

Lionel G- Fastrack Wire a Bi-Polar Indicator light and Mini Switch - with Fastrack - DOC

Lionel FasTrack Remote Switch wiring

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Have you ever wondered how to add a state indicator light (a Bi Color LED light indicating the current position of the switch rail on a switch track) to a control panel for use with a Lionel FasTrack Remote Switch (Turnout)? Well we have; while planning a new layout using FasTrack it was decided that a control panel with Bi Color LED, indicating the state of the Lionel Remote Switches was needed.

We searched books, articles, and the Internet for detailed information on how FasTrack Remote Switches worked. A lot of information on how to use FasTrack Remote Switches was available, and a small discussion of FasTrack Remote Switches and how they worked was found on OGR Forum (Miniature FasTrack Switch Controller). Using the information collected and experimenting with a new FasTrack O-48 Remote Switch, we developed and tested the following method for creating both a switch state indicator light for the control panel and the miniature controller system for FasTrack Remote Switches.

Information on FasTrack Remote Switches

The FasTrack Remote Switch uses a cable with four wires to connect the track section and the switch controller. Each wire performs a specific function to control the switch state (THRU or OUT) and the color of the light shown on the Lionel-produced Switch Controller. The table below shows the color of each wire used by Lionel and its function.

4 Colored wires

Wire Color	Function	Additional Info	Notes
Black	Ground		
Red	Turn	(OUT)	
Green	Straight	(THRU)	
Yellow	Controls the color of the light on the Lionel-provided controller	+5 VDC (Green) -5 VDC (Red)	The voltage is changed by the switch as the turnout position is changed.

Table 1

We decided not to disassemble the Lionel FasTrack Remote Switch Controller, but from the Internet and some quick testing, we determined that it contained some unknown electrical components and a Single Pole Double Throw (SPDT) momentary, center off switch that controls the turnout position. The Lionel controller uses three wires from the cable connection from the track section to change the state of the switch. From the labeling on the back of the track it appears that the three wires are used to complete a ground circuit. The wire plugged into the connector labeled GND (normally black) connects to the SPDT center pole and acts to complete the ground for the other two wires attached to the SPDT outer poles. The other wires plug into the connector labeled THRU and OUT (normally Green and Red in color, respectively) are connected to the two throws on the SPDT and are the other legs of the circuit

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controlling the switch's state. When the toggle of the SPDT is flipped to complete a ground with the red wire on the FasTrack Remote Switch, the route is changed to the OUT position. Toggle the SPDT to complete a ground with the green wire on the FasTrack Remote Switch and the route is changed to the THRU position.

The final wire in the cable is used to control the color of the light displayed by the Lionel FasTrack Remote Switch Controller. This wire is plugged into the connector labeled "RSC Light". This wire has either +5 VDC or -5 VDC charge. When the Remote Switch Controller is activated, the voltage on this wire is reversed causing the Remote Switch Controller color to change.

Operating power for the FasTrack Remote Switch comes from either the track or from a fixed voltage auxiliary power connection. This power along with the completed ground allows the motor in the FasTrack Remote Switch to function.

FasTrack Remote Switch Connection Picture

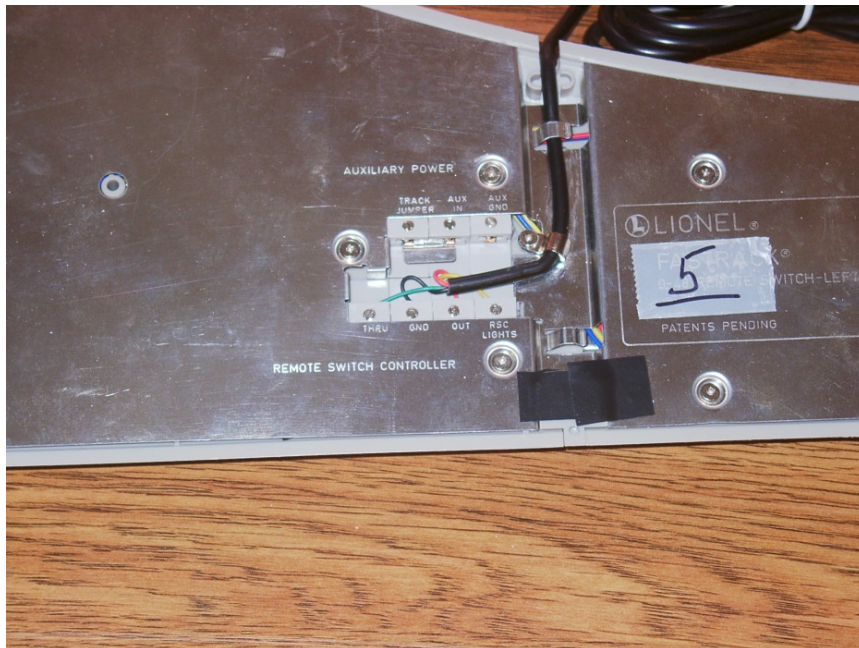


Photo 1

Note: the number 5 on the switch pictured above is simply a notation for the user's switch number.
Note: the black tape is only holding in the block for wire to come through on that side of turnout.

How to create a switch state indicator light and Miniature Switch Controller to a control panel.

The following hardware is required for each switch.

Number Required	Description	Notes
1	Bi-color 2 leg voltage-controlled LED	Any two leg, Bi-color LED should work.

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		How the leg is connected may change the color of the light given off by the LED.
1	Single Pole Double Throw momentary center off switch	
1	470 ohm resistor	The resistor may change with the type of Bi-color LED that is used. See the data sheet with the LED.
	A cable with four color wires of 22 GA	The length you need depends on the distance from the FasTrack Remote Switch to the control panel. For ease of installation, we suggest that you use a cable with Red, Green, Black, and yellow wires.

Table 2

How to create and attach a miniature switch controller

1. Run a length of cable, consisting of four wires, between the FasTrack Remote Switch and the control panel.
2. Insert a wire into the connector label OUT, GND, and THRU as seen in Photo 1 above. Only three of the four wires are required for the miniature switch controller. If your cable has colored wires, it is suggested that you match the color that Lionel used.
3. Connect the wire plugged into the GND connector (the black wire/ground) to the pole of the SPDT switch. Soldering the wires is suggested.
4. Connect the other two wires to either of the SPDT's throws. The position of these two wires depends on how you mount the switch and what direction you want to toggle for THRU or OUT. Soldering the wires is suggested.
5. Mount the miniature controller as required on your layout's control panel.
6. Mount the LED on your control panel as required for your layout.

Miniature Controller picture

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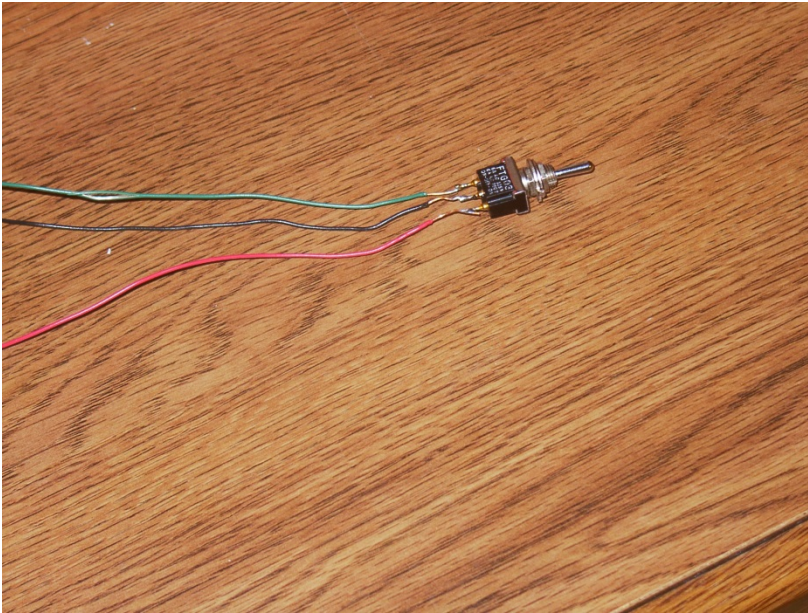


Photo 2

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How to create and attach a switch state indicator light

1. Select an appropriate Bi-color 2-leg voltage-controlled LED.
2. Use the LED's Datasheet and then you can use the Formula 1 below to calculate the correct resistor for the circuit.
3. Connect the resistor to the anode leg of the LED. Soldering the resistor to the wire is suggested.
(Soldering all connections and heat shrinking the connections is recommended.)
4. Mount the switch state indicator light to your control panel.
5. Connect one of the wires from the bi-polar LED to the "RSC Lights" connector with the resistor attached. Soldering the connection to the resistor is suggested. This should be the yellow wire location and it needs to go all the way from the control panel to the turnout RSC connector.
6. Connect the other leg of the Bi-color 2-leg voltage-controlled LED to the layout ground. Soldering the connection to the LED is suggested. This can be attached to the closest common ground for your layout on the control panel.
7. Testing the light with the switch throw. If the color is incorrect, simply reverse the LED connection wires.

Note: voltage-controlled Bi-color two-Leg LED should work as a color indicator for the switch position on the control panel.

Miniature switch state indicator light picture

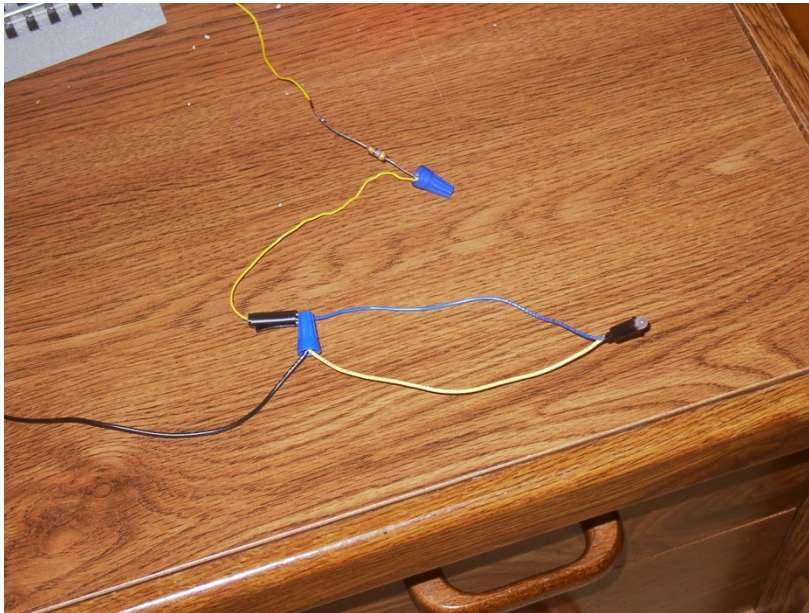


Photo 3

Lionel FasTrack O-48 Remote Switch with the state indicator light and miniature switch controller

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Switch set OUT – notice the red color on LED and Lionel Remote Switch Controller



Photo 4

Switch set THRU – notice the green color on LED and Lionel Remote Switch Controller

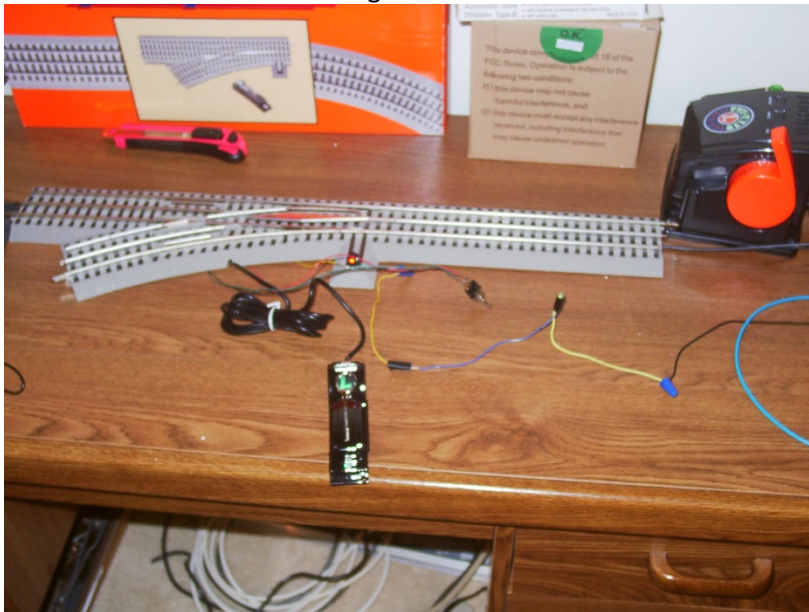


Photo 5

FasTrack Remote Switch Connection Picture with the Lionel Remote Switch Controller, the miniature controller and state indicator light installed

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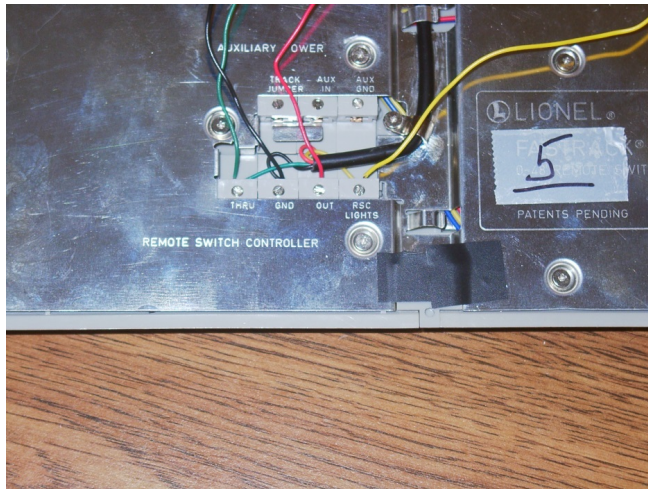


Photo 6

In the picture above, please notice two sets of wires plugged into the FasTrack Switch's connectors.

Formula 1: LED Resistor Calculation.

To ensure the longest possible life for your Bi-color LED, perform the following calculation to pick your resistor.

$$R = (V_s - V_L) / I$$

R – resistor value in ohms

V_s – supply voltage (voltage from switch)

V_L – LED voltage (best voltage for LED)

I – LED current in amps (must be less than the maximum current supported by the LED)

V_L and the maximum current for the LED can be found in the LED's datasheet.

Notes:

1. Disconnecting of the Lionel-supplied controller is not required to use the miniature controller. We have mounted the supplied controller under the layout in an easily reached position. This allows for switching if not near the control panel or if not using TMCC when available.
2. The miniature controller and state indicator light will work with the Electric Railroad Company TMCC FasTrack Remote Switch Controller up-grade (Switch Commander).
3. Simulated Control Panel showing turnout straight and the light is green to indicate straight track operation.