# Glossary D

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## D Type Connector

A D type connector gets its name from the D shape of the surround to the pins and socket. The most common types contain either 9 or 25 pins. It is common for some of the pins to be missing from the connector or to have pins that are not connected to the attached cable. These connectors are said to have genders which relates to a pin being a male connection and a socket being the female connection. To be clear, the male connector has a D shaped metal surround with two or more pins sticking up in the open part of the connector. You will typically see D type connectors on PCs used for serial communications ports and parallel printer ports.

## DC

Direct Current. DC is the unidirectional flow of electric charge/current. Direct current is produced by sources such as batteries, rectified power supplies, or a dynamo on your bicycle. DC current is the opposite of AC current which reverses polarity (direction of current flow) at low rates such as 50hz or 60hz, depending on what country is supplying the AC mains voltage. Typical DC voltage values related to model train layouts are as follows:

- 0V to 12V track voltage for DC powered locomotives
- 5V, 12V or 15V for Printed Circuit Boards (PCB), usually with regulators for lower voltages
- 5V for servos or logic circuits such as those used by Cbus
- 3.3V for some newer logic circuits and newer microprocessors
- 2-3V (Light-Emitting Diode (LED) illumination).

More information about DC: Wikipedia - DC

## DC Control

The traditional method of controlling and powering model locomotives is by gradually varying the (“analogue”) voltage supplied to the track, usually from a 12v DC (“Direct Current”) supply, with the motor in the locomotive simply connected to the track via the wheels. This method has become known as DC or Analogue Control to distinguish it from Digital Command Control (DCC).
To have more than one working locomotive on a layout usually requires some form of track sectioning which provides, as a by-product, a means of locating trains, help finding track and wiring faults and some interlocking against collisions.
State-of-the-art digital electronic and IT techniques are applicable in DC Control too.
Some reasons you might use DC/analogue control rather than DCC, especially for a small, personal layout:

- You already have a DC/analogue controlled layout and/or a lot of non-DCC locos.

- You enjoy/understand electronics and
  - don't want to pay someone else to provide circuitry
  - want to avoid the complexity of fault-finding in DCC.
  - are attracted by the challenge of making a model railway perform well.
- The DCC learning curve looks daunting.
- The potential lack of freedom with DCC. There will be a procedure prescribed for most things that you want to do.
- The potential extra cost of DCC hardware, software and support.
- A desire to use a switching method for DC control such as RLSC or Super Bloc.
- A desire to use a DC bases automatic system e.g. shuttle.

# DCC

Digital Command Control. DCC systems allow you to simulate prototypical train operation on your model railroad. With DCC you can operate multiple locomotives independently at the same time on the same section of track without a computer and without blocking or other complex wiring schemes. DCC systems use digital data packets to communicate commands to decoders that control locomotives and turnouts on the railroad.
What will it do for me and my railroad?
Simply put, DCC will let you “run your trains, not your track.” DCC gives you the freedom to bring your railroad to life! With DCC you have truly prototypical operation at your fingertips.
Why use a digital system rather than an analogue system?
Because digital technology gives extremely reliable operation and the technology is almost infinitely extendible without causing backward compatibility problems (analogue systems are inherently more restrictive). Also, digital systems make wiring simple and easy to install. Because a digital system encodes information sent from the command station to the decoder as numbers grouped into packets, new types of packets can be added to a digital system to send more information thus extending the existing system without causing backward compatibility problems.

# Debounce

Most mechanical switches and relays have springy contacts that can bounce when thrown. This will deliver multiple pulses to the electronics and play havoc when a circuit or software only wants to see one pulse or step in the signal. The classic cure is to add a delay of several 10s of milliseconds after the first step so repeats can be ignored. The delay length can vary according to known switch parameters. Nowadays that is most easily done in the software and is typically called Debounce delay. For hard-wired logic in CMOS, TTL etc, with no software, the usual method of trapping bounces is to add a bistable latch between the switch and main input.

# DecoderPro

A better tool for programming decoders. DecoderPro simplifies the job of configuring complicated DCC decoders by providing screens on which you can select the various options and values you want. Modern DCC decoders are complicated beasts to program. The simple idea of “put the address in CV01” doesn't cope well when you program complicated functions using combinations of bit patterns. A friendlier interface is needed. There are programs that provide better ways of programming specific

decoders. Unfortunately, they are limited to specific types of computers, and only their authors can customize them for new types of decoders. The DecoderPro symbolic programmer is meant to improve this. It is configured using text files, so that it can be adapted to additional decoder types easily. It talks to the decoders using the JMRI programming interface, so that it can run on any computer and layout hardware that JMRI has been ported to. It's freely available for download. And since the code is available via open source, if you want to improve on it you can.
http://jmri.sourceforge.net/help/en/html/apps/DecoderPro/index.shtml

## Decoupling Capacitor

Decoupling capacitors are used to prevent transfer of high-frequency noise between electrical nodes. The most common use of decoupling capacitors is on power supply rails where they prevent voltage drop when transient voltage spikes/current spikes are experienced. These capacitors can be viewed as small localized energy reservoirs. Decoupling capacitors are generally connected as close as possible to the power and ground pins of the IC they are protecting to provide the most benefit.

## Digital

The word digital is most commonly used in computing and electronics, especially where real-world information is converted to binary numeric form as in digital audio and digital photography. Such data-carrying signals carry either one of two electronic or optical pulses, logic 1 (pulse present) or 0 (pulse absent). The term is often meant by the prefix “e-”, as in e-mail and ebook, even though not all electronics systems are digital. The opposite of digital is analogue where information is typically represented by varying voltages.

## Digitrax

Digitrax is a supplier of DCC systems located in Norcross, Georgia (just outside Atlanta). They supply a full range of command stations, decoders and accessories.
For their website see Digitrax

## DIL Socket

Dual In Line sockets. A DIL socket is usually two rows of pins surrounded by plastic to be soldered to a printed circuit board to receive the pins of an IC. DIL sockets are used when you want to be able to easily remove an IC from a PCB without having to desolder it from the board.
Wikipedia - DIL

## Diode

A Diode is an electronic component that allows the passage of current in only one (their forward) direction. They will block current in their reverse direction. Diodes are rated for different maximum

voltages and currents. Diodes can be put in parallel to increase the amount of current that can pass through the combination. A characteristic of diodes to keep in mind is that when they have a current passing through them in their forward direction, they will have a voltage drop of typically 0.6V (for a silicon diode).
Main article

## Dirty PSU

“Dirty” PSU is BBC Engineer speak for a good, regulated and clean power supply that has a dirty job to do… supplying relays, servos, etc. that often produce voltage spikes on the supply line. These spikes are sometimes called EMI, noise or dirt.

If the feed wires from the power supply unit (PSU) to the load are of sufficient length to have a bit of impedance and supply several loads, then the electrical noise (dirt) caused by one load can cross to other loads. This would usually be positive & negative sharp spikes superimposed on the DC. If the power lines that feed clean and dirty loads exhibit noise, then the effects can also cause microprocessor “brown-outs” or resets which may force a re-boot or even more subtle disturbances to your previously happy data.

The separation of the digital low current circuitry with a separate “clean” PSU is one of the classic precautions to be observed ( as you and we all are frequently reminded on the MERG forum! ). While this may be the best method to provide clean power, it is a good design practice to provide bypass capacitors next to your digital ICs to help diminish the effect of power line noise. See Decoupling Capacitor

## DPDT

Double Pole Double Throw (DPDT) switch. A switch which connects or disconnects two inputs to two sets of outputs. It is common to use a DPDT switch with cross connected pins to easily change polarity of a voltage just by flipping a switch. This is common for DC track layouts to cause the locomotive to change direction, or as a way to reverse a solenoid/switch motor to change the points on a track.

## DPR

DPR Double Pole Relay module from the RPC range.
In spite of all the advances in electronic components over the past few years, there is still no realistic alternative to the electro-mechanical relay. This is especially the case when the voltages or currents to be switched bear no relation to the circuitry switching them. Similarly, the ‘Changeover Switch’ arrangement is not easy (or economical) to implement in solid state form. Analogue Switches are available, but are generally only suitable for ‘small signal’ circuitry such as Audio/Video equipment. The DPR module provides eight independent double pole changeover relays, mainly intended for track section switching, frog polarity switching etc, although they can be used for any desired function within the specification of the relays. The module is designed to be Control Panel mounted, as part of an RPC (Remote Panel Control) system.

# DPST

Double Pole Single Throw (DPST) A switch that connects or disconnects two inputs to two outputs.

# Driver

A driver is typically a small piece of code inserted into an operating system or run in memory which allows an application/program to communicate with a device not native to the operating system. You may encounter the need to load a driver when you add a new printer, video card or USB device that an operating system does not recognize or support. In the case of model railroading, you might need a driver to allow a PC to communicate with a DCC controller, USB interface on a servo/relay accessory card or just to get a USB based serial communications adapter working as a COM port. Drivers are usually provided by the vendor selling the device to be connected to the PC.

# DTC

DCC Track Circuit. That is a DCC-Compatible Track Circuit Detector, a circuit or module that detects DCC traction current in the supply to a section of track.