

V3 Important Changes

The following changes/improvements/features have been added in Run8 Version 3, some of which have their own Documents elsewhere within this folder:

- **Route Loading**
 - As before, in the **Main Menu**, you will see a list of available routes within the currently selected region
 - You can mouse-select whichever routes you wish to load for this session, using the standard Windows multi-selection methods
 - If none are selected, the sim will simply load all the available routes within the region as before
- **Automatic Dispatching** is now available in Run8, and is toggled on or off per-route from that route's F3 DS Screen. For more details, **please read the Auto-DS Manual**
- **Dispatch Screens**
 - **"ABS Mode"** fleets all of the signals in both directions, simulating Automatic Block Signal operations. Auto-Dispatching must be off for the route in order to use this feature. You can toggle the control for a particular route in the DS Screen's options menu by pressing **[F1]** in the DS Screen
 - **Some DS Screens are now multi-paged**; we simply couldn't cram some routes into one page using the newer system, so those routes' screens have multiple pages (up to 4). If you are viewing a multi-page DS Screen, you may press:
 - **[TAB]** to see the next page
 - **[Shift-TAB]** to see the previous page
 - **[Ctrl-TAB]** to see all the pages together
 - Note: If you are currently viewing all pages together, you can put the mouse-pointer over the desired area and press **[TAB]** to zoom to it
 - Note: **[F3]** functions the same as before, cycling between the various routes
- **Traction Motor Temperatures** now respond properly whether it's amperage from Power or amperage from Dynamic Braking
- If set, units can **derail**, and can also be re-railed by selecting the offending unit's Truck and using the available options
- **Manned-Helper Operations** are now possible, and units can be designated as Helpers in the same manner as they are for DPU, using a new switch in the DPU section of the unit's Options Menu. There is a separate User Guide that explains Helper Ops in more detail
- **Locomotive Failures**: Locomotives now keep track of their overall "health", and it will persist in the world as a unit comes and goes, according to the amount of accumulated "Notch-Hours" of time on the engine. See "Locomotive Failures" PDF for more details
- **Locomotive Numbering**: A user database can be set up that gives the user fine control over how particular locomotives are numbered, which will override the default values used by Run8. If the database is unable to assign a number, the system will default to the Run8 values as before
- The **Options Menus** are now a Drop-Down style and are accessed by mousing to the top edge of the screen.
 - Note: **[F1] no longer opens the Options Menu!**
- **EOT Devices**, when mounted to a coupler, must have the Angle-cock opened (or partial) in order to read rear-end BP PSI as well as to trigger an emergency-brake application from the EOT. If the angle-cock is closed, neither is possible. Built-in EOT Devices, as found on some locomotives, do not have this requirement
 - EOTs also now simulate battery level. If the battery gets too low, it will stop working and cause an EOT Error. You can simulate replacing the battery by removing and replacing the EOT
 - EOTs powered by an air-turbine will charge the battery if the brakepipe is above 40psi and the anglecock to the EOT is open
 - EOT type (battery or air-turbine) is selected randomly by the sim when attaching a new EOT
- **EMD Airflow (CFM) Gauges** have been adjusted to respond more accurately to real-life (in an exponential manner). A real-world CFM gauge was graphed and an equation found that best-matches most of the data points. The following **Calibration Chart** shows actual CFM for each gauge-unit in the sim:

Gauge	Actual CFM
2	18
3	29
4	37
5	44
6	50
7	55
8	60
9	64
10	68
11	72

- 12 75
- 13 79
- 14 82
- Refactored **Hump-Controller** code to be more efficient
- **Turn-tables** are now a thing in Run8, and are controlled using the **[Ctrl-F6] Hump Controller** menu
 - As with Hump Controllers, you must be within about 100 meters of the table
 - The control will instead show **Clockwise** and **Counter-Clockwise** buttons; if the table is currently unsafe, the buttons will be disabled
 - After selecting a direction, the table will then rotate one track in that direction, automatically stopping once it aligns itself
 - If on a network session, the polite turn-tabler will wait a few seconds after stopping his train before operating the table as to allow other guys' sims to catch up. If you happen to be a complete jerk, by all means please disregard this and carry on in ADHD mode
 - Your locomotive(s) must be fully on the turntable and stopped with brakes set
 - If you see the track rotating, but not the table model, just press [F10] to reload the local scenery and it will solve itself
 - Your train will likely delete itself if you attempt to drive off the table when mis-aligned, or attempt to run off the edge into the pit
- The **Shadow System** now automatically adjusts itself when there are many trains in the scene to help smooth and enhance performance when in busy yard areas
- **Train Updating Code** has been tweaked a bit to reduce the "Stutter" caused by parallel-updating of trains
 - In the **F1 Menu**, in the "**Simulator Options**" section, you can adjust the **Parallel Limit** to suit your tastes. The default value of **4** should be quite sufficient. The main cause of the stutter was basically related to pawning-off too many trains to the various CPU cores at one time, causing some stalling. Limiting the amount greatly mitigated this whilst still retaining the benefit of multi-threaded updating
- **Barstow Yard** has been enhanced:
 - **North Departure** now has a sixth track
 - **South Departure** now has a sixth track
 - the **Hump Underpass** can now accomodate Autorack cars, and the grade has been lowered from 4% down to about 2%
 - the **Car-Repair Yard** has been moved over to accomodate the newer underpass
 - the **Hump Yard** now has 26 bowl tracks
 - the **Local Yard** and the **Inbound R-Yard** track have been moved over to accomodate the new bowl-tracks
 - The **"WJ"** control-point is now a real thing, usable from the DS Screen
 - **Barstow Hump** works fine up to **4+mph**, and I've seen **5mph** mostly successful in single-player, HOWEVER, this is unwise on a network and also unrealistic. Keep your humping to a realistic medium pace of **2-3mph** and everyone involved should be quite satisfied
- EMD diesel rpm change-rate has been increased a bit to be more realistic
- On the west-coast routes, Signals that are set for **Restricting** by the DS now light up properly as either a **Restricting** or **Diverging-Restricting**
 - Before, all heads of the signal would show Restricting, which was wrong
 - Now, only the proper heads will show Restricting, the others will simply show Red
- **Alerter**
 - There is a new option for **Realistic Alerter Time**
 - This option is only available when using "**Realistic Train Handling**" mode, since otherwise the alerter system is disabled
 - If **Off**, the Alerter will time at 120 seconds (this is the original simulator logic)
 - If **On**, the alerter will time according to Speed, in accordance with FRA regulations
 - The **Alerter** is also now functional on the older EMD SD\GP locomotives
 - The **Alerter** visual warning now blinks silently for a few seconds before the warning alarm starts
- **Class Lights** are now functional for locomotives that have them
 - You can choose between **Off, White, Green, and Red**
- You can now board and dismount cars\locomotives using:
 - **[E] Key** (Avatar Up) to board (if on the ground in F12 mode)
 - **[Q] Key** (Avatar Down) to dismount
 - **[F11]** and **[F12] Keys** still also work as-before
- **Coupler Draft-Gear Simulation** has been greatly enhanced and is much more realistic than Version 2
 - Dirty Little Secret: V1 and V2 simply used stiff spring equations to mathematically simulate couplers. While this worked decently overall, it was terribly inaccurate as to how buff and slack forces are transmitted and dissipated in a real train

- The number of physics-iterations per second has been increased for more accurate tracking of numerical models
- Acceleration errors have been reduced quite a lot due to more accurate integration
- The **Audio System** has been totally overhauled and now uses **FMOD**
 - V2 only supported Stereo; V3 can support Surround 5.1
 - XACT is no longer used
 - **Horns** made for V2 will no longer work in V3, HOWEVER, they are very simple to create for V3 now
 - See the **User Guide** for documents pertaining to Horn and Bell creation
- Run8 V3 now supports **True Fullscreen** rendering in addition to the two previous modes, and for the first time ever in Run8's long and glorious history, we can finally render Menus in True Fullscreen as well!
 - Use **[F4]** to toggle between the "Small Window" and "Borderless-Fullscreen Window" modes as before
 - Use **[LeftShift-F4]** to toggle between the current windowed-mode and True Fullscreen
 - Notes:
 - If you happen to be in True-Fullscreen, you can use **[F4]** or **[LeftShift-F4]** to drop back to the previously used window mode
 - **True-Fullscreen will likely render much more smoothly** than Run8's traditional Fullscreen-Borderless Window mode
 - V-Sync Note: **V-Sync only works in True-Fullscreen**. This is not a Run8 problem but rather is common to any software\hardware
 - If you exit the sim while in True Fullscreen, there may be a short delay
- Due to the above, as well as running out of menu-space for new stuff, the **Menu System** has been redone:
 - The "**F1 Options Menu**" is no more. It has been replaced by a more traditional DropDown style menu, accessed by running the mouse up to the top of the screen
 - Many of the "on\off" options have been replaced by **Checkable Menu Items**, and when they are enabled, you will see a checkmark next to the option
 - Various other options will have their controls (ie sliders, buttons, etc) appear next to them when the option is hilited by the mouse
 - The more complex options will open their own windows after being selected, many of these windows will look familiar from V2
 - **[F1]** is now a shortcut for the **Load-Save Menu**
 - Special Options Notes:
 - **"Slow Speed Uses Current Speed"** has been removed; setting **"Slow Speed Fixed MPH"** to zero causes the sim to use your current speed
- For guys who like to watch bar-graphs and numbers, the **Railcar Options Menu** (the one that pops up when you select a railcar) now shows a small graphical representation of the various airbrake system pressures for that car
 - BP: brakepipe PSI
 - AuxRes: auxiliary reservoir (aka service reservoir) PSI
 - EmgRes: emergency reservoir PSI
 - Bcyl: brake cylinder PSI
 - The **"Bleed" Button**, as before, bleeds-off the car's airbrake system
 - See further below for more information about realism improvements to Brake Bleeding
- The **Coupler Options Menu** now supports manual connecting\disconnecting of the brakepipe Air Hose betwixt railcars
 - As in real life, you must now pay attention to the order in which you manipulate your hoses and anglecocks, otherwise you'll dump or block the air on the train. The Coupler Menu buttons will color themselves to show safe and warning conditions
 - Normally you would never manually disconnect an Airhose, as they are designed to automatically disconnect as the cars pull apart during uncoupling, however, the option is there since technically it could be done in real life
 - Don't anglecock-block your brakepipe: after connecting the airhoses, partially open one anglecock and fully open the other, allow the air to stabilize for several seconds, then fully open the anglecock. Make sure both anglecocks are fully-opened once the air has stabilized
 - As in real-life, after connecting to a car with an empty brakepipe\airbrake-system, don't be a noob and fully open both anglecocks right away as you will likely end up dumping the air on the entire train!
 - Also, as in real life, don't be a noob and leave the anglecock open at either end of the train!
 - Exception: If a coupler-mounted EOT is installed on the end of the train, you **MUST** open that anglecock so that the EOT can sense the brakepipe PSI. If you do not do this, you will not show a proper BP reading for the EOT, neither will you be able to trigger an Emergency Brake Application from the EOT
 - Neither shalt thou remove thy EOT having not first closed its anglecock, lest thou, being naughty in thy engineer's sight, dump his air and heap hot coals of shame upon thy head

- See further below for info on placing a Red Flag instead of an EOT device
- **Engineer Head-Out View** has been improved:
 - **[Right-Ctrl UpArrow]** puts your head outside facing forward
 - **[Right-Ctrl DownArrow]** puts your head outside facing reverse
 - Normal Up and Down arrows put your head back inside the cab
 - Quick-Zoom and Reset have been moved to **[Right-Alt Up\Down Arrow]**
 - **Note:** if you used your Key Settings file from Version 2, there may be a conflict between these functions which will require you to go to the Keyboard Menu and reassign the assigned keys for these functions
- **TMU (Train Maker-Upper) Menu**
 - Due to the newer menu system, Drag-n-Drop of available units into the New Train box is no longer possible for programming reasons that are too boring to mention here
 - To make up for that lost convenience, you can use the **[Right Arrow]** key to move the currently selected unit(s) into the train as many times as you wish
 - You can still double-click a unit into the new train as before
 - You can still multi-select units using Control and Shift as is normal in Windows. Multi-selecting and then using **[Right Arrow]** makes creating a new train easier, especially if you want to use many of the same car(s)
 - New: If there is a selected unit in the New Train box, using **[Left Arrow]** will remove it from the train and move the selection to the preceding unit
 - So overall, the TMU has actually gained convenience
 - Railcars & Locomotives that have not yet been installed are now listed in Gray
- **Retainer Valves**
 - Run8 now supports the use of Retainer Valves. This is a valve on the exhaust-line of a railcar's brake system which affects how the railcar's brakes are released
 - Retainers are not normally used anymore in modern railroading, but railcars still have these valves
 - They were mainly used for long down-grade runs, before Dynamic Brakes were mainstream, and would allow the engineer to release the airbrakes but maintain some braking effort while the system recharged.
 - We chose to simulate the modern 4-position valve, which has the following settings:
 - **DE (Direct Exhaust):** This is the **normal position** of the valve; no air pressure is retained within the brake cylinder, and the brake cylinder releases normally
 - **LP (Low Pressure Retain):** The brake cylinder will exhaust until reaching 10psi, and will hold that pressure
 - **HP (High Pressure Retain):** The brake cylinder will exhaust until reaching 20psi, and will hold that pressure
 - **SD (Slow Direct):** The brake cylinder will eventually release fully, but at a much slower rate than normal; it could take several minutes for the brake cylinder to fully release
 - The valve is operated by selecting the car and using the slider control in the menu
 - With that being said, pretty much nobody ever uses retainers anymore...
- **V3 Air Brakes**
 - The brake-rigging of a car is automatically set so that the car's max braking force falls within AAR regulations; Load\Empty Sensors are automatically placed on cars that need them
 - To better simulate air-brake systems, cars and locomotives now have a random "health" assigned, which modifies the above value. Some brakes may be in poor condition, while others may be out of adjustment or too strong; most will be within regulations
 - Brake Cylinder pressure now builds and releases at a more accurate rate (according to AAR regulations)
 - The first couple PSI in the brake cylinder are now "wasted" to simulate slack in the rigging and the force necessary to overcome the return-spring within the brake cylinder. In other words, it takes a couple PSI just to get the pads forced onto the wheels
 - There is now an option in the Train Menu for **Allow Brake-Valve Failures**
 - If enabled, the brake-valves on cars are subject to random failures, which are usually the result of a brake-valve piston being stuck, perhaps due to a groove or defect inside its piston causing it to snag until a certain air-pressure is reached sufficient to force it past the snag. This snag can be on either the Application side of the piston, or the Release side of the piston, resulting in any of the following:
 - **Dynamiter (aka "Kicker"):** this is a condition that causes the brake-valve to errantly trigger its Emergency function, dumping the air on the train when a normal brake application is made, usually the result of a stuck valve-piston that finally budge and causes a momentary shock wave in the brakepipe. Depending on where the valve is stuck, it will take a certain brakepipe reduction to finally budge the piston. This can be useful in tracking down the smartass car causing the problem. The worse-case scenario is a Dynamiter that happens on a minimum-set
 - **Stuck Valve Piston:** This can happen either during **Application** or during **Release**
 - If the piston is sticky during **Application**, you may notice the brakes not setting on the car until some certain brakepipe-reduction is attained
 - If sticky during **Release**, you may notice the brakes releasing late or not at all, in which

case you may need to make a deeper reduction in the brakepipe and try to release again. This will usually force the piston into the Release position

- Depending on the severity of the problem, you may have to **Cut-Out** and **Bleed** the offending car (see below for more info on this)
- There is now an option in the Train Menu for **Realistic Indy Braking**
 - In real life, it can take several moments for the indy-brake signal to propagate from the lead-unit down the consist. If turned on, you will notice the independent brakes lagging on the trailing units, and moreso as the number of units increases
 - Some locomotive types lag more than others, with modern locomotives responding fairly quickly
 - If turned off, the locomotives in the consist will have a fairly uniform and quick response
- Brake force calculations now take into account wheel temperature. Overheating of the brakes will result in brake-fading
- Wheel-rail adhesion now decreases a bit with speed
- Brakeshoe/wheel adhesion also varies according to the properties of composite (Cobra) brake shoes. This means you'll have slightly increased braking at lower speeds. Older cast-iron brakeshoes, which diminish greatly with heat, are not used on any of Run8's equipment at this time
- Wheels will also heat up due to wheel-slip and wheel-skid
 - **Wheel-skid** can happen if the braking force exceeds the wheel's adhesion, especially if the handbrakes are set too hard on an empty car while being moved
 - **Wheel-slip** happens if a locomotive's tractive-effort exceeds the wheel's adhesion; Note: some locomotives have automatic wheel-slip circuits that effectively reduce power to stop/prevent/mitigate wheelslip
 - Note: Slip and Skid only happen when using "**Realistic Train Handling**"
- **Brake Cut-Out:** On railcars, the car's Brake Valve can now be cut-in/out via a valve in between the car's Brakepipe and its brake valve. The button shows the current status of the valve:
 - **Cut-In:** This is for normal operation, and the brake valve has communication with the brakepipe
 - **Cut-Out:** The car's brake-valve is separated from the brakepipe, and the car's brakes will not respond to the brakepipe. Note: the brakepipe still functions normally and communicates pressure to neighboring cars
 - You can check the status of the car by clicking on it and viewing the Airbrake System section
 - The button will show **Green** and say "**Cut In**" for normal status
 - The button will show **Yellow** and say "**Cut Out**" when the car's brakes are cut-out
 - You can click the button to toggle the Brakevalve Cutout state
 - The Train's **TOB** value will also change as cars are cut in or out
 - If a car in your train is found to have malfunctioning/stuck brakes, first **Cut-Out** the brake system, then **Bleed** the car. The train may then proceed
 - If not using **Realistic Train Handling**, the **F7 Airbrake Cheat** will also cut-in all brakes on the train. Otherwise, only cars that are cut-in will be affected by the airbrake-cheat
- The **Parking Brake Indicator** can now be set according to the following modes:
 - to light up if any unit in-train has its handbrake set (Run8 traditional default mode)
 - to light up only for the particular locomotive (realistic)
 - Use the **Train** dropdown menu to set the desired mode
- **Brake Bleeding**
 - Bleeding a car's brake system no longer triggers an emergency-application of the brakes. Run8 V2 mistakenly bled the Brake Pipe along with the other reservoirs, which was incorrect. **V3 does NOT bleed the brake pipes**
 - Bleeding is normally necessary when an uncoupled car has gone into Emergency due to normal uncoupling, which means the car's Brakepipe is empty and the brakes are set hard. In order to release the brakes and move the car, you either need to recharge the car's air, OR, bleed it off totally
 - When humping or kicking cars, you will need to follow one of the two following procedures in order to properly kick/hump without the brakes engaging:
 - **Option 1: Bottle the Air**
 - Make sure the train-brakes are Released
 - Isolate the car(s) by closing the anglecocks on both ends of the cut to be kicked/humped so that the brakepipe PSI is maintained after uncoupling
 - Proceed with kicking/humping. As long as the air is bottled, the brakes will remain released. If you forget to close an anglecock, you will dump the brakepipe and cause the brakes to set
 - **Option 2: Bleed the Air**
 - Isolate the cars to be kicked/humped by closing the anglecock on the last car that will be kept
 - Once the car(s) are isolated from the rest of the train, open the end-anglecock to dump the air on the cars that will be kicked/humped. This will cause those cars to go into Emergency

- Once the Emergency-application has completed on those cars, you can bleed each one of them
 - Once bled, proceed with kicking\humping
- Typically with Humping, most of the time the hump-crew will be picking up a cut of cars from a Receiving Yard that are in emergency with their brakes set, in which case the brakepipe on the entire cut will be empty. All that needs to be done is to keep the anglecock on the locomotives closed, then walk the train and bleed each car real quick
- In real life, the bleed lever has a couple of positions, the last of which would cause the car's **Emergency Reservoir** to bleed down in addition to the normal bleeding of the **Aux Reservoir** and **Brake Cylinder**. For the simulator, we simply bleed the Emg Reservoir at a lesser rate to simulate this. You don't need to totally bleed down the Emg Reservoir unless you want to take longer to recharge the air later. You only need to make sure the **Aux Reservoir** and **Brake Cylinder** are empty. One press of the button is usually all that is needed unless you're messing up
- Keep in mind how these airbrake systems work:
 - If your **Aux Reservoir PSI** is at any time higher than the car's **BrakePipe**, the **Aux Reservoir** WILL feed its air into the car's **Brake Cylinder**! You would normally not be bleeding a car unless its Brakepipe was first empty!
 - An exception to this would be in the case of a stuck-brake. By actuating the bleed-lever, you cause the **Aux-Reservoir PSI** to fall below the car's **Brake Pipe PSI**, thus likely triggering the car to release its Brake Cylinder
- **V2 Air Brake Option**
 - There is an option in the **Train Menu** that allows you to use the older **Run8 V2 Braking Values** on railcars instead of the more accurate V3 values. The older V2 system is simpler and more homogenous, whereas the V3 system accounts for more variability as mentioned above. But because guys like to complain, the option is there if you want it
- **Dynamic Brakes**
 - Even though it sounds odd, it is possible to "skid" a locomotive's wheels if too much dynamic-braking force overcomes the present wheel-rail adhesion conditions of the locomotive. Run8 now models this. The result is the locomotive's wheels end up spinning at a slower speed than what the unit is actually moving. If you notice this condition, reduce your dynamic-braking force
 - Note: under normal wheel-rail adhesion conditions, this would likely not happen, however, if the rails are wet or greasy, well, have fun...
- **Volume Controls**
 - The Audio Menu now has a **Master Volume** slider which affects all audio
 - The **Truck Volume** slider controls the volume of sounds specifically related to trucks\wheels rolling on the track
 - The **Cab Rattle** slider controls the rolling\rattling sound heard in the locomotive cab
 - **Radio Volume** controls cab-chatter, defect detector, and DS-tone volumes
- **Locomotive Controls** can now be operated with the Mouse
 - By *left-clicking and holding* a control lever, you can move the mouse Up or Down to actuate the lever
 - The currently-clicked lever will hi-light in blue
 - In the Controls Menu, you can:
 - adjust the Mouse-Dragging sensitivity
 - enable or disable the blue hi-lighting
 - Note: Mouse Dragging Sensitivity is relative to your Windows mouse settings
 - Controls can still be actuated with the usual key-commands
 - Some control levers, such as the Train Brake, have a safety-limit on its travel when mouse-dragging. This means you'll need to release the mouse and re-grab it to move the control beyond the safety limit. This simulates the safety-notch that the engineer would have to maneuver around in order to place the lever in that position
 - If you have difficulty mouse-grabbing a lever, try clicking at its base, near its pivot
- **Flashing Ditch Lights (for units that have them)**
 - In the past, flashing ditch-lights were tied to the Bell being on, which was incorrect. Typically, the flasher circuit is tied to an air-pressure switch sensing the Horn's air line. Run8 now more accurately models such a flasher box:
 - Ditch Lights now flash for 30 seconds whenever the horn is pressed AND the headlight switch is on (either dim or full). After 30 seconds, the ditch lights will return to their previous state
 - The 30-second timer restarts any time the Horn is sounded
 - Turning off both headlight switches cuts power to the timer and cancels the flashing
- Added code to hopefully prevent\mitigate sudden camera-angle jumping when looking around while pressing the mouse's right button
- There were a few ES44 units with naughty rear ditch-lights which are now fixed
- **Industry Tags** and **Track Dots** have been changed from light purple to a red-orange for moBetta readability

- **AI Humping**
 - Trains can now be AI-Recrewed for Humping. For example, you can attach hump-power to a train in the receiving-yard, set the switches, set the hump-controller program, then AI-Recrew the train.
 - To AI-Hump properly:
 - Select the Train
 - Enter the desired Hump Controller Name into the lead-locomotive's Destination Tag; name must include the word "Hump". For example: Barstow Hump. If the hump-controller can't be found by name, then the nearest one will be used
 - Press the "**AI Recrew**" button
 - If a Hump Controller is found, the AI Engineer will begin backing towards it and hump the train until all the cars are humped
 - The engineer will notify when he is finished humping, and will simply stop and hold position and rest for a bit; undoubtedly he will be a bit sleepy after such vigorous activity
 - Notes:
 - train must not have any DPUs. MU's to the lead-unit are ok
 - the Lead Unit of the train must be at the shove-end of the train
 - the Hump Controller must have the desired program set prior to humping; if not, the currently-selected program will be used
 - You must set the necessary switches leading to the Hump before the AI backs over them
 - You must verify the status of your hump-bowl beforehand. Don't hump like a rookie by sending a train over the hump that's gonna overflow the bowl
- **AI Headlight Courtesy Dimming**
 - At night, AI Engineers now dim their headlights when approaching other trains
 - AI Engineers will NOT dim under the following conditions:
 - Daylight hours
 - Approaching a Railroad Crossing
 - Or he's just a jerk
- **Load-Save Menu**
 - There is now only one menu for Loading and Saving scenarios while in the sim, whereas before in V2, we had two menus depending if you wanted to Save or Save-As
 - It is opened from the Options Drop-Down Menu, or by pressing **[F1]**
 - As before in V2, you still select the type of save, and you can select an existing save to overwrite
 - If you wish to "**Save As**" with a new filename:
 - enter the desired filename in the SaveAs text-box
 - enter a **Description** if desired
 - then press the "**Save As**" Button
 - Note: If you enter a filename that already exists, it will get overwritten
 - While in Save-As mode (ie, there is text in the SaveAs text-box), the listing of existing scenarios is disabled. Remove the text from the SaveAs text-box to return to normal mode
- **Consequences for RailUnit Defects**
 - If you have a car with a **Dragging-Equipment** defect (which we assume to be a low-hanging airhose), you now run the risk of the airhose being snagged and disconnected on switches or road-xings as the car passes over
 - These consequences only happen if using **Realistic Train Handling**
- **Spawn Points** can now be created, edited, and deleted. Spawn Points are a type of **Special Location**. Special Locations govern AI Behavior in various ways
 - **To Create a New Spawn Point\Special Location**
 - Open the **TMU Window [LeftCtrl-F1]**
 - Add a locomotive to the **New Train List** so as to activate the placement buttons
 - Press "**Place Spawn Point >**" Button
 - Note: You are actually creating a new Special Location, however, they default as Spawn Points
 - Place the Ghost Unit's front truck at the desired location and left-click the mouse as you would when placing any other TMU train. At this point, however, no train will be placed, but rather a new Spawn Point will appear on the track
 - The **Special Location Tool** will open automatically, allowing you to rename and adjust various aspects of the new Spawn Point. **We highly suggest you rename it!**
 - When done, either **Delete** or **Save**
 - You can now set up the new Spawn Point as you would any other from the AI Traffic Generation window as you are used to in previous versions of Run8
 - **To Edit an Existing Spawn Point**

- Press [**LeftShift-F1**] to open the **Special Location Tool**
- Once open, **Special Locations** will show their markers on the tracks
- Mouse-select the desired marker; the Special Location Tool will populate itself with the selected information, which can be edited, saved, or deleted
- You can change the type of the selected Special Location
- Once finished (and Saved if needed), press [**Esc**] to exit the tool
- **Notes:**
 - Special Locations are saved into each route's "**AISpecialLocations.r8**" file; **we highly suggest making backup copies of this file for each route you intend to modify!**
 - Only **Spawn Points** show in the **AI Traffic Generation Window**. The other types of Special Locations are NOT used for AI Spawning, but for other AI behaviors
 - *Conversely, if you have modified this file, it's your responsibility to keep a backup of it, because a later sim Update may overwrite it causing you to lose your mods!*
 - You cannot edit\create\delete Special Locations when in Multiplayer; you must be Single-Player
- **Distance Counter** readout has been added to the Shift-C HUD display
- **Red Flags & Fusees (Flares)**
 - It's now possible to place a Red Flag\Flare on the last coupler of your train, in the same manner as you would place an EOT device. Simply click on the coupler as usual and you will see the options.
 - You will of course not receive any EOT data when using a flag\flare, nor will you be able to trigger an EMG Stop from the rear of the train
 - At night-time, a red flare will be placed instead of a red flag. For simplicity, flares used on couplers have no time limit
 - **Auto-EOT** will always place an EOT; red flags\flares must be placed manually
 - And to give the Trolls something new to play with, you can also drop a Red Flare (Fusee) on the ground by using the **F6 MOW Object Menu**. These flares last for about 10 minutes and will automatically disappear afterwards. They are placed exactly the same way as you would place one of the MOW flags
- **Rendering of Reflections**
 - V2 used a generic "pre-canned" environment map to simulate reflections. V3 now renders reflections real-time as seen from the camera's position. There are two options in the **Graphics Menu**:
 - **Low:** Reflection map updated every few seconds (best performance)
 - **High:** Reflection map updated every frame (best quality)
 - As with V2, reflections are convolved (a fancy mathematical way of saying 'blurred') based on surface-roughness
 - To help performance, we only reflect certain items to a certain distance
- **DPU Realism Enhancements**
 - **DPU Fencing** has been changed to operate from the rear-consist towards the front (or from right towards left as you view it on the DPU screen). Therefor, use **Fence Decrease** to initially enable the fence (which will start by fencing off the rear-most consist), and **Fence Increase** all the way to disable. This is more in-line with how a real train would fence the various DPU consists, also preventing a sudden change in train forces when the fence is first enabled
 - The **Auto-MU** button's function has been tweaked so that if a DPU consist is at the end of the train and consists of more than one locomotive, the rear-most locomotive will be assigned as the **DPU Lead**
 - There is a new Train Menu option for **Realistic DPU**. If enabled, the following features apply, which are a generalization of some real-railroad practices:
 - **Lost-Comms** are now simulated which usually only last for a short time due to a missed radio signal or temporary interference from terrain or tunnels. Radio or system failure can also cause lost-comms, which may or may not rectify itself
 - Should lost-comms occur on a DP consist, it will continue to operate at the last known setting for **5 minutes**. The system will alert the engineer according to the following schedule:
 - **After 10 seconds:** "DPU No Comm" idiot-light will illuminate solid yellow
 - **After 2 minutes:** "DPU No Comm" light will illuminate flashing yellow
 - **After 4 minutes:** "DPU No Comm" light will illuminate solid red
 - **After 5 minutes:** "DPU No Comm" light will illuminate flashing red, and if the DP consist is in-power, will notch down to Idle at a rate of one notch per 3 seconds
 - On the **DPU Page of the MFD display**, the offending consist's throttle data will mirror the color and behavior of the idiot-light, with the remainder of the data being grayed-out. The data may show the last-known condition, or may show "---"
 - During lost-comms, the offending consist will cut-out its brake valve and respond to brakepipe changes as does a normal railcar; A consist during this time is therefor unable to help initiate a train-brake application or release. The consist will cut-in its brake valve once comms have been reestablished
 - Any DP consist operating **in-power** will immediately drop load and return to Idle if it senses its brakepipe psi having fallen **20psi below** normal feed-valve psi (ie, from 90 down to 70). Units

- operating in **Dynamic Braking** are not subject to this
- 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 brakepipe 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 ;)
- **Signal and Response Delay**
 - When the engineer makes a control-input, it can take several seconds for each DP consist to act upon the new input. Brake commands transmit at a higher rate and will normally respond with less delay
 - If **Realistic DPU** is disabled, then the system will operate and respond as it always has in V2, with no failures or delays
- **Train Tags**
 - A new train-tag has been added to the cycle allowing you to see a train's Loads, Empties, Tons, and Length. The tag shows on the controlling-unit of the train
- **F2 Network Menu**
 - On the **Client Tab**, server data and passwords are now be hidden once "Join Session" is pressed, and will remain hidden until you have bailed out of the session. This was done at the request of server admins who noticed private server data getting live-streamed by accident when the user would open the menu.
 - Note: **Hosts** still show their data in the menu
- **Industry Manager**
 - In the past, when AI Trains were being generated and the Industry manager couldn't find a car to use, or some other error occurred, the system would generate a Run8 Boxcar and set its tag to "HELP". We've removed this, and the system will simply not generate the car
- **RailDriver Button Mapping**
 - Functions that are currently Unassigned are now listed in Gray
- **User Notes Window**
 - We've implemented a customer suggestion allowing text-files to be displayed in the sim
 - **[LeftAlt-F1]** opens the **User Notes** window
 - Use the drop-down control to select from any available text files
 - Files must be plain-text **UTF-8** format with a file extension of ".txt"
 - Files are located in the Region's "**UserNotes**" folder, for example:
 - ../V2Routes/Regions/SouthernCA/UserNotes
 - Any suitable **UTF-8** text file can be placed in this folder for viewing within the sim
 - Files can be deleted using the "**Delete**" button
 - A file called "**ScratchPad.txt**" exists by default, and is text-editable so the user can write down notes as desired
 - This file automatically saves itself, and cannot be deleted in-sim
 - This is the only file that can be edited in-sim; mouse-click within the text window to show the cursor and make changes
- **You asked, we listened: The [Esc] Key** can now be used to close the Text-Chat
 - Before, only [TAB] could close it
- **Text Messages** can now be set to display as follows, with the setting found in the Overhead Menu's Message Options:
 - **On Top:** This is the original\default Run8 method, with new messages displaying atop the list and pushing older messages down
 - **On Bottom:** New messages display at the bottom of the list, with the list indexing upwards as old messages fade away
 - Regardless of setting, the newest message will show in its original color, with older messages using a darker version thereof. Old messages still fade out and disappear as before
- **Slack-Action on the Network**
 - You can now see the slack-action of another user's train as well as during Helper operations
 - If you like to run ridiculously long trains (ie PSR), you may see ridiculous results in the slack action seen over the network
- **TrainLink II Radio (EOT Communication)**
 - Many of the EMD locomotives use the TrainLink II radio system for communication with the EOT device. We have enhanced the operation of this radio to make it more prototypical thanks to an excellent writeup

given to us by Steven Graham

- The Distance counter now shows 5 digits, or "OFF"
- As with the previous version, the upper-right display shows the rear brakepipe PSI. Note: make sure you have the EOT properly attached and the anglecock opened to the EOT
- **"MOV"** and **"STP"** indicators show if the EOT is Moving or Stopped. A change in status will cause the indicator to blink for 5 seconds then remain solid
- **"HVM ON"** and **"HVM OFF"** indicate if the EOT **High Visibility Marker** beacon is on or off. It is normal for the HVM to be on during darkness and off during daylight, and to also turn on for a short time when movement has started. A change in status will cause the indicator to blink for 5 seconds then remain solid
- **"BATTERY LOW"** indicates when the EOT battery is nearing discharge. For Run8 purposes, we have it set to light up when there's about 2 hours remaining on the battery
- **"RADIO BREAK"** indicates that the EOT did not squawk back any data when polled by the radio. This can happen when the battery finally dies, or during temporary loss of communication
- **"EMERG ENABLED"** indicates that the EOT and Radio are linked and an emergency-application of the airbrake system can be initiated from the EOT if necessary
- **"EMERG DISABLED"** indicates that the EOT and Radio are not satisfactorily linked and an emergency-application of the airbrake system CANNOT be initiated from the EOT
- Various status messages will also show in the lower-center text display. When a message is triggered, it will show for 5 seconds and then disappear:
 - **"COM TEST"** shows when the Com-Test button is pressed on the radio. This causes the radio to immediately poll the EOT, causing the EOT to squawk its data. You can press this button to get an immediate readout of the EOT provided the system is linked properly. After 5 seconds, you should receive a "COM OK" or "NO COM" message
 - **"COM OK"** shows whenever telemetry is received from the EOT under normal conditions. The EOT normally squawks its status once every 55-65 seconds, or whenever its status has changed, or when a Com-Test is performed. Note: A brakepipe variation ≥ 2 psi transmits immediately, otherwise it is transmitted with the next cycle to prevent nuisance fluctuations in the display
 - **"NO COM"** shows after a Com-Test when telemetry has not been received from the EOT
 - **"STOPPED"**, **"REVERSE"**, or **"FORWARD"** shows when the EOT has either begun to move or has come to a stop. Three audible beeps accompany this message
 - **"LOW PRES"** shows if the brakepipe pressure has dropped below **45psi**. If an EOT is air-powered, the turbine cannot power the EOT if the pressure falls below **40psi**. In this case, the backup battery will power the EOT until it's depleted
 - **"NO AIR"** shows if the brakepipe pressure has dropped below **10psi**, perhaps due to the anglecock being closed
- **Notes:**
 - We have purposely left out the **EOT Arming\Disarming** functions. It was considered to be too much extra complication for very little benefit. We simply consider the Arming\Disarming process to automatically be part of Attaching\Removing the eot
 - The real-life **"TLK LCU"** startup message has been omitted and replaced with **"NO EOT"** as it makes more sense to the user and better reflects the condition
- V3 has a mode for Server-Only, as well as the ability to Auto-Start the Host. See the UserGuide folder for PDFs on these two features
- The **"4 View"** has been modified a bit:
 - When attached to a loco\railcar, the first press of **[4]** puts the camera into **Orbiting** mode, keeping you at a fixed position relative to the unit unless adjusted by the keys listed below, with the view pointing at the unit
 - Subsequent presses of **[4]** put the camera into **Grounded** mode and reposition the camera further ahead, which allows you to stand on the ground and watch the train pass. You can press **[4]** again and again to reposition further away
 - The following keys adjust these views:
 - **[A]** and **[D]** orbit the camera clockwise or counter-clockwise
 - **[Q]** and **[E]** change the elevation of the camera (**Orbiting** mode only)
 - **[W]** and **[S]** decrease or increase the distance from the unit
 - You can change the pitch-angle of the camera by holding the right mouse button and moving the mouse up or down
- **Doors and Windows**
 - For those locomotives that have been set up, you can open and close the doors and windows
 - **Left-MouseClick** to **open** a door or window
 - **Shift-Left-MouseClick** to **close** a door or window
 - You must be within a short distance of the desired door or window, ie, you can't operate the Conductor's Window while sitting in the engineer's seat
 - Doors and Windows affect the volume of external noise heard within the cab

- **Unit-Alarm (Trainline Alarm)**

- The unit-alarm indicator now has two states:
 - A **flashing** light on the lead locomotive indicates an MU'd locomotive has an alarm or failure
 - A **solid** light indicates this particular locomotive has an alarm or failure
 - Units with MFD screens who have a failure will also show what the failure is, or you can also just click the locomotive and view its "**Stats**" page
 - For MU'd units, isolate the offending unit (using its Engine-Run\Isolation Switch) to cancel the trainline alarm on the lead-unit

- **Maximum Number of Units within a Train**

- Trains over 250 units will not be able to spawn in the sim. Not only are such trains just plain silly, but they start causing network and CPU problems
- If you attempt to couple two trains together that will exceed 250 units, the coupling will fail and one or both of the trains will be deleted
- If you attempt to TMU a train over 250 units, it will fail
- If you attempt to load\spawn a train over 250 units, it will fail
- if you attempt to hump\kick two cuts of cars together that total over 250, it will fail

- **Handling of Existing V2 Add-On DLC**

- If you have both V2 and V3 installed to the "Run8Studios" folder, you can run or re-run V3's main installer and it will attempt to copy and update existing V2 DLC into V3
- **Note For Guys Who Actually Know What They're Doing:** If you have V2 and V3 in different locations, you can go to your V2 and copy your "**V2RailVehicles**" and "**V2Routes**" folders into V3's Content folder. You can then **re-run V3's main installer**, and it will see these two folders and update them for V3, copy them into V3, then delete them. This is also an excellent way to pirate our DLC if you happen to be one of those types

- **Installation of V2 DLC into V3**

- You can install V2 DLC into V3 by changing the installation path when prompted by the installer
- You will then need to **re-run V3's main installer**, and it will update and copy the files into V3