



Model Railroading Education Series –

DC & DCC

Presented by:

NMRA NCR 3 Rivers Division



Locomotive Power & Control

- Traditionally and today mostly, model railroad locomotives obtain electrical power and control through the rails.
- Newer technologies are using on-board batteries to power locomotives with wireless control links.

Operational Complexity

- Desired complexity of running trains determines today's electrical systems.
- Each level utilizes well-known techniques and materials.
- Each level increase involves more time, material, and money.

Complexity Levels

- A. 1 locomotive.
- B. 2 or more locomotives running 1 at a time.
- C. 2 or more locomotives running 2 at a time.
- D. 3 or more locomotives running 3 or more at a time.

1 locomotive

2 or more locomotives, running 1 at a time

2 or more locomotives, running 2 at a time

3 or more locomotives, running 3 or more at a time

Complexity Level A

- Direct Current (DC) – Speed controlled by voltage applied to track {higher voltage = higher speed}. Direction controlled by polarity (positive right-hand rail = locomotive moves forward).
- All locomotives on track respond similarly.

Complexity Levels B & C

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- Block Control – Same as DC except power goes through Selector Switches. One locomotive per control block. Change selectors as locomotive(s) move.
 - Designed for layout with one or two trains.

Complexity Level D

- Digital Command Control (DCC) signal is an alternating DC waveform, which contains the digital information.
- Command Station contains master computer coordinating system through communications bus.
- Boosters convert bus information to DCC signal and power the track.

Complexity Level D Results

- Wired and wireless handheld throttles pass user inputs to Command Station.
- Each locomotive (with unique address) contains computer that decodes data for it.
- Each locomotive runs independently.
- DCC obsoletes DC equipment.

DCC Operation Situations

- DCC decoders are installed into existing DC locomotives.
- It is possible to have “cornfield meets” in which two locomotives come face-to-face on single track.
- It is possible to configure two (or more) locomotives to run together in Multiple-Unit (MU) mode.

DCC Standards vs. Proprietary

- DCC standards apply at the rails only:
Any DCC system can control any DCC locomotive, regardless of manufacturer.
- All technology internal to DCC system is proprietary.
- System A throttle likely will not work with System B Command Station.

DCC Considerations

- When choosing DCC system, consider what other local modelers are using.
- There are advantages in having common knowledge base and in sharing equipment during sessions.

DC & DCC

Questions? Ask us.

National Model Railroad Association

North Central Region

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<http://div3.ncr-nmra.org/>

