Install a Point to Point Auto Reversing Relay Module (all scales-DC only)

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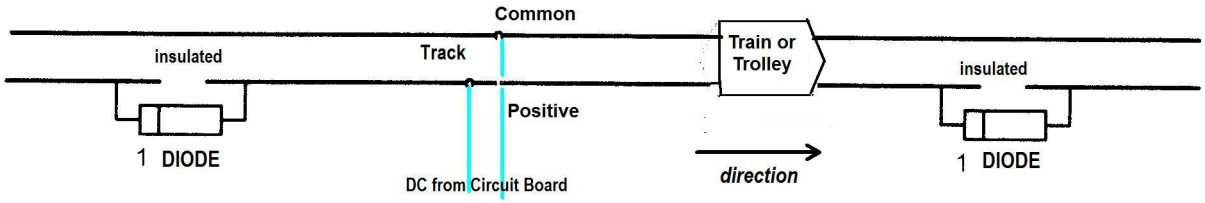
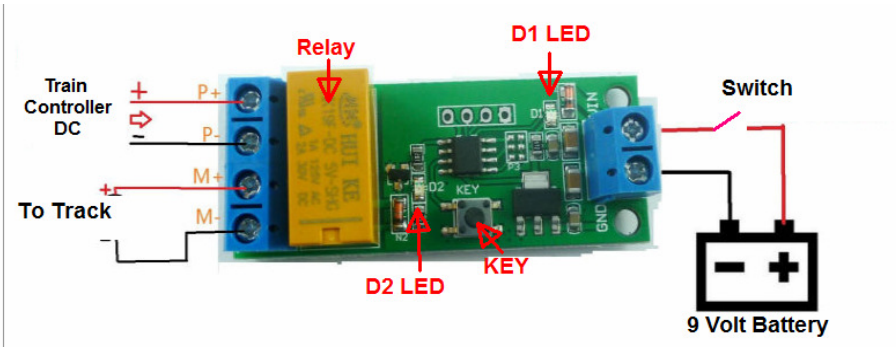
This automated system allows a train, tram or trolley to go from one point to another, stop , pause for a short period and return to the start again. Plus repeat the process over and over without intervention The system uses a relay board and 2 diodes set at both ends of the track connecting across an insulated rail joiner to direct current flow in alternating directions. The system works with N, HO, S and O scales operating in DC mode. It will not work in DCC mode. Larger scales (S,O and G) do require higher rated diodes to work safely in DC mode.



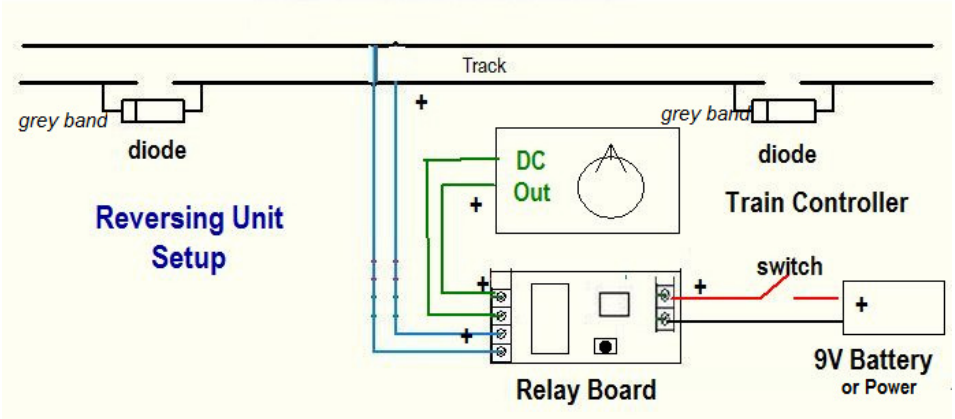
When the train proceeds to one end (Travel time) and crosses the insulated end it stops. After a stop (PauseTime) which can be set from a few seconds to several minutes the relay activates to reverse the polarity, the train or trolley returns to the point of origin and the sequence repeats.
This Reversing Relay Board module is used to control this reversing process automatically.



The unit uses **9V Battery** or **9 Volt DC power source**, preferably with a **switch** to turn the unit on and off. The battery leads are connected to the 2 Blue connector plugs labeled VIN and GND.
The positive red wire to the VIN and black negative to the GND connector. The Train Transformer variable DC output wires connect to the terminals **(P+ and P-).**Wires from connectors **M+ and M-** are attached to the terminals on the Track. The Relay unit uses a DPDT (double pole double throw) circuit to activate the reversing of the polarity to the track. Two indicator **LEDs D1 and D2** are present on the board .The **D2 LED** will light OFF and ON during the Relay cycling times. The **OFF time** will be set to the Travel time plus the Pause time in the forward direction and the **ON time** will represent the Travel time and Stop time in the reverse direction. The **KEY** push switch is used to set the relay's ON and OFF times. Setting these times are outlined in Step 4 below.

How to set-up the Back and Forth Relay unit.

The track wiring and Relay Board set up is illustrated below.



1. First, **set out the track design** that you wish to use. Set the power to the track terminals in the middle of the layout. Make sure the locomotive moves forward when the controller is in forward mode with the + rail on the right. (if it does not the diodes will need to be reversed) Run your locomotive, train or trolley at the desired speed from one end to the other to determine the Travel time. Decide how long the train will Pause. Add these times together to determine the **OFF time** and **ON times** and for the relay. These times will be used to program the Relay board.

2. Next determine how long the train or trolley is in length as this will determine where to insulate the track at both ends. The locomotive will stop when it passes over the insulated point.
Install rail insulator rail joiners at these 2 points or cut gaps in the track.

3. Solder the two diodes across on the outer sides around the insulated track points. The grey band on the diode indicates the cathode side. ***Both diodes must face in the same direction as shown in the diagram above based on current flow***.

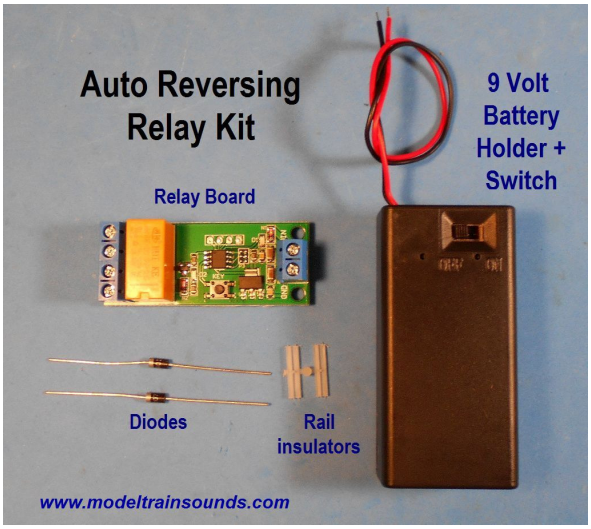
4. **Program the Relay Board (*This is can be done before connecting the board to the track*)**
The Relay Board has 2 modes of operation, "**Working mode**" and "**Setup mode**". When power is switched on **LED D1** will blink as the board enters the "**Working mode**" with the **LED D2** going ON and OFF as the Relay cycles.

Setup mode is used to program the time of each ON and OFF cycle.
To enter **Setup mode** press and hold the **KEY** switch for 2 seconds. **D1** will light. If **D2** is off you will be programming the **OFF time** which is the calculated forward travel time plus the pause time in seconds. Press and release the **KEY** twice, **D1** will go out. Press **KEY** again and **D1** will start blinking. Allow the blinking for as long as the **OFF time** calculated. (eg 15 seconds) . Now press the **KEY** again to stop the blinking which will record the **OFF time** onto the chip. **D1** will remain on for up to 10 seconds . During this time you can press and hold the **KEY** for 2 seconds to program the **On Time** or simply re-power the board. In **Setup mode**, if you do not press the **KEY** within 10 seconds the board will reset to the **Working mode.**
To program the **ON time** alone, press and hold the **KEY** switch for 2 seconds, **D1** will light and **D2** will go out, Press and hold the **KEY** again for 2 seconds and **D2** will light so both are on. With both lit press the **KEY** twice and **D1** will go off . Press the **KEY** again and **D1** will again blink. **D2** will remain lit. Allow **D1** to blink for the length of time for the reverse travel plus the pause time in seconds. Press the **KEY** to stop and record the **ON time**. Again wait 10 seconds for the board to reset or simply re-power the board to enter the **working mode** which should now cycle with the new relay times.

5. De-power the board and now connect the track wires to the M+ and M- terminal connection plugs.

6. Connect the two wires from the variable DC side of the controller transformer to the P+ and P- connection plugs.

7. The system is ready to test. Power the Board on and place the test engine on the track near the middle. Turn on the controller to move the locomotive to the desired speed. When it crosses the insulated connection it will stop, pause and reverse the motion. After this step it should operate to the correct **ON and OFF times**.



8. If necessary reprogram the Board using the **KEY** to get the desired travel and pause times you want.

To try this Project, a Kit containing the Reversing Relay Board Module, a 9V Battery Holder with switch, 2 diodes and insulators for HO scale can be purchased at the website ***www.modeltrainsounds.com*** along with accessories.

A video and in color with installation instructions can be found at this website. Project # 16
If using S,O or G scale request diodes rated for 2 amps. The motor must run in DC mode, not AC.

Summary of Programming The Auto-Reverse Relay Board.

Connect up the battery power to the board only.

1) Turn Switch ON (D1 blinks) Board enters the working mode.

2) With D2 OFF, Press & Hold till D1 comes ON Board is in SETUP mode

3) Press KEY twice (D1 goes out - D2 is already out)

4) Press KEY again (D1 blinks rapidly, let it blink for time desired)

5) Press KEY to stop (OFF time is programmed)

6) Press and Hold KEY again till both D1 & D2 light.

7) Press KEY twice (D1 goes out but D2 stays on)

8) Press KEY (D1 blinks rapidly, Let it Blink for ON time desired)

9) Press KEY to STOP. (ON time is programmed)

10) TURN Switch OFF then ON (D1 blinks). D2 now cycles OFF then ON to the new programmed times in working mode