



RR-Concepts

StationMaster

Decelerator



This manual contains detailed hookup and programming instructions for the StationMaster train decelerator.

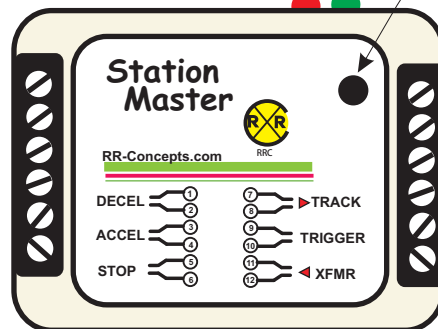
Additional StationMaster hookup diagrams not shown in this manual are located at RRConcepts.com.

Before we Start- Please do not attach XFMR wires (from your power pack) to any other terminals except the designated transformer inputs. (XFMR) Your StationMaster will be damaged if power is put on any of the sensor terminals!! (not kidding!) ***ONLY ATTACH WIRES WHILE THE POWER IS OFF.***

Two Color Status LED
Sensor Detected LED

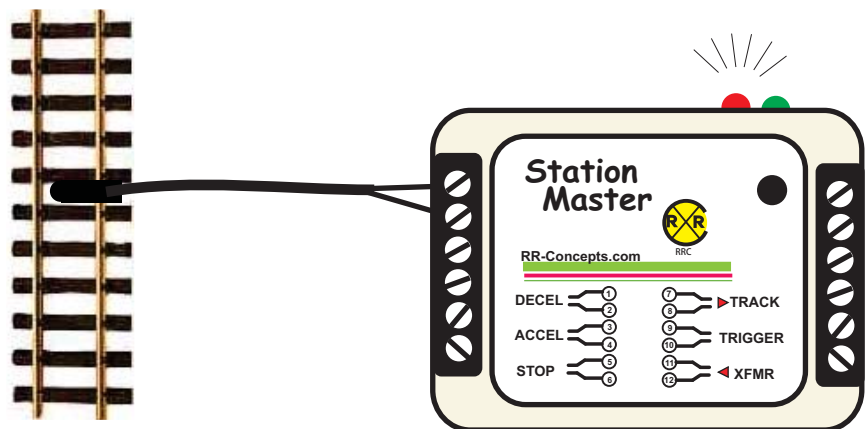
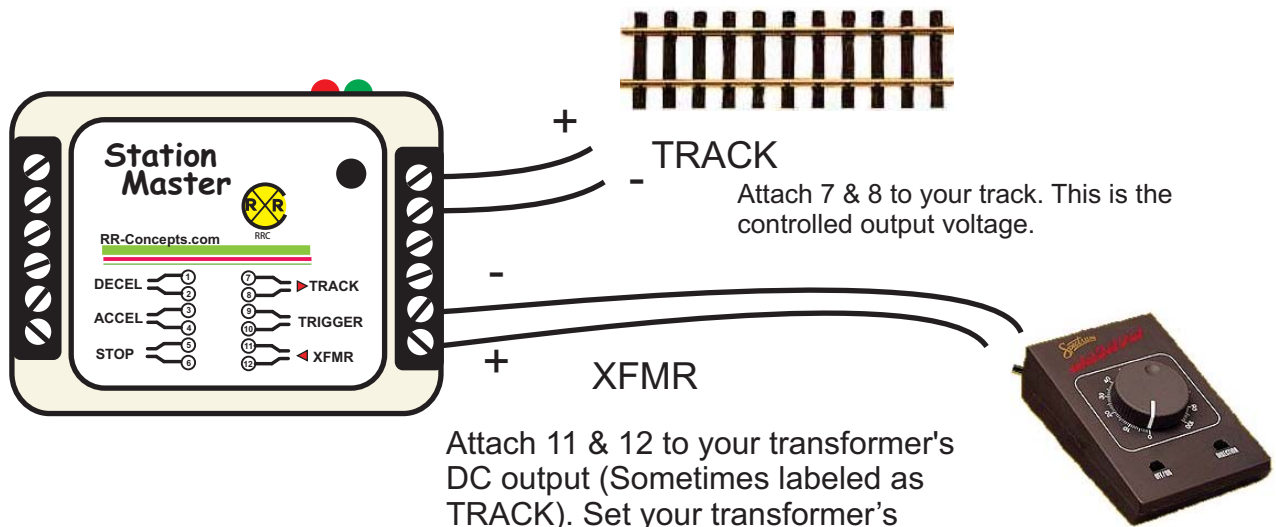
Top Speed Adjust and Programming Dial

Sensor Inputs



StationMaster Basic Hookup Description

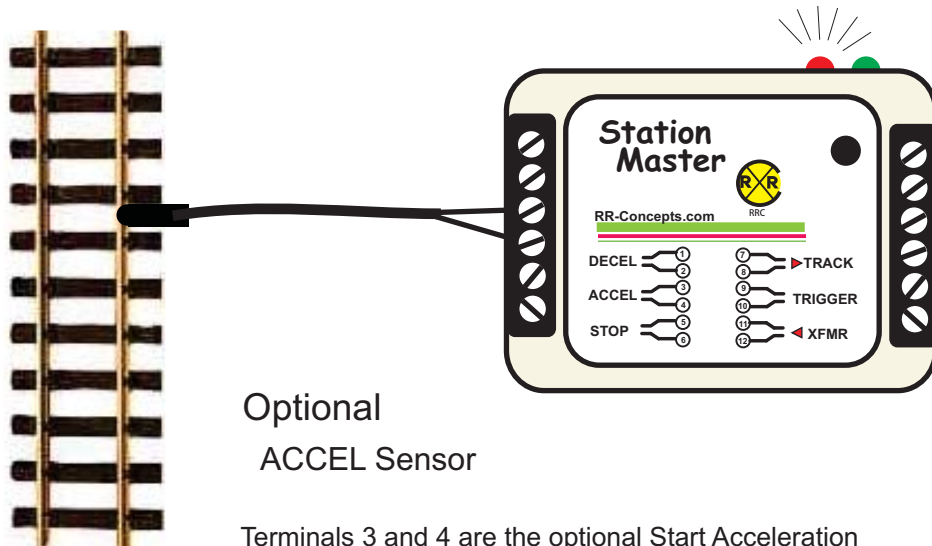
The StationMaster is designed to be installed between the train transformer, and the track.



DECEL Sensor

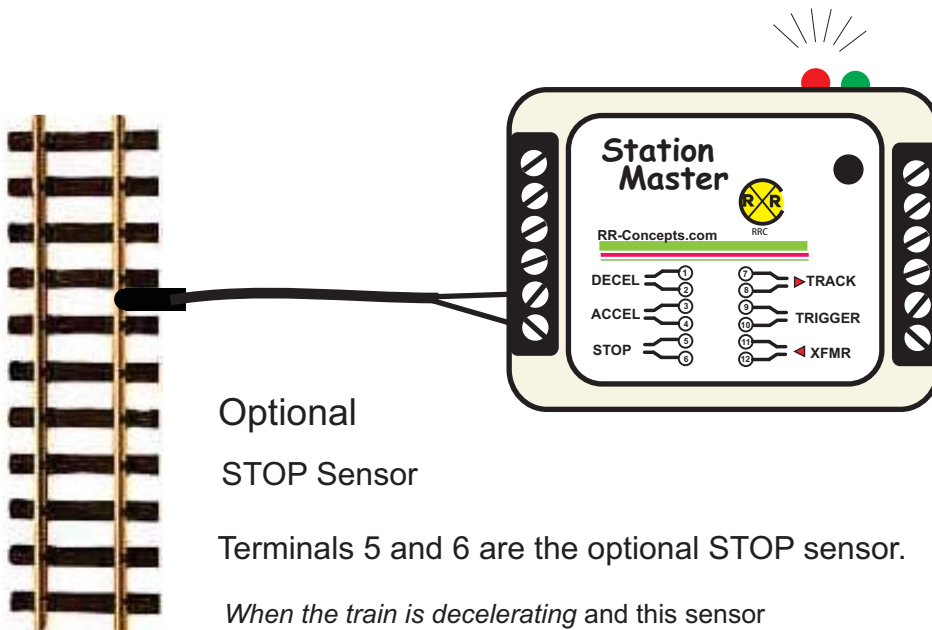
Terminals 1 & 2 are the start DECEL sensor. When this sensor detects a magnet, the StationMaster will decelerate your train, pause, and then accelerate. The RED led will light up when this sensor is detected. By placing multiple DECEL sensors wired in parallel, you can stop at multiple stations on your railroad.

Sensor Descriptions



Optional ACCEL Sensor

Terminals 3 and 4 are the optional Start Acceleration sensor. When this sensor detects a magnet, your StationMaster will accelerate the train. This sensor is **not** necessary unless using "Block Control", advanced hookups, or the **time delay** is set for maximum. (See below)

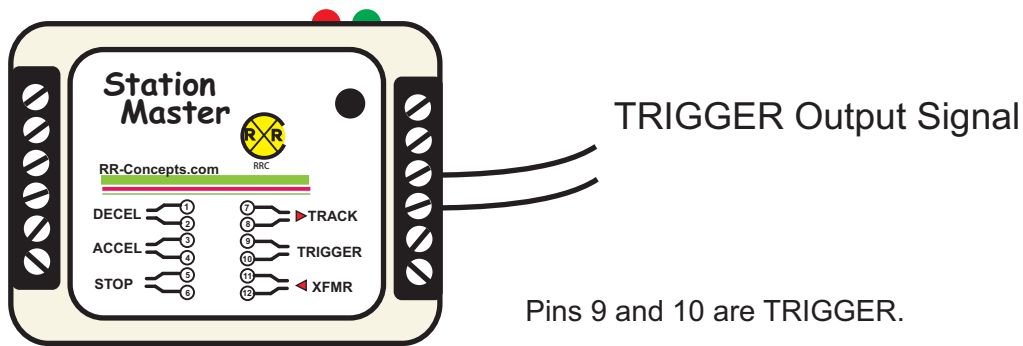


Optional STOP Sensor

Terminals 5 and 6 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 using the "Self Adjusting Deceleration", or "Two speed" operations. (See below for details on two speed operations).

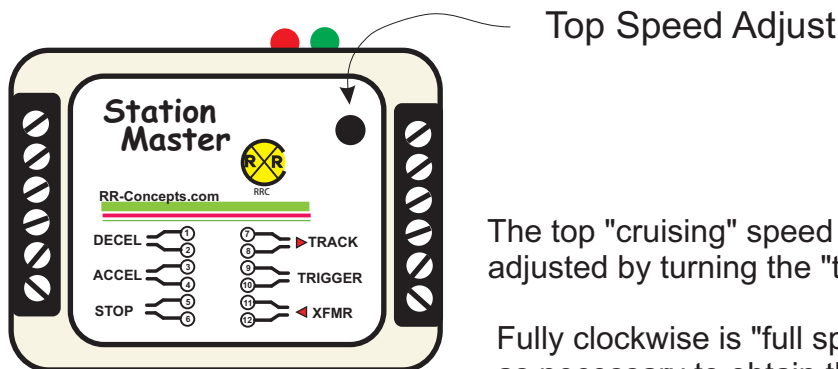
For advanced hookups a special feature is available when both the ACCEL and STOP sensors are triggered at the same time. When this happens the StationMaster will put 0 volts on the track, fire the TRIGGER, and accelerate. A decelerate operation will not occur. This can be useful when a train is waiting in a siding that must be released onto the main line.



Pins 9 and 10 are TRIGGER.

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. Note that putting track power on these terminals will permanently damage the trigger circuitry. See "Trigger Programming" if the TRIGGER signal is used.



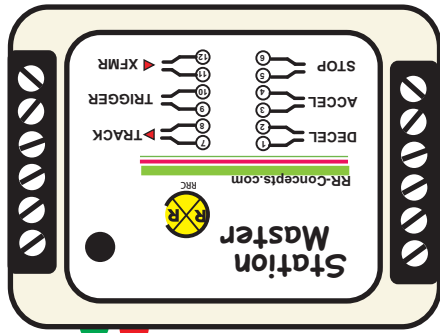
The top "cruising" speed of the train can be adjusted by turning the "top speed" dial.

Fully clockwise is "full speed". Turn this dial down as necessary to obtain the desired 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.

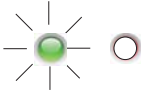
To program your StationMaster, turn this dial fully counter-clockwise to enter "programming mode". (See below)



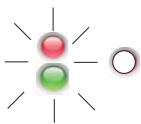
LED indicators

STATUS LED

SENSOR LED



Green flashing: train is ACCELERATING.



1. Fast alternating Red/Green Flashing: train is CREEPING and hunting for the STOP sensor. If flashing **orange** then the train is CREEPING with the slowest possible speed for that train. (SM is programmed for max deceleration rate which is self-adjusting deceleration)

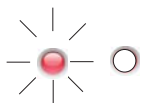
2. Slow alternating Red/Green Flashing: StationMaster is waiting for a short circuit to happen and will record the new shutdown threshold. (Short the track or turn top speed dial to zero)



Green NOT flashing: Train is AT TOP CRUISING SPEED.



Orange NOT flashing, StationMaster will ignore next DECEL sensor due to lap counting or block control. The ACCEL sensor while running will cause next DECEL sensor to be ignored. This is block control.



1. Quick Red flashing: Train is DECELERATING.

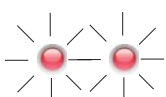
2. Red flashing at 1 second rate: StationMaster is performing a time delay.

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

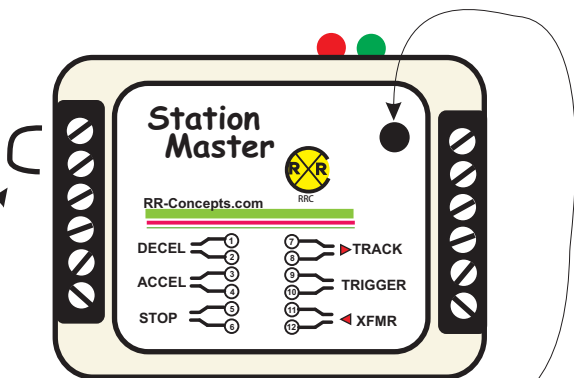
4. One quick red flash while in programming mode every 1/2 second indicates the StationMaster is in secondary programming mode.



Sensor RED LED ON or flash: One or more of the three sensors is detected. The LED will remain on for as long as the 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.

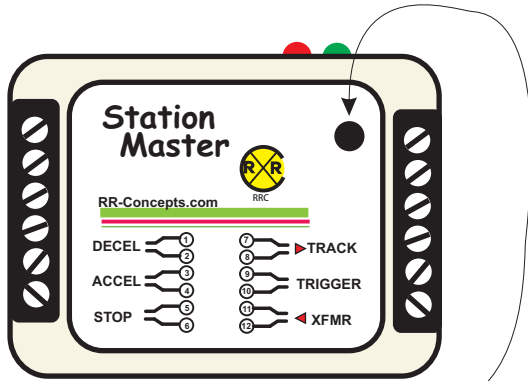


Programming: Deceleration Rate

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. Temporarily close terminals 1 and 2. (Either place a magnet over the **DECEL** sensor, or touch terminals 1 and 2 together with a piece of wire or a paperclip) Keep these terminals closed while counting blinks.
4. Watch the TWO COLOR led. Each RED flash will increase the deceleration distance. **The shortest deceleration Distance will be with one flash. (TRAIN Stops fastest)** Open the terminals when the desired number of flashes 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 flashing orange, the “SELF adjusting deceleration” mode will be set. (See below)

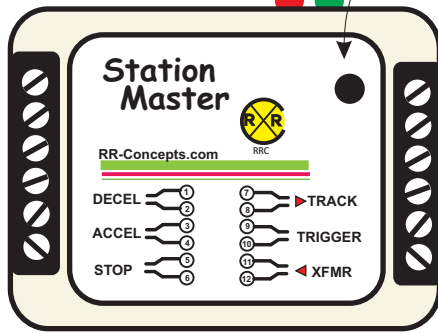
When finished with all programming, increase the top speed dial clockwise to MAX and then down to a desired top speed. All programming values are stored in flash memory and are retained until re-programmed.



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. Temporarily close terminals 3 and 4. (Either place a magnet over the **ACCEL** sensor, or touch terminals 3 and 4 together with a piece of wire or a paperclip) Keep these terminals closed while counting blinks.
4. Watch the TWO COLOR led. Each GREEN flash will decrease the acceleration rate. **The fastest acceleration will be with one flash.**
Open the terminals when the desired number of flashes 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 10 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.



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. Temporarily close terminals 5 and 6. (Either place a magnet over the **STOP** sensor or touch terminals 5 and 6 together with a piece of wire or a paperclip) Keep these terminals closed while counting blinks.
4. Watch the TWO COLOR led. Each ORANGE flash will increase the waiting time. **A wait time of zero will be with one flash.** Open the terminals when the desired number of flashes have occurred. A 1 minute delay will be with 5 blinks. Repeat this procedure if you want a different value.

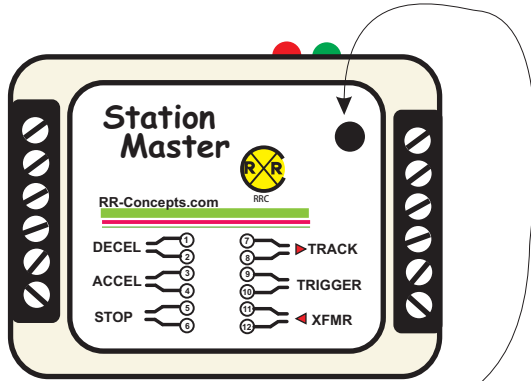
The LED will turn orange when an infinite delay is set (after 10 counts).

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!

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 orange FLASHES will correspond to the following time delays:

- 1: 0 seconds, no wait.
- 2: 5 seconds,
- 3: 10 seconds,
- 4: 30 seconds,
- 5: 1 minute,
- 6: 2 minutes,
- 7: 5 minutes,
- 8: 10 minutes,
- 9: 30 minutes,
- 10: Infinite, wait for GO sensor.



Programming:
Operating Modes

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

To view the currently programmed operating modes quickly close and release the 1 and 2 terminals before the RED/GREEN LED blinks. (Must already be in secondary programming mode) The StationMaster will then echo the currently programmed state.

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 to **half position** to enter secondary programming mode.
2. Close terminals 1 and 2 by either triggering an attached sensor or jumpering the terminals together.
3. Count the blinks while the terminals are closed. Open the terminals when the appropriate number of blinks have occurred. Each blink sets or clears a different feature.

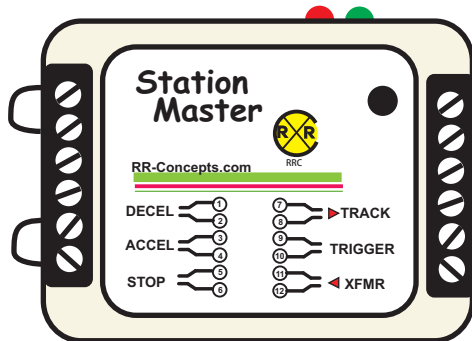
The programming modes (features) correspond to the blink count as shown:

- 1 blink = Unused.
- 2 blinks = Trigger YardMaster after train has stopped.
- 3 blinks = Trigger YardMaster before acceleration.
- 4 blinks = Use automatic train detection to start deceleration,

After the terminals are opened the StationMaster will echo the currently programmed features by blinking the red/green LED. For example, if “Trigger after train has stopped” has been programmed the StationMaster will blink RED - GREEN- RED - RED.

Example #2, if “Trigger before acceleration” is also programmed, the StationMaster will blink RED - GREEN - GREEN - RED.

Each time the operating feature is programmed the function will toggle on or off. (Will go OFF if ON, or ON if OFF)



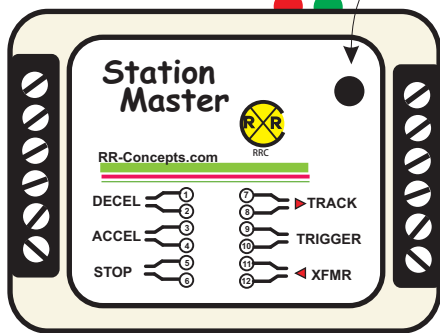
Programming: Factory Reset

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

- 1: Power down
2. Short (close) the DECEL and STOP sensor terminals and keep them closed.
3. Power up.

The StationMaster will quickly blink ORANGE to indicate that a factory reset has been done.

4. Power down.
5. Remove jumpers or open contacts.
6. Power up to resume normal operations.



Programming: MULTIPLE LAPS

The StationMaster can be programmed to ignore the DECEL sensor to allow running up to 10 laps before stopping. To allow multiple laps, program as follows:

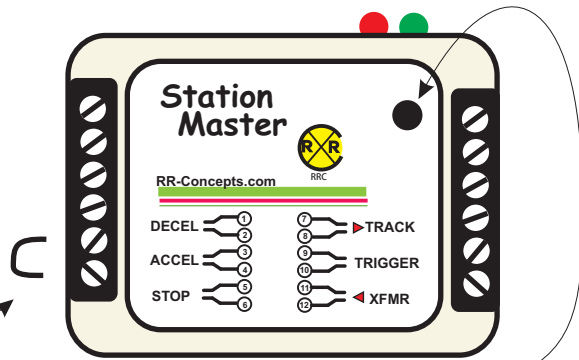
1. Turn the Top Speed dial fully counter-clockwise to enter programming mode (Skip this step if already in programming mode).
2. Turn the Top Speed dial clockwise to **half position** to enter secondary programming mode. (Skip this step if already in secondary programming mode)
3. Close terminals 3 and 4 by either triggering an attached sensor or jumpering the terminals together.
4. Count the blinks while the terminals are closed. Open the terminals when the appropriate number of blinks have occurred.

The number of blinks corresponds to the number of laps the train will do before stopping as shown:

1 blink = 1 lap,
2 blinks = 2 laps
etc...

To verify the programmed value, close briefly close terminals 3 and 4 and count the number of blinks 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.



Programming: Train Count

For the self-adjusting deceleration feature to work for more than 1 train the StationMaster must know the number of trains that are to be controlled. The train count is also used by the StationMaster to trigger multiple YardMasters connected in parallel.

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.

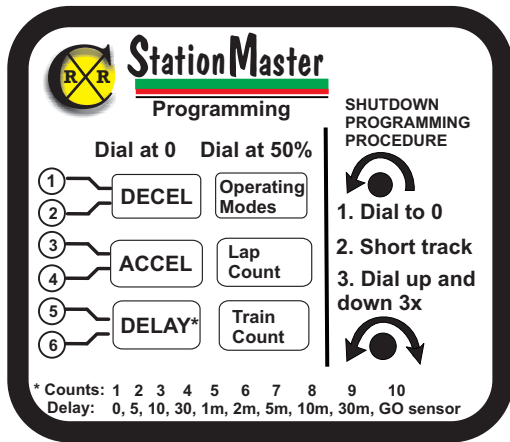
Programming:

1. Make sure all three sensor inputs are open. (red "Sensor" Led is off)
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.
4. Close terminals 5 and 6. (Either place a magnet over the STOP sensor, or touch terminals 5 and 6 together with a piece of wire or a paperclip) Keep these terminals closed.
4. Watch the TWO COLOR led. Each flash counts the number of running trains.

Open the terminals when the desired number of flashes have occurred. The number will be echoed back when the terminals are opened. Repeat this procedure if you want a different value.

To verify the programmed number, briefly close the two terminals 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.



**Programming:
Shutdown Current**

After June 1 2011 all StationMaster units will include current sensing ability which can detect when a train is on the track, and can also detect when a short circuit occurs. *The following information is valid if label shown above is attached to the bottom of the StationMaster*

Short me if you love me! The StationMaster should go to shutdown mode if the shutdown threshold is properly set. If this happens then the protection is set and it's time to run trains. If not then the shutdown current needs to be set. (The factory programmed shutdown may be perfect for your setup)

When an over-current condition occurs your StationMaster will blink both LED's RED. To recover either turn the dial fully counterclockwise and then clockwise or perform a power cycle. (Turn off and then back on) (P.S. Your StationMaster just saved itself from burning up!)

Programming the shutdown threshold.

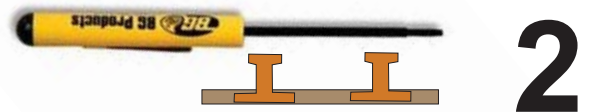
Programming the StationMaster to shut down after a short circuit condition is a simple 3 step procedure.

Step 1. Turn the top speed dial fully counter-clockwise to the zero position..

The StationMaster will stop the train all LED's will turn off.



Step 2. Short the track and keep it shorted.



Step 3. Turn the top speed dial fully clockwise and then counterclockwise three times.

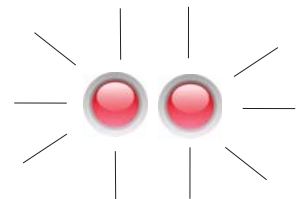


Done! The StationMaster will blink RED to indicate the operation is complete.

Notice that after the dial is turned to zero for the third time both LEDs will change color to solid RED. This indicates that the shutdown will be programmed when the dial is next turned to 100%.



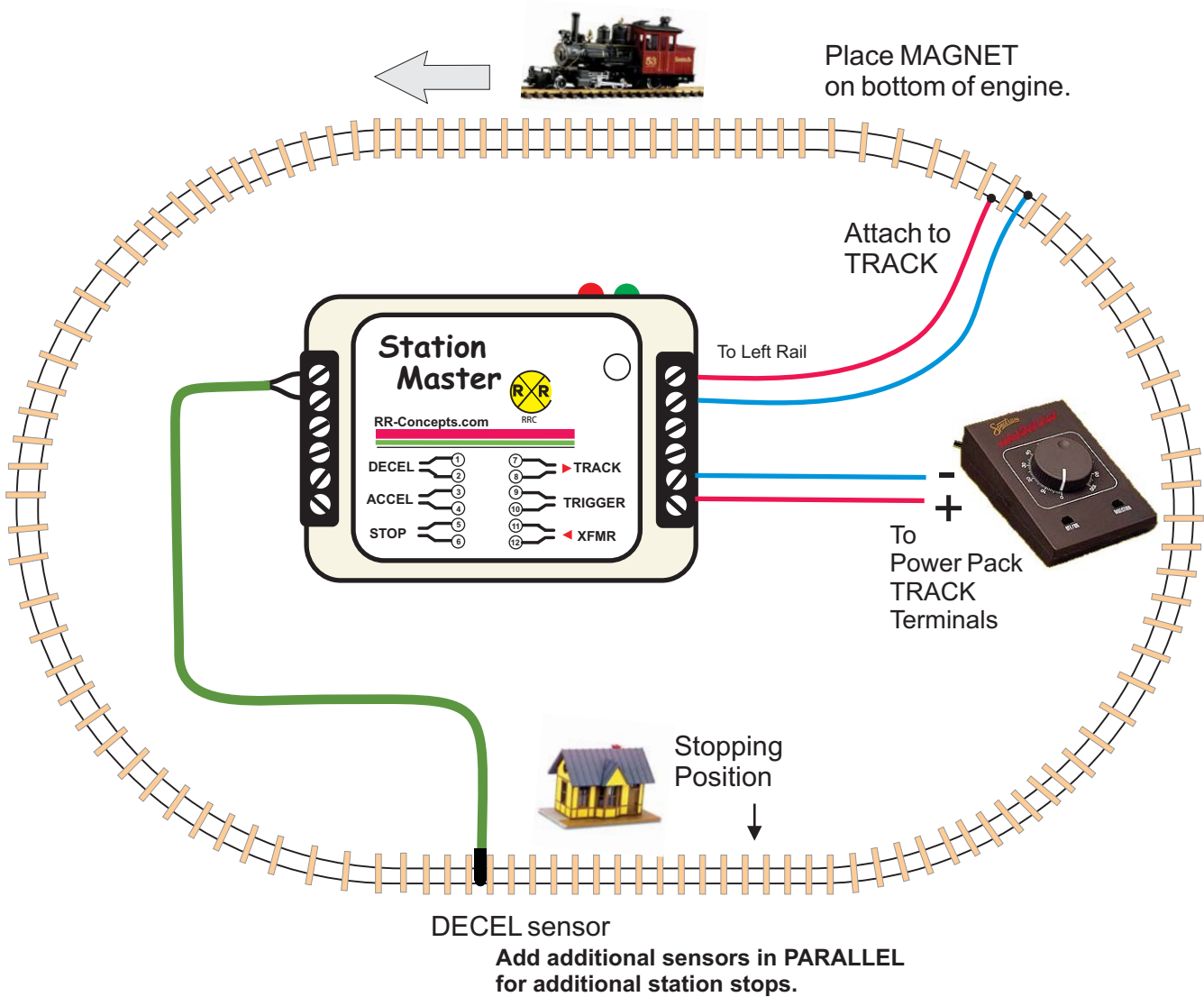
Once the shutdown is programmed both LEDs will enter the shutdown blinking state. To recover from this either turn the dial to zero and 100% again, or cycle power.



Test:

Test the shutdown by briefly shorting out the track again. If the StationMaster does not shut down then repeat the programming sequence. The short circuit condition will be detected in about 2 seconds.

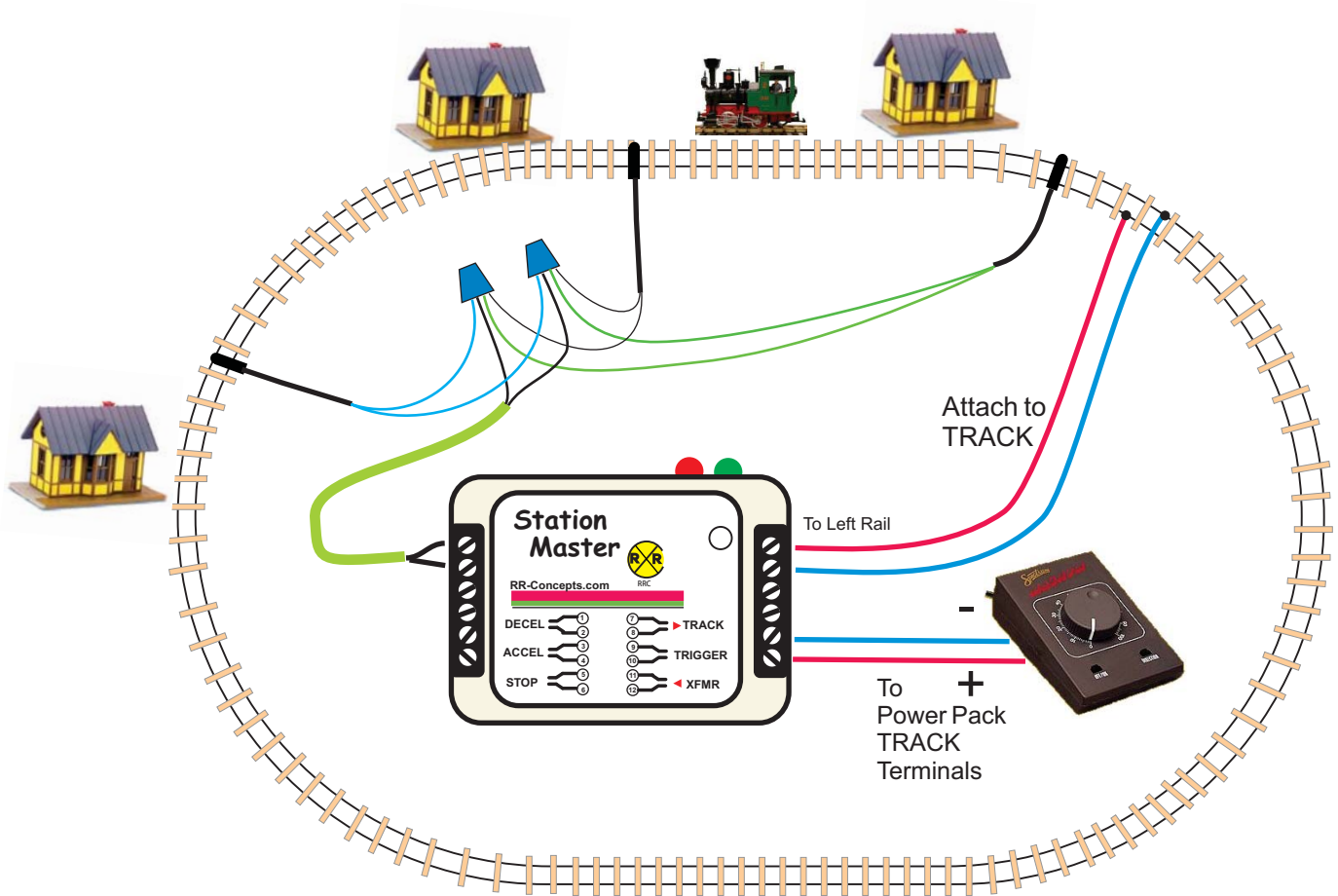
Basic Hookup Diagram for Automatic Station Stops with Deceleration/Acceleration



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

Multiple Station Stops

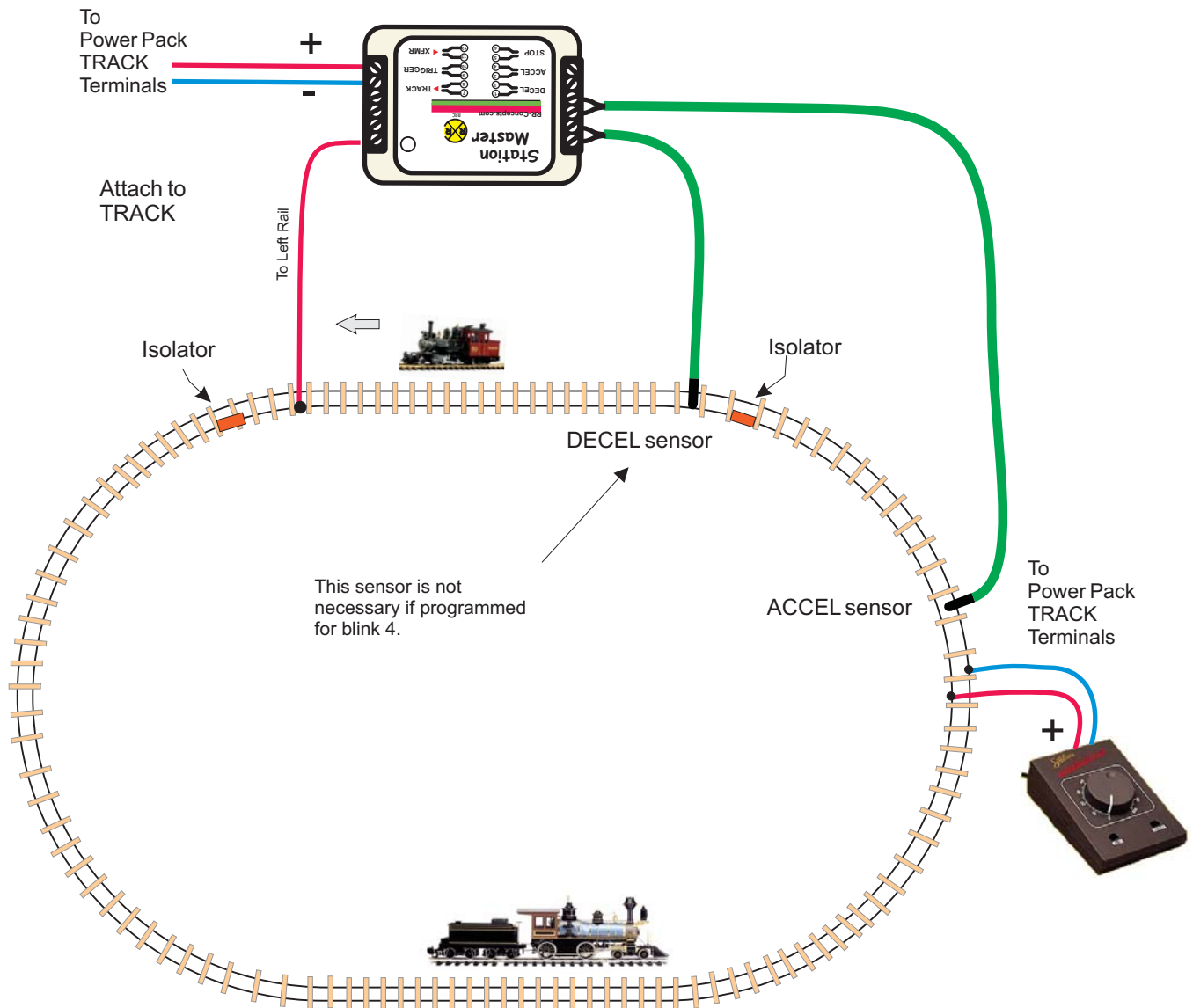
Your train can stop at many stations on the loop by adding DECEL sensors in parallel.



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

Block Control

For 1 or 2 Trains on 1 track with gradual Decelerations and Accelerations.

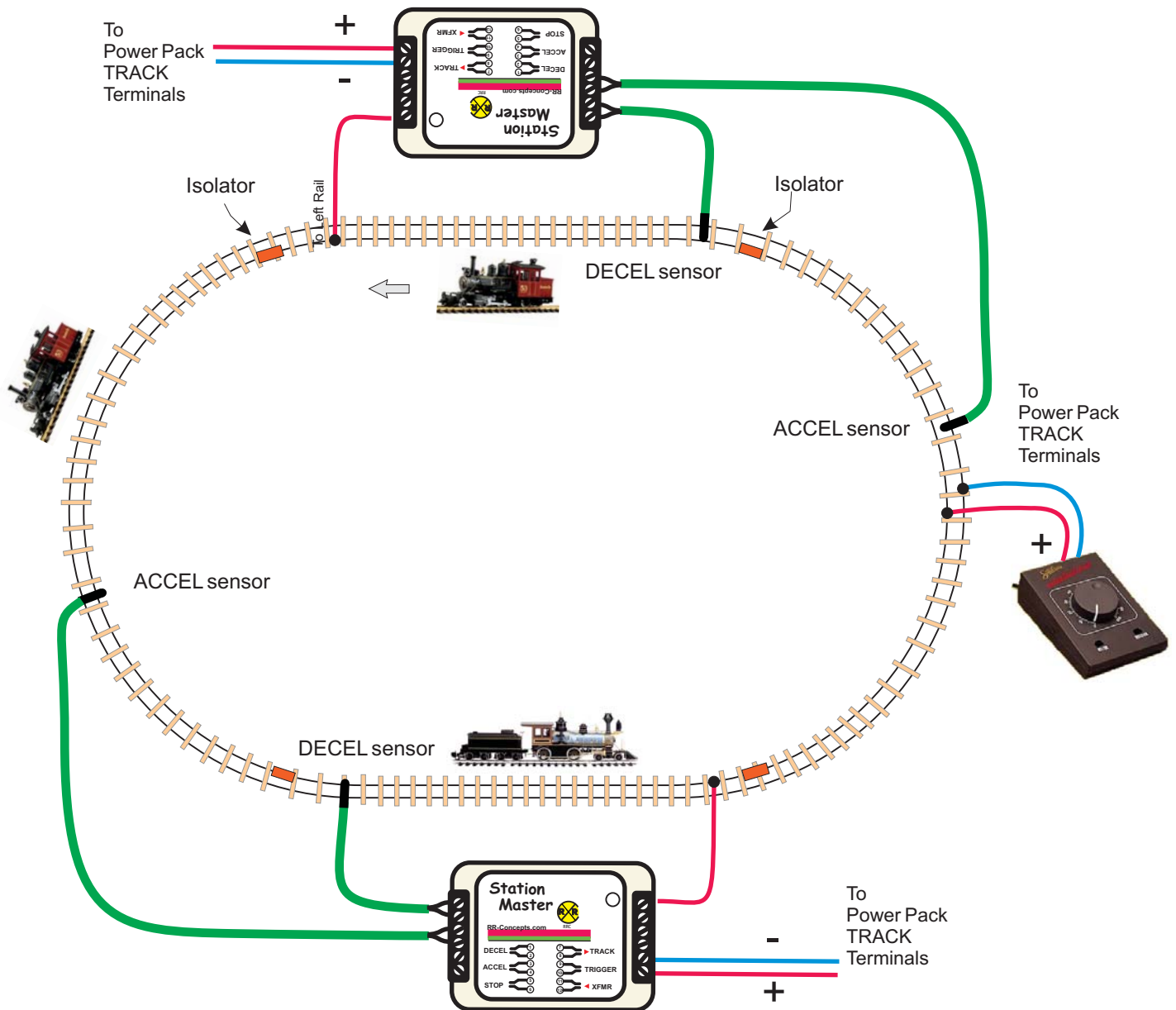


Hookup Notes:

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.
4. The TIME DELAY must be programmed for MAXIMUM. (No time delay desired)
5. Location of ACCEL sensor must allow stopped train time to accelerate and exit before 2nd train enters the siding.
5. This hookup can run with 1 train or 2 trains. (1 train will never stop)

Block Control

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

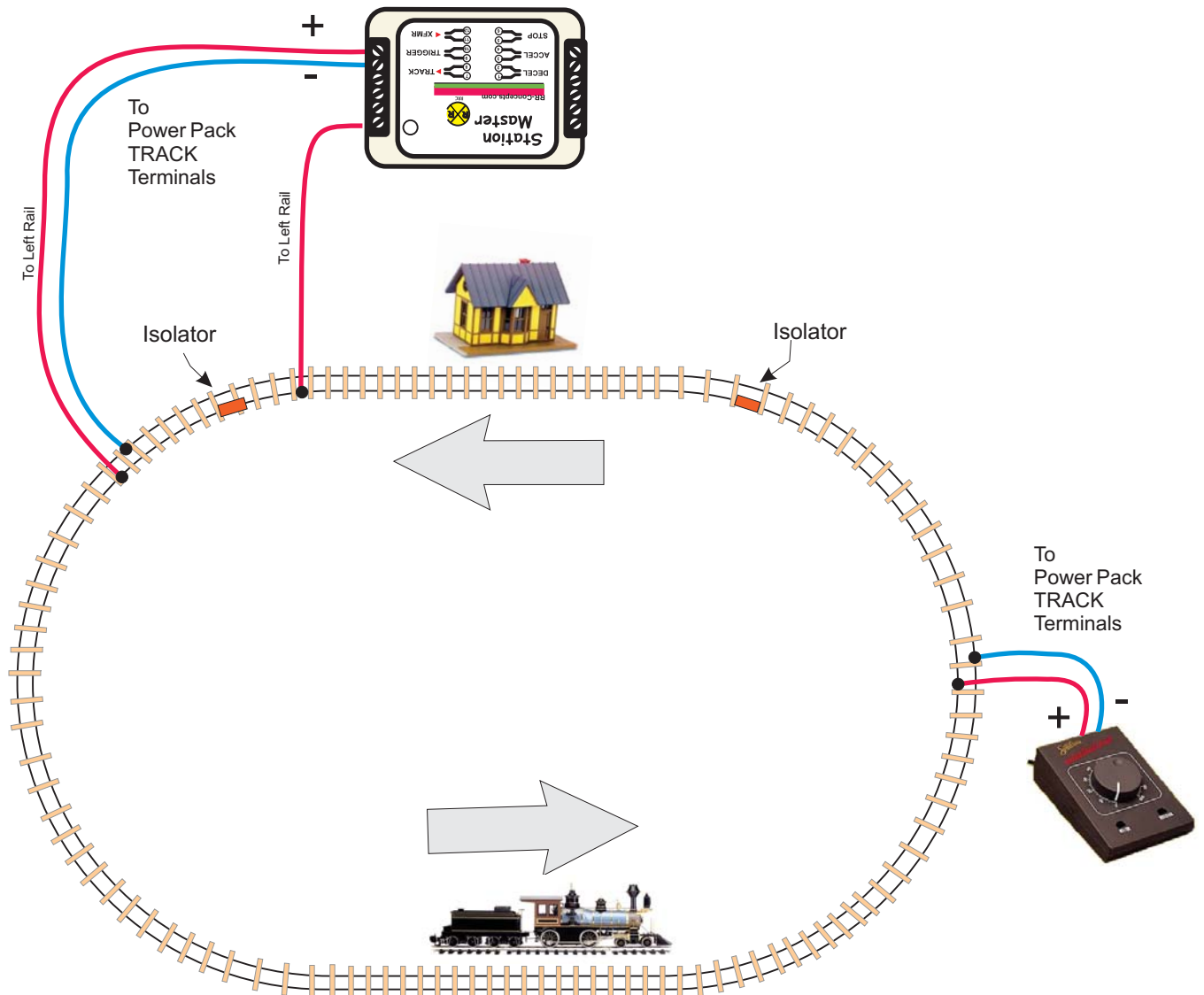


Hookup Notes:

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 isolators.
3. If the train is slowing or stopped, then the second train will tell it to "go" when it hits the ACCEL sensor.
4. The TIME DELAY must be programmed for MAXIMUM. (No time delay desired)
5. Location of ACCEL sensor must allow stopped train time to accelerate and exit before 2nd train enters the siding.

Station Stop Without using Magnets or Sensors

featuring gradual Decelerations and Accelerations.



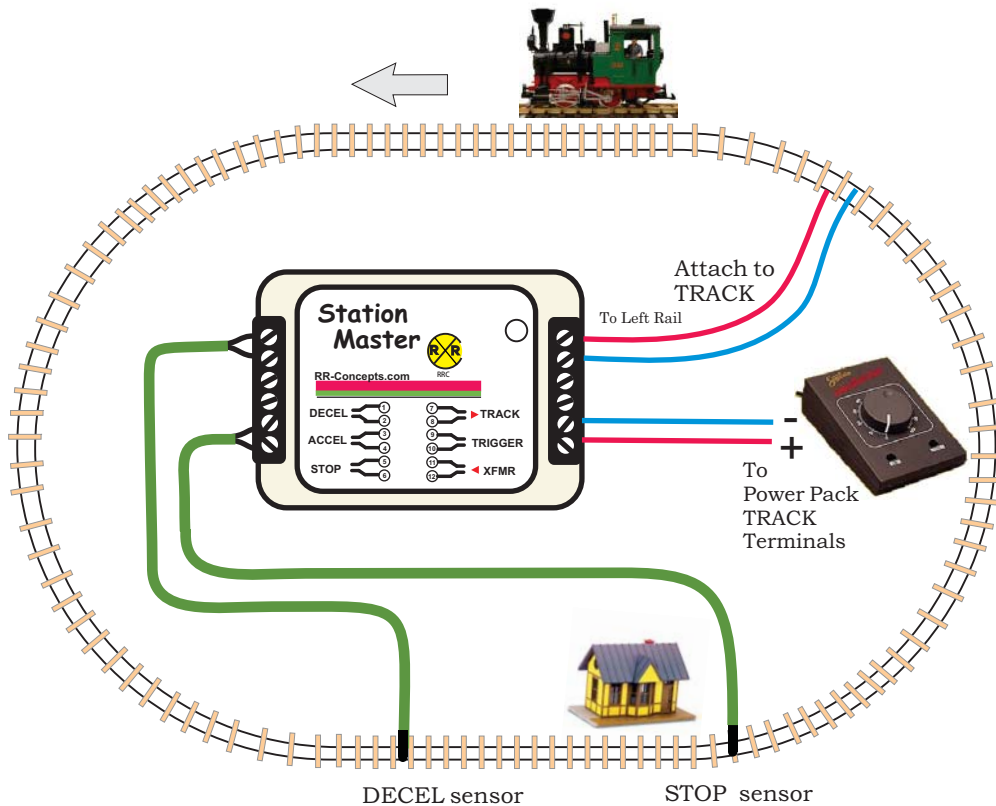
Hookup Notes:

1. Isolated section must be long enough to allow train to decelerate and accelerate.
2. Train can only go in one direction.
3. Allowing train to enter from wrong direction will damage StationMaster unless protection diode is used.
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.

Self Adjusting Deceleration

A unique and extremely realistic feature of the StationMaster is “Self Adjusting Deceleration”. By using both a DECEL sensor and a STOP sensor, the StationMaster will self-program itself for the most optimum and realistic deceleration profile. Programming your StationMaster to use “Self Adjusting Deceleration” is very easy:

1. Program your **deceleration** to **MAXIMUM**. (About 15 flashes)
2. Place the **DECEL** and **STOP** sensors on your track as shown. The distance between sensors should be between 2 and 10 feet.



When “Self Adjusting Deceleration” is turned on the trains will self-adjust each lap until the optimum deceleration is found. The trains will decelerate and then slowly creep into the station in a very realistic manner.

If a train ever stops while entering the siding then just wait.. it will eventually carry on and reach the sensor. The StationMaster will determine the absolute slowest that each train can travel and then record this speed. To determine this minimum speed it must stop the train and then turn up the speed until the train reaches the sensor. This could take a minute or two but only happens once per power cycle.

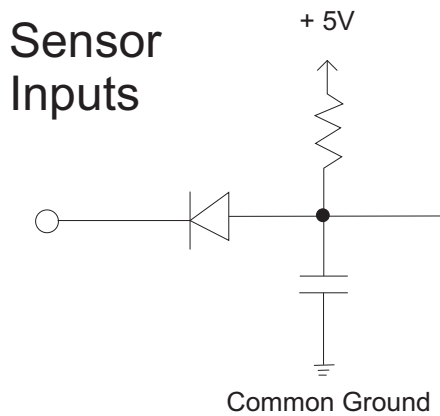
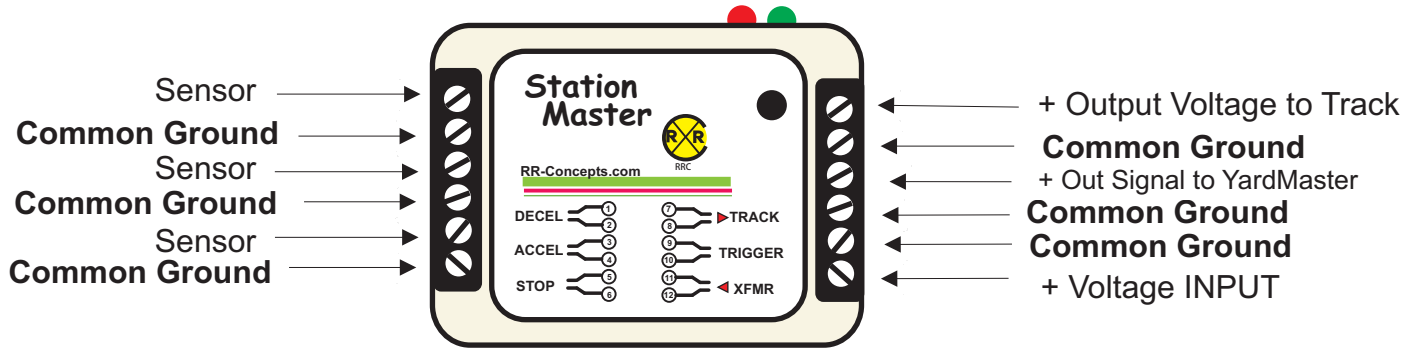
Up to 5 different deceleration profiles can be done on 5 different trains. Use the train count to set the number of trains that will be entering the StationMaster deceleration track.

More detailed information on the self-adjusting deceleration is available online at <http://www.rr-concepts.com/StationMasterDocumentation.shtml>

Electrical Details

For reference only

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

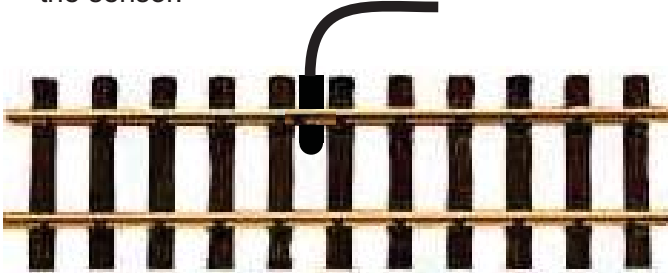


Non-Documented Features

The StationMaster contains a software controlled micro-controller. Additional customer-driven features, special functions, and enhancements have been added to the software which are not documented in this manual. A current list and description of these features is available online. Please go to RRConcepts.com for additional info.

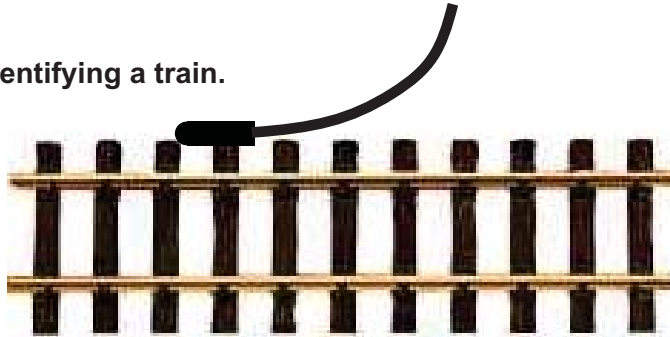
Sensor Placements on Track

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.



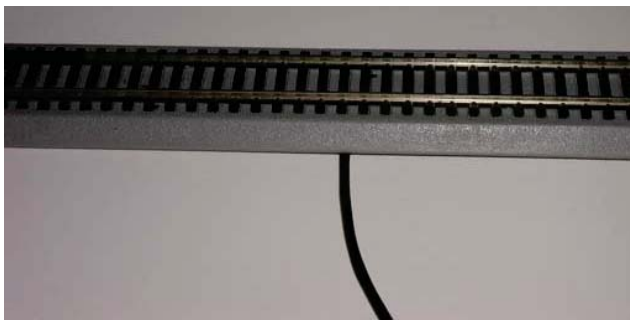
Sensor Placement for identifying a train.

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.