



RR-Concepts

YardMaster

Turnout Controller
Lamp Driver
Power Switcher



This manual contains detailed hookup and programming instructions for the YardMaster controller.

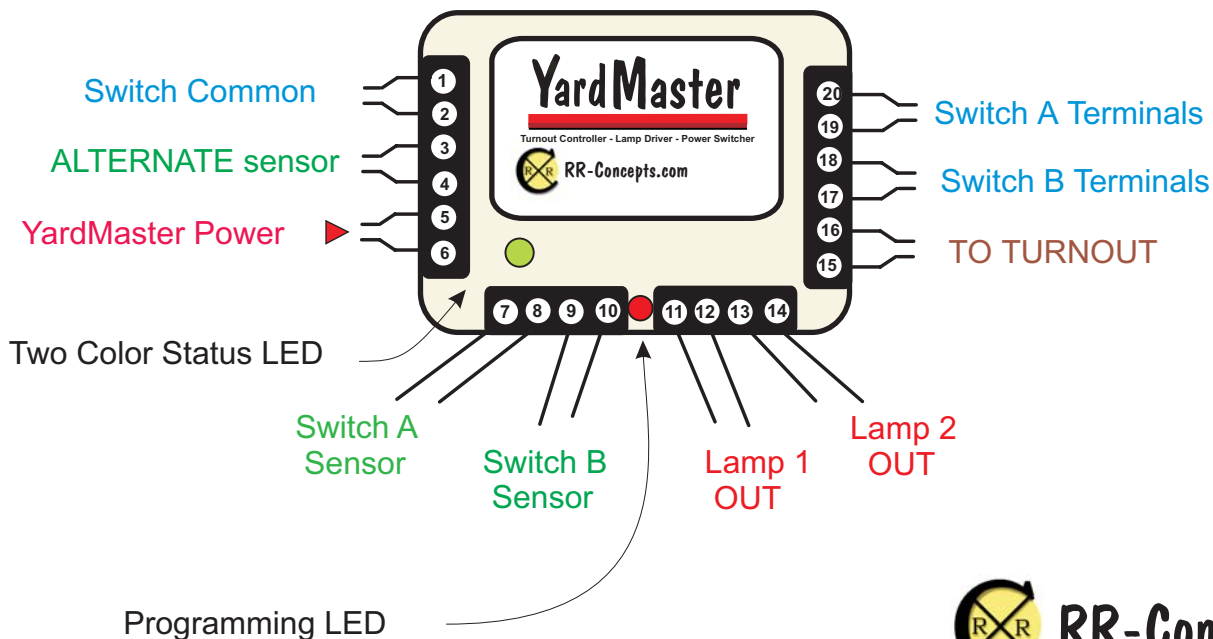
Please download "wire-to-wire" hookup diagrams at <http://www.RR-Concepts.com>.

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

Your YardMaster will be damaged if power is put on any of the sensor terminals, Lamp terminals, or Turnout terminals!!

- o The YardMaster contains a micro controller and can be reset by cycling the power. To do this, turn your transformer off for a few seconds, and then turn it back on.

- o The YardMaster will throw the turnout and switch the on-board relay to it's previous state before power was removed.





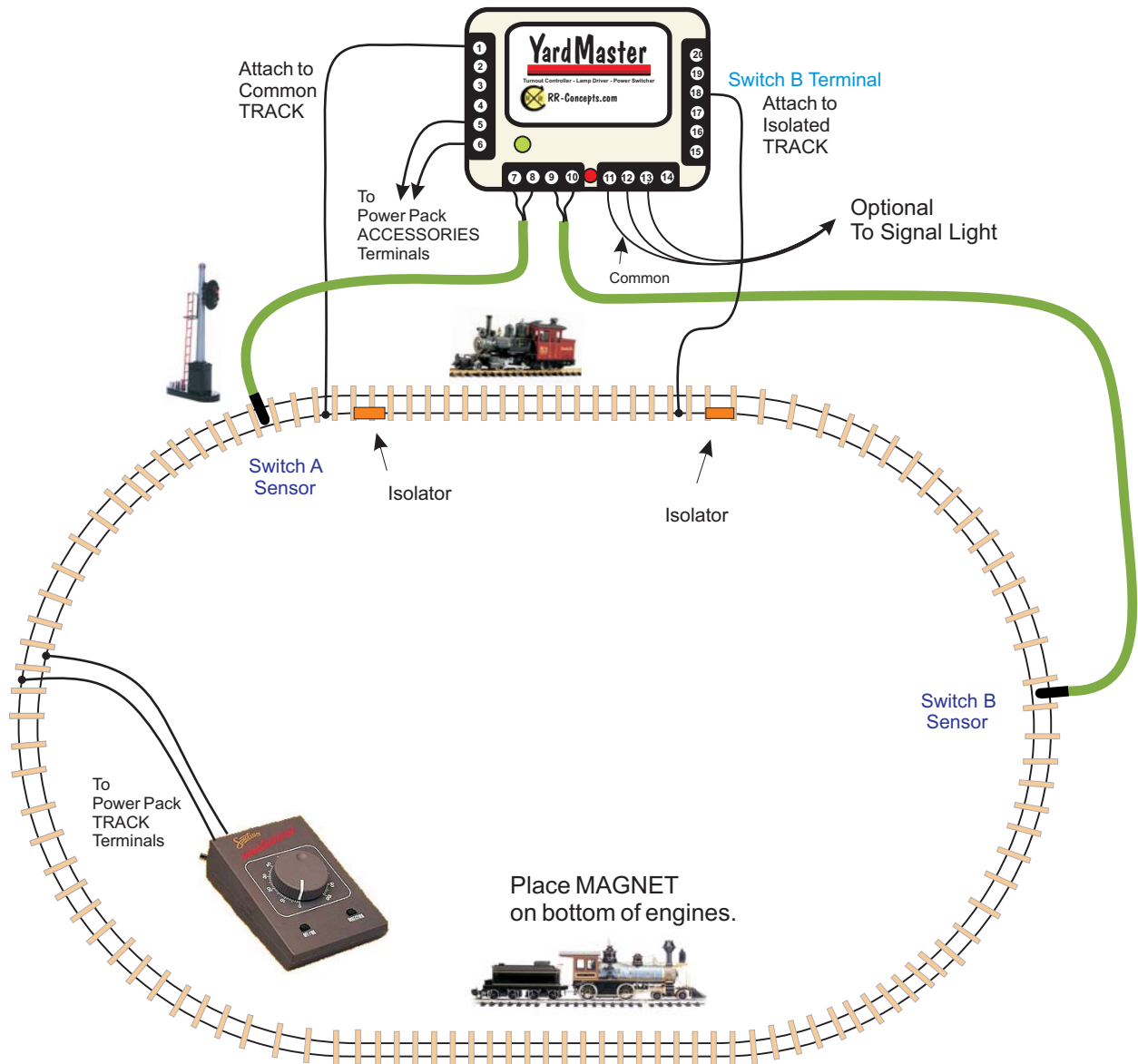
YardMaster Versions

Since there are different styles of turnouts (switches), there are also different configurations of the YardMaster to control them.

The Standard Yardmaster will control LGB style (2 wire) turnouts.
The following YardMaster software versions are available:

- * Standard YardMaster for LGB style turnouts.
- * HO YardMaster for 3 wire turnouts.
- * Continuous turnout YardMaster for Tortoise, Aristocraft, and Pneumatic turnouts.

2 Trains on 1 Track - Block Control Hookup Diagram



For two trains on one track this is all you need to do.

Remove any YardMaster time delay if one has been programmed.

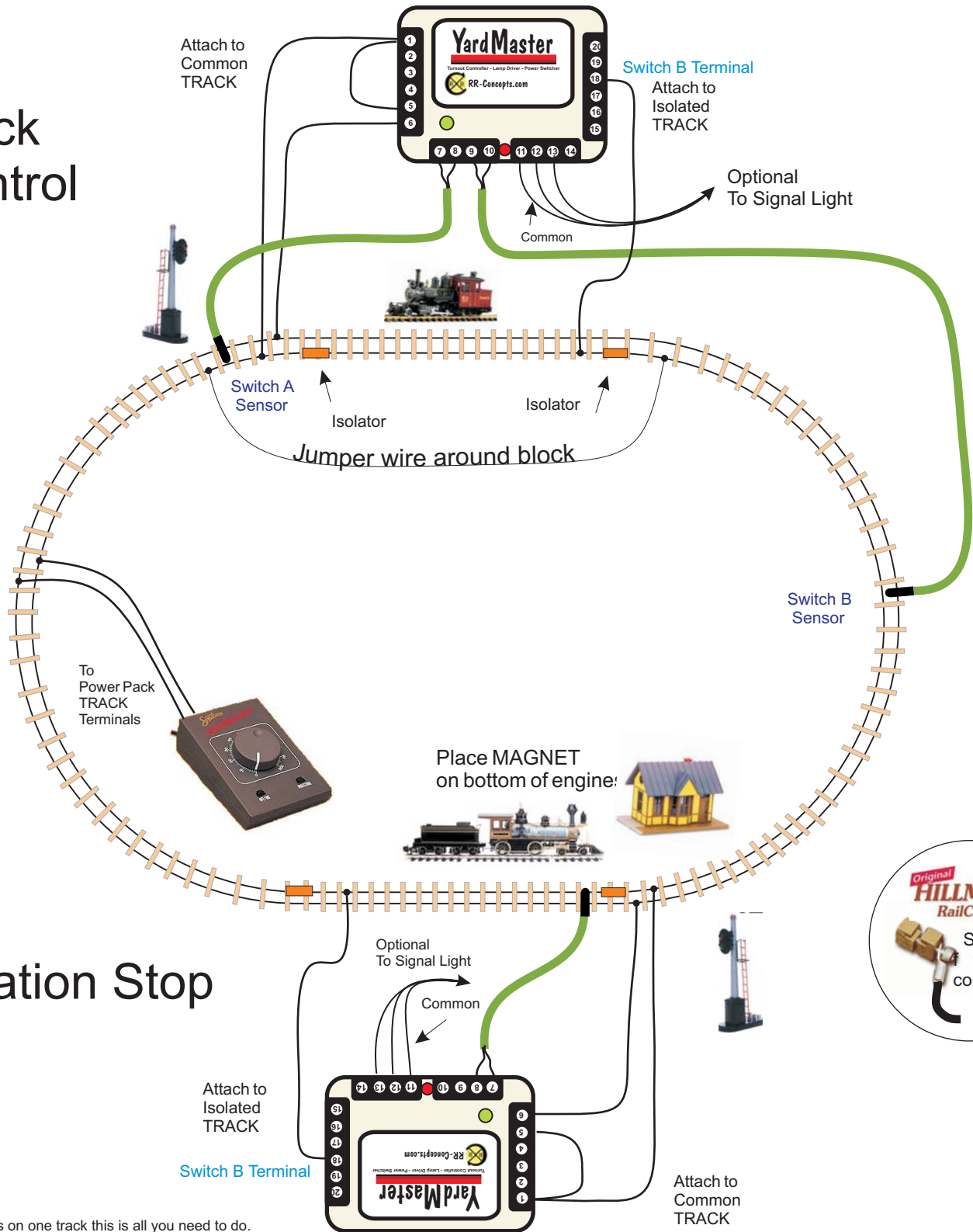
When the power supply unit is turned on the train should run. If it does not then trigger the alternate sensor by briefly touching contacts 3 and 4 together with a piece of wire. This is a one-time operation since the YardMaster will remember the state when it is power cycled.

Change the direction of train to run as shown and adjust the speed as desired.

The signal light is optional but adds to the fun.



Block Control



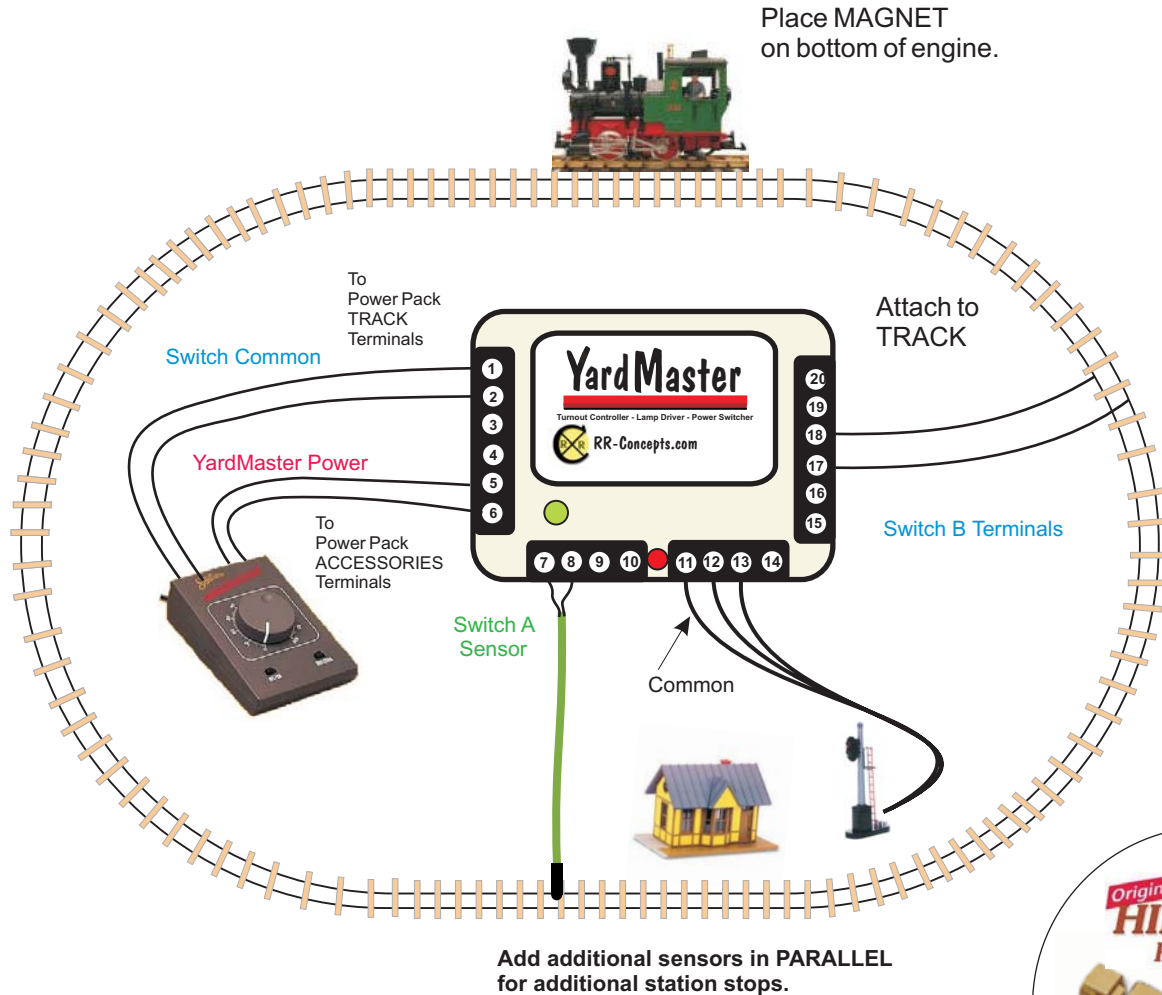
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Change the direction of train to run as shown and adjust the speed as desired.

Station Stop Hookup Diagram



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

Make sure to program the YardMaster for the desired time delay.

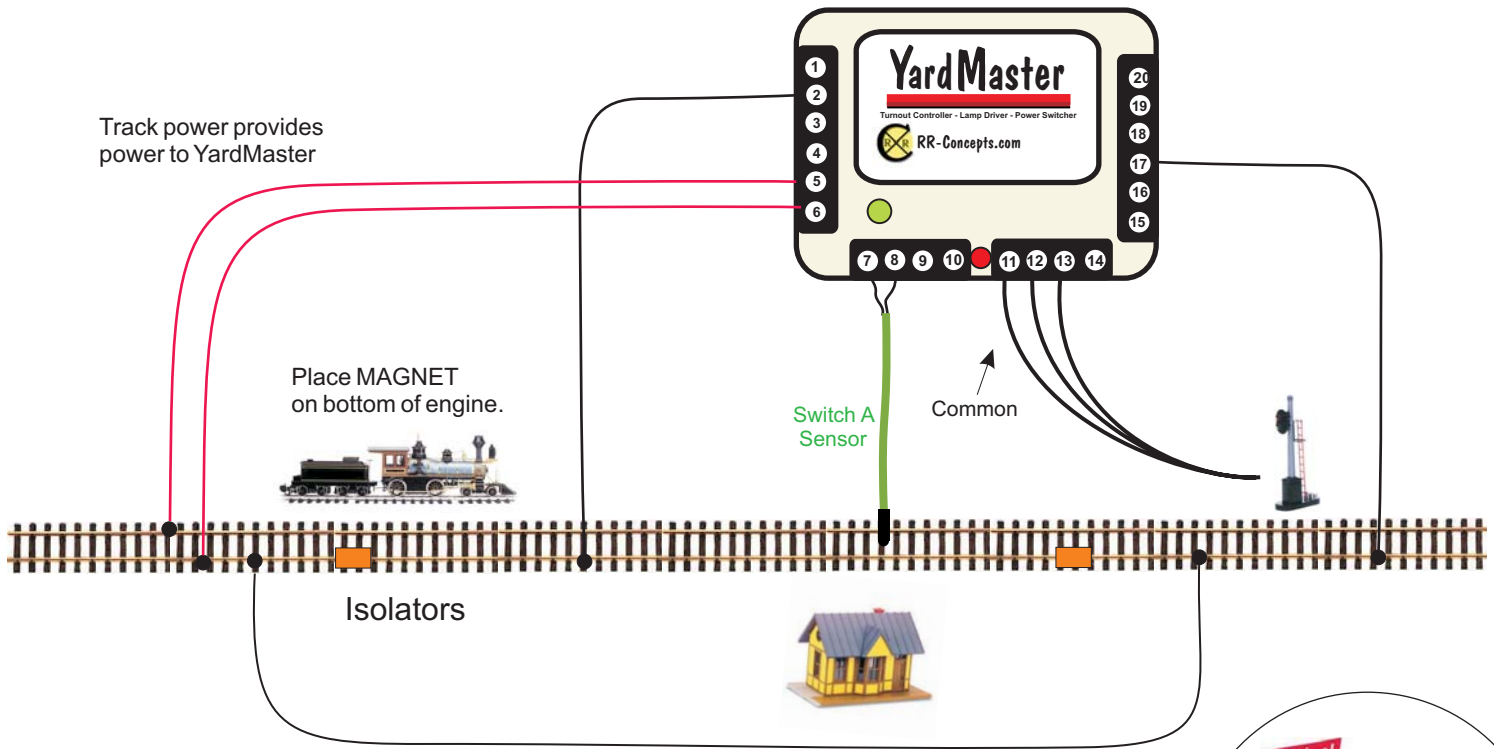
When the power supply unit is turned on the train should run. If it does not then trigger the alternate sensor by briefly touching contacts 3 and 4 together with a piece of wire. This is a one-time operation since the YardMaster will remember the switch state when it is power cycled

Change direction of train as required. The YardMaster will operate in both directions.

Adding a signal light is optional, but adds to the fun.

Station Stop Hookup Diagram for a Track Section

Add this to a remote location on your railroad.



Track connections not shown. AC, DC, or DCC trains are controlled.

Make sure to program the YardMaster for the desired time delay.

When the power supply unit is turned on the train should run. If it does not then trigger the alternate sensor by briefly touching contacts 3 and 4 together with a piece of wire. This is a one-time operation since the YardMaster will remember the switch state when it is power cycled

Change direction of train as required. The YardMaster will operate in both directions.

Adding a signal light is optional, but adds to the fun.

Using wire nuts, a clever re-arrangement of wires would only require 4 track connections.

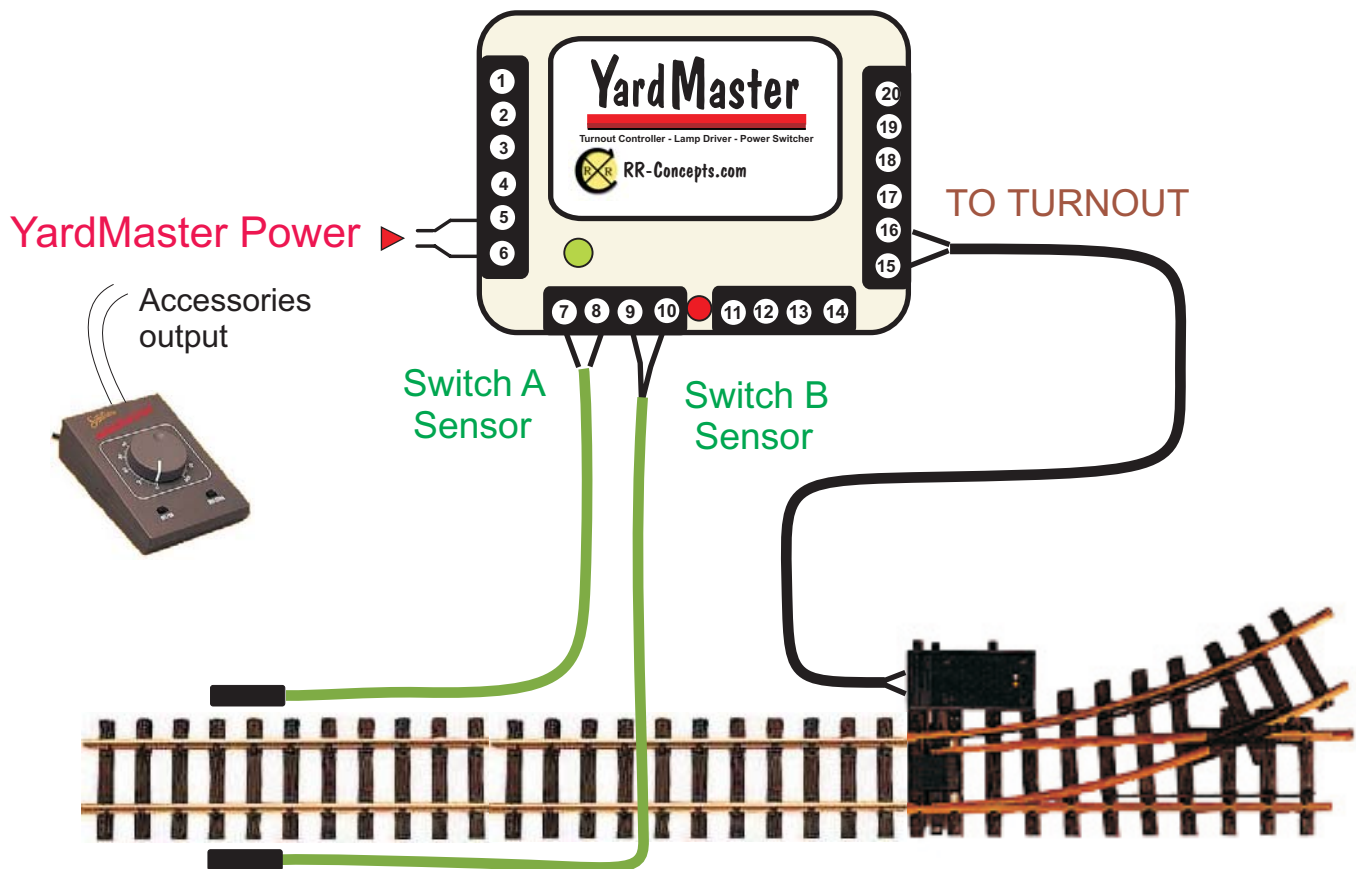
Smart Turnout

A Smart Turnout will allow one train to go Left, (Passenger train goes to Station) while the other train goes to main line. (Freight train does not go to station).

All trains with the magnet offset to the left will go left, while all trains with the magnet offset to the right will go right.

The Smart Turnout works for ALL trains- Electric, Battery and Live Steam.

For more fun, the YardMaster can directly drive a signal lamp synchronized with the turnout. See the YardMaster manual for hookup details.



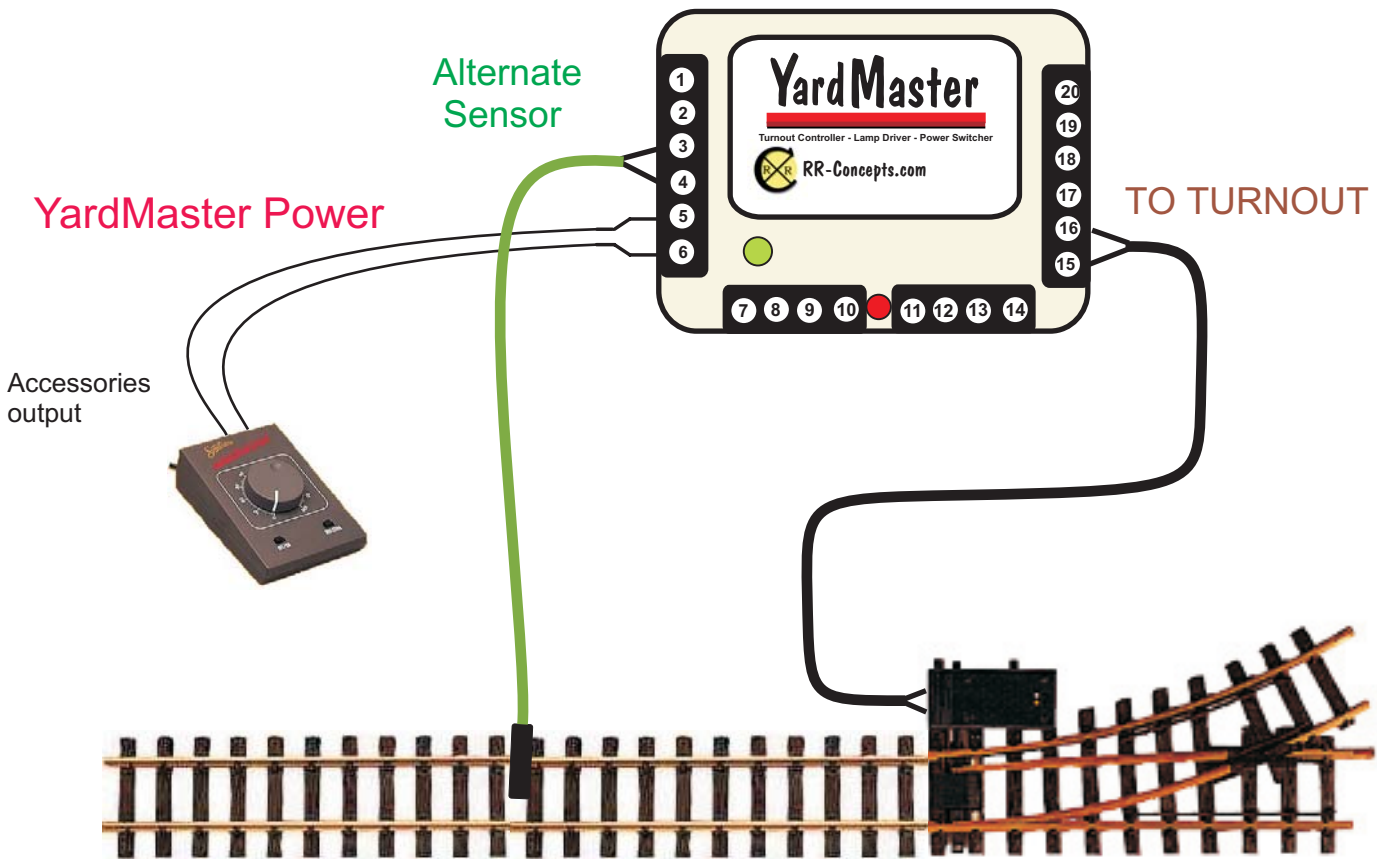
Alternating Paths

In this configuration the train will alternate the turnout each time it crosses over the sensor. Each train that approaches will take an alternate path.

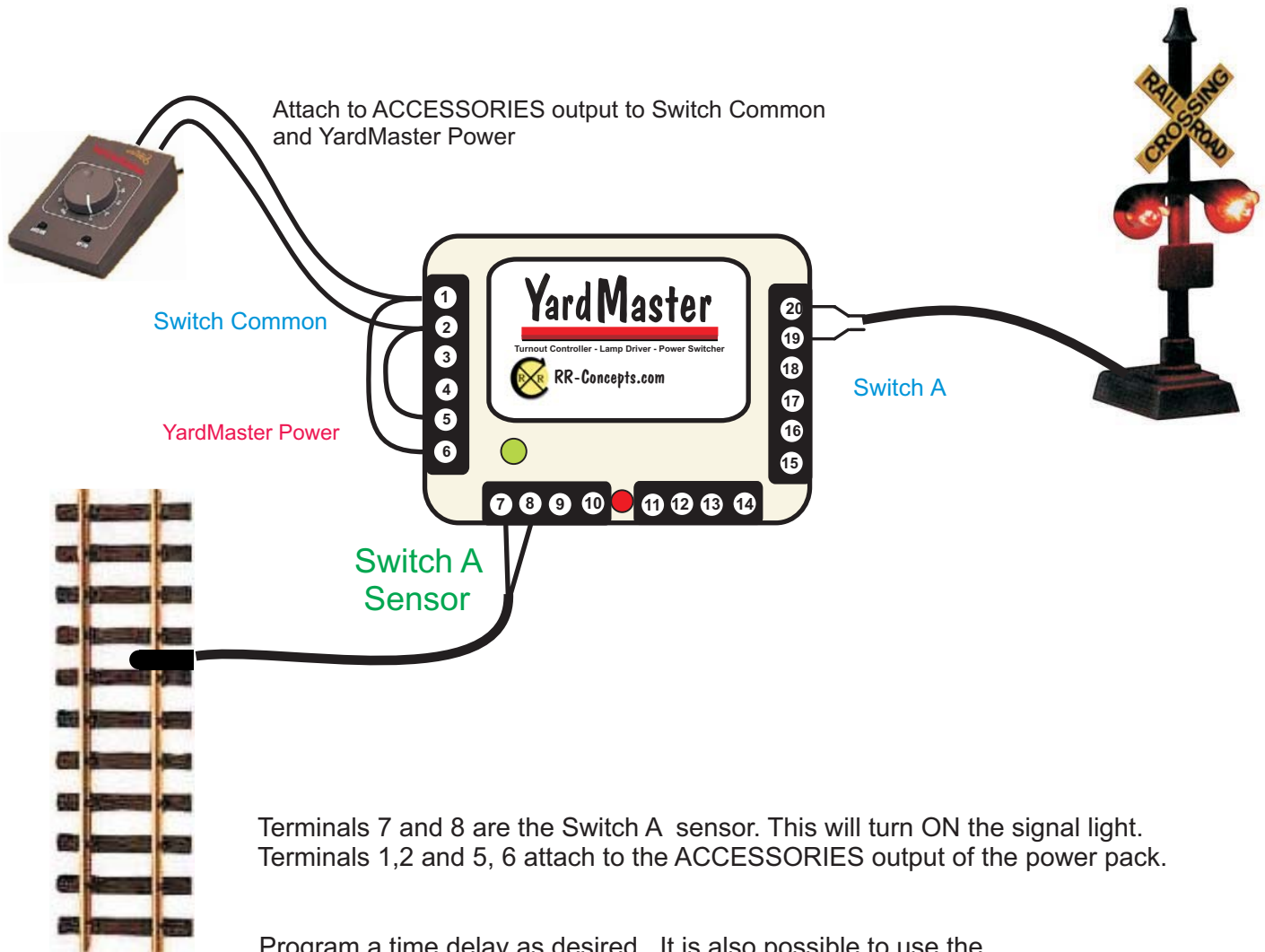
This could be useful for multiple trains that follow each other on the same track.

The Alternating Path hookup will work for ALL trains- Electric, Battery and Live Steam.

For more fun, the YardMaster can directly drive a signal lamp synchronized with the turnout. See the YardMaster manual for hookup details.



Controlling Crossing Signal Lights



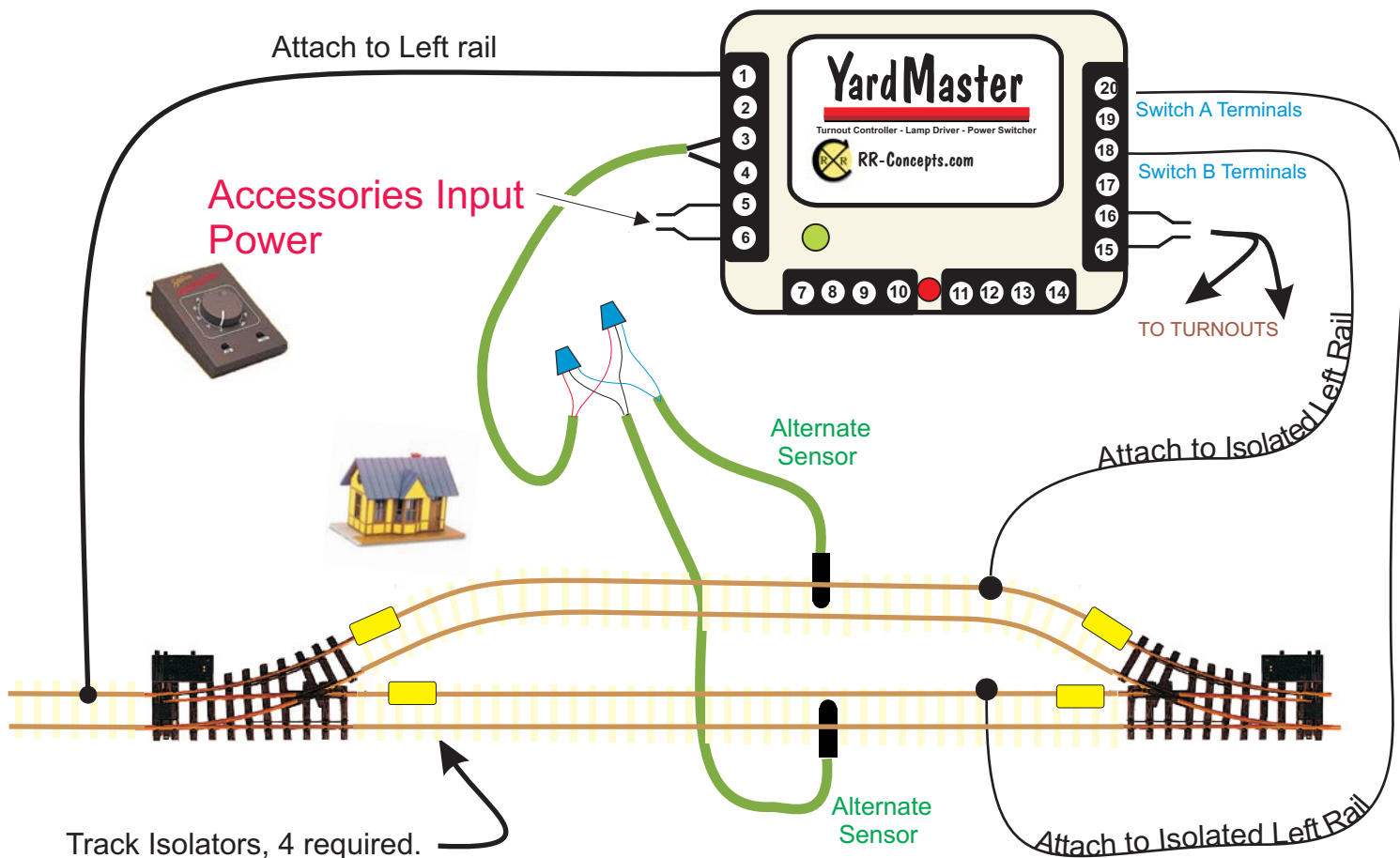
Terminals 7 and 8 are the Switch A sensor. This will turn ON the signal light.
Terminals 1,2 and 5, 6 attach to the ACCESSORIES output of the power pack.

Program a time delay as desired. It is also possible to use the Switch B sensor to turn off the signal light instead of using a time delay.

When sensor A is tripped the YardMaster will switch power to the SWITCH A terminals. After the timer has expired or the B sensor is triggered the switch will return to the Switch B state and turn off the signal light.

This hookup assumes that the crossing light contains electronics to flash the lamps. If it does not, a special YardMaster modification can do this. Consult RR-Concepts.com for more info.

Alternating Trains Hookup Diagram



This hookup will allow two trains to alternate. When one train enters a siding it will trigger a sensor which will switch power to the other track. The other train will then run.

Both turnouts are wired in parallel and attached to the TURNOUT terminals of the YardMaster. The exiting turnout can be powered or non-powered.

The YardMaster will switch when the train is clear of the sensor to prevent the train from parking on the sensor.

Place the sensor such that the train stops before reaching the isolator. The sensors have no polarity.

Clear any time delay programming if it has been set. (See manual) If acceleration, deceleration, or a station stop is desired consider adding a StationMaster to this hookup.

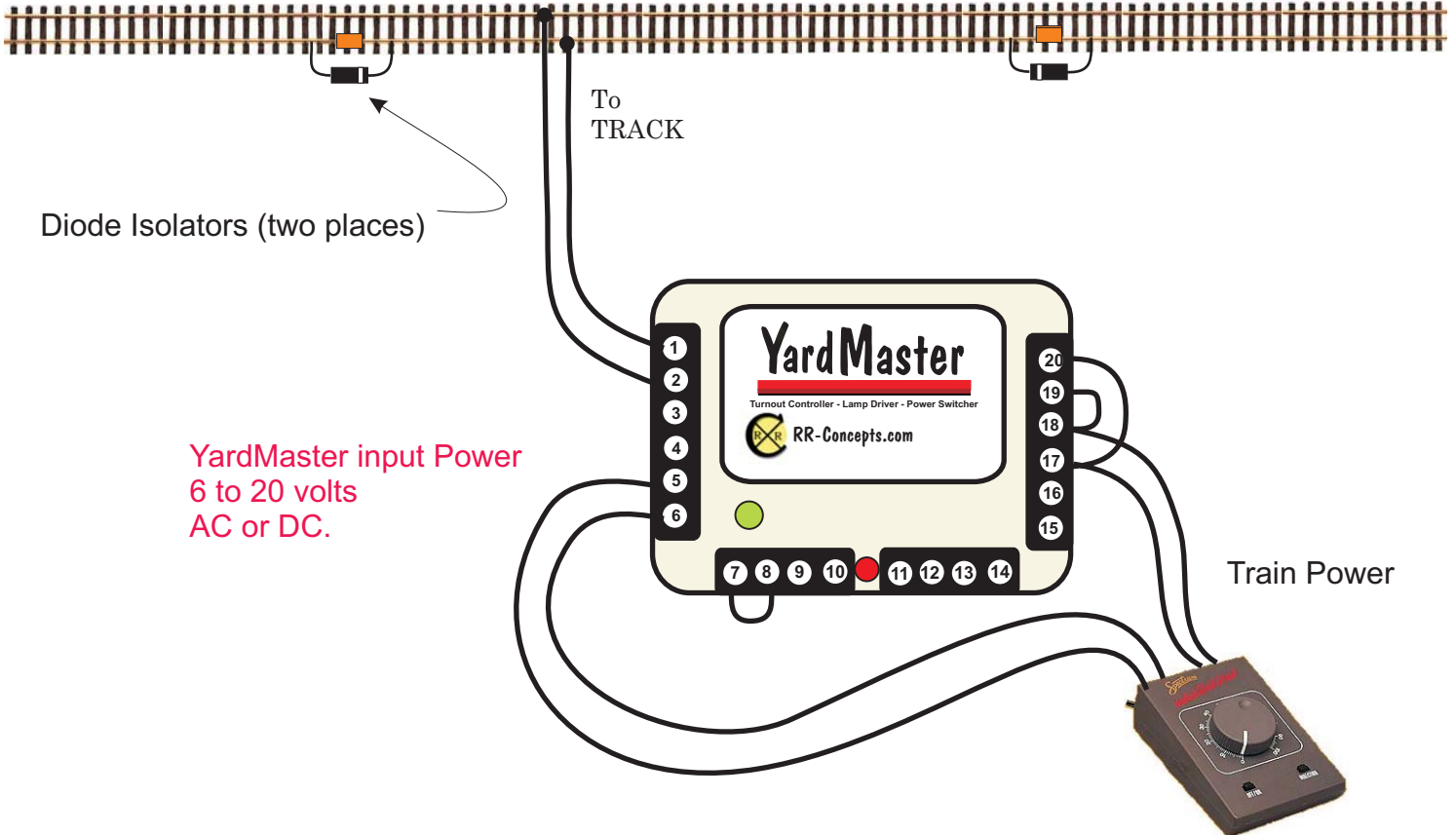
For back-and-forth alternating trains add an additional YardMaster. See <http://www.StationMaster.net> for more info.





Back and forth Automatic Reversing

MAGNET is not necessary.



The YardMaster can be configured to run a back-and-forth automatic reversing system when wired as shown.

Note the use of diode isolator sections. The train will stop when it reaches these. It is also possible to use LGB 10151 sections in place of these diodes.

Pins 1 and 2 connect to the track.

Pins 5 and 6 connect to the transformer accessories output.

Pin 20 is connected to pin 17, and these two are connected to one of the train power lines.

Pin 19 is connected to pin 18, and these two are connected to the other train power lines.

Pins 7 and 8 are shorted together. This tells the YardMaster to perform automatic switching using the programmed time delay. When powered up with this jumper installed the YardMaster will continuously switch using the time delay. Only the Alternate sensor will be active.

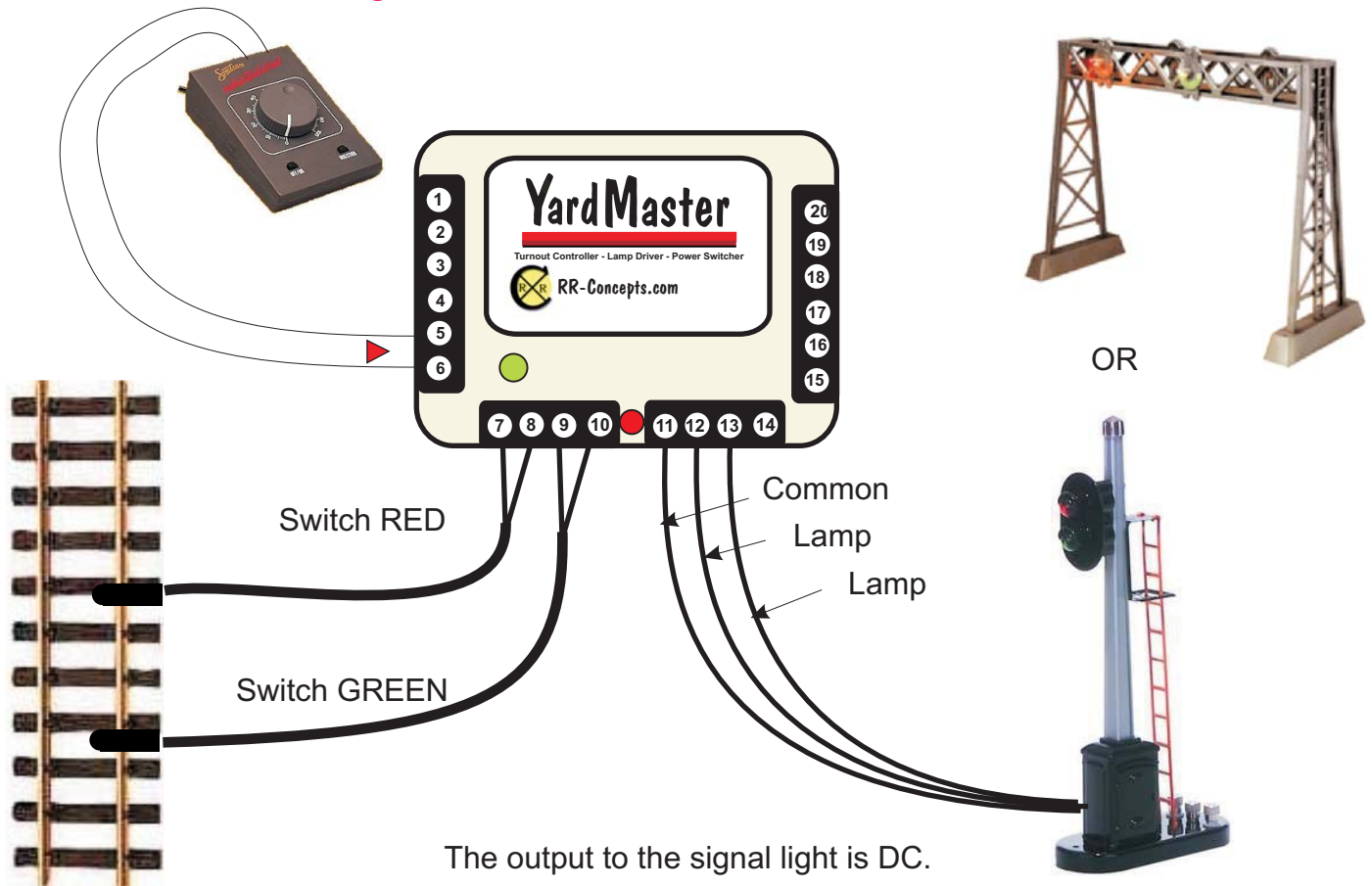
The time delay must be programmed such that the train can travel the length of the track and park at the end. (See time delay programming)

Note that the stops will be abrupt and there is no in-between station stop. For gradual accelerations and in-between station stops consider using the StationMaster/Reverser. Information is available at <http://www.RR-Concepts.com>



Controlling Signal Lights

To Accessories or voltage source



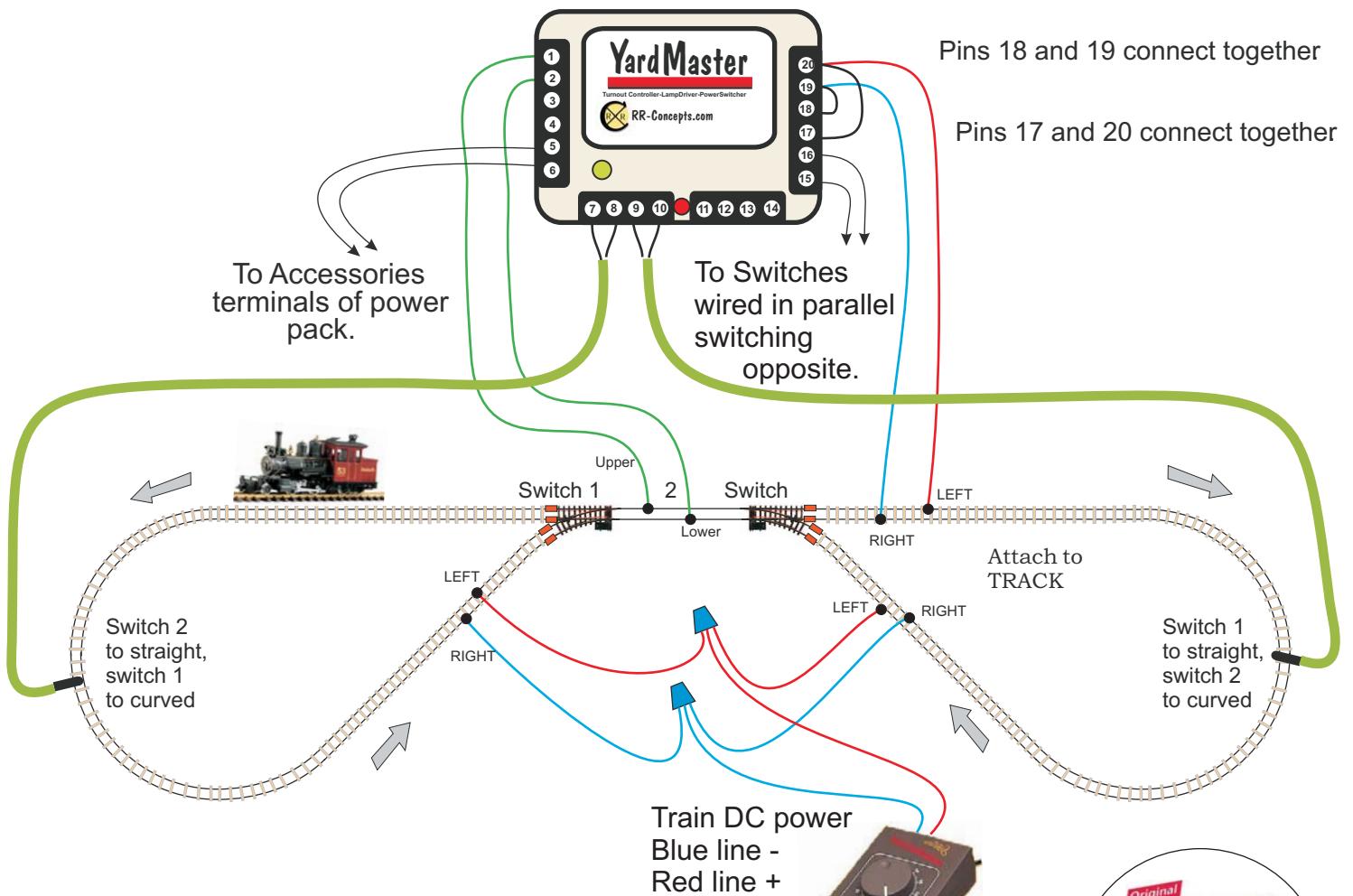
The YardMaster has been designed to directly drive signal lights in order to provide realism and interest. The signal light outputs are synchronized with the on-board relay and turnout.

Terminals 11 and 14 are the “common” wires, while 12 and 13 are the “controlled” wires. Typically a signal lamp will have one common wire and two separate wires going to the lamps. A typical hookup is shown above.

For added interest, signal lamps will enter a slow blinking state every minute to give your railroad a more realistic look.

To use LED signal lights the appropriate dropping resistor is required. The resistor value depends upon the input voltage presented to the YardMaster. The YardMaster can operate with voltages between 6 and 20 Volts AC or DC.

Reversing Loops with powered turnouts



Notes:

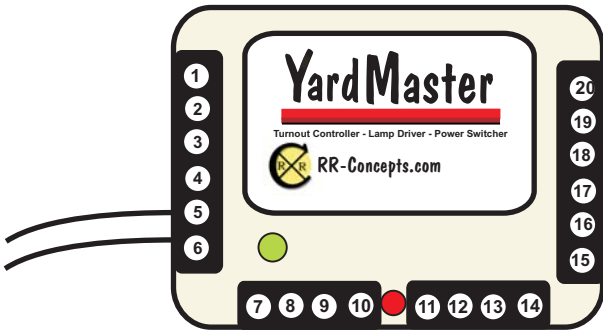
- * Center section can be as long as desired.
- * To run with two trains, add the alternating trains hookup using an additional YardMaster or StationMaster in the center section.

Hookup:

- Attach #1 and #2 to center track section as shown.
- Attach #4 and #6 to the accessories terminals of the power pack. Polarity is not important.
- Attach #7 and #8 to the sensor in the left loop. This will set the polarity of the center section.
- Attach #9 and #10 to the sensor in the right loop. This will set the polarity of the center section.
- Attach #15 and #16 to the switches wired in parallel. They should switch opposite so the train follows the arrows.
- Attach #18 to #19 and attach a wire to the negative power source (shown attached to right rail)
- Attach #17 to #20 and attach a wire to the positive power source. (shown attached to left rail)
- Attach TRACK outputs to track as shown. Each loop is hard wired for a certain direction.
- Make sure polarity and directions of trains are as shown.



YardMaster Power In



YardMaster Power IN

The YardMaster Power input (Pins 5 and 6) supplies power to the YardMaster controller, power for the Lamps, and power for the TURNOUT outputs.

The YardMaster can operate at voltages between 6 volts and 20 volts, AC or DC, but if firing turnouts then the power must be greater than 10 volts.

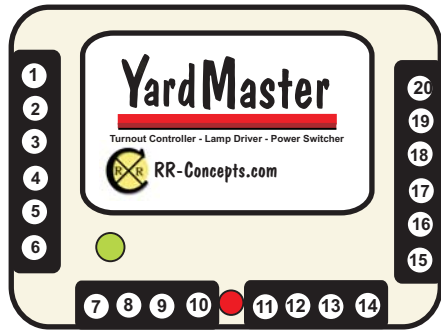
Typically the Accessories output of the power supply is used to power the YardMaster, however track power can be also used. For example, the YardMaster can be run by tapping off any track connection for block control operations where turnouts do not need to be controlled.

The YardMaster can also use the same DC StationMaster input power.

VERY IMPORTANT!!

When attached to a StationMaster the StationMaster AND YardMaster MUST share the same transformer. If separate power supplies are used the YardMaster WILL be damaged. As noted above the YardMaster and StationMaster can use the same input DC voltage.

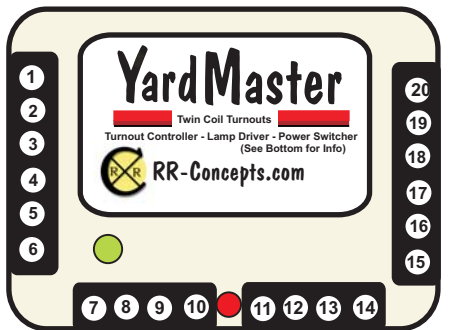
Turnout Output to Electric Switches



To 2 wire TURNOUT (electric switch).

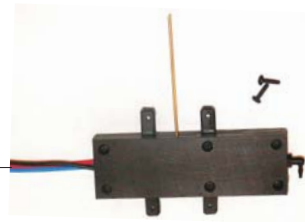
Pins 15 and 16 are the Turnout output signals for LGB style switches .

These terminals provide power to directly throw switch turnouts. Up to 3 AMPS of power is available to throw up to 3 LGB style turnouts simultaneously if wired in parallel. A pulsed DC output of 0.8 seconds is provided to drive the turnouts for both directions. The output voltage is pure DC and is not half wave rectified AC. This provides maximum power output to the turnout. The output voltage level is directly proportional to the input voltage. For example, a 12VAC input will provide a 12VDC turnout voltage, etc. Please DO NOT short these wires together or attach them to the track. Damage will result when the YardMaster fires.



Twin Coil Version
for 3 wire TURNOUT (electric switch).

Common
Coil
Coil

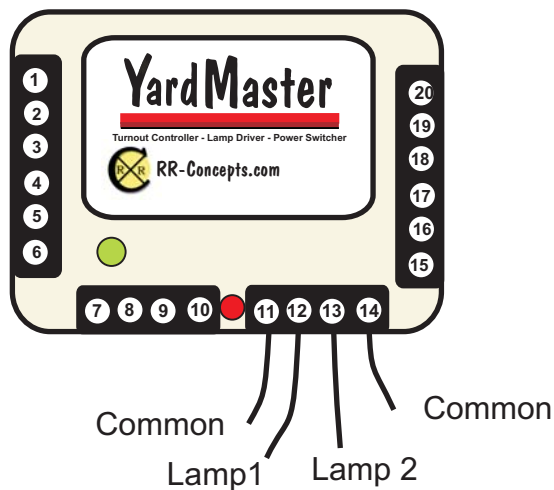


For Twin Coil YardMaster versions attach pins 11, 12, and 13 as shown. Pin 11 is the common connection. **If the YardMaster is not a twin coil version then this hookup will damage the turnout since the voltage will be continuous.** The twin coil YardMaster will pulse the signals to properly throw the turnout.

For continuous voltage switches such as Tortoise, Aristocraft, or pneumatic Ea-Ze Air, please specify that when ordering. These continuous voltage devices will attach to pins 12 and 13 instead of the TURNOUT pins. A different YardMaster software is required.



Lamp Outputs



Pins 12 and 13 are the Lamp output signals.
Pins 11 and 14 are common. (Ground)

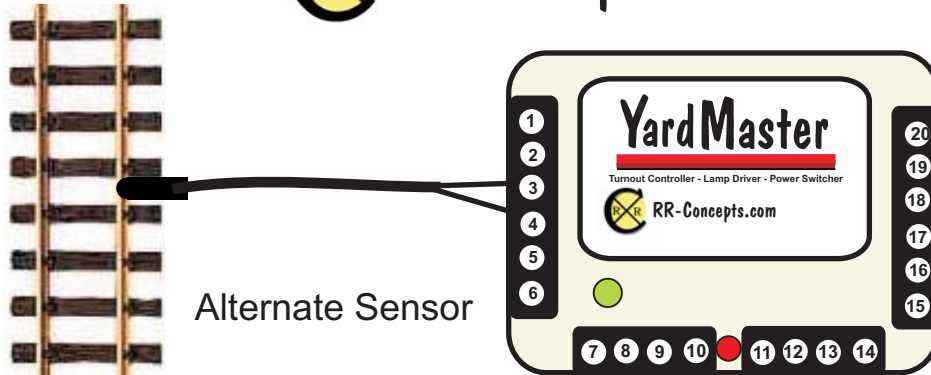
These terminals provide power to directly drive incandescent lamps. These can provide up to 3 AMPS of power. The output voltage is pure DC and is not half wave rectified AC. LED lamps can be used if the proper dropping resistor is used. Polarity is important when using LED's.

Note that the lamp output voltage is directly proportional to the input voltage. For example, a 12 VAC or 12 VDC input will provide a 12VDC lamp output, etc. If switch control is not required (requires higher voltages) then the input voltage can be lowered as necessary to drive the signal lamps.

DO NOT short these wires together or attach them to the track. Damage will result.

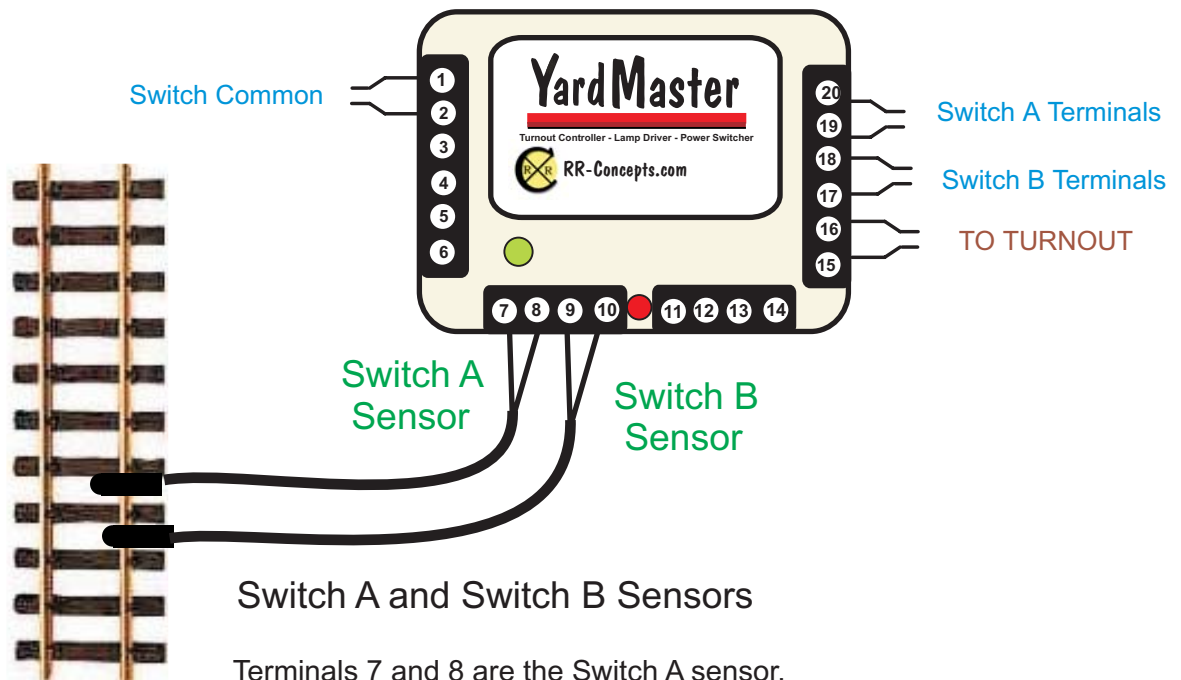
The YardMaster will flash these lamps at 1 Hz when performing a time delay operation. For standard non time delay operations these lamps will enter a slow blinking state every few seconds to give your RR a more realistic look.

Sensor Descriptions



Alternate Sensor

Terminals 3 and 4 are the Alternate sensor. When this sensor detects a magnet, the on-board relay will change state and the TURNOUT will fire to the other side. When the YardMaster is running in automatic reversing mode this is the only sensor that will be active.



Switch A and Switch B Sensors

Terminals 7 and 8 are the Switch A sensor. Terminals 9 and 10 are the Switch B sensor.

These sensors will cause the YardMaster to switch to the appropriate side. **Switch A** will cause **Switch Common** to connect to **Switch A Terminals**, and **Switch B** will cause **Switch Common** to connect to **Switch B Terminals**. The TURNOUT will also fire in synchronization and the lamps will change.

If a time delay has been programmed, the YardMaster will switch back to the beginning state after the timer has expired.

If the Switch A sensor is CLOSED on power up, the YardMaster will perform automatic time delay switching using the programmed delay value. These sensors will be ignored.

Switched Terminals



The standard YardMaster contains a latching DPDT relay which can switch 3 to 4 AMPS of track voltage. The 10 AMP Yardmaster can switch at least 10 AMPS.

When the "Switch A" sensor is tripped, the two Switch Common terminals will connect to the "Switch A terminals". Conversely when the "Switch B" sensor is tripped the Switch Common terminals will connect to the "Switch B terminals".

Since this is a simple relay there are no polarity or voltage restrictions. (AC, DC or DCC can be switched).

Terminal #1 connects to either #18 or #20
Terminal #2 connects to either #17 or #19.



Time Delay Programming for StationStopper or Reversing Operations

Note: The time delay programming can only be done with a YardMaster which has NOT been factory programmed as a Node Controller.

- 1 Apply power to the YardMaster.
 2. With power on, attach a jumper wire between terminals 7 and 8.
 3. Briefly touch terminals 3 and 4 together.
- When the red/green LED flashes the Yardmaster is in programming mode.

If sensors are attached to either of these terminals then just close the sensors with a magnet instead of using a jumper.

When the RED/GREEN led starts rapidly blinking the time delay will be set to zero and is non-operational. If this is the desired result then power down and remove the jumper or magnet on terminals 7 and 8.

To set a time delay: Close terminals 9 and 10. (Either place a magnet over the sensor, or touch terminals 9 and 10 together with a piece of wire or a paperclip).

Watch the RED LED. Each flash will increase the time delay for 5 seconds. The maximum delay will be 31 minutes at 255 flashes. (Red LED will stop flashing when the maximum is reached)

When the desired time is set, power down and remove the jumper wires. All programming values are stored in flash memory so it will remember the delay value forever.

Please note that the only way to exit programming mode is to cycle power after removing the jumpers. (Turn off and then on)



Programming Node ID

Note: Programming a node ID can only be done with a YardMaster which has been factory programmed as a Node Controller.

When programmed as a node the YardMaster will respond to a specific node ID command from a StationMaster. When a StationMaster has been programmed to operate as a node controller it will send out sequential node commands. For example, “1, 2, 3, RESET” will be sent when it has been programmed for 3 nodes. (4 sidings, or 4 blinks on the StationMaster)

Each of the YardMasters must have a unique node ID to operate in this fashion. YardMaster #1 must be programmed as Node #1, etc. All YardMasters with the same node ID will fire at the same time.

To program the Node Controller YardMaster:

- 1 Power down the YardMaster.
2. Attach a jumper wire between terminals 3 and 4 to enter programming mode.
3. Power up the YardMaster.

To program a node ID briefly close terminals 9 and 10 and count the blinks. Open the terminals when the appropriate number of blinks have occurred.

The programming blinks correspond as follows:

- 1 blink = Normal mode using sensors. Does not operate as node.
- 2 blinks = Programmed as NODE #1
- 3 blinks = Programmed as NODE #2
- 4 blinks = Programmed as NODE #3.. etc.
- 10 nodes are possible.

Power down the YardMaster and remove the 3-4 jumper when finished.

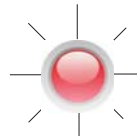
Please note that the YardMaster will not read sensor inputs while programmed as a node. Only the StationMaster can trigger the unit since it is listening for commands.



LED indicators

STATUS LED

Programming LED



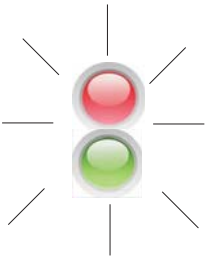
- o The RED LED will flash when any sensor is detected except when programmed as a node.
- o When in Programming mode each red Blink will increase the time delay or node ID.
- o When performing a time delay a slow blink will occur.



Green indicates the YardMaster has switched to A.



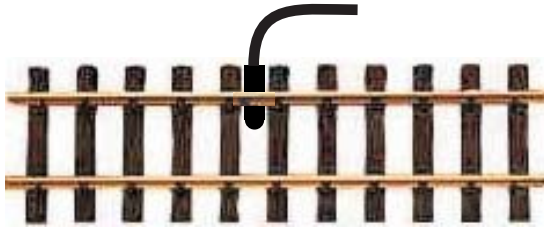
Red indicates the YardMaster has switched to B.



Red/Green Flashing indicates Programming mode. Open the sensor terminals and cycle power (turn off and on) to exit programming mode.

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.



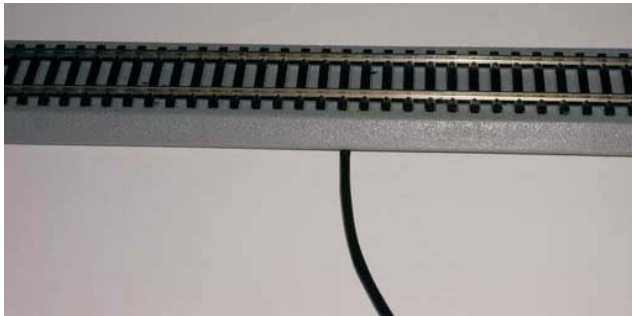
Sensor Placement for identifying a train.

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 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.