Converting Static HO Scale Bachmann(TM) Block Signals to Operating Green/Red LEDs

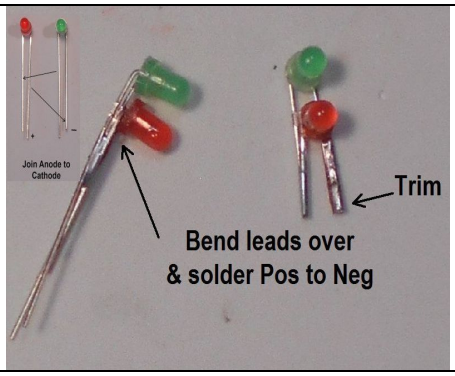
modeltrainsounds.com (Dec24)

Add LEDs for a Modified Operational Bachmann(TM) Signal

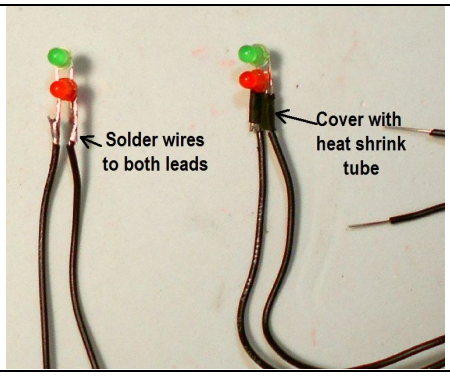
This project uses 2 LEDs to replace the 2 fake plastic red and green lens present on a non operational Bachmann(TM) Block Signal to create an operational signal. It can be **manually operated** using an electrical circuit with a double pole single throw switch (DPST) or it can **be automatically operated** using a simple occupancy detection system with a relay switch circuit to reverse the polarity. The manual system uses the DPST switch to change the direction of the circuit current and thus the aspect of the signal from Green to Red. A 9 Volt Battery or power pack is used to power the circuit. Two signals can be operated simultaneously on the one power supply and switch ..

Project 12a Adding LEDs to a Bachmann(TM) Block Signals

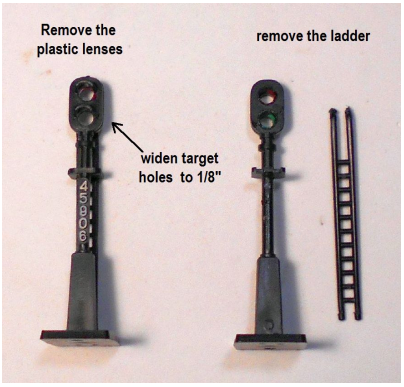
The 2 LEDs are set up by soldering their leads reversed so that a third common wire is not required. **THE SIGNAL** with a GREEN and RED LED replaced in the signal aspect, are connected to two wires threaded down the stem between the ladder and out of the base. A 680 ohm resistor is added to limit the current to the LEDs. Additional wiring can be added here to set the power source away from the signal. Heat shrink tubing is used to cover the solder connections. The wires can be directed to under the layout to the switching control circuit. Connection wires with male and female Dupont(R) connection plugs are used to connect to the signal. The signals are prepared in the following steps.



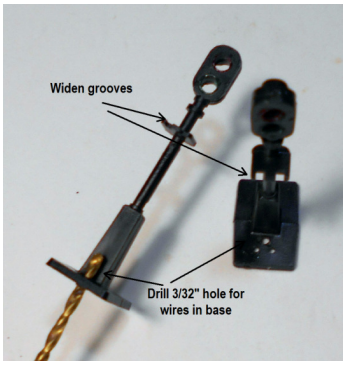
LED Prep Align Green over red polarity opposed . Solder the leads together . Trim to about ½ of lead length. If you test the lighting use only a 3V battery.



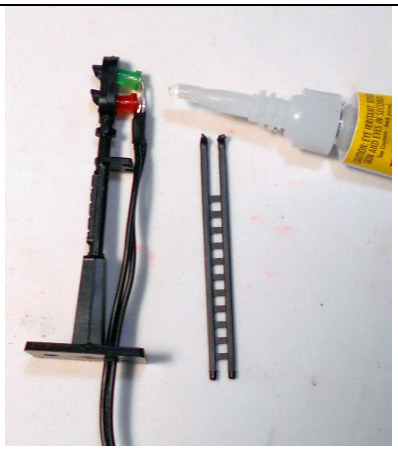
Cut two pieces of 8 inch black solid, 26 or 28 G wire. Solder the ends to the LED leads. Cover the joints with a short piece of 2mm heat shrink tubing and shrink using hot air.



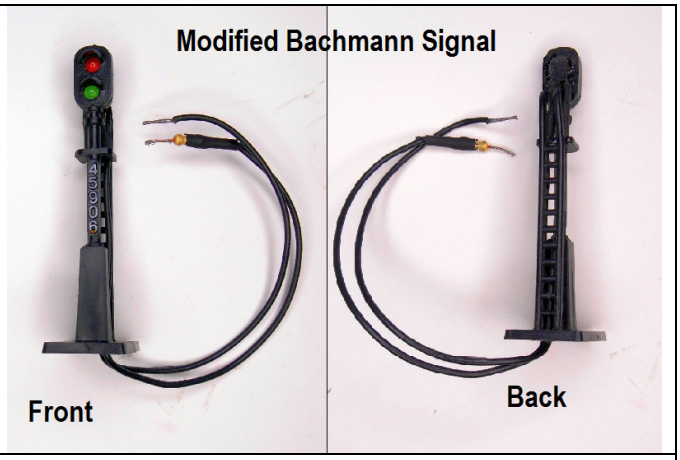
Prep Signal Remove the jewels and ladder from the signal stand. Widen the target openings to 1/8" diameter Widen two ladder holes in the base to 1/16 “.



Drill a hole in the base behind the stand 3/32" in diameter for the wires to exit. Use a pilot drill first. Using a file or snippers widen the groove on the ladder support to accommodate the wires and the ladder.



Insert the LEDs into the target holes. The LEDs can be glued in place with CA glue. Thread the wires down through the hole in the base. Reattach the ladder to the base holes and stem of the signal. Glue is used to secure the ladder in the holes and at the top.



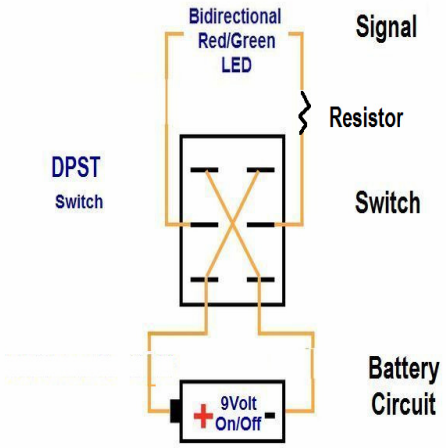
The wires at the back of the LEDs are painted black or covered with black putty. A 680 ohm is added to the one of the wires to limit the current to the LEDs and heat shrink is used to partly cover the body..
See Project 12b for manual operation of the signal or Project 12c for an automated operation .

TESTING: Once the resistor has been attached you can test the signal's LEDs using a 9 volt battery simply by placing the wires on the battery terminals.

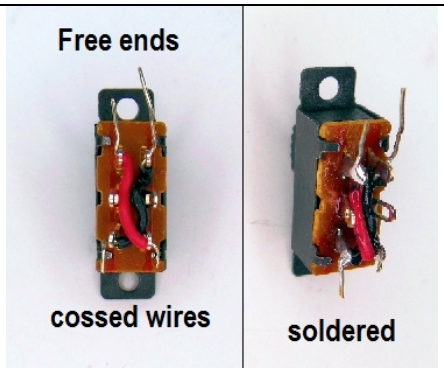
Project 12b Operating the Signal Manually

1. Preparing The Switch and Power Pack

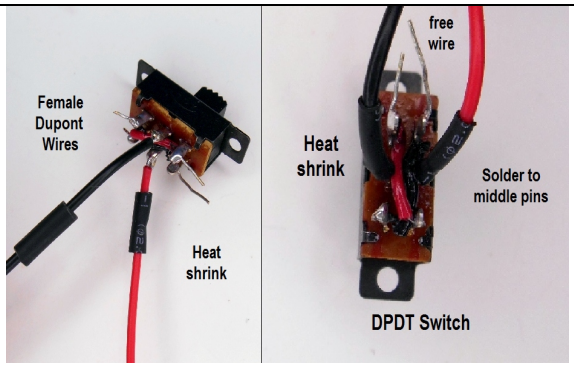
The DPST switch is prepared for attachment to the battery pack. The circuit set up is shown. Two wires are crossed to connect the end pins . One set of end pins are connected to the battery and the middle pins go to the signal.



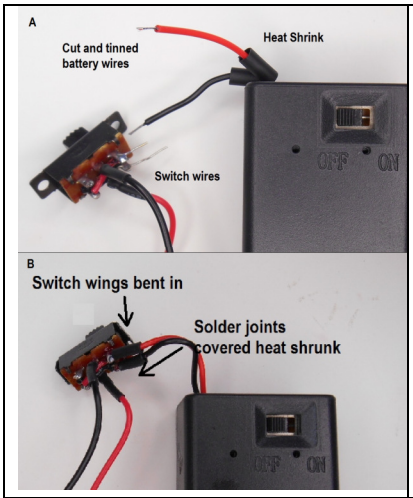
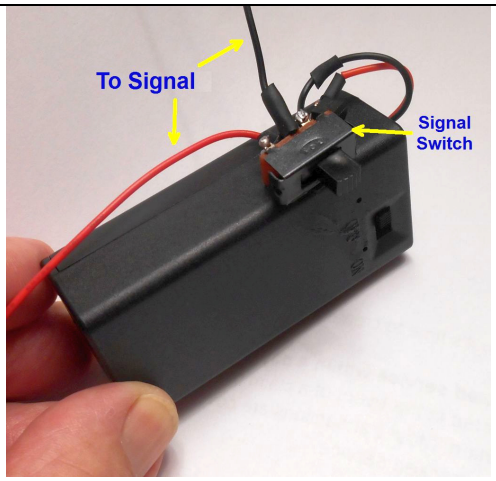
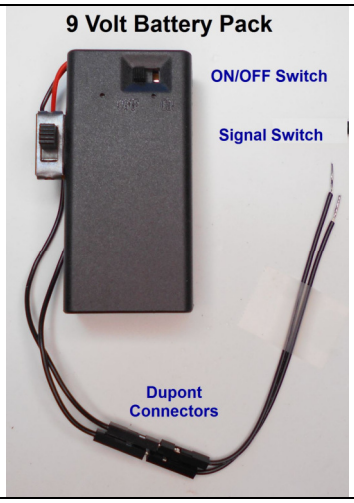
Changing the current flow relies on manually switching the DPST switch. The resistor is placed between the switch and the signal to maintain the low current flow when current direction is changed.
The two Dupont Wires are cut in the middle and the exposed ends are stripped and tinned, Two short pieces (3/4") of solid 26G wire are cut for the cross over wires or can be cut from free end of the female plug. Solid wire is however easier to manipulate.



The switch is prepared by first soldering the two crossover wires to the end pins leaving some bare wire free at one end for connection to the battery. Bending out the middle pins will help seat these crossover wires

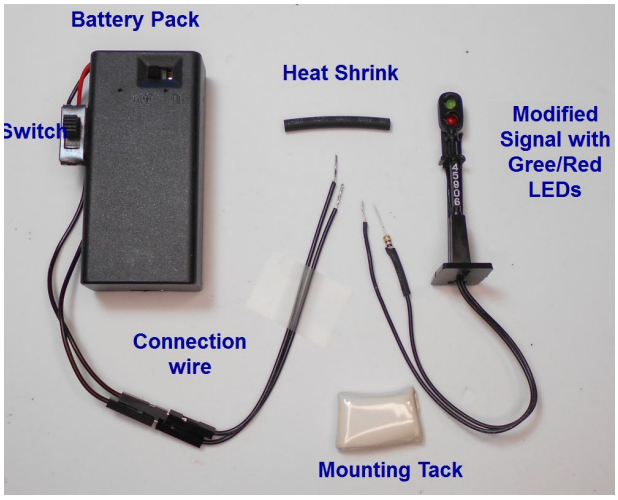


The Female Dupont wires have a short piece of heat shrink applied before soldering to the middle pins. Attach the red wire on the same side as the far red . Note the free exposed wire for connection to the battery wires.

		
A.Cut at 1" , trim and tin the Red and Black wires coming from the battery holder and add heat shrink both wires. B. Solder these to the free ends of the switch with the exposed wire. Bend wings in,	Heat shrink the joints and glue the switch to the body of the battery casing toward the front to avoid interfering with battery access. One could position the switch elsewhere just by extending the battery wiring.	The Dupont connectors are linked up by aligning the open slits. The free end will be connected to wiring going to the signal. The Dupont connections allow for disconnection of the signal from the power source.

Track Installation

The components , Signal, power pack and switch are ready for track installation. If the switch is to be setup remotely two extension wires will be required to be soldered to the battery wires and the signal wires. The selection of the connections is optional based on the switch setting and signal aspect color (green/red) . Be sure to add heat shrink to the connection joints.
The Signal is mounted adjacent to the track and can be mounted on modeling putty or prepared stand.
Install A 9 Volt battery and signal on the track.

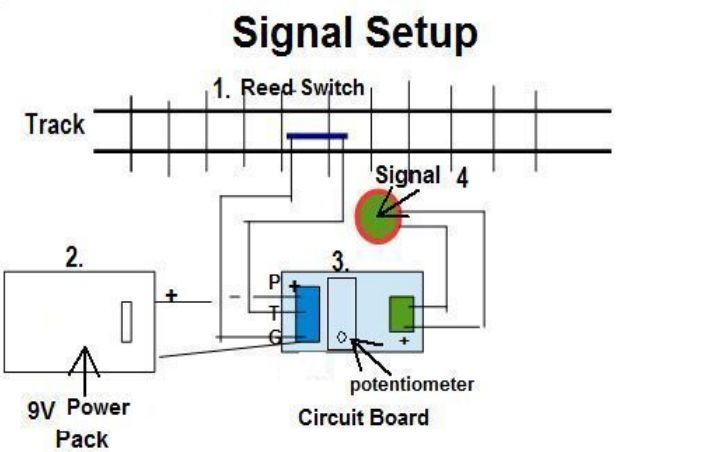


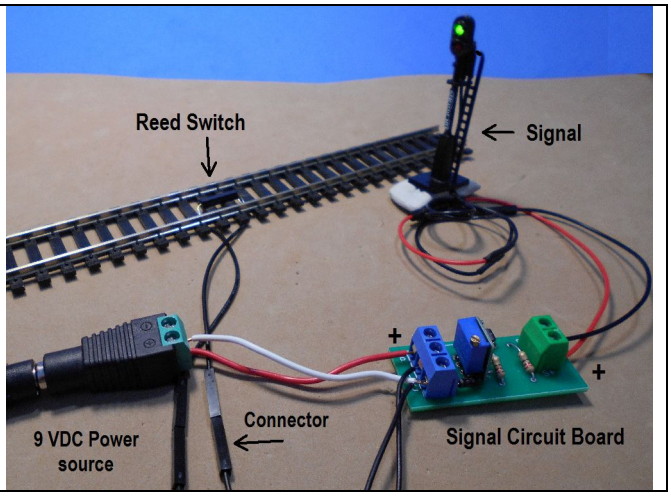
In this example the loco is stopped at the red light. Once the signal is switched to green the loco moves forward at which stage the switch turns is turned back to red

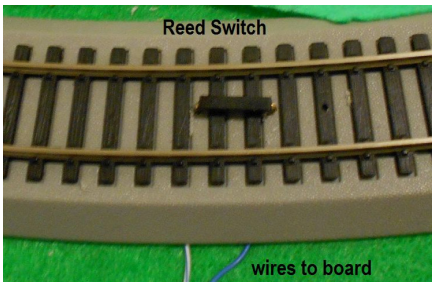
Project 12c

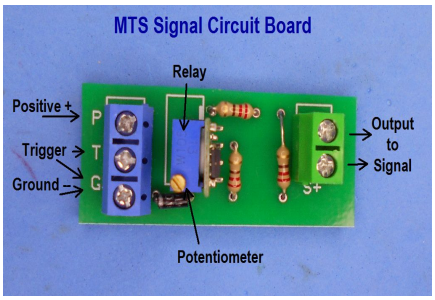
Automatic Operation for the Modified Bachmann Signals

This project involves automating the operation of a modified Bachmann(TM) Block Signal described in Project 12a. This modified signal is changed by a neodymium magnet attached to the undercarriage of the locomotive that activates a reed switch set in the track. The reed switch activates a relay switch on a signal circuit board with an adjustable delay to change the Green LED to Red once the train passes. After the delay the Red light returns to Green. The circuit board works by reversing the polarity of the current going to the LEDs. The Signal set up is shown below.





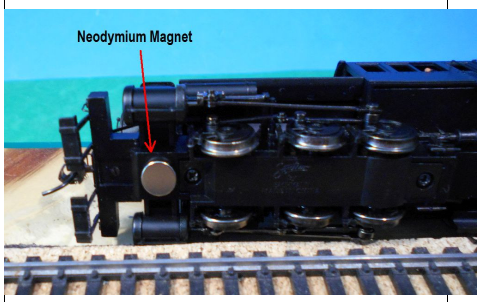
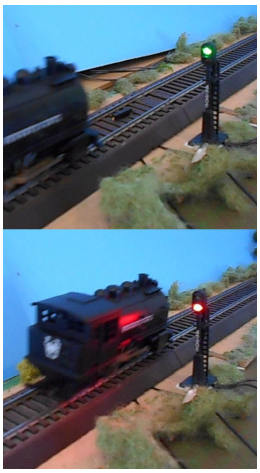




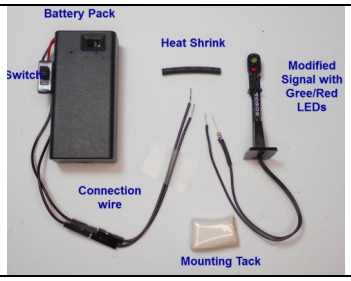
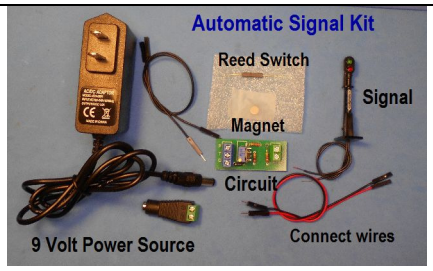
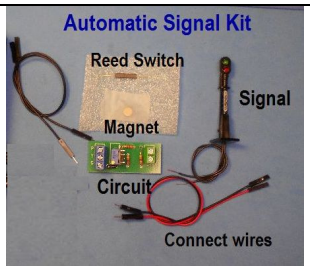
1.The Reed Switch has two wires soldered to the ends. The switch is laid parallel to the track between the rails at a location next to the signal. The wire are inserted between the ties and are attached to the middle and ground ports of the circuit module Blue Plug. The order of attaching the wires is irrelevant.

2. The Power Pack consists of a 9 Volt DC wall power source . The Positive output is attached to the + (P) port of the circuit board and the (negative) wire is also attached to the Ground (G) port on the circuit board. A 9 Volt battery pack can also be used with an alkaline or rechargeable battery. The battery life is about 12 hours of continuous use.

3. The Signal Circuit Board contains the Relay Module, Timer Chip and the circuit that reverses the current flow and sets the time delay for the red LED. The screw on top of the Blue potentiometer sets this delay. Turning the screw clockwise increases the time delay , counter clockwise decreases the delay. Timing can be set between (0-20 seconds)

		
4. The Signal is connected to the green plug on the board via two connecting wires. There is no need for a resistor on the wire as the resistors required are located on the circuit board. The wires are attached to the plug so that the green LED is lit when the signal is in ready mode.	**The Neodymium Magnet** is attached to a metal surface on the underside of the locomotive such as a screw. These magnets are powerful and will hold securely. Glueing is an option if no metal surface is present. The magnet can be changed to other locomotives as needed.	**Operation.** When the locomotive crosses over the reed switch the Green LED goes out and the Red illuminates for a period of time set by adjusting the screw on the potentiometer on the board as previously described.

Kits Available

		
Manual Kit. Assembled Signal with resistor + 9V Battery holder operated with DPST switch. This Kit requires some soldering.	**Automated Kit with Power.** 9VDC Power pack, automated signal circuit board, magnet, reed switch and assembled Signal. Some soldering is required	**Add on Automatic Signal** for multi signal operation using a power distribution board. (see Project 21)

Other Accessories are available at the website (unassembled signal kit, 6mm magnets, Power packs)

Operating Two LED , (Green/Red) HO Bachmann Signals with one Switch.

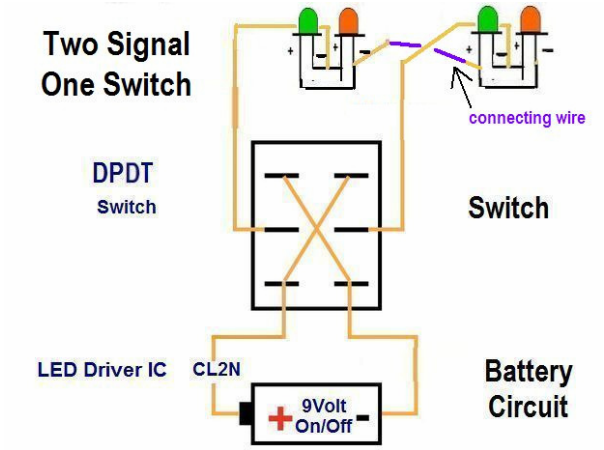
Two signals can be operated simultaneously from the one manual switch. With one switch the 2 signals work simultaneously with two switches the signals are operated separately.

Two Signal One Switch operation.

With two signals connected to one switch the circuit is set up in series with a connection wire female Dupont connector plugs) interconnecting between the two signals.

If the signal LEDs are to be the same the anode (RED) of the second signal connects to the Cathode (BLACK) lead of the first. If the signals are to be opposite (ie one RED and the other GREEN) , the cathode wire connects to Cathode lead of the first.

The resistance of the two signals creates a voltage



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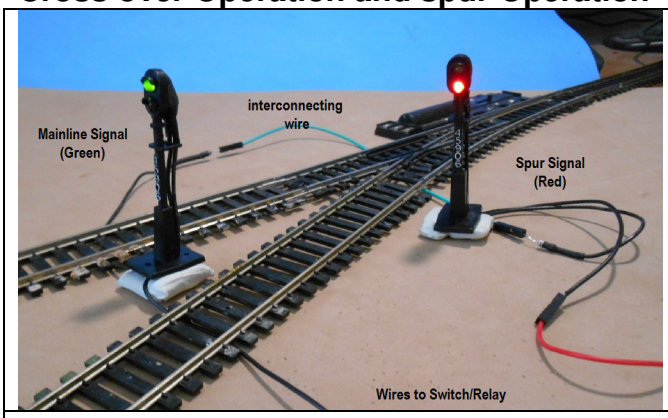
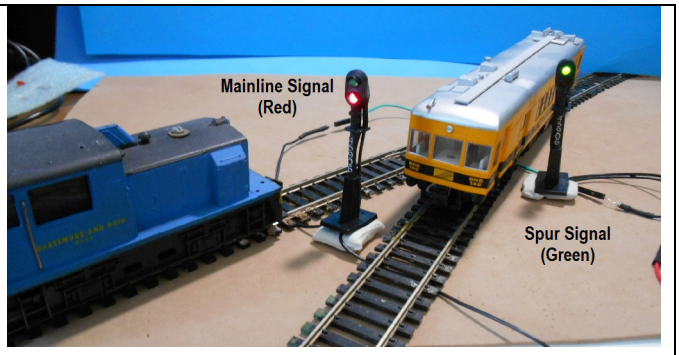
Example

Cross over Operation and spur Operation



Set up for operating 2 Signals on a spur or cross over, The mainline signal is set to green The green wire connects to the spur signal set to red . This system will work for both the manual and automatic version.



Here the Trolley the spur signal has been changed from red to green thus turning the mainline signal red to stop the oncoming diesel. After the time delay the spur signal goes red and the mainline turns green.