Preface

The origin of this book can be traced back to when I decided to convert my own HO Allegheny & Lackawanna Southern Railroad to Digital Command Control (DCC). The A&LS crew had just finished an operating session I considered to be somewhat less than smooth. It seemed as though the operators were constantly asking each other, "Who's got my train?" The yards were getting more and more backed up because of how restrictive operation was using cab control. I became more and more frustrated with how the railroad ran.

I've always prided myself on how well my layout was wired by keeping everything organized and not cutting corners in order to get trains running. Even with quality wiring, though, when electrical problems did arise they were hard to trace, because of the great number of wires in a conventional DC layout.

The next morning as I stood in the train room preparing to restage the railroad, I was going over the events of the night before. I decided right then and there, regardless how long it took, I was going to convert the railroad to Digital Command Control. I had heard so many horror stories about the difficulty of installing Digital Command Control—problems with prebuilt switches and all the precautions that had to be taken in case of electrical shorts. I was convinced that converting the A&LS to Digital Command Control was going to be an extremely complicated job.

It seemed to me the easiest approach would be to rewire the layout in sections. Finish one part of the layout, test all the track, make sure it was working satisfactorily, and then move on to the next section. It quickly became evident that instead of rewiring the layout it seemed more like I was unwiring the layout. I could not believe how much wire was being removed from under the layout. I was taking out so much wire it seemed as though I was making a mistake.

When you consider that with DC operation you need a complete set of wires for each of the separate cabs (six in the case of the A&LS), the amount of wire needed for a layout the size of the Allegheny & Lackawanna Southern is almost mind-boggling.

As it turned out, however, converting the railroad to Digital Command Control was not a complicated job at all. In fact, the whole experience turned out to be a lot of fun; that's right, I said fun. Not only does Digital Command Control simplify wiring, it's the best way available for model railroaders to simulate prototypical operation. You can now have as many locomotives running on your layout as you can handle.

The more I learned about Digital Command Control, the more fun I had operating my railroad. I know there are plenty of model railroaders as concerned as I was with the prospect of converting their railroad to Digital Command Control or starting a new railroad and installing a Digital Command Control system for the first time. I've discovered that with a minimal amount of effort you can learn everything you need to know to get started in Digital Command Control and enjoy all the advantages it has to offer.

—Lionel Strang

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The Origin of Command Control

At the root of every command control system is the functional premise that allows you to control your train on the track, rather than the track under your train. The origins of command control systems can be traced back to the 1940s when Lionel Trains introduced a commercial two-channel system using frequency control. An electron tube oscillator generated different frequencies, depending on which button an operator might press. Then a tuned circuit and relay in each engine controlled the direction of the train.

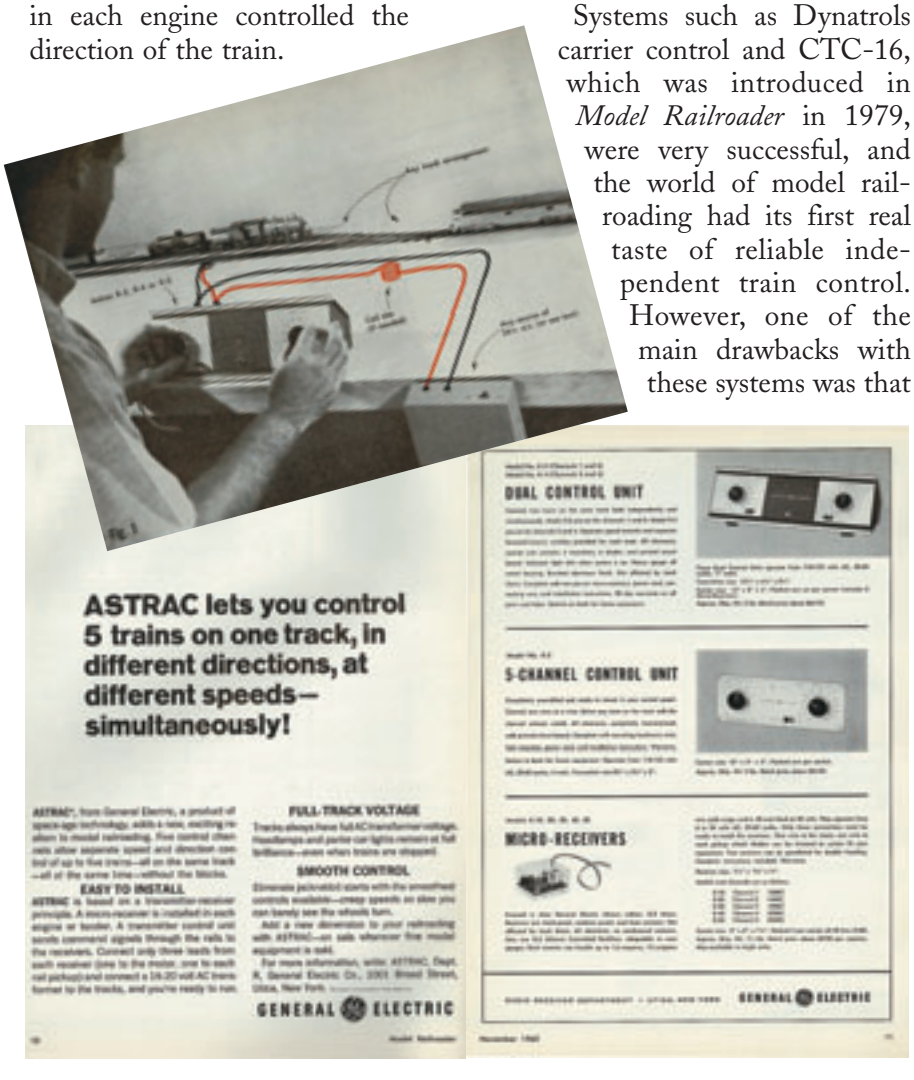
Unfortunately, Lionel's system was somewhat cumbersome and not always reliable.

In the early sixties, GE introduced a five-channel commercial carrier control system designed to control more than one train per block. It was called ASTRAC, which stood for Automatic Simultaneous Train Control. The system used a silicon controlled rectifier-based circuit which had a receiver in each cab and a transmitter that sent signals through the track.

Systems such as Dynatrols carrier control and CTC-16, which was introduced in *Model Railroader* in 1979, were very successful, and the world of model railroading had its first real taste of reliable independent train control. However, one of the main drawbacks with these systems was that they were not compatible with other systems. Several model railroad manufacturers introduced digital systems in the early to mid-eighties; however, most of these systems were incompatible with each other.

Before long, the National Model Railroad Association (NMRA) introduced standards for Digital Command Control; as electronics became cheaper, DCC started to become more and more popular. The NMRA Digital Command Control system standard is based on a proposal by Lenz, one of Europe's leading DCC manufacturers. The basis of that original concept comes from Märklin Digital, which Lenz took a step further.

All manufacturers have to abide by this standard in order to receive NMRA conformance approval. It is important to note that the NMRA standard applies only to the command signal between the decoder mounted in the engine and the



In 1963 advertisements appeared in *Model Railroader for a new* control system, called ASTRAC, manufactured by General Electric. With ASTRAC a microreceiver was installed in each locomotive and up to five locomotives could be controlled independently of one another. In many ways, ASTRAC was the first commercial command control system and predecessor of today's systems.