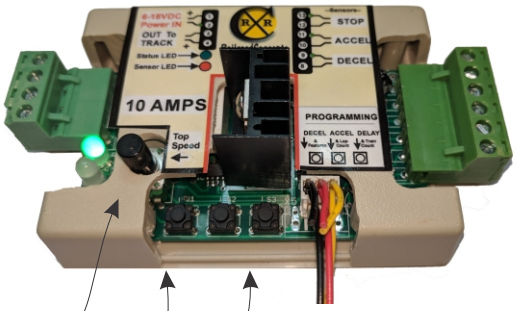

Fully counter clockwise

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, then release.
3. Save the settings by turning the top speed dial fully clockwise to exit programming mode.

Do not power off without first turning the dial fully clockwise.

The factory default settings are:

* Acceleration rate 5 blinks
* Deceleration rate 3 blinks.
* Time delay 5 seconds.
* Train count: 2 (Note: Block control will not be operation until set for 1 train)
* Lap count: 1
* Operating mode (features):

Blink 1 = RED, Fire YardMaster before accelerating: OFF
Blink 2 = GREEN, Fire YardMaster after stopping: ON
Blink 3 = RED, Use train sense to start deceleration: OFF
Blink 4 = RED, Disable current sensor: OFF
Blink 5 = RED, Enable CREEP-STOP mode: OFF

With these settings both the *Simple Station Stop*, and the *Alternating Trains* hookups are ready to run!

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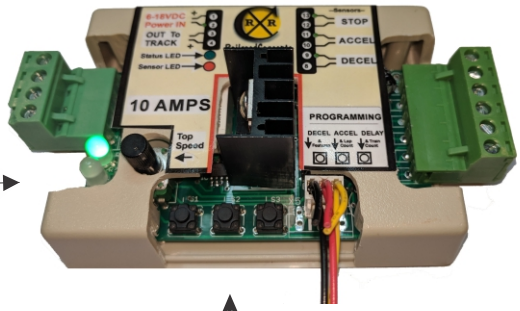

Green →

Programming: MULTIPLE LAPS

1. Turn the Top Speed dial fully counter-clockwise to enter programming mode (Skip this step if already in programming mode).

2. Slowly turn the Top Speed dial clockwise until the GREEN indicator turns on. This indicates secondary programming mode.
(Skip this step if already in secondary programming mode)

3. Press and hold button #2.

4. Count the blinks while the button is pressed. Release the button when the appropriate number of blinks (LAPS) are set.

When finished with all programming turn the top speed dial clockwise to maximum.

All programming values are stored in flash memory and saved until re-programmed again.

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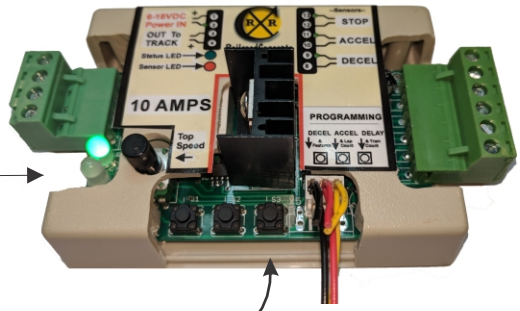
Programming: **Train Count**



Green →

The train count is needed for 3 reasons:
1. Save different creep speeds for up to 5 trains.
2. Send signals to one or more YardMasters to correctly fire turnouts.
3. Allow running in a block-control mode. (Must be set for 1 train)

For example, a 3 track siding using 2 YardMasters attached to a StationMaster would have a train count of 3, since 3 trains will be controlled.

For an alternating siding hookup no programming is necessary since the default train count is 2.

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.)

3. Slowly turn the top speed dial clockwise until the sensor LED turns GREEN.
This indicates secondary programming mode.
(Skip this step if already in secondary programming mode)

4. Press and hold button #3.

5. 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.

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

NOTICE: **A factory reset will set the train count to 2**. Block control will not be operational until set for 1 train.

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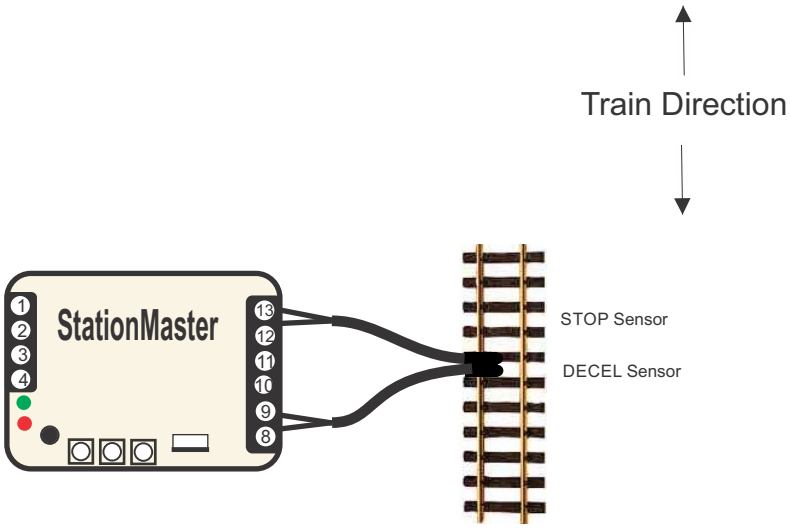
“Justa Station Stop”

Justa-Station-stop performs a decelerate/Pause/Accelerate sequence without triggering an attached YardMaster or reversing.

When operating in an alternating trains setup additional stations stops can be done at different locations around the loop without affecting the parked train.

Place a STOP and a DECEL sensor such that they are both triggered at the same time. The train will decelerate, pause and accelerate without triggering a YardMaster and without changing directions.

If self-adjusting mode is programmed then the deceleration rate will be fixed. Otherwise the programmed deceleration rate will be used.



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StationMaster “Deadman Timer”

A unique feature of the StationMaster is the *DeadmanTimer.* **If a train is sensed on the track** *and* **no sensor has been detected for 10 minutes,** the StationMaster will SHUT DOWN and flash both the GREEN LEDs.

This prevents the condition where a train is hung up on an obstruction and spinning it’s wheels, most probably grinding a divot in the rails and wearing out wheels and gears.

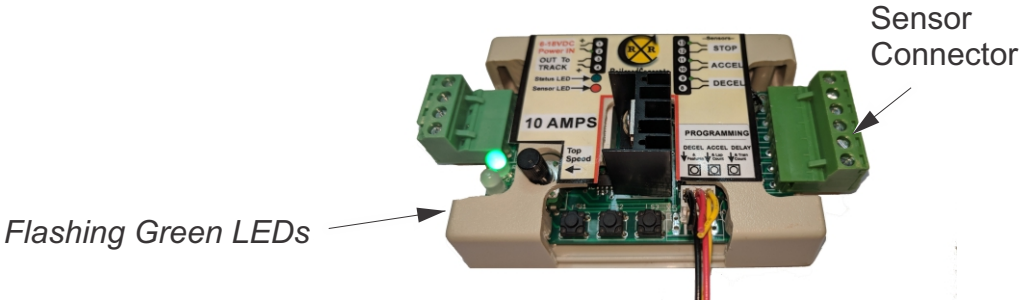
Each time a sensor is triggered, or the train is not sensed, the deadman 10 minute timer is reset.

The Deadman Timer will be enabled AFTER the first sensor or pushbutton is pressed after power up.

How to **use** or **bypass** the Deadman Timer Shutdown:

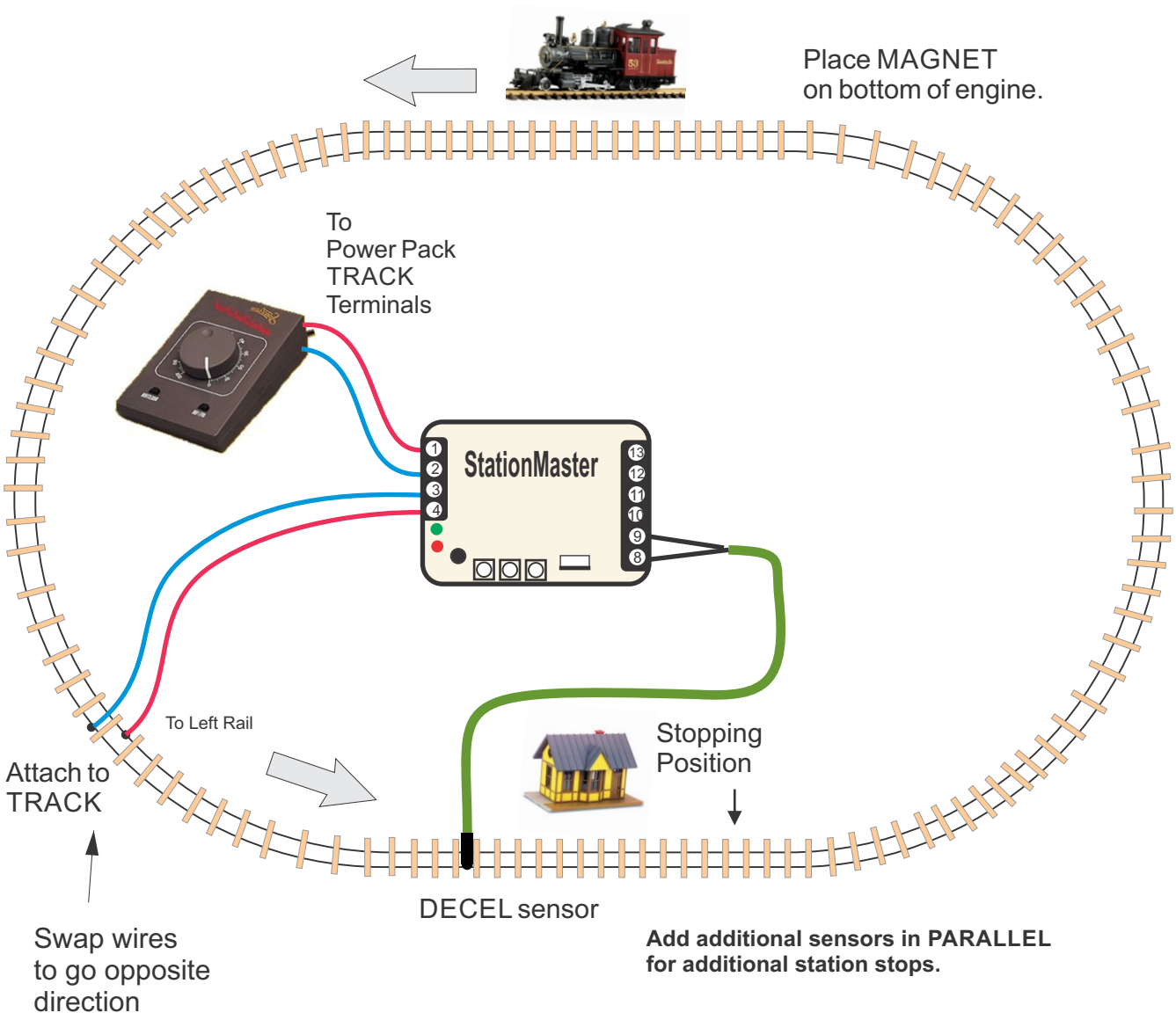
* When the sensor connector is pulled and trains are running “manually”, the Deadman Shutdown will not be enabled, unless a button is pushed.

* To run “manually” and also use the Deadman Shutdown, the DECEL sensor needs to be pulled, and either the STOP or ACCEL sensor must be run over.



RR Concepts

Basic Hookup Diagram for Automatic Station Stops with Deceleration/Acceleration using train sensors.

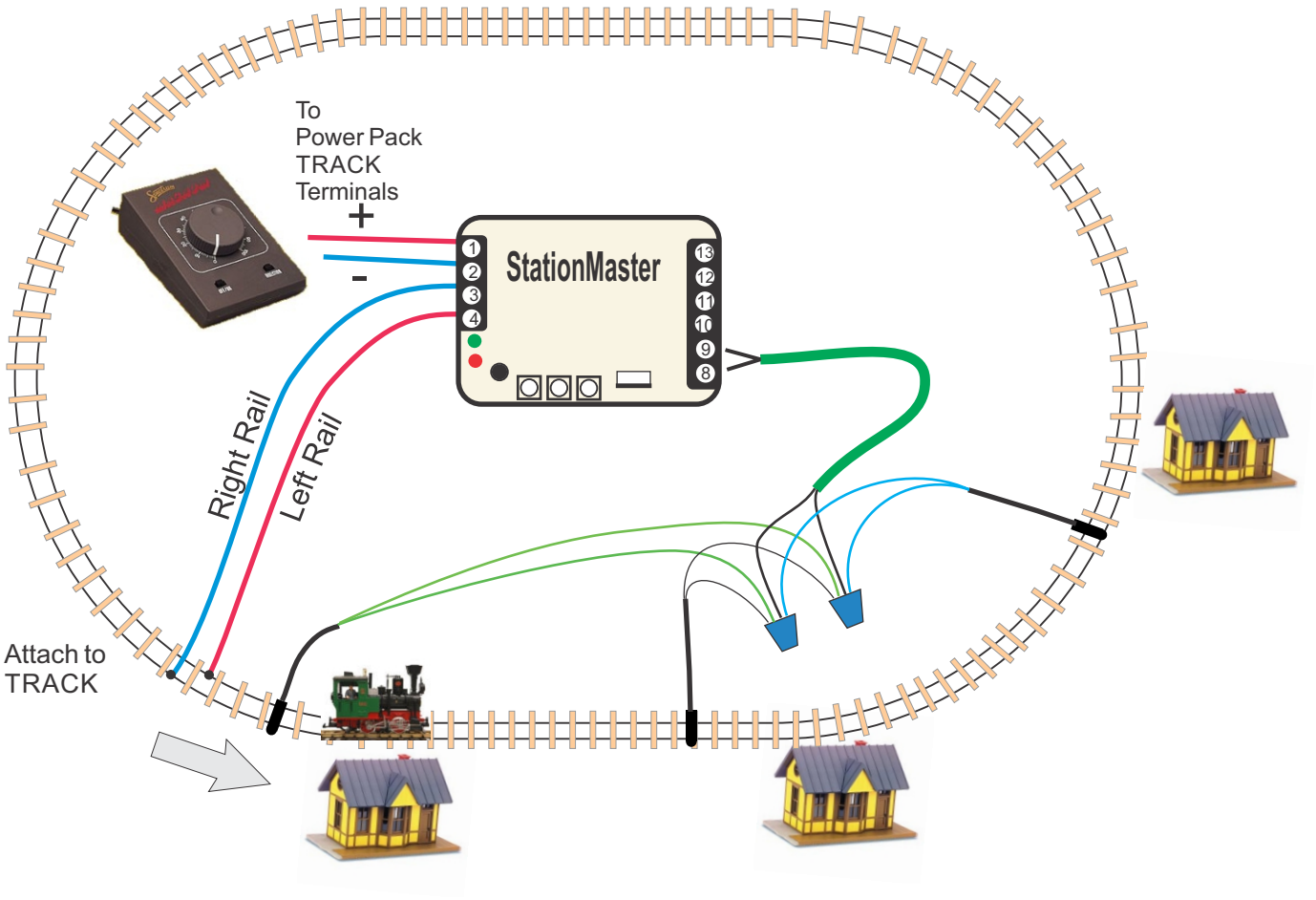


For a simple station stop, this is all you need to do!
Factory settings will be a gradual acceleration, gradual deceleration and 10 second stop.

RR Concepts

Multiple Station Stops

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



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

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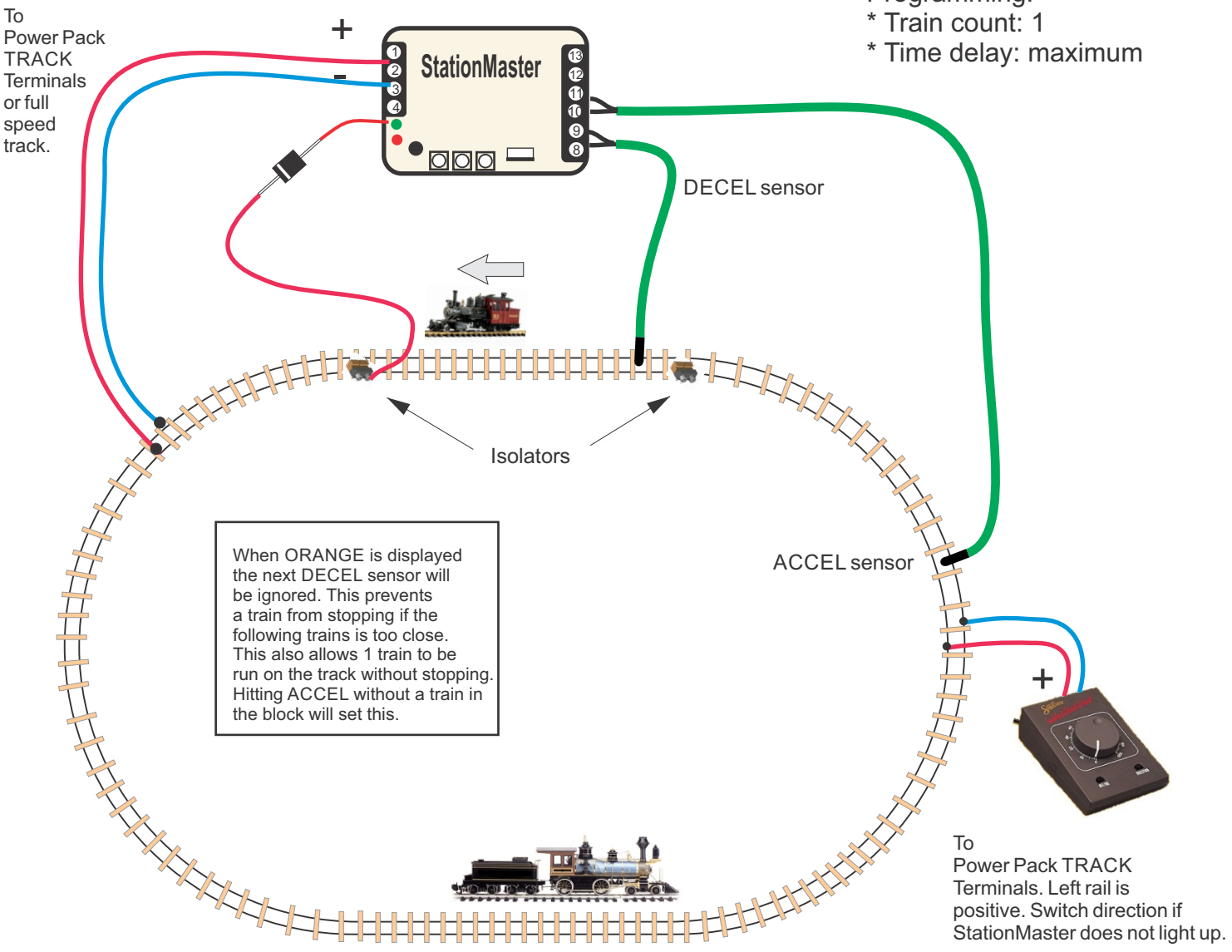
Block Control

For 1 or 2 Trains on 1 track with gradual Decelerations and Accelerations.
Can be located at a remote location on the railroad

Programming:
* Train count: 1
* Time delay: maximum

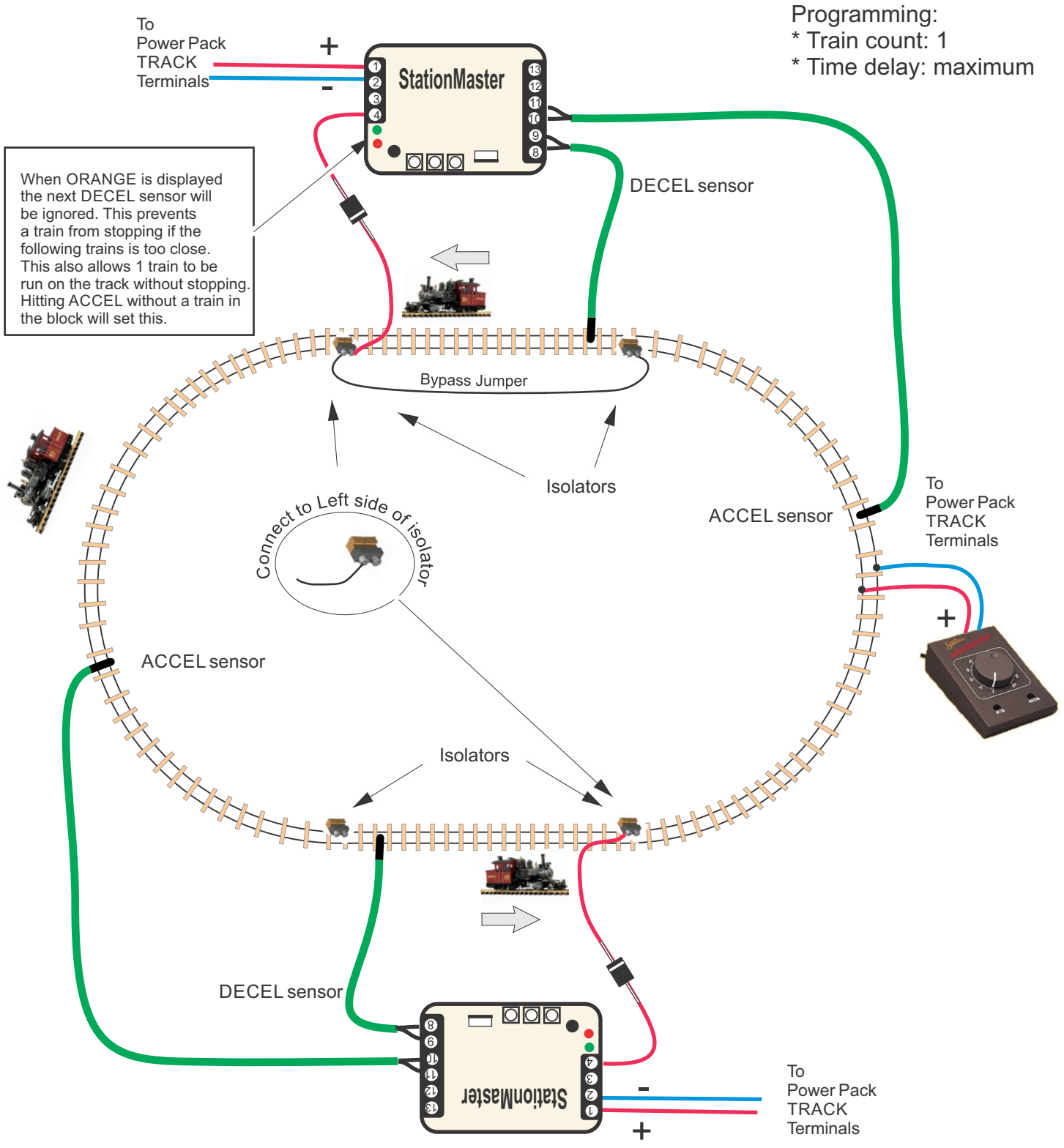


Hookup Notes:
1. Your train may not stop if the second train is too close.
   (ACCEL is hit before DECEL)
2. When the train decelerates it must stop before
   reaching the 2nd isolator..
3. If the train is slowing or stopped, then the second train
   will tell it to “go” when it hits the ACCEL sensor. (Start
   with sensor half-way around the track. Station stop
   will be longer with ACCEL sensor closer.)
   Move the location of this sensor to fit your track.
5. Location of ACCEL sensor must allow the stopped
   train time to accelerate and exit before the 2nd train
   enters the siding.
6. This hookup can run with 1 train or 2 trains.
   (1 train will never stop unless ACCEL sensor is removed)
7. A longer isolated section will provide more realism for
   the stopped train to decelerate and accelerate.
8. Station can be located at a remote location on your
   railroad.

RR Concepts

Block Control

For 1, 2, or 3 Trains on 1 track with gradual Decelerations and Accelerations using StationMasters.

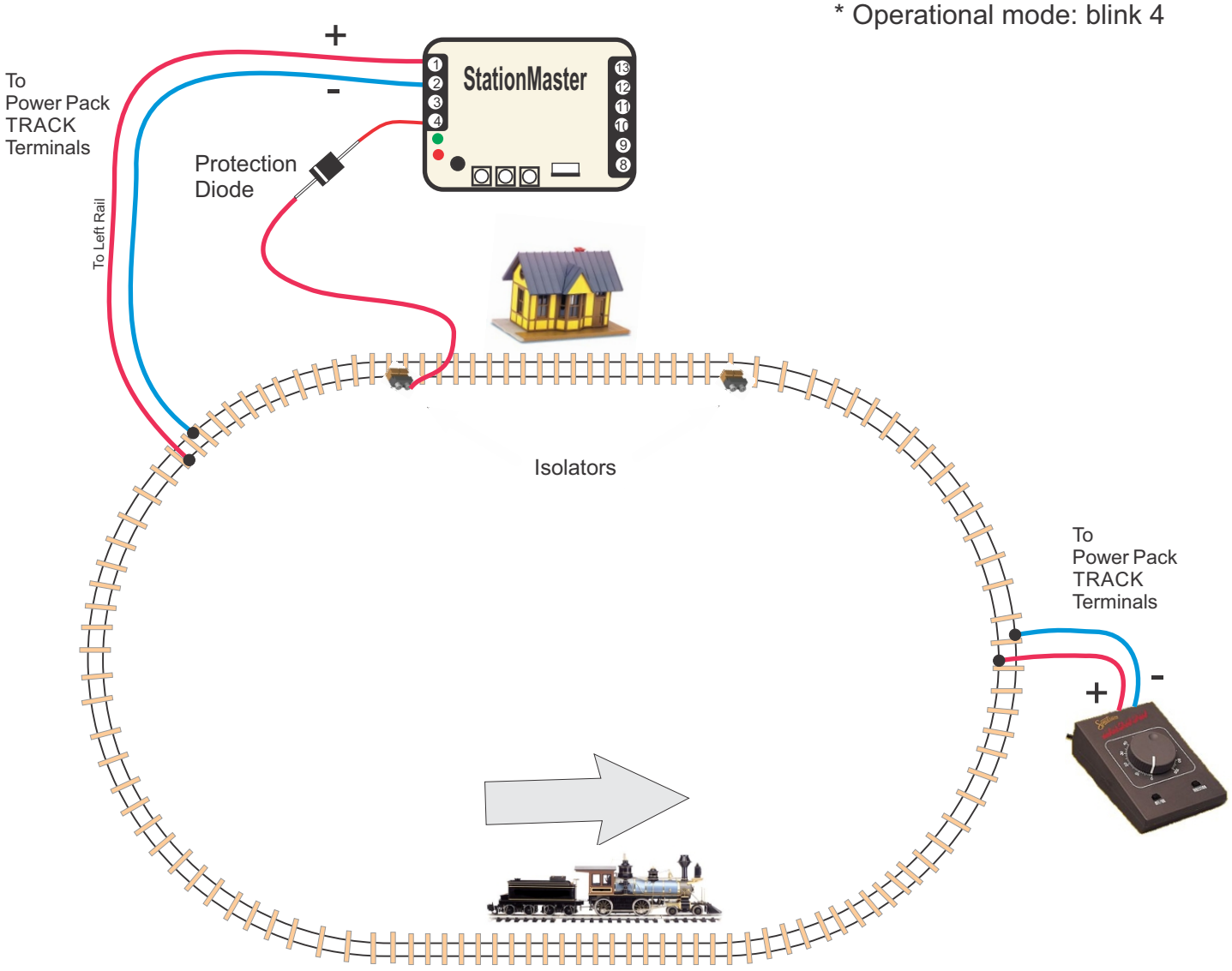


RR Concepts

Station Stop Without using Magnets or Sensors

Using the Automatic Train Detection feature.

Programming:
* Operational mode: blink 4



Hookup Notes:

1. Isolated section must be long enough to allow train to decelerate and accelerate.
2. Train can only go in one direction.
3. Protection diode prevents damage in case of train running backwards.
4. Program StationMaster for “blink 4”.
5. Program time delay as desired.
6. No magnets and no sensors are required
7. Station stop can be located at a remote location on your railroad far from the transformer.

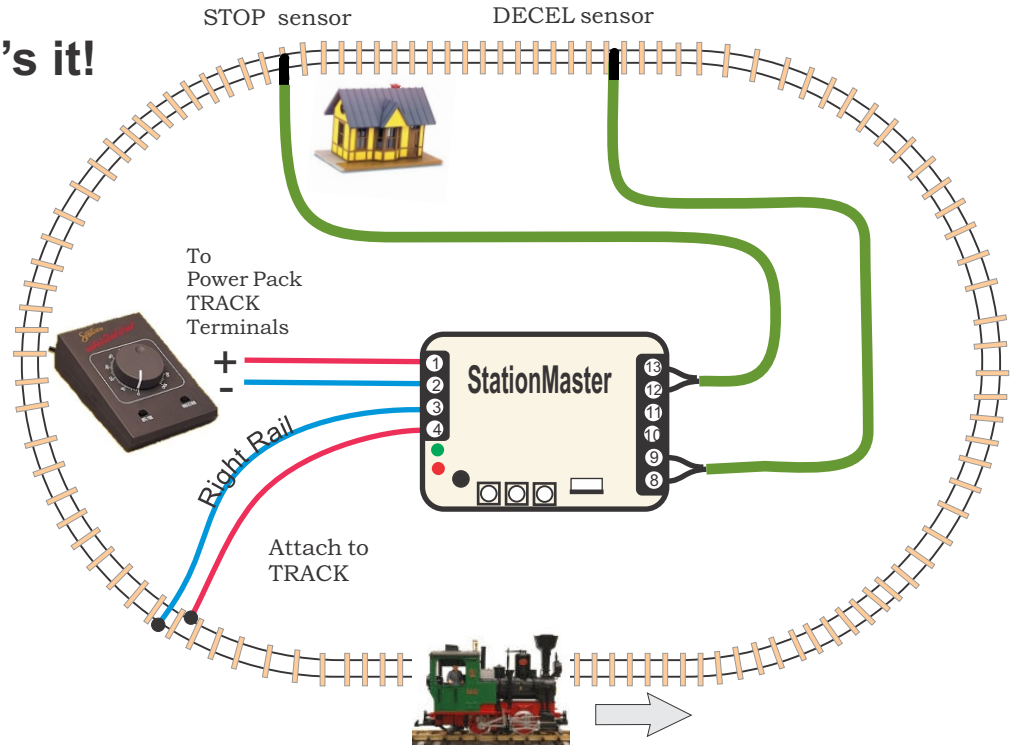
RR Concepts

“Creep-Stop” Deceleration for Incredible Realism

A unique and extremely realistic feature of the StationMaster is “Creep-Stop” Deceleration.
By using both a DECEL sensor and a STOP sensor the StationMaster will provide a very realistic station stop.
Programming your StationMaster to use “Creep-Stop” is very easy:

1. Set the creep stop bit in programming mode.
2. Place the **DECEL** and **STOP** sensors on your track as shown. The distance between sensors should be about 2 to 6 feet, or whatever looks good to you.
3. Program the deceleration rate (if needed) to provide a realistic deceleration into the train yard before the creep starts.

That’s it!



When “Creep Stop” is enabled, the train will decelerate using the programmed deceleration rate, then “creep” forward until the STOP sensor is reached. This guarantees the train will always stop on the STOP sensor using a realistic profile. The starting creep speed is relatively slow however the train must reach the STOP sensor within 25 seconds. ***If the train stalls, then the creep speed is increased for the next time.*** When a stall occurs, the voltage will be increased to allow the train to reach the STOP sensor after 25 seconds. Be patient. If the train stalls it will eventually carry on.

The length of the creeping can be adjusted by either increasing or decreasing the distance between DECEL and STOP sensors, increasing or decreasing the deceleration rate, or both. Start with a 4 foot distance and see how that looks.

Up to 5 different creep speeds can be used for 5 different trains. Slow trains can run next to fast trains and each will creep perfectly, Use the “train count” to set the number of trains that will be run. A factory default will set for 2 trains which is perfect for an alternating siding setup.

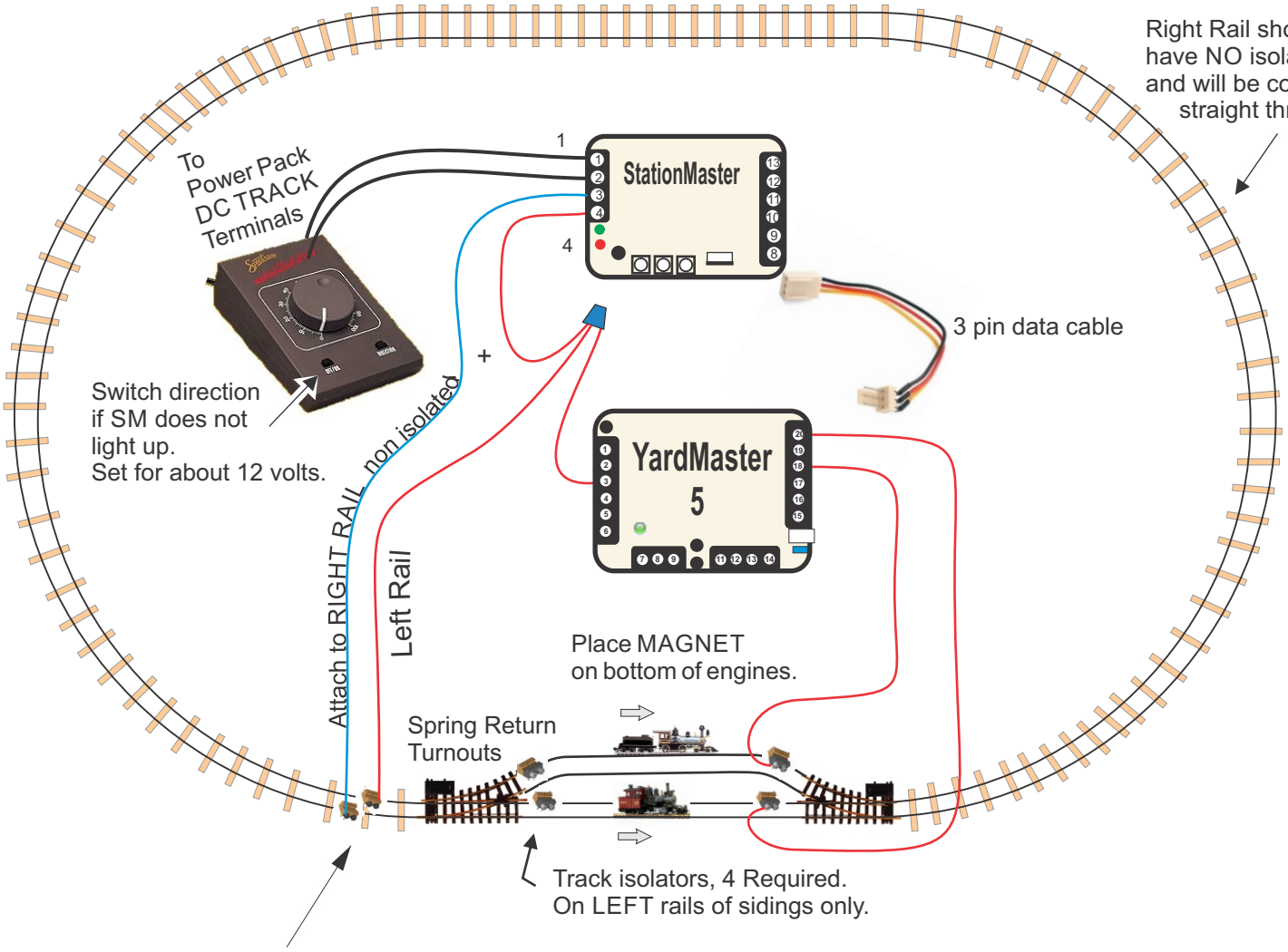
RR Concepts

Alternating Trains

Powered Turnouts

Two trains take turns with a time delay station stop.

TRACK CONNECTIONS

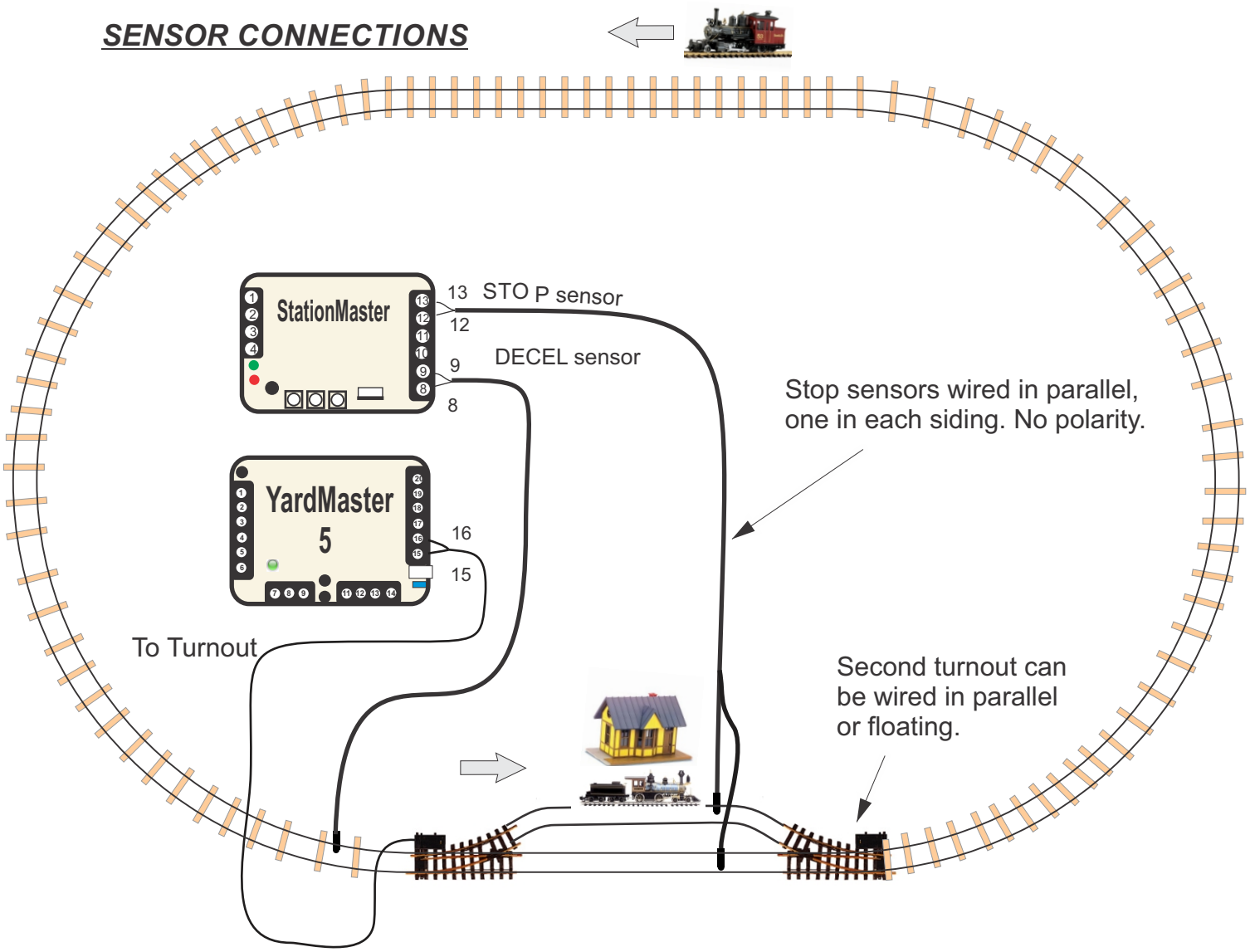


RR Concepts

Alternating Trains

Powered Turnouts

SENSOR CONNECTIONS



OPERATIONS

* Two trains will take turns running on the loop using an optional lap count. When the train has stopped the next train will run after the time delay.

PROGRAMMING:

1. This is the default operation after a factory reset.
2. Turn on optional “Creep Stop” for more realism so the trains creep to the STOP sensor.
3. Set an optional lap count if desired.
4. Set a longer acceleration rate if desired to creep out of the station.

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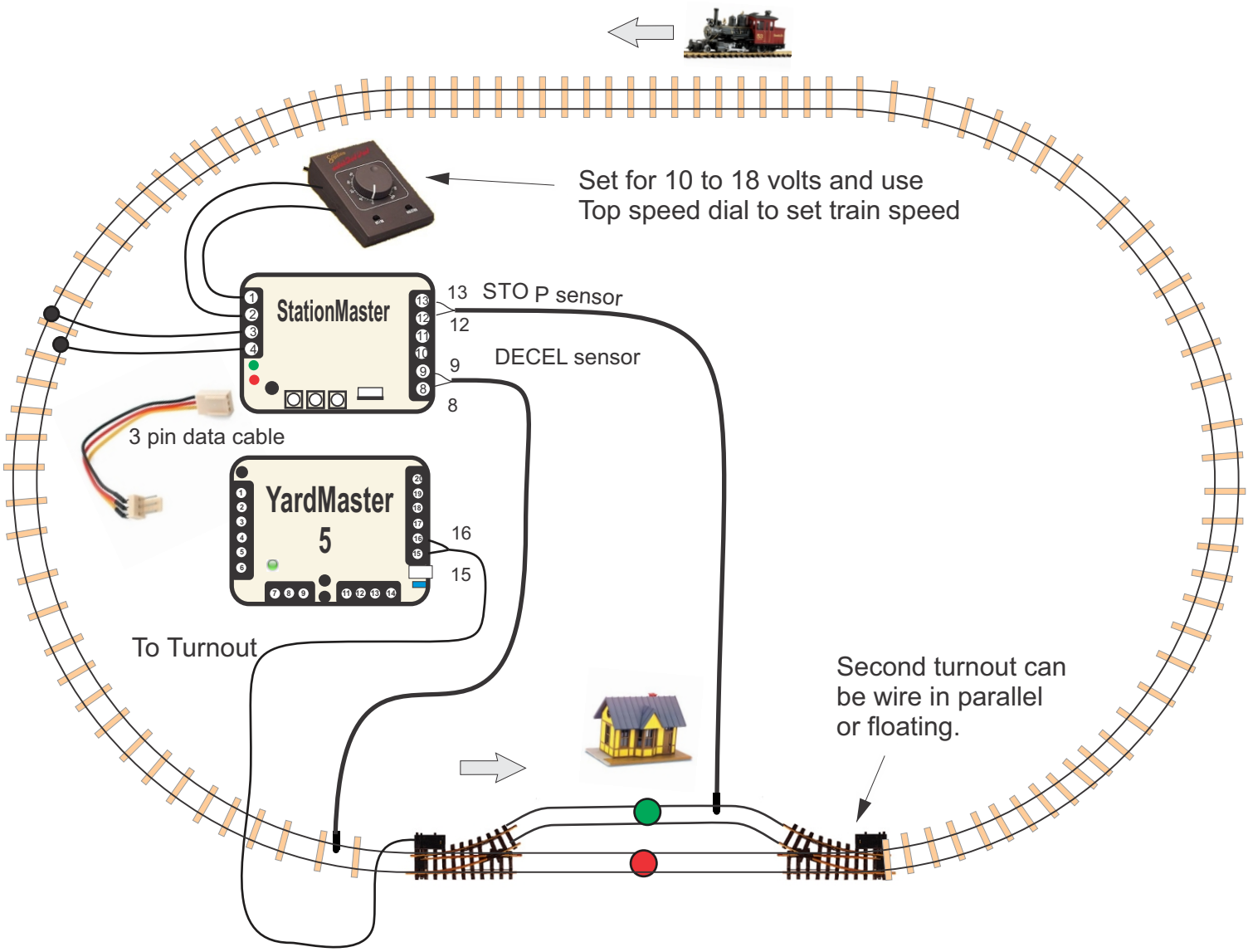
== Parts List ==
1 StationMaster
1 YardMaster-5
2 Train sensors
1 magnet
1 three pin data cable

Station Stop with a Siding

After a few laps on the main line, go into the siding and stop.



OPERATIONS

* While counting laps, the YardMaster will fire to RED each time the DECEL sensor is ran over.
* After the lap counting has finished, the YardMaster will fire to GREEN on the DECEL sensor and the train will stop in the siding.

PROGRAMMING:

1. Turn on blinks 1 and 2 in “features” programming. (2 is set by default after a factory reset)
2. Program a lap count greater than 1.
3. Turn on “Creep stop” in “features” programming OR set a deceleration rate such that the train reaches the STOP sensor.

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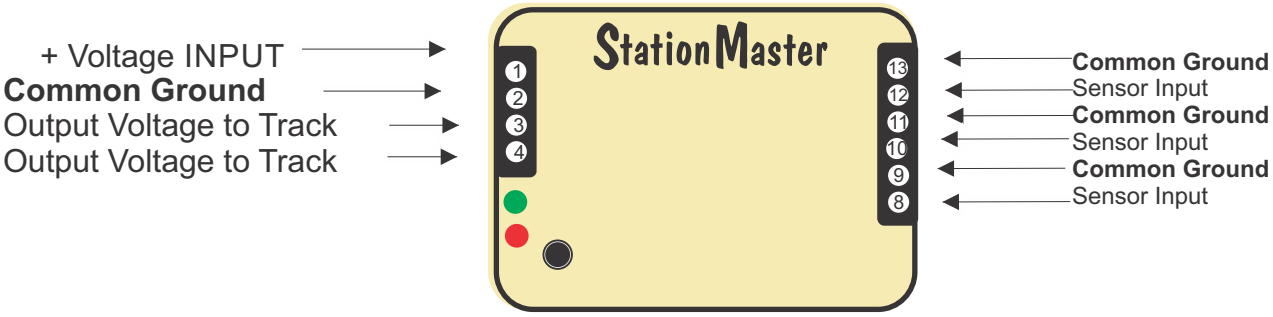
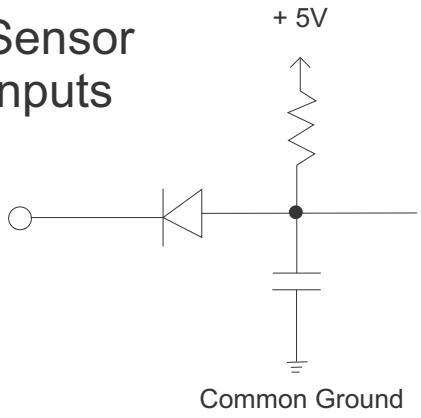
Electrical Details

For reference only

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



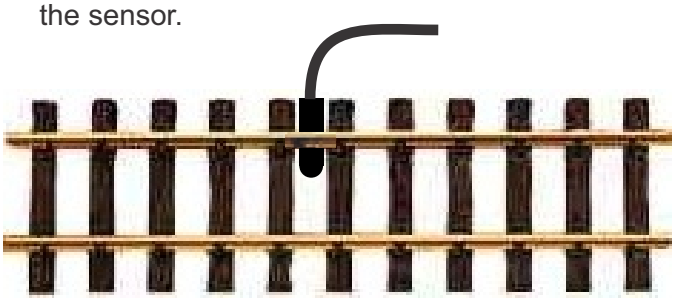
Sensor Inputs



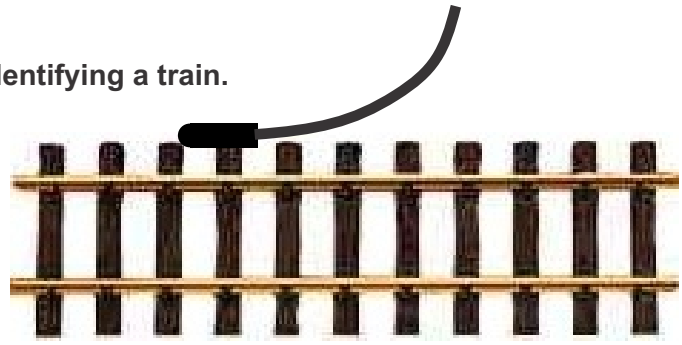
RR Concepts

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.



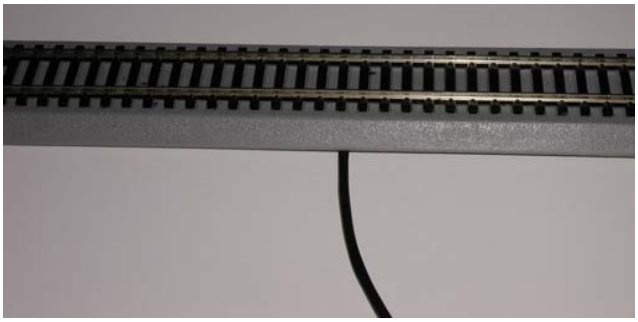
Sensor Placement for identifying a train.



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.