

1. Adding operations to your layout is easier than you think. Brooks Stover explains the operating scheme he developed for his S scale Buffalo Creek & Gauley. In this photo, mine run No. 1 passes westbound passenger train No. 3 at Widen, W.Va.



# Adding operations to a model railroad

How to use a straightline graph and conductor's orders to develop and manage operating sessions

By Brooks Stover • Photos by the author



I'm fortunate to be a part of a group of modelers who meet regularly for operating sessions. Like many, I've found that the ultimate enjoyment of the hobby comes from bringing model railroads to life with prototypical operating schemes. Within our group are layouts of all sizes, scales, and prototypes. There's also a variety of operating schemes used, from running trains sequentially with car-for-car switching to timetable-and-train-order operation with a fast clock and dispatcher.

As I reached the point of hosting an operating session on my new S scale Buffalo Creek & Gauley, I was faced with developing an operating scheme. I enjoy layouts where there are plenty of

train movements and the crews communicate with the dispatcher via radio. However, I knew this wouldn't be possible, or appropriate, for my circa-1957 backwoods West Virginia short line.

For starters, the BC&G's main line was only 18.6 miles long. In the period I model, the line operated one mine run a day, picking up empty coal hoppers from an interchange with the Baltimore & Ohio RR (B&O) at one end of the line and delivering the cars to a coal tippie at the other end of the railroad. After switching out the empties, the train returned to the B&O interchange with loaded coal hoppers. The train also did some local switching on the return trip.

In addition, a five-car log train made one round trip from the sawmill to the woods, and a Mack rail bus (shown on page 62) made two round trips. That was it. How was I going to make a challenging three-hour operating session for a 6- to 8-member crew with what seemed like so little action?

## Layout design

Before proceeding, I should provide some details on the configuration of the track plan shown on page 61. It's moderately sized, filling a large part of a 25 x 44-foot room. Since I model in S scale, and because I maintained a minimum aisle width of four feet and a low track-to-scenery ratio, the main line is only 110 feet.

Along the main there are five small towns, just like on the real railroad, and 18 switching locations. There's 40 feet of track on the logging branch, with nine switching locations.

I also modeled the BC&G's interchange with the B&O. That railroad serves four industries and has eight car spots, bringing the total number of switching locations to 35.

There are passing sidings at each town to allow runarounds, but with a four-car capacity, they're short. Longer passing sidings are located at the B&O interchange and the Rich Run Mine in Widen, and these hold 11 cars.

## The car-card trial

I first tried a car-card-and-waybill routing system. However, because of the limited siding capacity, I found it necessary to manually select the destinations for each car. My goal was to avoid having too many cars collect at one location or have trains longer than the passing sidings.

I also tried a couple of simple timetables to control train meets, but variations in the time it took to complete switching assignments, especially at the mine, made it difficult for crews to stay on schedule. Clearly I needed a better way to schedule trains and a simple way to communicate the schedule, consistent with the character of a short line.

## Train schedule

I developed a schedule of trains for the BC&G using the straightline graph shown in **fig. 1** on the next page. Time is depicted on the horizontal axis and layout locations on the vertical axis. This technique has been covered extensively in the hobby press, and I couldn't have worked out my operating scheme without it. It may not seem that such a graph, usually associated with larger layouts, was necessary for a fairly simple

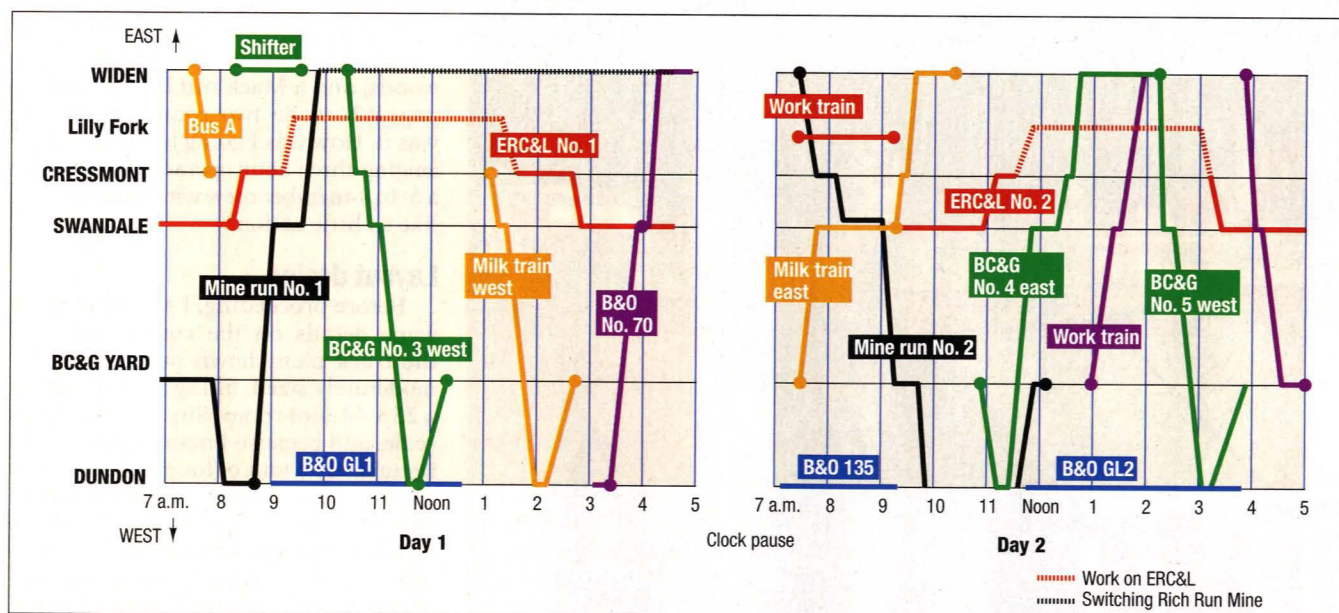


Fig. 1 Straightline graph. This graph shows the relationship between train time and location. Illustration by Rick Johnson

C.T. Form 204 - Schedule 5 (12-49 1500 JIC)

THE BUFFALO CREEK & GAULEY RAILROAD CO.  
Conductor's Orders

Train: BC&G PASSENGER #3 West

Engine No. 4 Engineer Conductor Date Aug 15, 1958

Crew Call: 9:15 am

**SUMMARY**

- This train makes a WB trip from Widen to Dundon Station where it sets out a B&O car. It then ties up at BC&G Yard.
- 2 MEETS: WIDEN and DUNDON
- Note for ENGINEER: Maximum speed - 14 mph

Active	WIDEN	Depart	10:15 am
<ul style="list-style-type: none"> <li>• Train is made up and spotted on Main 2</li> <li>★ • Meet BC&amp;G COAL EXTRA #1 arriving at 10:00 am on Main 1</li> <li>• Pull forward to Platform to load passengers before departing</li> </ul>			
Arrive	CRESSMONT	Depart	10:35 am
<ul style="list-style-type: none"> <li>• Discharge and pick up passengers at Dairy</li> </ul>			
Arrive	SWANDALE	Depart	10:50 am
<ul style="list-style-type: none"> <li>• Discharge and pick up passengers at Passenger Platform adjacent to Swandale Post Office</li> </ul>			
Arrive	BC&G YARD	Depart	
<ul style="list-style-type: none"> <li>• NO STOP. Proceed to Dundon</li> </ul>			
Arrive	DUNDON	Depart	11:25 am
<ul style="list-style-type: none"> <li>★ • B&amp;O GRAFTON LOCAL #1 will have cleared main and loop</li> <li>• Discharge passengers</li> <li>• When departing, back out of station and turn entire train on loop, then...</li> <li>Note: ...Set out B&amp;O 1443 on Coach Track</li> <li>• Proceed to BC&amp;G Yard</li> </ul>			
Arrive	BC&G YARD	Depart	Terminates
<ul style="list-style-type: none"> <li>• Spot BC&amp;G X6 and 16 on Passing Track</li> <li>• Spot engine on Engine House Track</li> </ul>			

Fig. 2 Conductor's orders. Brooks used a Microsoft Excel spreadsheet to create these single-sheet forms. The conductor's orders shown above are for a passenger train, listing meets, setouts, and departure times.

C.T. Form 204 - Schedule 5 (12-49 1500 JIC)

THE BUFFALO CREEK & GAULEY RAILROAD CO.  
Conductor's Orders

SHEET NO. 1 of 2 Train: COAL EXTRA #1

Engine No. 14 Engineer Conductor Date Aug 15, 1958

Crew Call: 7:00 am

**SUMMARY**

- After departing BC&G Yard and backing to the B&O Interchange at Dundon, this train makes a EB trip to Widen, switching Swandale enroute.
- This train does all required switching at Widen, including making up the WB COAL EXTRA #2.
- ★ - 2 MEETS: Both at WIDEN
- Note for Engineer: Maximum speed - 14 mph

PSM	CLASS	INITIAL	NUMBER	LOCATION	Lading	* EMPTY	LOADED	MILES
Active BC&G YD Depart 7:30 am								
<ul style="list-style-type: none"> <li>• Engine is spotted on RIP Track</li> <li>• Service engine with sand and make up train</li> <li>• Take water before backing to Dundon. Note: Water plug is on BC&amp;G main.</li> </ul>								
P	B	NYC	437	Dock	ADS			
P	G	BC&G	603	Trk 1	Pipe			
P	Coach	BC&G	17	Pass Trk				
Cars in consist: 2								
Active DUNDON Depart 8:45 am								
<ul style="list-style-type: none"> <li>• Pick up all cars on B&amp;O Interchange Track</li> <li>- Confirm cars with list below</li> </ul>								
P	CH	B&O	637	B&O Interchange	E			
P	B	CR&Q	321		E			
P	B	VGN	099		HG			
P	T	UTX	794		O			
P	H(2)	W/M	395 & 804		E			
P	H(3)	B&O	427 thru 203		E			
P	H	WAB	174		E			
P	LH	B&O	082		E			
Cars in consist: 13								
Active SWANDALE Depart 9:45								
<ul style="list-style-type: none"> <li>• Take water</li> </ul>								
S	CH	B&O	637	Passing Trk	E			
S	B	CR&Q	321	Passing Trk	E			
Cars in consist: 11								

Fig. 3. Freight orders. The conductor's orders for freight trains have a switch list. In addition to the car class and reporting marks, the last line includes the number of cars that should be in the consist before it departs each town.

railroad. However, I found the straight-line graph to be the only way to visualize where a certain train would be at a specific time.

Though the final graph depicting all the trains looks intimidating, I developed it one train at a time. I first created a schedule for the priority trains,

mine runs Nos. 1 and 2, shown in black on the graph. I developed the schedule by actually running the planned trains over the railroad and carefully recording the time required to complete all movements, including the mine switching (indicated by the black dotted line on the graph at Widen).

To test the validity of the schedule, I had members of my operating crew run the trains. I learned that the time required to switch the mine depended greatly on the skill of the crew.

It took some crews as little as 30 minutes to do the switching. Others took a full hour. This large variation

greatly complicated filling in the rest of the schedule.

My solution was to divide the operating session into two parts, or "days." The break between days serves as a buffer to accommodate the variation in the time required to switch the mine. The first day of the operating session ends when mine run No. 1 has finished its work and the return train, mine run No. 2, is made up and ready to depart. If the mine switching takes extra time during a session, the crews of the other trains can grab a coffee or a rest room break before getting their new assignments and starting the second day. The fact the prototype BC&G coal train made the round trip in one day but takes two on the layout was a compromise I was willing to make for the added benefit of a smoother running session.

With the mine run schedules set, I filled in the remaining time and track with as many trains as reasonable to generate a full operating session that would keep operators busy. In addition to the prototypical log trains and Mack rail bus trips, I introduced work trains and a fictitious, but plausible, BC&G passenger train. I also added a fictional trip to the mine by a B&O gas-electric. Finally, three B&O locals (from staging) switch industries near the interchange. In the end, I wound up with a schedule of 17 trains operating over two days. Four 2-man crews simulate nearly 24 hours of railroading during a three-hour session.

## Conductor's orders

The final step was to develop a way to let crews know the schedules for their trains, switching assignments, meets, and special instructions. I like to keep paperwork at a minimum so operators can focus on the sights and sounds of their trains. Besides, the engineer already has his hands full with the throttle, and the conductor has to lay down whatever paper he has to align turnouts and uncouple cars.

I developed the conductor's orders shown in **figs. 2 and 3** using a Microsoft Excel spreadsheet. The forms are loosely based on a real BC&G freight conductor's report form. The 8½" x 11" sheet fits on a standard size clipboard. Hooks on the fascia allow conductors to hang their clipboard but still read the orders.

Each form contains the information a crew needs to run its train. The train name, assigned engine, and crew name appears at the top. See **fig. 3**. Also near the top is the crew call time, the time crew members need to receive their orders, locate their train, and familiarize

## The layout at a glance

**Name:** Buffalo Creek & Gauley  
**Scale:** S (1:64)  
**Size:** 25 x 44 feet  
**Prototype:** Buffalo Creek & Gauley  
**Locale:** West Virginia  
**Period:** 1957  
**Style:** linear walkaround  
**Mainline run:** 110 feet  
**Minimum radius:** 32" (visible track), 24" (hidden track)  
**Minimum turnout:** no. 6  
**Maximum grade:** 1½ percent (BC&G), 2 percent (ERC&L)  
**Benchwork:** L girder  
**Height:** 43" to 57"  
**Roadbed:** cork over Homasote on 5/8" plywood  
**Track:** code 148 flextrack  
**Scenery:** grocery bag paper and plaster gauze over cardboard lattice  
**Backdrop:** drywall  
**Controls:** NCE Corp. Digital Command Control

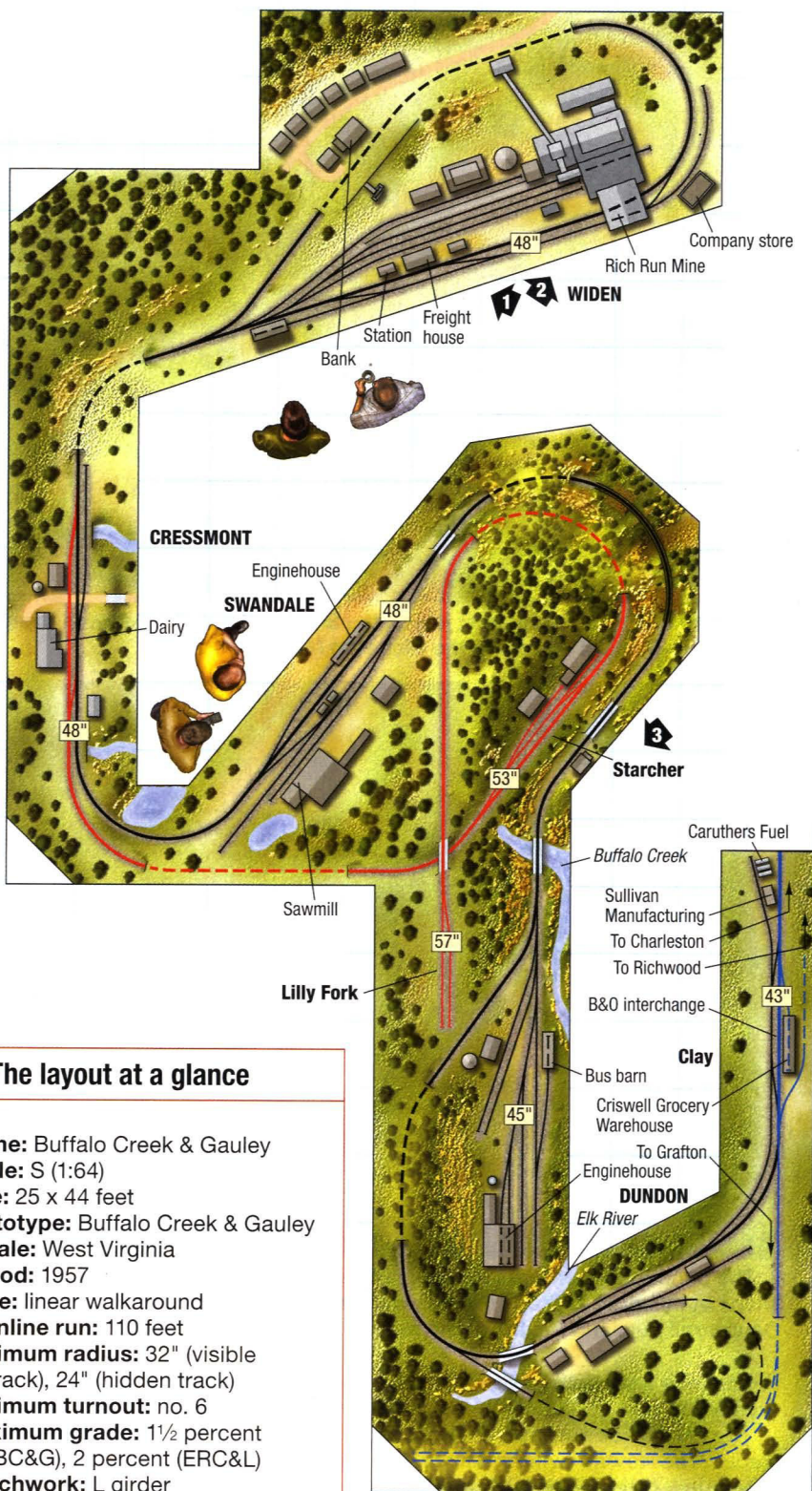


Illustration by Rick Johnson

## Buffalo Creek & Gauley RR

S scale (1:64)  
 Layout size: 25 x 44 feet  
 Scale of plan: 3/16" = 1'-0", 24" grid  
 Numbered arrows indicate photo locations

— Buffalo Creek & Gauley RR  
 — Elk River Coal & Lumber Co. logging branch  
 — Baltimore & Ohio staging tracks



2. Mine run No. 1 is the biggest job on the Buffalo Creek & Gauley. In this photo we see 2-8-0 no. 14 switching the Rich Run Mine at Widen.



3. The conductor's orders for Mack rail bus A call for it to pick up a parcel at the shack at milepost 4. Stops like this were made by the full-size Buffalo Creek & Gauley rail bus, and it adds to the realism of layout operations.

themselves with their assignment and the layout.

Next is the job summary, which includes the towns where meets are scheduled (highlighted by a star so they can't be missed) and the maximum speed for the train as displayed on the cab's liquid-crystal display screen. This information has proven useful, especially for new operators.

Below the job summary, the form is divided into boxes (one for each town that the train will pass through). At the top right corner of each box is the departure time, if designated. No departure times are specified unless

needed to control train movements. Otherwise, the train can depart when its work is done. These departure times are the only data from the straightline graph that the crews see.

Within the box are instructions for each crew. These special instructions include details concerning the time of the meets, what track to hold on, and what train the meet is with.

If required, a detailed switch list is included below the special instructions, as shown in **fig. 3**. Most of the column headings are self-explanatory. Interestingly, the full-size BC&G used its own abbreviations for car classes,

not those developed by Association of American Railroads. For example, the BC&G used B for boxcar, H for hopper, and G for gondola.

The railroad also used its own abbreviations for lading, which I attached to the clipboard for crews to refer to. Each clipboard also has a list of basic whistle signals.

On the last line of the switch list is the total number of cars that should be in the consist before proceeding to the next town. This verifies for the crew that all scheduled switching was accomplished and the correct cars are in the consist.

## Developing switch lists

I developed my switch lists by walking the layout, using car cards as a surrogate for actual cars. I laid the cards on the layout and orchestrated manually what would happen during the session. This way I knew each train's length at every stage. It didn't take long to choreograph a session, since not all trains do switching. I recorded the starting positions of all cars so I could use the same set of conductor's orders again in another session by restaging cars to their original positions.

## A proven winner

I'm very happy with the schedule that evolved using the straightline graph, and the conductor's order forms have been well received by new and veteran operators alike.

My operating sessions have a laid back atmosphere, but crews have clear instructions on what to do. Operators work from a single sheet of paper that I can use again if I choose to. I also keep a copy of the straightline graph handy for this purpose. Otherwise, I can enjoy watching the BC&G and B&O crews go about their business moving products and people efficiently around a little corner of West Virginia. **MR**

*Brooks Stover is a retired automotive design engineer who lives in the Detroit area with his wife, Carol. They have two grown daughters and four grandchildren. You can learn more about the full-size Buffalo Creek & Gauley and see more photos of Brooks' layout on the Internet at [buffalocreekandgauley.com](http://buffalocreekandgauley.com).*

## Now on ModelRailroader.com

Brooks' previous Buffalo Creek & Gauley layout was featured in the December 1993 *Model Railroader*. You can view the article on our Web site, [www.ModelRailroader.com](http://www.ModelRailroader.com).