4 BASIC MODEL RAILROADING

POWERING and WIRING THE LAYOUT

Powering the layout

Since WWII, most model railways in the smaller scales have operated with power packs converting mains voltage to 12 volt direct current (DC). The hobby is now migrating to Digital Command Control (DCC), which simplifies wiring, provides for the simultaneous operation of multiple locomotives without the hindrance of electrical “blocks” or sections that have to be individually activated or deadened, and comes with fantastic on-board sound and lighting. The initial investment, however, is rather more than for a DC power pack set-up. Research is advised, and there are good "how-to" books on methods of control and wiring. However, whatever the choice, quality equipment with power and features to spare is a good investment.

The fundamental difference between DCC and the traditional DC method of control is that this is achieved not by the provision of electrical power to the wheels or third rail/overhead pick-up of the locomotive, but rather by means of a digital command to an electronic decoder unit placed in the locomotive itself.

For those modellers wanting to move to DCC, it will make a decision necessary whether to rewire your layout and either to install decoders in the older locomotives, or to retire them. For anyone new to the hobby, it's very definitely the "state-of-the-art" form of control. The major benefits of DCC (with somewhat simplified wiring as the traditional “block” and “cab control” wiring is no longer required), are the achievable very realistic scale speeds, and the ability to run more than one locomotive independently on the same-powered track.

Wiring principles

Whatever system is used, model railroading operates with a basic electrical circuit consisting of a positive and a negative lead (polarity). Wherever either lead is broken, the resulting open circuit causes the locomotive to stop, or the motor to quit, or the light to go out. Where the two leads or polarities touch, a short circuit will result. A short circuit generates heat and will cause a motor or coil to burn out, or plastic to melt – and in extreme circumstances, a fire. Most power packs have built-in protection with a thermal cut-out that will shut the power off automatically. Nevertheless, a short circuit should be disabled as soon as it is discovered, if necessary by shutting off all power, and then tracing it circuit by circuit to locate it. No matter which system of control you have decided on, the layout still has to be wired to avoid potential short circuits arising from turntables and reverse loops (where a track doubles back on itself), and the design properties of turnouts and slips, where the electrical polarity of the “frog” (where the two inside rails come together) may change as the turnout is “thrown”. Do not wire the whole layout and then turn it on. Chances are that there is a short circuit somewhere, and you will have no idea where it is. Wire one section at a time and re-test your layout after the installation of every turnout, slip and crossing. If the locomotive no longer moves, chances are it’s a short circuit, and you will know that there’s a problem with what you just did.

The details of wiring and soldering techniques are beyond the scope of this leaflet and current “how to” books on wiring should be consulted.

Wiring for DC (Conventional control)

The distinctive feature of traditional wiring is the provision of electrical “blocks” or sections that have to be individually activated or deadened. The reason for this is that one DC power pack throttle can only control one locomotive unit independently of any others. So a layout with say 5 locomotives requires a minimum of 6 isolatable sections, so that only one locomotive unit is in motion at any given time under the command of that throttle. This requirement calls for the detailed planning of the location and extent of the required electrical “blocks”, so that the layout and available locomotives can become interchangeably operable.

Wiring for DCC (Digital Command Control)

As noted, the major advantage of this system is the ability to operate numerous locomotives independently over the same electrically-fed section without “blocks”. It is however a misleading oversimplification to state that “all that is now required is two wires to the track”. The only simplification resulting from the DCC method is the elimination of these “blocks” or individual electrical sections. The layout still has to be wired to avoid potential short circuits as noted under “Wiring Principles” above. While DCC systems usually provide for the operation of one locomotive on the DC system, if you have a need to operate locomotives on both systems, to avoid inadvertent damage to control units or locomotives, it may be advantageous to plan for entirely separate operating circuits to accommodate both systems of control, especially in the smaller scales.