GETTING STARTED IN MODEL RAILROAD OPERATIONS:
A SIMPLE SWITCH LIST SYSTEM
Arthur Boyd  C&P Junction   October 2013

From Train Layout to Model Railroad
As model railroaders, we make models of the real thing – selecting the parts we like and skipping the parts we don’t. We model:
- The engines and rolling stock
- The infrastructure (track, switches, yards, etc.)
- The setting (scenery, buildings, etc.)
- The movement (watch ‘em run)

Put it all together and we have a train layout: fun to make; fun to watch as “rail fans” on our miniature model of the world. Might even be enough to interest us for a lifetime, and what could be better than that?

But going only that far leaves out a huge part of the real thing. The missing part is modeling the operations of real railroads. If what we want to model is a railroad, then what a railroad DOES could be modeled also:
- Moving cars from shippers to receivers
- Moving trains required to meet shipper and receiver requirements

Modeling the operations parts of the real thing turns a “train display” into a “model of a railroad,” and that is a whole added dimension of fun. That display becomes a living, breathing organism made up of moving parts, each moving separately but in a combination to achieve a purpose.

Operations Pieces
Just as with the other components of the real thing we are modeling, for operations we get to pick and choose the parts we like and skip the parts we don’t. “Operations” can include timetables, signaling, train orders, waybills, fast clocks, dispatchers and on and on. Some people issue train orders by telegraph; some have great fun calculating when the load of coal will be used up and refueling is necessary; some set out miniature flagmen to protect the rear of a stopped train. The possibilities are endless. How much or how little, which components you use, or how accurately you portray them are yours to decide. It’s your railroad, after all!

The first general piece of operations is moving cars: determining which specific cars (freight or passenger) get picked up by which specific trains, to be delivered to which specific locations (yard, industry, interchange).

The second general piece is moving trains: determining what trains in which routings at what times are needed to get the cars where they need to go at the time they need to get there, and how to do that so the trains meet and pass each other without interference.
I’m going to focus on the first piece: moving cars, or what is referred to as “freight car forwarding.” While there are many methods described in the model press, I’ll describe only one very simple system.

**Simple Switch List System (SSS) - Criteria**
The Simple Switch List System is one I’ve adapted, drawing on the ideas of others, but unfortunately the sources are lost to my memory. The system served well on an 18x36 N scale layout (that’s inches, not feet!). It would work on any small to medium size layout with a relatively small freight car fleet and number of industries. It could easily be adapted to a modular layout such as Ntrak.

A simple system ideally should:
- Be easy to set up
- Be easy to use
- Be self correcting
- Be forgiving of times you “just want to run trains”

Easy set up might mean not a lot of paperwork or computer data entry or head scratching. Easy use might mean easy to follow instructions for the train crew, not a lot of re-setting between operating sessions. Self correcting might mean a car left in the wrong location is not a problem, and automatically gets handled properly in the next operating session. Forgiving of “just plain train running” might mean that if you just pull a bunch of cars into a train and run them around for the fun of it or to show visitors, that does not screw up the next operating session.

In other words, it needs to have a low MTTF factor – Mean Time To Fun.

**SSS – Description**
Take an example of a small switching layout: my 18” x 36” N scale empire. (The track plan was a modified version of layout #10 from Lynn H. Westcott’s book “101 Track Plans” by Kalmbach.) It had a nine-car freight car fleet and seven locations where the cars can be set out (industries, yards, etc.). Some locations can hold more than one car.

Here are the locations and set-out spots:
2 spots Freight house
3 Yard
2 Lumber mill
1 Farm supply
1 Barrel Factory
1 Foundry
2 Interchange
12 spots total
With 12 spots and nine cars, the layout is only 75% filled. A higher proportion of the layout filled would make operations hard, clog yards, complicate switching unnecessarily, and reduce the fun factor!

Note that each of these industries or locations could reasonably receive any of the most typical freight cars (box, flat, gon). The car fleet for this example model railroad only uses those three most typical car types. Choosing an ice house as an industry limits the switching opportunities, since only a reefer would reasonably be spotted there. Picking a tri-level auto rack for the car fleet similarly limits the switching opportunities: on this layout it could only go to the yard or the interchange (“magic” locations because any car type can go there!).

Thus, to maximize switching opportunities, avoid industries which can only take one car type, and avoid car types which can only go to specialized locations. The larger the number of possible car locations on a layout, the larger the variety of car types you can employ and still keep operations interesting. (That tri-level auto rack could only move back and forth on this layout between the yard track and the adjacent interchange track – boring!)

SSS – Set Up
Set up is done only once, and goes like this.

1. Make a list of your industries, the number of spots at each, and the car types that could reasonably be spotted there.
2. On a large sheet of paper, draw a number of large boxes – one for each car spot – and label them for the industry name and spot number. So the Lumber mill’s two spots would mean two boxes on the sheet. If an industry can only take specific car types which excludes a type in your fleet, mark that in the box: “No gondolas.” This is your “Industries/Locations Sheet.”
3. Make a piece of paper a bit smaller than the boxes you’ve drawn, one piece for each freight car, and write the description of the car on the paper. With a small car fleet, maybe that is “AT&SF flat;” for a large car fleet, maybe that is “AT&SF flat #95607.” I used railroad reporting marks, car type and color: “AT&SF flat - brown.” Also make a piece of paper, left blank, for the number of spots that exceed the number of cars (three, for this example layout and car fleet). These are your “car papers.”
4. Take your “car papers” (including the “blank” ones), shuffle them, and deal them out – one to each drawn box on the industries/locations sheet. If a prohibited car type comes up for a location, pick the next car paper instead. See Figure 2.
5. On a 3x5 card held in the vertical direction, write “Switch List #1” on the top, and write the industries/locations in a vertical list down the card in their route order on the layout. Look at your “Industries/Locations Sheet” and write down the car identifying information from the “car paper” in the box for each location. A blank car paper gets no entry on the switch list. There you have it: a completed switch list. See Figure 3.
6. Shuffle and distribute the car papers again, write the result on a card for “Switch List #2,” and repeat as often as you want. Four switch lists are enough to prevent each new operating session from seeming repetitive.
7. Distribute your freight car fleet randomly to industries and locations around the layout.

Your set-up is complete. Time to call an engine crew!

**SSS – Operations**
Your engine is ready, engineer is in the cab, and caboose (if used) has a coffee pot steaming and brakeman ready for orders. Now you, the conductor, pick one of the switch lists at random (except not the one just used in the immediately preceding operating session).

You are probably in the yard, but you could start anywhere. You may have cars assembled into your train, or not. Wherever your engine is, consult your switch list to see what cars are shown at that location. If there is a car in the location that is not shown on the switch list for that location, pick it up. If there is a car in your train that is shown on the switch list as assigned to that location, set it out. Anything else: leave it alone.

Pump up the air, do a brake line air test, and head down the line to the next industry or location. When there, consult your switch list, pick up any cars there that are not designated on your switch list to be at that location, and set out any cars in your train that are designated on your switch list to be at that location. See photo on page ____.

Pick ups first, set outs second. Your switch list might require you to move a car to or from a location on a spur with a facing-point turnout (the engine is facing toward the diverging spur track). In that case, you have to run around your train. No siding to make a run around move? Go to the nearest siding to do your run around move, and return. Is the first spot on the spur occupied and you need to make a move to/from the second spot? You will have to move the car in the first spot and return it after you have made your move for the second spot.

Keep working each location in succession. When you get to the end of the line, reverse your train and work each location as needed until you get back to your point of origin. At this point you should have no cars in your train, and every car is in the industry or location shown on the switch list.

You’ve just completed a train job called “a turn,” in which a local way freight runs from a yard or terminal to a town or towns down the line, and returns to the original terminal.

Ready to try it again? Pick any switch list except the one you just completed, and head on down the line!
**Additional Refinements**

In this example layout, with only nine cars, a full operating session could take as much as an hour depending on the complications presented randomly because of which list followed which other list. There are more refinements and additions you could consider.

A two person crew can be fun: one is engineer, the other is conductor. Engineer moves the engine based on directions of the conductor; conductor consults the switch list and the cars on the tracks to plan moves to get the job done in the fewest moves.

You can add specific spots to one industry: If an industry can take two cars, you could label “door #1” and “door #2.” Your switch list would now designate “Industry ABC door #1” and “Industry ABC door #2.” That adds interesting “complications” to the switching, and makes the fun last longer!

You can add industries and cars (writing them in on your switch lists), but this system is designed for a fixed industry and car fleet and additions are not easy or elegant. The balance of about 75% of the spots filled with cars needs to be maintained.

A larger layout with more cars and industries can have specialty cars and industries requiring them, but there need to be several possible locations for each car.

On a larger layout with a longer mainline run between towns, you can add to the train any other cars to give whatever length of train you want – these will be “through cars” and will not be switched. Since they are not listed on the switch list for any industry/location, they will remain in the train. If you add cars that are not on the switch list and place them at industries/locations, they will get picked up and remain in the train at the end of the session. Has your train now gotten longer than your runaround siding? Another interesting puzzle to solve!

A layout design with both facing point and trailing point spurs adds switching interest. A town or spur not near a runaround track adds even more fun, and requires the conductor to think ahead. It is embarrassing to get to an industry and have no way to set out that car!

Adding special rules can be fun, such as “hazardous materials cars must not be adjacent to the engine or caboose in the train.” A caboose adds switching moves compared to operating without one.

**What next?**

If you give this a try and like it, there is a whole new world out there to explore. There are often articles on model railroad operations in the model press. There are websites with a wide variety of examples of operating methods, sample forms, etc. There are computer programs to organize the movement of cars and the movement of trains. Most importantly, there is a network of folks pursuing this aspect of the hobby, through the Operations Special Interest Group (OpSig). Find them at www.opsig.org.
Warning! I built my little 18” x 36” layout just to have “a little something” while I planned and built my dream empire. But once I set up and started operations with this Simple Switch List System I kept having so much fun I did not get on with the big layout. After a couple years I finally sold the little layout, not because it was no longer fun, but because it was so much fun it was keeping me from going on to greater things!

Addendum – Application to Modular Set-ups (Ntrak etc.)
This Simple Switch List System could work easily on modular layouts like Ntrak, by a lone operator or a two-person crew. Since a modular layout can have different modules for any set up and any number of varying cars, the SSS needs a simple adaptation for this.

Select a fixed set of freight cars kept together for this purpose, and make your switch lists using industries and locations generically labeled A, B, C etc. Then make up your switch lists. Instead of, say, “freight house” as a location, you will have perhaps “D.” Also, make a set of small cardstock pieces, each marked with one industry/location label (A or B or etc.). These could be business cards, putting the label on the blank side, and folded to make a “tent” for easy placement on the layout.

On the layout, set up your designated operations car fleet on one of the mainlines which has industries (for Ntrak this is the blue line or the OneTrak branch). Add any other cars to give whatever length of train you want – these will be “through cars” and will not be switched. Locate functioning spurs and set your generic industry label cards around the spots on the functioning spurs. Then pick a switch list and head on down the line!

Addendum – Modifications to Published Layout
Many published layout designs suffer from having more tracks drawn in than can reasonably fit. It is an occupational hazard of layout dreamers. I started building the published layout #10 by drawing it out full size and placing buildings around. Crunch! Reality bites! I removed two spurs to increase the “scenery to track ratio.” I also added an industry on an existing track where space had opened up, thus increasing the switching complexity required to get to that industry. Also I designated an un-used spur off the runaround track as an interchange track, increasing the switching flexibility without adding track.

For more scenic interest and to separate the industrial area a bit from the yard area (supposedly miles apart), I introduced a 3% grade to the curve, lifting the industrial area just enough above the yard to lend a sense of a different scene. That curve? It was 7 and a half inch radius – ridiculous, of course, but after all this was a switching layout where tight curves are common. Short cars and short locomotives lessened the visual sharpness.