



# YardMaster

Turnout Controller  
Lamp Driver  
Power Switcher



XP- Expanded Programming

This manual contains detailed hookup and programming instructions for the YardMaster controller with the Expanded Programming software.

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

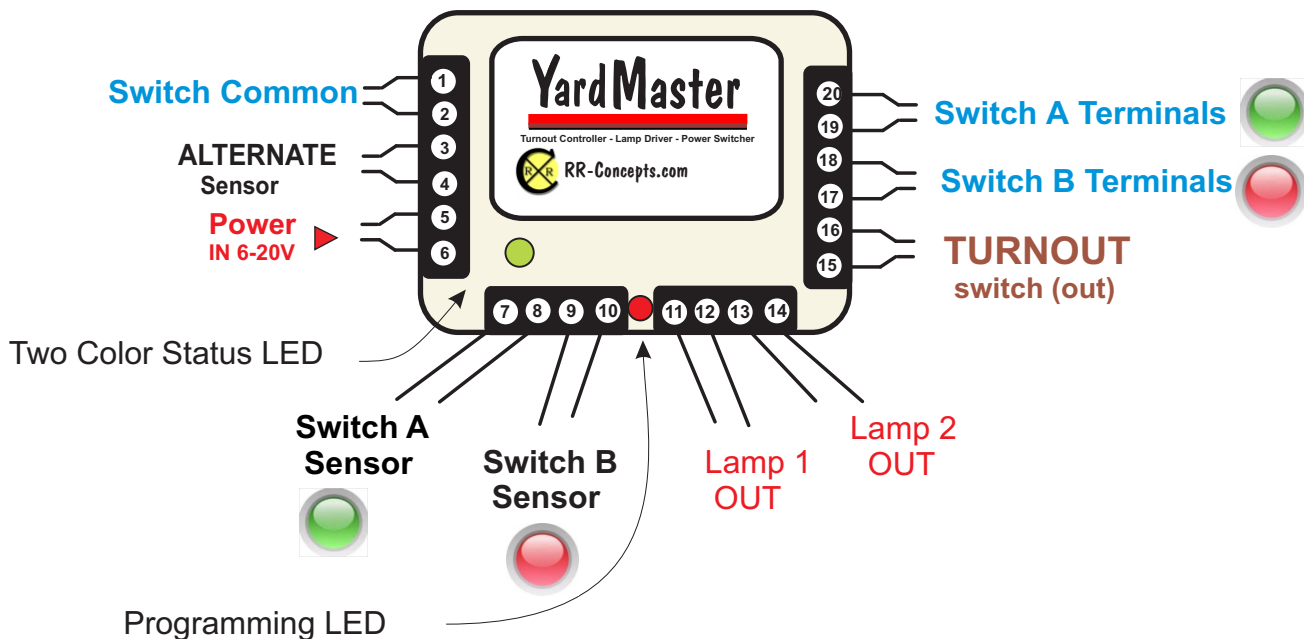
**Before we Start-** Please do not attach Power wires (from your power pack) to any other terminals except the designated inputs.

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.

**Please remove power before attaching wires.**





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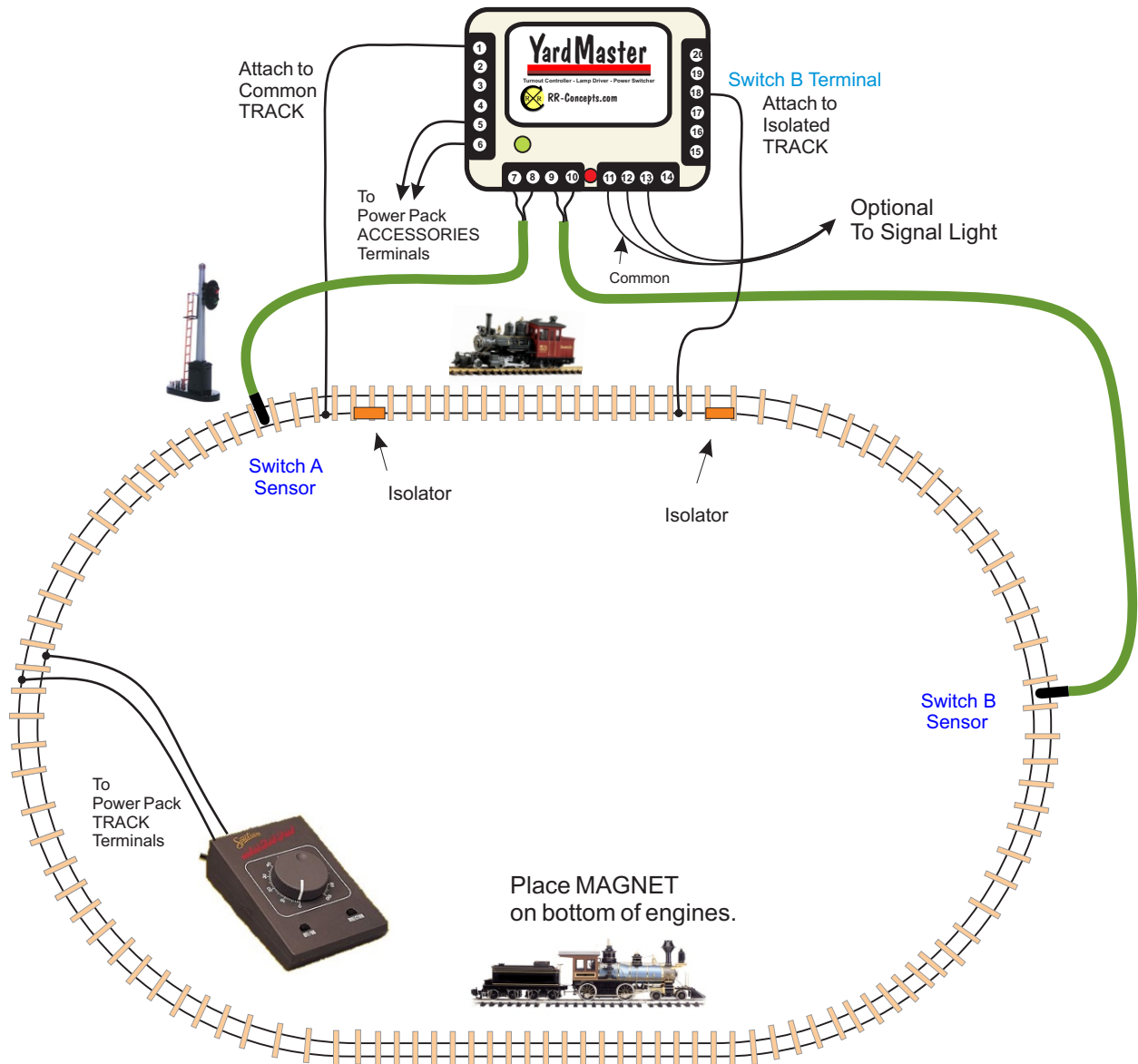
# YardMaster Versions

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.

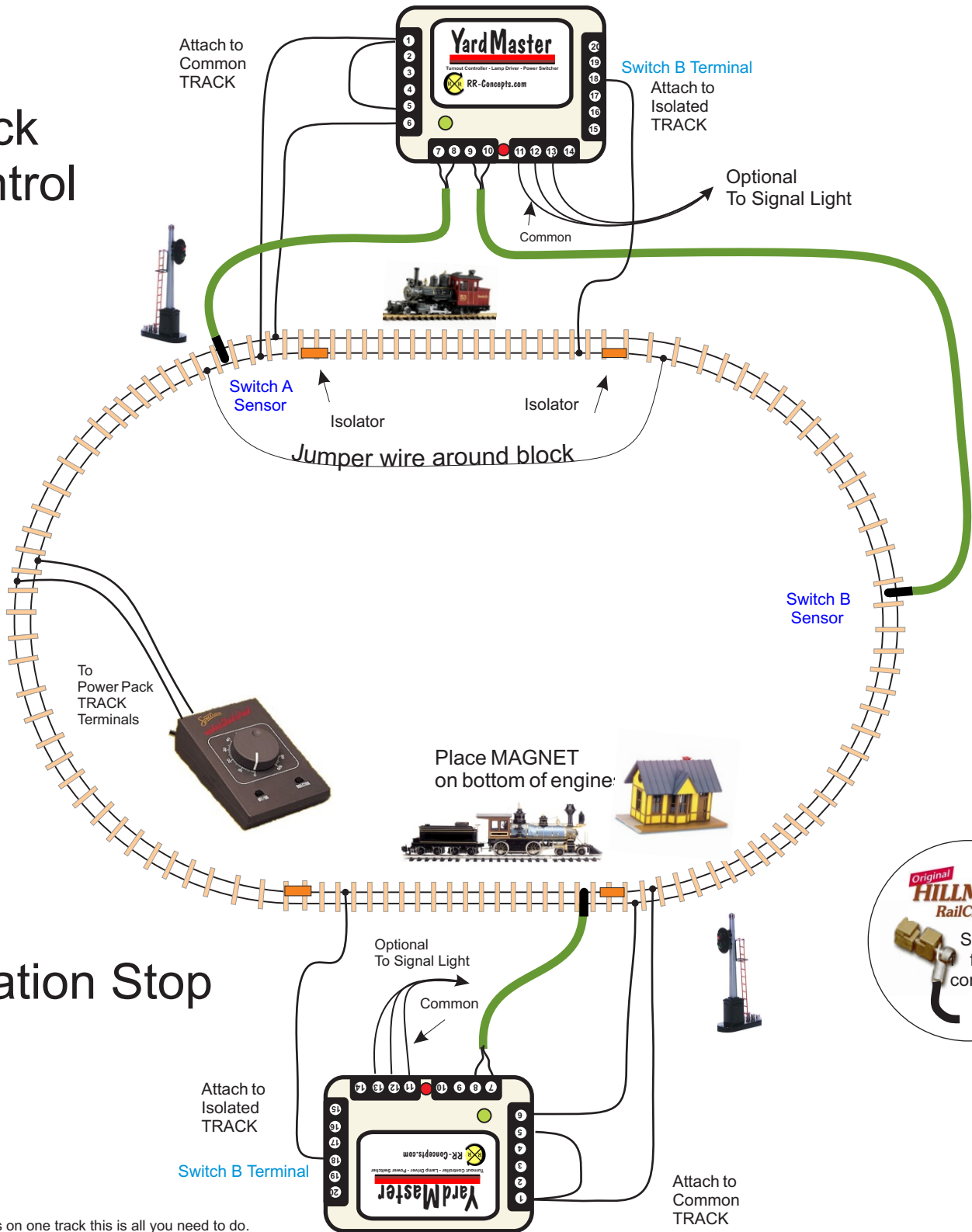
When the power supply unit is turned on the train should run. If it does not then trigger the alternate sensor by briefly touching contacts 3 and 4 together with a piece of wire. This is a one-time operation since the YardMaster will remember the state when it is power cycled.

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



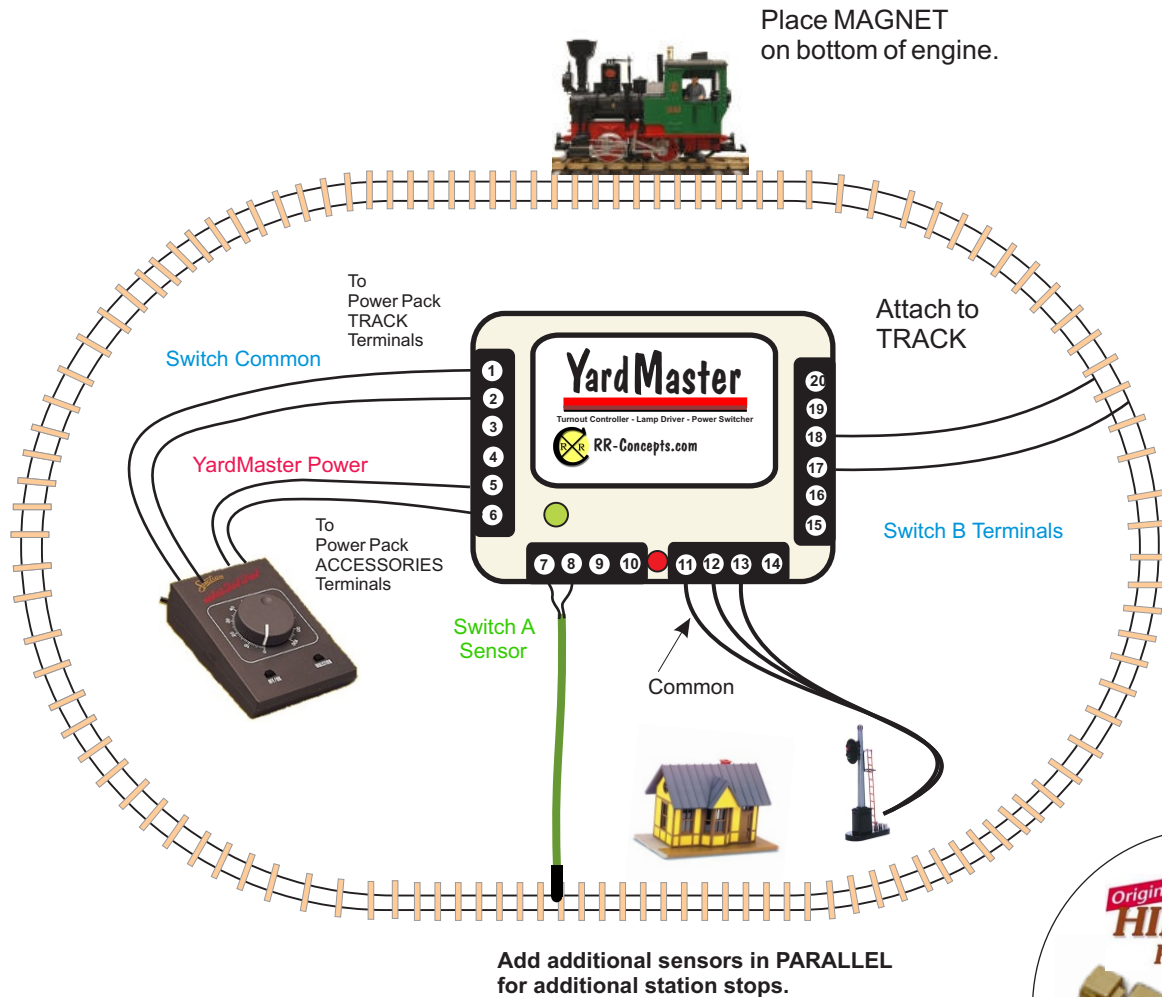
For two trains on one track this is all you need to do.

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.

## 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.

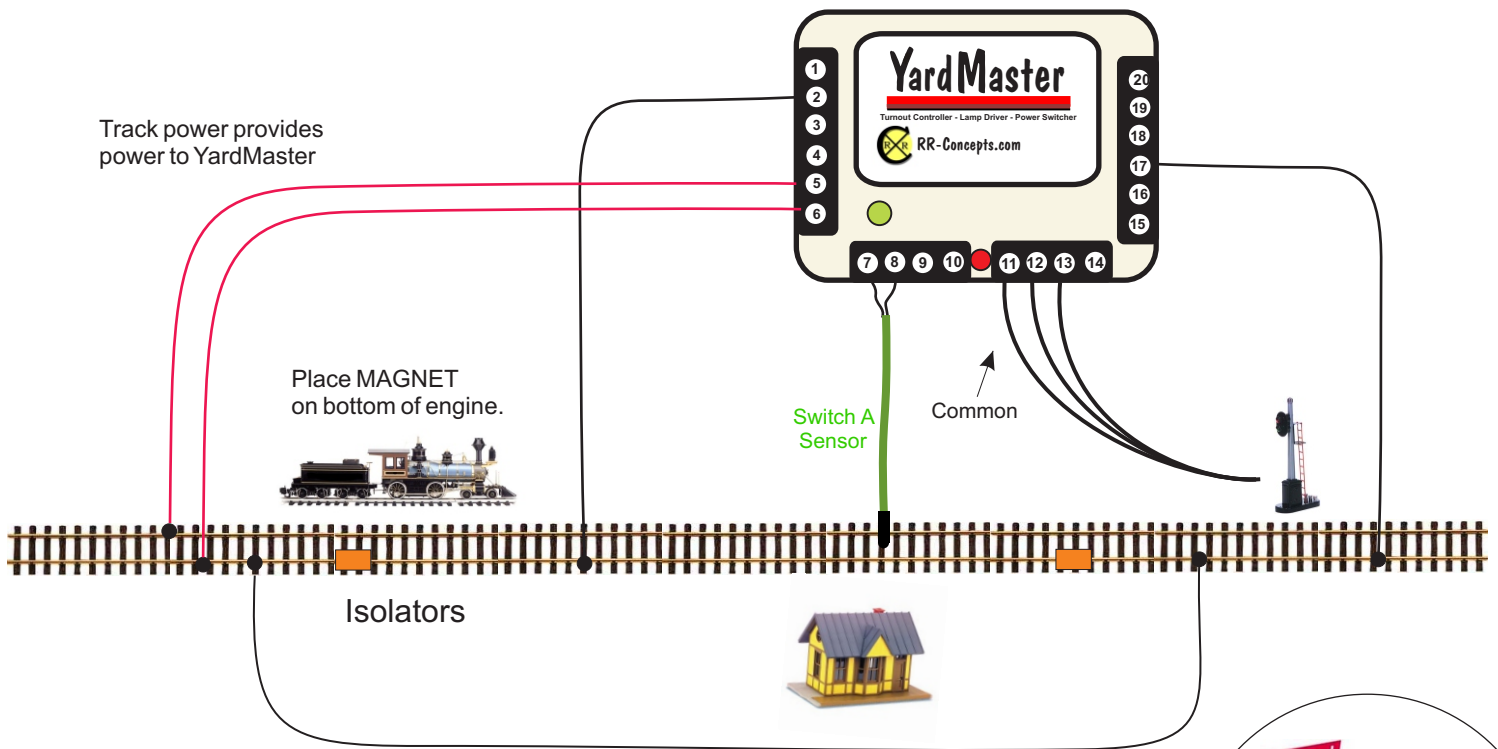
When the power supply unit is turned on the train should run. If it does not then trigger the alternate sensor by briefly touching contacts 3 and 4 together with a piece of wire. This is a one-time operation since the YardMaster will remember the switch state when it is power cycled

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.

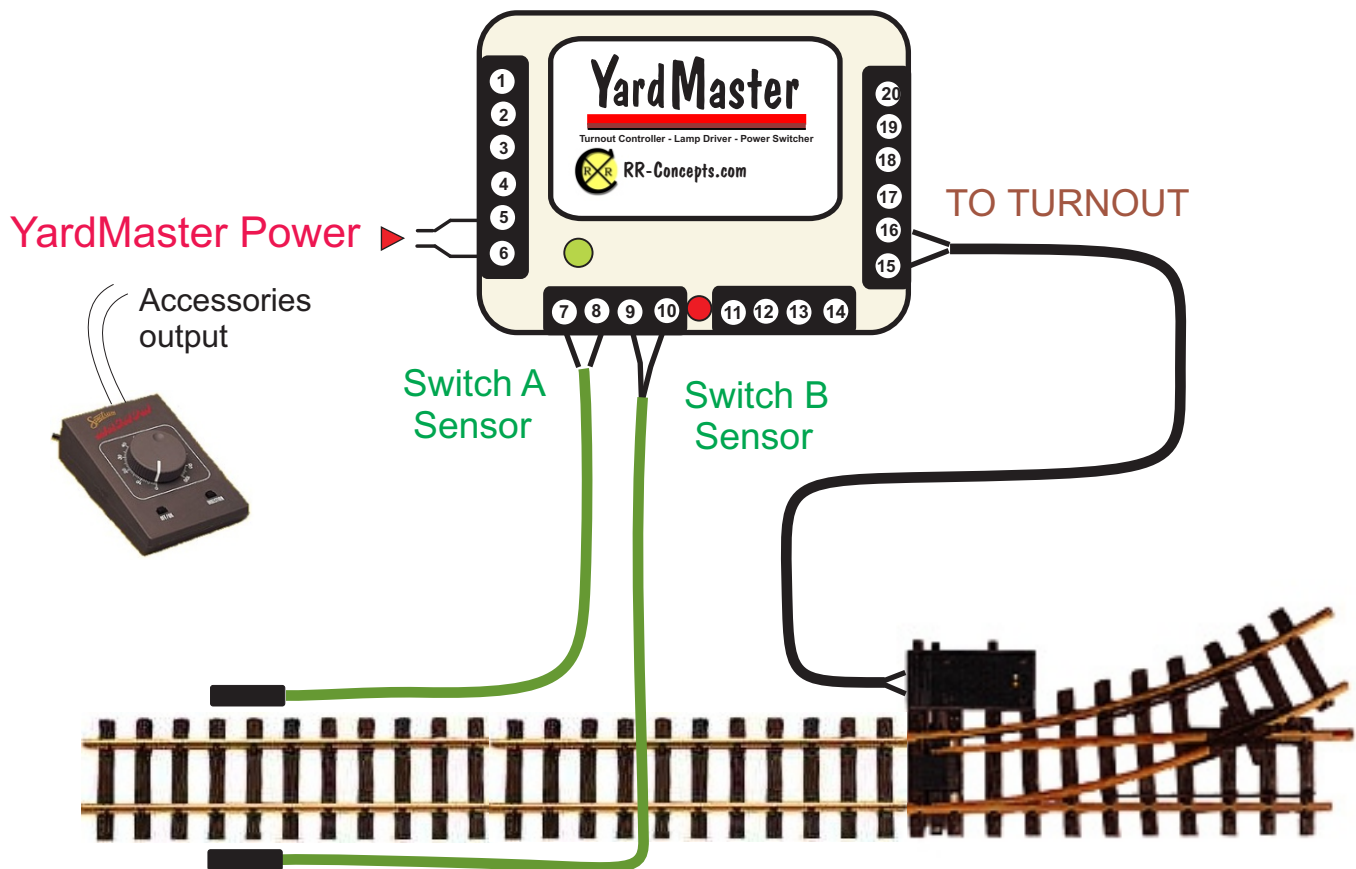
## Smart Turnout

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.



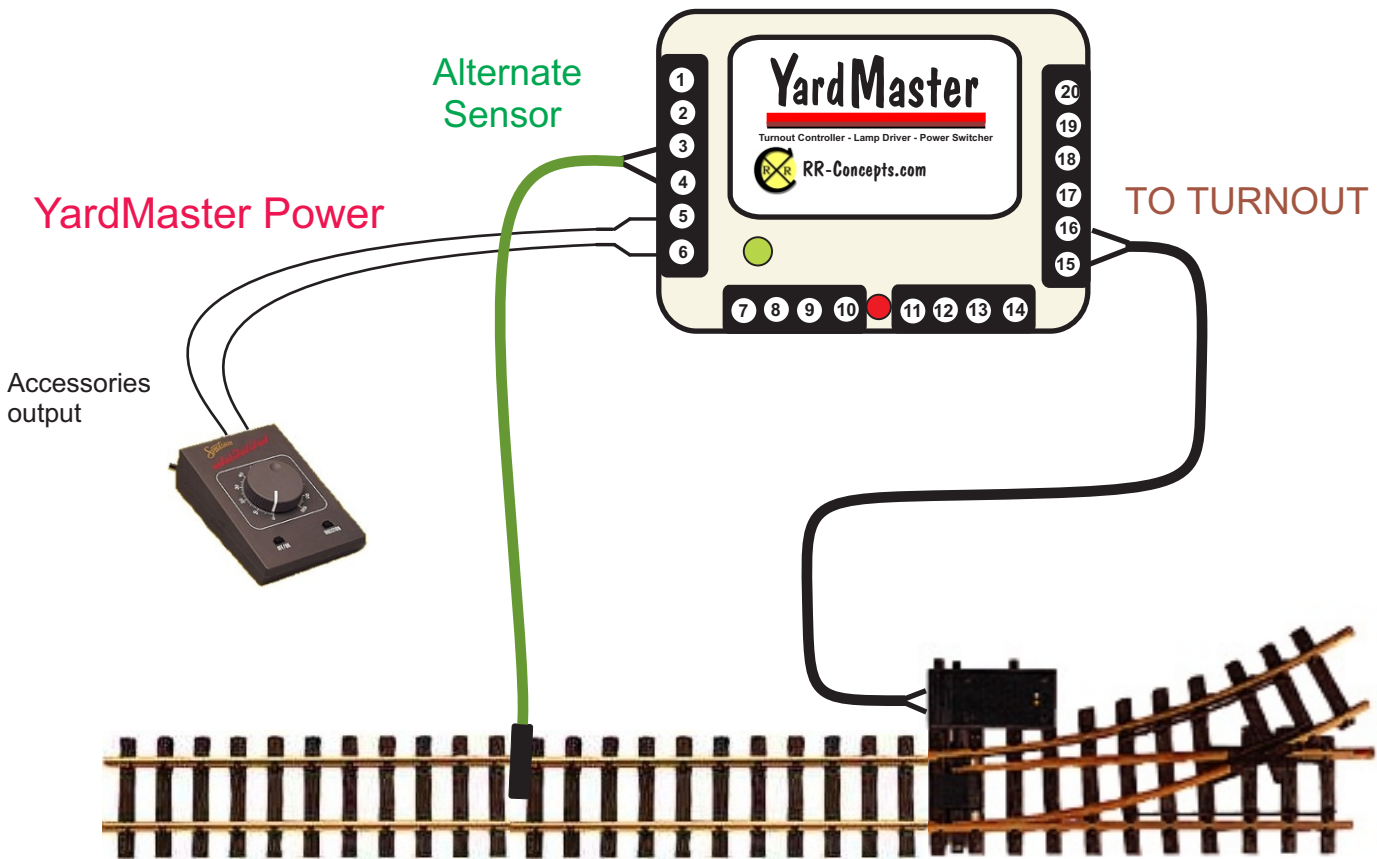
## Alternating Paths

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.

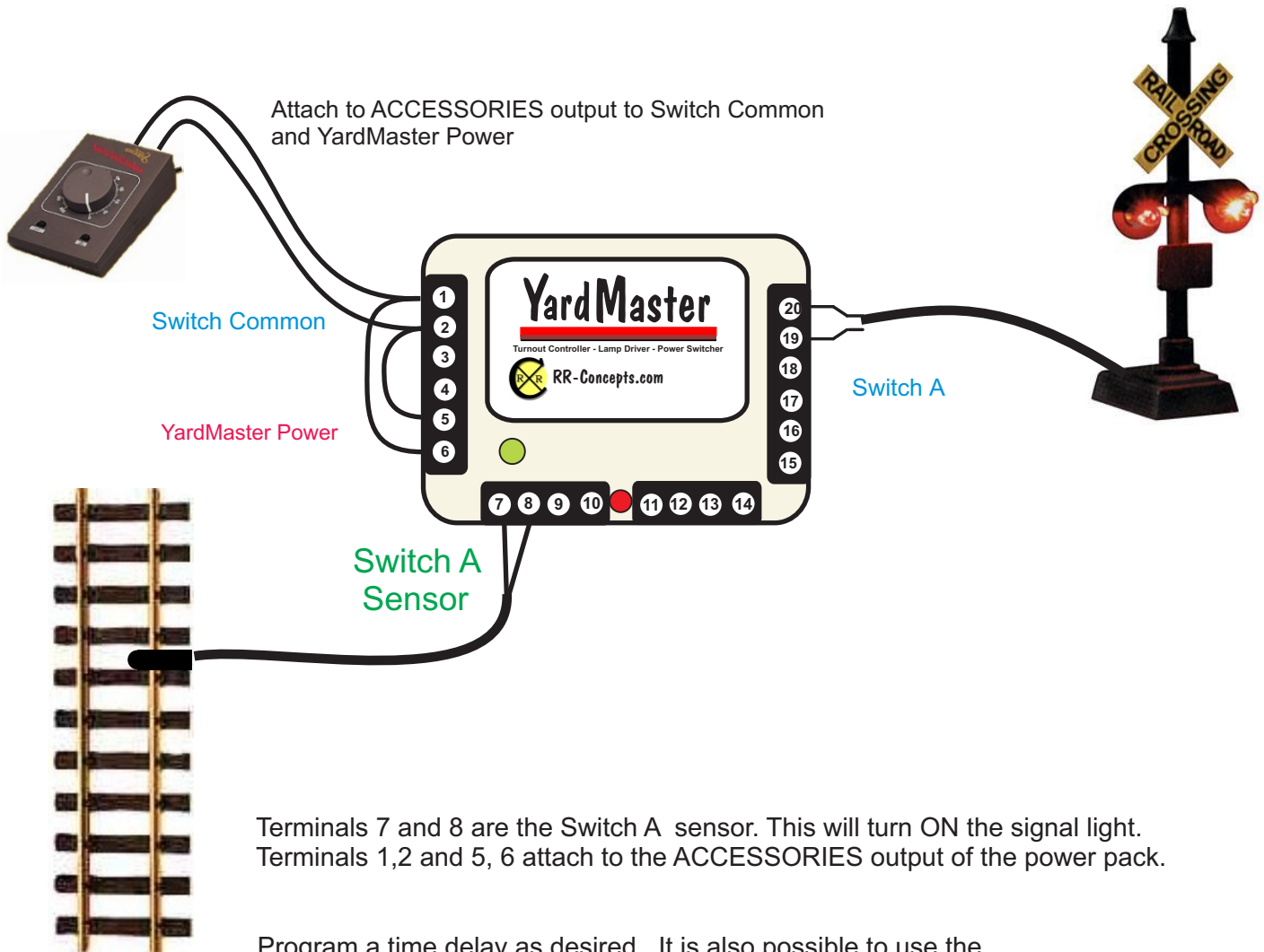
This could be useful for multiple trains that follow each other on the same track.

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



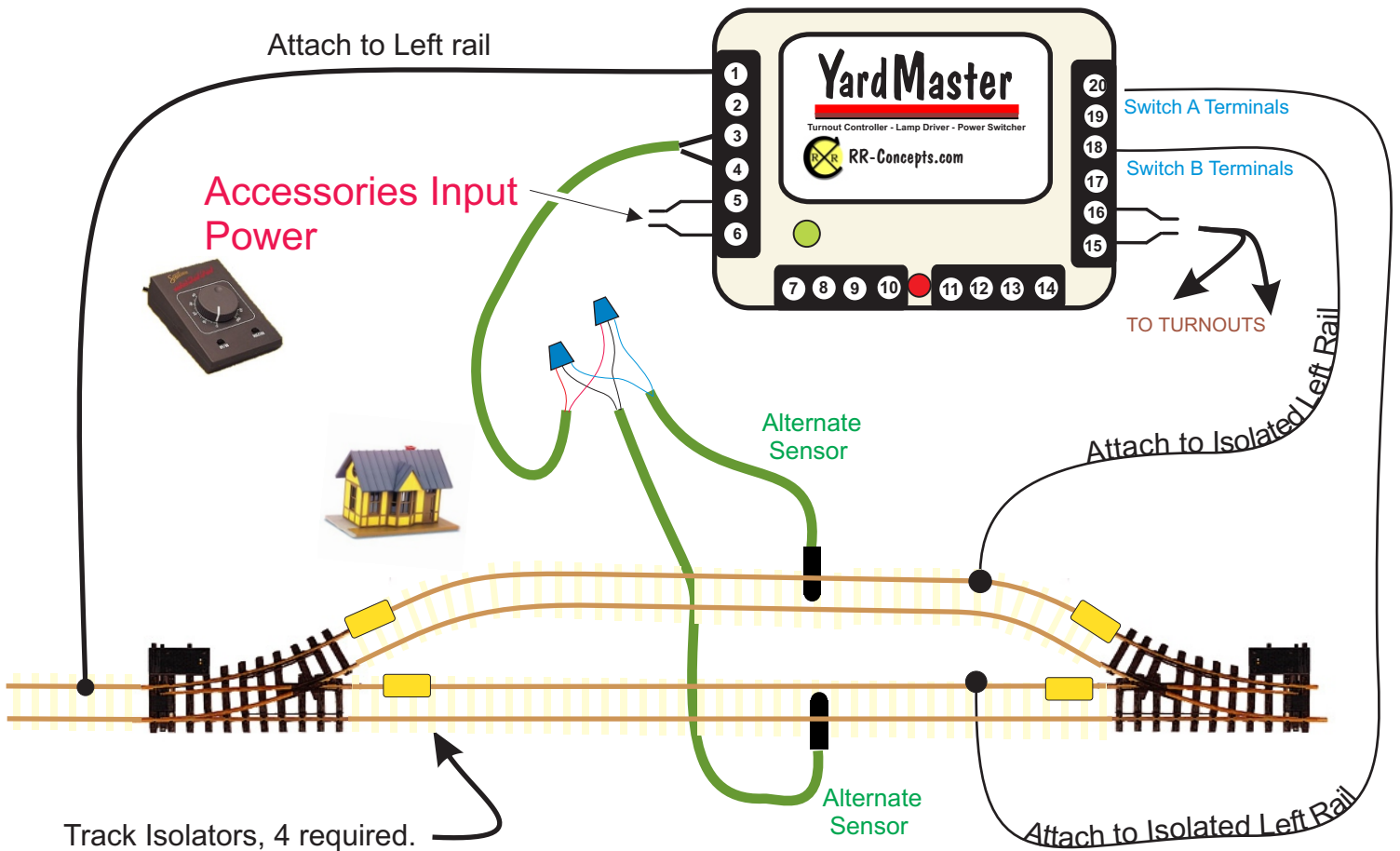
Terminals 7 and 8 are the Switch A sensor. This will turn ON the signal light.  
Terminals 1,2 and 5, 6 attach to the ACCESSORIES output of the power pack.

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.

## 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.

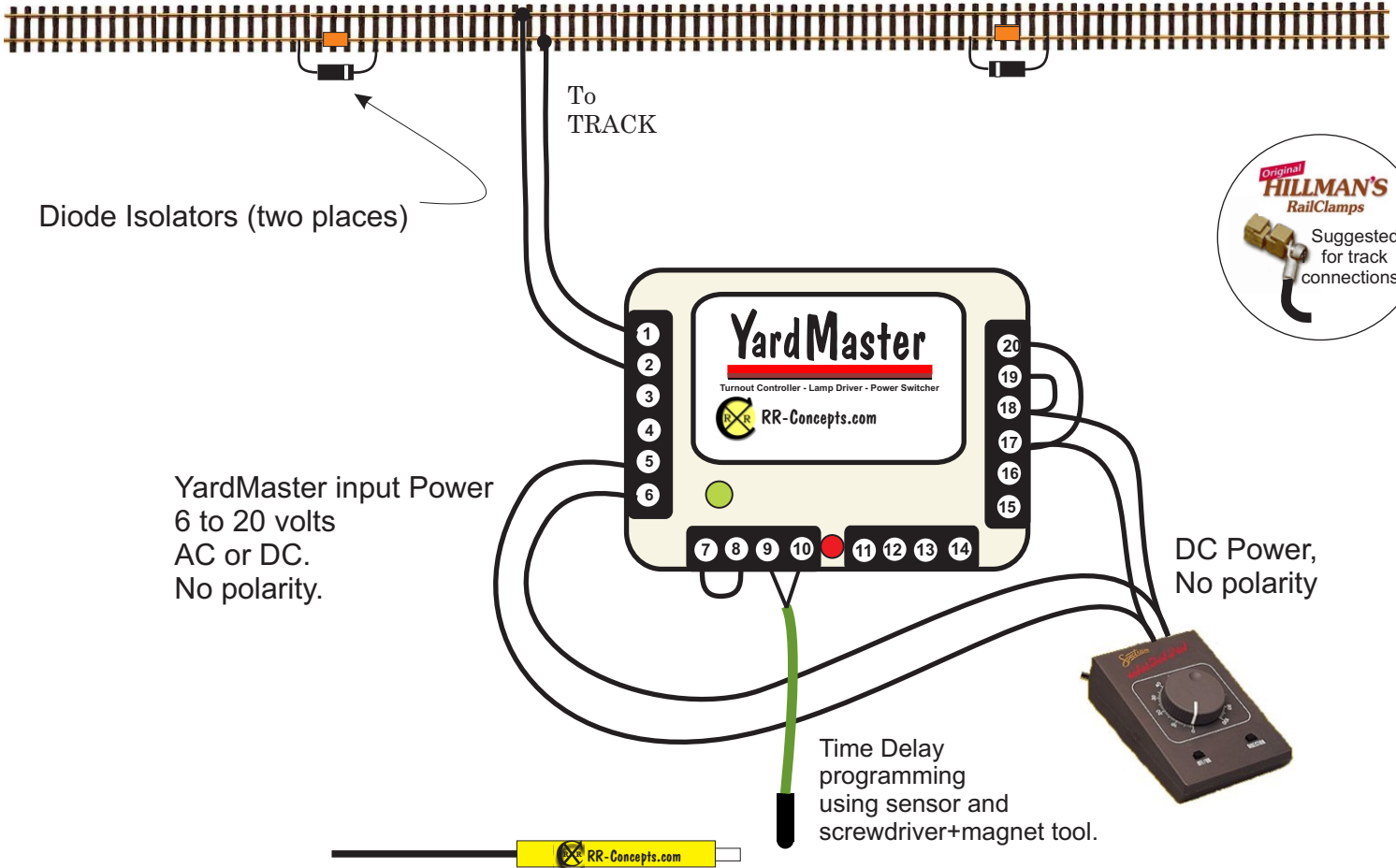
For back-and-forth alternating trains add an additional YardMaster or a StationMaster/Reverser. For each train to do a complete back-and-forth operation before switching program the lap count to 2. This will cause the YardMaster to ignore every other sensor. See <http://www.StationMaster.net> for more 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.

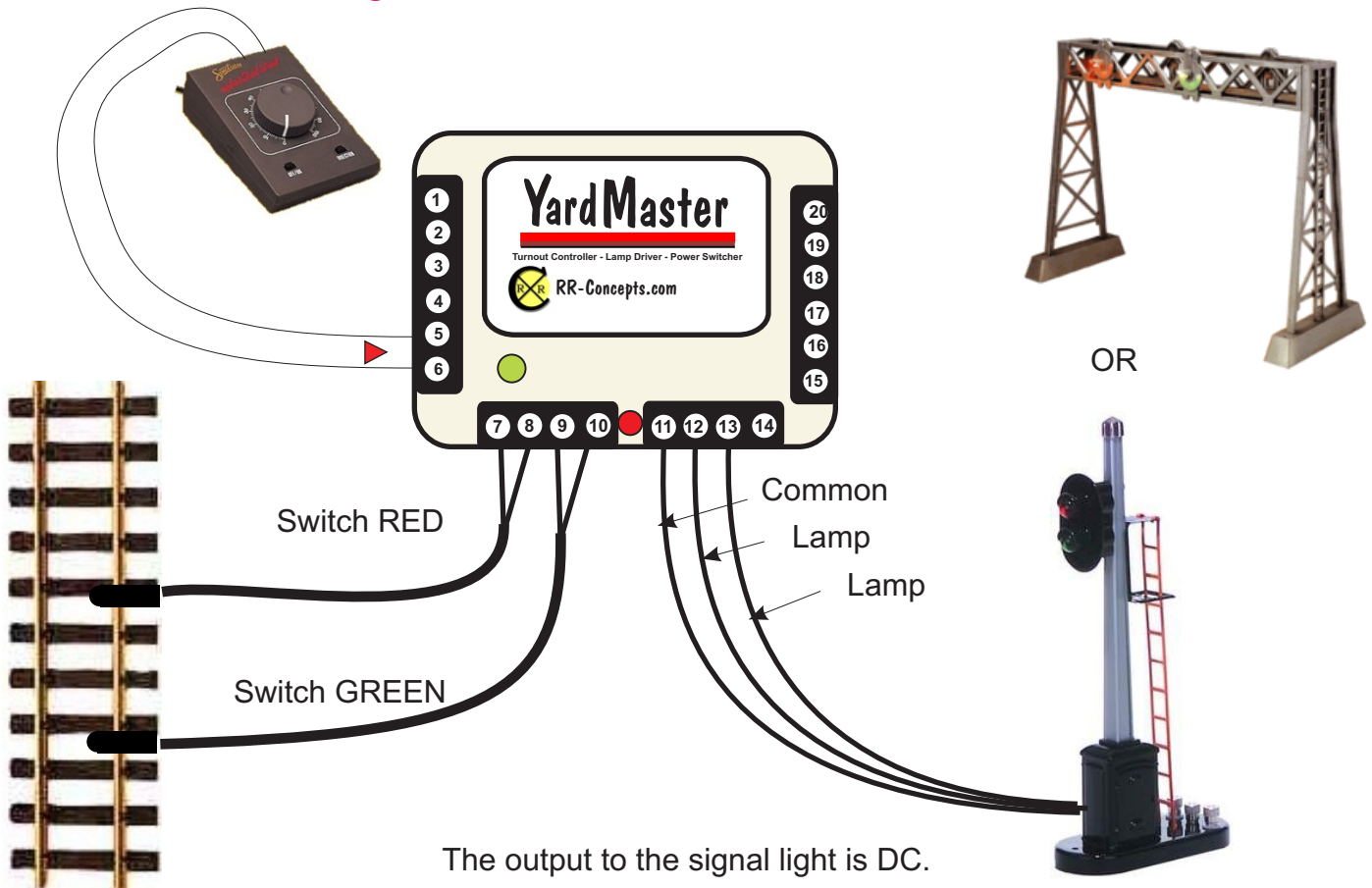
- \* **Pins 1 and 2 connect to the track.** Polarity is not important.
- \* **Pins 5 and 6 connect to either the transformer DC track power output, or to the accessories output.**
- \* **Pin 20 is connected to pin 17, and these two are connected to the DC transformer output.**
- \* **Pin 19 is connected to pin 18, and these two are connected to the other DC transformer output.**
- \* **Pins 7 and 8 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.
- \* **Pins 9 and 10 attach to either a sensor or to a pushbutton switch.** This is the TIME DELAY PROGRAMMING. When running back and forth the time delay can be changed "on the fly" by using this sensor input. A sensor with the magnetic screwdriver tool is shown here, however a pushbutton switch can also be used. Each blink programs the time delay for 5 seconds.

One time programming: (1)Remove jumper between 7 and 8. (2) Jumper 3 and 4 and power up. This enters programming mode. (3) Briefly close 7 and 8 for at least 2 blinks. Power down and replace jumper between 7 and 8.

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/Reverser. Information is available at <http://www.RR-Concepts.com>

## Controlling Signal Lights

To Accessories or voltage source



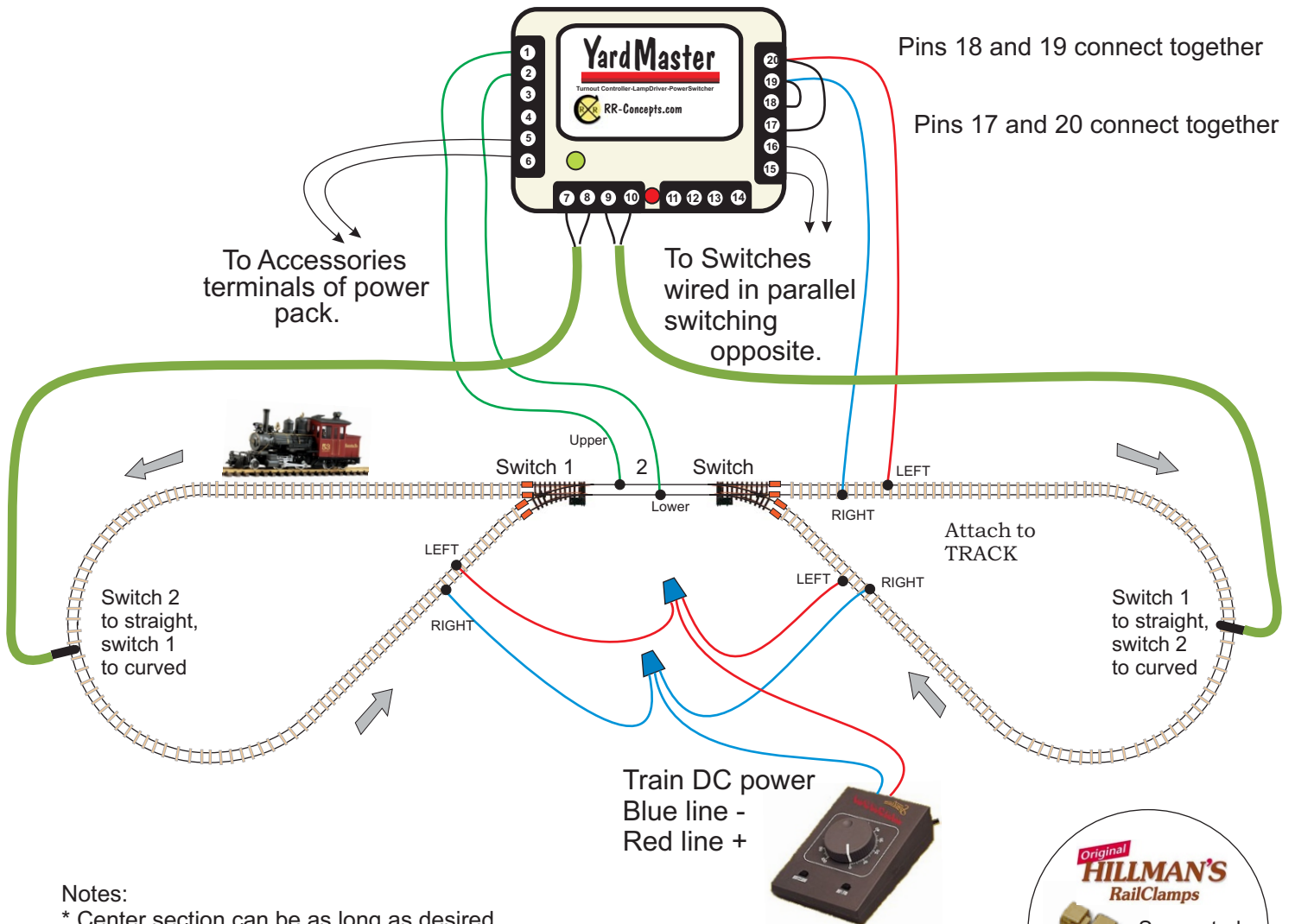
The YardMaster has been designed to directly drive signal lights in order to provide realism and interest. The signal light outputs are synchronized with the on-board relay and turnout.

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 .

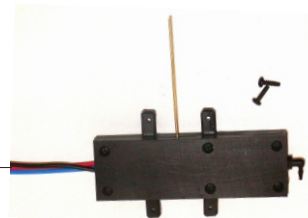
These terminals provide power to directly throw switch turnouts. Up to 3 AMPS of power is available to throw up to 3 LGB style turnouts simultaneously if wired in parallel. A pulsed DC output of 0.8 seconds is provided to drive the turnouts for both directions. The output voltage is pure DC and is not 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

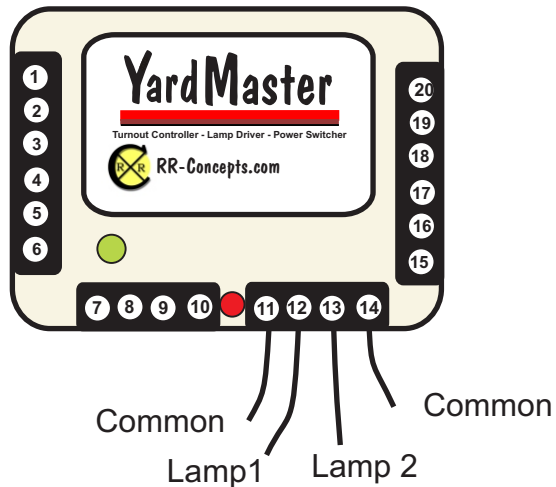


For Twin Coil YardMaster versions attach pins 11, 12, and 13 as shown. Pin 11 is the common connection. **If the YardMaster is not a twin coil version then this hookup will damage the turnout since the voltage will be continuous.** The twin coil YardMaster will pulse the signals to properly throw the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

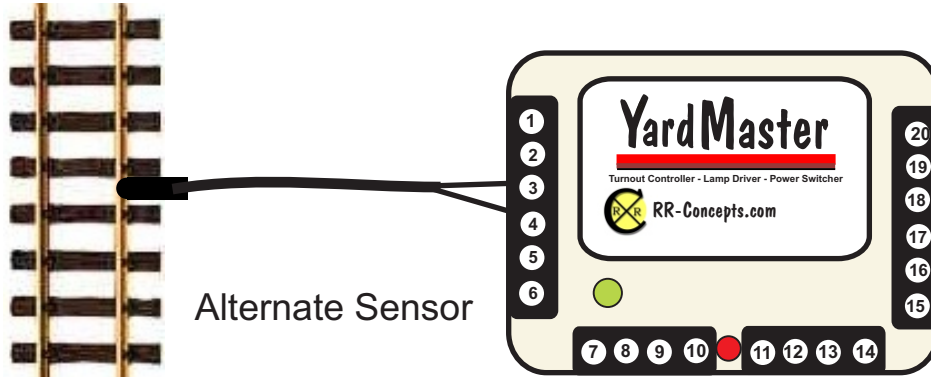
These terminals provide power to directly drive incandescent lamps. These can provide up to 3 AMPS of power. The output voltage is pure DC and is not half wave rectified AC. LED lamps can be used if the proper dropping resistor is used. Polarity is important when using LED's.

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.

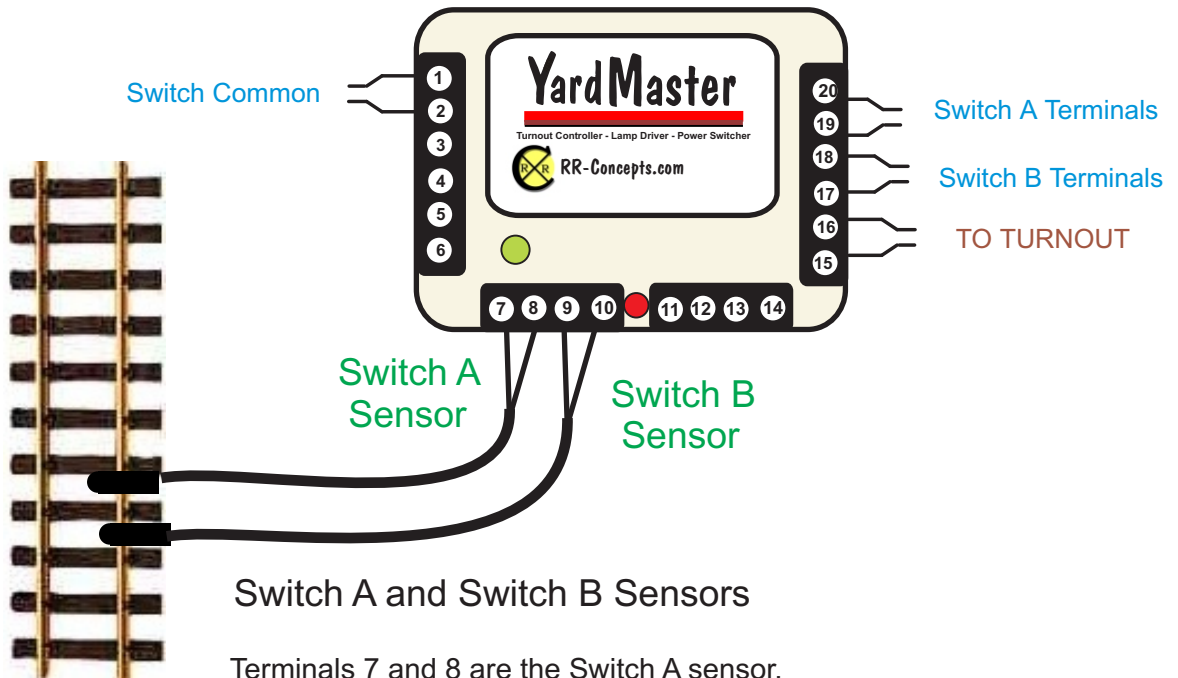
***DO NOT short these wires together or attach them to the track. Damage will result.***

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



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.



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 and these sensors will be ignored.

## Switched Terminals

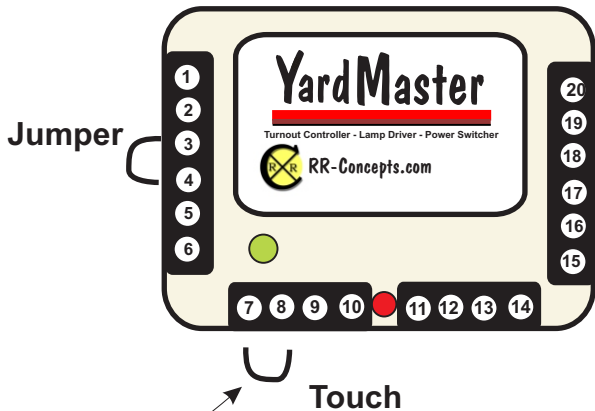


The YardMaster contains a latching DPDT relay which can switch up to 6 AMPS..

When the "Switch A" or "Alternate" sensor is tripped, LED will be **GREEN** and the two **Switch Common terminals** will connect to the "**Switch A terminals**".  
Terminal 1 will connect to terminal 20.  
Terminal 2 will connect to terminal 19.

When the "Switch B" or "Alternate" sensor is tripped, LED will be **RED** and the two **Switch Common terminals** will connect to the "**Switch B terminals**".  
Terminal 1 will connect to terminal 18.  
Terminal 2 will connect to terminal 17.

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



## Time Delay Programming for StationStopper, Reversing, or Signal Light on/off Operations

A programmed time delay will cause the YardMaster to self-trigger after the delay time. For example, if the Force Left sensor is triggered the YardMaster will automatically trigger the Force Right after the time delay. If jumpered for self triggering it will continuously self-trigger. (for back and forth operations)

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

### To Enter Programming Mode:

- 1 Power down YardMaster and jumper terminals 3 and 4 together.
2. Power up YardMaster with 3 and 4 still shorted. It should be blinking red/green/red. etc. This indicates programming mode for all features.

### To Change the time delay:

Terminals 7 and 8 are for programming the time delay. At any time briefly close 7 and 8 to view the currently programmed value.

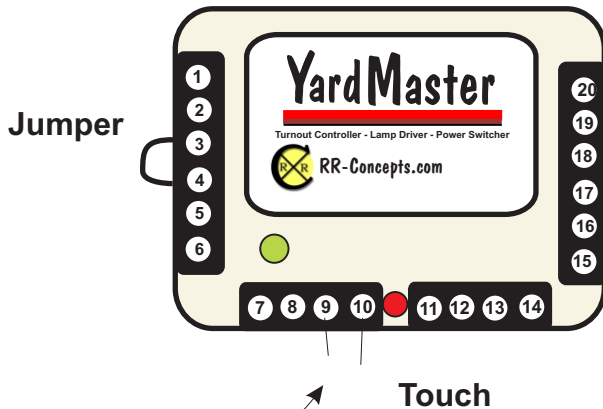
To change the time delay value close 7 and 8 and keep them closed until the proper number of blinks have occurred. The number of blinks correspond to the following table:

The number of red blinks will correspond to the following time delays:

- 1: 0 seconds, no wait.
  - 2: 5 seconds,
  - 3: 10 seconds,
  - 4: 15 seconds,
  - 5: 20 seconds,
  - 6: 25 seconds,
  - 7: 30 seconds,
  - 8: etc... each blink adds 5 seconds.
- The maximum delay is 200 blinks which is over 16 hours.

When all programming is finished power down, remove jumper between 3 and 4 (If present) and power back up.

Note: The time delay will not be operational when attached to a StationMaster.



## 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.

### To Enter Programming Mode:

- 1 Power down YardMaster and jumper terminals 3 and 4 together.
2. Power up YardMaster with 3 and 4 still shorted. It should be blinking red/green/red. etc. This indicates programming mode for all features.

### To Change the node ID:

Terminals 9 and 10 are for programming the node ID. At any time briefly close 9 and 10 to view the currently programmed value.

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

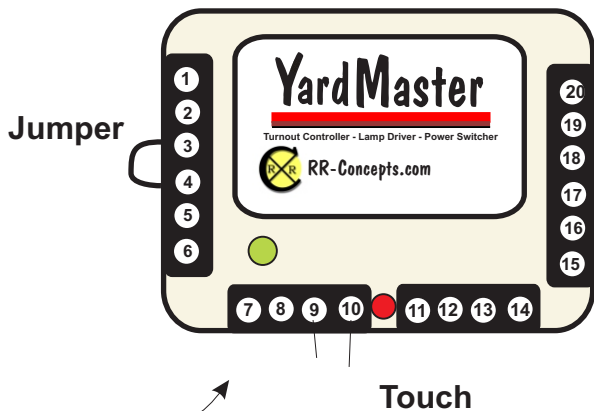
The programming blinks correspond as follows:

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

When all programming is finished power down, remove jumper between 3 and 4 (if present) and power back up.

### Notes:

- 1.The node operation will not function unless attached to a StationMaster.
2. The sensors 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: Trigger either the Force Left or Force right sensor 2 or more times within 2 seconds.**



## Programming for Multiple Laps

The YardMaster can be programmed to respond after counting sensors. This is for multiple laps, etc.

**DO NOT PROGRAM FOR MULTIPLE LAPS IF ATTACHED TO A StationMaster.**

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

### To Enter Programming Mode:

- 1 Power down YardMaster and jumper terminals 3 and 4 together.
2. Power up YardMaster with 3 and 4 still shorted. It should be blinking red/green/red. etc. This indicates programming mode for all features.

### To Change the Lap Counter:

Terminals 9 and 10 are for programming the lap counter. At any time briefly close 9 and 10 to view the currently programmed value.

To program the lap counter close terminals 9 and 10 and count the blinks. Open the terminals when the appropriate number of blinks have occurred. Each blink corresponds to 1 lap. Normal mode is with 1 blink. (YardMaster fires after 1 lap)

When all programming is finished power down, remove jumper between 3 and 4 (If present) and power back up.

### 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. Do not do this if attached to a StationMaster.

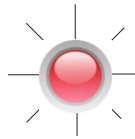
## LED indicators



STATUS LED



Programming LED



- o The RED LED will flash when any sensor is detected except when programmed as a node. When programmed as a node it will blink the received node command.

- o The RED LED will enter a slow blinking state when no activity is occurring. This indicates that the realistic lamp flashing is in process.

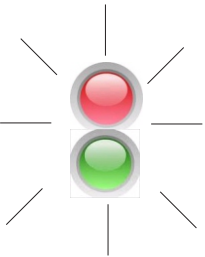
- o When performing a time delay a slow 1 second blink will occur.



Green indicates the YardMaster has switched to A.



Red indicates the YardMaster has switched to B.

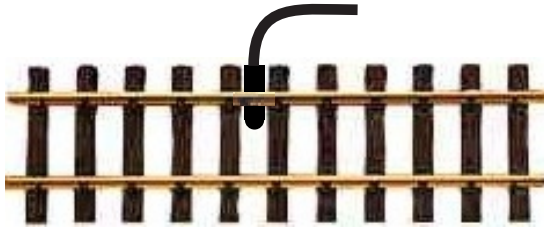


Red/Green Flashing indicates Programming mode. Open the sensor terminals and cycle power (turn off and on) to exit programming mode. This could occur if the YardMaster is powered up with the ALTERNATE sensor shorted.

If the YardMaster is blinking in response to a sensor then close the sensor a second time to exit node mode. (See programming for node ID)

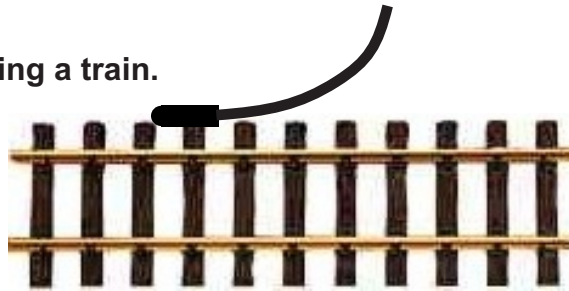
## Sensor Placements on Track

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.



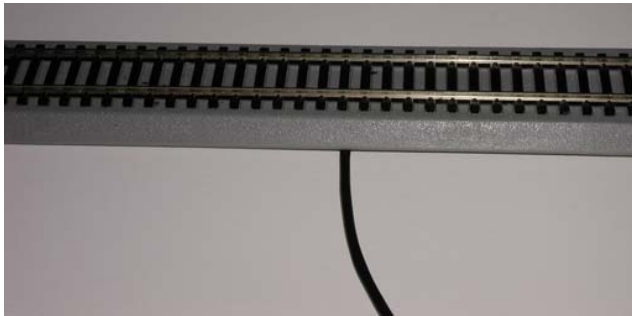
### Sensor Placement for identifying a train.

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.