

OPERATION AND MAINTENANCE MANUAL

THE MINI-EXPRESS TRAIN



WATTMAN TRAINS & TRAMS INC.

828, boul. Industriel
Granby, Québec, Canada
J2J 1A4

Phone: (450) 378-3333 or 1-877-928-8626

Fax: (450) 378-3334

Email: info@wattman.ca

<http://www.wattman.ca>



August 2007

One Year Limited Warranty

For the 48-Volts Mini Express Train

Effective April 25, 2005, Wattman Trains & Trams, Inc (WATTMAN) hereby warrants to the Original Purchaser (Owner) that any of its vehicles shall be free from any material defect for a period of 90 DAYS while in the possession of such Original Retail Purchaser. This warranty IS NOT TRANSFERABLE to any subsequent buyer.

The warranty period is extended to one year or one thousand (1,000) hours, which ever first occurs, on the electric motor, differential (parts that bathe in oil) and the electronic speed controller. WATTMAN makes no warranty or representation with respect to tires, batteries and charger, since their respective manufacturers cover such parts. WATTMAN makes no warranty or representation with respect to any item that, in WATTMAN's sole opinion, shows evidence of negligence, misuse, abuse, collision or alteration.

This warranty shall not apply to normal maintenance requirements as described in the User Manual, and to damages during shipment. The latter is the carrier's responsibility. No compensation will be allowed for delays.

It is the responsibility of the owner of the vehicle to make sure that the driver is properly trained and instructed in the safety features and operation of the vehicle.

To initiate warranty coverage on any WATTMAN vehicle, the customer must communicate the problem to WATTMAN, which in turn, will determine and communicate the appropriate procedure to the customer. If the procedure requires on-site (customer location) servicing, WATTMAN will determine the authorized service center that will perform servicing. In the case where parts need to be sent to an authorized service center, all transport cost will be at the expense of WATTMAN.

Operators shall read, understand and follow the safety operating instructions in WATTMAN's OPERATION AND MAINTENANCE MANUAL (this book) before driving and must always evaluate and care for all peculiar situations that he or she may meet while driving. The driver assumes the inherent hazards related to this activity and is responsible for any passenger on the train, just like for any other passenger carrying vehicle. Therefore, the driver MUST be at least 18 years of age.

The vehicle is designed for off-road use only. WATTMAN disclaims any liability for incidental or consequential damages including, but not be limited to, personal injury or property damage arising from vehicle misuse, lack of maintenance or any defect in the vehicle.

It is the responsibility of the Owner of the vehicle to make sure that the service technicians are properly trained. Service technicians shall read, understand and follow instructions in the WATTMAN manual before servicing the vehicle. Only qualified and authorized personnel shall be permitted to maintain, repair, adjust and inspect the vehicle.

WATTMAN prohibits, and disclaims responsibility for, any vehicle modification altering the weight distribution and stability, increasing the speed or affecting the safety of the vehicle. Such modifications can cause serious personal injury or property damage for which WATTMAN disclaims any responsibility.

For Owners that are located outside North America, the warranty period starts the date of shipment from the factory, and the defective parts must be returned at the Owner's expense to WATTMAN prior to warranty repair.

Table of content

1	<i>Introduction</i>	3
2	<i>Standard Equipment/Material supplied with your train</i>	3
3	<i>Safety Instructions</i>	4
3.1	Train Inspection	4
3.1.1	Battery inspection	4
3.1.2	Tire inspection	4
3.1.3	Hitch inspection	4
3.2	Boarding	5
3.3	Driving safety rules	6
3.4	Operating the train	6
3.5	Storing the train	7
3.6	Charging the batteries	7
4	<i>Accessories</i>	8
4.1	Public Address System	8
4.2	Smoke Machine	9
4.3	Sound In Motion	9
5	<i>Train Maintenance</i>	9
5.1	Locomotive	9
5.1.1	Opening the boiler for battery access.....	9
5.1.2	Maintenance instructions	10
5.2	Wagons	11
5.3	Cleaning	11
6	<i>Off-season storage</i>	11
	<i>Appendix A : Proper Care and Maintenance of Deep Cycle Batteries</i>	12
	<i>Appendix B : The Mini-Express Specifications Sheet</i>	14

1 Introduction

Congratulations for acquiring a Mini-Express Train produced by Wattman Trains & Trams. This product aims to bring happiness and a lot of smiles on the faces of the young (and the less young) while visiting your area of interest. Weather you use the train in a mall, an amusement park, a zoo or a special event, the train will make an even more enjoyable experience for all those who attend. We are certain that the revenues generated by the train will satisfy you beyond your expectations.

Wattman products are renowned for their quality and reliability. Our trains have the brightest colors with an exquisite finish which personifies the quality of the train. Children are more than willing to get on board and they often want to come back.

This manual depicts the most important safety procedures to follow and should be read thoroughly before operating the train. We are certain that you and your passengers will enjoy the ride with the Mini-Express Train. All aboard!!!

2 Standard Equipment/Material supplied with your train

- One ignition key and one key for the boiler's doors (with a spare set)
- Operation and Maintenance Manual (this book).
- One spare tire/wheel assembly in each of the passenger wagons, stored under the flip-top bench.
- One tool kit.
- One Wattman hat.

Optional Equipment/Material (if option requested)

- Smoke machine instruction manual

3 Safety Instructions

3.1 Train Inspection

The inspection is mandatory before every use of the train. It is the basic of all safety procedures. Always begin the operation with a complete safety inspection of the items below:

3.1.1 Battery inspection

Refer to the maintenance section (5.1.1) to open the boiler

Refer to appendix A for battery care

- Do NOT use the train if the battery indicator is low.
- You must always maintain your batteries in good condition. All wire connections must be kept clean and tight at all times. The 8 batteries plugged in series should provide you with 10 to 15 hours of autonomy on a flat surface.
- Cautiously remove the battery caps and verify the water level in each battery. The batteries are the liquid acid (H_2SO_4) type, so extra care should be taken while handling them. Avoid contact with the skin or clothes.
- Add the appropriate amount of DISTILLED water (do not use tap or source water because that WILL damage the batteries). The water level should fully cover the lead plates in each battery. Batteries should be checked for water level before and after each charging. It should be $\frac{1}{4}$ in. below the bottom of the fill well in the cell cover. Re-install the caps and make sure that they are tightly closed.

3.1.2 Tire inspection

Verify that ALL tires on the locomotive AND on EVERY wagons are properly inflated.

- On the LOCOMOTIVE, the FRONT tires need 55 lbs pressure and the REAR tires need 75 lbs.
- On the WAGONS, all tires need 55 lbs pressure.

3.1.3 Hitch inspection

- Verify each hitch to ensure that each wagon is well attached to the car ahead. When properly hooked together, it allows a pin or lock to be used to lock the ball and hitch. This pin is mandatory for safety.

- Also ensure that each safety chain and hook is properly installed and locked on the wagon ahead.
- All 4 attach of the safety net should also be fixed to prevent passage between wagons.
- If you have speakers on you wagons, pull on the connector (not on the wire) to see that it is correctly installed.



3.2 Boarding

- The recommended minimum passenger height is 36" (91cm), unless seated with an adult.
- All door latches have a button located underneath the latch. To open the door, push up on the button with one finger.
- Load the train from front to rear. Do NOT leave any empty (or undercharged) wagons before a wagon with passengers.
- Balance the weight of the passengers so that all wagons are approximately equal or that the heaviest is in the front and so on. Failure to do so may result in a dangerous situation (jackknife) when going downhill.
- Avoid seating 2 adults on the same side of a wagon, because this may cause tipping.
- Before leaving the station, check that all doors are securely closed and ensure that all passengers are seated.

3.3 Driving safety rules

- Each driver must be at least 18 years of age AND must have read and understood this manual prior to operating the train.
- The train is equipped with a low gear differential to enable you to pull four loaded wagons easily. It is not designed to go fast. This train is very narrow and therefore must be driven gently and slowly, without any fast and/or sharp turn.
- Wattman does not recommend driving the Mini-Express Train on uneven terrain with bumps and holes.
- If you are not familiar with the Mini Express Train operation, we recommend a trial run with no passengers over all the terrain that you will habitually use. It is very important for you to be at ease with the steering, accelerator, brakes and whistles.
- Since all the wagons will follow the locomotive very closely, it is safe to make gentle curving turns to avoid objects. You are able to make a complete U turn within 15 feet wall to wall.
- Be very careful going down a slope. There are no brakes on the wagons, only on the locomotive. Always go very slowly straight up or straight down. Do not attempt to go down or up a slope at an angle. The weight of the loaded wagons could cause them to fishtail or overturn, possibly creating a safety hazard for the passengers.

3.4 Operating the train

- To start the locomotive, insert the ignition key in the switch and turn the key clockwise to the ON position. The rocker switch on the left is for the direction : forward, neutral or reverse, as the arrows indicate.
- The black plastic button, beside the ignition key switch, is for the locomotive headlight.
- To use the locomotive whistle, pull on the knob to your right underneath the control panel.
- To use the locomotive horn, push on the black button located on the left side of the control panel.
- There is only one pedal to accelerate and brake. When you push down the front of this cantilever pedal, you accelerate. When you lift your foot off the pedal, the

locomotive stops automatically. If you want to stop very quickly, push down on the back of the pedal.

- Use the steering wheel to direct the train. As soon as the train is in motion, keep at least one hand on the steering wheel at all times.
- Every time you make an extended stop, put the forward/reverse switch to neutral position and then turn the key switch to off. Never leave the key in the ignition switch when you leave the train : TAKE IT WITH YOU.

3.5 Storing the train

- At the end of the day, make sure the ignition is OFF, that the direction is in NEUTRAL and that the key is out of the key switch.
- Check all tires and hitches.
- Recharge the batteries if needed (see next section).
- Wattman highly recommends storing your Mini Express Train indoors when not in use. Our trains are manufactured almost completely in wood. If water from rain and the dew is left standing on the wood overnight, the lifespan of the wood will be shortened.

3.6 Charging the batteries

- The Battery Charge Indicator moves from right to left as the batteries are being discharged. A flashing bar on the left warns the operator that the batteries are at the end of the useable charge. It is very important not to continue operating the train in this condition because over-discharging the batteries can damage them significantly. It is best to recharge the batteries after each complete day of operation. If the train is used in a very light duty application, you may be able to work two consecutive days on the same charge, but there is no real advantage to do it on purpose. You may skip a recharge only if you have accumulated less than 4 hours on the hour meter and when the charge indicator is above 2/3 full only. If you know that the next day will be a busy one, recharge your batteries to prevent running out of power. In any case, never try to operate more than 15 working hours on the same charge (as calculated by the hour meter). These batteries have a cycle life of 600 charges at 80% depth of discharge → 5.85V min. More cycles can be achieved with a lower depth of discharge, but do not recharge uselessly after only a very short use.
- When recharging is required, position the train near a 110-volt power outlet (or 240 V for European users), turn the train OFF, pull the electrical cord located in the bottom left compartment of the locomotive's cabin and plug it into the outlet.

The on-board charger will automatically shut off when the batteries are fully charged. Do not disconnect the charger until it has stopped by itself, even if the charge indicator gauge shows a full state. DO NOT turn the key ON when the charger is plugged.

- The power outlet must have a 15 A breaker capacity and nothing else than the charger must be connected to that circuit (not applicable for Europe). In the first few days of use with a given power outlet, try to watch the charger during the first hour of charge to be sure the charge is not interrupted. A defective breaker or an overload caused by another appliance on the same breaker can sometime cause an interruption of the charge after a short time. In that case, the charge level indicator may reset at 100% because the threshold voltage has been reached even if the real state of charge of the batteries remain low. If you use the train after an interrupted recharge (not recommended), the battery indicator will go down rapidly.
- All battery charging should take place in a well-ventilated location to avoid any vapor accumulation during charging. Make sure that the train is not enclosed too much. Do not operate any equipment or machines that could cause a spark when you are charging the batteries. The batteries are of the liquid acid (H₂SO₄) type, so extra care should be taken while handling them. Avoid contact with the skin or clothes. Nothing should obstruct the free circulation of air around the charger under the seat. This component produces a lot of heat and cool itself by natural convection. No object, such as a coat, should be left on the seat during recharge.
- It is also important to make an equalization charge periodically. This can be achieved by disconnecting and reconnecting the charger after a complete charge (after the charger has stopped by itself). This can preferably be done once a week during an off day. If the train is used 7 days a week, this operation could be done about an hour before the new work period. The equalization is particularly important if you use your front light very often and if you have the radio option and use it at high volume, since these accessories drain power on only a reduced number of batteries.

4 Accessories

These accessories are optional, so your train may or may not be equipped with them. This section explains how to use them.

4.1 Public Address System

The public address system (PA) is simple to use. Turn the power ON, adjust the volume and talk in the microphone. If you wish, you can use a warning signal prior to speaking. First, select “Fog” for a fog horn signal or “Siren” for a siren signal. Then, activate the signal by either pushing and maintaining the left side of the button or by pushing the right

side of this button to activate the signal and pushing it again when you want to deactivate it. You can also plug in an auxiliary unit, like a portable MP3 player. The auxiliary input has a separate volume control and has less amplification power. Please turn the PA OFF before turning the ignition key OFF.

4.2 Smoke Machine

Use only the specified liquid. Soapy water is NOT a supplement. Any liquid other than the specified one is likely to damage the machine. Periodically check the liquid level and do not use the smoke machine if the reservoir is empty. It does take very little liquid to generate smoke, but avoid emptying the reservoir at all cost.

To generate smoke, just turn the key ON and push the black button on the control panel of the train. Note that there is a small delay (about 1s) before the smoke comes out.

Be advise that a 30 second continuous use of the smoke machine is considered to be a very long use. It's battery is not designed to give many long bursts. It is better to use it for shorter bursts of 5 to 10 seconds (approximately), with some time between bursts to recharge the battery. Take note that, if you use the smoke a lot at the end of the trip, the battery will need to recharge, so you must not turn the key off immediately.

4.3 Sound In Motion

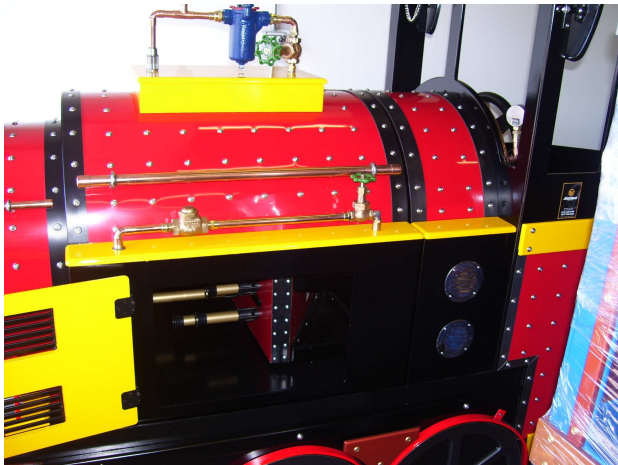
After turning the key ON, activate the sound panel (on the left). Adjust the volume and you are set to go. The system will generate sounds according to the way the pedal is pressed. You can also use the two whistles at will. Please turn the system off before shutting down the train.

5 Train Maintenance

5.1 Locomotive

5.1.1 Opening the boiler for battery access

- First, as a safety measure, never leave the key in the contact switch when the boiler is opened. (unless otherwise required)



- Use the key to unlock the left side boiler door.
- Sliding the boiler forward: Inside the door at the rear, your left hand will find a spring-loaded pin holding the boiler in place. Pull up and hold the pin up with your left hand while sliding the boiler forward with your right hand. The boiler is on rails that will allow it to slide forward and lock it into place.

5.1.2 Maintenance instructions

- The proper maintenance for the locomotive starts with checking the batteries, at least every week. This means measuring the voltage and water level on each battery. Taking note of these values may provide early diagnostic and help prevent some problems you may encounter due to normal use. For more details on battery care, refer to appendix A.
- The battery terminals must be tight and free of any corrosion.
- Be sure to grease all fittings (wheel bearings and steering linkage on the wagons).
- Oil the steering chain once a month. When the boiler is open, you can see the chain attached to the steering linkage behind the electric motor.
- Check all screws for tightness over time (even decorative ones).
- Keep the locomotive tires properly inflated. The appropriate pressure is 55 psi for the front wheels and 75 psi for the rear wheels. **IT IS EXTREMELY IMPORTANT TO MAINTAIN PROPER AIR PRESSURE IN THE TIRES.** Low tire pressure creates an extraordinary amount of rolling resistance which then requires more power than normal to overcome. The extra power coming from the batteries to overcome this friction is being wasted and you will therefore have less running time available on a charge. More current will also deteriorate your train faster.
- Periodically check the decorative wheel panels on each side of the locomotive, as it is possible that they could scrape on uneven ground. To remove the decorative panels, remove the 5 screws holding each panel on.

CAUTION : Whether greasing the train or doing some other maintenance, make sure you avoid any contact of electrically conductive tools with any active terminal (some terminals are directly connected to the batteries and are active at all time). Use a cloth to provide temporary isolation.

5.2 Wagons

- Keep the wagon tires properly inflated. The appropriate pressure is 55 psi.
- Grease fittings on each axle at least once a month and more often as environment and use dictate.
- Grease/oil the steering arms.
- Oil the coupler as necessary.
- Check and retighten all screws over time (even decorative ones).
- Remove wheels and check bearings as necessary.
- If a tire goes flat while operating the train, it is better to replace the entire wheel assembly with the spare, located under the flip-top bench of each of the passenger cars, and repair the flat after operating the train.

5.3 Cleaning

Yes, the train needs cleaning every now and then, more often if you run it outside. Simply use a cloth or sponge with soapy water. Do not use a water pressure machine, because the water could infiltrate the train and cause serious problems. No wax is necessary, but you may put some if you feel the need. WATTMAN is NOT responsible for any damage due to wax usage.

6 Off-season storage

During the off-season, your Mini-Express Train should be stored in a covered garage protected from the elements such as rain, snow and overnight dew.

It is important to charge the battery pack overnight every three weeks (to one month) during the storage period. This periodic charge will keep the unused batteries from sulphating, a process that deteriorates the plates and could shorten their life.

If you have the smoke machine option, after every recharge of the batteries, you must also recharge the smoke machine battery. To do so, UNPLUG THE CHARGER and then turn the key to the accessories position (ACC or LEFT) for about 30 minutes.

Appendix A :

Proper Care and Maintenance of Deep Cycle Batteries

Proper Care and Maintenance of Deep Cycle Batteries

- ▶ New batteries should be given a full charge before use.
- ▶ New batteries need to be cycled several times before reaching full capacity (20 - 50 cycles, depending on type). Usage should be limited during this period.
- ▶ Battery cables should be intact, and the connectors kept tight at all times. Systematic inspection is recommended.
- ▶ Vent caps should be kept in place and tight during vehicle operation and battery charging.
- ▶ Batteries should be kept clean, free of dirt and corrosion at all times.
- ▶ Batteries should be watered after charging unless plates are exposed before charging. If exposed, plates should be covered by approximately 1/8" of acid. Check acid level after charge. The acid level should be kept 1/4" below the bottom of the fill well in the cell cover.
- ▶ Water used to replenish batteries should be distilled or treated not to exceed 200 T.D.S. (total dissolved solids...parts per million). Particular care should be taken to avoid metallic contamination (iron).
- ▶ For best battery life, batteries should not be discharged below 80% of their rated capacity. Proper battery sizing will help avoid excessive discharge.
- ▶ Battery chargers should be matched to fully charge batteries in an eight hour period. Defective chargers will damage batteries or severely reduce their performance.
- ▶ As batteries age, their maintenance requirements change. This means longer charging time and/or higher finish rate (higher amperage at the end of the charge). Usually older batteries need to be watered more often. And, their capacity decreases.
- ▶ Avoid charging at temperatures above 120°F or ambient whichever is higher.
- ▶ Deep cycle batteries need to be equalized periodically. Equalizing is an extended, low current charge performed after the normal charge cycle. This extra charge helps keep all cells in balance. Actively used batteries should be equalized once per week. Manually timed charges should have the charge time extended approximately 3 hours. Automatically controlled chargers should be unplugged and reconnected after completing a charge.
- ▶ In situations where multiple batteries are connected in series, parallel or series/parallel, replacement battery(s) should be of the same size, age and usage level as the companion batteries. Do not put a new battery in a pack which has 50 or more cycles. Either replace with all new or use a good used battery(s).
- ▶ Periodic battery testing is an important preventative maintenance procedure. Hydrometer readings of each cell (fully charged) gives an indication of balance and true charge level. Imbalance could mean the need for equalizing, is often a sign of improper charging or a bad cell. Voltage checks (open circuit, charged and discharged) can locate a bad battery or weak battery. Load testing will pick out a bad battery when other methods fail. A weak battery will cause premature failure of companion batteries.
- ▶ Always use a matched voltage charger and battery pack system. An undersized charger will never get the job done, no matter how long you let it run. An oversized charger will cause excess gassing and heat; this situation could cause explosions or other damage.

- ▶ Lead acid batteries should be brought up to full charge at the earliest opportunity. Avoid continuously operating batteries in a partially charged condition. This will shorten their life and reduce their capacity.
 - ▶ Inactivity can be extremely harmful to all lead acid batteries. If seasonal use is anticipated, we recommend the following:
 - a. Completely charge the battery before storing.
 - b. Remove all electrical connections from the battery, including series/parallel connectors.
 - c. Store the battery in as cool a place as possible. However, do not store in a location which will consistently be below 32°F. Batteries will discharge when stored, the lower the temperature the lower the self discharge.
 - d. When not in use, boost every two months.
 - ▶ Extreme temperatures can substantially affect battery performance and charging. Cold reduces battery capacity and retards charging. Heat increases water usage and can result in overcharging. Very high temperatures can cause "thermal run-away" which may lead to an explosion or fire. If extreme temperature is an unavoidable part of an application, consult a battery/charger specialist about ways to deal with the problem.
-

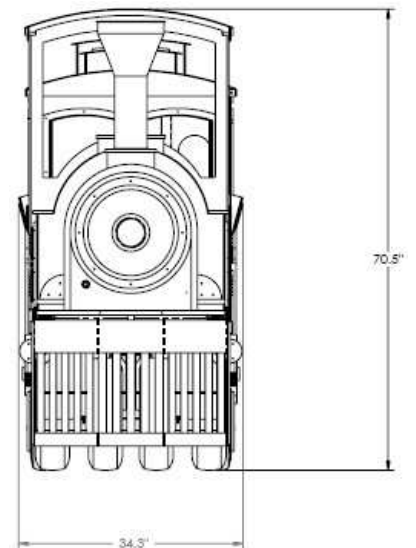
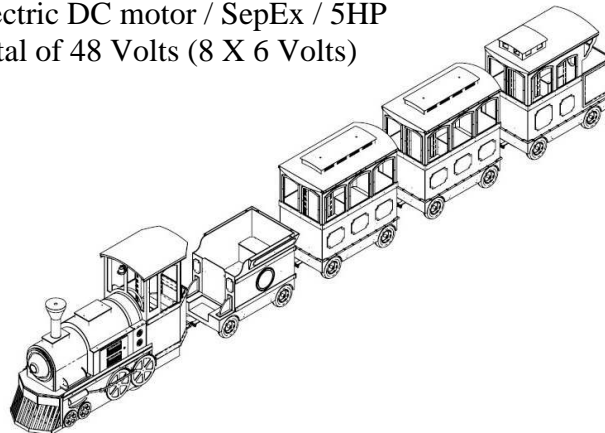


Appendix B : The Mini-Express Specifications Sheet

Locomotive:

Width	Length	Height	Weight
34.3 in	111 1/2 in	70.5 in	1500 lbs
87 cm	283 cm	179 cm	680.4 kg

- Battery pack : 8 Lead-Acid, Trojan T-105, 225 Ah @ 20 hrs. 25A output
- Charger : 120V, 60Hz, 15A for the Americas
230V, 50Hz 5.7A for others (the correct charger will be onboard)
- Autonomy : (Based on 50% Usage ratio): 20 hrs indoor; 15 hrs outdoor
- Recharge : 8 to 10 hours
- Max Speed : 3.8 mph (6.1 km/h)
- Tires : 4.80 – 8, Inflate front tires at 55 PSI (3.87 kg/cm²)
Inflate rear tires at 75 PSI (5.27 kg/cm²)
- Traction : Electric DC motor / SepEx / 5HP
- Voltage : Total of 48 Volts (8 X 6 Volts)



Wagons:

- Width: 32 1/2 in (82.6 cm)
- Weight: Total of all 4 wagons: 1,035 lbs (470 kg)
- Length (Body): Passenger: 54 1/2 in (1.38 m); Coal: 44 in (1.12 m);
Caboose: 60 in (1.52 m).
- Tires: 4.10 – 6 N H S, 55 PSI (3.87 kg/cm²).
- Max load: 450 lb (204 kg) / 1 wagon, 1800 lb (726 kg) / Total 4 wagons

Overall:

- Length: 410 in (10.414 m) (Loco + coal car + 2 passenger wagons + caboose)
- Weight: 2535 lbs – 1150 kg (Loco + coal car + 2 passenger wagons + caboose)
- Capacity: Approximately 24 small children or approximately 18 adults and children
- Grade: Max 7% (loaded) or 4 degrees.
- U-Turn: U-turn capability: 18 ft (5.5 m), wall to wall

