Model Rail Layout Power System

Most layouts require two forms of DC 12v. The first is a variable 12v supply to control the speed of the train, the second is a fixed 12v supply to power all ancillary equipments such as points, signals, etc.

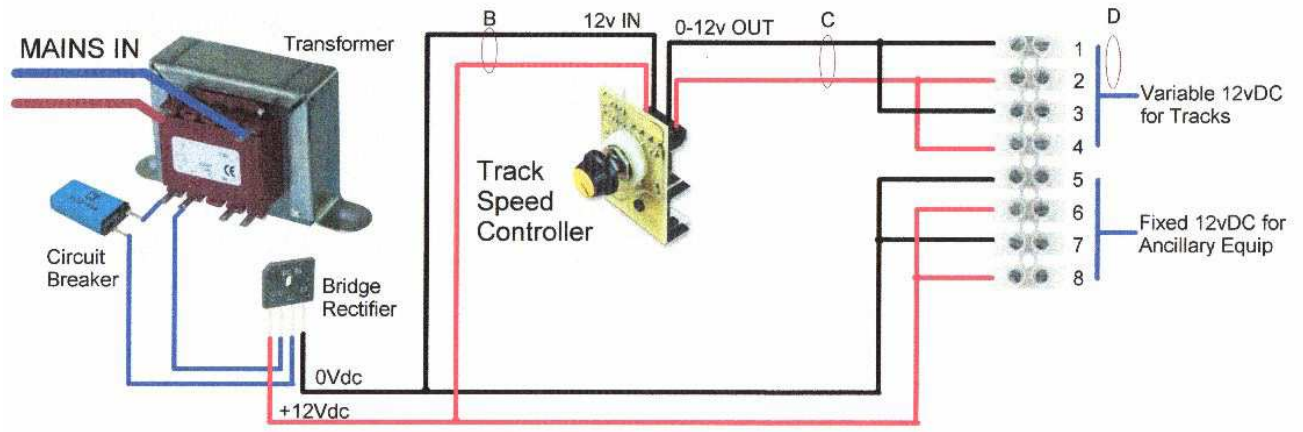
Electrical power is a function of voltage and current (literally: Power in Watts is equal to the current in Amps multiplied by the voltage in Volts, or P=IV). Power for model trains and accessories is typically measured in thousandths of an Amp, or milliAmps (mA) Note: one milliAmp of current at 12 volts provides 12 milliWatts of electrical.
What really matters in a model train is the torque produced by the motor (which varies with current) and the power to move a train ("power in rotational motion", which is at it's maximum at about half the full unloaded speed). Torque is used to overcome friction, and is particularly important when starting a stopped train

CIRCUIT 1

The average layout will require between 2 & 4 Amps to run the locomotives and all the accessories.

The circuit below shows a typical Power Supply circuit where the Track Speed Controller does not have a Transformer included.
The transformer would be a 12 volt AC output at 4 Amp, The Circuit Breaker should be rated initially at 3.0 Amp to protect your circuits and equipment from short circuits. The Rectifier converts AC to DC and must be capable of carrying at least what the transformer is delivering 4 amp or above.

The speed controller can be any transformer-less unit from any proprietary manufacturer, or our own unit which is included in the parts list below.



Part List

Transformer	TX258
Circuit Breaker	TS306
Bridge Rectifier	DD350
Speed Controller	EM160
Terminal Block 12 way	CN172

Note: A) All wiring should be no less than 16/0.2 Equipment Wire.
Note: B) The DC power supply above is unregulated and not stabilised and will work fine for most Railway systems, and will run ancillary equipment fine. It however is not recommended for use on sophisticated electronic circuits. The following circuit will do this job.

CIRCUIT 2

The following circuit is primarily the same as the above except for the Transformer and rectifier, these have been replaced with an off the shelf Power Supply Unit. The rest of the circuit is the same as above.

The power supply unit is available in 3 Amp or 5 Amp, has it's own built in Circuit Breaker, and Bridge Rectifier. It also has a electronic circuit which stabilises the output power at 12 volts DC no matter how much current is drawn up to the maximum of either 3 or 5 amp, where it will switch OFF until it cools down or some of the current draw has been removed.

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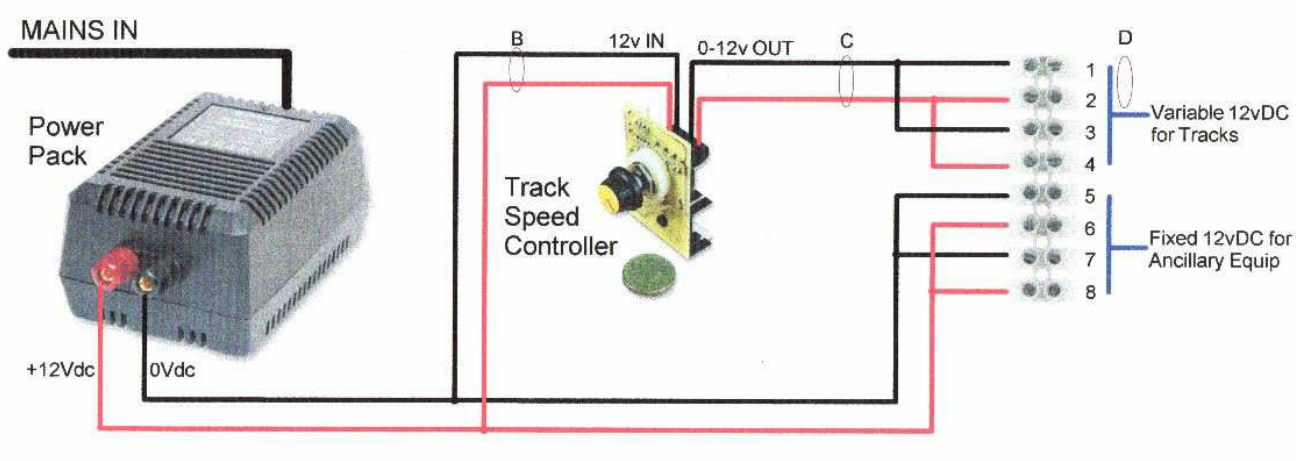
Note: A) All wiring should be no less than 16/0.2 Equipment Wire.



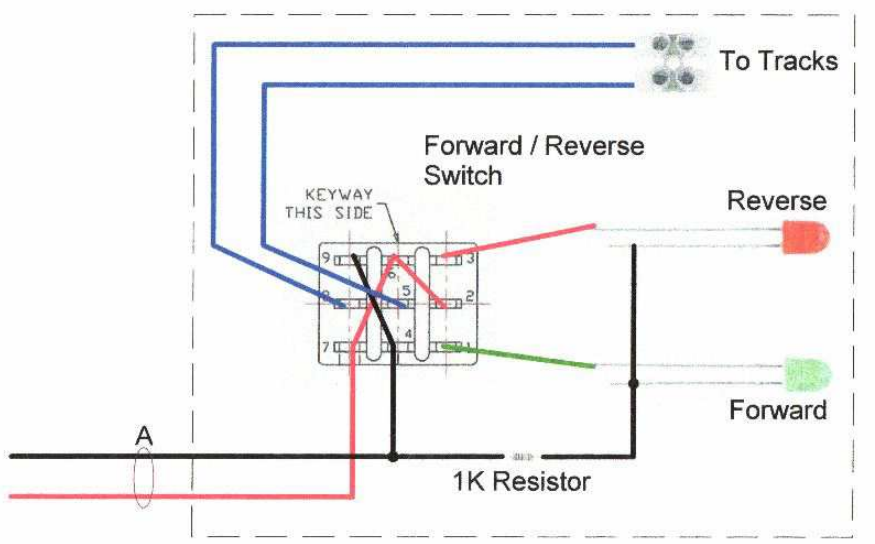
Parts List.

Regulated Power Supply	PW101 (3 Amp)	PW102 (5 Amp)
Track Speed Controller	EM160	
Terminal Block	CN173	

FORWARD REVERSE SWITCH

A forward/Reverse switch can be added to your layout by incorporating the following circuit. The Switch can be added in a number of places shown on the above circuits as 'A', 'B', or 'C'

Please Note: this switch should only be used when the Locomotive has been stopped, as it will instantly change the polarity of the tracks putting the locomotive in Reverse at any speed.



This circuit uses a 3 pole changeover switch. The Positive and Negative (RED & BLACK) are connected to the switch as shown (where they cross each other on the back of the switch ensure they are insulated, as they will create a dead short if they touch each other). The LED indicators are connected as shown with the 1K resistor on the Negative line. If using 12v Filament bulbs the resistor is not required.

The output to the track is shown in Blue as the polarity is now 'either or' depending on the position of the switch. The numbers on this drawing represent the numbers on the back of the switch.

Note: A) All wiring should be no less than 16/0.2 Equipment Wire, except to the LED's which is fine in 7/0.2 or 1/0.6 Equipment Wire.

Parts List.

Miniature Toggle Switch	SW315
Red LED	SL100
Green LED	SL102
1K Resistor	RE137