



Denver, Front Range

Designing, scenicking, and
operating a double-deck layout



By Doug Tagsold
Photos by Rand Hood

My HO layout, the Denver, Front Range & Western, recreates the Denver & Rio Grande Western's Moffat Tunnel main line from Denver to Grand Junction, Colo., and the Joint Line trackage of the Rio Grande and Atchison, Topeka, & Santa Fe between Denver and Pueblo, Colo. The Burlington Northern also has trackage rights over this section of historic Colorado railroad.

The layout is set in the mid- to late 1980s, when the Rio Grande operated as an independent bridge route and cabooses still brought up the rears of most trains.

Double-deck design

The layout is a double-deck, around-the-walls design. This being my second double-deck layout, I was able to make improvements in the design.

First, I didn't stack the levels directly above one another. The lower level is stepped out from underneath the upper level by one foot. This allows for better viewing of the lower level, and it also provides an area behind the backdrop for wiring, storage, and staging tracks.

Another design feature I included in this layout is the use of very wide aisles. Other than passing through two 30" doorways between the different rooms of the layout, most aisle space is four feet wide, making it easy for train crews to move about without getting in the way of another crew.

I avoided placing switching areas directly above and below each other, so two train crews aren't trying to work in the same aisle space at the same time.

Many modelers agree that we have a more realistic view of a layout when it's built near eye level, such as the 58" height of my upper-level benchwork, but what does that mean for the lower level? I solved that problem by giving the lower-level operators comfortable office chairs with casters, so they can simply roll around on the smooth tile floor. This gives a new meaning to "armchair model railroading."

The grade of the main line from Denver to the Moffat Tunnel is 1.5 per-

cent. I would have preferred it to be the same as the prototype at 2 percent, but that would have carried the track through the basement ceiling into the living room above, an idea that quickly lost the support of the rest of the family.

I did stiffen the grade through Winter Park to a little over 2 percent, which requires helpers to boost westbound coal trains up to the Moffat Tunnel.

Construction

I believe that the DFR&W is proof that the average modeler can build a fairly large home layout without taking a lifetime or small fortune to do it. My plan was to get the railroad operating as soon as possible, then add scenery and details as time and funds allowed. In less than a year, the benchwork was complete and the main line operational.

One thing that I try to maintain is an equal balance on the layout. After I rework some scenery, I might next work on replacing or detailing rolling stock or structures, so that all aspects of the layout slowly improve as my time and abilities allow, keeping an overall balance of quality.

Scenery

I felt the scenery needed to be as realistic as possible, so first I shot photographs of the mountains in the different areas I model. Later I had these photos enlarged to poster size and used them as the backdrops.

▲ 1. Helpers assist on all coal trains eastbound to the Moffat Tunnel on Doug Tagsold's HO Denver, Front Range & Western. After the train reaches the top of the grade at East Portal, the helpers will cut off the train and return to Bond.

& Western



▲ 2. The track crews stop their work to watch Rio Grande westbound freight no. 101 as it passes through the siding at Plainview.

The scenery is fairly basic: I used scenery products from several manufacturers, as well as sand and dirt made by Mother Nature. I've brought home over 50 pounds of dirt and small rocks from Colorado to use on the layout.

As I learn new ways for doing scenery, I apply it over the existing ground cover. In several areas the dirt, rock, and grass materials must now be over 1" thick.

Several years ago I was happy with the overall quality of the scenery, until I saw the photographs and articles by Rand Hood in *MODEL RAILROADER*. I think he has set a new standard for modeling Western scenery.

Then I met Rand at a Greenberg train show in the Detroit area. He graciously demonstrated his scenery techniques for me. They aren't difficult, and the results are fantastic. I'm now

reworking the scenery on several areas of the layout using scenicking methods we've developed together.

Touring the main line

The main line heading west from Denver climbs around Big Ten Curve and doubles back through the same area, just as the prototype does to gain elevation, and comes into Plainview, which is the location of the first passing siding on the layout.

West from Plainview, the main line disappears into the mountains and into the helix. The helix is only two-and-a-half revolutions as the main line has already gained half the 20" needed to reach the upper level. There's no worry of trains stalling in the helix, as the most difficult pull for a train is around Big Ten Curve. If a train can get into Plainview on its own, no helpers are needed in the helix.

On the upper level the main line passes through the short Tunnel No. 29 near Pinecliffe and follows South Boul-

der Creek to Tolland and East Portal, where the tracks enter Moffat Tunnel 64" above the floor. Exiting the west portal of Moffat Tunnel, the main line winds downgrade through a snowy winterscape, much to the delight of passengers aboard the seasonally run ski train.

Continuing through the Fraser Valley to Granby, the climate warms and the grade slackens. Granby is also the first station stop west of Denver for Amtrak's *California Zephyr*.

Next is Bond, where a branch line to the Energy Coal Mine diverges from the main line. Bond is also where helper engines are added to the rear of eastbound loaded coal trains for the push up the grade to the Moffat Tunnel. At East Portal, the helpers uncouple from the train and return to Bond.

Continuing west, the main line passes through Glenwood Canyon and into the resort town of Glenwood Springs. West of Glenwood Springs, and the end of the modeled portion of the Rio Grande, is Grand Junction. The yard at Grand Junction is a crew change point and a staging yard for the trains continuing west to Salt Lake City. A reverse loop above the helix brings the trains headed back to Denver.

Originally thought of as a staging or feeder line for trains for the Rio Grande portion of the layout, the lower level Joint Line has developed into a complete layout of its own. The tracks, owned by the Santa Fe and Rio Grande, are used mostly by the Burlington Northern. The Joint Line begins at the south end of the yard in Denver.

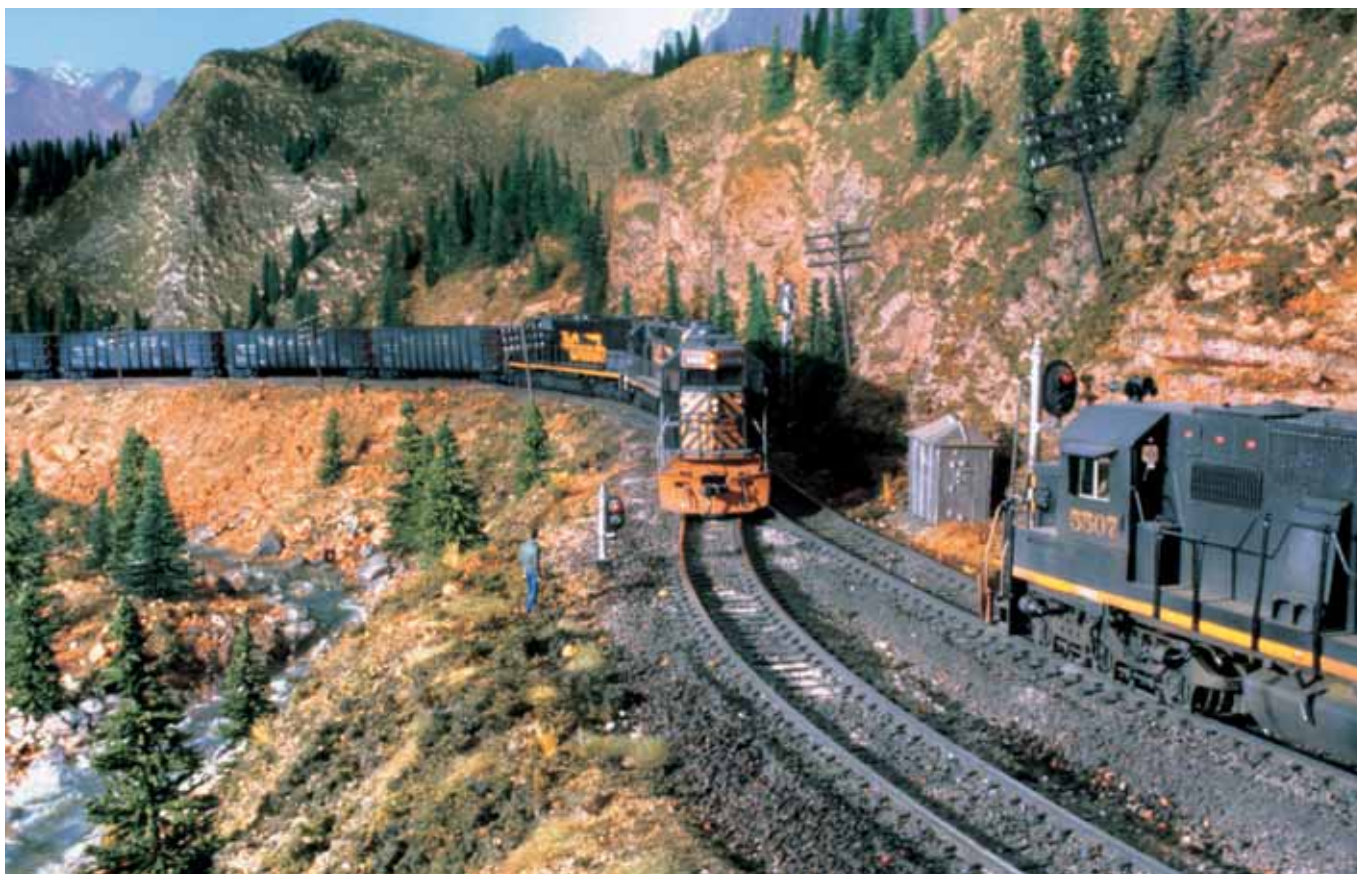
Passing by the Denver Union Station, the line is double-tracked to Castle Rock, where the two lines follow separate grades south. The southbound main (owned by the Santa Fe) crosses over a steel girder bridge near Larkspur, while the northbound main (owned by the Rio Grande), is high on the hillside to the east. The two lines come together again at Palmer Lake, where the joint line becomes single track through Colorado Springs.

In Colorado Springs is the Colorado Springs Department of Utilities Power Plant, which receives unit trains of coal. A switcher is stationed in Colorado Springs to work the local industries.

Heading south again, the main line enters Pueblo Yard. Like Grand Junction yard directly above it, Pueblo acts as a crew change point and staging yard. It too has a reverse loop.

The Denver connection

I designed and operate the layout as two separate railroads, with the yards



▲ **3.** An empty coal train, led by an SD50 and two SD40T-2s, climbs westbound at Toland as an eastbound freight, led by another SD50, holds the main line.

in Denver being the connection between the two lines. The Denver Yard area is also where two staging yards connect to the railroad. The first of these is at the north end of the yard at Utah Junction. This staging yard, hidden beneath Plainview and Big Ten Curve, stages Union Pacific trains and BN coal trains from Wyoming. At the south end, near the BN engine facility, is the BN's 38th Street Yard. These tracks, which disappear behind the backdrop, hold up to 75 cars and represent the connection with the BN's main line east to Chicago.

The main yard in Denver consists of four arrival and departure tracks and seven classification tracks. Though it's just one yard, it's operated as two separate yards with two switch crews.

The north end represents the Rio Grande's North Yard in Denver. The south end of the yard is worked by the BN crew. All BN and Santa Fe trains to

▶ **4.** The rear of a northbound BN empty coal train passes the industrial area of Colorado Springs. In Denver, this train will be turned over to the Rio Grande for its trip west for loading at the Energy Mine near Bond.

and from the Joint Line are switched here. Each end of the yard has locomotive servicing facilities for the respective railroads, and each end has its own independent control panel and throttle.

Realistic operation

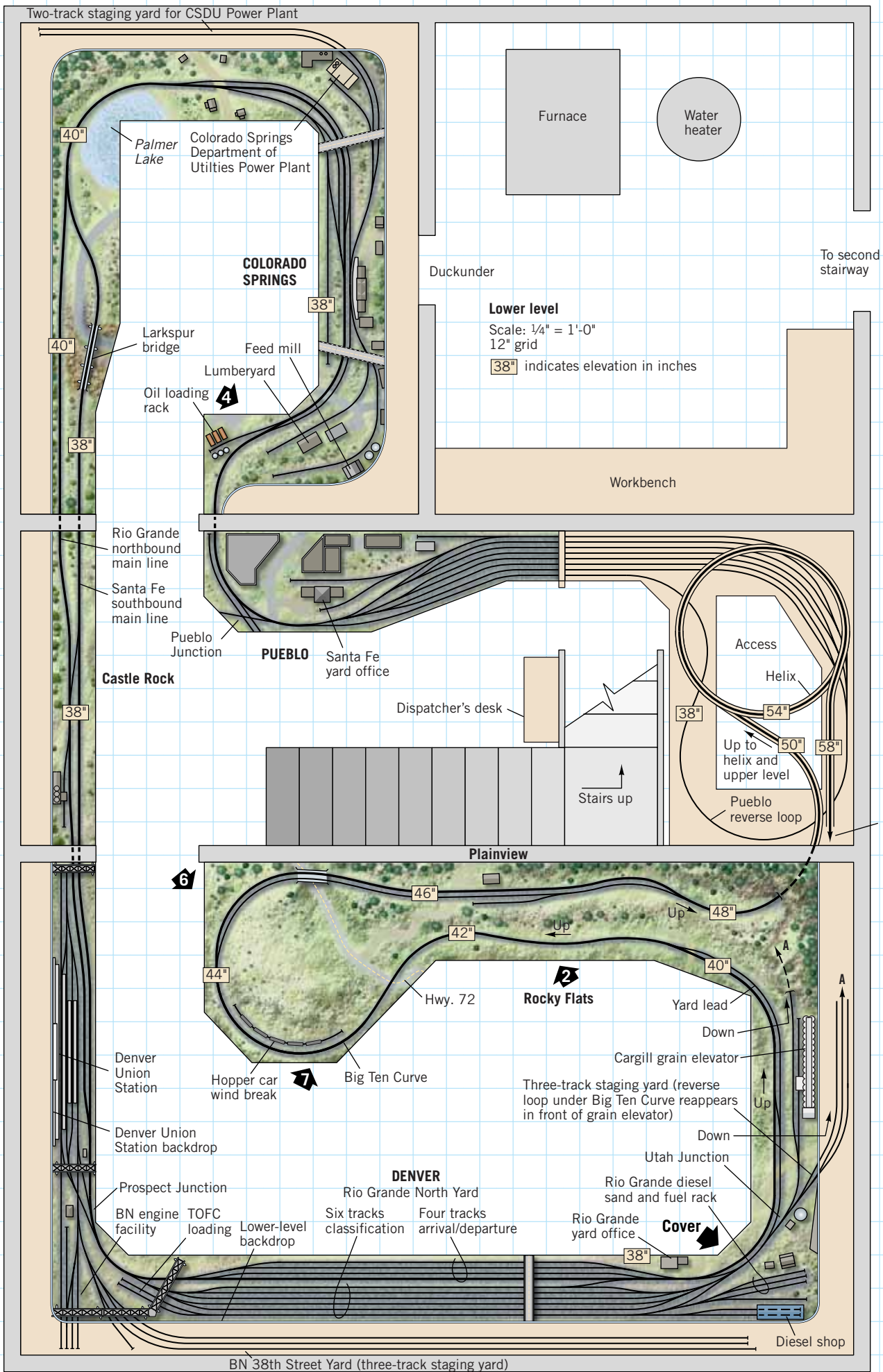
The one thing that I think stands out above all others on the DFR&W is realistic operation. I've put much time and research into making this layout operate as closely as possible to the way the real railroads do in Colorado.

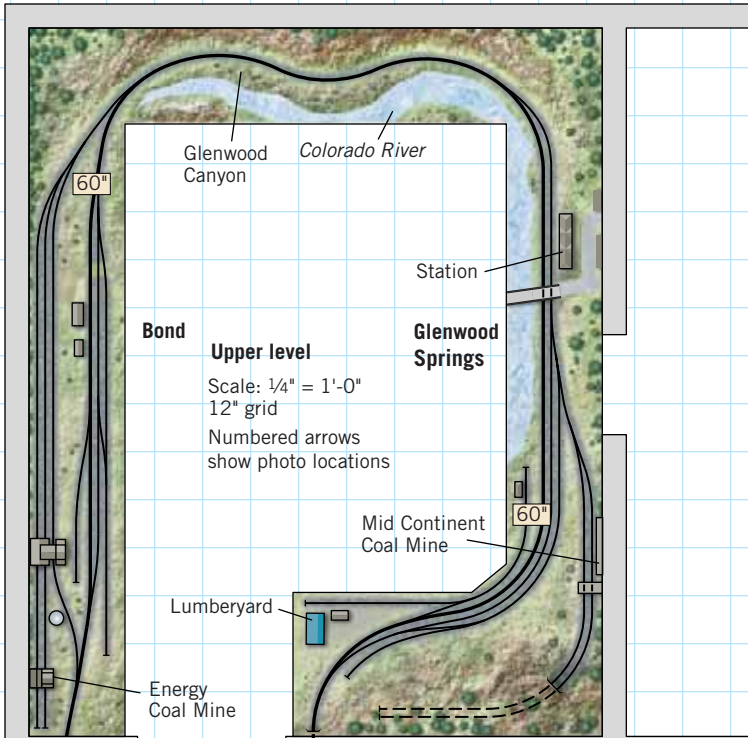
For example, on my layout, moving a heavy coal train up a steep mountain grade is not just something that happens, but it's a memorable event that takes much planning. All coal trains are weighted with actual loads, so at least four or five powered units are needed to move the trains up the grade at Winter Park to the Moffat Tunnel, just as on the prototype.

A typical operating session takes about four hours, depending on the attitude, size, and mountain seasoning of

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The layout at a glance

Name of railroad: Denver, Front Range & Western

Scale: HO (1:87)

Size of layout: 25 x 40 feet

Prototype: Denver & Rio Grande Western

Locale: Denver to Grand Junction, Colo.

Period/era: mid- to late 1980s

Layout style: double deck, around the walls

Layout heights: 36" to 66"

Benchwork: open grid

Roadbed: 3/4" plywood, 1/2" Homasote

Track: Atlas code 100

Length of mainline run: 375 feet

Turnout minimums: no. 6

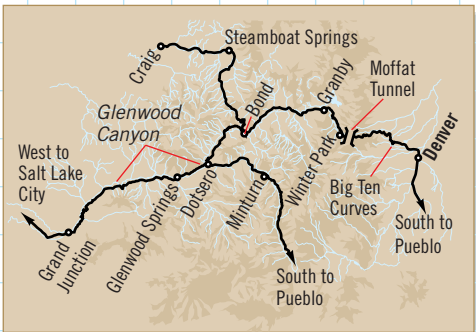
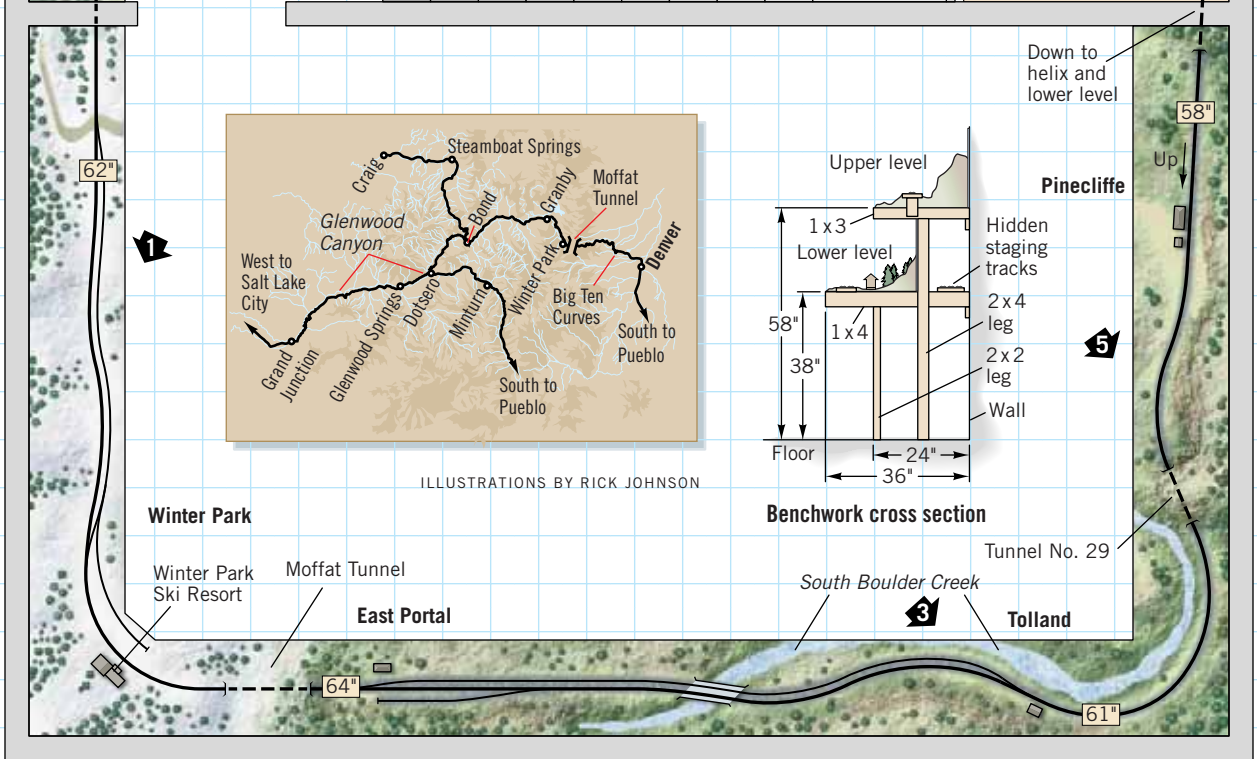
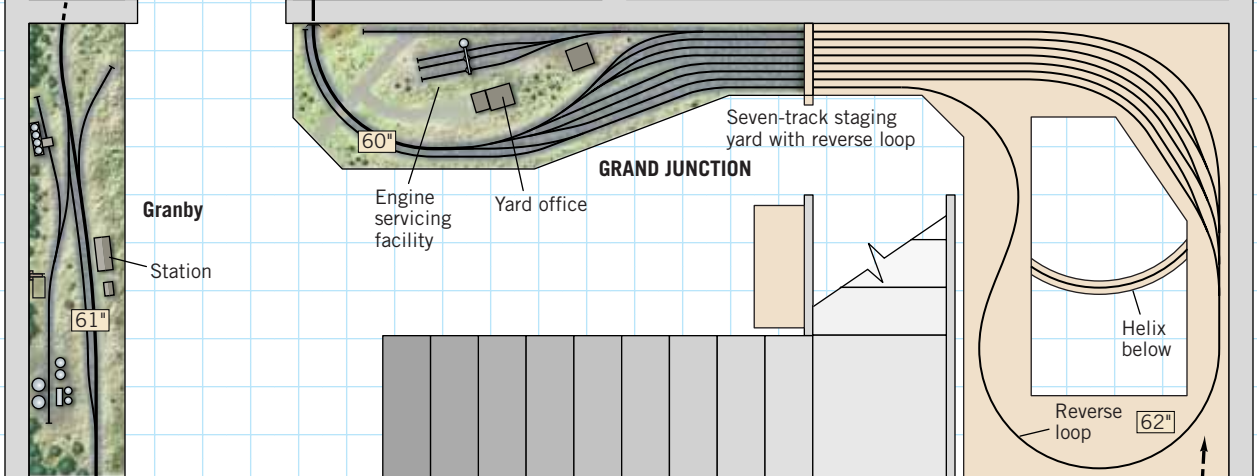
Minimum curve radius: 30"

Maximum grade: 2 percent

Scenery construction: plaster over wire screen; real dirt and rocks

Backdrop: photo murals on 1/2" drywall

Control: walkaround cab control with radio controlled handheld throttles



ILLUSTRATIONS BY RICK JOHNSON



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the operating crew. In this time we operate two 12-hour days (preferring to work only during the daylight hours).

The session begins with the two yard switchers working the main yard in Denver. A train list from the yardmaster tells them what trains will be departing Denver that day. Each list takes two hours. After going through one list, we take a break and change assignments before starting the second one.

The staging yards at Grand Junction and Pueblo will hold all of the trains that run outbound from Denver from

those two lists, so none of the trains will reappear later in the operating session.

All crews board their trains in Denver and do not go off duty until they return to Denver. For example, if you were called to be the crew on Rio Grande 0187, a hot through freight to Salt Lake City (Grand Junction), you'd take control of your train in Denver. At Grand Junction you'd bring your train to a stop in the yard. This train is now staged for its return trip to Denver during the next operating session. Then you'd board the next eastbound train

▲ 5. An eastbound freight drifts downgrade through the ultra-short Tunnel No. 29 near Pinecliffe. Train 136 handles most of the eastbound switching between Grand Junction and Denver.

back to Denver, which might be a local freight or a loaded coal train. Not until you arrive back in Denver have you finished your assignment.

As each train arrives in Denver, the yard switchers break down the train and reclassify the train's consist with each car being switched to the correct track for that car's next destination. We use a simple card system that works like the old tab-on-car method. There are no waybills to be turned between operating sessions; everything is ready to go at any time. I color-coded the car cards, making them on 3 x 5 file cards.

Dispatching

On the DFR&W dispatching can be a challenge, even though we deliberately don't flood the main lines with traffic,

◀ 6. A model railroad comes to life during an operating session. Norm Cattell (right) is busy working the Rio Grande's North Yard as Steven Tagsold (left) brings his westbound train up toward Big Ten Curve. The dispatcher has ordered him to hold in the siding for a meet with an eastbound freight, under the control of T. J. Stratton (standing).



as the prototype Rio Grande was not a high-speed main line running dozens of trains each day. Rather, we opt for slow speeds and less pressure, giving the train crews time to complete their work and enjoy the scenery.

Even so, with a local switching on the main and a loaded coal train waiting for helpers before it makes its run up the hill, the dispatcher must plan ahead to be sure that the *Railblazer* is not delayed on its overnight run.

Several passing sidings, such as at Bond and Winter Park, aren't always long enough for two trains to pass, so trains may be held at East Portal or Glenwood Springs until the main line is clear through the next several blocks.

The double track on the Joint Line is no problem for the dispatcher, but when the track becomes single at Colorado Springs and the local switcher is switching the industries, the Joint Line can become congested very quickly. Just as on the prototype, southbound trains are often held at Palmer Lake until the line to the south is clear.

Control and communication

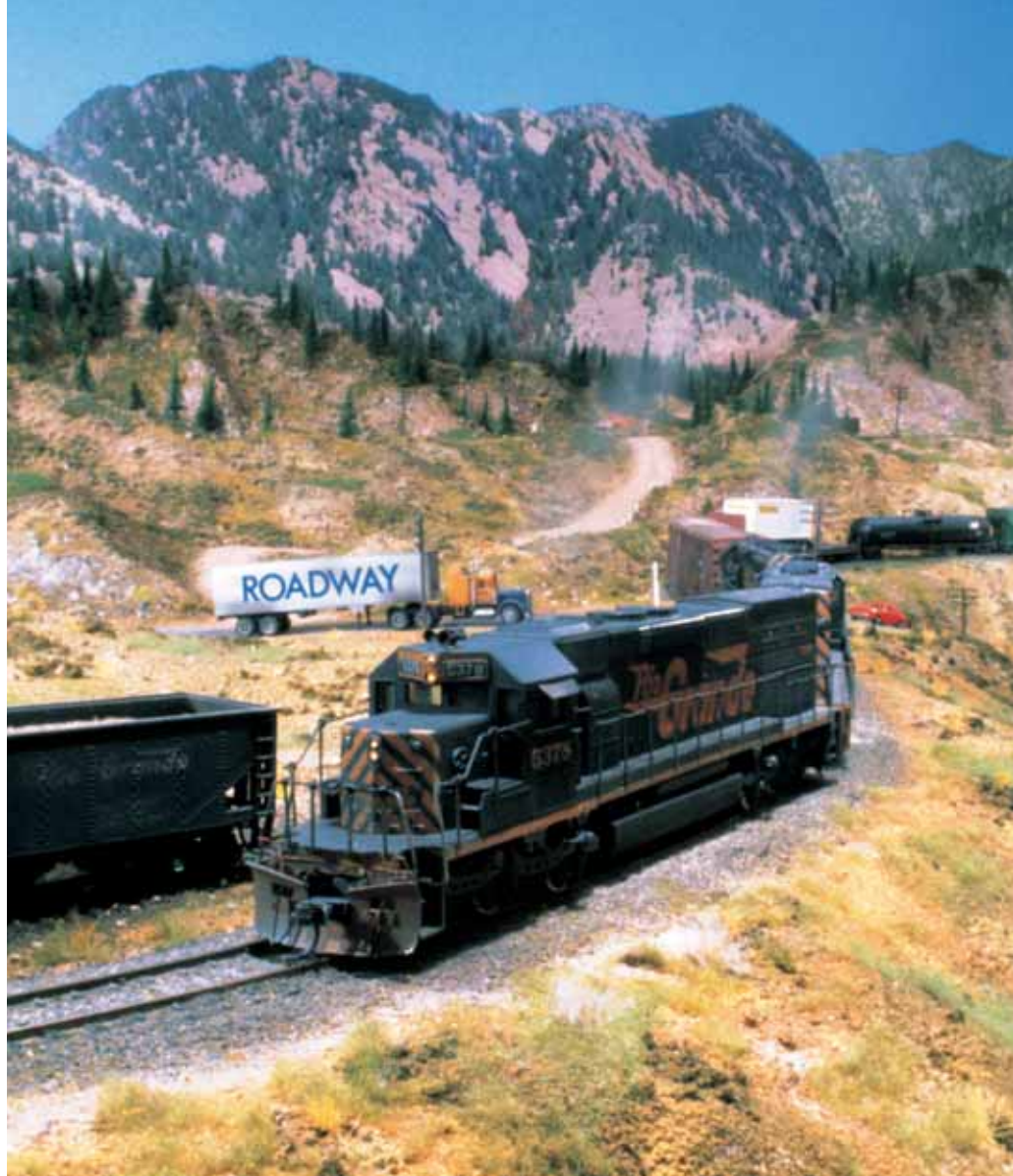
The control system is cab control for multiple cabs with rotary switches routing the power from the five mainline throttles to the track. I use Aristo-Craft radio controlled handheld throttles for the main line. There are two local yard throttles for the yard in Denver and one local throttle in Colorado Springs.

Road crews communicate with the dispatcher via radio headsets. The dispatcher tracks traffic with a schematic drawing of the main line on a metal board and magnets with train numbers.

The dispatcher also has a train sheet to record the locations and times for each train. The dispatcher authorizes train movements, but he doesn't route power to the blocks. When the dispatcher gives a train crew permission to proceed over the next block, the train crew lines up the rotary selector switch for their cab. The rotary switches are located on the layout's fascia near the center of each mainline block.

If we have a large operating group of ten or more people, we can run with two-man crews, where one person acts as engineer and runs the throttle and the other is the conductor, wearing the radio headset. The conductor walks ahead of the train to line up the blocks.

Some might wonder why I don't have the selector switches at the dispatcher's panel. My previous layout was wired that way, which was fine during operating sessions. But I also like to operate the layout by myself and with



▲ 7. An SD40T-2 leads westbound freight no. 187 around the famous Big Ten Curve just west of Denver. The hopper cars at left act as a wind break, shielding the train from the sometimes gale force winds that rush down the Front Range of the Rocky Mountains.

my son, or maybe with one or two friends. Having to walk over to the dispatcher's panel constantly to do the power routing became a bother.

I've developed a signal system that will only give a train a green signal to enter the next block if that block has been lined up for that train's throttle. With the use of relays and common rail wiring, the system is quite simple and was easy to build.

Though the prototype Rio Grande no longer exists, and the Joint Line is now property of BNSF and the Union Pacific, the Rio Grande, Santa Fe, and BN still operate in my basement with the same challenges of big-time mountain railroading that their prototypes had. What a great hobby! 🚂

Meet Doug Tagsold

Originally a New York Central modeler, Doug switched prototypes following a family vacation to Colorado in 1989. After



witnessing the drama of mountain railroading on the D&RGW, he wanted to capture that feeling in HO.

Doug is the fourth generation to operate the family funeral home business in Blissfield, Mich. He's also a volunteer fireman. Doug and his wife, Diane, and their two children, Steven and Jennifer, enjoy family trips and sailing on Lake Erie.

The Denver, Front Range & Western will be featured in Volume 33 of Allen Keller's Great Model Railroads video series.