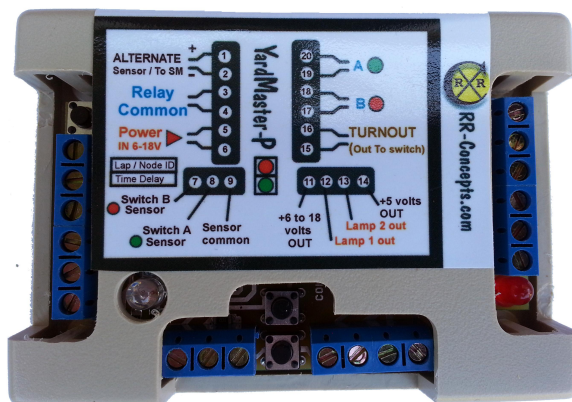




RR Concepts

YardMaster- P

- Turnout Controller
- Lamp Driver
- Power Switcher
- Pushbutton Programmable



This manual contains detailed hookup and programming instructions for the YardMaster-P controller. This is the 3rd generation YardMaster and the first version with pushbutton controls.

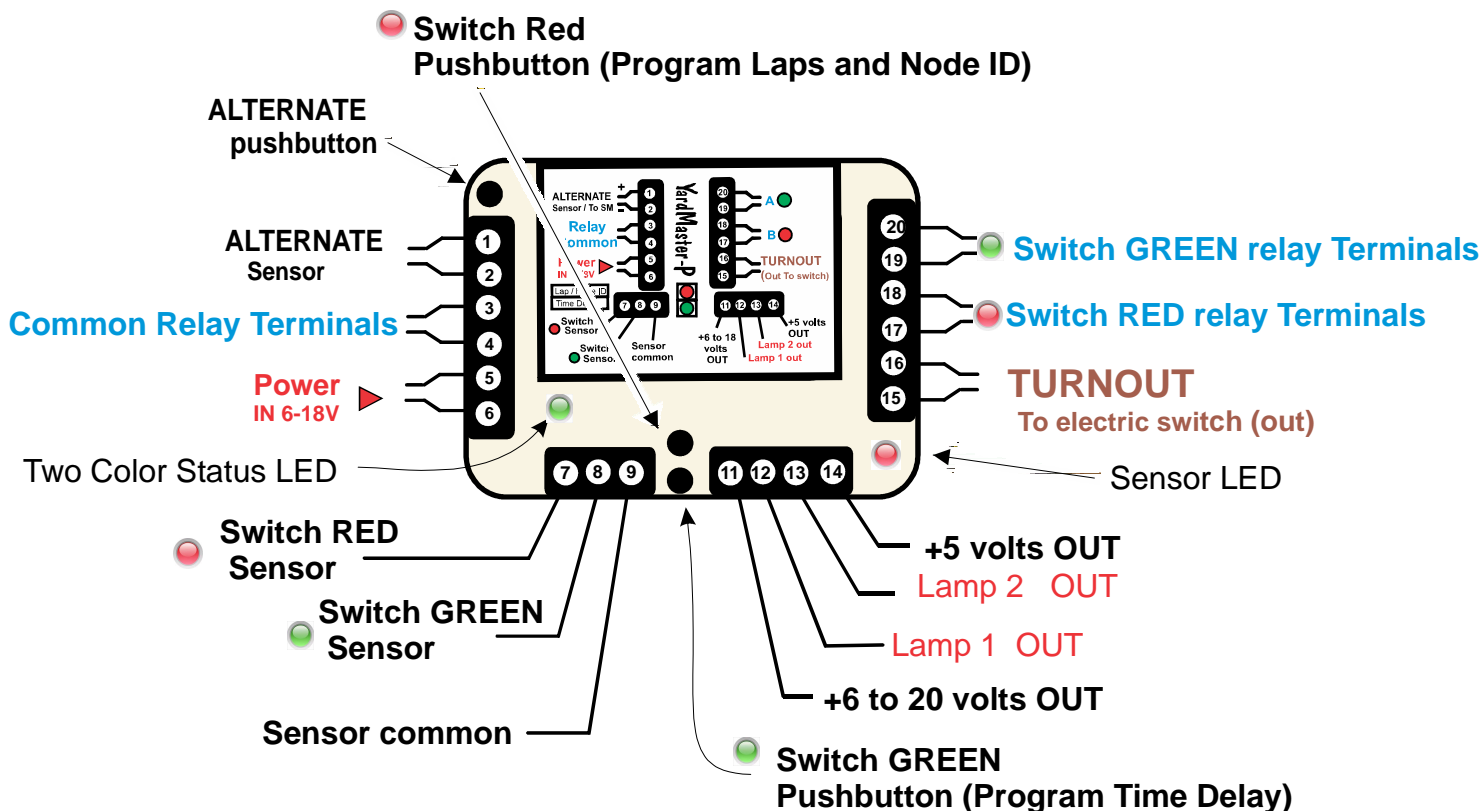
Please download “wire-to-wire” hookup diagrams from <http://www.Manuals.RR-Concepts.com>

Before we Start- Please do not attach Power wires (from your power pack) to any other terminals except the designated power inputs 3, 4, 5 and 6. Your YardMaster will be damaged if power is put on any of the sensor terminals, Lamp terminals, or Turnout (out to switch) terminals!!

- o The YardMaster contains flash memory and will return to the previous state when power is removed. The turnouts will be thrown and the on-board relay will return to their previous states.

- o Please see the programming procedure for setting operational modes and features.

Always remove power before attaching wires.





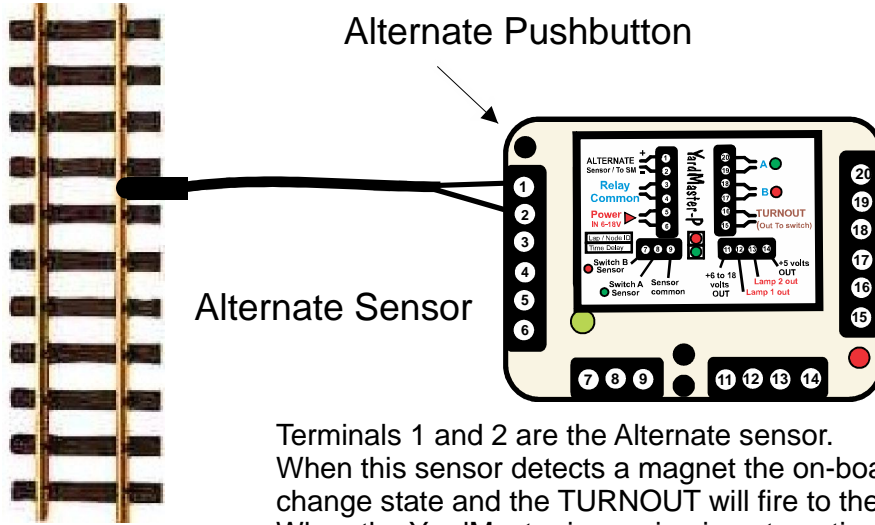
YardMaster- P

Table of Contents

Sensor Descriptions	3
Optical Sensor	4
StationMaster Plug Connections	5
YardMaster Power In Description for Stand-alone systems	6
Output to Electric Switches (turnouts)	7
Internal Switching Contacts	8
Lamp Outputs	9
Factory Reset	11
Programming the Operating Mode	12
Programming Time Delay	13
Programming Node ID	14
Programming Laps	15
Programming Forced Alternate	16
2 Trains on 1Track - Block Control Hookup Diagram	17
Station Stop Hookup Diagram	18
Station Stop Hookup Diagram using optical sensor	19
Station Stop Hookup Diagram for a Remote Track Section	20
Smart Turnout	21
Alternating Paths	22
Alternating Paths using the Optical Sensor	23
Power on an accessory for a programmed time duration	24
Alternating Trains Hookup Diagram	25
Back and forth Automatic Reversing	26
Reversing Loops with LGB powered turnouts	28
Reversing Loops with Slow Motion powered turnouts.....	29
Alternating between 2 loops of track	31
LED indicators	32
Sensor Placements on Track	33

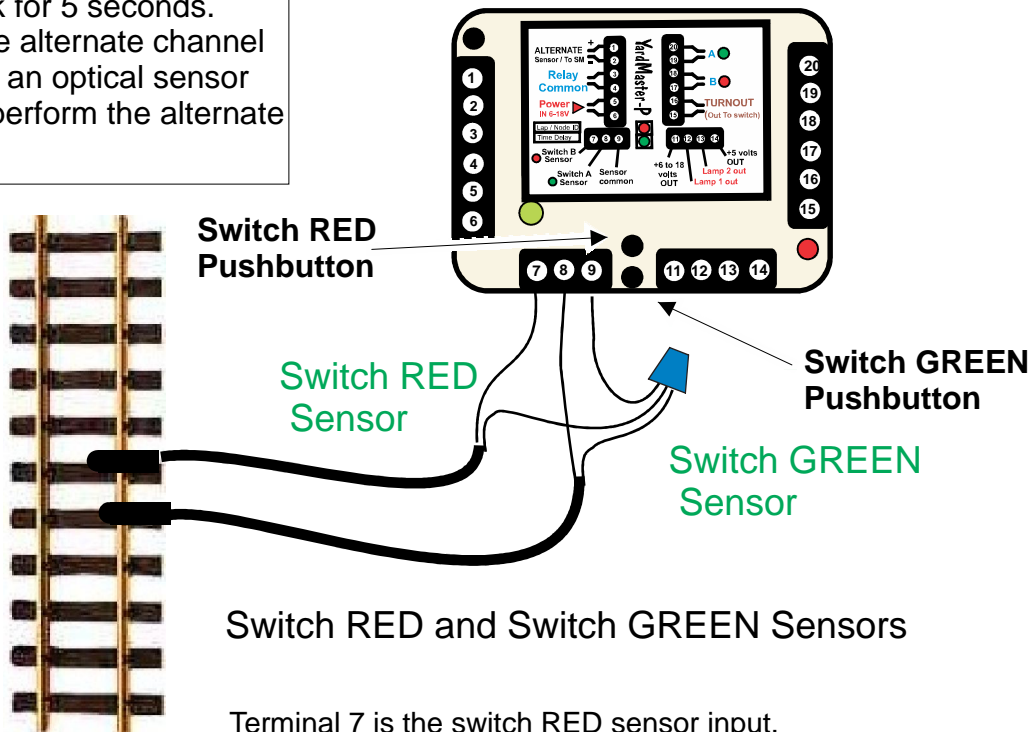


Sensor Descriptions



Terminals 1 and 2 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. The Alternate pushbutton simulates the sensor.

If the alternate sensor input is sensed closed on power up the LEDs will blink for 5 seconds. After this delay the alternate channel will be disabled. If an optical sensor is attached it will perform the alternate function.



Terminal 7 is the switch RED sensor input.
Terminal 8 is the switch GREEN sensor input
Terminal 9 is the switch common terminal

These sensors will cause the YardMaster to switch to the appropriate side. **Switch GREEN** will cause the **Common Relay Terminals** to connect to the **Switch GREEN relay Terminals**, and **Switch RED** will cause the **Common Relay Terminals** to connect to the **Switch RED Terminals**. The TURNOUT will also fire in synchronization and the lamps will change. The Switch RED and Switch GREEN pushbuttons simulate the sensors.

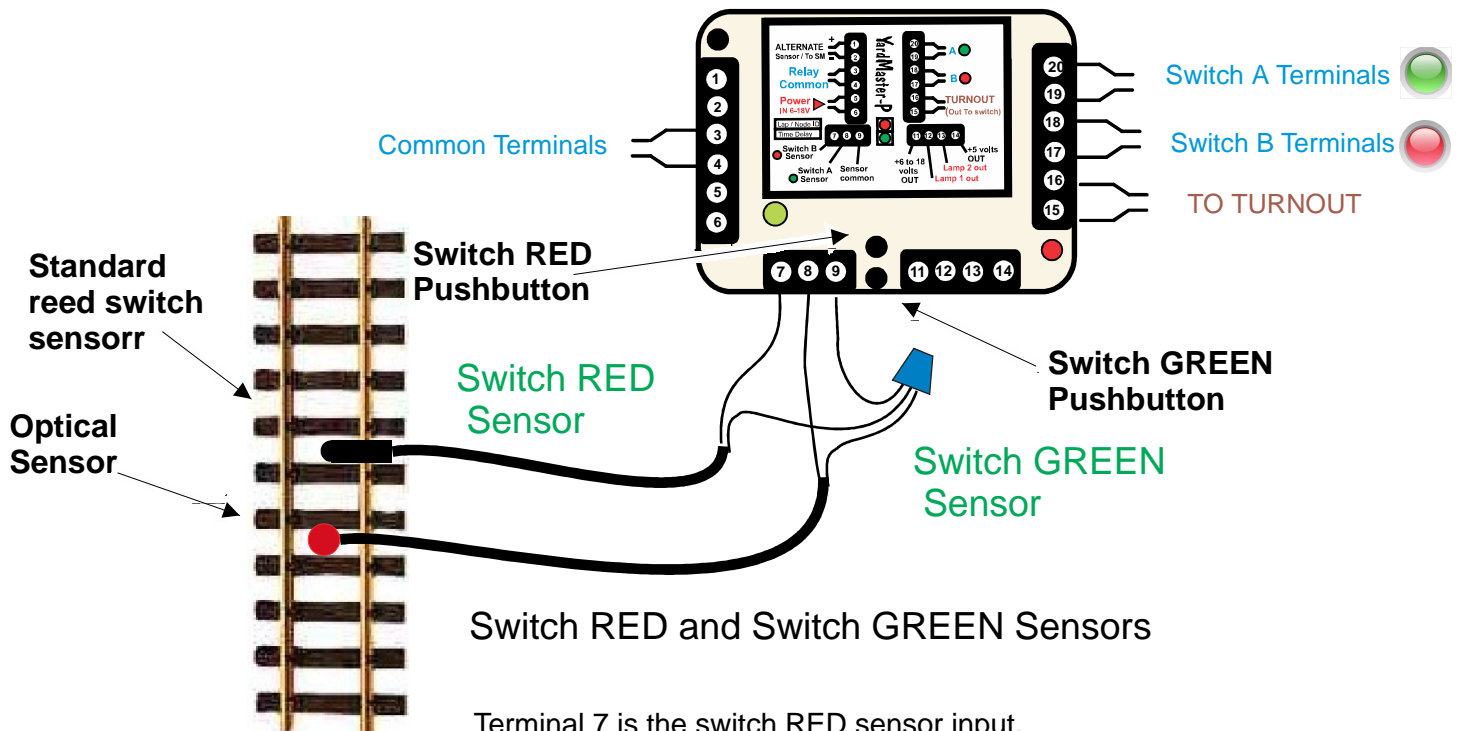
If a time delay has been programmed the YardMaster will switch back to the previous state after the timer has expired.

If the Switch GREEN sensor is CLOSED on power up, the YardMaster will perform automatic switching using the programmed delay value and these sensors will be ignored.



Optical Sensor

(Wires to the optical sensor must be in the order of 12 inches or less)



Switch RED and Switch GREEN Sensors

Terminal 7 is the switch RED sensor input.
Terminal 8 is the switch GREEN sensor input
Terminal 9 is the switch common terminal

The optical sensor can only go to the Switch GREEN contacts on pins 8 and 9. All other contacts must use the standard reed-switch sensor. A reed switch sensor can also be wired in parallel to the optical sensor if desired. The purpose of the optical sensor is to provide a simple station stop without using sensors. The optical sensor can not operate in dark conditions and is not recommended for extended outdoor use. The wire length between the YardMaster and the optical sensor should be less than 12 inches for best operations.

When using the optical sensor for a station stop, please see the station stop diagram in this manual and program a time delay. A train passing over the optical sensor will cause the YardMaster to switch to GREEN. After the programmed time delay has elapsed it will switch back to RED.

When programmed for RR crossing (mode 4) the flashing will start and the relay will switch when the train is sensed and continue for as long as the train remains sensed. Once the train passes by and is clear of the sensor the flashing will turn off after 5 seconds. This will give a very realistic RR Crossing control no matter how long or short the train is, and at any speed.

To provide an alternate operation with the optical sensor add a wire between terminals 1 and 2 and power up. The optical sensor in pins 8 and 9 will then perform the alternate function instead of the "switch green" operation.

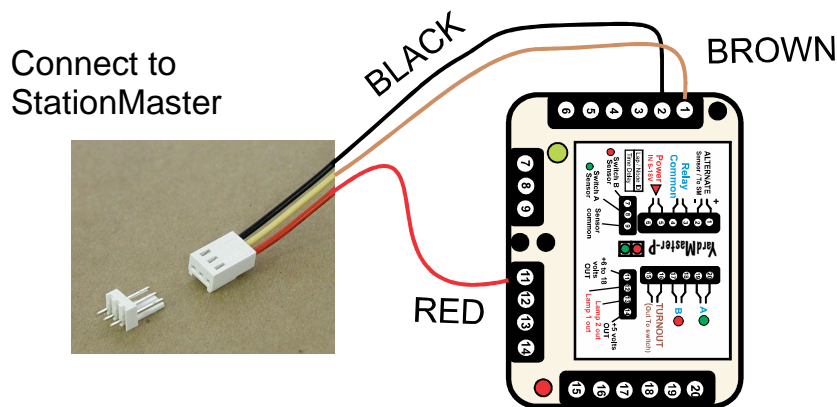
Since the optical sensor is a light-variable resistor thicker gauge wire should be used for long runs to compensate for the wire resistance.



StationMaster Plug Connections

YardMaster Power connections when attached to a StationMaster which has a connection plug. This plug is included with the StationMaster systems.

YardMaster Power and signal connections

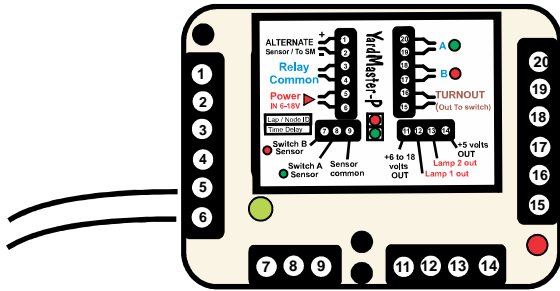


Some StationMaster systems are equipped with a connection pin header which is for YardMaster hookups. When available connect the wires as follows:

- The black wire is the common ground between the systems. Connect this wire to the YardMaster terminal #2.
- The brown wire is the communications signal between the units. Connect this wire to the YardMaster terminal #1.
- The red wire is the voltage source for the YardMaster. Connect this to the YardMaster terminal #11. Please verify this connection as an incorrect hookup will cause damage to the YardMaster.



YardMaster *Power In* Description for Stand-alone systems (Not attached to a StationMaster)



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 and 18 volts DC, or 6 and 12 volts AC.

For block control or simple switching operations with optional LED signal lamps (**not attached to a StationMaster and not attached to a turnout**) the input power can be as low as 6 volts and can come from the DC track power OR from a 6 to 12 volt DC “wall wart”. An example of a 6VDC “wall wart” is the following Radio Shack part: (Any equivalent 6VDC wall wart can be used)

“Enercell™ 6V/300mA AC Adapter Model: 273-313 | Catalog #: 273-313”



For block control or simple switching operations with optional 12 volt signal lamps or controlling a turnout (**not attached to a StationMaster**) the input power can come from the DC track power OR from a 12 volt DC “wall wart”. An example of a 12VDC “wall wart” is the following Radio Shack part: (Any equivalent 12VDC wall wart can be used)

“Enercell™ 12V/1500mA AC Adapter Model: 273-358 | Catalog #: 273-358”



The YardMaster **MUST** use the same DC StationMaster input power when they are wired together! The StationMaster connection plug provides power when attached and is recommended. If different power sources are used a ground loop will cause damage to both.

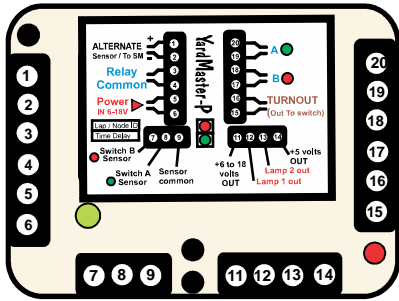
When running with AC trains the same AC train transformer must **not** be used for power into the YardMaster. (Pins 3 and 4) The reason for this is because AC trains create electrical “noise” as the motors run. This electrical noise can cause the YardMaster to behave erratically or burn out. *Please use a 6VDC “wall wart” for YardMaster power when running with AC trains.*

VERY IMPORTANT!! (Mentioned above and repeated here)

When attached to a StationMaster both the StationMaster AND YardMaster **MUST** share the same input power. If separate power supplies are used the YardMaster **WILL be damaged**. These units share a common ground when connected together and a damaging voltage loop will be present when they are attached to different transformers. Note that some model train transformers contain two independent transformers. Use the same DC track voltage for both the StationMaster and the YardMaster. **(Or just use the StationMaster connecting cable and there will be no issues)**



Output to Electric Switches (turnouts)



To 2 wire TURNOUT (electric switch).

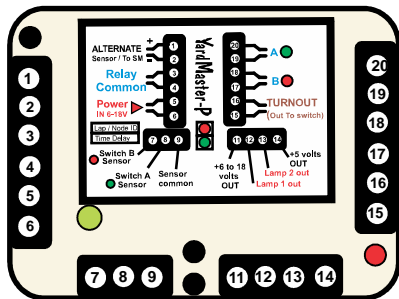
Pins 15 and 16 are the Turnout output signals for LGB style switches and slow motion switch machines.

These terminals provide power to directly throw switch turnouts.

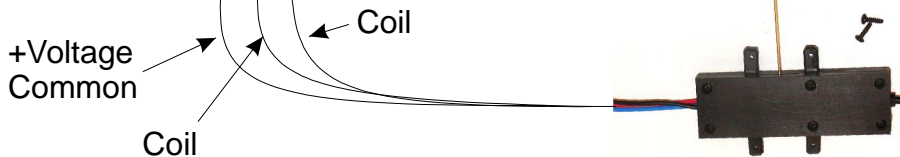
Up to 3 AMPS of power is available to throw up to 3 LGB style turnouts simultaneously if wired in parallel. For LGB operation a pulsed DC output of 0.8 seconds is provided to drive the turnouts for both directions. The output voltage is pure DC and is not half wave rectified AC. This provides maximum power output to the turnout.

For slow motion switch machines the power is continuous and changes polarity. (Tortoise, Aristocraft, or pneumatic Ea-Ze Air) **Program the YardMaster accordingly.**

The output voltage level is directly proportional to the input voltage. For example, a 12VAC input will provide a 16VDC 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).

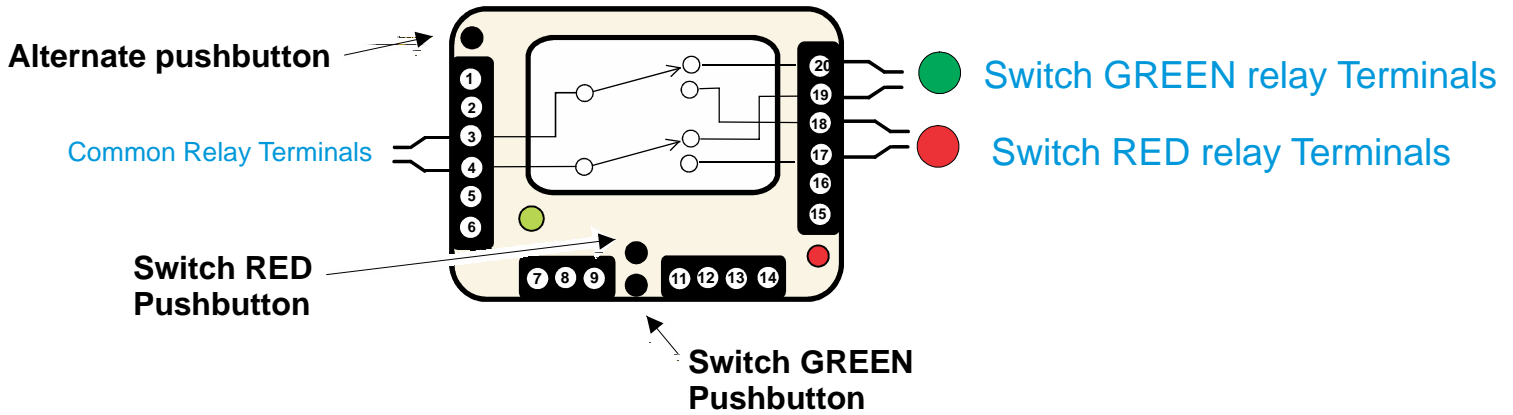


For a Twin Coil turnout attach pins 11, 12, and 13 as shown. Pin 11 is the common connection and provides + voltage.

The YardMaster MUST be programmed for twin coil turnouts before attaching wires! Remove wires when in programming mode. This is very important as damage may occur to the turnout machine.



Internal Switching Contacts



The YardMaster contains a latching DPDT relay which can control up to 6 AMPS.

When the “Switch GREEN” sensor or pushbutton is detected the status LED will turn **GREEN** and the two **Common relay terminals** will connect to the “**Switch green relay terminals**”. Terminal 3 will internally connect to terminal 20. Terminal 4 will internally connect to terminal 19.

When the “Switch RED” sensor or pushbutton is detected the status LED will turn **RED** and the two **Switch relay Common** terminals will connect to the “**Switch RED relay terminals**”. Terminal 3 will internally connect to terminal 18. Terminal 4 will internally connect to terminal 17.

The Alternate sensor or alternate pushbutton will alternate these contacts.

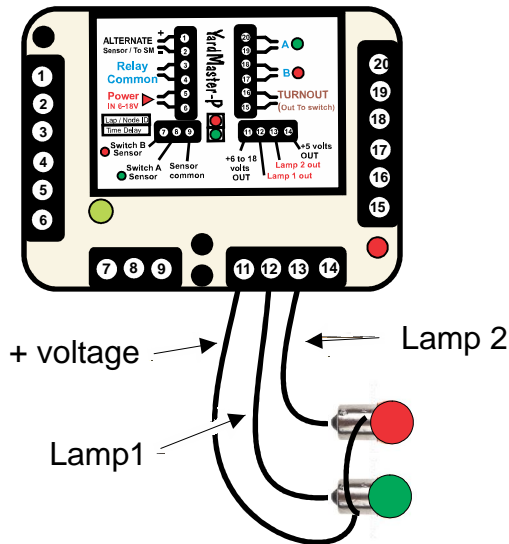
Since this is a simple relay there are no polarity or voltage restrictions. (AC, DC or DCC can be switched, and up to 110V).



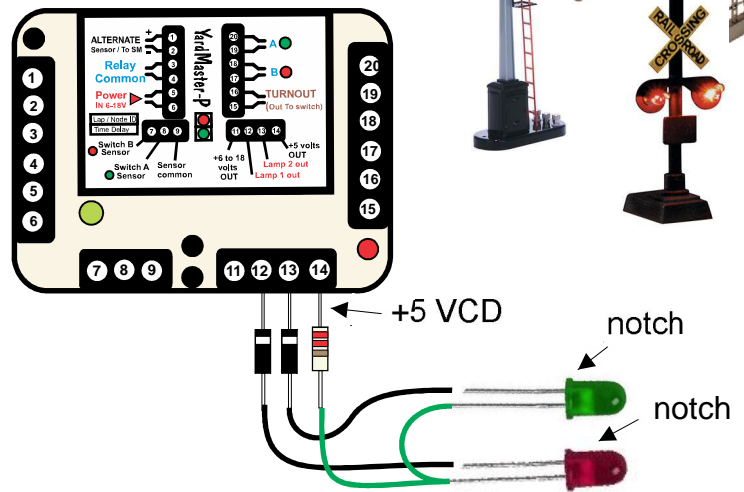
Lamp Outputs

The YardMaster can control both 12 volt lamps and 5 volt LEDs synchronized with the turnouts and relay. When programmed for **crossing light control** the lamps will alternately flash when triggered.

+12V Output



LED direct connect



If the input to the signal lamp is 12 volts use terminal 11 as the common. This terminal provides a constant voltage and the lamp terminals are grounded to turn on the lamps.

Pins 12 and 13 are the Lamp output signals. These are set at +12 volts when OFF and grounded when ON.

Note that the lamp output voltage is the same as the input voltage, but converted to DC. For example, a 12 VAC or 12 VDC input will provide a 12VDC lamp output, etc.

If direct driving LED's use pin 14 as the common. This provides a constant +5 volt voltage. Diodes are then added to the lamp outputs which attach to the LED's as shown. A 220 ohm resistor is then added to provide the current limiting for the LED's.

The notch pin of each LED attaches to diodes and the other pins are connected together and attached to the resistor. (green wire) Note the banded end of the diodes must be as shown.

DO NOT short these wires together or attach them to the track. Damage will result.
DO NOT measure these pins with a meter set on "ohms" or "amps". Damage will result.
The lamp driver is a chip in a socket that can sometimes be replaced if damage occurs.

Flashing the lamps

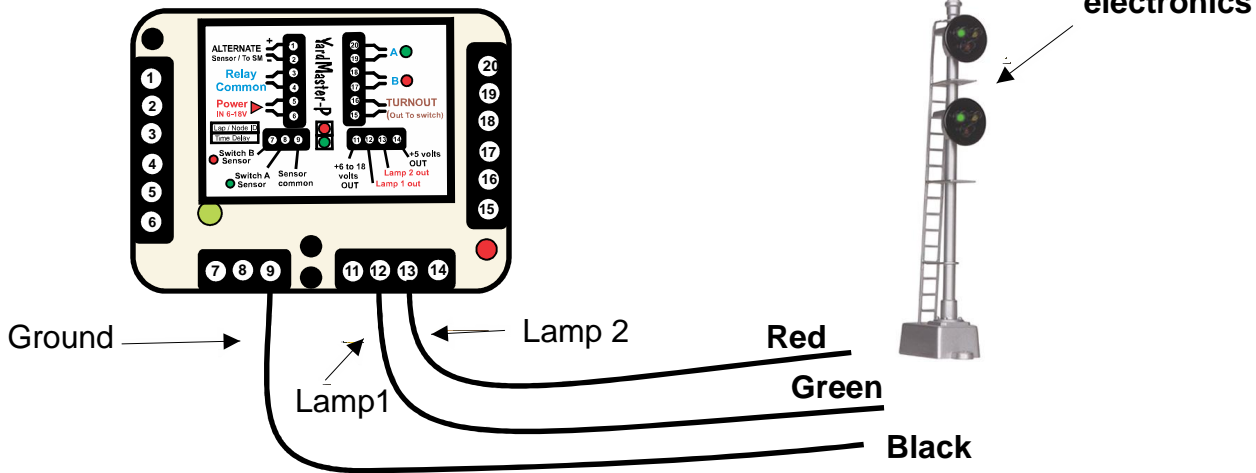
The YardMaster will flash these lamps at 1 Hz when performing a time delay operation. For standard non time delay operations these lamps can be programmed to enter a **slow blinking state** after a few minutes to give your RR a very realistic look. See the programming section for more details.



Lamp Outputs (continued)

The YardMaster can control signal lights which contain flashing circuitry. These include MTH target signals, etc.

Common Ground hookup

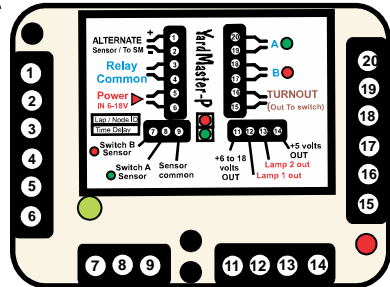


Use terminal 9 as the common.

Pins 12 and 13 are the Lamp output signals. These are set at +12 volts when ON and grounded when OFF..

Note that the lamp output voltage is the same as the input voltage, but converted to DC. For example, a 12 VAC or 12 VDC input will provide a 12VDC lamp output, etc.

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



To perform a factory reset:

1. Enter Programming Mode:

Press the ALTERNATE button and either one of the Switch A or Switch B buttons simultaneously.

The YardMaster will quickly flash red and green when in programming mode.

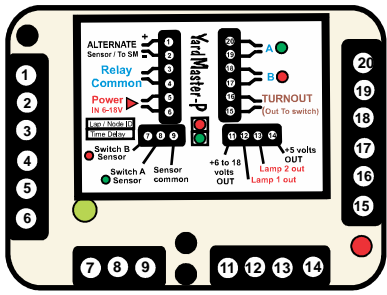
2. When flashing red & green press and hold the ALTERNATE pushbutton for at least 15 seconds. The YardMaster will slowly flash the red LED many times and then after a delay the RED LED will twinkle to indicate a factory reset. Release button.

A factory reset will set the following:

- > Turnout control for LGB style turnouts (electric switches).
- > Time delay OFF
- > Lap count: 1
- > Signal lamp flashing: OFF
- > Node ID: "1".



Programming the Operating Mode



The YardMaster can be programmed to control different types of turnouts (electric switches), and enable the realistic signal light blinking feature.

All programming is stored in flash memory and retained until re-programmed. To program the YardMaster perform the following:

1. Enter Programming Mode:

Press the ALTERNATE and either one of the Switch A or Switch B buttons simultaneously. The YardMaster will quickly flash red and green when in programming mode. To exit programming mode quickly press the ALTERNATE pushbutton one more time.

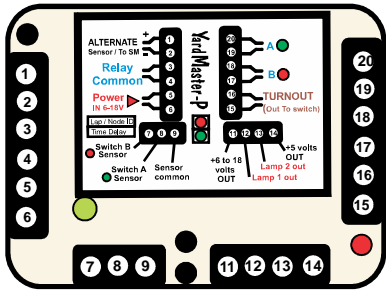
2. Program the operating mode:

Press and hold down the Alternate pushbutton for the desired number of blinks. The blink count corresponds to the following table. To exit programming mode quickly press the Alternate button.

1	Control LGB style turnouts (electric switches) This is the default setting after a factory reset.
2	Control SLOW_MOTION turnouts (electric switches) These include Tortoise, Aristocraft slow motion, etc.
3	Control 3 wire turnouts (electric switches) These typically include HO, N scale, etc.
4	Directly control Railroad Crossing signals Alternately flash the lamp outputs to directly control lamps or LED's.
5	Perform realistic signal light pseudo-random flashing for LGB Style turnouts. When using the signal light outputs they will slowly blink every few minutes to give a realistic look.
6	Perform realistic signal light pseudo-random flashing for SLOW MOTION Style turnouts. When using the signal light outputs they will slowly blink every few minutes to give a realistic look..
7	Control Pneumatic turnouts by keeping the output voltage on continuously.



Used for Station stops, Reversing, or Signal Light on/off Operations



A time delay will cause the YardMaster to self-trigger after the delay time. For example, if the Switch red sensor is triggered the YardMaster will switch to red and then automatically switch to green after the time delay. The YardMaster will blink red when counting seconds before switching.

If jumpered for "self triggering" the YardMaster will continuously self-trigger which will allow back and forth operations)

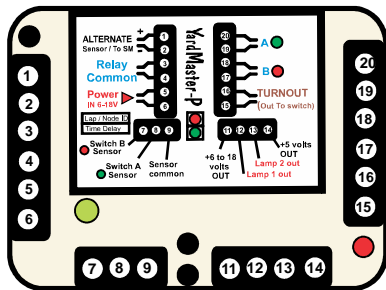
All programming is stored in flash memory and retained until re-programmed.

1. Enter Programming Mode:

Simultaneously press the ALTERNATE and either one of the Switch A or Switch B buttons. The YardMaster will quickly flash red and green when in programming mode.

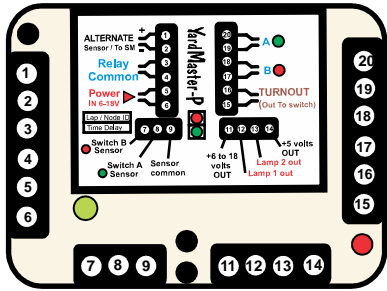
2. Change the time delay:

Press and hold the Switch green button and count the number of blinks, Release when the desired time delay is programmed. The YardMaster will echo the number. EACH BLINK will correspond to 5 seconds. 5 blinks = 25 seconds, etc.



3. Quickly press the ALTERNATE pushbutton to exit programming mode.

- Notes: 1. The time delay will not be operational when attached to a StationMaster.
- 2. To clear the time delay either program for 1 blink or perform a factory reset.



Programming Node ID

Node mode allows a robust serial communication between the StationMaster and the YardMaster.

When multiple YardMasters are wired in parallel they must be identified so that they fire in sequence. **This programming is only necessary when 2 or more YardMasters are attached to a single StationMaster. This programming is not necessary when a single StationMaster is attached to a single YardMaster. SEE NOTES**

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

1. Enter Programming Mode:

Simultaneously press the ALTERNATE and either one of the Switch RED or Switch GREEN buttons. The YardMaster will quickly flash red and green when in programming mode.

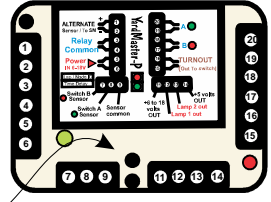
2. Program the node ID:

Press and hold the Switch RED button until the proper number of blinks have occurred.

The programming blinks correspond as follows:

- 1 blink = Normal mode using sensors. (This is the factory default)
- 2 blinks = Programmed as NODE #1
- 3 blinks = Programmed as NODE #2
- 4 blinks = Programmed as NODE #3.. etc.

4 nodes are possible to allow 4 YardMasters to be wired together.



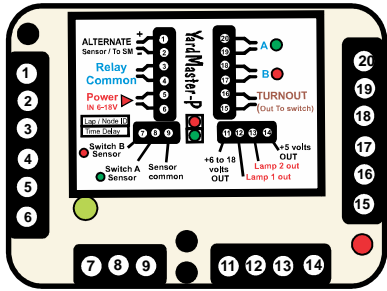
3. Quickly press the ALTERNATE pushbutton to exit programming mode.

Notes:

- 1. The node operation will not function unless attached to a StationMaster.
- 2. The alternate sensor and alternate pushbutton will not be operational while in node mode.
- 3. The YardMaster will Self-Program to Node #1 when attached to a StationMaster.
- 3. **TO EXIT NODE MODE: Enter programming mode again.**



Programming Laps



The YardMaster can be programmed to respond after counting sensors. This is for multiple laps on a station stop or other features. The lap counting ONLY occurs on the GREEN channel (terminals 8 & 9) The other channels instantly respond without counting sensors.

Multiple laps are not recommended when attached to a StationMaster

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

1. Enter Programming Mode:

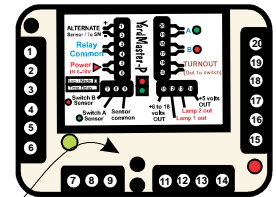
Simultaneously press the ALTERNATE and either one of the Switch RED or Switch GREEN buttons. The YardMaster will quickly flash red and green when in programming mode.

2. Program the node ID:

Press and hold the Switch RED button until the proper number of blinks have occurred.

The programming blinks correspond as follows:

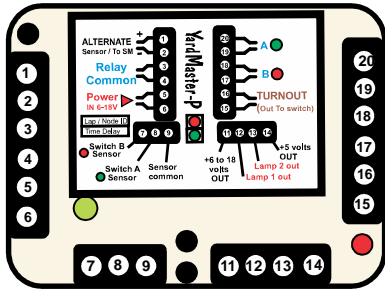
- 1 blink = Normal operation, or 1 lap.
- 2 blinks = 2 laps
- 3 blinks = 3 laps
- 4 blinks = 4 laps



3. Quickly press the ALTERNATE pushbutton to exit programming mode.

Notes:

- 1. The lap counter will not function when attached to a StationMaster.
- 2. When attached to a StationMaster this lap number will become the Node ID.
- 3. To erase the lap counter either program for 1 lap or perform a factory reset.
- 4. When programmed for maximum laps (5) the red LED will quickly flash for as long as the button is pressed.
- 5. When programmed for maximum laps(5) the "Forced Alternate" feature will be turned on and lap counting will not be done. See the Forced Alternate section for details.



Programming Forced Alternate

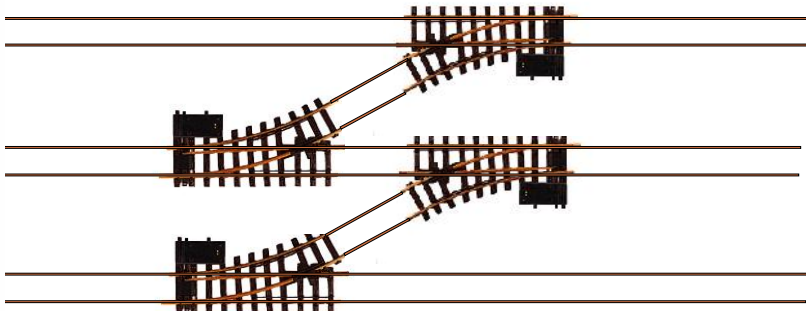
The YardMaster has a “Forced Alternate” feature which allows control of Wyes, Switchbacks, etc.

When the Forced Alternate feature is turned on the *Alternate* sensor will switch to the direction opposite of the most recent “*Switch*” sensor, regardless of the number of times the *Alternate* sensor is hit.

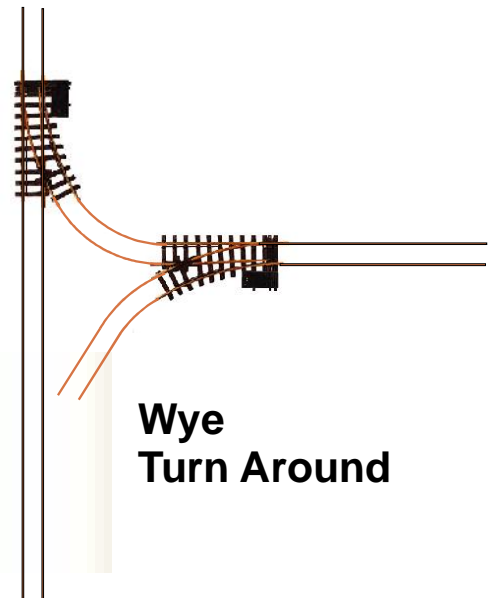
For example, when the *Switch RED* sensor is hit, the *Alternate* sensor will always switch to GREEN, regardless of the number of times it is hit. This allows the turnout to be set correctly for operations where the train reverses and triggers the *Alternate* sensor a second time.

How to Program Forced Alternate

1. See the previous page for **Programming Laps**.
2. Set the lap count to maximum by holding down the Switch Red button until the Red LED rapidly flashes.



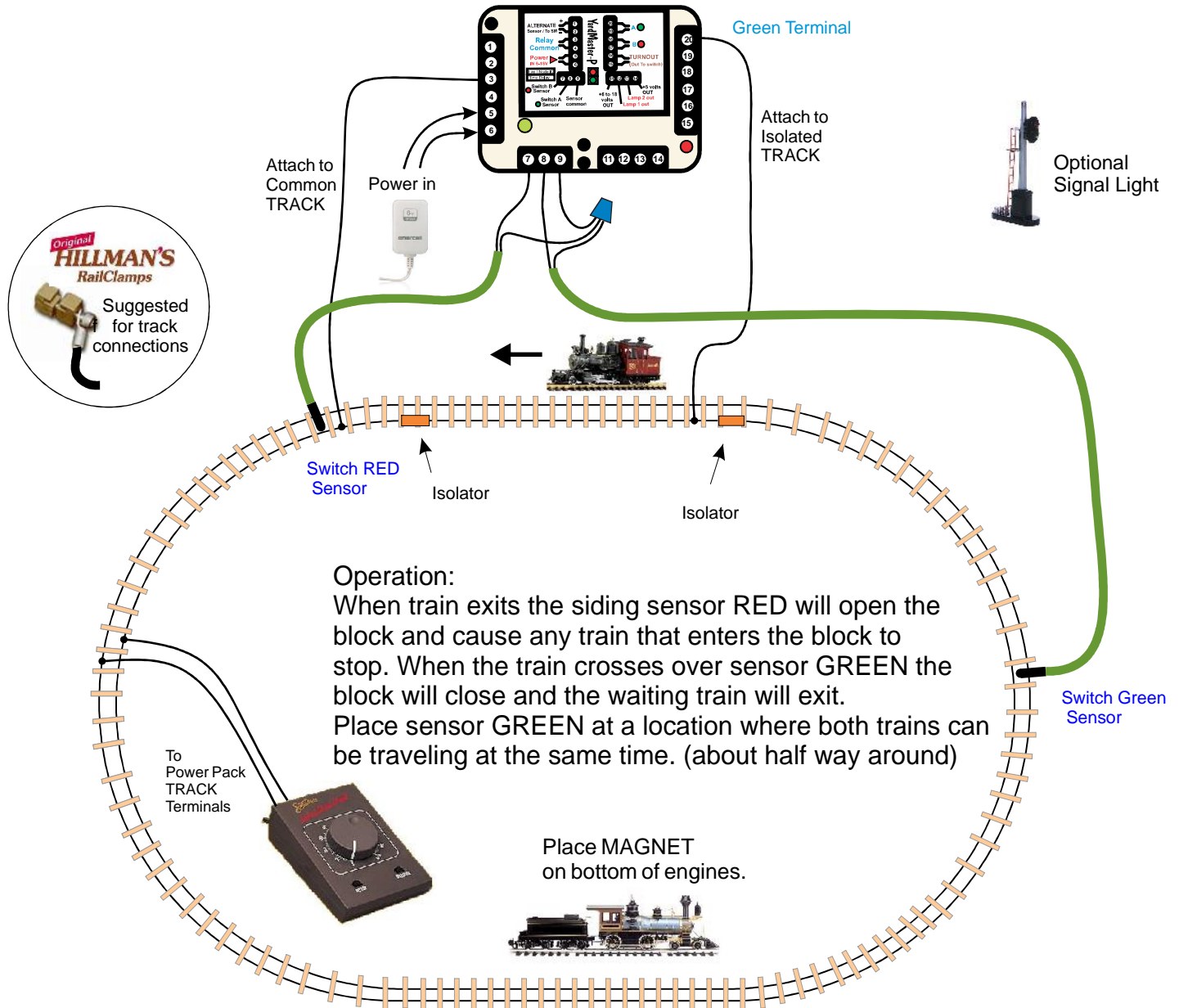
Reversing train Switchbacks



Wye Turn Around



2 Trains on 1 Track - Block Control Hookup Diagram



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

“Power In” can be attached to the track power to supply voltage (DC trains only) or to a fixed 6 volt “wall wart”. See the power page for more details.

Remove any YardMaster time delays or lap counts if they have been programmed. A factory reset will do this also.

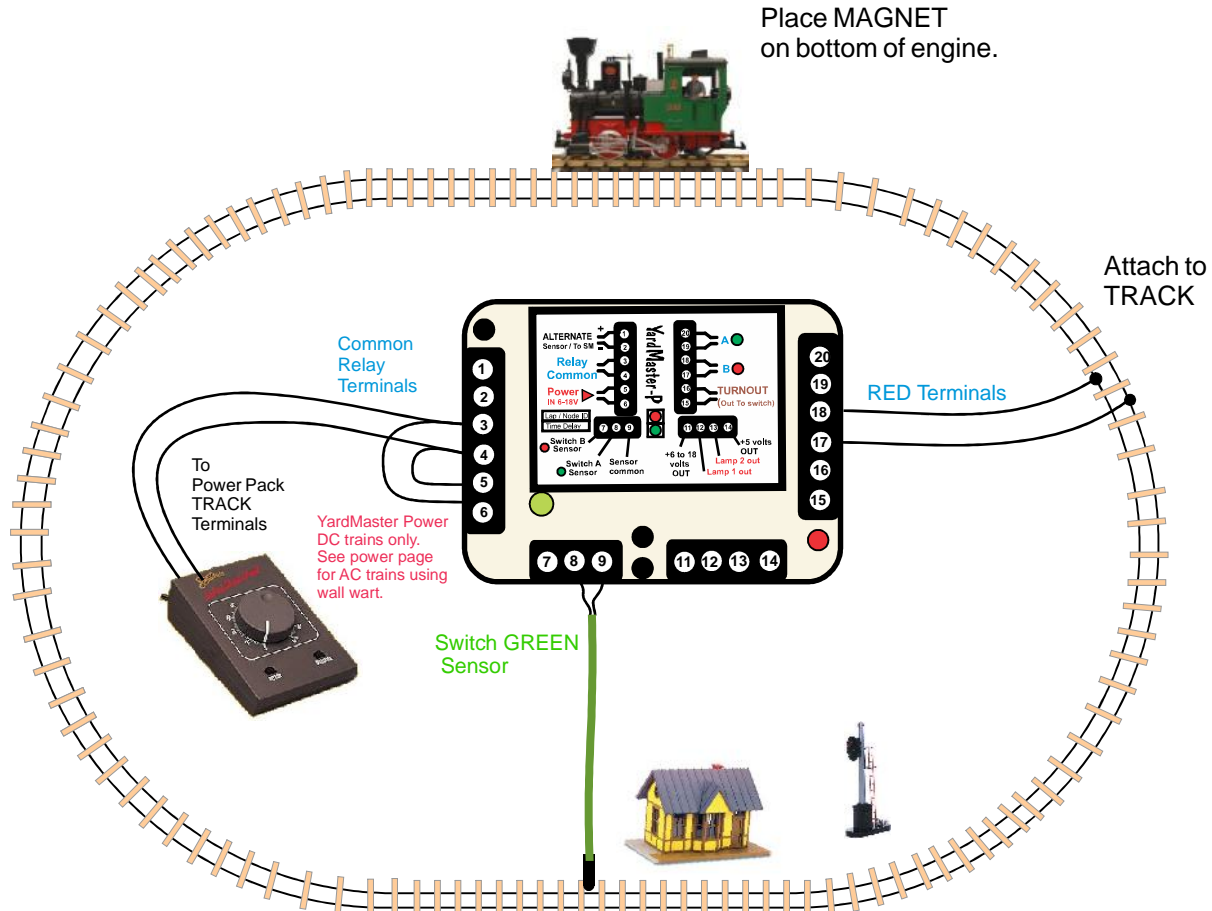
Change the direction of transformer so train runs as shown and adjust the speed as desired.

The signal light is optional but adds to the fun.



Station Stop using sensors

Station Stop Hookup Diagram



Add additional sensors in PARALLEL for additional station stops.

Programming:

- * Set time delay as desired.
- * Set lap count as desired.

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 is turned on the train should run. If it does not then press the Alternate button. This is a one-time operation since the YardMaster will remember the switch state in memory.

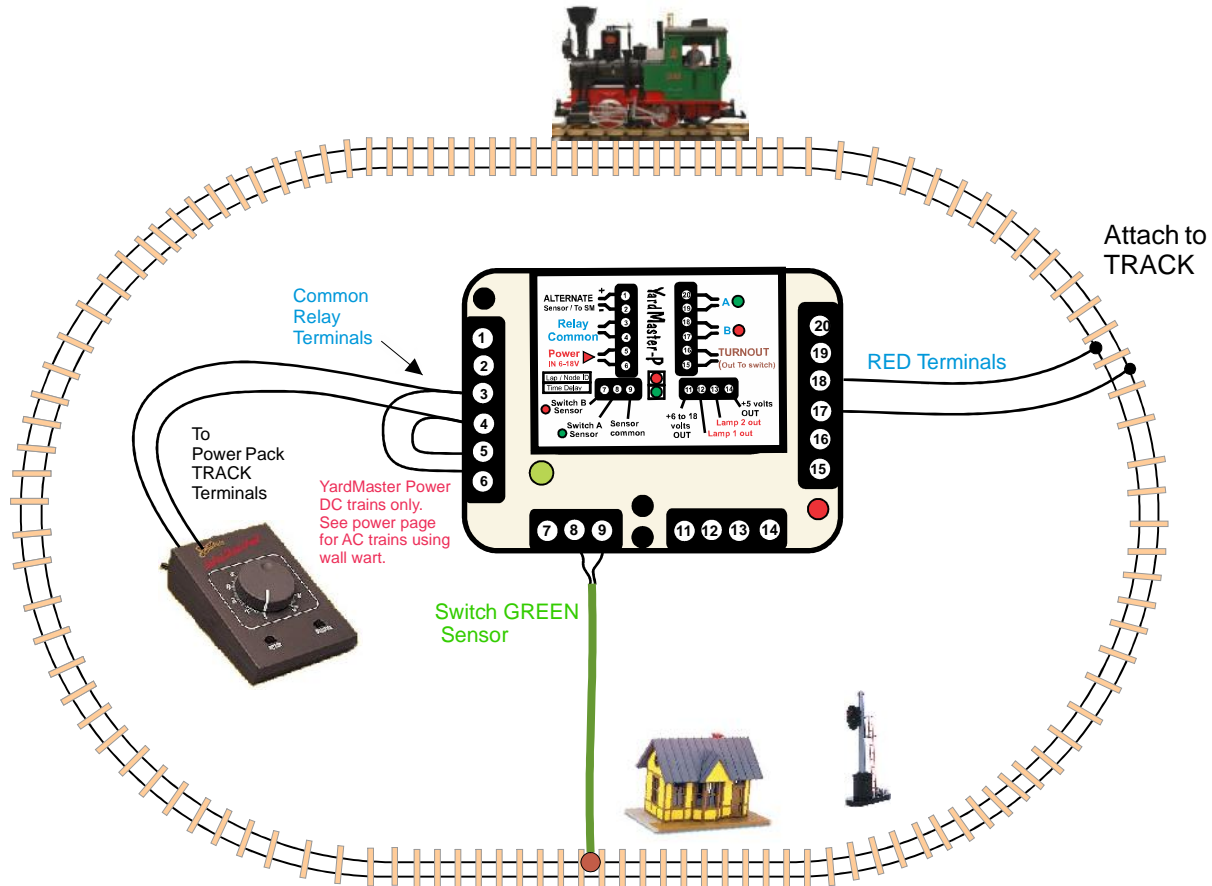
Change direction of the train as required. The YardMaster will operate in both directions.

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



Station Stop Hookup Diagram

Station Stop using Optical Sensor



Place 3 mm optical sensor under track looking up.
 Additional station stops not available when using the optical sensor.
 Not recommended for extended outdoor use.

Programming:
 * Set time delay as desired.
 * Set lap count as desired.

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

When the power supply is turned on the train should run. If it does not then press the Alternate button. This is a one-time operation since the YardMaster will remember the switch state in memory.

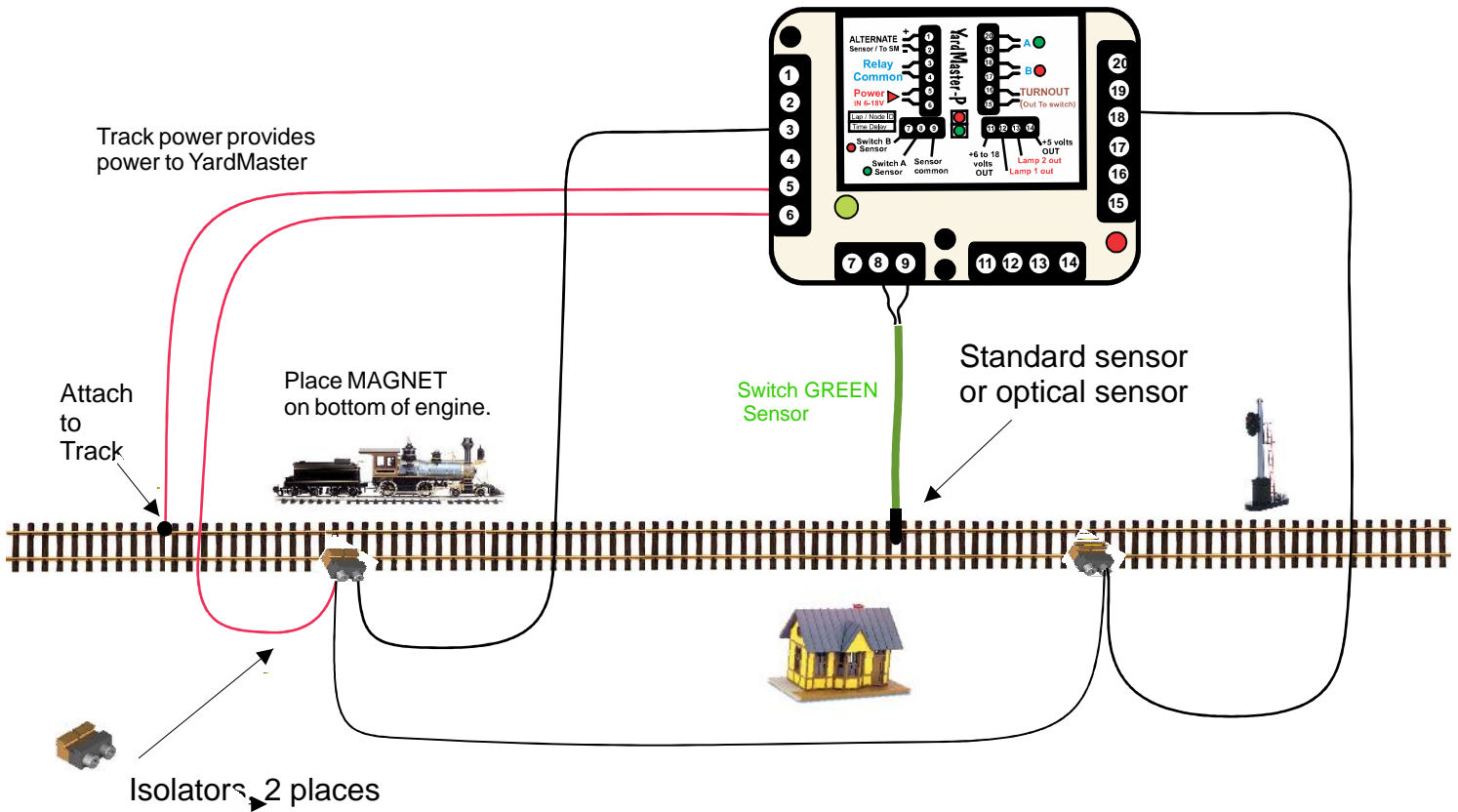
Change direction of the train as required. The YardMaster will operate in both directions.

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



Station Stop Hookup Diagram for a Remote Track Section DC TRAINS ONLY

Add this to a remote location on your railroad. Trains can run in either direction. This can either be a back and forth track section or a section from a loop.



AC, DC, or DCC trains can be controlled.

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

When the power supply is turned on the train should run. If it does not then press the Alternate button. This is a one-time operation since the YardMaster will remember the switch state in memory.

Change direction of the 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 track connections.



Smart Turnout

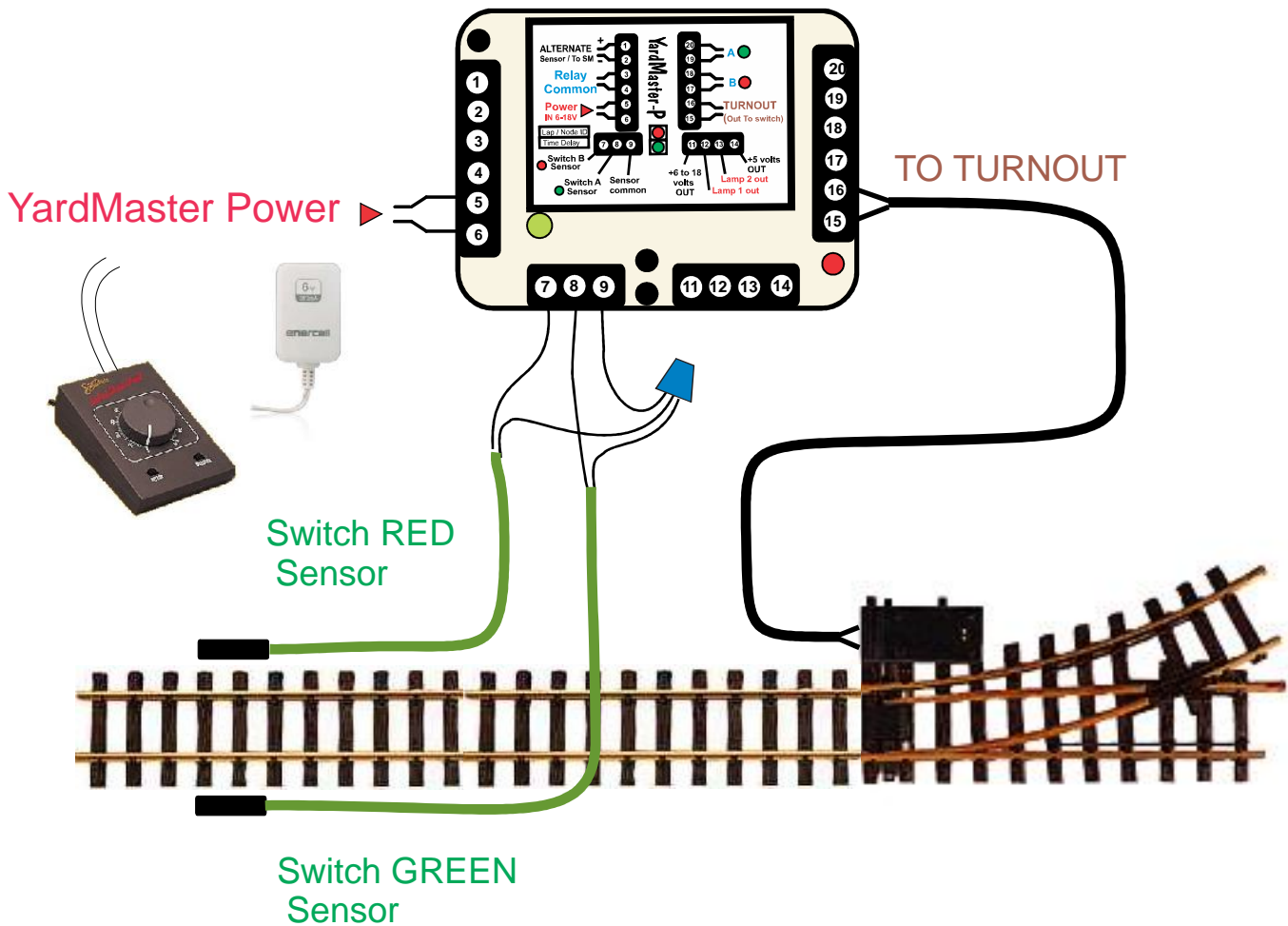
A Smart Turnout will allow one train to go Left, (Passenger train goes to Station) while the other train goes to main line. (Freight train does not go to station).

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 can also have sensors placed before the turnout to force the points to the correct orientation. (not shown) Magnets are not offset but placed as normal. As the train passes over a sensor the turnout aligns to the proper orientation.

The Smart Turnout works for ALL trains- Electric, Battery and Live Steam. See power hookup page for input power requirements.

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





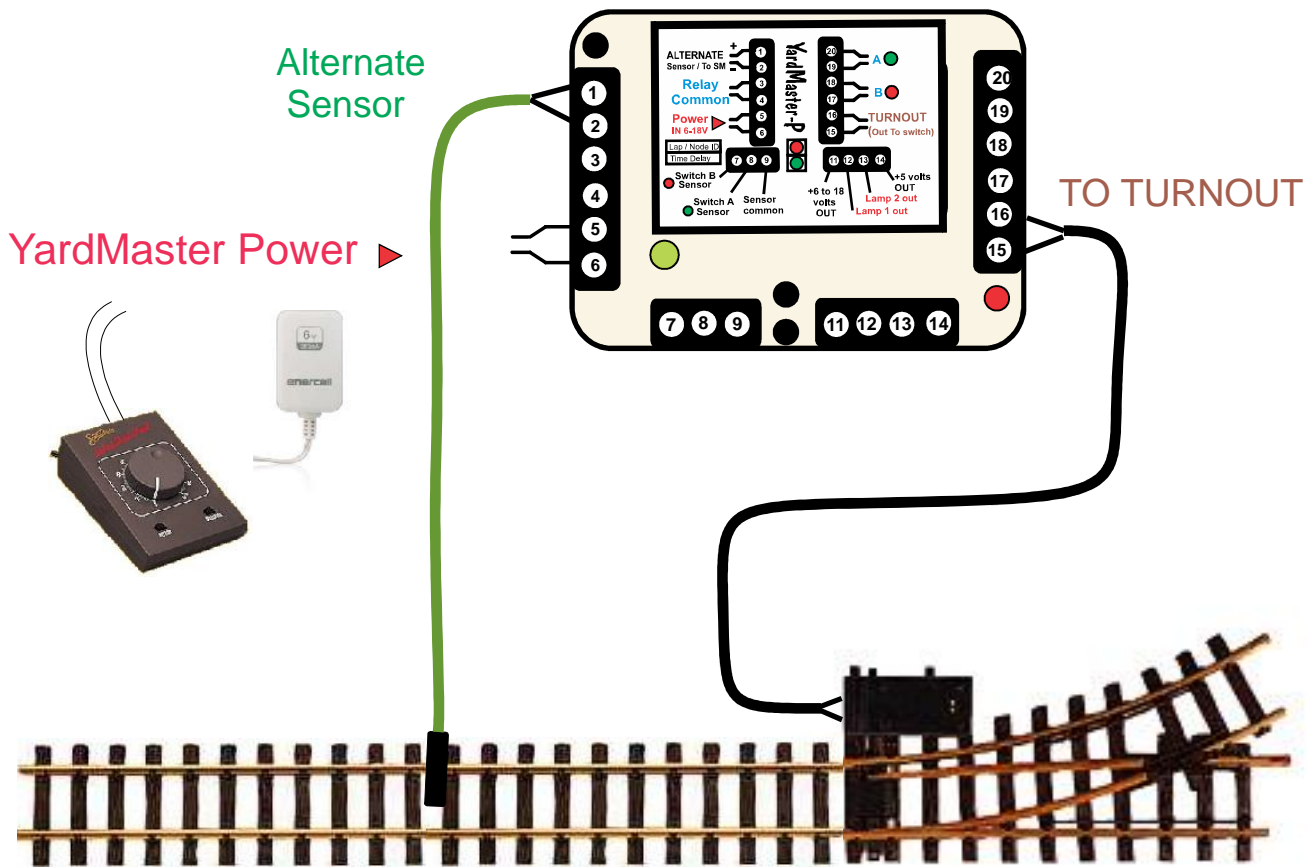
Alternating Paths

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.

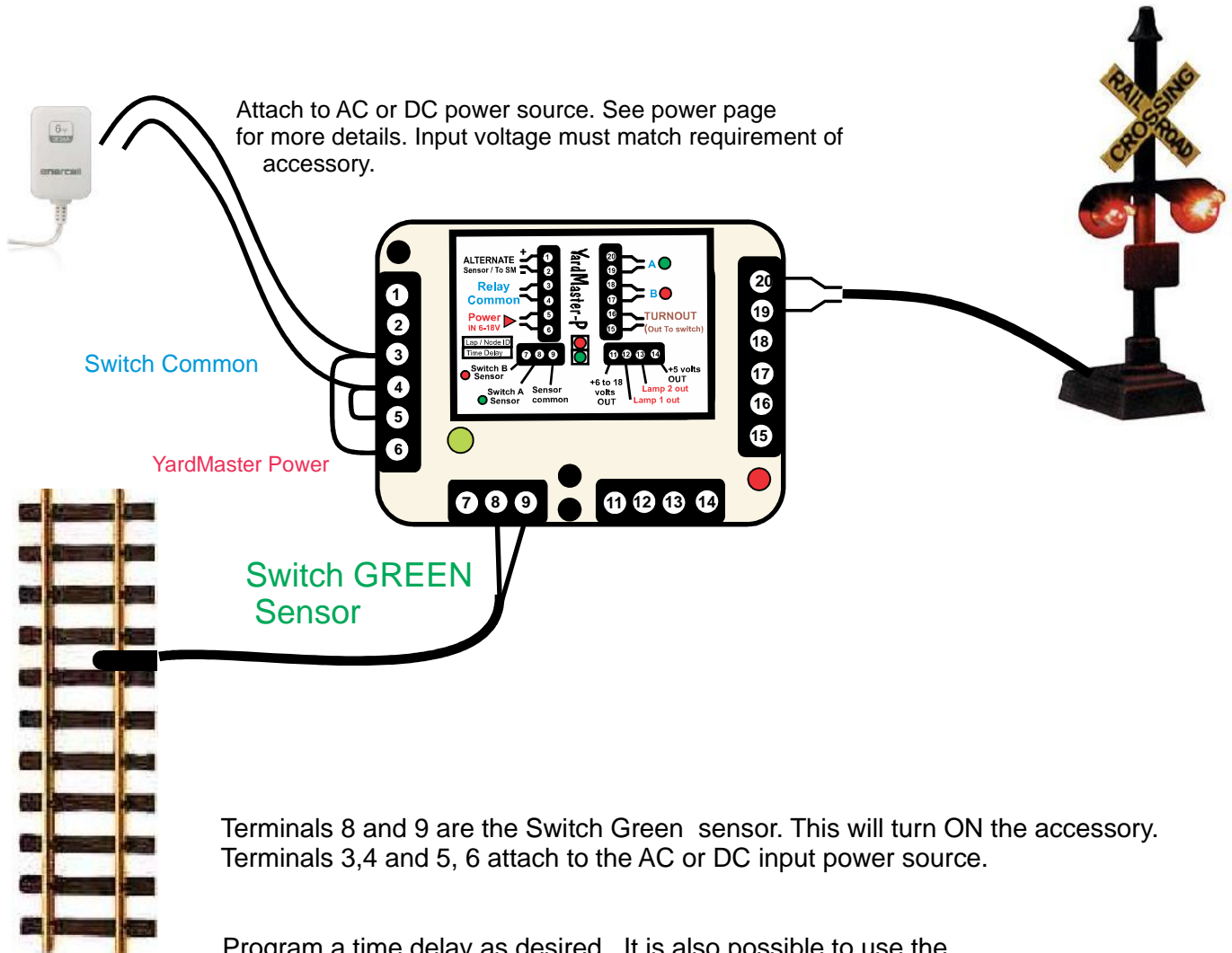
The Alternating Path hookup will work for ALL trains- Electric, Battery and Live Steam. See power hookup page for input power requirements.

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





Power on an accessory for a programmed time duration



Terminals 8 and 9 are the Switch Green sensor. This will turn ON the accessory. Terminals 3,4 and 5, 6 attach to the AC or DC input power source.

Program a time delay as desired. It is also possible to use the Switch RED or Alternate sensor to turn off the accessory instead of using a time delay.

When sensor GREEN is tripped the YardMaster will switch power to the SWITCH GREEN relay terminals and turn on the accessory. After the timer has expired (or the RED sensor is triggered) the switch will return to the Switch RED state and turn off the signal light.

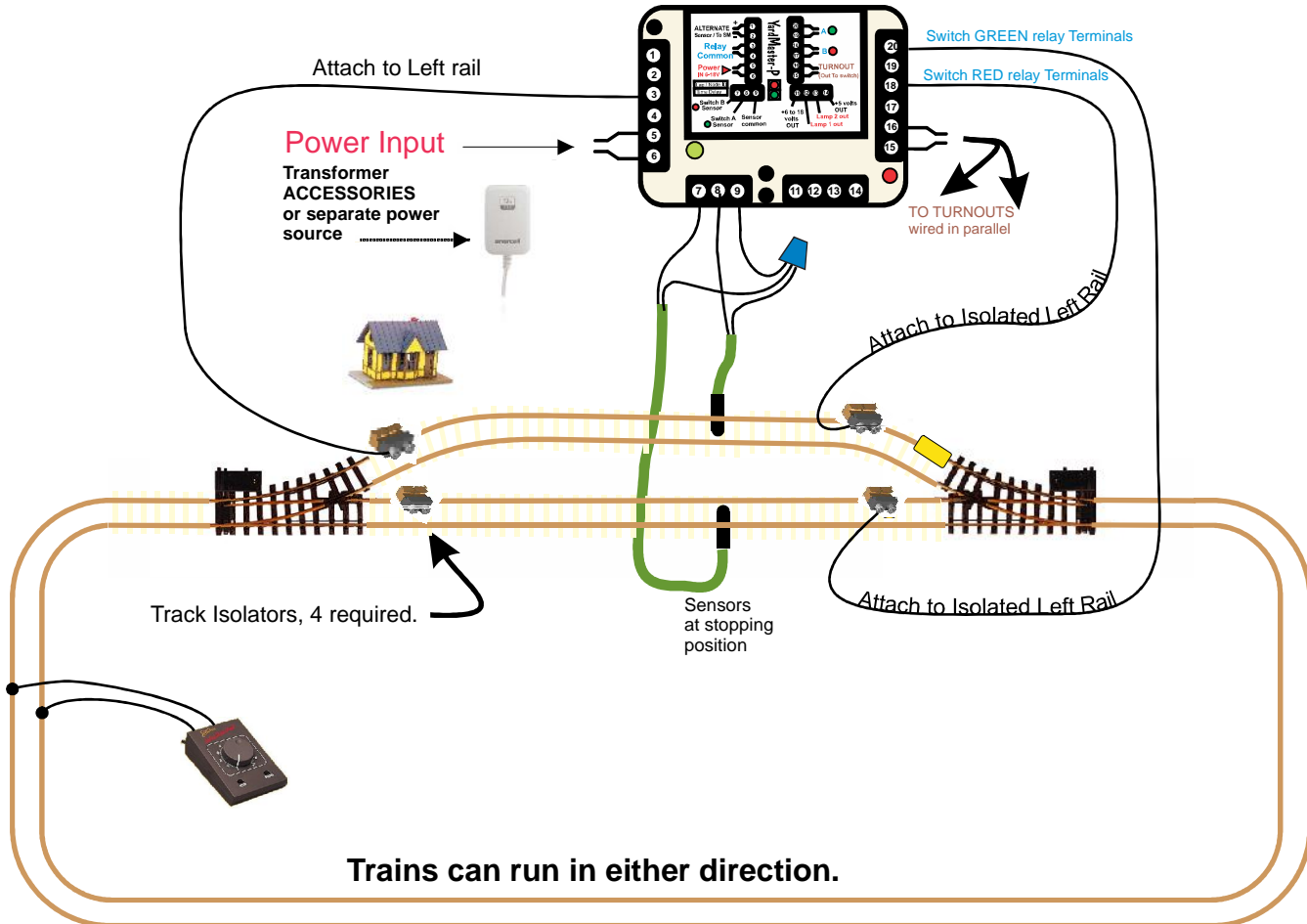
Whatever power is applied to terminals 3 and 4 will be switched to terminals 17 and 18.

Notice that with a Switch RED sensor used instead of a programmed time delay the train can turn ON the accessory with one sensor and then turn OFF the accessory with the other sensor.



Alternating Trains Hookup Diagram

Trains will not pause but instantly alternate



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. (one direction only. For two directions both turnouts must be powered)

The YardMaster will switch when the train is clear of the sensor. This will 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. See the power page for input power requirements. Transformer accessories power or a 12V wall wart are recommended.

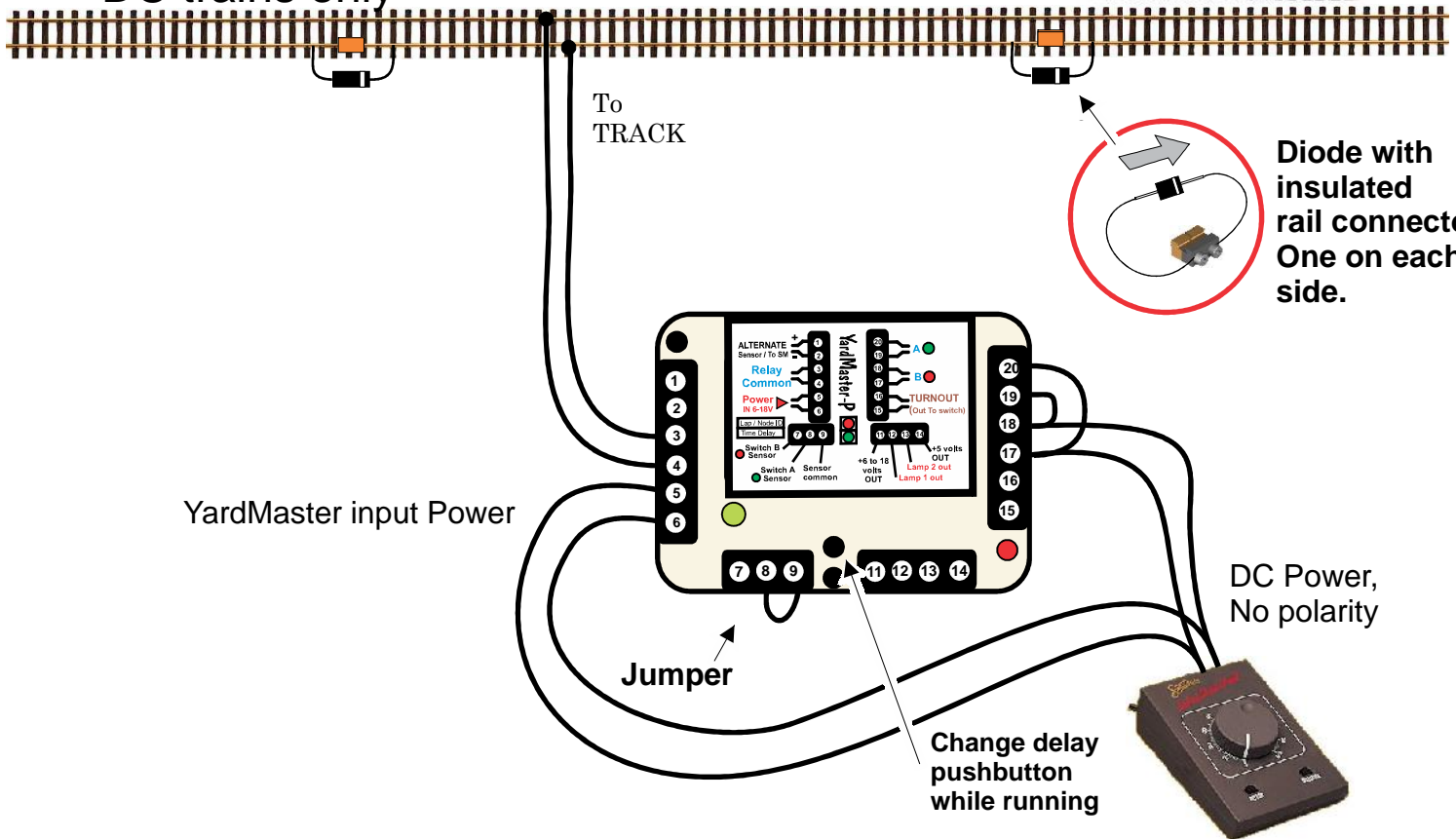
Clear any time delay programming if it has been set or perform a factory reset. If acceleration, deceleration, or a delayed station stop is desired consider using a StationMaster instead of this hookup.

Enhancement Ideas:

1. Program a lap count for each train to do multiple laps before switching.
2. This alternating siding hookup can be added to simple back-and-forth operation so 2 trains can be run. When a lap count is programmed each train will do a complete back and forth before switching.



Back and forth Automatic Reversing DC trains only



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 on the ends. The train will stop when it reaches these. It is also possible to use LGB 10151 sections in place of these diodes. NOTE: if the train does not stop when entering the diode section then reverse the direction of the diodes. NMRA and LGB operate differently and go different directions for track polarity.

- * Pins 3 and 4 connect to the track. Polarity is not important.
- * Pins 5 and 6 connect to the transformer DC track power output to provide power to the YardMaster.
- * Pin 20 is connected to pin 17, and these two are connected to the DC transformer output.
- * Pin 19 is connected to pin 18, and these two are connected to the other DC transformer output.
- * Pins 8 and 9 are shorted together. This tells the YardMaster to perform automatic switching using a programmed time delay. When powered up with this jumper installed the YardMaster will continuously switch if a time delay of at least 2 blinks is programmed.

When running back and forth the time delay can be changed “on the fly” by pressing and holding the upper SWITCH RED pushbutton. Each blink programs the time delay for 5 seconds. For example to set the time before reversing to 30 seconds hold down the button for 6 blinks. This time delay will include the time for the train to travel to the other side and also pause while stopped. For more realistic operations the train should park on the ends for a few seconds before reversing. If the time delay is too short then the train will not reach the ends. This time delay is retained in flash memory and will resume when power is turned off and on.

One time programming: (1) Remove jumper between 8 and 9 if present and power up. (2) Simultaneously press the ALTERNATE sensor pushbutton and either of the SENSOR pushbuttons. This enters programming mode. (3) Press and hold the SWITCH Green pushbutton for at least 2 blinks. Power down and add a jumper between 8 and 9.

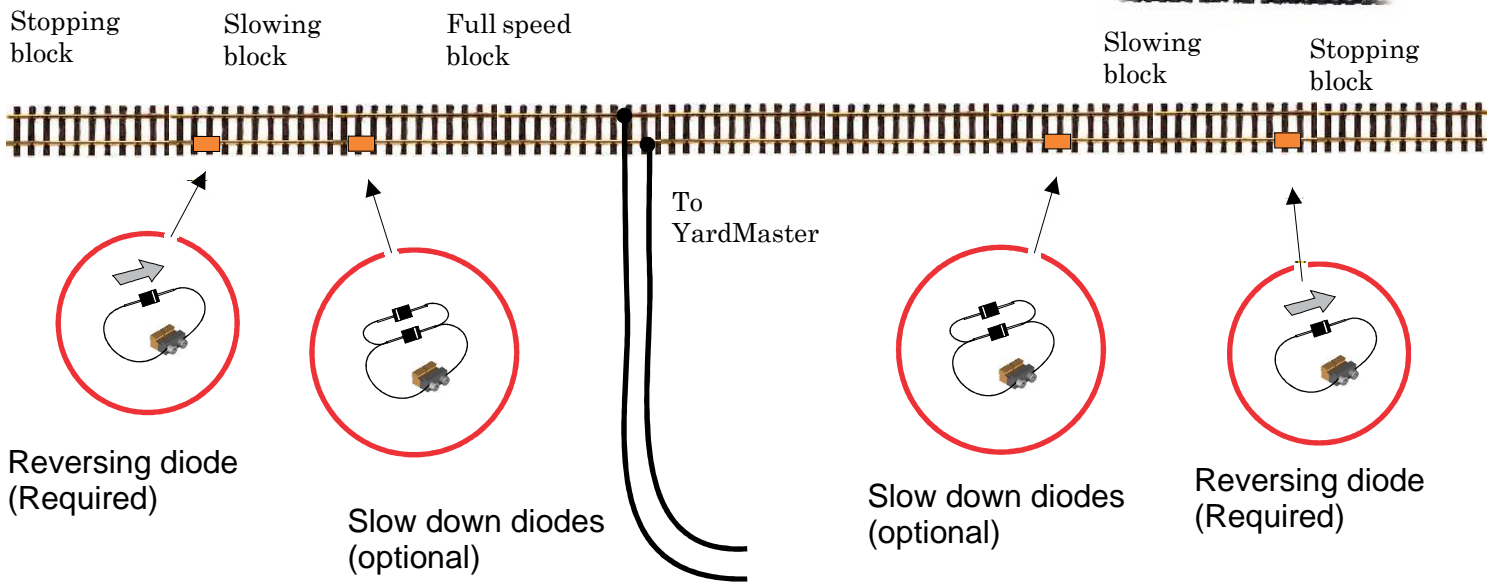
Note that the stops will be abrupt. This will work well for slow moving trains. For gradual acceleration and decelerations, and in-between station stops consider using the StationMaster or StationMaster/Reverser instead. Information is available at <http://www.RR-Concepts.com>. See the next page for diode slow down options.



Back and forth Automatic Reversing DC trains only

Hookup detail showing optional diode slow down sections

By adding back to back diode sections the train will slow down when approaching the ends. Add as many slow down diode sections as desired.



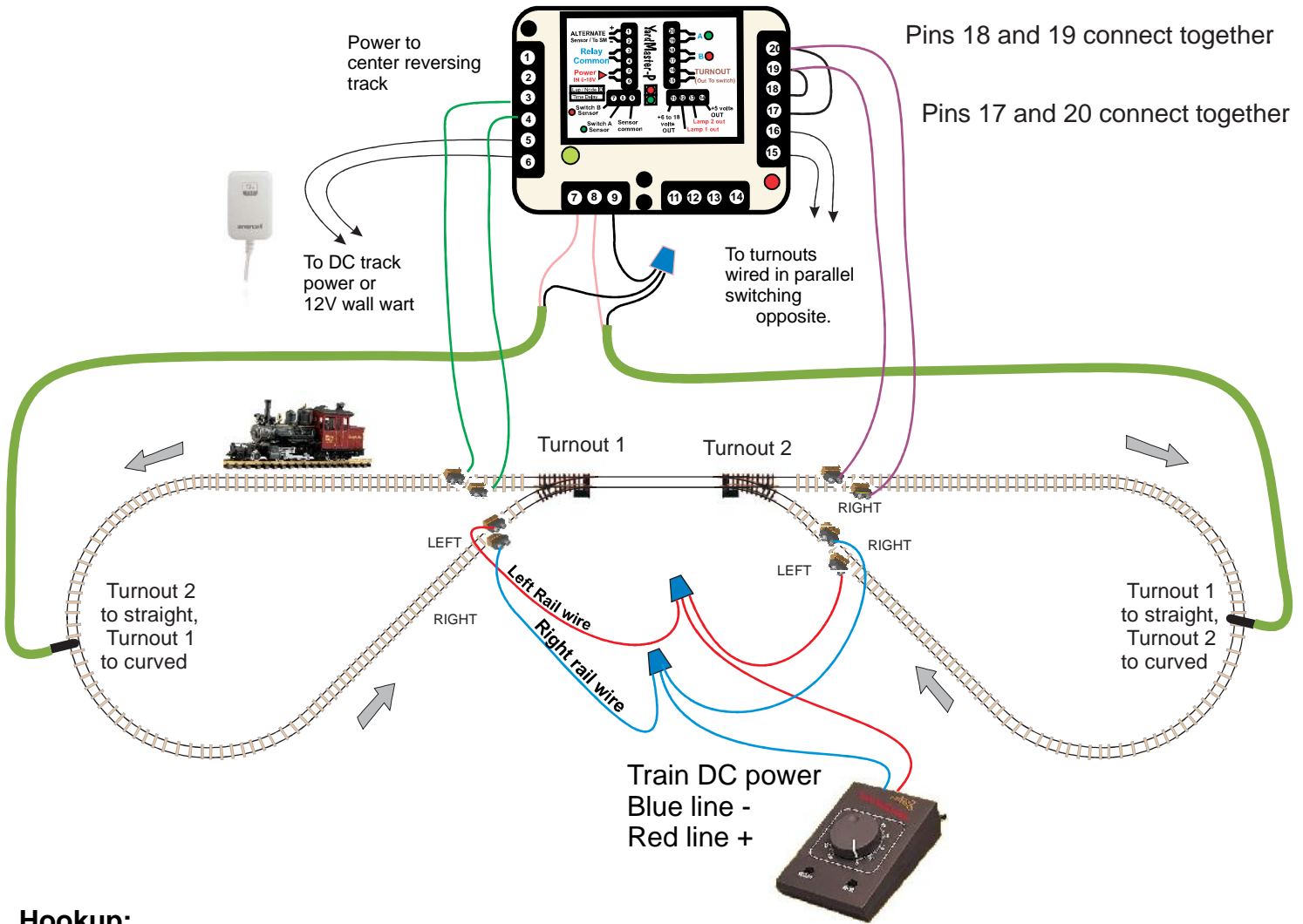
Alternatively diodes can be added directly to rails by using self-tapping screws and 3 AMP diodes. See RailroadConcepts.com to purchase these parts.



1. Attach self-drilling screws.
2. Cut rail between screws with Dremel.
3. Wrap diodes leads around screw heads.
4. Cut protruding screws flush to rails, trim diode leads.



Reversing Loops with LGB style powered turnouts



Hookup:

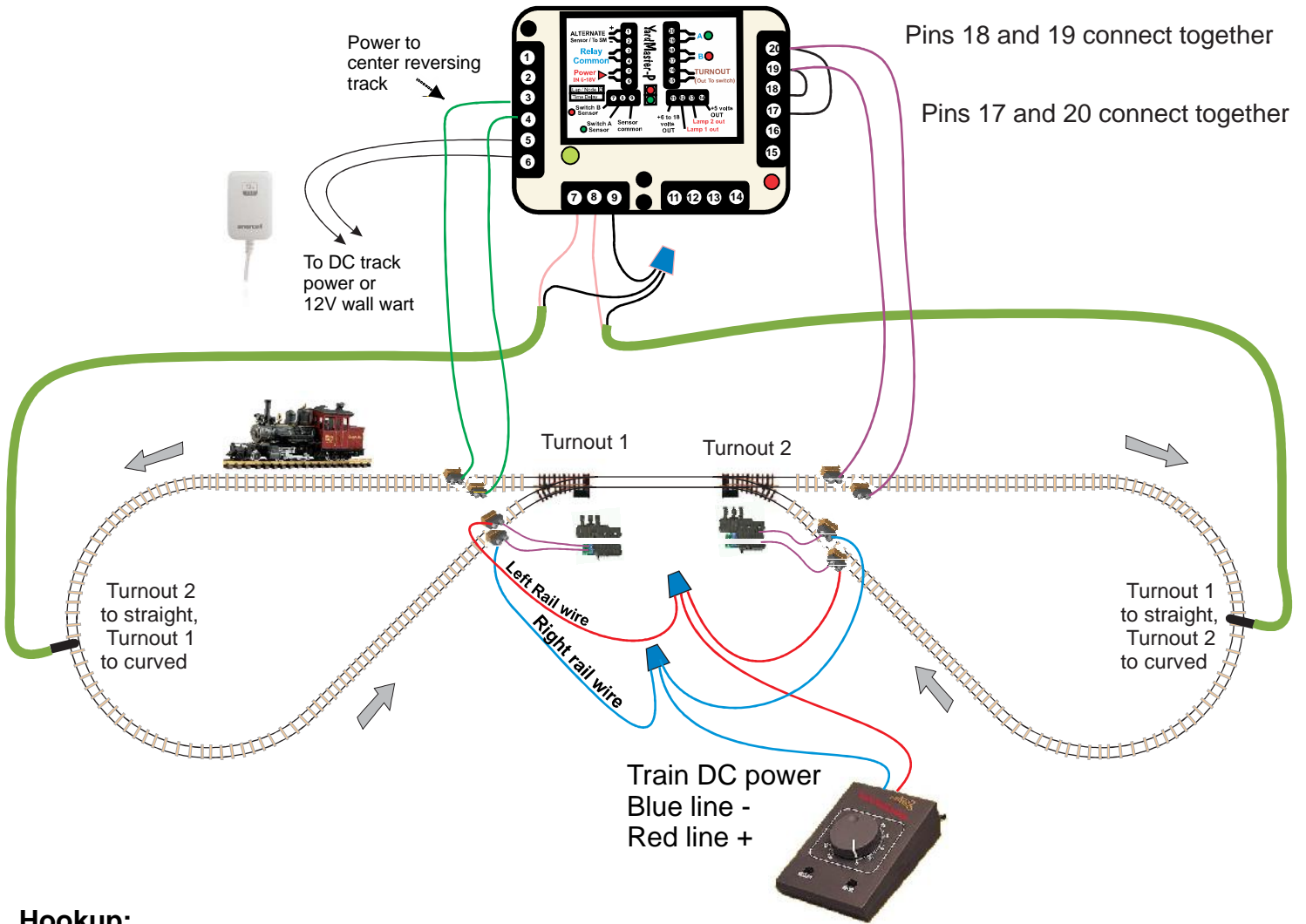
- Attach #3 and #4 to center track section as shown. Polarity is important.
- Attach #5 and #6 to a 12VDC power source. Polarity is not important. See power page for more info
- Attach #7 and #9 to the sensor in the left loop. .
- Attach #8 and #9 to the sensor in the right loop..
- Attach #15 and #16 to the turnouts wired in parallel. Turnouts should switch opposite so the train follows the arrows as shown.
- Jumper #18 to #19 and attach a wire to the negative power source (shown attached to right rail)
- Jumper #17 to #20 and attach a wire to the positive power source. (shown attached to left rail)
- Attach TRACK outputs of power source to track as shown. Each loop is hard wired for a certain direction.
- Make sure polarity and directions of trains are as shown. For LGB style trains left rail is always POSITIVE while right rail is NEGATIVE. Notice that this is reversed for trains following NMRA standards.
- (... Continued on next page)

Notes and Enhancements:

- * 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.
- * Station stops can be added in the loops by adding an additional StationMaster or YardMaster.



Reversing Loops with Slow Motion powered turnouts



Hookup:

- Attach #3 and #4 to center track section as shown. Polarity is important.
- Attach #5 and #6 to a 12VDC power source. Polarity is not important. See power page for more info
- Attach #7 and #9 to the sensor in the left loop. .
- Attach #8 and #9 to the sensor in the right loop..
- Attach Slow motion turnouts to reversing track sections. Turnouts should switch opposite and match direction as shown by arrows.
- Jumper #18 to #19 and attach a wire to the negative power source (shown attached to right rail)
- Jumper #17 to #20 and attach a wire to the positive power source. (shown attached to left rail)
- Attach TRACK outputs of power source to track as shown. Each loop is hard wired for a certain direction.
- Make sure polarity and directions of trains are as shown. For LGB style trains left rail is always POSITIVE while right rail is NEGATIVE. Notice that this is reversed for trains following NMRA standards.
- (... Continued on next page)

Notes and Enhancements:

- * 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.
- * Station stops can be added in the loops by adding an additional StationMaster or YardMaster.



Reversing Loops with powered turnouts (continued)

Operation

The loops on both ends connect straight to the transformer and trains must travel in the directions as shown. The turnouts must be hooked up so that this happens.

When the train goes over the sensor in the loop the turnout will align to receive the approaching train and the polarity of the center section will reverse.

Both turnouts will fire since they are wired in parallel. The transformer should be set to the desired speed of the train, Notice that pins 19 and 20 attach to the track. These can also attach to the appropriate transformer output wires instead.

Polarity is important for all wires except sensor wires.

Before adding a train press the sensor pushbuttons and verify that the turnouts fire to the correct positions.

First time start up: Place a train at the location where the engine is shown in the drawing. Power up and run the train past the first sensor. Verify that turnout 1 goes down and turnout 2 goes up. Swap wires to the turnouts if necessary to make this happen.

When the train enters the center section verify that the train goes in the proper direction. If it stops then there is a short circuit. Turn off power and swap the two wires which attach to the center section. The train should enter the right side loop in the direction as shown. If the train stops when entering the loop then there is a short circuit. Remove power and swap the wires which attach to the loop track.

The YardMaster will remember the state when power is removed. To make restarting easier after removing the train always stop the train at the same location before turning off and removing the train, or just always place the train in one of the loops before the sensor.



Alternating between 2 loops of track.

When a sensor is triggered track power will switch to the other loop of track.

Note differences in terminals 3,4, 5, and 6 between AC trains and DC trains.

AC trains generate electrical noise which affect the microcontroller, so an external power source must be used.

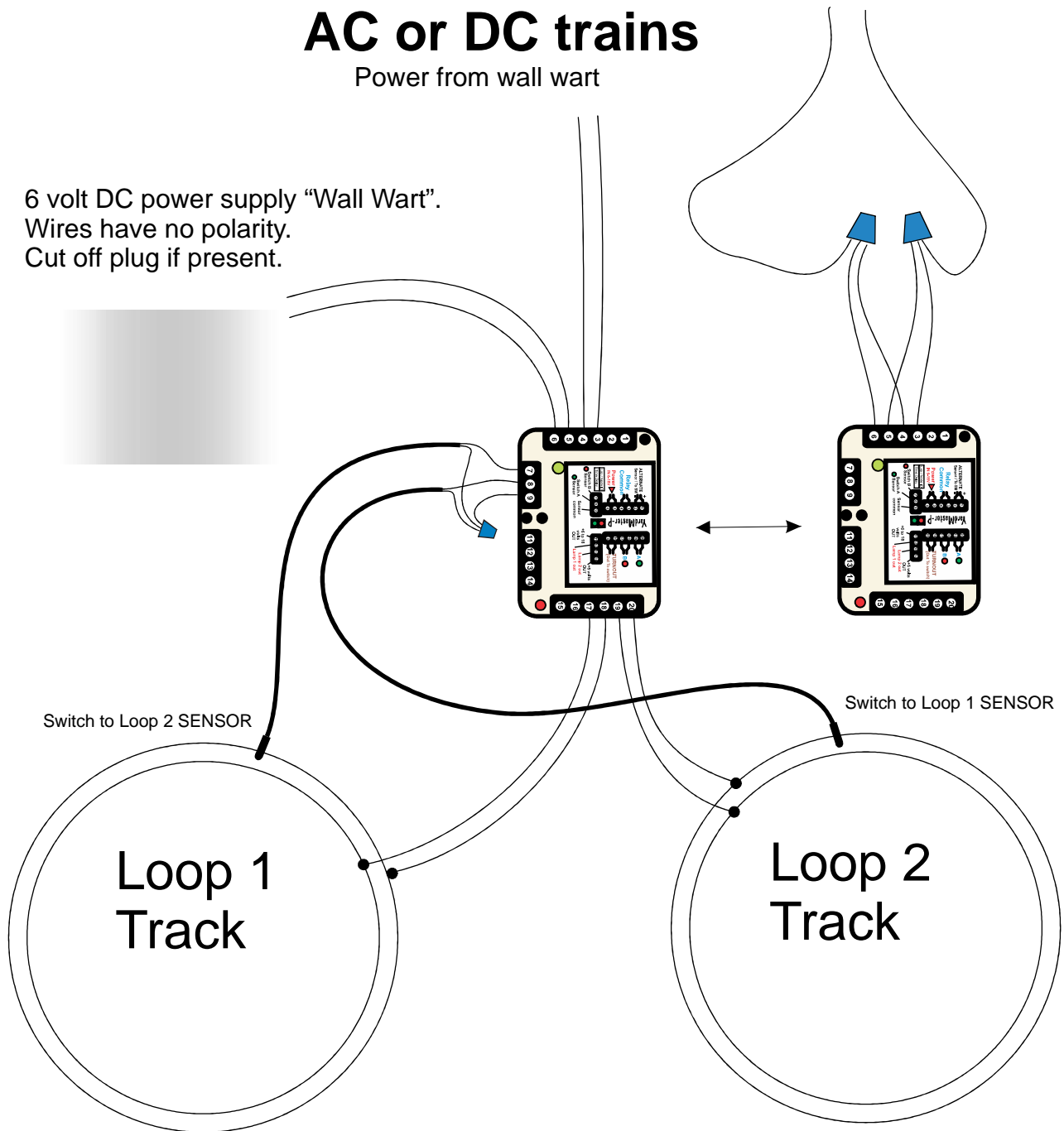
DC trains only

Train power from transformer

AC or DC trains

Power from wall wart

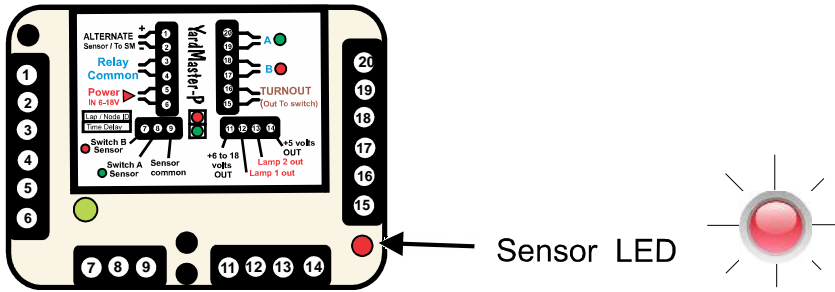
6 volt DC power supply "Wall Wart".
Wires have no polarity.
Cut off plug if present.



Trains must carry magnets to trigger sensors



LED indicators



STATUS LED

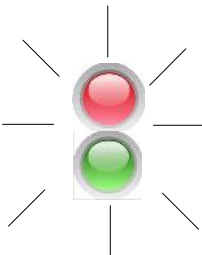
- o The RED LED will flash when any sensor is detected except when attached to a StationMaster.
- o When programmed for “blinking signal lights” the RED LED will enter a slow blinking state every few minutes when no activity is occurring. This indicates that the realistic lamp flashing is in process.
- o When performing a time delay operation a slow 1 second blink will occur.



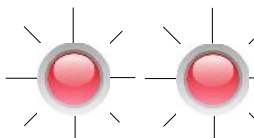
Green indicates the YardMaster has switched to GREEN.



Red indicates the YardMaster has switched to RED.



Red/Green Flashing fast indicates Programming mode. Quickly press the alternate button or cycle power to exit programming mode (turn off and back on again)

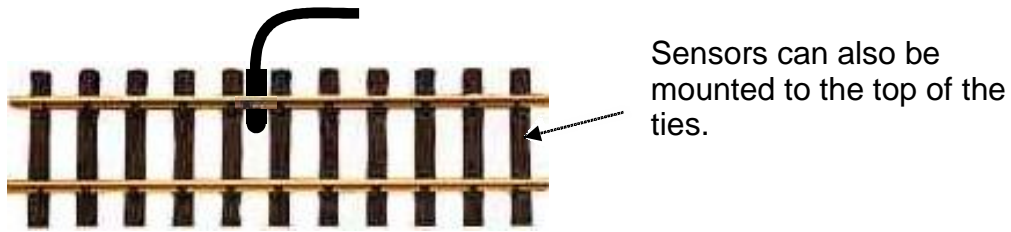


On power up both LEDs will flash red for 5 seconds **when the alternate sensor is sensed closed or damaged.** After 5 seconds operation will continue however the alternate channel will be disabled. All other sensors will behave normally. **If an optical sensor is present it will perform the alternate operation.**



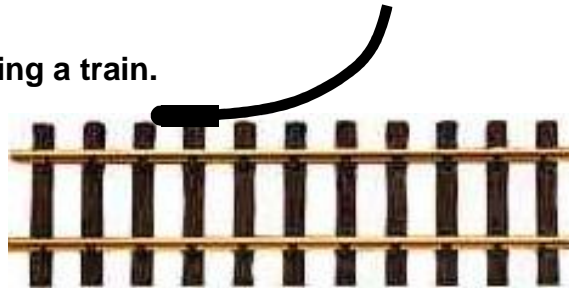
Sensor Placements on Track

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.



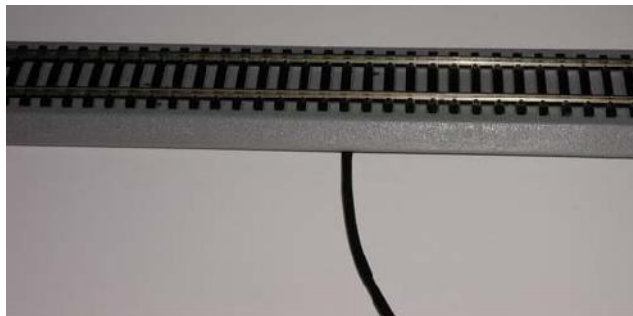
Sensor Placement for identifying a train.

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.