

High Iron Simulations

Realistic Routes, Packs, and Scenarios for Train Simulator

B&O Mountain Subdivision Route



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ABOUT HIGH IRON SIMULATIONS

As a Train Simulator Partner Programme member, we collaborate with Dovetail Games to produce a variety of realistic content for Train Simulator. Our products include highly detailed and authentic routes, railroad “retro” packs, and realistic Train Simulator scenario packs, all of which is available at the Steam Store and Dovetail Games Store.

BALTIMORE & OHIO’S LEGENDARY MOUNTAIN SUBDIVISION

In the long and renowned life of the Baltimore & Ohio Railroad, its steel route stretching deep into the Allegheny Mountains was called “The West End.” In the Chessie System era – and today as part of CSX – it is the Mountain Subdivision. By any name, it is one of the most historic, demanding, and awe-inspiring railroad main lines in America.

The Mountain Subdivision extends from Cumberland, Maryland to Grafton, West Virginia, a distance of 101 route miles. It was the great Baltimore & Ohio’s original main line crossing of the Allegheny Mountains, opened in 1852 and hence, for more than 160 years, it has seen the endless passage of heavy tonnage. The Mountain Subdivision is home to and evokes names that to railroaders and enthusiasts alike are the stuff of legends Seventeen Mile Grade, Grafton and Cumberland, Cranberry Grade, Altamont and Terra Alta, Cheat River Grade, Viaduct Junction, and Keyser.

The historic Baltimore & Ohio – America’s first common carrier railroad chartered in 1827 – was, as its name suggests, conceived to link Baltimore, Maryland to the Ohio River. To do so meant crossing the Allegheny Mountains. The B&O began abuilding in 1828 and by 1842 it had reached Cumberland, Maryland, the “Queen City,” set below the eastern slope of the Alleghenies along the North Branch of the Potomac River at an elevation of 627 feet.

The Baltimore & Ohio’s crossing of the Alleghanies, begun in 1850, was one of the railroading marvels of the age. To stretch from Cumberland to Grafton, West Virginia, the line would first follow the banks of the North Branch of the Potomac River, then, just west of Keyser, West Virginia, begin the Allegheny climb and crossing. That journey would require no less than four torturous grades (two westbound, two eastbound). The first – to become known as fabled Seventeen Mile Grade – carried the line up the east slope of the mountain range to Altamont, West Virginia on grades of 2.2 percent and more. Altamont, at an elevation of 2,628 feet above sea level, was the highest point on the line, but the challenge was far from over.

West from Altamont, the B&O first crossed a high plateau to Terra Alta, West Virginia, then descended Cranberry Grade with its gradients of up to 2.67% to Rowlesburg, West Virginia and a crossing of the Cheat River. And still, there was more. From Rowlesburg to Blaser and Tunnelton, West Virginia and the nearby 4,137-foot Kingwood Tunnel (which when built was the longest railroad tunnel in America), the railroad first climbed the 2 percent gradients of the Cheat River Grade, then descended the equally steep Newburg Grade to Hardman, after which followed a relatively level run to the railroad town of Grafton, West Virginia. B&O opened the West End route to Grafton in 1852 and reached its namesake goal – the banks of the Ohio River – at Wheeling, West Virginia in 1853.

What followed has been, continuing to this day, a titanic battle between mountain grades and tonnage, locomotives, and railroaders.

(continued next page)

THE B&O MOUNTAIN SUBDIVISION (*continued*)

As critically important as the West End was at its opening, the line only became ever-more important in the following years. In 1856, a second B&O line west from Grafton – to Parkersburg, West Virginia and beyond – was opened (in modern terms, the two routes would become B&O's Fairmont Subdivision and Parkersburg Subdivision). Grafton emerged as a true and captivating railroad town, with sprawling yard, servicing facilities, a classic railroad station, and its towering railroad-owned Willard Hotel. Coal would become virtually synonymous with the West End and various coal feeder lines were built, including the Cowen Subdivision south from Grafton and the Kingwood Subdivision which connected with the West End at M&K Junction near Rowlesburg. At the east end of the line, Cumberland emerged as one of the most important locations on the entire B&O, home to Cumberland Terminal with its locomotive shops and sprawling classification yards. Just west of Cumberland, at Viaduct Junction, the B&O's second crossing of the Alleghenies, famed Sand Patch Grade which opened in 1871, linked with the West End route.

With coal traffic, much of it coming off the Fairmount, Cowen, and Kingwood subdivisions, primarily moving east to the ports of Baltimore, the battles of lifting ponderous coal tonnage up Newburg and Cranberry Grades became showcases of railroading at its toughest and dramatic best. In the steam era, the West End was home to B&O's massive S-class "Big Sixes," 2-10-2s built by Baldwin and Lima, and perhaps most famously, to the railroad's huge but beautiful Baldwin-build EM-1 2-8-8-4s. In both the steam and diesel eras, the West End was helper territory, with helper stations at Keyser, M&K Junction, and Hardman. Also surviving well into the diesel era was the railroad's traditional and captivating use of lineside towers and operators to control train movements and well into the 1970s, no less than nine towers remained opened and in regular use.

While coal was king on the West End, it was joined by priority manifests and, in the later B&O years, intermodal traffic such as the *St. Louis Trailer Jet* and *Manhattan Trailer Jet*. That, in turn, meant lifting loaded trains up Seventeen Mile Grade and Cheat River Grade. Before the general demise of railroad passenger services in the 1960s, the West End was also host to premier B&O passenger services including the elegant New York – St. Louis *National Limited*. With local services such as Train Nos. 11 and 12, B&O passenger trains remained until the advent of Amtrak in 1971.

With the creation of the Chessie System in 1973, the B&O West End formally became the Mountain Subdivision. The creation of Chessie brought with it the arrival of the railroad's brilliant Chessie-liveried diesels as well as regular appearances of Chesapeake & Ohio and Western Maryland power. Indeed, Western Maryland had long been a part of the West End experience, with WM also hosting large yard facilities at Cumberland and with its Thomas closely paralleling the B&O line between Cumberland and Bloomington, Maryland. By the mid- to late 1970s, most of the WM operations in the area were integrated into those of the B&O. Interestingly, for a short period from 1976 to 1981, Amtrak passenger services utilized the Mountain Subdivision in the form of the Amfleet-equipped Washington, DC – Cincinnati *Shenandoah*.

The railroads included in the Chessie System – the Baltimore & Ohio, Chesapeake & Ohio, and Western Maryland – in turn became in 1986 part of today's 21,000-mile CSX Transportation. On the eve of the CSX formation, the railroad made the decision to downgrade, then abandon, portions of the Parkersburg Subdivision west of Grafton. The decision (controversial to this day) resulted in most of the Mountain Subdivision's manifest traffic being re-routed via Sand Patch. But while the likes of the *Cincinnati 97* and other fast freights may be in the past, the Mountain Subdivision remains pulsing with its traditional lifeblood of coal tonnage and continues to put on a railroading show that is both memorable and extraordinary.

THE CHESSIE SYSTEM

The B&O Mountain Subdivision route for Train Simulator is set in the early to mid-1970s, during the formative years of the Chessie System. The Chessie System was created in February 1973 to integrate the operations of three notable eastern railroads that had long been closely aligned: the Chesapeake & Ohio, the Baltimore & Ohio, and the Western Maryland Railway.

The Chesapeake & Ohio: Among the great railroads of America, few were more successful and influential than the Chesapeake & Ohio. With a route system that reached from Virginia Tidewater through the coal-rich Alleghenies and Appalachians to key Midwestern industrial hubs including Cincinnati, Toledo, and Chicago, the C&O was a great coal hauler, a forwarder of manifest freight, and a classy passenger road operating name trains such as *The George Washington*. C&O's acquisition of the Pere Marquette in 1947 further strengthened the already mighty C&O, expanding its route miles to nearly 5,000 and reaching Detroit and Buffalo. The C&O held an interest in the Baltimore & Ohio and C&O and B&O operations became increasingly integrated as early as the 1960s. And it was the C&O, which in 1933 introduced a sleeping kitten — named “Chessie” — as a symbol of its comfortable passenger accommodations. Chessie the kitten would become an icon of American railroading for decades to come.

The Baltimore & Ohio: Chartered on February 28, 1827, the historic B&O was America's first great railroad. As its name well implied, the B&O was created to build a railroad from the city of Baltimore to the Ohio River. And so it did, building the first railroad across the Alleghenies (via the Mountain Subdivision). The B&O would go on to reach across the Midwest to Chicago and St. Louis, serve Pittsburgh, Washington, D. C., Cleveland, and New York. Like eventual partner C&O, the Baltimore & Ohio enjoyed a diverse base of tonnage to haul and carded classic passenger trains such as the *National Limited* and *Capitol Limited*. By 1962, C&O held a controlling interest in the B&O in what was a prelude to the creation of the Chessie System.

The Western Maryland: Although never of the stature of the C&O or B&O, the Western Maryland Railway held a much admired place in the memory of railroaders and railroad enthusiasts. In stretching from Baltimore, Maryland westward to Connellsville, Pennsylvania, and West Virginia's coal country, the Western Maryland was big and busy enough to be pulsing with action, yet small enough to be comfortably familiar. For the train-watcher, Western Maryland was at once a tough, traditional Allegheny coal hauler and a spiffy bridge route that hustled freight on its “Alpha Jets.” As early as the 1920s, B&O held a large percent stake in the WM, and B&O influence continued across the decades, finally reaching culmination in the creation of the Chessie System in 1973.

The Chessie System, as it turned out, was one evolutionary step toward creation of today's 21,000-mile CSX Transportation, which was formed by the combination of the Chessie System and Seaboard System in 1986.

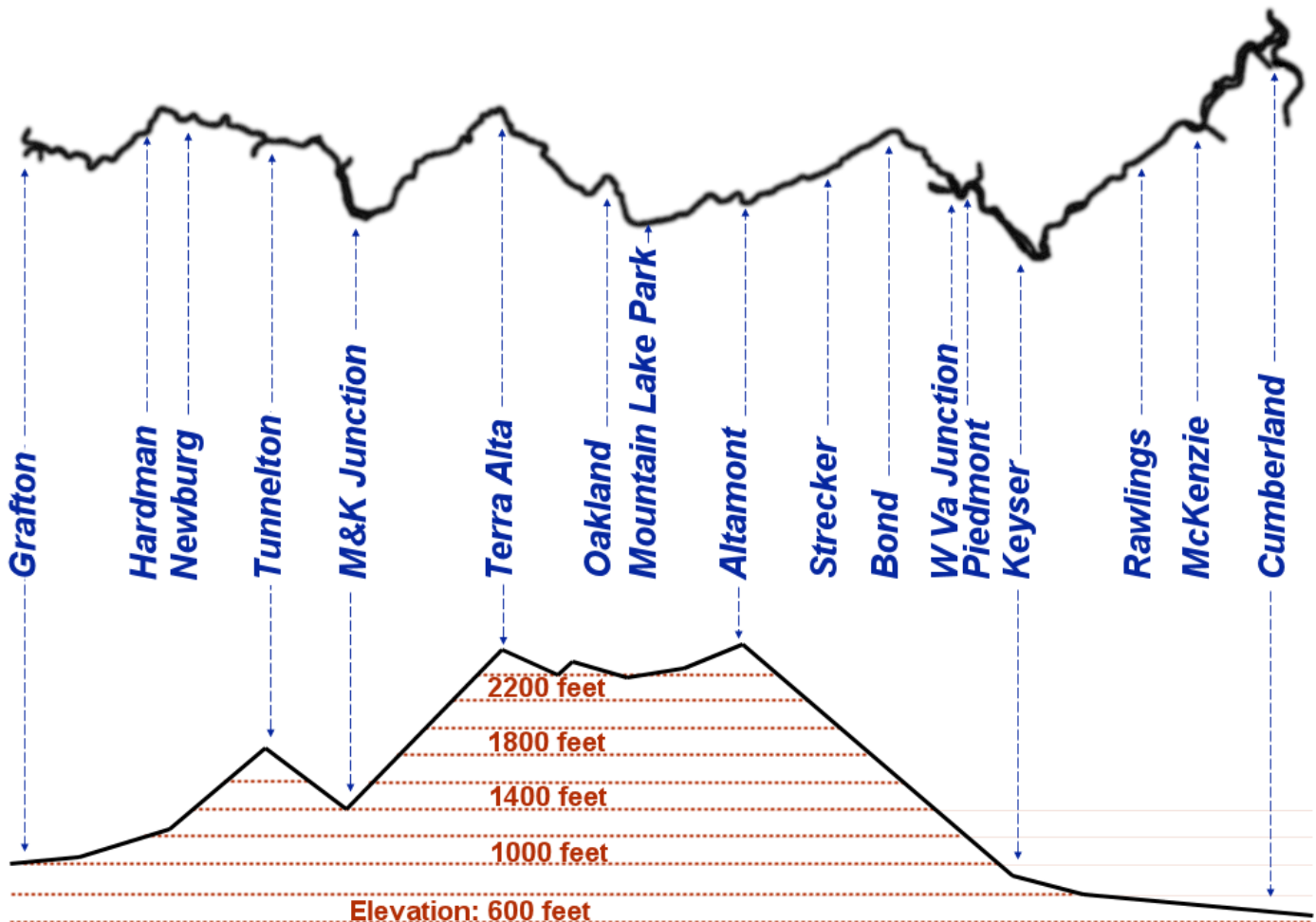
THE TRAIN SIMULATOR B&O MOUNTAIN SUBDIVISION ROUTE

The B&O Mountain features 140 route miles of main line, four locomotive models in multiple liveries, more than 20 types of freight equipment, thirteen career scenarios., and is Quick-drive (QD) enabled.

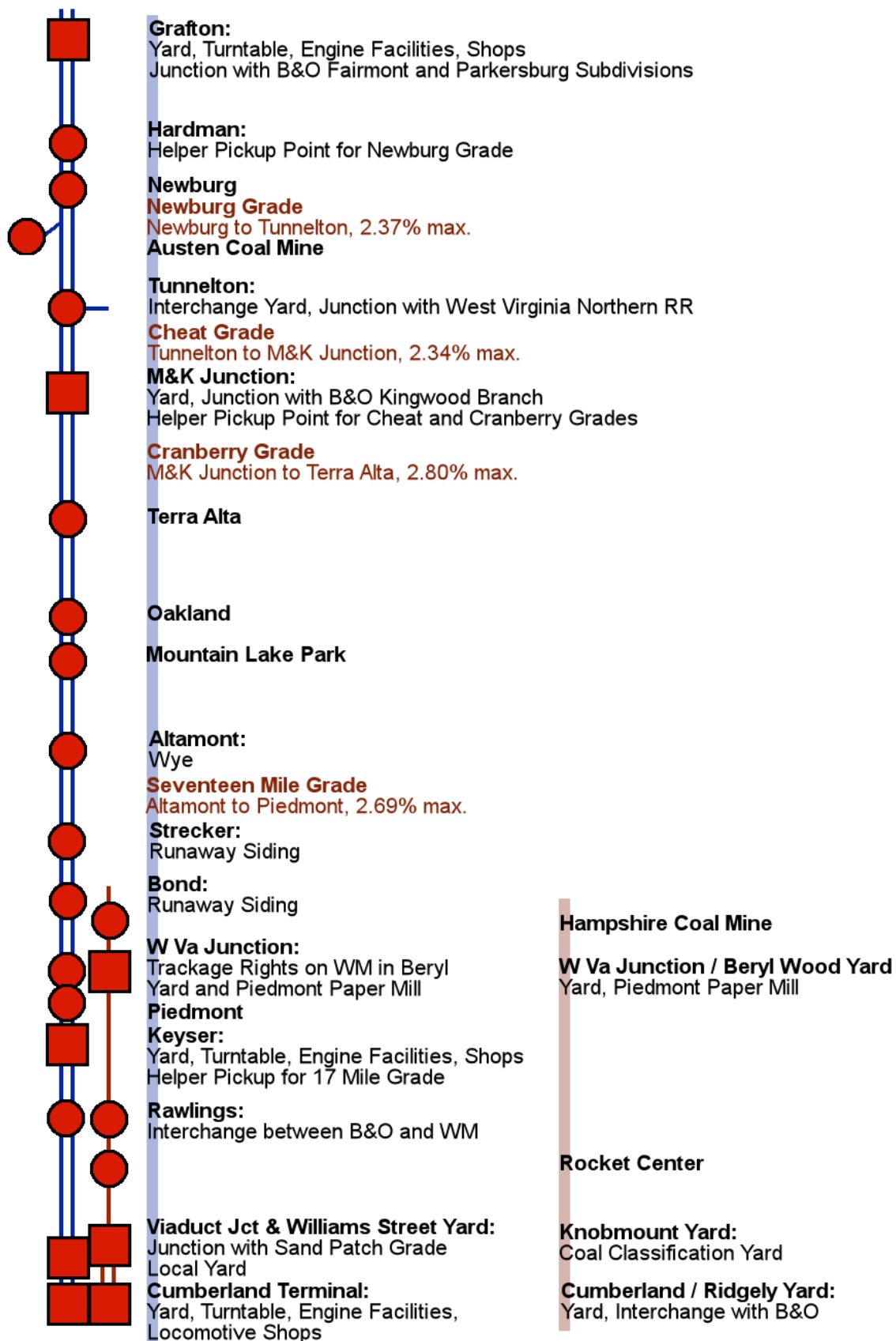
The Mountain Subdivision extends from Cumberland, Maryland to Grafton, West Virginia, a distance of 101 route miles. Also included in this Train Simulator edition are more than 30 route miles of the Western Maryland Railway's Thomas Subdivision, B&O's sprawling Cumberland Terminal, and portions of several other B&O subdivisions.

Anchored by two of America's timeless and classic railroad towns – Cumberland, Maryland and Grafton, West Virginia – the route features four grueling Allegheny Mountain B&O grades – 17-Mile Grade, Cranberry Grade, Cheat River Grade, and Newburg Grade – each with daunting and twisting gradients of more than 2 percent. And the B&O Mountain Subdivision route is also be host to extensive yards and terminal facilities, plus large lineside shippers including coal mines and cement, paper, steel, and manufacturing plants.

Please note: The B&O Mountain Subdivision is a large and extensively detailed route and use of the 64-bit version of Train Simulator is recommended for best results.



THE TRAIN SIMULATOR B&O MOUNTAIN SUBDIVISION ROUTE *(Continued)*



ROUTE OPERATING NOTES

Operations on the B&O Mountain Subdivision during the 1970s were busy and were governed by dispatching, lineside signals, and open towers where agents controlled key junctions and cross-overs and handed up orders to train crews.

The separate section in this manual details the B&O's distinctive color position light (CPL) signals and indications.

The route features operating towers which were open during the period and, at appropriate times, train orders are received by the crews (via pop-up messages). You can also expect to receive messages from terminal and yard masters.

With its numerous steep gradients well in excess of 2 percent, and with heavy manifest traffic moving west and ponderous coal train working east, manned helpers, stationed at West Keyser, M&K Junction, and Hardman regularly assisted trains. Typically, the helpers were attached to the rear of a train (behind the caboose), but could on occasion work from the front end of the train.

The steep grades and heavy tonnage of the line frequently required that trains descending grades would have retainers set to make their descent. This interesting — and fundamentally important — aspect of Mountain Subdivision operations is represented by instructions you will receive (via pop-up) from the Conductor to set or release retainers (which in this case means setting car hand brakes). The more retainers you set, the easier it will be to control the speed of the train as it makes its way downgrade.

NOTE: The Mountain Division had a profusion of speed restrictions due to its curving nature and steep gradients and these are authentically replicated on the route and marked both on the HUD and with lineside signs. You will need to be highly attentive to speed changes and, especially when make steep descents, moderate your speed, often below posted track speeds in anticipation of the next upcoming speed restriction.

AIR BRAKE SYSTEMS

The diesel locomotives included with the B&O Mountain Subdivision route feature highly authentic and realistic air brake systems. The diesels utilize the following types of air brakes:

- EMD SW-series: Type BL6
- EMD GP9: Type 24L
- EMD SD35 AND GP40-2: Type 26L

Each of the above three types of air brakes utilize functions and are controlled in slightly different manners and understanding their realistic use will enhance your immersion and enjoyment of the route. Provided with this route is a separate and detailed air brake manual.

To best demonstrate the proper use of the different braking systems, we have created a video tutorial series hosted by Mike Rennie of Smokebox. You can access and view these tutorials at:

[Train Simulator 2021, Mountain Subdivision by High Iron Simulations, EMD GP40-2 Brakes Tutorial](#)

[Train Simulator 2021, Mountain Subdivision by High Iron Simulations, EMD GP9 Brakes Tutorial](#)

LOCOMOTIVES

Four notable types of Chessie System Electro-Motive diesels are included with the B&O Mountain Subdivision route.



ELECTRO-MOTIVE GP9

Along with the Electro-Motive F7, the classic EMD “Geep” helped dieselize America’s railroads. Following in the footsteps of the landmark GP7, the 1,750-horsepower EMD GP9 was produced from 1954 through 1959 with a production run of more than 4,000 locomotives. The C&O, B&O, and Western Maryland all were operators of the versatile GP9. The GP9s featured in B&O Mountain Subdivision route include Baltimore & Ohio units configured to operate “long hood forward” and C&O and WM units configured to operate “short hood forward.” The units wear the schemes of the Chessie System, (with road sub-lettering) Baltimore & Ohio, and Chesapeake & Ohio



ELECTRO-MOTIVE SD35

During the “horsepower race” among diesel builders in the early and mid-1960s, Electro-Motive introduced the 2,500-horsepower four-axle GP35 and six-axle SD35. A total of 360 SD35s were constructed and Baltimore & Ohio, Chesapeake & Ohio, and Western Maryland were buyers. The units wear the schemes of the Chessie System (with road sub-lettering), Baltimore & Ohio, and Chesapeake & Ohio, as well as Western Maryland liveries.

LOCOMOTIVES (continued)



ELECTRO-MOTIVE GP40-2

Electro-Motive introduced its “Dash 2” series of locomotives in 1972 and the line, which included the four-axle GP40-2 and six-axle SD40-2 went on to extraordinary success. More than 900 GP40-2s were constructed and the Chessie System was its most prolific buyer, with B&O, C&O, and WM all rostering examples. The Chessie System in total purchased 348 GP40-2s, which were all delivered in the Chessie System’s vibrant yellow, blue, and vermillion livery with railroad sub-lettering.



ELECTRO-MOTIVE “SW” SERIES DIESEL SWITCHERS

Electro-Motive’s introduced its “SW” series diesel switcher line in 1936 with the 600-horsepower “SW” type. Through a long and successful evolutionary line, the SW models would increase in size and horsepower and culminate with the 1,500-horsepower SW1500 introduced in 1966. The B&O Mountain Subdivision includes three EMD sister models — the 1,200-horsepower SW7, SW9, and SW1200 — which are included in B&O blue livery.

OPERATING THE LOCOMOTIVES

The locomotives in this add-on use the standard keyboard controls of Train Simulator. Please refer to the User Manual of Train Simulator or the Academy scenarios for general information about how to drive a locomotive in this game. Information on specific locomotive control and operating features follows.

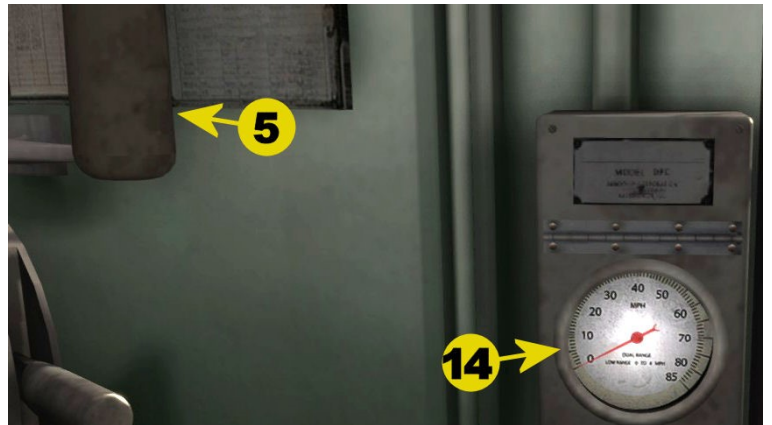
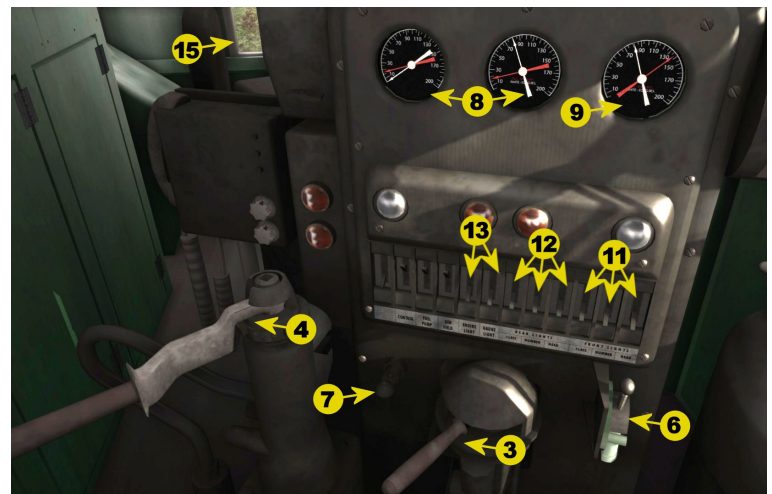
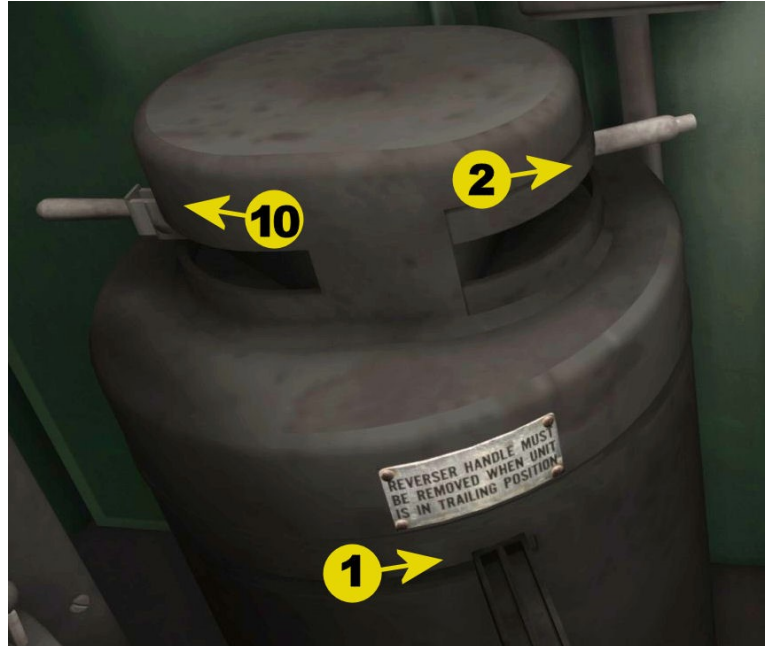
LOCOMOTIVE CONTROLS — EMD GP9

- 1) Reverser
- 2) Throttle
- 3) Independent Brake (Locomotive Brake)*
- 4) Train Brake*
- 5) Horn
- 6) Sander
- 7) Bell
- 8 & 9) Brake Gauges
- 10) Dynamic Brake
- 11) Front Headlight, Classification, Number board Light Switches
- 12) Rear Headlight, Classification, Number board Light Switches
- 13) Gauge and Cab Light Switches
- 14) Speed Recorder
- 15) Cab Windows (openable on both sides)

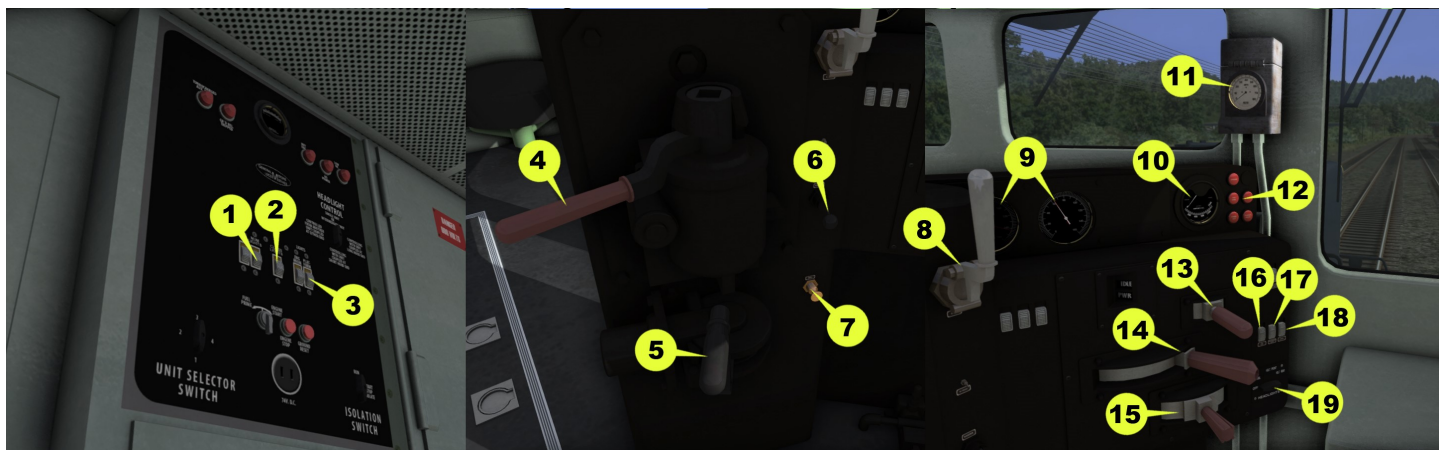
*** NOTE:**

The locomotives included with the B&O Mountain Subdivision route feature highly authentic brakes which accurately differ by model type.

The GP9 locomotive utilizes 24L air brake controls, see page 8.



LOCOMOTIVE CONTROLS — EMD SD35



- 1) Numberboard Lights
- 2) Class Lights
- 3) Platform Lights
- 4) Train Brake*
- 5) Loco Brake*
- 6) Sander
- 7) Bell
- 8) Horn
- 9) Air Gauges

- 10) Ammeter
- 11) Speed Recorder
- 12) Warning Lights
- 13) Selector
- 14) Throttle
- 15) Reverser
- 16) Cab Light
- 17) Gauge Lights
- 18) Wipers
- 19) Headlights

* **NOTE:**

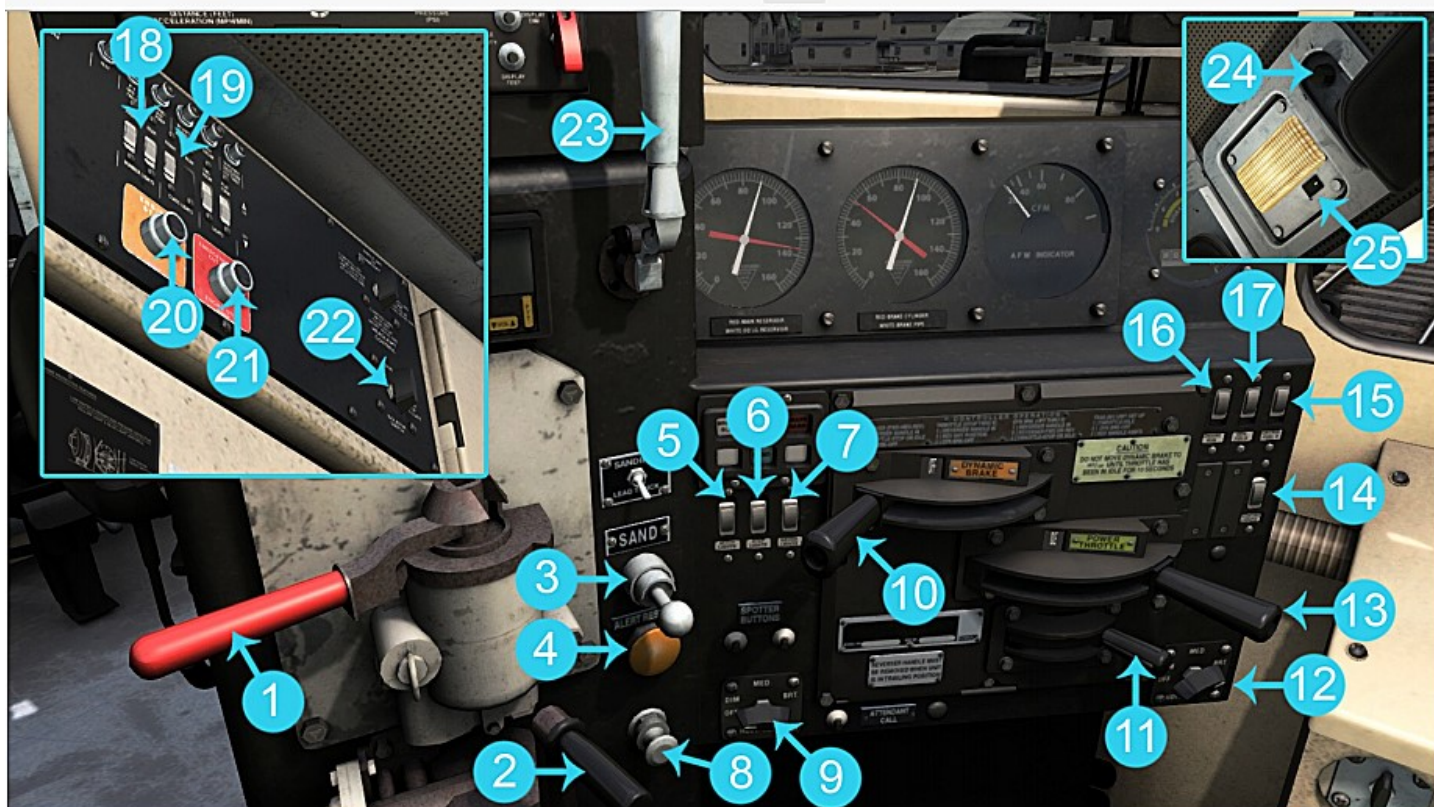
The locomotives included with the B&O Mountain Subdivision route feature highly authentic brakes which accurately differ by model type.

The SD35 locomotive utilizes 26L air brake controls, see page 8. For operation of the SD35, it is also important to understand the use of the selector level as described below.

Use of SD35 Selector Lever:

The Selector Lever allows the driver to switch between Throttle and Dynamic Brake controls using the same lever (Throttle). To use it you must move the Throttle Lever to Idle, then move the Selector lever twice to the long hood direction. You will see that the selector display changes from PWR, to Off and then to DYN. Now moving the Throttle Lever you will apply Dynamic Brakes. To apply power again move the Throttle Lever to Idle, then move the Selector Lever twice to the short hood direction until the display shows PWR. Then you can apply throttle again.

LOCOMOTIVE CONTROLS — EMD GP40-2



- | | |
|---|---|
| 1) Train Brake* | 14) Rotating Lights (not applicable to this locomotive) |
| 2) Locomotive Brake* | 15) Control & Fuel Pump |
| 3) Sander | 16) Engine Run (mouse only) |
| 4) Alerter Reset | 17) Generator Field (mouse only) |
| 5) Ditch lights (not applicable to this locomotive) | 18) Number Lights (mouse only) |
| 6) Step lights (mouse only) | 19) Class Lights (mouse only) |
| 7) Gauge Lights (mouse only) | 20) Engine Start (mouse only) |
| 8) Bell | 21) Engine Start (mouse only) |
| 9) Headlights Rear (mouse only) | 22) Engine Run Isolation Switch |
| 10) Dynamic Brakes | 23) Horn |
| 11) Reverser | 24) Wipers |
| 12) Headlights Front | 25) Cab Lights |
| 13) Power Handle | |

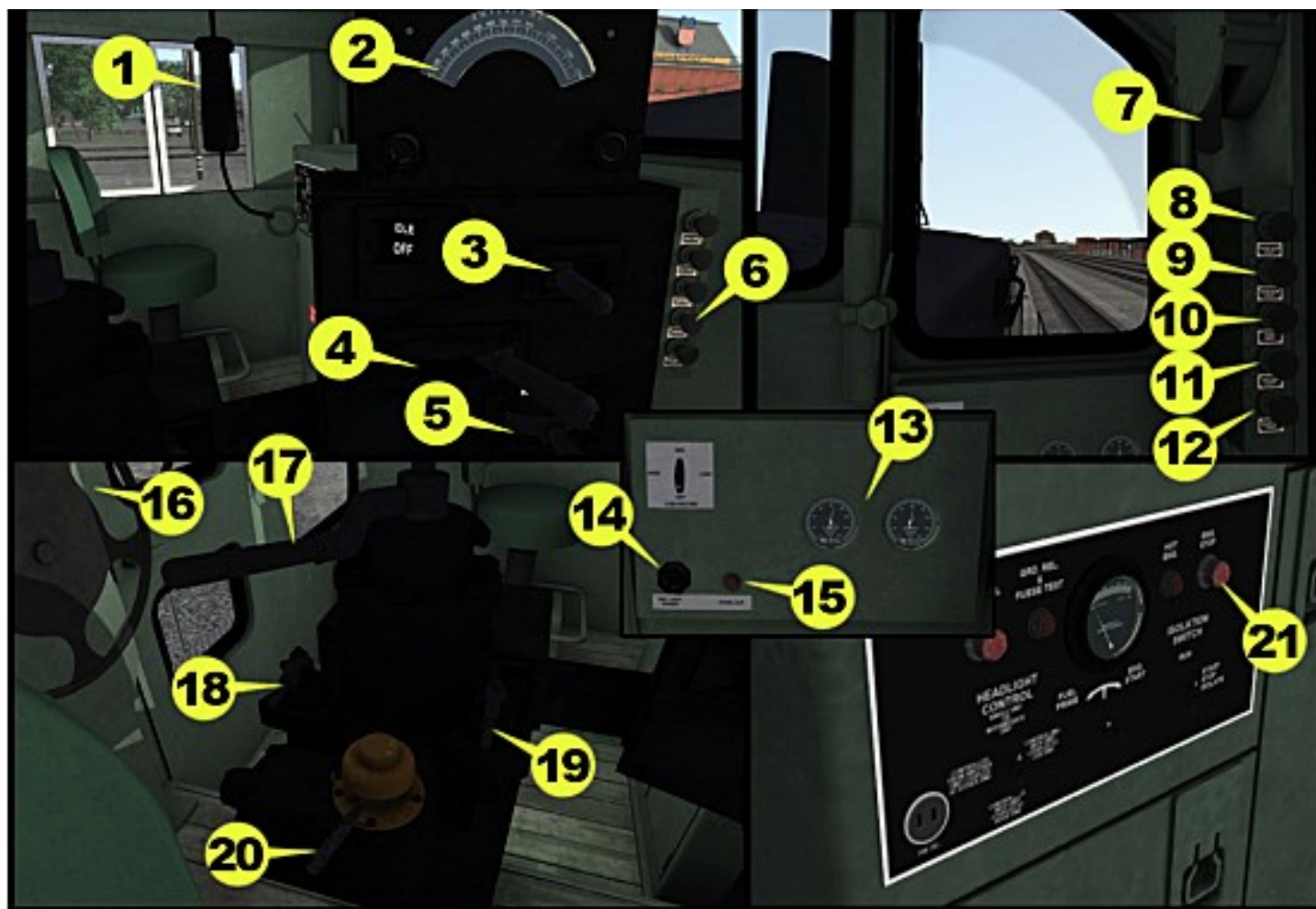
* **NOTE:**

The locomotives included with the B&O Mountain Subdivision route feature highly authentic brakes which accurately differ by model type. The GP40-2 locomotive utilizes 26L air brake controls, see page 8.

Cold Start Procedures:

1. Move the Engine Run, Generator Field and Control & Fuel Pump switches to the on position (Up).
2. Turn the Engine Run Isolation Switch to the Start/Stop Isolate position.
3. Depress the Engine Start Button until the engine has started.
4. Turn the Engine Run Isolation Switch to the Run position.

LOCOMOTIVE CONTROLS — EMD “SW” SWITCHER



- | | |
|------------------------------|-----------------------|
| 1) Horn | 19) Bell |
| 2) Ammeter | 20) Locomotive Brake* |
| 3) Selector (not functional) | 21) Engine Stop/Start |
| 4) Throttle | |
| 5) Reverser | |
| 6) Wipers | |
| 7) Headlight Controls | |
| 8) Front Number boards | |
| 9) Rear Humber boards | |
| 10) Step Lights | |
| 11) Rear Cab Light | |
| 12) Right Cab Light | |
| 13) Air Gauges | |
| 14) Gauge Light Dimmer | |
| 15) Wheel Slip Light | |
| 16) Hand Brake | |
| 17) Train Brake* | |
| 18) Sander | |

*** NOTE:**

The locomotives included with the B&O Mountain Subdivision route feature highly authentic brakes which accurately differ by model type.

The EMD SW-Series locomotives utilize 6BL air brake controls, see page 8.

SW Diesel Detail Customization:

In addition to operating features, you can customize a variety of details of the EMD switchers by using and cycling through the key commands listed below. Detail changes can include exhaust stacks, handrails, pilot plate, underframe piping, mirrors, and sunshades.

W/S = Reverser
A/D = Throttle
'/; = Train Brake
/ = Handbrake
[/] = Locomotive Brake
Z = Start Up / Shut Down
B = Bell
H = Headlights
V = Wipers
Backspace = Emergency Brake
Space Bar = Horn
X = Sander
N = Front Numberboard Lights
Shift+N = Rear Numberboard Lights
L = Left Cablight
Shift+L = Right Cablight

M = Front Mirrors
Shift+M = Rear Mirrors
Shift+Q = Sunshades
Shift+E = Exhaust Stack
Shift+R = Handrails
Shift+F = Pilot Plate
Shift+T = Underframe Pipes

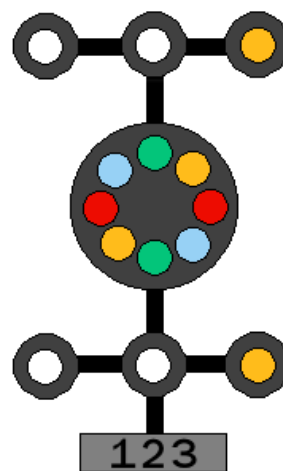


BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS

The B&O has always been famous for its fascinating and colorful “Color Position Light” (CPL) signaling system.

At first glance, those signals might seem confusing or even intimidating to novice engineers. So many lights! So many colors! The underlying principles however are of a clear and elegant logic and very similar to what you can encounter on many other North American railroads, no matter how different the B&O’s signals may appear.

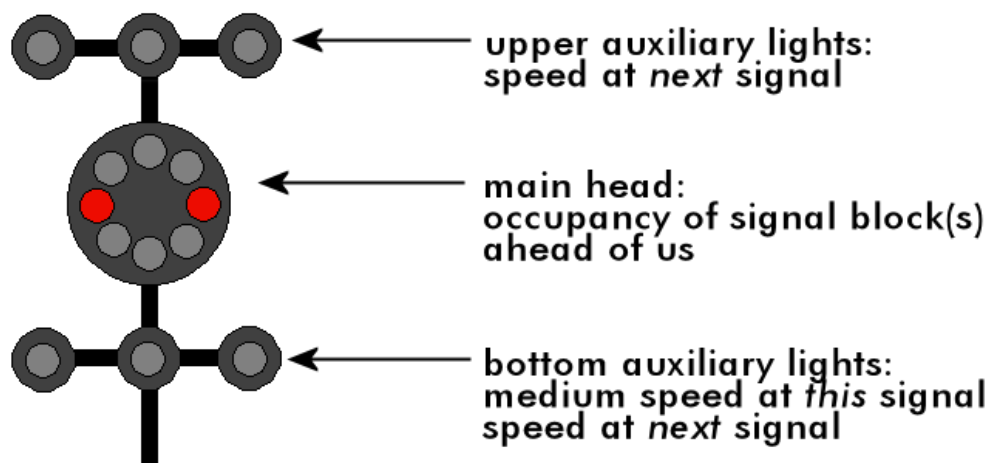
Let us take a closer look at a B&O signal. Illustrated at right is a CPL signal in its fullest configuration with the main signal head (middle), the top and bottom auxiliary lamps, and the number plate.



These components convey specific information to the engineer:

- The main head informs us about the occupancy of the blocks ahead, just like on most other signals: red = occupied, amber = the block after the next signal is occupied, green = track ahead is clear.
- The upper auxiliary lights, when lit, tell us what speed we are allowed to pass the next signal ahead, whether we can pass it at track speed, at medium speed (30 mph), or at slow speed (15 mph).
- The bottom auxiliary lights, when lit, inform us of speed restrictions when passing this signal and the next one.
- The number plate, when present, indicates that this signal is a permissive signal. In the real world, encountering a Stop aspect (red lights) on this signal means that the train can proceed at restricted speed. Please note though that this functionality is not possible to replicate in Train Simulator: Stop always means Stop, or you will highly likely receive a SPAD (“signal passed at danger”) game-over error.

So, let us recap:



And now (next page) we can take a look at how this translates into the actual signal rules of the B&O railroad and learn the method behind the madness.

BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS (*continued*)

Signal Rules of the B&O Railroad: Block, Interlocking and other Fixed Signals Aspects and Indications

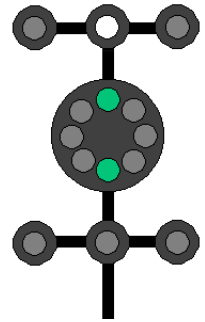
The overview below lists all the signal aspects and their indications which you can encounter on the Mountain Subdivision route. The signal rules apply equally to all signals on B&O territory, no matter if they are mounted on

Rule B-281

Name: Clear

Indication: Proceed

Explanation: The track ahead is clear past this and the next signal. You can proceed at permitted track speed.

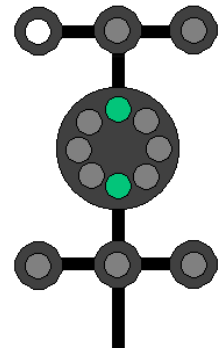


Rule B-282-A

Name: Approach Medium

Indication: Proceed approaching next signal at not exceeding medium speed.

Explanation: The track ahead is clear past this and the next signal. You are diverging at the next signal and must slow down to 30 mph before the next signal.

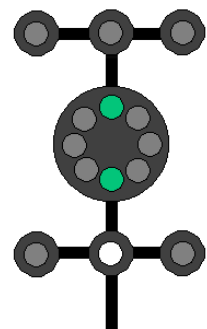


Rule B-283-A

Name: Medium Clear

Indication: Medium speed through crossovers, turnouts, sidings, interlocking limits and over power switches; then proceed at maximum authorized speed.

Explanation: The track ahead is clear past this and the next signal. You are diverging at this signal and must maintain 30 mph until your train has cleared the switches and can then return to permitted track speed.



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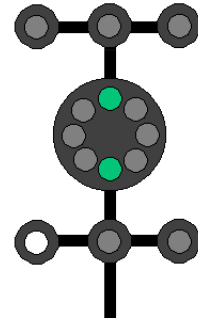
BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS *(continued)*

Rule B-283-B

Name: Medium Approach Medium

Indication: Proceed at not exceeding medium speed approaching next signal at not exceeding medium speed.

Explanation: The track ahead is clear past this and the next signal. You are diverging at this and again at the next signal and must keep your speed below 30 mph at both signals.

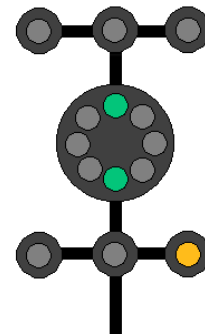


Rule B-283-C

Name: Medium Approach Slow

Indication: Proceed at not exceeding medium speed approaching next signal at not exceeding slow speed.

Explanation: The track ahead is clear past this and the next signal. You are diverging at this and again at the next signal and must keep your speed below 30 mph at this signals and below 15 mph at the next signal.

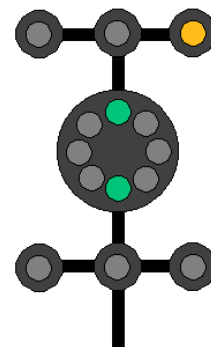


Rule B-284

Name: Approach Slow

Indication: Proceed approaching next signal at slow speed; train or engine exceeding medium speed when indication is seen must take action at once to reduce to medium speed or slower, if necessary.

Explanation: The track ahead is clear past this and the next signal. You are diverging at the next signal and must slow down to 15 mph before the next signal. Slow down immediately to 30 mph (or slower) if you are exceeding 30 mph when encountering this signal.



(continued next page)

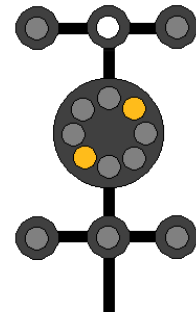
BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS *(continued)*

Rule B-285

Name: Approach

Indication: Proceed prepared to stop at next signal.

Explanation: The track ahead is blocked past the next signal.
Slow down to below 30 mph so that you can safely stop before the next signal.

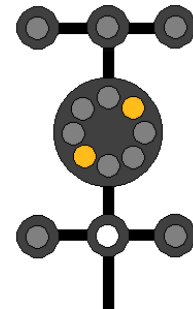


Rule B-286

Name: Medium Approach

Indication: Proceed at not exceeding medium speed prepared to stop at next signal.

Explanation: The track ahead is blocked past the next signal. You are diverging at this signal and must not exceed 30 mph. Maintain a speed below 30 mph so you can safely stop before the next signal.

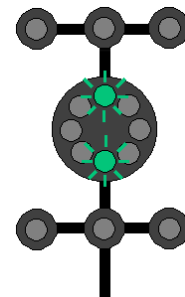


Rule B-287

Name: Slow Clear

Indication: Slow speed through crossovers, turnouts, sidings, interlocking limits and over power switches; then proceed at maximum authorized speed.

Explanation: The track ahead is clear past this and the next signal. You are diverging at this signal and must maintain 15 mph until your train has cleared the switches and can then return to permitted track speed. This signal aspect shows flashing green lights.



(continued next page)

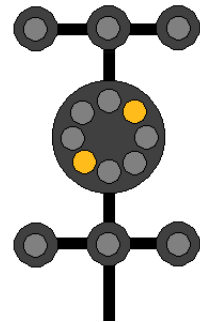
BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS *(continued)*

Rule B-288

Name: Slow Approach

Indication: Slow speed through crossovers, turnouts, sidings, interlocking limits and over power switches; then proceed at not exceeding medium speed prepared to stop at next signal.

Explanation: The track ahead is blocked past the next signal. You are diverging at this signal and must maintain 15 mph until your train has cleared the switches, then maintain a speed below 30 mph so you can safely stop before the next signal.

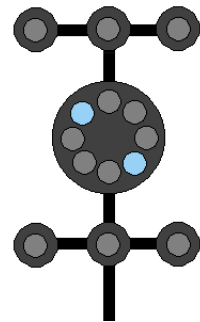


Rule B-290

Name: Restricting

Indication: Proceed at restricted speed.

Explanation: The track ahead may be blocked but you are permitted to proceed past the signal. You must keep your speed at below 15 mph at all times and be able to stop your train within half of visible distance at all times. This aspect is most commonly encountered around yards, spurs and sidings.

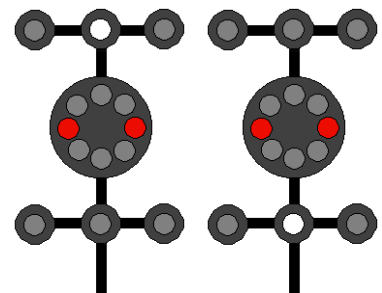


Rule B-291

Name: Restricted Proceed

Indication: Proceed at restricted speed.

Explanation: The track ahead may be blocked but you are permitted to proceed past the signal. You must keep your speed at below 15 mph at all times and be able to stop your train within half of visible distance at all times.



(continued next page)

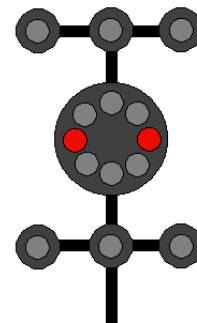
BALTIMORE & OHIO COLOR POSITION LIGHT (CPL) SIGNALS (*continued*)

Rule B-292

Name: Stop

Indication: Stop.

Explanation: The track ahead is blocked past this signal. You must not proceed past this signal. Wait until the signal changes to a different aspect or you receive permission from the dispatcher to proceed (which sometimes you can obtain during game-play by pressing the TAB key on your keyboard.)

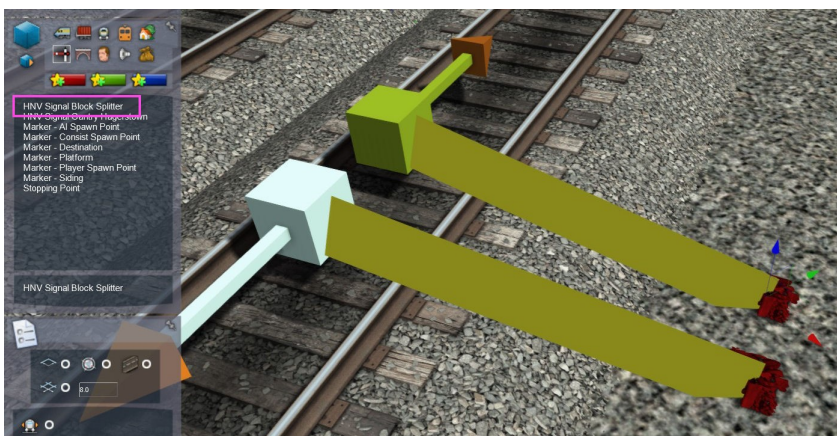


HIS SIGNAL BLOCK SPLITTER (INVISIBLE SIGNALS)

The Western Maryland Thomas Subdivision portion of the route is not signaled and was operated primarily via Direct Traffic Control (DTC) block occupancy. To allow player/AI train movements in scenarios on these portions of the route, we have included invisible signals which are available in the scenario editor, and which allows to precisely determine how a meet between two or more trains will happen.

To run AI trains on the route in your own scenarios, you can use our scenario-based signal asset. Look for the "HIS Signal Block Splitter" in the scenario editor.

These are very simple signals that split the track network into signal blocks in which the dispatcher can then run AI services. You should always place these signals in pairs with the link arrows pointing away from each other to fully separate two blocks. This mimics the link placement of two normal single-link signals placed opposite each other. To change the direction the link defaults to during placement, hold down the Shift key when placing it on the tracks. The screenshot below illustrates the recommended placement:



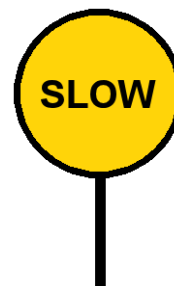
The example shown here creates two signal blocks: one to the right and one to the left of the two signals (so you could run a maximum of two trains here if these are the only signals on your route). As far as the AI dispatcher is concerned, these are perfectly normal signals. You can create as many and as large or small signal blocks as needed for your planned traffic flow.

LINESIDE SIGNS

B&O Permanent Speed Signs

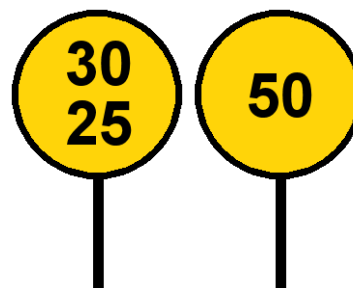
"Slow Sign"

The Slow Sign indicates a permanent speed restriction ahead. Like all speed signs, they are generally located to the right of the tracks in direction of travel and apply to all tracks they are next to, unless a track is restricted to an even lower speed.



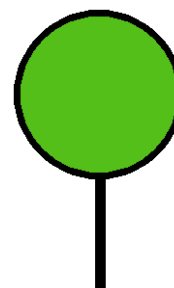
"Reduce Speed Sign"

These signs indicate the beginning of a reduced speed zone. Before a train passes this sign, its speed must be reduced to or below the speed indicated on the sign. When two speed limits are shown, the upper number applies to passenger trains and the lower to freight trains. Signs with only one number apply to all trains.



"Resume Speed Sign"

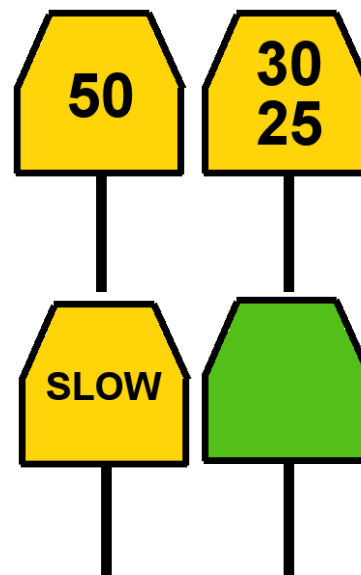
This sign marks the end of a reduced speed zone. A train may resume at maximum authorized track speed once its end has passed the sign's location. Maximum authorized track speed on the Mountain Subdivision is 50 mph for passenger and 45 mph for freight trains.



B&O Temporary Speed Signs

Temporary Speed Signs

Temporary speed restriction signs have been provided for the use in user-created scenarios. These follow the same rules as the three permanent speed signs above.

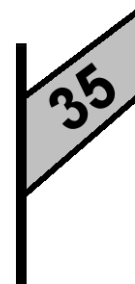


LINESIDE SIGNS (*continued*)

WM Speed Signs

"Reduce Speed Sign"

These signs indicate the beginning of a reduced speed zone. Before a train passes this sign, its speed must be reduced to or below the speed indicated on the sign. When two speed limits are shown, the upper number applies to passenger trains and the lower to freight trains. Signs with only one number apply to all trains. Please note that there are no warning signs for upcoming speed restrictions on WM territory.



"Resume Speed Sign"

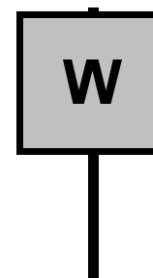
This sign marks the end of a reduced speed zone. A train may resume at maximum authorized track speed once its end has passed the sign's location. Maximum authorized track speed on the WM Thomas Subdivision is 49 mph.



General Lineside Signs

"Whistle Sign"

This sign indicates an upcoming grade crossing where the engineer must sound the horn. Whistle signs are typically placed 1/4 mile (400 meters) before the crossing. The whistle signal consists of two long blasts, one short, and another long blast, which must be sounded at least 15 seconds before reaching the crossing and must be repeated or prolonged until the engine has passed the crossing. Please note that whistle signs come in various sizes and shapes, but on our two railroad lines they always consist of a black letter W on a light background.



"Yard Limit Sign"

Indicates extent of Yard Limits. Movements within yard limits are subject to approval of a dispatcher and/or yard master, and locomotives and trains must be prepared to stop within half the range of vision short of obstructions, switches not properly lined, etc.



TRAIN ORDER SIGNALS

Train order signals are installed at various stations and depots along the route. Unlike the automatic block and interlocking signals, the train order signals do not actually interact with the player or AI services. Nevertheless, their signal state can still be set by the scenario author.

Open the 2D map (9 key) and look for a set of switches buried underground near the train order signal. Setting these switches changes the state of the train order signal.

1) A straight path on these buried switches indicates a CLEAR train order signal.

- Indication: There are no train orders. Proceed without slowing or stopping.

2) Setting the near switch from the center of the buried tracks (in direction of travel) at a train order signal makes it show ORDERS.

- Indication: Proceed slowly (15 mph or less) and pick up orders from the agent while on the move.

3) Setting the distant switch from the center at a train order signal makes it show STOP.

- Indication: Stop the train, go into the depot/office and pick up orders from the agent.



ROLLING STOCK

More than 20 freight car types are included with the B&O Mountain Subdivision route, with many featuring multiple road names (B&O, C&O, WM, and other CSX predecessor railroads) as well as different liveries and loads.

- B&O I-12 class caboose in five B&O and Chessie liveries
- WM steel caboose in Chessie and WM liveries
- AAR Class 111A tank car
- 40-foot boxcars in multiple roads and liveries
- 50-foot boxcars in single-door and double-door styles and for multiple roads and liveries
- 50-foot waffle-side boxcars for multiple roads and liveries
- Flatcars in multiple styles and with multiple loads
- Bulkhead flatcars
- 52-foot gondolas with multiple loads
- 65-foot mill gondolas with multiple loads
- 100-ton coal hopper
- 70-ton coal hoppers in multiple styles and for multiple roads
- 55-ton coal hoppers in multiple styles and for multiple roads
- ACF 3-bay covered hoppers in multiple liveries
- ACF 2-bay hopper
- Ribbed-side 3-bay covered hopper
- 40-foot Airslide covered hopper
- 50-foot Airslide covered hopper in multiple liveries
- 50-foot mechanical refrigerator car



CAREER SCENARIOS

Thirteen career scenarios are included with the B&O Mountain Subdivision route. Scoring on all career scenarios is based upon a starting score of 1,000 points with reductions made for operating infractions including exceeding the speed limit. The route is also Quick-Drive (QD) enabled. The career scenarios included are:

B&O Trailer Jet, Part 1

The B&O Mountain Subdivision was most renowned for its hauling of coal, but in the B&O and Chessie System eras, the line was busy with manifest and priority tonnage as well. The two hottest trains on the Subdivision were piggy-backs – the westbound St. Louis Trailer Jet and eastbound Manhattan Trailer Jet. You are the engineer of B&O SLTJ, the St. Louis Trailer Jet, and as this multi-part scenario begins are ready to depart Cumberland Terminal at dawn.

Duration: ~ 45 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP40-2.

B&O Trailer Jet, Part 2

You are the engineer of one of the hottest trains on the Mountain Subdivision – B&O Train SLTJ, the St. Louis Trailer Jet – and in the first part of this scenario you made the run from Cumberland to Keyser. Now, for the ascent of legendary and steep Seventeen Mile Grade, you are having helpers added for the rugged climb ahead.

Duration: ~ 45 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP40-2.

B&O Trailer Jet, Part 3

You are the engineer of one of the hottest trains on the Mountain Subdivision – B&O Train SLTJ, the St. Louis Trailer Jet – and in the second part of this scenario you made the climb of famed Seventeen Mile Grade. Now, at Altamont, your helpers have been removed and you're ready to continue west with the descent of Cranberry Grade and M&K Junction ahead.

Duration: ~ 60 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP40-2.

B&O Trailer Jet, Part 4

You are the engineer of one of the hottest trains on the Mountain Subdivision – B&O Train SLTJ, the St. Louis Trailer Jet – and in the third part of this scenario you arrived at M&K Junction. Ahead is the last leg of the journey over the subdivision, crossing the Cheat River and Newburg Grades and arriving at famed Grafton, West Virginia.

Duration: ~ 60 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP40-2.

(continued next page)

CAREER SCENARIOS *(continued)*

Local to Terra Alta

Between Seventeen Mile Grade on its east slope and Cranberry Grade on the west slope, the B&O Mountain Subdivision crosses a high plateau region where the country is more open and the grades less severe. You are the engineer of a B&O westbound local working across this scenic high plateau countryside and with a pair of veteran EMD GP9s as power, have set out and pick up work to do as you make your way from Mountain Lake Park toward Terra Alta.

Duration: ~ 65 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP9.

M&K Switch Job

It's a wintry day deep in the Alleghenies at M&K Junction and Rowlesburg, West Virginia, and you are working an afternoon switch job with a veteran Baltimore & Ohio Electro-Motive SW9 switcher as power. From M&K Yard, you'll be crossing the Cheat River to make set outs and pick-ups in Rowlesburg, then pull together a local consist at M&K Yard.

Duration: ~ 45 minutes.

Featured locomotive: Baltimore & Ohio Electro-Motive SW9.

Newburg Climb

The operating challenges on the historic B&O Mountain Subdivision were countless, but among the toughest was lifting eastbound loaded coal trains up the Newburg Grade. You are the engineer of a coal train off the Fairmount Subdivision at Grafton and are preparing to pull eastbound. A set of west slope SD35 helpers were at Grafton for refueling, so the set has been added at Grafton rather than later at Hardman.

Duration: ~ 45 minutes.

Featured locomotive: Western Maryland Electro-Motive SD35.

Seventeen Mile Grade!

Ancient in construction and among the most famous mountain trackage in all of America, B&O's Seventeen Mile Grade carried the Mountain Subdivision's main line up the east slope of the Alleghenies. Climbing the grade was torturous and descending it safely was no less a challenge. You are the engineer of B&O manifest freight No. 196 and are at Altamont, ready to drop down Seventeen Mile Grade bound for Keyser Yard.

Duration: ~ 60 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive SD35.

(continued next page)

CAREER SCENARIOS *(continued)*

Tunnelton Tonnage

At Tunnelton, the B&O interchanged with the West Virginia Northern short line. By the mid-1970s, the glory days of the coal-hauling WVN were largely past, but the railroad still regularly delivered coal loads to the B&O. You are the engineer of an eastbound coal drag and as the scenario begins, you are at Tunnelton to pick up coal loads. Ahead is the descent of rugged Cheat River Grade, then the climb of legendary Cranberry Grade. Having been added for the climb of Newburg Grade, your helper set will stay with you to Terra Alta.

Duration: ~ 70 minutes.

Featured locomotive: Baltimore & Ohio Electro-Motive SD35.

Williams Street Switcher

Located not far from Baltimore & Ohio's Cumberland passenger station, Williams Street Yard helped serve various industries including a nearby rolling mill. Aboard a veteran B&O Electro-Motive SW1200 diesel switcher, you are working the Williams Street industries and then will make a transfer run to sprawling Cumberland Terminal.

Duration: ~ 50 minutes.

Featured locomotive: Baltimore & Ohio Electro-Motive SW1200.

Turn to West Virginia Junction

One of the largest online shippers on the Mountain Subdivision was the sprawling paper mill complex which straddled to Potomac River adjacent to Piedmont, West Virginia and West Virginia Junction and was served by both the Baltimore & Ohio and Western Maryland. You are the engineer of a turn ready to depart the yard at Keyser and, with a pair of EMD GP9s, make the run to West Virginia Junction for switching at the paper mill and nearby Beryl Wood Yard.

Duration: ~ 60 minutes.

Featured locomotive: Baltimore & Ohio Electro-Motive GP9.

Empties to Austen

Austen, West Virginia, located approximately 16 miles east of Grafton, was home to a coal spur serving a mine and prep plant. You have been called on an autumn morning as engineer for an extra run out of Grafton to deliver empties to Austen. With a set of EMD SD35s as power, you will pull together your train at East Grafton, then head east on the Mountain Subdivision and climb Newburg Grade.

Duration: ~ 50 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive SD35.

(continued next page)

CAREER SCENARIOS *(continued)*

Last Lap to Cumberland

You are the engineer of B&O's "Cumberland 94" train, bound for its namesake Terminal. As the scenario begins, with a set of EMD GP9s as power, you are at Keyser making a pick up, then you'll head east to Cumberland Terminal.

Duration: ~ 65 minutes.

Featured locomotive: Baltimore & Ohio (Chessie) Electro-Motive GP9.



ACKNOWLEDGEMENTS AND CREDITS

Contributors

Michael Stephan: Track Work, Signaling, Route Building, Rolling Stock Development, Modifications, and Liveries, 3D Assets.

Gary Dolzall: Research, Route Building, and Scenario Development.

DTM and Cesar Pach: EMD SD35; EMD SW7, SW9, and SW1200; GP40-2 Modifications and Livery. Chessie 2-Bay AC&F Covered Hopper and AAR tank car.

Paul Dolzall: Custom 3D Assets

GTrax and Rick Grout: Custom 3D Assets

Wayne Campbell: Procedural Scenery, Distant Scenery, Terrain Texturing, and Technical Testing and Advisory.

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