

GP33ECO

LOW-EMISSIONS LOCOMOTIVE v1.0

Operations manual to Train Simulator



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GAMES



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The GP33ECO locomotive:

Designed and constructed at the railroad's Juniata locomotive shops, the GP33ECO will see yard service as the mother unit in a mother-slug set. So far, 10 have been built. They will be deployed in Atlanta; 65% of their cost has been subsidized by a CMAQ (Congestion Mitigation and Air Quality) Improvement Program grant administered through various federal and state agencies, among them the Federal Highway Administration, the Georgia Department of Transportation Environmental Protection Division and the Georgia Department of Natural Resources.

Based on an EMD GP50, the four-axle, 3,000-hp GP33ECO uses an EPA Tier 3-compliant 12N-710G3BT3 ("710 ECO Kit") prime-mover from Electro-Motive Diesel, D87 traction motors (which offer 10% higher tractive effort than a D77), new radiators with two-speed fans, electrical cabinets with EMD's EM 2000 microprocessor, an AR15 main traction alternator (retained from the GP50) and a CA6 companion alternator (a replacement for the D 18). NS's Admiral Cab, with its angled windshield, has been fitted to the carbody. The unit's flared radiators "are similar to those of an SD70," according to NS Mechanical Engineer-Locomotive Design Mark Duve.

A total of 28 locomotives are being repowered with Tier 3 compliant EMD 12-710 ECO engine.

RP-M4C slug:

Thirteen RP-M4C slugs will be produced to create GP33ECOs mother-slug sets. Three mother-slug sets will be assigned to the Chicago area with the remaining 10 based in Atlanta.

"RP-M4C" stands for Remote Powered-Microprocessor 4-axle Cab. The PR-M4Cs will be of similar design to the 610-class RP-M4C slugs that are currently operating with GP59Es.

NS expects to assign 610-series numbers to the slugs

The project is partially funded by Congestion Mitigation and Air Quality emission reduction grants from the states of Illinois and Georgia.

NS calculates that the 10 units, dubbed "Eco units," will account for 6.6 fewer tons of PM (particulate matter) and 155 fewer tons of NOx (nitrogen oxides). "In addition to lower emissions and fuel savings, benefits include operating efficiencies, as each Eco unit can replace two older, less-efficient locomotives," said NS Chief Operating Officer Mark Manion. "Over the past five years, we have significantly lowered greenhouse gas emissions of our locomotive fleet, achieving an 8.5% reduction per revenue ton-mile. Rollout of the Eco units demonstrates Norfolk Southern's continuing commitment to industry leadership in sustainability best practices and environmental partnerships.

Info: <https://www.railwayage.com/regulatory/introducing-the-ns-gp33eco/>

Technical Data

Model: **GP33ECO locomotive**

Power type: **Diesel**

Builder: **Norfolk Southern Railway**

Build date: **2014–present**

Rebuilder: **Altoona Works**

Configuration:

- AAR B-B
- UIC **Bo'Bo'**

Gauge 4 ft 8 1/2 in (1,435 mm)

Prime mover: **12N-710G3B-T3**

RPM range: **200-900**

Engine type: **Diesel**

Aspiration: **Turbocharged**

Displacement: **8520 cu in**

Alternator: **AR15CA6-D14**

Traction motors: **4 D87B**

Cylinders: **12**

Cylinder size: **710 cu in**

Transmission: **Electric**

MU working: **AAR**

Loco brake: **Pneumatic, dynamic.**

EM2000 microprocessor installed

Remote Control equipped

Setup to operate with RP-M4C road slugs

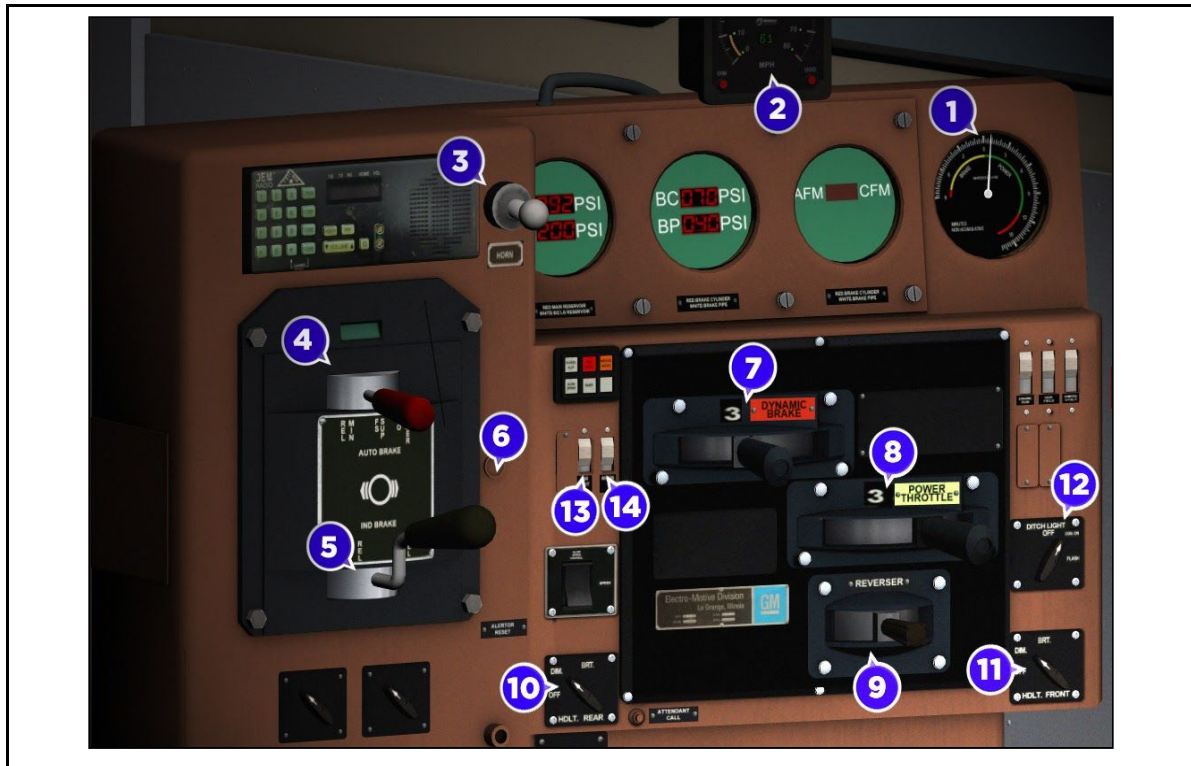
Power output: **3,000 horsepower (2,200 kW) (software limited)**

Tractive effort: **64,200 lbs**

Numbers: **4700-4727**

Current owner: **Norfolk Southern**

GP33ECO & RP-M4C basic controls



- | | |
|----------------------|------------------|
| 1. Ammeter | 8. Throttle |
| 2. Speedometer | 9. Reverser |
| 3. Horn | 10. Rear lights |
| 4. Train Brake | 11. Front lights |
| 5. Independent brake | 12. Ditch lights |
| 6. Sander | 13. Step lights |
| 7. Dynamic brake | 14. Gauge lights |

Shortcuts

Cab lights: **L**

Driver wipers: **V**

Middle wipers: **Control + V**

Rear wipers: **Shift + V**

Numberboard lights: **Shift + N**

Engine shutdown: **Z**

Front lights: **H / H+H**

Step lights: **Control + Shift + N**

Career scenarios included

N-Line route [RP-M4C] Back to N-line [Train P92] PART1:

You must enter the N-line with two simple deliveries.

The last ten hoppers of the train, must be delivered to Gold Hill quarry.

Then continue journey for the second installment in New London.

There is a bridge in poor condition, it is marked on the map You must cross at the slowest speed possible.

N-Line route [RP-M4C] Back to N-line [Train P92] PART 2 :

Then continue journey for the second installment in New London.

You must move the locomotives to end of the train and deliver the wagons following the order.

N-Line route [GP33ECO] I'm here now:

A storm is hitting with everything. You must get to Salisbury if there are no mishaps later.

Several trees have fallen and you may need to stop later until the track is secured.

N-Line route [GP33ECO] Seven o'clock:

Easy introduction of ECO locomotives.

Through the fog you must drive the last leg of the trip to the Salisbury yard.

Advanced Braking Quick Reference Guide

1 Getting Moving

- Move the Train Brake handle towards Release - it will latch around 17%
- Release the keyboard button
- Wait a second
- Move it towards release again and it will move towards 0% and release
- Observe ER moves to 90psi
- Observe BP rises towards 90psi
- Observe BC drops towards 0psi
- Once BC is at 0psi, brakes are released on the loco and will begin releasing down the length of the train
- Apply Run 1 throttle and wait for the train to begin to move, once it begins to move you can start to apply more power

2 Going Down Hill

- Move the Dynamic Brake handle to Setup
- Move the Train Brake towards Apply, it will latch at around 24% for Initial Application
- Observe the ER moves to 84psi (6lb application)
- Observe BP rapidly drops to 84psi to follow
- Observe BC rapidly applies and stabilises around 84psi
- Brakes are now on a minimum application at the loco, the rest of the brakes on the train should respond relatively rapidly
- Once approximately 10 seconds have elapsed after the Dynamic Brake handle was moved to Setup, begin moving it further towards Apply in order to achieve more braking
- If Dynamic Brakes are not holding the loco, gently move the Train Brake a small amount to apply some more air brake but note that beyond the initial application the brakes are much slower to respond and it will take time to get the extra braking effort along the length of the train
- If you find yourself slowing too much even without Dynamic Brakes then you should bring the train to a stop, then release the brakes. It will take some time for the brake pipe to recharge and if you try to release the brakes while moving you may be going too fast before you can re-apply the brakes.

- At the top of a steep incline, you may wish to set handbrakes on some wagons using the coupling view
- this is equivalent to standard railroad practice of using retainer valves to maintain air brake pressure on some freight cars which would allow a minimum amount of braking even if you've released the main air brakes. Stop your train before applying hand brakes and then proceed.
- Above all, braking requires a lot of forward thinking and careful management.

Remember, safety first

- if in doubt, stop the train. If you need to stop the train and release the brakes while on a gradient in order to allow a full recharge of the brake pipe then set all the hand brakes first.

3 Stopping

- Move the Train Brake towards Apply, it will latch at around 24% for Initial Application
- Observe the ER moves to 84psi (6lb application)
- Observe BP rapidly drops to 84psi to follow
- Observe BC rapidly applies and stabilises around XYZpsi
- Brakes are now on a minimum application at the loco, the rest of the brakes on the train should respond fairly rapidly.
- If you need further application to come to a stop then continue to move the train brake towards Apply gently, remember that the more air you let out of the BP the longer it will take to get the BP recharged again once you get going.

4 PCS Light Illuminated

- Ensure the Throttle handle is in the Idle position
- Move the Train Brake into the Emergency position before moving it back into Release

5 FAQ

The train won't move when the brake cylinder says the brakes are off

Remember all the gauges on the front refer only to the state of the brakes on the locomotive, as you use the air brakes a pressure wave makes its way down the train and it can take sometimes minutes for the effect of your braking to take effect along the length of the train.

Therefore, make small changes and wait for their effect. Forward thinking and small, careful changes are crucial in the safe operation of US freight trains.

The train won't slow down even though the BC is at 65psi!

You've most likely run out of air in the reservoirs down the train which can happen after a number of repeated applications and releases without allowing time for all the reservoirs to recharge.

There is no way to know what pressure the car reservoirs are holding so it is important to allow the train plenty of time after a brake release for everything to recharge, more so if the last application was a strong application since more air would have been used.

If you find yourself in this situation, move the Train Brake handle to its maximum application position, wait a second or two and then move it further to the Emergency position. This will make an emergency application of the brakes using a separate dedicated emergency reservoir and bring the train to a stop.

You should now set ALL handbrakes on the train so that it is pinned down safely and then you can release the Train Brake handle and let the brake system fully recharge, which may take 10-20 minutes on the hardest difficulty setting.

Once recharged you can make a minimum service application, release all the handbrakes and then continue on your journey.



Final credits and acknowledgments

- To the entire Dovetail team for supporting independent developers and making it possible to offer this product.
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