Dispatch Your Trains!

Elements of Train Dispatching, a "how to" clinic

By Steve "Breezy" Gust and Rick Kang

Most of us enjoy, appreciate, and strive to model detailed rolling stock, motive power, structures, and scenery and many of us also model the processes and documents (waybills, switchlists) that specific movements of freight and passengers. Few of us add the overarching aspect of Train Dispatching, a key feature of the prototype.

Dispatching adds several dimensions of realism by:

a.) more precisely defining and structuring train movements.

b.) providing lots of opportunities for interaction among operating employees, the content of communications and the communications themselves add a great deal of authenticity to an op session!

So, we hope you're here because:

A. you want to know more about how Train Dispatching works.

B. you're thinking about adding Train Dispatching to your layout.

What is a TRAIN (rulebook definition vs. functional definition)?

Carloads go from Customer A to Customer B. A given railroad may run that car from origin, over intervening route, and/or to termination point, and handle any single segment or combination thereof.

Trains (freight traffic as carloads) originate/terminate at:

1. Connecting railroads: INTERCHANGES.

2. Online marshalling of and distribution of local traffic: YARDS.

Trains may handle BRIDGE traffic (ENDPOINTS/INTERCHANGES), ON-LINE traffic (YARD TO YARD), and LOCAL traffic (to/from CUSTOMERS to/from YARDS).

HOW DO PHYSICAL TRAINS COME INTO BEING?

When sufficient tonnage and/or marketing schedule dictates, a train is CALLED to depart its originating connection or yard:

a. Yardmaster offers a train (ID-destination/blocks, tonnage) to Assistant Chief Dispatcher

b. YM works with Assistant Chief Dispatcher to determine CALL TIME based on train arrival/yard work/schedule, availability of POWER, CABOOSE, and CREW, and on TRAFFIC SLOTTING considerations.

c. Crew Dispatcher selects and notifies (literally calls) crew members based on labor agreements.

d. Yard clerk/Yardmaster fill out CALL SLIP ("Soup Ticket") that lists train information (ID, call time, Conductor/Engineer names and on duty time, engine numbers (including helpers), caboose number, loads, empties, tons, length, this data is passed to Train Dispatcher.

HOW DOES THE DS BRING THE PHYSICAL TRAIN TO LIFE?

a. The DS records the train data on the TRAINSHEET (station record of train movements), a government document that looks like a do-it-yourself blank timetable. Each train is posted to a column header, opposite directions on each side of the station list column.

b. The DS is responsible for creating and OKing paperwork to ensure that crews receive written notice about track restrictions (slow orders, hazards), and about hi-wide load restrictions. Usually via TRAIN ORDERS listed on a CLEARANCE. The OPERATOR (train-order telegraph operator) at the originating station yard office, has the actual paperwork, compiles it, and gets OK from DS.

c. The train doesn't yet have AUTHORITY to OCCUPY THE MAIN TRACK! FIRST THE DS MUST ENSURE THAT PROTECTION IS PROVIDED AGAINST OPPOSING MOVES! Then the the DS provides AUTHORITY.

Whoa, what is AUTHORITY? Let's visit a scheme devised by SP Rules and Training Officer Bill Farrens back around 1970, that simplifies the basic concepts of safe train movements on MAIN TRACK (what's the main track?):

AUTHORITY, CONTROL, and PROTECTION   A-C-P concept:

AUTHORITY: permission to move DIRECTIONALLY on MAIN TRACK.

CONTROL: provisions designating ROUTE, STARTING and STOPPING POINTS, STARTING and STOPPING TIMES, and STARTING and STOPPING CONDITIONS of movement.

PROTECTION: Protection against OPPOSING and FOLLOWING or PRECEDING traffic.

Timetable, Train Orders, Signal Indications, Flag and Lantern Signals, DTC and TWC forms, and many operating RULES all provide and describe various A-C-P provisions.

The DS PROVIDES AUTHORITY BY one of these following means:

i. OKing Clearance addressed to REGULAR TRAIN (TTTO territory), a SECTION may be specified on clearance. (NO 552, SECOND 554).

Train receiving such clearance is regulated by leaving times shown in timetable for that schedule number and by rules against superior trains.

ii. Issuing TRAIN ORDER to run or work EXTRA, and clearing train as Extra (identifying engine number) (direction) ex. EXTRA 8878 WEST, or WORK EXTRA 4334 (TTTO territory), extra's movement is governed by rules and timetable times/info, and by contents of train orders, against superior trains and other potentially conflicting trains. The DS is ultimately responsible for the PROTECTION against OPPOSING movements.

iii. Clearing an absolute (interlocking) signal that gives train authority to enter CTC or INTERLOCKING territory and proceed to next absolute (interlocking) signal.

iiii. Issuing verbal authority to occupy specific blocks in DIRECT TRAFFIC CONTROL (DTC) territory directly to crew via radio or phone, who after writing down on prescribed form, must repeat back the instructions and receive "that is correct" from DS prior to acting on such instructions.

v. Issuing verbal authority to occupy specific territory while complying with dictated restrictions in TRACK WARRANT CONTROL (TWC) territory directly to crew via radio or phone, who after writing down on prescribed form, must repeat back the instructions and receive "that is correct" from DS prior to acting on such instructions.

vi. OKing Clearance in DOUBLE TRACK-CURRENT OF TRAFFIC territory that specifies Train ID (including Direction) and originating and terminating stations. Train will run with current of traffic and be governed by automatic block signals warning of preceding movement. ("wrong-way" moves require special PROTECTION!).

Note: on very low traffic branchlines (and even on primary routes in olden days), "staff" or "token" authorities were used, currently usually REGISTER sign in/sign out is used. Historically, staffs/tokens were sometimes used in conjunction with MANUAL BLOCK systems where adjacent STATION OPERATORS communicated that intervening block was clear and then authorized a train to proceed while opposing signal was held in stop position manually safeguarded or interlocked with the "token".

Also Note: There may be Yard Limits on a Main Track to enable Yard Engines to occupy Main Track without authority from Train Dispatcher: Control and Protection are via the rules and signals: typically times of First Class trains must be cleared and all movements must be made at Restricted Speed.

IN ALL CASES, trains must comply with rules to safely enter a main track, protecting against or obtaining permission from person in

charge of that section of main track (typically YM or DS who will provide protection) trains approaching from rearward direction.

The track speed limit governs the severity of the protection required!

So, now we're authorized to operate on a section of main track, we have permission to enter the main track, now what?

Remember that the DS is responsible for trains over an entire DISTRICT (typically several hundred miles)! If the DS doesn't know where you are and what you're doing, the DS can't keep you moving! See "Breezy's" wonderful slide about "You may know where you are and what you're doing, and God many know where you are and what you're doing, but if the Train Dispatcher doesn't know where you are or what you're doing, you better be on good terms with God!"

TRACKING (reporting of train location/status) is the next critical element of TRAIN DISPATCHING! This is the MOST OVERLOOKED element in modeling operations, you cannot replicate dispatching, particularly TTTO, without frequent proper OS (on sheet) reports! Some of the new electronics can tell the DS that something is occupying a section of track but that ISN'T SUFFICIENT, we need to know about approach, who, delay (arrival and departure), etc.., if you want to play the game, PLAY THE GAME!   Crews can furnish OSs, but NEED TO BE TRAINED! A station list with blanks for OSs for the Conductors often helps train and promote good OS habits.

The DS records OS times on the Trainsheet. To aid the DS visualize the railroad, particularly a novice DS, having a mimic board with icons is sometimes useful, creating a train graph (stations versus time) is also useful, and an electronic panel display is impressive but not always useful without sufficient ID info. We highly recommend learning how to manage and interpret a Trainsheet, really simple, just fill in the reported times (helps DS locate right spot on trainsheet if crews identify themselves by Station, Direction, Train ID, Crew Name, IN THAT SEQUENCE! when they call the DS on phone or radio).

The block authority sheets used in DTC/TWC need to be kept current, and will reflect state of railroad, but the TRAINSHEET really

should become the current "snapshot" and the staple record (will provide interesting historical data also!).

Nothing goes as planned, Murphy sees to that. So, the THIRD major element of Train Dispatching (after AUTHORITY and TRACKING), is MODIFICATION of movements! The DS needs to be able to change meeting points, hold trains, and advance trains beyond what their current movement instructions provide for. Train orders (TTTO), signal indications (CTC), and new block authority (DTC) or new warrants (TWC) are the most common means. There are various rules that provide for safe modifications, hazards of accident can be created if sufficient safeguards aren't observed. We'll go over some of the details shortly.

So, the three basic ELEMENTS of doing Train Dispatching are:

1. Granting AUTHORITY to occupy and run on Main Track

2. TRACKING progression of train movements

3. MODIFYING the authority within special and temporal specifications to keep traffic safely and efficiently flowing.

When you are considering adding Train Dispatching to your layout, here are some initial issues:

1. ERA: what technologies are appropriate and available?

2. Prototype: what system did your prototype use in that era?

3. If you're freelancing, what are the actual economics (mostly for communications)?

4. How many crew members can you devote to Operator's jobs, and is there space for these people?

5. How much traffic is run, what type of Dispatching system might work best? The volume of traffic is probably a lot more significant than the trackplan.

What do we recommend?

Don't dispatch for yard operations, industrial switching, "bottleneck" situations. Use Interlocking and/or Yard Limits authority!

Generally you'll need staging somewhere as a place for trains to originate and terminate offline.

You can set up a Train Dispatching system for even a single station layout, or a simple loop. Obviously a point to point configuration leads more naturally to dispatching but closed loops can have paperwork adjusted to simulate a lot of distant mileage.

You will need to designate and provide signage for STATIONS, perhaps MILEPOSTS if you elect to use them, and BLOCK (for DTC) and YARD LIMITS.

DTC or TWC are simplest, almost designed for model railroad applications. Timetable and D-251 are even simpler to implement, minimal paperwork, but very little flexibility/control. May work really well for a display layout. "Number 21 is due in ten minutes."

Speaking of which, a CLOCK is a necessity, since we deal with time for CONTROL and PROTECTION and even for AUTHORITY (leaving times). Prototype designates STANDARD CLOCKS that must be verified daily. You may elect to use "fast time" or not, remember that switching and most other station work takes about same time on model as on prototype (if you follow prototype procedures).

Interlocking/CTC is a lot of fun for the DS but reduces involvement of train and engine crews and is relatively difficult and expensive to implement truly prototypically (with short OS sections, "delay" feature, train graph), try a small interlocking for starters.

TTTO is nostalgic, challenging, can be very interesting, but there are several good reasons why the prototype got away from it ASAP. Very messy very quickly, complex for operators to understand and execute, really needs online Train Order Operators to do it justice.

What makes us cringe are hybrid systems which are usually quite unrealistic. There are many tradeoffs designing and implementing a dispatching system that is realistic, safe, and reasonably

prototypical, yet is practical to use on a model that has a relatively limited total mileage.

During the two clinic sessions (sorry that "Breezy" Gust was unable to attend to share presenting this clinic and to do his excellent clinic about TWC) we covered the seven most requested topics from a fairly detailed topics list that I'll also supply for posting to the clinics listing website.

You're welcome to email me at epoguy@gmail.com with questions.

Thanks for all the great interest in Train Dispatching!

Rick Kang Sept. 7, 2015