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Command-control operation of locomotives and layouts is no longer the future of O gauge model railroading—it is the present.

The goal of this book is to help new and existing operators without technical backgrounds better understand command-control systems designed to operate O gauge trains.

To keep the information within the grasp of all O gauge operators, MTH’s Digital Command System and Lionel’s Legacy and TrainMaster Command Control components are explained in down-to-earth terms. My apologies to those looking for a technical analysis.

Both MTH and Lionel are continually improving their command-control products. When I wrote the first edition of this book in 2002, MTH’s DCS had just debuted and TMCC’s second-generation Legacy controller was only in the discussion stages at Lionel.

Today, Lionel’s Legacy products are on store shelves and MTH has upgraded its DCS software numerous times. Both companies promise more to come as hobbyists continue to embrace the digital age of O gauge model railroading.

—Neil Besougloff

Operating toy trains is all about control, but for nearly a century, the flow of electricity to a piece of track, not the train itself, was all that could be controlled.

Raise the track voltage and the train went faster. Put an additional train on the track and it went faster as well. There was no way to individually control the speed of each train because both would blindly respond only to the amount of voltage sent to the track.

The dawn of cab control
As model railroading moved away from a living-room oval to a dedicated model railroad, the concept of cab control developed. Pioneering scale model railroaders divvied up layouts into separate electrical segments, or blocks. While the rails appeared to run seamlessly from one block to the next, each block was electrically insulated from the others. Each block had a toggle switch to select between one transformer, called a cab, or another. Through deft manipulation of toggle switches as trains moved from block to block, two operators could independently control the speed and direction of two different trains on the same layout. That is, as long as the two locomotives were not in the same block at the same time. If they were, both would speed up or slow down together. Cab control was still controlling the track and not the trains.

Control by magic
Just before World War II, Lionel tried a different, less sophisticated and, ultimately, less satisfying tactic. Called Magic
Operating TMCC locomotives

Once a command base is plugged in and its U terminal is attached to an outside rail of your track, you're ready to operate in command-control mode.

First, make sure your TMCC locomotive is in Run mode. On most locomotives, the Run/Program switch is on the underside of the frame. On diesel locomotives, the switch is usually on the outer edge of the frame near the front truck. It's a black switch on a black frame, so look closely. Some locomotives also have similar-looking smoke On/Off switches on their undersides. On steam locomotives, the Run/Program switch is usually on the tender frame, but it may be partially hidden by one of the trucks.

The Program position is used to change the two-digit address of the locomotive. Brand-new TMCC locomotives leave the factory with number 1 as their address (also known as an ID number).

Place your locomotive on the track and make sure the command base is plugged in before you raise the track power to 18 volts. The locomotive will start up in command-control mode if it hears the TMCC signal. If you turn up the track power before turning on the command base, the locomotive will start up in conventional-control mode.

Adding a PowerMaster

A PowerMaster or Track Power Controller (TPC) on your layout allows you the flexibility to operate, in conventional-control mode, postwar or other non-TMCC locomotives using the wireless handheld controller instead of the handles of a transformer.

Using a PowerMaster or TPC adds another step to command-control operation. Since the PowerMaster or TPC controls track voltage, you must send a command to either of those components to turn on the track voltage. If you are using a PowerMaster, move the slide switch to Cmd. This sets the PowerMaster to an all-or-nothing mode – all is 18 volts and nothing is zero volts. Press TR on the handheld controller, press the PowerMaster ID number, usually number 1, and then press Boost. Now you have 18 volts on the rails and can proceed to address your locomotive.

Adding a TPC

The TPC 300 and TPC 400 are addressed differently from the PowerMaster. Instead of a moving a slide switch between command and conventional control, you use the buttons on the bottom of the handheld controller. The buttons are Set, L, M, and H. When addressing a TPC, L indicates command mode, M indicates conventional, and H is not used.

To command the TPC to put 18 volts into the track, press TR, press the address or ID of the TPC, press L, and then press Set.
Operating DCS locomotives

Smart locomotives
ProtoSound 2.0 locomotives are unlike any other O gauge locomotives – each one knows its name and its features. The circuitry in each locomotive is imprinted with the locomotive’s name, a list of sound and lighting features specific to the locomotive, and even the locomotive’s cumulative running time and scale mileage.

All of this locomotive information is shared with the DCS controller when you introduce the locomotive to your layout. The locomotive’s name, assigned numeric ID address, and list of features are then stored in your DCS components.

Addressing locomotives
With your locomotive on the track for the first time, press the gray Menu button, scroll down to System with the thumbwheel, select System by pressing inward on the thumbwheel, and then follow the menus to select Engine Setup, Add Engine, and Add MTH Engine.

DCS takes over from here as you sit back and watch. The controller’s screen will show “Looking for Engine” for about 15 seconds. While you are waiting, the DCS controller, TIU, and locomotive are communicating, and the locomotive’s name and feature list are being uploaded into the DCS controller. When the transfer of information is complete, you’ll see the message “Congratulations, you’ve added a new engine!” on the screen.

Assigned automatically, your locomotive’s name and ID number are now in the ENG menu. Names are abbreviations of the locomotive. For instance, RK M10000 Eng is a RailKing Union Pacific M-10000 streamliner, and RK RS-27 is a RailKing Soo Line Alco RS-27 diesel.

Click on your locomotive’s name with the thumbwheel, and the LCD screen will change to show you an automotive-