Eric Smith
Operations SIG Board of Directors
Editor, *The Dispatcher's Office*

Getting Started in Operations

What is the Operations SIG?

- To act as a forum for the member's exchange of information and ideas, and to develop improved ways for hobbyists to learn the art and science of operating a railroad and in particular a model railroad.
- To provide leadership for planning, developing, coordinating, and expanding the knowledge of operating model railroads
- To promote, develop, support and encourage participation by the public in model railroading.

Visit **www.opsig.org** for more information and membership details.

Types of Layouts

- Starter layouts – 4x8 ovals
- Display layouts – focus on scenery, animations, or running trains
  Chicago's Museum of Science and Industry Great Train Story:
  https://www.msichicago.org/explore/whats-here/exhibits/great-train-story/
  Miniatur Wunderland – Hamburg, Germany
  https://www.miniatur-wunderland.com/
- Timesaver/switching puzzles– don't get me started
- Operational layouts

Why should you design for operations?

- Keeps you sharp – requires some concentration to move cars
- Improves your modeling
- Adds a social aspect to your railroad
- Gives your railroad something to do

What is an operational layout?

- Every train, car, and track has a purpose
- Operations are intentional and controlled by a set of rules
- Wide variety of complexity levels can be put into play
- Can work with any scale and any physical size layout
- Applying rules does not mean it's not fun to run; in fact, giving trains a purpose means there's an end goal other than just running in circles
- Not for open houses – visitors generally want to see trains running, not switching cars in a deliberate manner

Components of Operations

- On-stage and off-stage
- Traffic Control
- Freight movement
- Passenger movement
- Special train operations

On-stage vs. Off-stage

- Operating layouts are like theater stages
- Some trains come on stage from one side/direction
- Trains perform some function
- Some trains leave the stage towards the opposite direction
- Simulates traffic coming from places you don’t model

Staging Tracks

- Can be parking tracks (inactive) or yards where cars are rearranged (active)
- Some people leave all cars on layout, others store cars off the layout
- Stub-ended – manually reverse trains between sessions
- Auto-reversing – use a reverse loop to simplify turning of trains
- Can always use more staging tracks

Staging Tracks

Mike Tomei's ATSF Albuquerque Division

Staging Tracks

South Oakland Model Railroad Club - Detroit

Staging Tracks

Jim Rollwage's Denver Pacific

Traffic Control

- Mainline trains normally don’t run without permission
- Yardmasters control track within yard limits
- In some places, trains coordinate with each other without dispatcher involvement

Types of Traffic Control

- Free for all – common in open house running, just don't hit the train ahead of you – not what we're talking about.
- Verbal orders – dispatcher gives permission for trains to proceed from point A to point B
- Signals – most expensive option – normally requires block detection hardware, signal logic circuitry, and the signals themselves
- Signals – paper signals are a cheap option
- Timetable and train order – most complicated and most paperwork for beginners

Paper Signals

A signal system to FIT ANY RAILROAD

Meet the Human Model Railroad Interface – paper signals allow prototypical operations without all the wiring and expense

By Bruce Carpenter
Photos by the author

Frankfort, Kan., is a typical intermediate signal location on the Kansas Subdivision. This view shows the key components of the system: the east and westbound signal locations, station sign, and spare signal holder.

Fig. 1 Train order signals. Bruce made these paper signals for his Milwaukee Road layout. The paper printouts are switched to show the proper indication.

Fig. 2 Signal set. This photo shows the signals required for West Sullivan on Phil Buck's Union Pacific Kansas Division layout. Since only one movement is possible at a time, some of the signals can be used for the main and the siding. Consult specific railroads' operating and signal rules for exact signal indications and definitions.

On most operationally based model railroads, a working signal system seems to be on everyone's wish list, in one form or another. I fell into that category when I built my HO scale BNSF Ry. Chillicothe Subdivision and my HO scale Milwaukee Road Rocky Mountain Division.

There are lots of things to consider when thinking about signals, though. Do you install them with relays or use one of the many computer-based systems? Do you build a Centralized Traffic Control (CTC) machine or use a computer monitor? Regardless, it's a lot of design, research, wiring, programming, time, and especially, money.

When my friend Phil Buck decided to build a modern-day version of Union Pacific's Kansas Division, signals were on his wish list, as well. Given the volume of traffic expected during each operating session – as many as 25 trains per session – the best way would've been to install a full-blown CTC system with control logic and operating block signals. Although the railroad is wired with individual blocks for an eventual signal system, a CTC system didn't fit Phil's budget.

In the end, when it came time for the first operating session, we settled on Track Warrant Control (TWC), via Family Radio Service (FRS) radios. I put together an exact copy of a UP track warrant form, and Phil had several pads of forms printed for the crews to fill out in the field. We knew the dispatcher was going to have his hands full making the "paper fly" to keep trains moving.

The first few sessions went fairly well, but our worst fears came true: the dispatcher was overwhelmed at times, causing sessions to end prematurely. After about a year of this, it was hard to get a dispatcher to step up to the task, attendance started to suffer, and sessions were ending before the operating schedule was completed.

In most cases, you could cut your operating schedule

MORE ON THE WEB

A free file including PRR, B&O, C&O, NKP, NS, BNSF Ry., Santa Fe and Union Pacific signals is available at MRmfiles@kalmbach.com

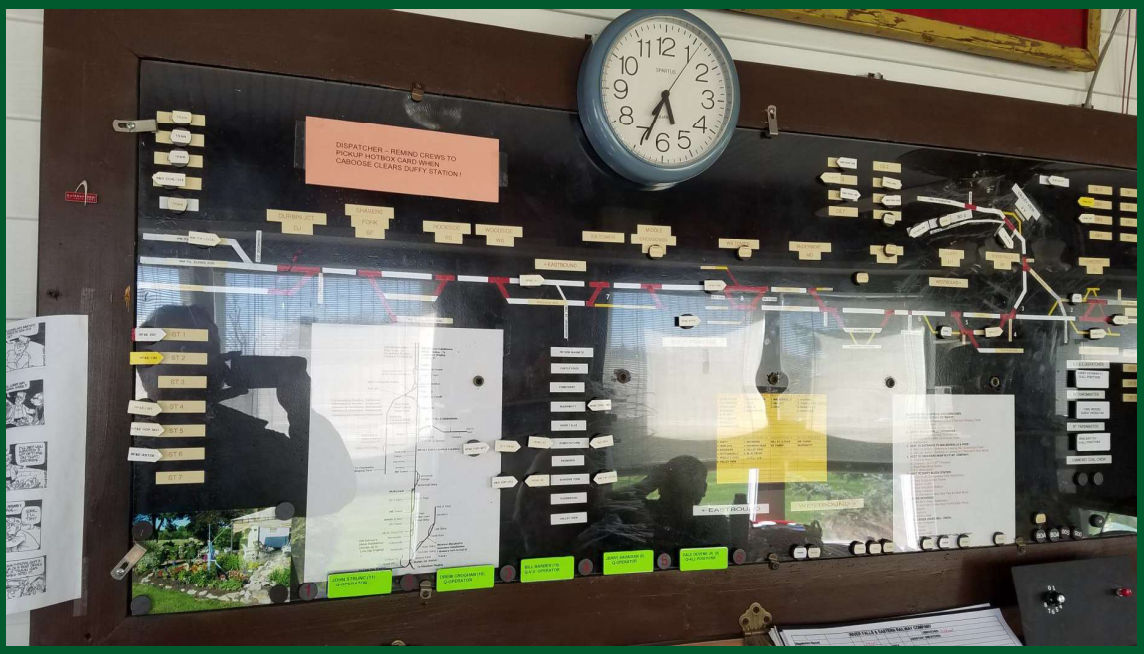
Fig. 3 Signal placement

Model Railroader – April 2017 Issue

Verbal Orders

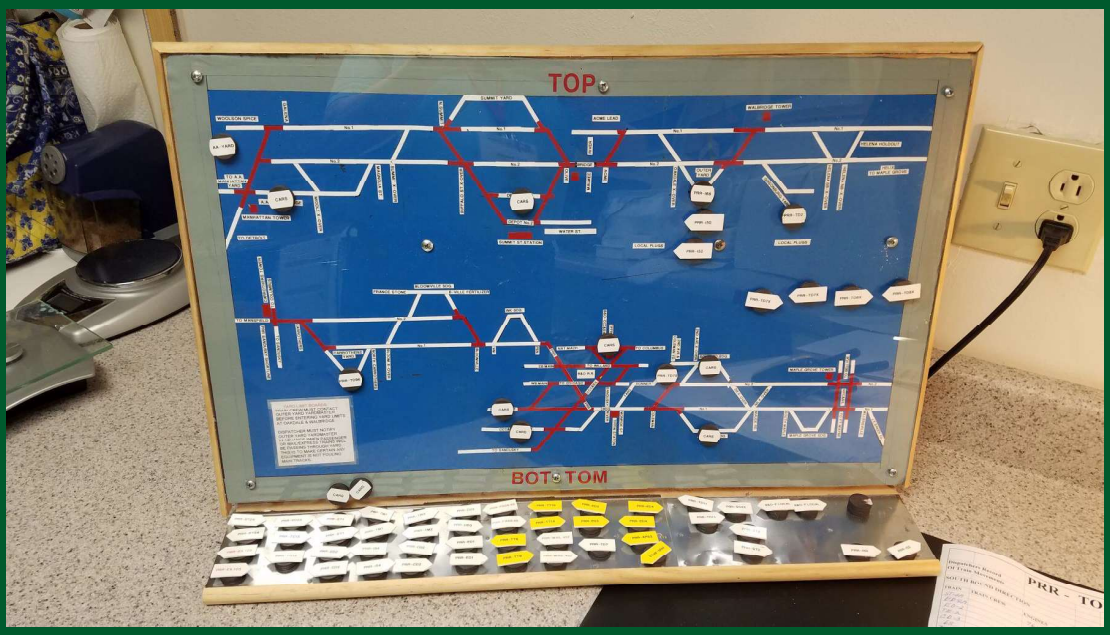
- Dispatcher keeps track of trains on a whiteboard/magnetic board
- Board shows schematic of track plan
- Dispatcher communicates with train crews with radio or loud voice

Tracking Board Examples



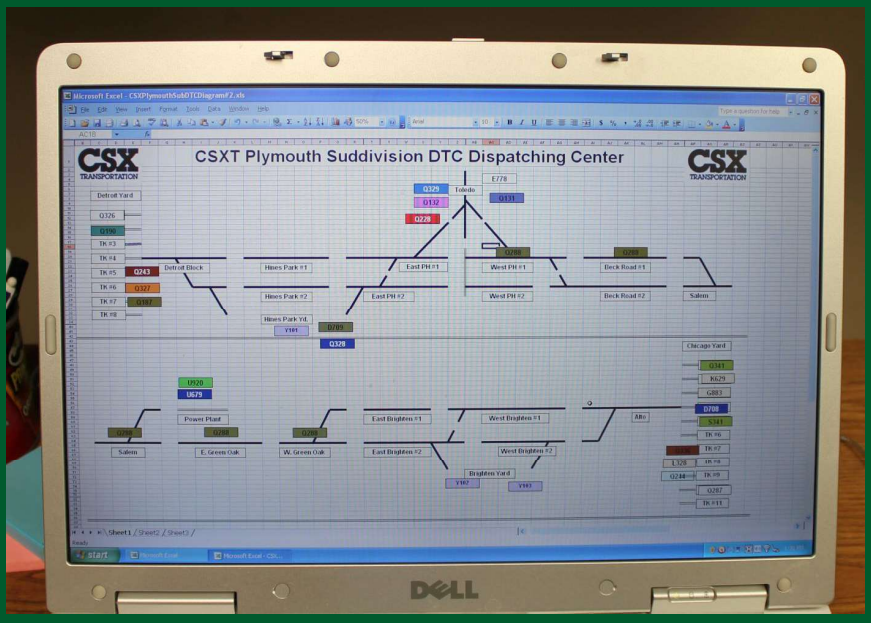
Larry Hickman's River Falls and Eastern

Tracking Board Examples



Mike Finkler's PRR Toledo Division

Tracking Board Examples



Chip Cole's CSX Plymouth Subdivision

Radio Communications

- Family radios are inexpensive option
- Earpieces cut down background noise
- Teach radio discipline, something like this:
  - Dispatcher: “Dispatcher calling train 123”
  - Train 123: “Train 123 answering”
  - Dispatcher: “Train 123 clear to proceed from current location to point C”
  - Train 123: “Train 123 clear to point C”
  - Dispatcher: “Dispatch clear”
- Long conversations should be done in person
- Can use separate channels for dispatch to yard, dispatch to crew room, etc.

Freight Movement

- Key component of most layouts
- Cars move with a purpose
- Combination of trains move cars between locations
- Real railroads have a mix of train types
  - Unit trains (coal, oil, potash, intermodal, etc.)
  - Manifest freight (mixed freight moving between yards) – more stops
  - Locals (move cars between yards and industries)

Freight Car Cycles

Every freight car goes through these steps:

- Empty
- Industry requests an empty car, car is delivered there
- Car is loaded at the industry
- Car is picked up at the industry and moved to the load's destination
- Car is unloaded at the destination
- Empty car is returned to either a yard, or taken directly to another industry to be reloaded

Freight Car Cycles

- A car may be loaded on the layout and taken offstage
- A car may be unloaded on the layout and taken offstage
- A car may be both loaded and unloaded at industries on the layout
- Cars may just pass through the layout

The specific cycle is up to you and how much detail you want to have

Unit Train Movement

- Easiest train to operate, good for beginners
- Unit trains generally take loads and return empty
  - Intermodal trains may run loaded in each direction
- Unit trains may have an industry to stop at, or they may go between staging yards (power plant receives coal, refinery receives oil, etc.)
- Fewest stops, minimal switching
- Focus on just the traffic control portion of the job

Unit Train Planning

- Size the train to your layout
- Train should not go through more than one scene or two at a time
- Passing sidings and staging tracks need to be sized properly
- Schedule/sequence trains so that you don't overload one yard or the other
- Turning power
  - Steam requires a turntable or reverse loop
  - Diesel can go to the other end of the train, or you can use pairs of engines

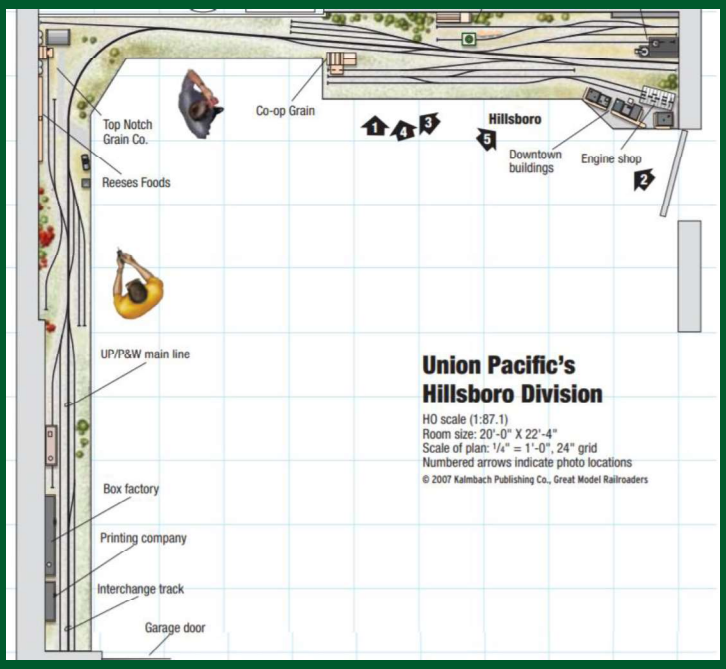
Manifest and Local Trains

- Manifest freight trains can deliver cars to yards, interchange points, etc.
- Local trains deliver cars to industry spurs
- Some industrial layouts only have local trains
  - Cars are left in yards at either end of the railroad to go elsewhere

Manifest and Local Train Sequencing

- Lots of possibilities here
- Manifest train comes into a yard
  - Cars heading for yard-served industries are removed
  - Cars heading for other yards are added to train
- Local trains are arranged to deliver and pick up cars at industries
  - Cars are dropped off at industry tracks
  - Cars are returned to the yard serving the industries
- Next manifest train moves those cars to next location

Industrial Layouts



Union Pacific Hillsboro Division – Model Railroader

Car Management Options

Simple exchange system

- Train arrives at yard or industry and trades a predetermined number of cars
- Don’t care about car numbers, car types, or loaded/unloaded status
- No paperwork, other than maybe instructions for the crew on what yards or industries to stop at
- No restaging, can just keep running
- Good for beginners

Car Management Options

Car order system

- Originated by Mike Wolf, Hank TenWolde, etc.
- https://groups.io/g/carordersmrr
- Focuses on moving car types to industry spots
- Don’t focus on loaded/unloaded status or specific car numbers

Car Management Options

Industrial	Industrial
CAR ORDER	**PICKUP ORDER**
40' Boxcar	40' Boxcar
Deliver To: **Allegheny Milling** **Spot 2**	Pick up at: **Allegheny Milling** **Spot 2**
When car has been delivered, place this card in box labeled: **SETOUT**	Forward car to: **Harrisburg**
	After car is gone, TURN card, then place in box labeled: **UNFILLED ORDERS**
West Valley Union RR	**West Valley Union RR**

Car Management Options

Car Cards and Waybills

- Waybill assigned to card goes through four steps
- Waybill is turned between sessions, so car only moves once during a session

Sunset Valley Railway – Bruce Chubb

Car Management Options

Car Cards and Waybills

- Most paperwork, but most experienced operators understand system
- Need to create a card for each car in inventory
- Focuses on car type and car reporting marks/number
- Layout owner has to ensure that all cards are in the right place to fix system

Car Management Options

JMRI Operations Pro

- Computerized system, freely available
- Generates list of movements for all trains on the layout
- Each car, industry spot, and train has to be entered into computer
- Online tutorials available at jmri.org
- October 2020 Dispatcher's Office will also have how-to article
- Focuses on car type, car number
- Errors in location can cause system to break down or have too many cars/too few cars on a train

Passenger Trains

- Operate like unit trains
- Some railroads prioritize passengers, especially in railroads modeling times before Amtrak
- Passenger trains may exchange/pickup/set out cars
  - Amtrak Empire Builder combines two sets of cars in Washington or Oregon to create train that heads east to Chicago
  - Amtrak had express freight boxcars that could be setout/swapped at stations
  - Older trains had to exchange Railway Express Agency cars
  - Cars/train might need to be serviced before going out again, or train might need to be turned

Passenger Trains

- Commuter trains are also option
- May only run part of the layout
- May be high priority or low priority depending on owner preference
- May run inbound at beginning of session and outbound at end of session
- Passenger trains add to operations complexity/interest
- Passenger trains can be cancelled/annulled if there aren't enough operators

Special Trains and Special Operations

- Maintenance of Way – slow sections of train, may have a maintenance train blocking track
- Fan trips – easy way to mix steam trains in with modern equipment
- Random events – train operator draws a card at a designated location with instructions on what to do.
  - Train breakdown
  - Leave a car at the next siding
  - Etc.
- Adds to simulation effect of running a railroad

Key Takeways

- Start small
- Operate on other people's layouts that have varying schemes
- Don't be afraid to try something
- Welcome new operators and be patient with them
- Combine the ideas you like and omit those you don't
- Any type of operation will make your railroad more interesting to run

Questions?

- Visit www.opsig.org for beginner resources
- Sign up at www.operatingsessions.com to participate in sessions near you
- Email Eric Smith at editor@opsig.org