Run8 Primer

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Introduction

This primer's purpose is to familiarize new Run8 players with the Run8 interface and essential concepts for prototypical railroading. This will be done by picking up from where Jack's Run8 15 Minute Quick Start Guide leaves off. That guide, and therefore this primer, starts from the assumption that your Run8 program is installed and functioning correctly. By the time you finish reading this primer and understand the concepts provided, you should be prepared to join Run8 multiplayer servers. Keep in mind that every server has rules and guidelines to read that can vary- always read any operations documentation provided so you don't disrupt other players.

While this primer covers many topics, it does not contain everything there is to know about Run8. For example, this primer does not cover customizing your industry configuration, spawn points, AutoDS, bells and whistles, etc. Also keep in mind that

updates, DLC releases, or “real-life” news may make some information out-of-date. The most recent version will be hosted at https://smashedfinger.github.io/.

We hope this primer is useful, if you have further questions or feedback feel free to reach out to SmashedFinger on Discord or the Depot forum. Thank you for reading!

Program troubleshooting

While Run8 troubleshooting is not the primary purpose of this guide, there are troubleshooting resources new users should know: Firstly, the official support website is https://run8support.com/. There you can find a knowledgebase that can help solve many issues, including license issues, DLC installation, and updater instructions. Be sure to run the updater app after installing the game for the first time. An important tip is to back up your installers and save the transaction IDs. His79 has made a FAQ thread that has many useful points of knowledge, including a “common problems” section that may be useful for brand new users, as well as a step-by-step guide for DLC installation. If you would like more detail with pictures, Jack has that available at http://run8guides.com/.

Recommended reading materials for beginners

The Run8 community has created many resources that can be used to improve your experience. As noted in the introduction, if your Run8 program is running properly then Jack’s Run8 15 Minute Quick Start Guide is the best place to get an understanding of the basic movement of the player and train, as well as some basic dispatching. The rest of http://run8guides.com/ is useful, having some links to other helpful third party tools like the external assistant for Run8 and the external consist editor for Run8.

Please note that Run8 also has a **user guide folder** with several PDFs included, located in C:\Run8Studios\Run8 Train Simulator V3\UserGuide by default. For people new to Run8, I particularly recommend `keybindings.pdf`, `Run8v3DefaultKeyboard diagram.pdf`, `UsingTheConsistEditor.pdf`, and the grade maps for your territory (Mojave and Needles, for example). In addition, documentation on many of the advanced topics not covered in this primer can be found there.

One more resource I’d recommend to someone who is new to train simulation or railroading is the CSX railroad dictionary. It contains definitions for much of the slang, lingo, jargon, and vocabulary used by railroaders. This primer will try to define many terms as they’re introduced- feel free to use “ctrl-F” to find what you need.

Starting or joining a world

In single player, Run8 is very much a sandbox game with a continuous world. It's not "scenario based" like some other games, and you can choose to set your own goals

and make your own fun- similar to a model railroad. This could include running a *road train* from one destination to another, *switching cars* in a yard or plant, delivering and picking up cars on a *local*, *dispatching* trains run by AI or people, and more. Run8 can also be set up to be run *prototypically*, basing operations on chosen *prototype* railroads from the “real world”.

You can access saved trains and worlds from the main menu or by pressing F1 in-game.

- The “Extra Board” tab is saved locations for your character to occupy. You can use this to load into an empty world, or teleport around in-game. You might think of it as a saved camera position.
- The “Train” tab will load a single saved train at a pre-set location.
- The “World” tab is similar to “scenarios” in other sims where the trains and locations are saved.
- The “Auto-save” tab periodically saves the world you have loaded and the train you control.

If you wish to play in single-player, there are pre-made worlds that are set up for you to do what you like at your own pace. In addition to the “Busy Barstow” world save included with the game, you can download saves from other people. Two popular ones are available on the Depot forum: Bradlb’s “A Very Populated SoCal” and Hontz’s SoCal Single-Player Setup. One thing to keep an eye out for is making sure your industry configuration file matches the save, so your industry tracks handle cars properly. Bradlb’s requires the Depot’s config, Hontz’s includes a customized config in the download. Note that using these customized configuration files will overwrite the default one, and any edits you’ve made to it.

Multiplayer servers give you the chance to be a part of a community and a world that keeps moving while you’re not there, and can have more structure with little set up on the player’s part. There is a tutorial from the Depot on youtube showing how to connect to a Run8 server. Be sure to set your player name before joining a server by going to the top left “train” dropdown, then “crew avatars”. Press F2 to open the network menu, and click the “client” tab. Make sure you load the proper region and have the necessary connection information (IP address and port) for the server. When entering the password, be careful that you don’t have any blank spaces at the beginning or end- you may want to hit delete and backspace a couple times before putting passwords in.

Once you have loaded into a single-player world or connected to a multiplayer server, you can look around for work that you can do. Make sure you follow the rules and guidelines the server staff may have set so you don’t disrupt other players. Oftentimes it is smart to ask questions about what to do, so that you don’t make a mess that needs to be cleaned up later.

Running a basic road train

The simplest thing a new player can do is drive a train from one location to another. For example, a *relief engineer* may take over on a *manifest freight train* taking a variety of cars from one *yard* to another. This train may be stopped at a *siding* for *recrew* after being *tied down* by another *train crew*. A yard is where cars get sorted and trains are assembled or "built". There is important knowledge you need to know to run such a relatively basic train in Run8, especially in a *prototypical* environment. Unless you have a tutor with you for this, I encourage doing this for the first time in single-player and on a track that isn't too steep. There are several saved trains available in the F1 menu but you could also build your own with left-control+F1. The "Train Maker-Upper" is explained by `UsingTheConsistEditorV3.pdf` in the UserGuide folder (there are some nuances to train building that might get you in trouble if you don't know them, covered later in this primer). Before we proceed, make sure you've read and understand the lessons in Jack's Run8 15 Minute Quick Start Guide. This primer builds off the knowledge provided there.

Important controls - getting started

If you move your mouse cursor to the top left corner of your screen, a series of tabs with dropdowns will appear. We'll call this the "Top left menu". You can adjust various settings here, such as graphics, audio, the time in-sim, and more.

The first time you click on a train, whether it's a locomotive, a cut of cars, or a full train, you'll get a notification that "Train now belongs to you". If you wander too far from your train and get lost, you can teleport back to it by going to the top left menu, and under the "train" tab selecting "transport to my train". To control a different train, you'll need to relinquish your train, done by:

- Selecting a car or the original train you control, and clicking "relinquish" in the pop-up menu. NOTE: It is very easy to hit the adjacent "delete" button on accident!
- Pressing Left-Alt+R
- Hovering over the top left menu, go to the "train" tab, and select "Relinquish my train"

When you select a locomotive, it will turn red and the train menu will appear. As done on page 5 of Jack's guide, you can click all five "Auto" buttons and run a train just fine (after checking the DPU settings). You can see the unique *road number* of the locomotive at the top, and a *train symbol* may be entered at the bottom. The nuances of this locomotive menu will be covered in depth later in this primer. We will get into the cab of the train now (Left-ctrl+F11).

Note there is a difference in meaning between **train** and **locomotive**. A train is the collection of **cars**, passenger or freight, connected to one or more **locomotives**, also known as **engines** or **units**. A set of cars coupled together without any locomotives is called a *cut.* Before departure, a train may need to couple to one or more cuts on different tracks- this is called *doubling*.

Each locomotive type in Run8 has differences that set it apart from others. You can use every type of locomotive- they are not locked behind DLC. One exception is some of the C44-9Ws in Dash 9 packs 2 and 3 will not have their Multi-function displays, and their gauges will not work. A list and gallery of all locomotives can be found in the Depot rolling stock database, and is useful for familiarizing yourself with the different models.

Air brakes- the basics

I think that before you start moving a train, it is best to know how to bring it to a safe stop. With that in mind, we will start by discussing the airbrake system modeled in Run8. The main principle to understand is that intentionally applying the airbrake using the Driver's Brake Valve results in a decrease in *brake pipe* air pressure, which in turn, causes a *brake cylinder* application. Conversely, releasing the air brake causes an increase in brake pipe air pressure, which triggers the brake cylinder release.

Note that this is a system which is designed to be 'fail safe'. The loss of brake pipe pressure for any reason should result in the air brake applying automatically throughout the train. In Run8, this could be the result of a derailment or a broken coupler, resulting in train separation and the loss of brake pipe air pressure. For the same reasons, uncoupling without first properly closing the appropriate brake pipe anglecock may also result in the uncontrolled loss of air from the brake pipe. Another situation in Run8 would be disconnecting the Air Hoses between cars without closing the anglecocks. **Any situation where the brake pipe pressure is lost will result in the air brake automatically applying**, and will require a PCS reset on any locomotives that were connected to the air system.

If you prefer a video to watch or listen to, the Depot has a good Youtube video explaining air brakes in run8. Please refer to the diagram below throughout this written explanation.

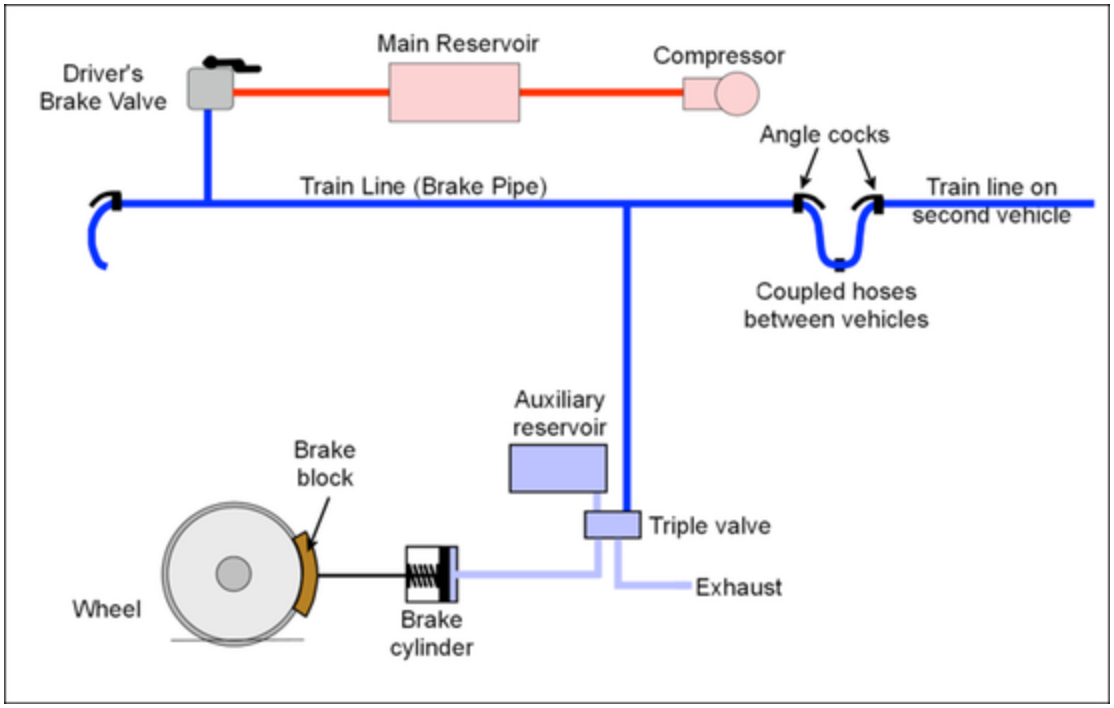


Image Credit: http://www.railway-technical.com/trains/rolling-stock-index-l/train-equipment/brakes/

First, The *compressor* takes air from the atmosphere and increases its pressure by storing it in the *main reservoir* (MR),which can be used to do work. The pressurized air flows from the main reservoir through the *brake pipe*, and charges the *auxiliary reservoirs* on each car.

- ➢ Advanced: The brake pipe is normally fed with air up to a pressure value somewhat less than that in the main reservoir. In Run8, this brake pipe feed pressure value is controlled by the 'FeedValve PSI' setting. For freight operations this is typically set to 90 psi, passenger is 110 psi.

The auxiliary reservoir on each car in the train stores pressurized air to provide a local supply of air, ready to apply the brake if and when necessary. When the brake pipe pressure is reduced, each car acts independently via its triple valve to apply the brake on that car using air from its own independent auxiliary reservoir.

- ➢ Explanation: The provision of a separate auxiliary reservoir on each car ensures that even if a train derails or breaks apart into multiple portions and all air is lost from the brake pipe, there should always be the stored air available in the individual auxiliary reservoirs on each car to bring all of the cars in the train to a stop.

You might think of the brake pipe as a way of communicating to each car, as well as supplying "power". If the main reservoir lacks air pressure, you won't be able to release applied brakes.

Next, note the *air hoses* that connect each car in the train. The flow of air is controlled by *angle cocks* that can be opened to connect the car to the air brake system,

or closed to remove it. It takes time for air pressure changes to flow from the locomotive to all the cars, especially in longer trains.

Brake application and release

When the *train brake* (formally called the *automatic brake*, and called the driver's brake valve in the diagram) is moved, the air pressure in the air brake system changes. When the train brake is moved to the right, called an *application*, it produces a decrease in the brake pipe pressure. The triple valves on each car then respond by allowing air to flow from each auxiliary reservoir to the brake cylinders to apply pressure to the *brake blocks* and push on the wheel. This slows the wheel down through friction. You can gradually increase the application (by making progressively greater brake pipe reductions) to brake harder. An application of the automatic (train) brake normally results in the brake applying on all vehicles in a train - the locomotive(s) and all of the cars.

- ➢ Once the brake pipe pressure is reduced to about 65 psi, the brake is fully applied. Continuing to reduce the brake pipe below this pressure would not normally produce any further increase in braking force.
- ➢ During an automatic (train) brake application, if desired, the brakes on just the locomotive(s) may be released ('bailed') by holding "." (period key), whilst leaving the brakes on all the cars still applied.
- ➢ During an automatic brake application, the brakes on the locomotive(s) require adequate pressure in the main reservoir in order to be functional.

When the train brake is moved to the left, called a *release*, it increases the pressure in the brake pipe (eventually restoring it back up to the feed valve setting). The triple valves on each car respond to this brake pipe pressure increase and cause the brake cylinders on each car to release. The air pressure in the brake cylinders is exhausted to the atmosphere, and spring pressure pulls the brake block away from the wheels. Releasing the brakes is "all or nothing"- you can't release only some of your brake cylinder pressure.

- ➢ Explanation: To restore the pressure, the system uses the air stored in the main reservoir (normally at a higher pressure than the feed valve setting) to recharge the brake pipe back up to the feed valve setting (typically 90 psi).
- ➢ Advanced: In Run8, the normal train brake mode is the 'Frt' (Freight) setting, which is the "all or nothing" behavior described above.

During the release, the air flowing into the brake pipe also flows into the auxiliary reservoirs on each car, allowing them to recharge back to full pressure. Note that this can take quite a bit of time to fully recharge all the auxiliary reservoirs in a train after a brake application and release. If a series of applications and releases of the automatic brake are made in quick succession without allowing enough time in-between for the

auxiliary reservoirs to properly recharge, the air pressures in the system may become depleted and the brakes may become ineffective. On a downgrade, this situation could result in a train becoming uncontrollable (a runaway)!

Similarly, the locomotive brake, formally called the independent brake, controls the brake application and releases on only the locomotive(s) in the train. This can be quicker than affecting the brakes on the whole train, but it should not be used at high speeds (more than 10mph) or for long periods. One advantage it has over the train brake is that it can be applied *and* released gradually.

- ➢ Important: Adequate air pressure in the locomotive main reservoir is necessary in order to apply the independent brake on a locomotive.
- ➢ Usage: The independent brake may often be used during switching operations or other low speed applications.

Some notes to wrap up this section:

- Handbrakes are applied to stopped cars, because they don't require air to function and the pressurized air will gradually leak out.
- There is also an emergency reservoir on each car that functions similarly to the auxiliary reservoir.
- You can press F7 to connect air hoses, set angle cocks, and charge the air system on the train you control. This can also be customized in the top-left menu to do only one or two of these things- advanced users may have it set to just lace up air hoses if they wish to still work with angle cocks and air pressure charging.
- If you're about to crash into something, you can immediately stop your train by pressing shift+F5.
- Some people may be used to older brake systems that are non-self-lapping (especially steam engines in some other simulators). All brakes in Run8 are *self-lapping* (meaning you do not need to move the auto brake handle to a "lap" position - it can be left at the requested service reduction).

Control Stand

The control stand is where you can find the main controls of a locomotive. While mouse controls are an option for many of these, it can be advisable to use a keyboard instead for better control. Try both and see how you feel, and note that an external peripheral called Raildriver is available for purchase and recommended by many people. A diagram showing the ES44DC control stand is below:

To see a similar view and follow along, look left (holding right mouse button) and zoom out (scroll down on mouse wheel). The controls shown in this picture are:

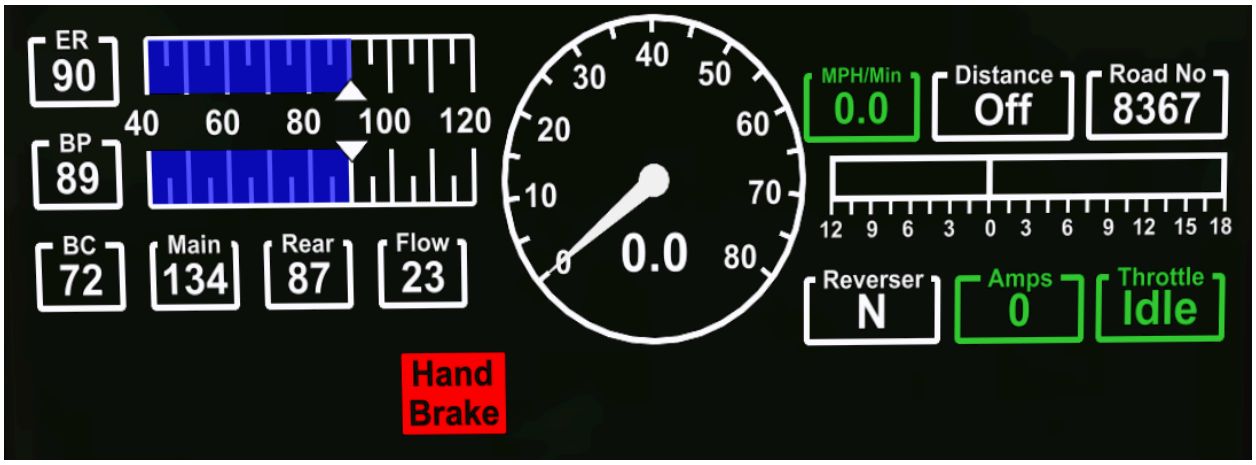
1. **Radio controls** - used for contacting the dispatcher or other trains. A basic video guide on its use is available from the Depot here.
2. **Auto brake/Train brake** - this red handle fully releases brake cylinder pressure to the whole train when moved to the left (END key), and applies brake cylinder pressure to the train in increasing amounts as it moves right (HOME key).
3. **Independent brake/locomotive brake** - this black handle below the train brake releases brake pressure from the locomotives only when moved to the left (PAGE DOWN key), and applies brake pressure to the locomotives in increasing amounts when moved to the right (PAGE UP key). Avoid using this above 10mph.
4. **Headlight controls** - These two knobs can be set to off, dim, or bright. The left knob controls the rear headlight of the train (J and left-shift+J) , and the right knob controls the front headlight of the train (H and left-shift+H). The default headlight setting you should use for road trains is “bright” for the front and “dim” for the rear. Occasions where dim or off are appropriate are covered later in this primer.
5. **Horn** - spacebar - used for alerting people to your intentions. Will automatically turn on the bell in the ES44DC and other widecabs.
6. **Alerter reset** - right alt - If you see a flashing “alerter” warning or hear loud and repetitive beeping, you want to press this yellow button, otherwise your engine will trigger a penalty-brake application, and if you don’t apply the auto brake it will trigger emergency brakes. Adjusting any other control will also reset the alerter.

7. **Sand** - “0” (zero) key- deploys sand on the tracks to help your wheels gain traction and avoid slipping. Best used on steep grades or wet rails. A limited resource in real life, but unlimited in Run8.
8. **Bell** - “.” (decimal) key- turns the bell on and off. Keep it on for railroad crossings.
9. **Reverser** - tells your locomotive which direction you want to move in. Starts in the center for neutral, and moves right for forward, and left for reverse. The INSERT key will increment the reverser forward, and the DELETE key will increment it backwards.
10. **Throttle** - tells your locomotive how much power to apply in the reverser’s direction. Moving the handle fully to the right (“-” [numpad minus] key) is idle (no power). Moving the handle to the left (“+” [numpad plus] key) increments in notches from 1 through 8 (little power to a lot of power). You often want to start at lower notches before moving to higher notches, to avoid wheelslip and pulling cars too hard. A quick way to tell when you can notch up is when the AMPs stop changing very quickly.
11. **Dynamic brake** - tells your locomotive how much power to apply in the *opposite* of the reverser’s direction. This is used for slowing your train down without burning off the brake pads on the cars or using your air reservoir. Handy for making adjustments to your speed when going downhill. Cannot be used at the same time as the throttle, and must be moved right on to “set up” (“/” key) before use. Moving the handle fully to the right (“-” [numpad minus] key) gradually increases braking power, moving it to the left (“+” [numpad plus] key) gradually decreases dynamic braking or fully (“/” key) turns it off. Note that this is generally not used at the same time as the independent brake, except for at very low speeds where the dynamic brakes are less effective.
12. **Circuit breakers and switches** - the four black ones should be flipped up and on when the engine is in operation. Cabin Light turns on a cabin light (L) for better visibility at night. Step light should be kept on (Right-Shift+L), it turns on lights for the steps for safely climbing on to the locomotive at night. In Run8, attendant call lights up the circuit breaker labels (It rings an alarm bell in all engines in real life). Window heater is nonfunctional in Run8.
13. NOT SHOWN - **locomotive brake bail off**- “.” (period key) - Hotkey only, but is very important when using the automatic brake to stop a train without dynamic brakes. To avoid burning out the brake pads on locomotives, you need to *hold down* the period key until your brake cylinder pressure (BC) is 0 on all locomotives (including DPUs). Generally, the only time you should use the locomotive air brakes (independent) is below 10mph.
14. NOT SHOWN - **distance counter** - “*” (asterisk) key - useful for knowing when you’ve exited a yard, passed a speed restriction board, cleared a switch, etc. Use Right-shift+* to begin a countdown of your train length.

15. NOT SHOWN - **windshield wipers** - “V” key. Various speeds plus “off”.

Multifunction displays (MFDs)

If you face forward you’ll see two computer monitors. You can increase or decrease their brightness with the + and - keys between the number row and backspace key. You can select a screen with the Z key and cycle through the different display options with X and C. On the ES44DC, there are six options. Five of them have this cluster displayed at the top, which we’ll cover now.



- The Speedometer is the needle in the middle, and tells you how fast the engine is moving in MPH.
- Reverser- shows position of the reverser. REV for reverse, N for neutral, and FWD for forward
- Throttle- The current throttle **N**otch (1-8) or **D**ynamic **B**rake (0-99) setting. Will read “SET” while transitioning to dynamic braking.
- Amps - consider this a measure of how much power the locomotive(s) are putting out to the wheels. Also shown in the bar above it.
- MPH/Min is an estimate of how much your speed will change in the next minute based on conditions the computer is detecting. Very useful for knowing if you need to increase or decrease throttle or braking power.
- Distance counter - useful for knowing when you’ve exited a yard, passed a speed restriction board, cleared a switch, etc. Use Right-shift+* (asterisk key) to begin a countdown of your train length, it will make a high-pitched “beep-beep” noise when completed. Press the * by itself to count up.
- Road No- the number on the sides of the engine you’re sitting in - a unique identifier.
- ER- Equalizing Reservoir. This is the brake pressure in PSI (pounds per square inch) the brake pipe will try to match. Directly controlled with the auto brake (train brake). Also shown in the bar to its right.

- BP- Brake Pipe- this is the pressure in the Brake Pipe on the locomotive. Also shown in the bar to its right.
- Rear- Rear BP. This only functions with an active EOT device. This is the reported pressure in the Brake Pipe of the car at the rear end of the train.
- BC- Brake Cylinder - the air pressure in the brake cylinders on the locomotive. Note that this is affected by the auto brake (train brake) as well as the independent brake. Using the locomotive brakes is not advised above 10mph or for long periods, so it should be **bailed off** in those situations by holding down "." (period key) to avoid burning out the brake pads on locomotives. Also note that this number is only the locomotive you're sitting in, so hold it down longer to ensure all locomotives release their brakes (including DPUs), which may take several seconds (sometimes 30 or more).
- Main- Main Reservoir. This is the pressure in the reserve of compressed air available for use to release the automatic brake and to apply the brake on the locomotive (both auto and independent). Recharges constantly using the engine's air compressor, which works harder with the throttle in notch 1 or 2.
- Flow - the flow rate of air in cubic feet per minute into the train Brake Pipe that is triggering the release of the train's brake cylinders and recharging the air reservoirs on each of the cars. Higher numbers (above 60 for example) mean that there are probably still brakes applied. Lower numbers (below 60 for example) mean that the brakes have mostly released and movement is safe for the equipment.

Indicators below, not all shown:

- Wheel Slip - wheels are slipping due to not having traction- throttle down or turn on sand
- PCS Open - The air pressure rapidly decreased and applied emergency brakes. See "Recovering from PCS errors and derailments" section for more information.
- Sand On - sand is being applied
- Hand Brake- Depending on your settings, this can mean 1) there is a handbrake applied somewhere on the train or 2) the locomotive has its handbrake applied. A handbrake is applied by a person directly and is not controlled by the air brake system.
- Alerter- flashes when the alerter has not been reset and will trip soon, activating penalty mode.
- DPU No Comm - radio communication with a DPU lead is lost, often as a result of a mountain in the way of the signal. Usually temporary but if it does not resolve itself, you need to stop the train, set the reverser to neutral, make a brake pipe reduction of 20psi, and then wait for a re-established comms message. See page 8 of `V3 Important Changes.pdf` for more information.

- Penalty - result of the alerter not being reset. Requires a brake application to reset.
- Unit Alarm - Engines can randomly have issues. Mechanical issues can be fixed by selecting the engine and clicking “stats” in the top right, then double clicking on any red text. See `Locomotive Failures V3.pdf` for more information.
- EOT error - radio communication with the End of train device has been lost
- EOT Move - Lit when the End of Train device at the rear detects that it’s in motion. Reports start of its movement with a beep.

See the appendix for similar explanations of the control stands in the SD70ACe and the SD40-2. More may be added in the future. See the advanced knowledge section for more in-depth explanations of the MFDs/gauges (WIP).

The different “Shift” HUDs

These appear at the top of the screen when the listed keybinds are pressed, and give you very useful information. Note that you can cycle through these with Left-shift+Z. Important information is in **bold**.

Sim - Left-shift+X - helps you find your location using Heading and Tile

Sim time	Shows the current time in the simulation
FPS	Frames Per Second. 60 FPS is the standard frame rate to shoot for, though playing with 30 FPS can be done. If you’re not reaching that, maybe decrease some graphics settings.
Temp	Ambient temperature - measured in fahrenheit. Might affect how quickly your brakes and traction motors cool off.
Heading	The cardinal direction the player camera is facing. 0/360 is North, 90 is East, 180 is South, and 270 is West.
Rank	Either “train crew” or “foamer” - train crew gives permission to control trains, foamers are spectators.
Tile	Your player coordinates in the game world. The first number is your X coordinate for East-West, the second number is your Z coordinate for North-South.

Engine - Left-shift+C- useful for keeping track of the vital statistics of your train when outside of the cab

Sim time	Shows the current time in the simulation
Rev	Shows position of the reverser. REV for reverse, N for neutral, and FWD for forward
MPH	Current speed of the train from the controlling locomotive. Will have a minus (-) if moving in reverse.
MR	Main Reservoir- the pressure in the reserve of compressed air available for use to release the automatic brake and to apply the brake on the locomotive (both auto and independent). Recharges constantly using the engine's air compressor, which works harder with the throttle in notch 1 or 2.
ER	Equalizing Reservoir. This is the brake pressure the brake pipe will try to match. Directly controlled with the auto brake (train brake).
BP	Brake Pipe- this is the pressure in the Brake Pipe of the controlling locomotive.
CFM	Cubic Feet per Minute- the flow rate of air in cubic feet per minute that is flowing into the train Brake Pipe, to trigger the release of air from the brake cylinders throughout the train and to recharge the air reservoirs on each of the cars. Higher numbers (above 60 for example) mean that there are probably still brakes applied. Lower numbers (below 60 for example) mean that the brakes have mostly released and movement is safe for the equipment.
N or **DB**	The current throttle **n**otch (1-8) or **d**ynamic **b**rake (0-99) setting. Will read "SET" while transitioning to dynamic braking.
BC	Brake Cylinder - the air pressure in the brake cylinders of the controlling locomotive on the train. Note that this is affected by the auto brake (train brake) as well as the independent brake.
Coupler kLbs	The highest force being experienced by the couplers in the train, measured in thousands of pounds. If this number is approaching 400, be prepared for a train separation!
Grade %	The grade or slope of the track the controlling locomotive is currently experiencing, based on direction of travel. Numbers close to 0 means level ground. Numbers with a plus (+) sign mean the engine is climbing

	upwards, numbers with a minus (-) mean the engine is rolling downwards.
Dist	Counts distance when told, measured in feet. Press “*” (asterisk) to begin a count upwards, press right-shift+* to begin a downward count of your train length.

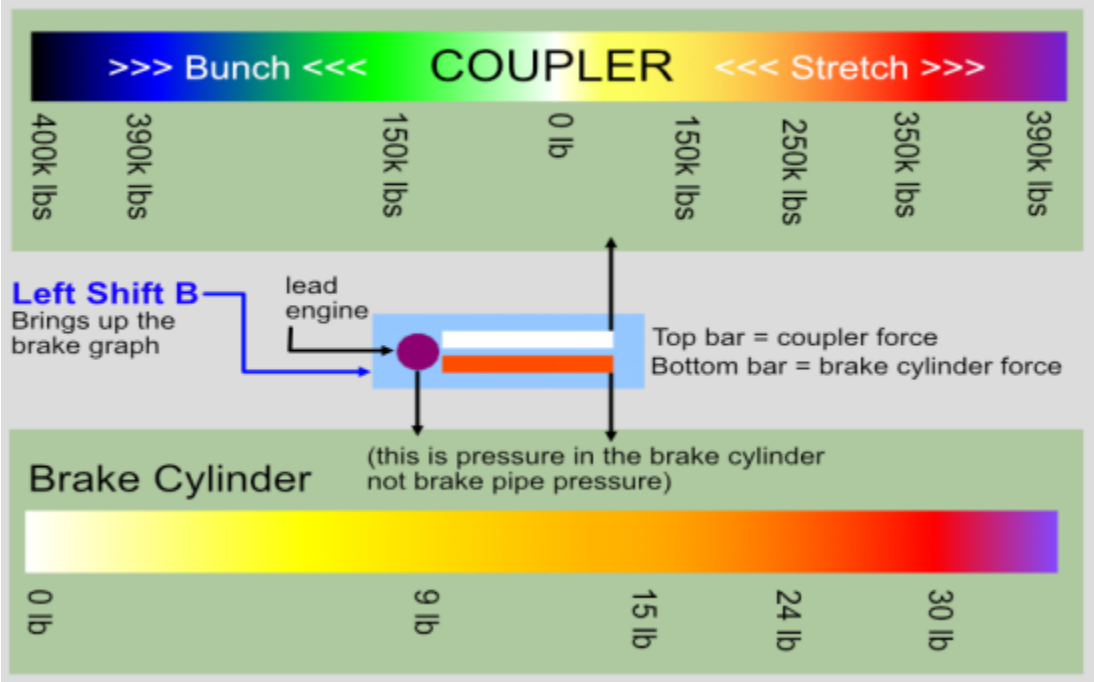
Train - Left-shift+V - useful when building and assessing a train before departure

Sim time	Shows the current time in the simulation
Symbol	Shows the text that was entered on the locomotive under “Train Symbol”.
HpT	Horsepower per Ton- Shows the total horsepower of locomotives set to “run” (not start or isolate) divided by the tonnage of loaded and empty cars. This number can determine if you make it up a mountain or stall out partway up. If this says 2.3, you’ll be able to go pretty much anywhere. Check out this page from the Depot for ideas on minimum HPTs on different subdivisions.
Tons	Total tonnage of loaded and empty cars in the train. Does NOT include locomotive weights.
Lds	The number of loaded cars in the train
Mtys	The number of empty cars in the train
Axles	The number of wheel axles in the train. Most cars have 4 axles, but some locomotives have 6.
DB axles	The number of dynamic brake axles in the train. With older locomotives such as the SD40-2 etc, this number may match the physical number of locomotive axles. With the ES44DC and SD70ACe locomotives, which have higher capacity dynamic brakes, this number may be greater than the physical number of locomotive axles. This number give an idea of how much power is available for dynamic braking in the train
Length (FT)	The length of the train in feet (with the coupler slack neutral). Note that on a long train with lots of coupler slack, the physical length at any moment could be longer or shorter than indicated.

Coupler and brakes - Left-shift+B - useful when controlling long and heavy trains, to ensure that you know what your pulling and pushing forces are doing to the train.

ER	Equalizing reservoir
Coupler kLbs	The highest force being experienced by the couplers in the train, measured in thousands of pounds. If this number is approaching 400, be prepared for a train separation!

There is also a “brake graph” displayed, explained by Jack in the diagram below. Circles are engines, including DPUs. Before releasing the handbrakes and moving a train, you may want to apply the auto brake to check if the pressure applies the brake cylinders successfully. Using this is covered in more detail in the train handling section.



Track - Left-shift+N- displays information about the track you’re on

Sim time	Shows the current time in the simulation
Grade %	The grade or slope of the track the controlling locomotive is currently experiencing, based on direction of travel. Numbers close to 0 means level ground. Numbers with a plus (+) sign mean the engine is climbing upwards, numbers with a minus (-) mean the engine is rolling downwards. It is good to keep an eye on this number while learning a territory, so you know when you may need to begin increasing throttle

	or braking. You also can (should) look at grade maps beforehand, which are available in the userguide folder, and drf30q has some fantastic detailed ones available on the depot forum.
Prev. Signal	The name of the signal that was last passed
Next signal	Distance to the next signal, in miles. Get your signal rules chart ready, if you're still learning!
Train/Track Speed	The speed restriction in MPH the sim has programmed for the track you're on, taking train type into account (e.g. passenger and intermodal can be higher than manifest freight in some places). If you exceed this speed and go around a curve, be prepared for a derailment!
Reduction	An upcoming lower track speed, in MPH, and listing distance to it in miles. Appears 3 miles from the start of the restriction. It can also list additional restrictions that come after the first restriction. Note that you are NOT told if a faster speed restriction is upcoming- but Train/Track Speed will update appropriately.

Signal rules

To travel safely to a destination, we need to make sure we follow the *signal rules* and *speed restrictions*. These vary by railroad and by region. We will start with explaining route signaling, as that is what is used in the base game by BNSF and UP. The Depot has links to signal charts made by Joseph Hoevet appropriate for each Run8 region, which are handy to keep on hand while learning the rules. The most important thing to know is that if a signal has all red lights with no flashing, you should stop and not proceed past it. However, if there are any other colors or there is flashing, it is saying you can proceed at a certain speed, depending on the colors. Therefore, "If a signal is not all red, then it is not red at all." The combination of different colors and flashing is called the *aspect*, and that aspect may have a *name.* What you should do based on the aspect is the *indication*.

The signal aspect is affected by 3 main factors. First, the railroad is divided into *blocks* that should generally be occupied by only one train at a time. If a block is occupied, that should be indicated with a red *stop* signal behind that train. We can give warning of the stop signal with a solid yellow *approach* signal. As trains can move quickly and take a while to slow down, we can warn of the approach with…a signal that has different names and aspects depending on the railroad. UP, CSX, and NS call it "advance approach", while BNSF calls it "approach medium". UP indicates it with a

flashing yellow light, CSX and NS use solid yellow over yellow, and BNSF uses both. If there are three or more blocks ahead that don't have a train or other obstruction, then a solid green *Clear* signal is displayed.

Another important signal that can be displayed is a *restricting* signal, which you could think of as one step above a stop signal. It is often indicated with a flashing red light or a white "lunar" aspect. This indicates that you proceed past the signal at *restricted* speed, which is defined as "a speed that will permit stopping within one-half the range of vision, but does not exceed 20 mph." Under these conditions, this means you should slow down when approaching low-visibility curves, especially if you have a heavy train behind you.

The second and third signal aspect factors are closely related. The signals also show if the train is *diverging* onto a different track via a switch. Often, this is indicated by a signal with solid red on top and another aspect below it. Signals can also show what the speed of that different track is, as well as the turnout speed while switching to that different track. Not every railroad does that third method, those that do call it *speed signaling* and have specific speeds for *limited, medium*, and *slow* speeds.

Home signals, also called *Absolute (block) signals*, are controlled via the dispatch board and are located at *control points*. The names of these control points are often posted at these locations on white signs with black text- you can look for these if you're lost. Home signals are linked to the switches to form an *interlocking*, and invalid routings will be denied. Absolute signals should not be passed if they give a stop indication, unless there is explicit permission from the dispatcher. Keep in mind that you often serve as both the engineer and dispatcher in Run8.

A home signal showing "stop" with a control point sign (and electronic switch machine on the bottom left).

Intermediate signals are *not* directly controlled by a dispatcher, and are *automatic block signals*. They can often be identified by signs attached to the signal mast, such as a *permissive plate* with a large letter “P”, a *grade plate* with a large letter “G”, or a *number plate*, often a black rectangle with white numbers. The numbers, if present, loosely correlate to its location, starting with a nearby *milepost* (which have their own trackside markers), but the last digit is arbitrary and NOT in relation to a tenth of a mile. The signal before a home signal is called a *distant signal*. Modern signal rules allow intermediate signals with a stop indication to serve as restricting signals instead (they used to be “stop and proceed”). The lights on these signals might not turn on unless a train is detected nearby. Note that at time of publication, there are some signals that are intermediate but don’t have visual indicators like number plates- however they may show in the milepost tags with left-shift+F8.

Examples of intermediate signals, from left to right: numberplate with numbers, numberplate without numbers, a grade plate (and numberplate with numbers), and a permissive plate.

Danny Harmon on the Distant Signal Youtube channel has a good series for CSX southeast signals, which use the speed signaling system mentioned earlier. But rather than simply memorizing the charts, you can find some logic to them, as explained by Al Krug in this archived article.

Speed limits and speed restrictions

The speed of a train is governed by four things: the train type, the track’s speed restrictions, the signal indication, and the direction of travel. Your speed should not exceed whichever factor lowers your speed the most.

Each type of train has different authorized maximum speeds, depending on the railroad. By default in the Run8 Southwest region, most freight trains are limited to 55mph. Intermodal trains, which can include a combination of wellcars, piggybacks, autoracks, and reefers, have a limit of 70mph. Light power moves (engines without cars) have a maximum of 65-75mph depending on the engines. Passenger trains are the fastest with a 120mph maximum (however the fastest track speed restriction in the Southwest is 90mph). Speed limits can differ across Run8 regions. Multiplayer servers may set different limits than what the sim specifies, a more complex example of different speed limits that the Depot uses can be found here.

Important signs you should watch out for on the side of the railroad are *permanent speed restriction signs*. These are yellow or white with a number indicating the maximum track speed past where they stand. The train's speed at the head-end (front) should match or lower the restriction *before* passing it. These restrictions may be put in place before sharper curves, changing grades, diamond crossings, or track held to a lower standard of care. They can display a lower speed for freight trains and a higher speed for passenger trains. They may also appear after these same phenomena to show that there is still a restriction, but it is higher than the previous restriction. Your *entire* train must pass the sign before you can accelerate to this new speed. You can measure this by using the distance counter to count down your train length (right-shift+*). A green *permanent resume speed sign* indicates that there are no permanent speed restrictions in effect after the train fully passes the sign. You may also see an *advance permanent speed restriction sign* warning that a permanent speed restriction is upcoming. Note that some railroads (NS in particular) may not post signs and rely on timetables to advise crews of track speeds.

This all assumes that the train is moving forward. If the train is backing up, reversing, or shoving, the train is limited to restricted speed, 15-20 mph. If there is a shove platform (caboose) at the end of the train, the limit is 30 mph.

Remember that you should follow whichever speed you're restricted by the most. For example, an intermodal train might have a speed limit of 70mph. However, the train may be limited by a permanent speed restriction of 55mph. Furthermore, the train may have just passed an approach signal, which limits you to 30mph. Another example: a manifest freight may have a limit of 55mph, but entered track with a 70mph speed restriction, and has a high green clear signal. The train is still limited to 55mph due to its train type.

It is strongly advised to have the maps made by the Depot at hand. They are great for planning ahead before driving a route, orienting yourself while traveling, and being aware of upcoming speed restriction changes. Speed restrictions are marked with yellow numbers, resume speed signs are shown with a green rectangle. Control points, home and intermediate signals, switches, and siding lengths can be found as well.

The dispatcher screen

The dispatcher screen can be viewed with F3, and pressing F3 again will cycle through the other available dispatch boards. For some routes, you will need to press “tab” to enlarge the view for each board. Be sure to know where you are at and where your destination is before departing. Remember there are some tricks which you can use that are explained in Jack’s 15 minute guide. The following was written by his79 and is taken from their FAQ thread.

Signals on dispatcher screen

There are several meanings for the signal on the dispatcher screen. They correspond only indirectly to the signal aspect in the sim. The signals in Run 8 act as block signals.

- red means *Stop* - signal will always be red
- yellow means *Proceed* - signal will fall back to red after the train has passed it
- green means *Fleet* - signal will stay green [*on the Dispatch board*] after the train has passed it
- white/blue means *FlagBy* - restricting signal, e.g. used to enter a siding with manual switches

Setting a signal to yellow or green on dispatcher screen will set the signal in sim to:

- red, if block is not free or switches are thrown against the way of the train
- yellow, if the next block is free but the one after that is blocked
- blinking yellow, if the next two block are free, but the one after that is blocked
- green, if at least three next blocks are free

[Note- the above isn’t always exactly true, depending on the railroad and particular signal location.]

Switches on dispatcher screen

- N means normal - the switch is set for straight
- R means reverse - the switch is set for diverging

[*Note- With V3 changes, most switches, including all of those in the base game, use a more intuitive graphical representation of the switch positions. These still show up in places like West Colton yard, though]*

Meaning of colors on the new dispatcher screen in V3

AI trains

- red text - stopped AI train
- green text - moving AI train

User train

- orange text - stopped user train
- beige text - moving user trains (color tone changes with speed)
- magenta text - user train with overspeed

Blocks

- red - occupied block
- green - free route according to signals
- white - switches and blocks in general
- grey - blocks not accessible due to switch alignment
- blue - CTC switch in manual mode (right click)
- pink - user has Mainline Authority, manual switch operation

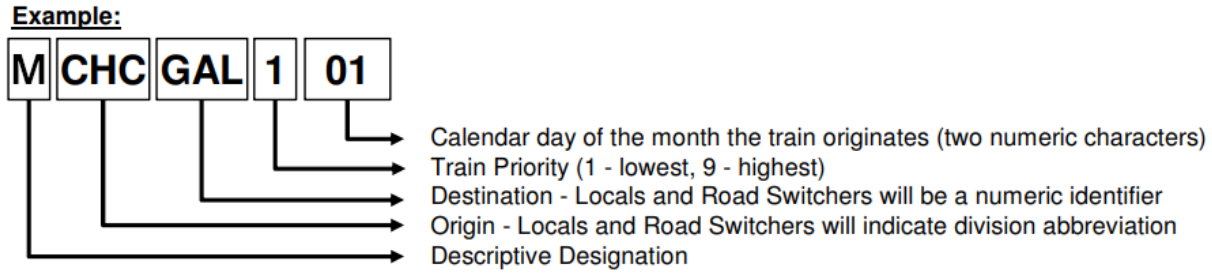
Planning your route - train symbols

The whole point of driving a train is moving something from A to B, whether it's a passenger, a car full of freight to deliver, or a car to be loaded elsewhere. You can view the destination tags (for cars) and train symbols (on lead locomotives) with left-ctrl+F8. There can be other notes in the train tags, such as if a locomotive is DIT (dead in tow, isolated and not powering the train) or DB cutout (Dynamic brakes turned off). More information on tags is in the intermediate knowledge section.

Before taking a train, make sure that your route and destination can be cleared, and you can do any work needed enroute. Specifically, keep in mind if there is space for your train to stop at, there is not another train coming that will block your track, and you can reach a tie down point that will fit your train. You may also need to set out cars at a yard enroute- is there space to fit them? If any of these cannot be accomplished, it may be best to take a different train (or remove cars with the delete button, if allowed).

When taking control of a prebuilt road train, you can look at the *train symbol* to determine its destination. These vary across railroads (and Run8 servers), so you should take care that you are taking the correct route. There are two places in particular I recommend viewing for beginners- one is the Railroad Fan wiki that collects prototypical symbols from real railroads. The other is looking at the Depot's database of train symbols, as it is specifically customized for use with Run8. Note that the origin or destination may not actually be represented in Run8. Some DLC comes with documentation in the userguide folder of prototypical symbols you can use. When playing on a multiplayer server, there is usually a list or spreadsheet available to reference.

How to read BNSF: First letter is train type (example - M for manifest, U for unit). Next three letters are origin, three letters after that are destination. Next number is priority- 1 is lowest, and 9 is highest. Two numbers at the end are the day of the month the train originated on. Last letter is to identify the same train symbol being used more than once in the same day. For example there may be a first train (section), A, sent out, then another "2nd section", B, for the next train, etc. The below image is an edited version from http://www.qstation.org/bnsf/BNSF_Train_Symbols.pdf, which also has a list of the first letter descriptive designations. The symbol below is written as "M-CHCGAL1-01A", and read as "manifest from Chicago to Galesburg, low priority originating on the first of the month (first section)".



How to read UP: similar to BNSF, but can be more varied. Generally, first letter (sometimes two) is train type. Next two letters are origin, and next two letters after that are destination (note that trains with the same two letter code can mean different places). Last two numbers are date. There are additional prefixes and suffixes that I won't cover here, but can be read about at https://uphs.org/wp-content/uploads/2012/10/trainsymbols.pdf (good explanations) and http://ucrail.com/symbols/upsymbols.html (more recent). A train with symbol MWCRV 12 would be a manifest from West Colton to Roseville, originating on the 12th of the month.

How to read CSX: There are not alphabetic location codes like with BNSF and UP. There is a letter prefix and number combination assigned for each train, along with a date code. You can glean some information from the letter prefix alone- G90106 would be a grain train from the 6th of the month for example. The numbers assigned are more arbitrary and require more study. The best thing to do is reference any system documentation for your config/server. You can look at car tags as well for clues. Note that in 2022 CSX changed many of their train symbols, so information from before that year is more accurate to the time setting for the Run8 CSX Southeast region (2005). However the server/config may be using the updated symbols- just check documentation to see which. Videos from Distant Signal on Youtube have some great examples (and footage): old symbols in https://www.youtube.com/watch?v=oGW3MERGFKE and new symbols in https://www.youtube.com/watch?v=xyzv08zK0bk.

How to read NS: Similar to CSX in that there are no destination codes. Also, not every train has a letter prefix, many are just numbers with a date code- 154 06 is a

manifest train from the 6th of the month, for example. Again, the best thing to do is reference documentation for the config/server and look at car tags.

Switches

Switches, also called *turnouts*, are what determines which track a train travels on. There are two main types in Run8- *CTC switches* and manual *switch stands*, commonly called *handthrows*. You can verify they are set correctly by looking at the moving *points* of the rail in the sim world. A switch set for the *straight* track is said to be *normalized*, while a switch set for the *diverging* track is said to be *reversed.* Always triple-check how the switches are set ahead of your train so you don't waste time or cause an accident by going the wrong way. The pictures below show a normalized switch on the left and a reversed switch on the right. An easy way to tell which direction you will go via a switch is to notice the side with a gap between the rails. Remember "Gap and Go".


When interacting with switches, plan ahead as much as you can so you know when you need to flip them. You may need to take a certain track at a *junction* to get to your destination, or use a *crossover* to access the main track that leads to your destination. Junctions are places where a track splits into two or more different routes, or converges. Crossovers are sets of two or more switches where a train can switch between main tracks. Note that when using handthrown crossovers, making sure the switches match is encouraged (i.e. if one is diverging, the other should be too).

CTC switches are electronically controlled from the dispatch board- CTC stands for *centralized train control*. In normal operation, CTC switches cannot be changed from the ground. CTC switches in yards may have a *switch point indicator* nearby that's lit green if the switch is normalized, and yellow if diverging/reversed.

CTC switches can only be changed if there is not a train occupying the relevant *interlocking* and there is not a signal allowing a train to enter. An interlocking is a group of switches connected to signals that prevent invalid or conflicting routes from being set. If needed, CTC switches can be changed despite the interlocking restriction by right clicking them on the dispatch board, where they will turn blue. The switch position can

then be changed by left clicking on the switch on the DS board, or the train crew on the ground could change them by clicking on the metal box by the switch. Remember to right click the switch on the dispatch board again to return it to normal use when you're done.

Switch stands are changed in the sim world rather than from the dispatch board. They are also known as handthrows since they are lever-operated by hand, but often in everyday use are simply called a switch. You may be prevented from moving a handthrow due to signals indicating a train may enter the block the switch stand is in. Conversely, leaving a switch stand in a reversed position may prevent a dispatcher from indicating a train may enter a block.

There are many kinds of switch stands in the real world, but in Run8 there are only two main types: low switches and high switches. Low switches are low to the ground, and high switches are tall. There are a variety of colored *targets* that can be attached to the switch stand to indicate its position. On low switches, two different colors will be visible. If green is visible from the track, that means the switch is normalized for travel straight across the switch (first picture below). If yellow or red is visible, that means the train will take the diverging track when crossing the switch (second picture below). On high switch stands there will be a yellow or red target visible if the switch is reversed (third and fourth picture below). If this is not visible from the direction of travel that means the switch is normalized.

An important switch distinction is whether it is a facing point switch or trailing point switch. Note that you can change a switch to the other type by moving where your leading power is in relation to the cars. For example, by running around them on another adjacent track. While you can drive through a non-aligned trailing point switch in Run8 without damaging equipment, it is a bad habit due to the possibility of splitting a switch if the train moves backwards (see PCS errors and derailments section below). When switches have been used, it is important to avoid leaving equipment sitting over the tracks of the switch when possible- this is called *fouling* and can lead to accidents.

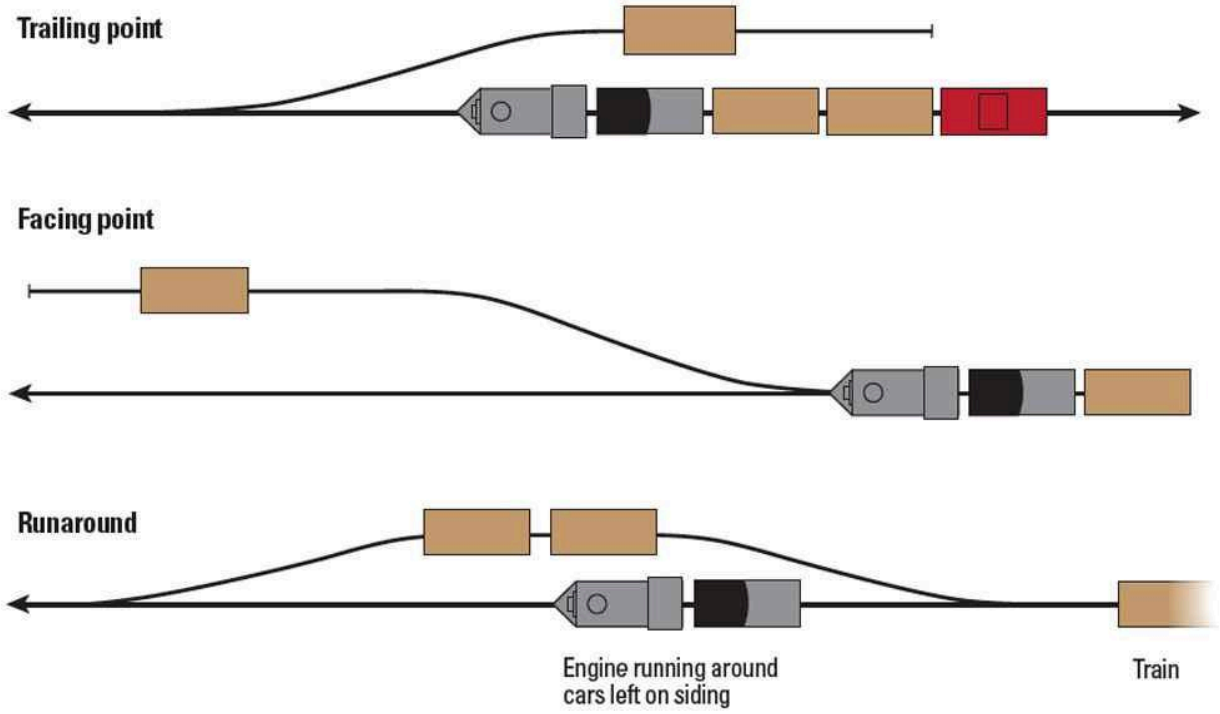


Image credit: https://www.trains.com/mrr/beginners/ask-trains/switching-a-model-railroad/

Using the Horn/Whistle and bell

The horn, also called a whistle, works in conjunction with the bell to ensure anyone nearby knows a train is moving. These are the most common rules to follow,

and are useful in multiplayer so people know that a nearby train is going to start moving or is approaching- and it's just fun to do!

- Brakes are releasing, proceeding forward from a stop- make two long blasts and let the bell sound for a few seconds.
- Reversing from a stop - 3 short blasts and let the bell sound for a few seconds.
- Approaching a road crossing at grade - two long blasts, a short blast, then a long blast until the lead engine has exited the crossing. May be repeated if the last blast would go on too long. Turn the bell off after the engine exits the crossing. *Whistleposts* are signs with a W or X on them that remind you to do this for an upcoming crossing.

Tying down a train

When it's time to stop the train, whether it's because it has reached its destination or the engineer (you) has to go, the train needs to be *tied down*. As you're traveling, look out for the next available place your train will fit in if you need to stop. This can be sidings, yard tracks, one of the mains in double track territory (if traffic won't be negatively affected), etc. Once you reach your stopping point, you want to make sure the train is secured properly and doesn't roll into another train or become a runaway on another track.

1. Ensure the train is stopped by fully applying the independent brake
2. Apply 10 lbs of brake pressure (ER should read 80)
3. Apply an appropriate number of handbrakes (a quick way to do this is pressing left-shift+F5, which applies handbrakes on every car of the train)
4. Turn the front headlight from bright to dim.

Coupling and uncoupling

Coupling and uncoupling is much safer and simpler in Run8 than the real world, but there are still steps to be followed. When coupling to cars, manage your speed. Avoid doing it at more than 4 mph. You can now press F7 to activate the "airbrake cheat" and have your air hoses, anglecocks, and air pressure ready to go. When you click on a coupler, the coupler menu will appear and it should look like how it does below. However, you can also do this manually, described below.

Once connected, go the new end of the train (shortcut: left control+F12) and click on the coupler. Under “Anglecock”, set it to “closed”. Lace up the air hoses on all the cars by clicking on either one of the couplers and clicking “connect” in the menu. You can set the F7 cheat to apply only to air hose connections and still do the following processes. At the point where you coupled, click on either one of the couplers, and under “anglecock”, click “partial”. Then click on the other coupler and set the anglecock to “open”. Watch your CFM increase sharply and then start decreasing, and when it drops to below 100 you can set the other anglecock to “open”. If you change it to “open” too early, this will cause the locomotive to detect a rapid decrease in air pressure and go into emergency, *dumping* the air and triggering PCS. *Charging* the air brakes will take longer with longer cuts of cars, especially if they haven’t been *charged* recently. For many locomotives, the compressor will work faster if the engine is running, so you may want to put the reverser in neutral and put the throttle in notch 1 or 2. If your CFM is not decreasing, walk the train and listen for the hiss of air escaping from a disconnected hose.

Uncoupling uses this same interface. First, make sure the cars you want to uncouple from are in the spot you want and secured with sufficient handbrakes. Second, go to the spot where you want to uncouple from, and click on one the knuckle closer to the (lead) engine you are controlling. Under “Anglecock” click “Closed”. Check if “Open Coupler” is yellow or white. If it is yellow, you want to remove tension from the

coupler by pushing back with your locomotive. Once it is white, click “Open Coupler” and you will see it change to “Uncouple Pin Open” in green. Note that we are intentionally leaving the anglecock open on the cars we are cutting loose from so it will dump the air and apply brakes. Pull away from the cut, and monitor to make sure it does not begin rolling away. Leaving the anglecock closed on the cut you are leaving is called *bottling the air* and is prohibited on prototypical railroads, here are two instructional videos on the topic if you want to learn more.
https://youtu.be/Uu4DfZWpqB8?si=oyflEU2ibmMWDWyd
https://youtu.be/3AL5CE7Roa8?si=4H2DotG59JsW0Bya

Note that there are two more sections on the coupler menu- MU Connection and External EOT options. MU connection has buttons for connecting and disconnecting the MU cables between locomotives. These cables are used when coupling locomotives together so they will take throttle and braking commands from a lead unit. When uncoupling from DPUs or MUs, or disconnecting a ‘MU Connection’, the trailing locomotives might sound like they have throttled up. This is not a problem, the now disconnected units have changed from a ‘low’ to ‘high’ idle and the diesel engine speed increased slightly. External EOT options are covered under “Rear end markers” later in this document.

Recovering from PCS errors and derailments

Accidents happen to everyone sometimes, so you just have to be ready to fix it. If there is a train separation, there may be a broken knuckle. This can be fixed by clicking on the coupler and clicking the “Fix Broken Coupler” button. PCS errors are a safety feature often caused by a rapid change in air brake pressure. Trivia: PCS stands for “Power Cutout Switch” in GE locomotives and “Pneumatic Control Switch” in EMD locomotives, but they have the same functionality.

With PCS errors, there will be a bright red warning light on your MFD or control stand. To reset from a PCS fault, fully apply the automatic brake and set the reverser to neutral. Locate and reconnect the separated air hoses, or close a brake valve as needed. Wait 60 seconds until the MFD says you can release the brake, or until the red light starts flashing. Make sure your train is put back together with no broken knuckles and the brake pipe is fully connected. Double check any switches you were crossing, too.

Derailments can occur due to operator error such as speeding or poor train handling, or simply bad luck crossing a switch. The wheels must be put back on the rails, possibly in addition to a PCS reset. First, make sure air hoses are connected and PCS is reset if necessary. The “easy” way to rerail is to locate the truck that is on the ground, click it, and click “rerail easy”. The “hard” way is to put rerailing frogs under the wheels, and pull or push the car up and back onto the rails. This can fail sometimes, so just try again. After you’ve verified all wheels are back on track, PCS is reset, and your

train is fully connected with couplers and air pressure, you can proceed. Note that there is a random chance when crossing over a switch that a wheel will *pick* the switch and get derailed. See `Derailments.pdf` in the userguide folder for more information.

Another human error accident is *splitting a switch*, which is when a train or car is split between two tracks at the switch. Oftentimes you'll discover this when the air hoses separate. To fix it, first close the anglecocks on any separated hoses, then reset PCS. Release the handbrakes and air brakes, and push or pull towards the switch point until the cars are clear. You should then be able to set the switch for the correct direction. You may need to uncouple from cars to accomplish this process. Sometimes the air hoses won't reconnect, and in that case you may have to move the car with the brakes on. Sometimes moving to controlling a DPU can make this process easier, if it's on the other side of the switch. A simpler alternative is to close the anglecock behind the locomotive, bleed all air brakes with left-ctrl+F7, release handbrakes, and then you can move forward or backward as needed (be careful doing this on an incline). In some severe cases, it may be better for server stability to save the train and respawn it (be sure this is allowed based on the particular server rules).

Distributed Power Units (DPUs) - the basics

I recommend viewing this [video from the Depot] if you plan on using DPUs. Auto MU/DP mostly works, but double check that the following setting was set correctly on the DPU Lead:

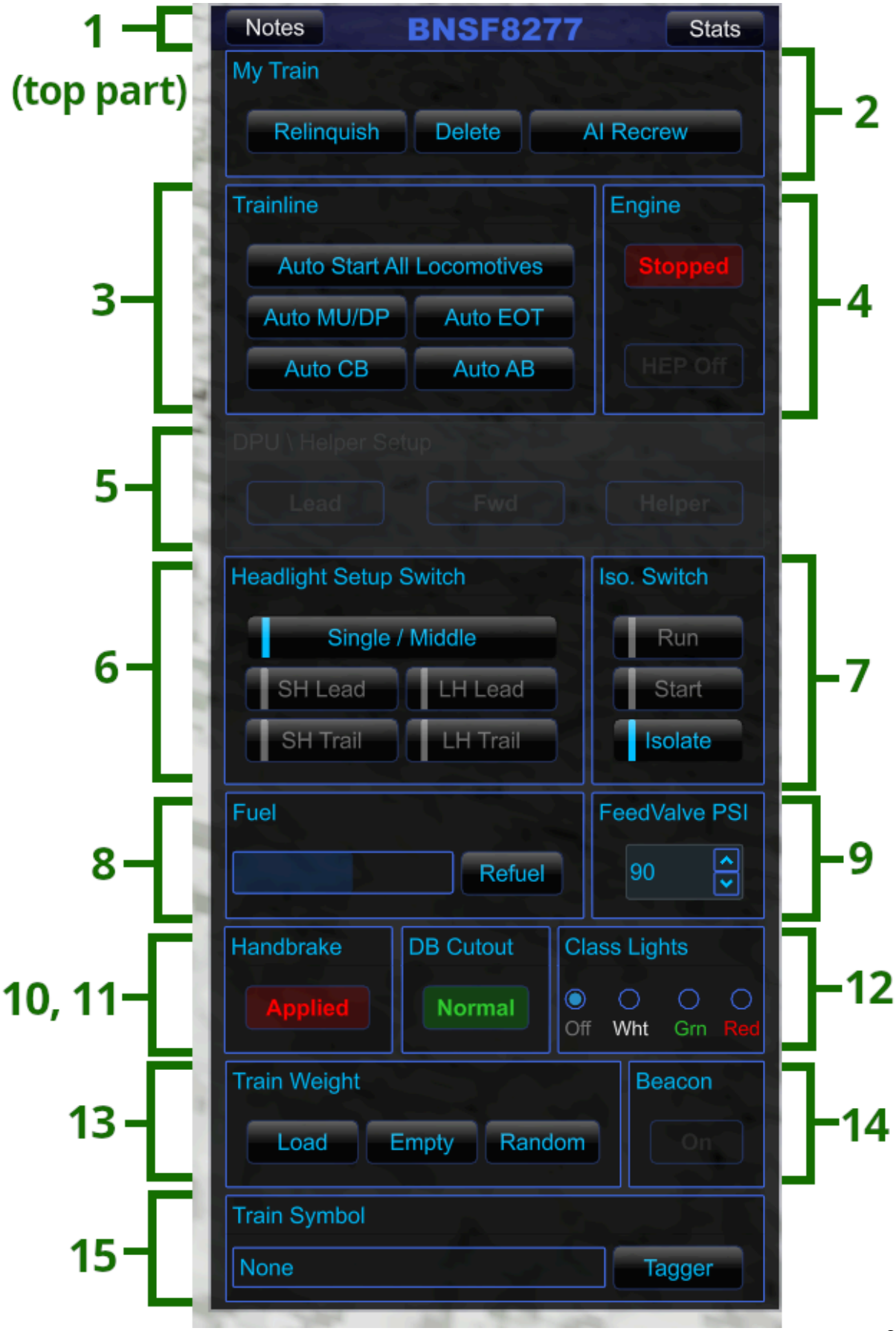
Basically, you're telling the DPU if it's facing the same way as the controlling "Lead" unit that you're driving (Fwd), or if it's facing the opposite direction (Rev). If this is

set incorrectly, your DPU will pull in the opposite direction and a train separation would be very likely!

To manually set up DPUs, make sure your lead locomotive is set to “Lead” and any connected engines are set to “MU” under “DPU/Helper Setup”. Use the “Set as lead unit” button if necessary. There should only be one lead unit in a train (usually the frontmost engine). Next, select one engine in each DPU set to be the lead, and make sure it says DPU_Lead so it can communicate with the lead engine. Make sure any engines coupled to the DPU_Lead are MU. Last, verify the Fwd and Rev status for the DPU_Lead engines is correct as shown above (i.e. if same orientation as lead set it to “Fwd”, and if reversed orientation set to “Rev”).

Locomotive menu

Shown when a locomotive is clicked. Note that this will be greyed out if you are controlling another train already. Feel free to open this in a single-player session and click the buttons as they’re explained. I’ve bolded the most important buttons for beginners that are just using the Trainline “Auto” buttons. I encourage revisiting this menu if you are interested in setting up a train from scratch, especially if it has DPUs.


1
(top part)
Notes
BNSF8277
Stats
My Train
Relinquish
Delete
AI Recrew
2
3
Trainline
Auto Start All Locomotives
Auto MU/DP
Auto EOT
Auto CB
Auto AB
Engine
Stopped
HEP Off
4
5
DPU \ Helper Setup
Lead
Fwd
Helper
6
Headlight Setup Switch
Single / Middle
SH Lead
LH Lead
SH Trail
LH Trail
Iso. Switch
Run
Start
Isolate
7
8
Fuel
Refuel
FeedValve PSI
90
9
10, 11
Handbrake
Applied
DB Cutout
Normal
Class Lights
Off
Wht
Grn
Red
12
13
Train Weight
Load
Empty
Random
Beacon
On
14
15
Train Symbol
None
Tagger

1. Top part
    - Notes- Can freely type a note to yourself or others. Will be yellow if there are notes. Shows date and time of note creation date/time and last updated
    - **Road Number** - currently set locomotive road number. Double click to change. Must be compatible with the UnitNumberDatabase file. See `Renumbering Locomotives.pdf` in the userguide folder for more information.
    - **Stats** - Show the mechanical report. Most importantly, any **problems with the engine can be** triggered or **resolved here**. Will be yellow if there's an issue or the bad order card is filled out, or red if it's a severe issue. Also lists gear ratio (based on locomotive model) and engine hours (initially randomly generated). You can look at `Rail Unit Stats Menu.pdf` in the userguide folder for more information.
2. **My Train**
    - **Relinquish** - gives up control of the train, allowing someone else to take control of that train and you to select a different one.
    - **Delete** - removes the train (all coupled cars) from the world.
    - **Set as lead unit** - should be clicked when changing the controlling locomotive. For most trains, this will be the locomotive at the very front. You may especially need to do this when uncoupling engines from a train. If it is grayed out, you can press this button on a different locomotive, then you can click it on the intended locomotive.
    - **AI recrew** - Gives control of the train to a basic AI that can drive forward and read signals. Replaces the "set as lead unit" button on the locomotive set as the lead unit. See the AI Train Crews section of this document for more information.
3. Trainline
    - Auto Start All Locomotives- starts any stopped locomotives and puts them in "Running" status.
    - Auto MU/DP - Does three things: First, connects all MU (Multiple-Unit) cables between all coupled locomotives, so commands are transmitted and they are controlled as one set. Second, sets any locomotives not connected via cable to the lead unit as "distributed power". Be sure to double check that this was done correctly, as discussed earlier in this guide. Third, it sets the headlight setup switch to an appropriate setting. (see below for more info)
    - Auto EOT- Attaches or activates an end of train device - see "rear end markers" for more info.

    - Auto CB- Sets circuit breakers and isolation switch for normal operation- see “Iso. Switch” below for more info on the latter, information on circuit breakers is in the advanced knowledge section.
    - Auto AB- connects air hoses, opens anglecocks and closes the ones at the ends, and charges the air brake reservoirs.
4. Engine
    - Spawns as “stopped,” clicking changes it to “starting”, changes to “running” after a few seconds. Click again to shut down.
    - HEP is head end power for passenger trains. Should always have an engine with this on so the passenger cars have power (for lights, climate control, etc)
5. DPU/Helper Setup
    - First box- can be Lead, MU, DPU_Lead, or HLP_Lead.
        - Lead is for the controlling locomotive and should be greyed out after using the “Set as lead unit” button. There should only be one lead in a train.
        - DPU_Lead is the controlling unit for a DPU set, enabling communication between it and the lead engine.
        - HLP_Lead is activated by changing a DPU to a helper - see DPU and helper below.
        - MU is for engines connected with MU cables to a Lead engine (any of the three types above).
    - **Fwd** and **Rev** - this is for the DPU_Lead engine- make sure that it matches the lead unit appropriately (i.e. if same orientation set it to “Fwd”, and if reversed orientation set to “Rev”). See section above for visual.
    - DPU and Helper- by default this will say DPU, if you want another player to control a manned helper set click this to change it to Helper. Note that DPU_Lead changes to HLP_Lead. Refer to `Manned-Helper Operations.pdf` in the userguide folder for more details.
6. Headlight Setup Switch - This should be set so the ends of the trains have appropriate lights displayed.
    - Single/Middle is for locos that are either running solo or not at either end of a train.
    - Lead is for the front of the train, trail is for the end of the train.
    - SH is short hood, the end of the locomotive the cab is on. LH is long hood, the end opposite the cab.
7. Iso. Switch - The Isolation switch controls if the engine will supply power.
    - Isolated- starts this way. Should be in this position if the engine is off or you don’t want it to supply power. If it is not supplying power but part of a train it is called Dead in Tow (DIT).

    - Start- set to this when the locomotive is off and you are starting it. If you want to cold start a locomotive manually, this guide from the Depot walks through the steps. https://www.youtube.com/watch?v=NIm42IA8F8o
    - Run- Once a locomotive is Running, set a locomotive to this if you want it to supply power to move the train.
8. **Fuel** - Shows the fuel level of the locomotive. Press the refuel button to fill the fuel tanks, which can be done anywhere (pretend a fuel truck drives up). Locomotives usually don't spawn in with full fuel. If you have car tags on (Left-Ctrl+F8), they will be colored according to the fuel level in the locomotive. Green is full, transitions to yellow to orange to red as it empties.
9. FeedValve PSI - affects the braking force in the brake system. Default is 90 for freight and 110 for passenger.
10. **Handbrake** - whether the handbrake on the car is applied or released.
11. DB cutout - dynamic brake cutout, disables dynamic brakes on the locomotive to prevent excessive pushing/pulling force
12. Class Lights- Present on some locomotive models in Run8, can be set to off, white, green, or red. Classification lights were used before more advanced signaling and communication systems were in place, and are generally not used on modern railroads. More info here: https://www.trains.com/trn/train-basics/abcs-of-railroading/locomotive-classification-lights/ and more in depth (with pictures!) from Al Krug here https://web.archive.org/web/20111204214158/http://www.alkrug.vcn.com/rrfacts/markers_class/markers_class.htm
    - GP40: Conrail, DRGW, Run 8, and WP
    - SD40: Chessie, Conrail, Seaboard, SOO, SP
    - SD40T-2: DRGW, Run 8, SP, UP02
    - SD45-2: ATSF02/03/04, both Conrails, and both Seaboard roads
    - MP15DC: SP
13. **Train Weight** - controls weights of cars in the train. Quick way to fill or empty a unit train you just spawned.
14. Beacon - not yet implemented - refers to the rotating amber light on top of the locomotive that alerts bystanders that it's operating.
15. **Train Symbol** - can be typed in, shown on dispatch board, read by Otto and other players. Tagger button opens the Tagger menu.

Train-Tagger Menu

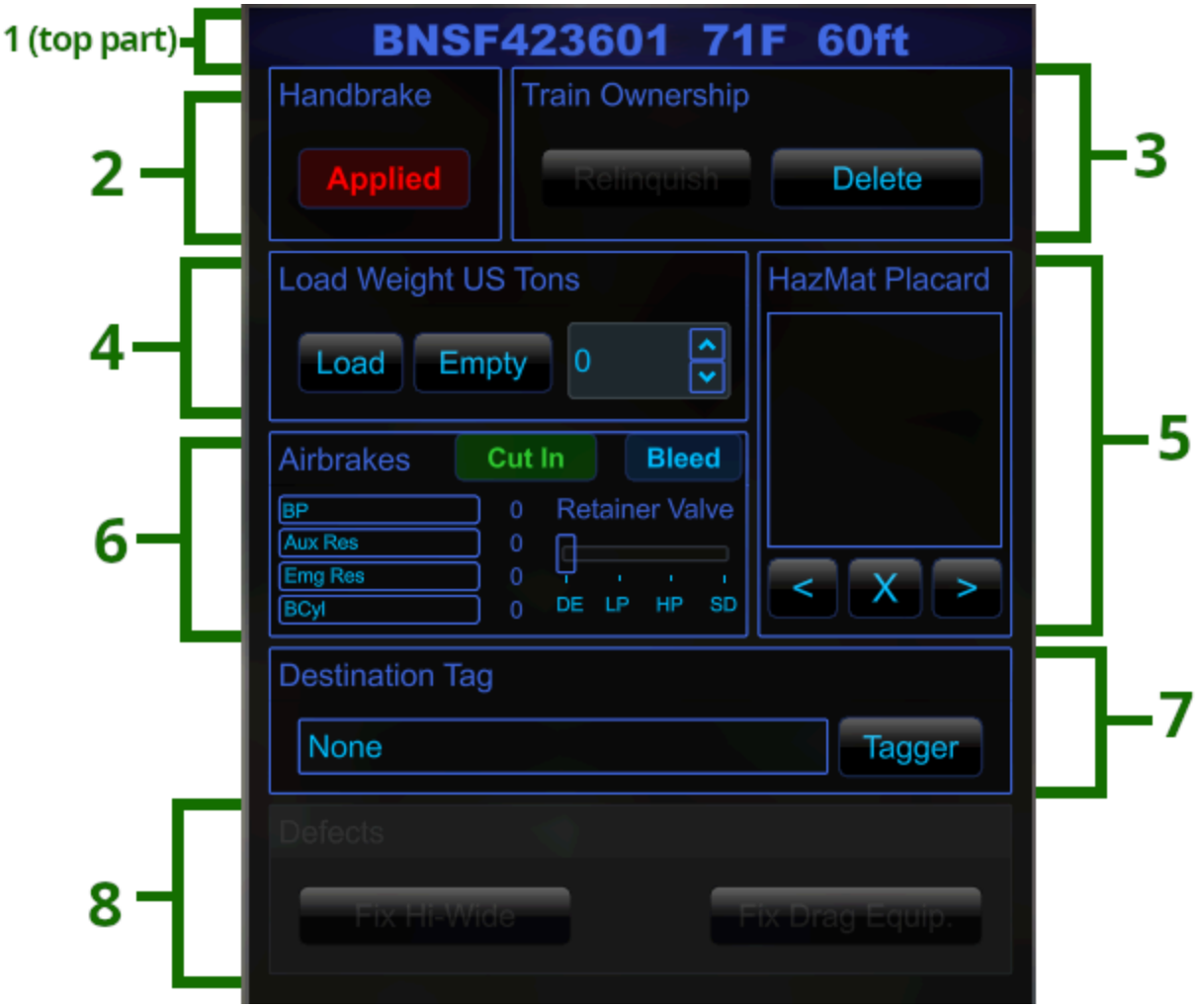
Shown when the "Tagger" button in the train or car menu is clicked. Note that you can ctrl+click to select multiple cars and shift+click to select groups of cars. Changing the tag or weight will affect all selected cars. Particularly important items in bold. This menu

is useful when building trains in a yard to check stats. For more information, read `UsingTheTrainTaggerV3.pdf` in the userguide folder.

- Loads - number of loaded cars in the train
- MTYs - number of empty cars in the train
- **Speed Limit** - Speed limit of the train based on cars in the train (does NOT account for signals and trackage)
- Weight - total trailing tonnage of the train. Includes weight of cars and cargo, does not include locomotive weight.
- **HP/T** - HorsePower per Ton - shows the total horsepower provided by locomotives divided by the weight. Higher numbers mean the train will accelerate more quickly and handle grades better, lower numbers might lead to slower speeds or outright stalling. 2.3 HPT is enough to go pretty much anywhere.
- **Length** - total length of the train, in feet
- Industry Tags- used to tag cars for industries in bulk.
- HP/T Calculation - toggle whether the HPT displayed is based on all locomotives or only those that are online (isolation switch set to “Run”)
- Selected Weight - changes the load weight of the selected cars. Note that loaded cars can have varied weights.
- Override Spd Limit - can’t increase from default, only decrease. For example, if a train has 20 or more hazmat cars you may want to set the limit to 50 mph.

Car Menu

Shown when a car is clicked. Particularly important items in bold.



1. Top part
    - Car number - unique, can't be changed, not reflected on the actual car model, but shown when left-ctrl+F8 is used. Will change if respawned.
    - **Axle temperature** - Having a brake applied, whether it is intentionally applied or stuck on, will increase in temperature with extended use, especially at high speeds. Brake fatigue can occur at higher temperatures. Temperatures above 350 degrees Fahrenheit will trigger the defect detector. If your wheels are smoking or too hot, stop the train and let them cool off.
    - Length - the length of the individual car
2. **Handbrake** - whether the handbrake on the car is applied or released.
3. Train ownership - buttons for deleting the train or relinquishing control. Note: You can take control of cuts of cars but can't do anything, be sure to relinquish before trying to take control of a locomotive.

4. **Load Weight US Tons** - Loads and empties cars. Loads weight varies depending on the car. Empties have a green car tag, loads are yellow, orange, or red depending on how heavy they are.
5. HazMat Placard - Applies a (cosmetic) hazardous materials placard to show what is in the car. This only shows on the model for tank cars, but can be applied to any car.
6. **Airbrakes**
    - Cut in/out - toggles between the brake cylinder being affected by air pressure in the brake pipe (cut in) or not (cut out). Brake cylinder will remain in whatever position it was in before being cut out. Useful if the brakes on a car are misbehaving and need to be disabled altogether (e.g. sticky brake that's releasing too slowly or not at all).
    - Bleed - releases air pressure from the aux res, emg res, and brake cylinder. If you have a stuck brake on a car, click this.
    - **BP** - current air pressure in the brake pipe. Used to recharge the air brake system and send commands to apply and release brakes.
    - **Aux Res** - current air pressure in the auxiliary reservoir
    - **Emg Res** - current air pressure in the emergency reservoir
    - **BCyl** - current air pressure in the brake cylinder (how strong the braking force is). 0 means brakes are released.
    - Retainer valve (DE, LP, HP, SD). From Jack: Brake valve reference:
        - DE - Direct Exhaust, (default)
        - LP - Low pressure retain - exhausts until 10lbs, retains 10lbs
        - HP - High pressure retain - exhausts until 20psi, retains 20lbs
        - SD - Slow Direct - delayed release , but will eventually go to 0
        - Not used today thanks to dynamic brakes but in the old days, an engineer could set these to retain 10lbs going down a hill. This would let the engineer recharge the brake lines while still maintaining braking effort.
7. **Destination Tag** - for sorting on hump and industry processing. Can be edited, though if it already has a tag it shouldn't need to be. The Tagger menu can be opened by clicking on the Tagger button.
8. **Defects**- dragging equipment randomly can trigger on a car. Will change the car tag to pink. Will activate defect detectors. Click the "Fix Drag Equip." button to fix. Hi-Wides are not implemented yet.

Communicating with other people

The multiplayer aspect is one of the main draws to Run8, though single-player is also enjoyable. When multiple player trains are moving on a server, it is best to communicate intentions so accidents are avoided. For example, when you take control

of a train and are going to start moving, you can say something in chat with the tab key. If a dispatcher is online, listen to their instructions. When talking to a dispatcher, provide your location (control point) and identifier like the train symbol or lead loco number. Make requests, not demands. If you think they're not understanding, then concisely provide information and avoid getting in an argument.

If there's not a dispatcher, discuss who is in control of signals ahead of you- yourself or is someone else going to handle that for you? If you're staying in control, look ahead of where you're going. Do you need to plan a meet at a siding to pass by another train? Is there a junction you're coming up to that you'll need to change the switches and signals for? Be sure to communicate with others when appropriate. Sometimes a train will give way due to being lower priority, or because it is easier to stop and get going again. For example, if a heavy train is going uphill it's better for that to keep its momentum so it doesn't stall out - a train going downhill would stop for it.

Intermediate knowledge

At this point you may have driven a train from one place to another, and hopefully did not cause a major accident or crash a server. Now we get into what really sets Run8 apart from the rest: the industry system and the physics.

Where cars come from and where they go

When looking at a freight car, it will likely have a *destination tag,* as well as a *reporting mark*. The reporting mark is a unique identifier for a car or locomotive, and can be viewed by pressing left-control+F8. A car's destination tags can be viewed by pressing left-control+F8 again, and are more significant to Run8 simulation. Green tags are empties, yellow, orange, and red tags are loads of lower to higher weight. A car may be tagged for either an *industry* or for an *off-route destination.* In Run8 these off-route cars are sometimes called "fluff".

An industry, in Run8's context, is any track marked for processing cars, which will change the destination tag and may load or unload the car. Industry tracks can be viewed with right-control+F8, showing the track with orange dots and the assigned destination tag in orange letters. Note that industry track locations and functions can vary depending on the config you or the server are using.

A *subdivision*, often called a sub, is a segment of the railroad. For example, the base game includes the BNSF Needles, BNSF Mojave, and UP Mojave subdivisions, with portions of others. The Run8 DLC and dispatcher screens do not always line up with the prototypical subdivisions.

If these cars are not spawned in and tagged manually, many times a train starts at the *End of Track* for what Run8 has built. The end of track is often designated as a

place where randomly generated or saved trains can spawn. These locations are also where trains for off route destinations are driven to. For example, East of BNSF Barstow Yard there is UP Yermo Yard. The UP Cima subdivision would be East of Yermo, but the track and scenery has not been developed in Run8 - hence it is the end of track we can use. In particular, we would send cars for North Platte, Nebraska this way.

Upon reaching the end of track, the train will be deleted. This also happens when a train reaches the end of tracks in other places such as yards or industry tracks, especially those without *buffers* to stop the train. Note that there are some places that may appear to have buffers that can stop the train, but don't actually function. When possible, it is best to stop short of any end of track and give at least a half-car length of extra space, so the cars and train won't be accidentally lost.

Train types

There are several train types on the railroad, which Run8 can replicate with more or less imagination required. Each type may have different speed limits, handling characteristics, destinations, and responsibilities enroute.

- *Manifest freight trains* may be made up of mixed freight cars with a variety of destinations going from one yard to another. These have the most variable handling characteristics and can be troublesome due to placement of power, loads, and empties if not built correctly. May be required to make setouts and pickups at yards or sidings enroute.
- *Passenger trains* carry passengers and their baggage, plus possibly mail, to scheduled station stops at the highest permissible speeds. Generally shorter than freight trains and should be prioritized over them.
- *Unit trains* carry cars of one type in bulk quantities. These could be very heavy if all loads and very light if all empties. Common examples include tank cars for oil, covered hoppers for grains, open hoppers for coal, and more. These could be going directly to or from an industry for processing, or to a yard for splitting between customers.
- *Key trains* are an additional designation for trains that carry certain amounts of hazardous material (hazmat) loads, and can have reduced speed limits.
- *Intermodal trains* transport loaded and empty containers and trailers. At an *intermodal yard,* wellcars, flatcars, and piggybacks are brought to *ramps* where cranes and other vehicles unload and load these containers and trailers.These trains can have a higher speed limit and can have a high priority compared to other trains. These may also have autoracks or refrigerator cars attached.
- *Local trains* and *yard jobs* take cars to be processed at industries and pick up cars that have been processed. These are often based at a *home yard* where the crew might *block* a train into a certain order for easier delivery.

- *Plant switchers* move cars around an industry to loading and unloading tracks. They are sometimes prohibited from entering mainline tracks.
- *Maintenance of Way* (MOW) or *work trains* take care of the railway. Run8 does not simulate track degradation but it does enable role-playing. Watch out for track bulletins where workers may be at trackside.
- *Light power moves* transport engines from one place to another where they're needed. This could be moving them to a shop for servicing or from that same shop after servicing. Sometimes excess engines can build up at a yard if lots of heavy loads are brought in and light empties are sent out.
- *(Manned) Helpers* help heavy trains up or down steep grades, to increase speed and prevent stalling.
- *Transfers* are a type of local that moves cars from one yard to another. This can especially include interchanging cars from one railroad to another. Oftentimes long distance hauling is the most profitable, and the “last mile” delivery is disproportionately costly, so railroads prefer to get cars as close to the destination as they can on their own rails before handing the cars over.

Yard operations

Yard crew assemble cuts of cars into other trains. This is done by *classifying* (sorting) the cars into different destinations, including for local trains based at that same yard. This is done by *switching* the cuts of cars between tracks. Local train crews might be *blocking* their train so the cars are in a certain order before departure. A *Yardmaster* coordinates train movements at yards to prevent accidents. *Hostlers* will move engines to and from trains. Tracks may be designated for certain tasks, such as power storage, inbound cars, outbound cars, a yard *lead* to allow room for switching without entering the main line, a *runner* to make sure engines can get from one side of the yard to the other, and more. Yards might also have fuel pads or shops that can refuel and service trains, respectively. A switcher that moves cars around may be called a *yard goat* or *shop goat.*

Hump yards are major classification yards where railroads sort cars going to a wide variety of destinations. They can process trains from far away with cars for close by, or trains from close by with cars for far off destinations. Within a hump yard, there will often be a *receiving yard* for trains to be humped, a *bowl* to collect humped cars, and a *departure yard* for trains that have been assembled. There are two jobs specific to these yards function: hump jobs and trim jobs. Hump jobs push a set of cars over the hump at a slow speed (2.5 mph or less). Trim jobs pull cuts of cars from the bowl and move them to designated tracks for building into trains- often out of more than one trim cut.

How cars get to their destination

A car that is part of a larger train might be spawned at the end of track and taken to a yard. This car may be sorted by the yard crew and put on a local train. The local train then takes that car to the industry. Once the car is processed, it can be picked up and taken back to the yard. The yard crew will make it part of an outbound train where it goes to its next destination (either offmap or another industry). Further reading from the Depot can be found here.

A more complex and specific example: A manifest train is created at Saco on the UP Mojave sub with a boxcar for the R8B industry in Los Angeles. This train would run South, possibly making setouts and pickups at UP Bakersfield and Mojave yards. After proceeding down Cajon pass, the train arrives at West Colton and is humped. The car is aggregated with others for Weeds yard, and is built into a train that drops it off there after traversing Alhambra sub. The car is then added to YLA70R, and gets delivered to the R8B industry. Later, after the car has been processed, the local will be run again to pick up the car, a manifest train will take it from Weeds back to West Colton, the car will be humped, and it will get sent offmap on a different train.

Train handling- preventing separations

To make sure our cars get safely to their destination, let's talk about train handling concepts for a bit. We want to make sure the cars stay on the track, and the couplers do not break and cause a train separation.

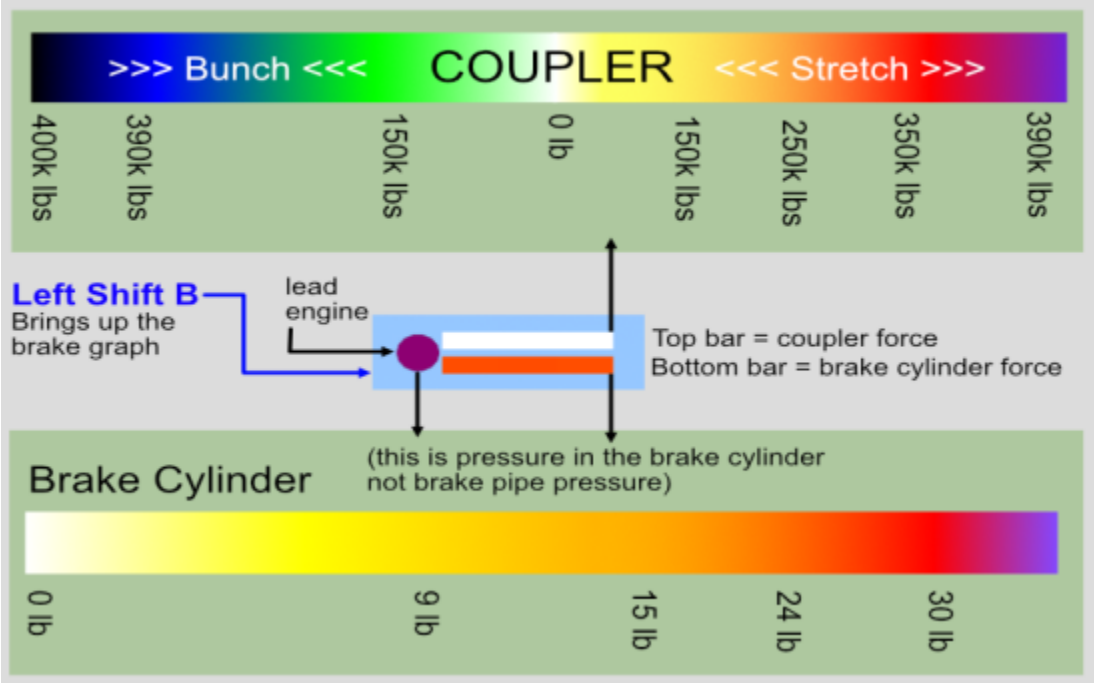
You may have noticed that couplers have some springiness to them- they can stretch and contract based on the forces they experience, and can make a racket in the process. This coupler movement based on being pushed or pulled is called *slack action*. You may have also noticed that on a long train, the engines at the front can start moving before the cars at the back start moving. This stretching process is called *running out the slack*, and if done too violently can result in train separations. This can occur in a few ways- the first is by pulling on a coupler with so much force that it breaks, which in Run8 is around 400k lbs, viewable in some of the HUDs. This can be done by accelerating too quickly, or on an uphill grade by having too much weight from the rest of the train hanging off a coupler.

The second is putting a set of lightweight empty cars in between two sets of heavy loaded cars and starting movement on a sharp curve. When too much pulling force is applied from the front, the lightweight cars can be *stringlined* and "jump" from the track, causing a derailment. This can also occur when braking too hard, as the heavy cars at the back push the front cars off the track.

To avoid these occurrences, we have a couple tools. First is hanging a device from the rear coupler, called a *Flashing Rear End Device* (FRED) or *End Of Train Device* (EOT or ETD). This will report "EOT MOVE" with a beep and a light when it

detects movement at its location at the rear of the train. Using this, you can know if the rear of your train has not yet accelerated, and wait until after it has started moving to increase your throttle and speed. To prevent stringlines, the train can be built to put loads together towards the front and empties together at the rear.

Excessive forces can also be managed by adding DPUs to the rear or middle of the train. By pushing from the rear, the DPUs can *bunch* the couplers and prevent them from moving back and forth too much. When on the rear, some locomotives have built in EOTs that can be activated that function similarly to the FRED. The graph below should make more sense to you now.



Train handling- descending grades

When descending from a hill or mountain, it is important to abide by speed restrictions so you do not lose control and become a *runaway*, as this can lead to derailment. The Depot has a good video explaining this process. After cresting the top, be ready to switch from throttle to dynamic braking. If you apply DB50 and are still accelerating, apply the auto brake. The air brakes can serve as a baseline, and your dynamic brake can be your “wiggle room” to increase or decrease your acceleration. However, you don’t want to run out of wiggle room by reaching DB99 and still be accelerating. Remember that you can take away Dynamic brake power but releasing the air brakes is much more dangerous. It’s also important to note that your train brakes can heat up over long distances of being applied, and can trigger a “hot axle” warning from the defect detector. When this occurs, stop the train and let the axles cool off- this may take some time.

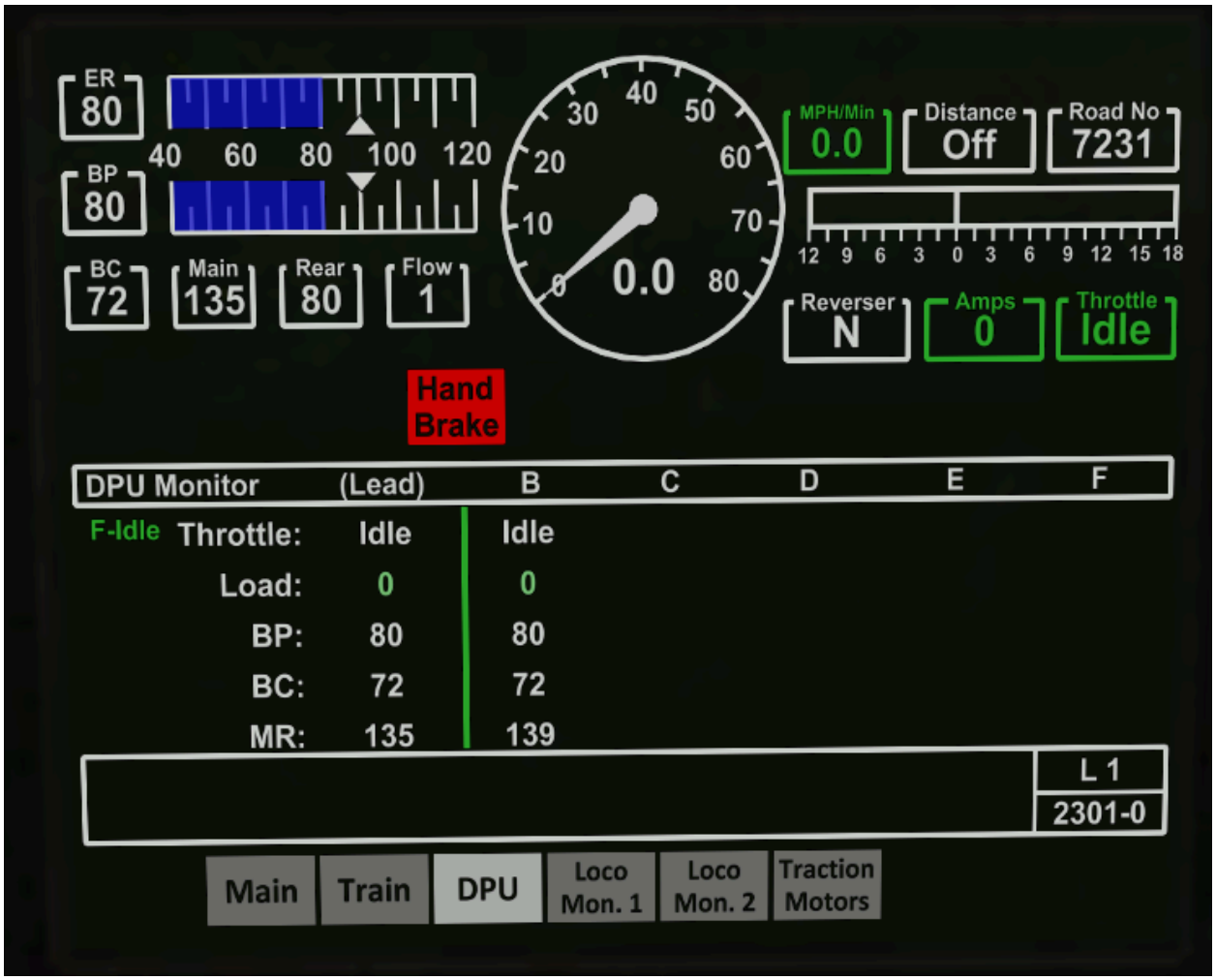
When starting a descent already on a grade, I fully apply the independent and auto brakes, release handbrakes, set reverser to forward, turn on dynamic braking, release the auto brake, apply DB50, and gradually release the independent brake. If speed picks up quickly, I reapply the auto brake and apply additional brake pressure or dynamic braking as appropriate.

Train handling- ascending grades

When starting an ascent up a grade, it's good to make sure you have enough power to make it over the top. The quick way of checking this is checking the HPT of the train and comparing it to what is recommended for the subdivision. The Depot publishes their minimum HPTs, but your server may use different rules. Also keep in mind that it can help to distribute power with a set of rear and/or mid DPUs, rather than continually adding engines to the front of the train. The Depot youtube channel has a video on how to set up DPUs and ascending a grade.

Starting a train without DPUs on a grade is similar to level ground- you just have to make sure you're not rolling backward or accelerating too quickly. First, fully apply the independent brake and auto brake, and release handbrakes. Next, set the reverser to forward and move the throttle up a notch. Release the independent brake, and bail off the brake cylinder, then observe if your engines are pulling. If so, set notch 2 and release the auto brake and after pulling out some slack. If your EOT is moving forward (not backward), continue to notch up. If you have started rolling backwards, apply the auto brake to an appropriate level to achieve a stop. In this case, you should now have the slack stretched out, and can try starting over at notch 3 instead of 2.

Starting a train with DPUs on a grade can be easier due to having more ways to influence the train, but there can be more steps. We are not as worried about breaking the train because the DPU is pushing from the back to bunch the cars and the whole train isn't just hanging from the front couplers. First, make sure your MFD is set to display your DPU status (see image below). If not, press Z and then X or C to cycle through the options. Now to start operating the train, fully apply the independent and auto brakes, and release handbrakes. Set the reverser to forward and throttle up a notch. Release the independent brake, and bail off the brake cylinder, then observe if your engines are pulling and pushing. If so, set notch 2. Release the auto brake and set notch 3. If you are rolling backwards then apply the auto brake, and try using a fence as described, in the next paragraph. If you're standing still watch your EOT until once you're moving forwards, you can then increase the throttle according to your speed restriction.



Using the *fence* when talking about trains is operating the throttle in different increments between power sets, especially applicable when rear or mid DPUs are in a higher throttle notch than the front DPUs. Watch your DPU MFD, and press Left shift+[(left bracket). A green line will appear. Now when you throttle up or down, engines to the left of the line will change but not the ones to the right. Engines to the right will respond to left shift+' (apostrophe) to increase throttle and left shift+; (semicolon) to decrease. As before, fully apply the independent brake and auto brake, and release handbrakes. Set the reverser to forward and throttle up a notch. Release the auto brake, and observe if your train stays still- if so, leave it released, and if not reapply it. Put up the fence, and throttle your rear DPU up to notch 4, and your front DPU to notch 2. Gradually release the independent brake, or release the auto brake if its still applied. Increase your front throttle to notch 3. If your train is stationary with all brakes released, then increase the rear DPU to notch 5 and the front throttle to notch 4. Continue increasing your DPU throttle and lead throttle, each by one at a time, while monitoring your coupler forces. Your EOT move will trigger once you're moving forward, and you can continue to accelerate to track speed.

Navigation tricks

As noted earlier, CTC switches, control points, mileposts, and intermediate signals are handy for identifying your location. You can also use roads, stations, industries, and yards. Press Left shift+F8 to bring up the “milepost tags,” which include other landmarks as well. The Depot maps and Depot train tracker are very handy for connecting everything together with the sim world. In the shift+X HUD, you can see your camera’s heading and your tile coordinates. Note that 0 or 360 degrees is north, 90 is East, 180 is South, and 270 is West.

One important concept is understanding “railroad directions” versus “cardinal directions”. At a particular moment, you could be going South in cardinal directions, but be going North in railroad directions. This is because the railroad’s sense of direction does not take into account the current heading of the train as it twists around curves, it’s about which direction the train on the track is headed in overall. You can view these on the Depot maps at the bottom, and railroads can keep track of their directions differently (for example, BNSF may say a track is East-West while UP says it’s South-North).

One particularly useful navigation trick is teleporting to industries, especially when working a local or yard. First, access the Industry List menu with left-control+L, and then click on the “industry configuration” tab. You can then click on the “transport” button next to any industry listed to teleport to its track. You can sort the list alphabetically by Industry name, IncomingTag, or Local Freight Symbol. This is useful to quickly find industries and better understand their actual in-game position, especially if your industry config does not match the one used in The Depot’s maps.

Assembling and/or building a train

Whether using the consist editor or building a train from cars in a yard, there is knowledge to keep in mind to ensure the train arrives at its destination without issue. The key aspects to think about are the cars in the train, the order of those cars, how much power is needed, and where the power is put in relation to the cars.

The first thing is determining which cars to put in the train. You may put whatever you want on a train if you are playing in a sandbox, but if there are industries you want to spawn cars for or already existing cars in the world, you will need to choose what to include. Manifest trains can have a mix of many cars for different destinations, but may have their speed limited. Intermodal trains can have some other cars mixed in like autoracks or modern reefers, and may reach higher speeds, but have more limited destinations. Trains may have their length limited by available sidings enroute or a tonnage limit based on how steep the grades are. One other measurement to keep in mind is TOB- Tons per operative brake. Most cars have one operative brake, so a quick

way to calculate this is tons divided by number of cars. A higher TOB means the train can be harder to stop than a train with a lower TOB.

When you've decided what cars you want to include, next you should consider what order to put them in. If there are setouts enroute, can you put them close to the head end of the train, or the tail end if there aren't rear DPUs? Is there a large block of empties that should be moved to the rear, or a large block of loads that should be moved to the front? Are there loads behind the lead engines and will there be a group of loads for DPUs to attach to?

At a basic level, you want to ensure you have a high enough HPT to pull and push the train up and down the steepest grade the train will go over. This is done by taking the horsepower of the engines and dividing by the tonnage of the train. The depot has a useful calculator that includes the Horsepower values of the different engines in Run8. Many routes in Run8 will have a recommended minimum HPT, but you can shoot for a higher HPT to go faster.

Having too many engines on the head end of a train can lead to coupler breakage when too much pulling force is applied. Often the limit is 5 locomotives that are running on the head end, but it can be smarter to put power elsewhere in the train as a DPU, either in the middle or at the rear. When this is done, the force is split between pulling *and* pushing the cars. For long and heavy trains, a mid DPU set and a rear DPU set may be used. This used to be done only as "manned helper" crews, but with developments in remote controlled locomotives this can now be done with the head end engineer controlling all locomotives.

Yard crew

Once cars get to a yard after a train terminates or does a setout, they need to be classified, either by flat switching or humping. Plan which tracks you will do this on, as a yard may have tracks assigned to arrivals, departures, run through, or other assignments that you don't want to block. Classification can be done by different locals, different industries, different outbound destinations, or loads and empties. After classification is done once, there may be further sorting, and for locals *blocking* is a common next step. Blocking is arranging the cars to be delivered in a certain order to make it easier to work industries along the way. Keeping facing point and trailing point switches in mind is significant to this process, so plan ahead.

Some yards may have a shop or refueling pads that crews need to take the engines to for servicing. Afterwards they may be added to the yard's power pool for use on outbound trains, or adding additional engines to those passing by. Shops and refueling are common at hump yards due to the amount of traffic they receive.

Working the hump

Humping can encounter issues, so it's important to carefully monitor the process. The process of how to hump is covered extensively in `ConfiguringHumpYardsV3.pdf`, but an abridged version is included here.

AI Humping

Start by putting your avatar/camera near the hump, then pressing left-ctrl+F6. You will see the hump menu where you can load hump configurations, save one, and enable or disable the hump. Make sure the configuration you want to use is loaded. Next, take your hump power and put it at the opposite end of a cut of cars, so the cars can be pushed over the hump. If you want the AI to hump the train for you, on the lead locomotive, type "HUMP" somewhere in the train symbol field. Open the hump menu and enable the Auto Pin-Puller and hump controller. AI recrew the locomotive, and it should get to work and stop automatically when a bowl track is full or when out of cars.

Manual Humping

Note that some servers don't allow manual humping. First, make sure the correct configuration is loaded. Next, we will set up slow speed fixed MPH so that we do not push cars over the hump too quickly. Go to the top left menu, and under the Train tab hover over Slow Speed Fixed MPH. Make sure this number is 2.4 mph or less, then click apply. Next, take your hump power and put it at the opposite end of a cut of cars, so the cars can be pushed over the hump. Close the anglecock at the coupler of the locomotive connected to the cars, then press left-ctrl+F7 to bleed the air out of the cars. Push the train close to the hump and stop. Open the hump menu and enable the Auto Pin-Puller and hump controller. Activate slow speed control with left-ctrl+C, then push the cars over. Be sure to stop your locomotives when bowl tracks fill or before they go over the hump.

Hump troubleshooting

If any issue occurs while pushing over the hump manually, the best course of action is to immediately stop the train by applying independent brakes and reducing the throttle. If you do stop while in the middle of pushing over the hump manually, it is best practice to turn the hump controller off and then pull forward, away from the hump crest (this prevents the controller trying to uncouple cars while traveling in the wrong direction!). Each hump has a small colored rectangular sign at the crest indicating the point where it pulls the pin on the cars. Pull at least two full car lengths forward of the crest sign.

Cars stopped mid bowl track may need their handbrake released or moved with a locomotive. Misrouted cars could be pulled out now or by the trim job later. If the bowl is ready for more cars you can restart pushing over the hump in the following process:

press reset hump yard in ctrl + F6, enable the hump controller and pin puller, enable slow speed if you turned it off, and start pushing back up to the hump crest. Or simply use the AI humper after resetting the hump.

Keeping speed low (~2 mph) and keeping an eye on the bowl for issues like stopped cars, misrouted cars, or full tracks, and stopping as soon as you see one, will make things go as smoothly as possible. Also note that telescoped cars can't be "fixed", they must be deleted. Trying to separate them is a recipe for corrupt trains and disaster. You might be able to recover and respawn them from a world save.

In general, good ways to prevent issues like ghosts/server crashes in multiplayers servers while manual humping have not been found. From the current understanding, most of these issues on servers come from the way Run8 networking traffic is handled. Small increases in ping and dropped packets can cause major issues during manual hump operation in V3.

Trimming the bowl

When a bowl track fills up, the *trim* job locomotives will couple to a sorted cut of cars and move them to another track, typically a departure track, so the hump can continue sorting cars. Sometimes the hump can make a mistake and send a car down the wrong track. The trim power will need to fish that car out later so it can be re-humped or moved to the correct track.

Locomotive types in Run8

There are currently 8 freight locomotives in Run8, which can be divided into three categories: Widecabs, standard cabs, and end cabs. Widecabs are the ES44DC, SD70Ace, and the C44-9W. They have the most horsepower- 4,400-4,4500. In Run8, most widecabs, except some dash 9s, have MFDs, while standard cabs and end cabs do not. These will often pull long and heavy road trains, though they can also be assigned to locals that go a long distance or have high tonnage. Standard cabs are the GP40-2, SD40-2, SD40T-2, and the SD45-2. The first three have 3,000 horsepower, while the SD45-2 has 3,600. These are versatile locomotives that are most commonly found working in yards and local trains, but can pull shorter and lighter road trains, especially when not on shallow grades. The only end cab locomotive in Run8 is the MP15DC, which has 1,500 horsepower. Typically these are assigned to yards for switching jobs, especially with low tonnage, low speeds, and shallow inclines, and might also work the hump.

There is only one passenger locomotive, the Amtrak P42, available. There are also a couple more vehicles- a hyrail and a trackmobile. Accelerate by holding down + and decelerate with - (think gas and brake pedal). The trackmobile can move cars but it is very weak and shouldn't move more than a few at a time, especially on a grade.

Resolving issues

Sometimes equipment can fail over the course of use. Run8 simulates various different issues that can arise with engines and cars. A simple one to fix is dragging equipment that can randomly occur. The car tag will change to pink, and it will trip and defect detectors the train crosses. After selecting the car the “Fix Drag Equip.” button will be highlighted. Click it to fix the error, or you can pretend it’s a bad order (see below) and set it out.

Another issue that can occur with cars is sticky or stuck brakes that either don’t apply or release as rapidly as the rest of the brakes on the train. Sometimes this can be resolved by applying a large amount of pressure to the brake pipe and then releasing to “unstick” it. If it does not release after a minute, locate the car by looking at the car menus until you find the car that is retaining brake cylinder pressure. You can bleed the pressure out, and then optionally you can cut out the brakes on the car so it doesn’t apply anymore. If a brake gets stuck on (or a handbrake was left on), it can result in a hot axle (due to friction causing heat), which will trip the defect detector and alert you to stop your train.

In real life, if an issue cannot be easily fixed, the locomotive or car may be called a “Bad Order” and need to be set out from the train for a mechanical crew to come fix - this is mostly only roleplay in Run8.

Rear end markers

In the real world, the rear end of a train that’s outside of yard limits must have a *marker* attached. Depending on the conditions, in Run8 this could be a light, red flag, flare, or an end-of-train device (EOT or EOTD), also called a flashing rear end device (FRED). Instructions for using these are included in `EOT Devices V3.pdf` in the userguide folder. Sometimes the marker doesn’t stay attached and “falls off” after a few seconds. Relinquishing the train and re-claiming fixes this bug. Tip: you can jump to the rear of your train with left-ctrl+F12.

It is generally advantageous to use an EOTD device due to the alert it provides when it’s moving. It also enables an emergency brake from the rear of the train if necessary. Many local train crews may choose to instead use a flag in the day and a flare at night. If there is a DPU engine on the rear of the train, you can set the light to “Dim” and enable the built in EOT device.

Headlights and platform/step lights

Headlights are important so trains can see where they’re going and be seen. If a train is not stopped, generally the front stays on bright, especially when going over grade crossings. If there’s a rear DPU, it should have the light at the end of the train set

to dim. In general, the front headlight can be dimmed when the train is stopped. Platform and step lights should generally be left on so the train crew can have the steps illuminated, especially when recrewing.

AI train crews

Trains can be “crewed” by AI, which can drive forward according to track conditions. They cannot reverse or do switching, but can work the hump. See `InteractingWithAITrainCrewsV3.pdf` in the userguide folder. AI’d trains delete themselves upon reaching the end of a track, so their path should be monitored if you care about the cars on them. To avoid this, they are stopped by four things: 1) Red absolute signals, 2) Switches lined against the train, 3) Something else on the track, 4) The “Stop and hold position” or “Stop immediately” buttons in the selected AI train menu. If you wish to take control of an AI’d train, click the “relinquish when stopped” button.

Dispatching in multiplayer

Dispatching can almost be a separate game from the rest of Run8, but is integral to the experience of train crews. It is strongly recommended to be familiar with the driving experience on the territory you'll dispatch, so you're aware of block sizes, speed restrictions, and grades. As with normal train driving, your goal is to get cars from A to B, but you're guiding multiple trains instead of just one. Being able to quickly reference train symbols to know where they should be directed is very important, and memorization will come with practice. Having maps at hand is also smart, and you can start with dispatching one subdivision at a time before doing multiple at once. Learn which way destinations go at each junction, how things are connected, and where each DLC starts and stops.

When dispatching, keep in mind any particulars for the community, such as where each dispatcher's responsibilities are, train priorities, radio formalities, train identifiers (lead unit or symbol), and operations (where trains may be setting out or picking up cars). The Depot has a good beginner’s guide to Run8 radio communication. Listening to other people dispatch in Run8, or real railroads with sites like https://www.broadcastify.com/listen/, can help you learn how to build immersion for those you dispatch.

Remember that while you're dispatching trains, you are working with the train crews, not against them. This is a sim/game that people play for enjoyment in their spare time, not for pay. You may be controlling the switches and signals, but if you have a bad attitude with your crews or treat them poorly, they may leave and then you'll have nobody to dispatch. At the same time, if someone is giving you an attitude that you think is against the rules, it's best to let server management know so they can listen in and

make their judgement of action to take, if any. Everyone can make mistakes, whether dispatching or driving, so forgive each other and help resolve any issues as they arise.

Advanced Knowledge (WIP)

This section focuses on knowledge not core to the run8 experience, especially optional steps that are based on prototypical operation. If you've gotten this far, you may want to peruse GCOR for Western railroad rules (UP and BNSF) or NORAC for Eastern railroads (CSX and NS).

Kicking cars

Kicking cars is when a car is uncoupled from a train while still in motion, often done down a yard track to couple to another set of cars. This saves time by allowing the train to not travel down the track and then pull back out. If done on a grade that's too steep, it can result in runaway cars. It can be better to take a smaller cut from a long cut of cars instead of kicking everything at once.

To kick cars, first close the anglecock between the locomotives and the cars you want to kick, and open the anglecock at the other end of the cars. Bleed the air from the cars to be kicked, then pull the uncoupler lever. Push the cars with the train, and then brake to stop sharply enough to uncouple. Be careful of the car(s) picking up too much speed, you can click the car(s) to apply hand brakes if needed.

Future content

If you'd like to contribute more to this Primer, please reach out! Some ideas for advanced knowledge include:

1. More specific headlight rules
2. Whistle and bell rules
3. More on other circuit breakers and MFDs
    a. ENG run, gen field, fuel (pump), DB
4. Track warrants and forms
5. Other prototypical rules from GCOR and NORAC

Appendix

Resources and further reading

While this primer has attempted to cover many Run8 related topics, there is much more to learn. Here are some suggested resources for further reading.

http://run8guides.com/ has the External Assistant for Run8 available for download, which is handy for quickly pulling up maps, viewing the chat log, inspecting your train, teleporting to coordinates, and more!

The external consist editor is like a more feature-rich Train Maker-Upper, preferred by many for its versatility. https://railcoder.com/external-consist-editor-ece/

https://www.thedepotserver.com/ - has many useful resources that I have referred to throughout this guide. On the subject of DLC, The Depot maintains a Rolling Stock Database that lists exactly what's included in each trainset pack, with photo galleries. They have a great Youtube playlist for many "how-to" walkthroughs.
https://www.youtube.com/playlist?list=PL42BbrUwNZM3wLCubSuxZVfP_ZnnmEXqO

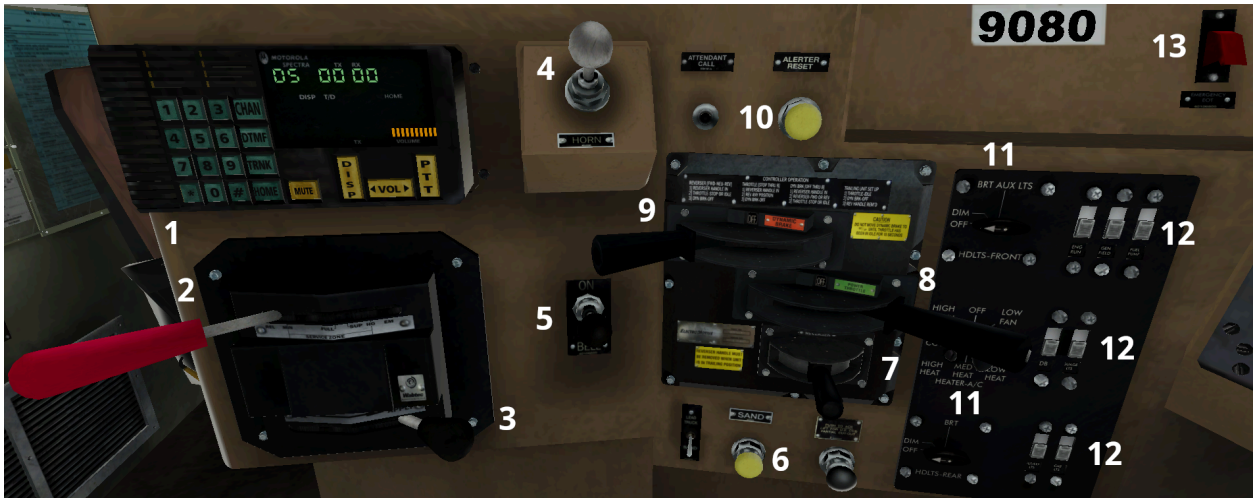
The Depot forum is a nexus for the Run8 community that many different people post on. If you have trouble with the program or simply want to discuss it with others, it is the place to go. Here are some particular recommended threads:
Drf30q has some excellent detailed grade maps available. He also has some other "miscellaneous ramblings" from him that cover additional technical aspects of the sim.
His79 has a great FAQ that includes some troubleshooting advice, an abbreviation glossary, and DLC information.
SmashedFinger has also collected information on what DLC is required for several common Depot intermodal, unit, and local train symbols and plant jobs. Blocking guides for some locals are also here, WIP.
https://thedepotserver.com/forums/threads/unit-trains-intermodals-locals-and-plants-by-dlc.13426/

Additional control stands

All keybinds are the same across locomotive types. There are features not visible in the cab of a locomotive but they are still usable. For in-depth control explanations, refer to "Important controls - getting started" at the beginning of this document.

SD70Ace

The SD70Ace has broadly similar controls to the ES44DC. Any modeled controls not listed are non-functional.



1. Radio Controls
2. Auto brake/Train brake - red handle
3. Independent brake/locomotive brake - black handle
4. Horn -silver/grey knob
5. Bell - black knob
6. Sand - yellow button
7. Reverser - black handle
8. Throttle - black handle
9. Dynamic Brake - black handle
10. Alerter Reset - yellow button
11. Headlight controls - black dials
12. Circuit breakers - top 3 on, DB (behind throttle handle) - turn on for dynamic brakes, Gauge LTS turns on lights for some controls, PLT/STP LTS is platform/step lights (usually kept on), CAB LTS turns on overhead lights
13. Emergency EOT - click once to flip up cover, click again to activate emergency brake from rear of train. Keybind: left-ctrl+left-alt+backspace

Mileage
Road number
Date and time
Equalizing reservoir
Brake pipe
Rear - air pressure at rear of train
Flow - flow of air in brake pipe, in CFM
Main - main air reservoir
BC - brake cylinder pressure in locomotive
Speedometer, in MPH
Accel- estimated change from current speed in one minute, in MPH
Distance
Reverser- shows current reverser position
Tractive Effort - pulling force exerted by the locomotive in kilo pounds (kLB)
Throttle - shows current throttle when green, or dynamic brake setting when yellow.

Indicators

- Wheel Slip
- PCS Open
- Hand Brake
- Penalty
- Unit Alarm
- Sand On
- EOT No Com
- EOT Move

LH - long hood headlight setting
SH - short hood headlight setting
Horn
Bell

SD40-2

The SD40-2 has a cab representative of the other standard cabs in Run8. Note that there are no MFDs. Any controls not listed are non-functional.

1. Head of Train Device - see page 10 of `V3 Important Changes.pdf` for more details. (nicknamed “Wilma” to match “FRED” - like the Flintstones)
2. Radio controls
3. Auto brake - red handle
4. Independent brake - black handle
5. Bell - yellow button
6. Sand - silver-grey knob
7. Headlight dials - front and rear

8. Lights switches - silver switches - panel lights for overhead light, and gauge lights for illuminated controls.
9. Indicator lights
    a. Wheel slip
    b. PCS Open - will be solid when triggered, will blink when ready to reset
    c. Hand Brake
    d. Sand
10. Reverser - black handle
11. Throttle - black handle
12. Dynamic brake - black handle
13. 3 breakers - silver switches - put all three in up position for normal operation.
14. Gauges
    a. Main reservoir - red needle, goes up to 140psi. Decreases when air brakes are released.
    b. Equalizing reservoir - white needle, starts at 90psi for released brakes and decreases with brake application
    c. Brake cylinder - red needle, goes from 0psi for break release up to 72 psi for full application
    d. Brake pipe - white needle, 90 psi when brakes released (by default), lowers in response to auto brake application
    e. Air flow indicator/CFM - lower numbers mean brakes have released, higher numbers mean brakes are applied. see page 1 of `V3 Important Changes.pdf` for relation of gauge numbers to actual CFM.
    f. Ammeter - dial that shows the amps being supplied to the traction motors. Moves right for throttle power and left for dynamic braking power.
15. Distance counter
16. Speedometer - analog gauge showing the speed of the locomotive in MPH
17. Platform light - Not shown, switch behind and above

Manual train setup checklist

Also useful if you're expecting the engines to respond and they aren't.

1) Close anglecocks at front and rear of train (and ensure sufficient handbrakes are applied).
2) "Set lead unit" if not already done. (note that this button will do some of the following steps for you)
3) Iso switch to "start", start the engine(s), then turn iso switch to "run" on each engine after startup finishes. (note the iso switch doesn't actually do anything)

4) Connect all MU cables. Ensure lead unit is in “lead” status and connected units are “MU”.
5) Check DPU sets - one DPU_Lead per set, and the rest MU. DPU_lead should have appropriate FWD or REV setting to match the lead unit.
6) Connect air hoses, and open anglecocks between cars.
7) Set front headlights appropriately
8) Set up rear marker appropriately (EOT device and/or headlight)
9) Turn engine, fuel, and control breakers on.
10) Turn on Dynamic brake breaker and cutout any designated units.
11) Perform a class 1 brake test (optional but encouraged), and if system is charged, release handbrakes.

Recovering from failures

Run 8 V3 simulates failures. There are different types of situations that can occur. A list of common defects and how to recover from them is shown below. Many defects can be cleared following the right procedure. This information was first published in the Depot forums.

For very hard defect situations, AI-ing a train can fix a defect. If nothing helps you might need to respawn the train.

Locomotive failures

Situation
- The Stats button on the locomotive menu will be yellow.

Remedy
- It can be fixed at a service facility or on the tracks by double clicking on the defect.

Derailment

Situation
- A message will appear that a car has derailed. The car identifier is included in the message.
- It is also possible to get a split track condition error after relinquishing your train.
- Too much pushing forces from the rear can push a car off track, mostly empties are prone to that. Consider using mid DPUs when building a train.

Remedy

- Like in the real world, you need to walk the train and search for the derailed car. Click on the car truck and rerail it with your favorite method.

Dragging equipment

Situation
- A defect detector will inform you that something is wrong with your train.

Remedy
- Enable tags and look for a magenta colored one, use the fix button on that car.
- If you cannot find any tag, it is possible that the brake pipe could have a leak, see below.

PCS error

Situation
- The red PCS error light will indicate the problem on the locomotive. It indicated that the measured pressure drop on the brake pipe was too high. It can occur after derailment.

Recovery
- Perform PCS error recovery as mentioned on the MFD screen. It will also work for locomotives without a MFD screen like the SD40s.
    - Set reverser to neutral
    - Perform a full brake application
    - Wait for 60 seconds
    - Fully release the train brakes
- To find the leak mid train, check the brake indicator for no pressure drop at a certain car and all cars behind. LeftShift+B will bring up the following display.

- Walk the train and listen for airflow at disconnected air hoses. The couplers can also have a strange angle like in the picture below.

Hot axles

Situation

- A defect detector will inform you about a hot axle and the info will include the axle count.
- In case a loco is involved, you will see a lot of smoke. The reason is that you might have forgotten to bail off the independent brake after the train brake application. Using dynamic brakes downhill will prevent the indy brake application.

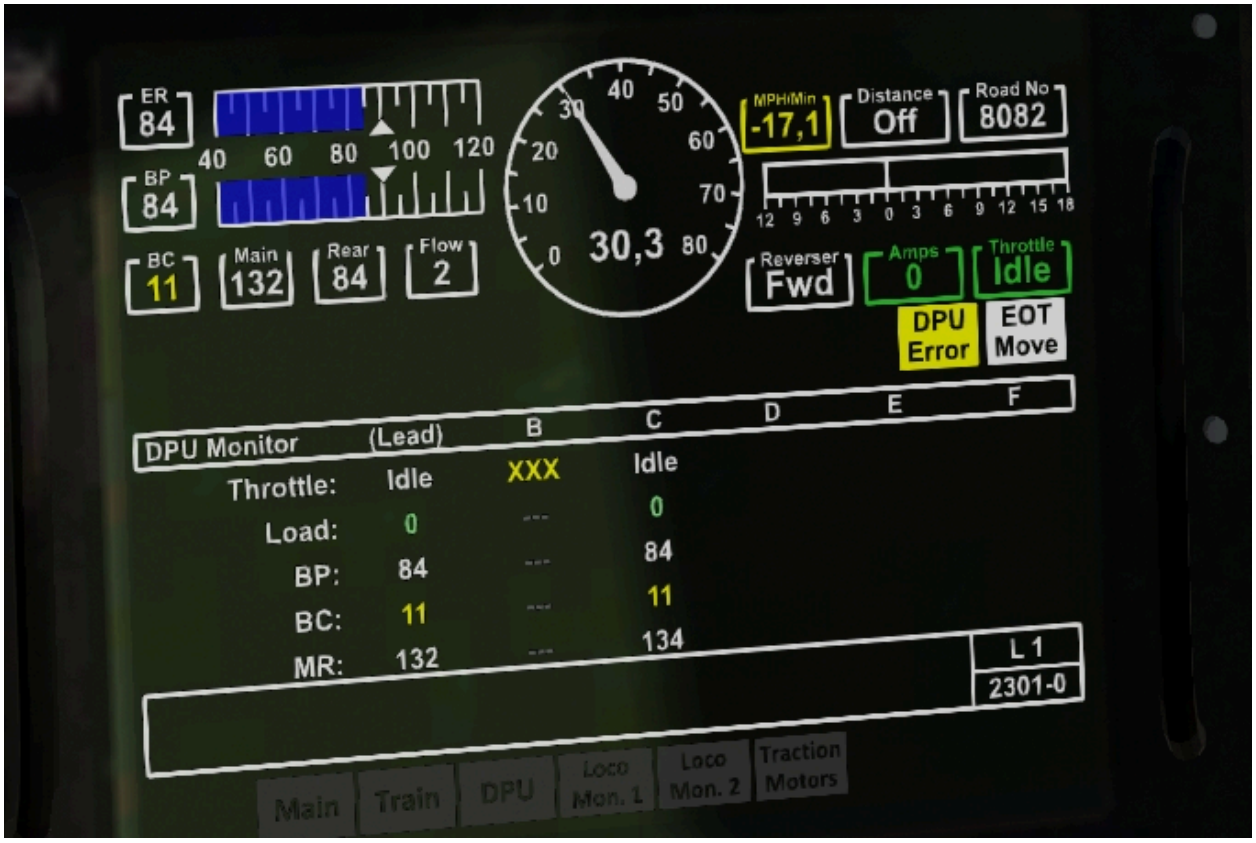
Remedy

- Check the brake indicator for no pressure drop at one car.
- The cause can also be a dynamiter or triple valve error. Over time cars tend to have these errors. Cut out the air brakes and bleed the car in the car menu to continue. You can also set out a defect car at a siding.

DPU Error

Situation

- A yellow DPU Error indication will be shown on the MFD screen. The reason is that the radio transmission to the DPU is blocked due to hills or tunnels. It can be a self recovering problem when the obstacle is out of the way.
- After some time of missing connection to the DPU, the indication will turn red.



Remedy

The remedy can be found in the V3 Important changes and did not make it to the Loco Failures document.

If a consist has suffered a radio failure and cannot recover from it, the user can simulate "fixing" the problem with the following procedure:

- Bring the train to a complete stop
- Place the Reverser in Neutral
- Make a brake pipe reduction of 20psi or more (on a 90psi train, drop the BP to or below 70psi)
- You should see a message about Comms being re-established, and the DPU Screen should show the consist's data normally. You may proceed with your trip
- Or you can cheat and cycle the "Realistic DPU" option in the menu