



Museum of Transportation Trolley Volunteers

Operations Manual

Fifth Edition March 2015





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Streetcar Service History

Streetcars came on strong in the 1890's, peaked in the 1920's and declined as the automobile became Americans prime means of mobility. World War II slowed a slide that became precipitous in the 1930's.

After World War II, streetcars dried up almost in direct proportion to the availability of new automobiles. The use of all public transit modes (i.e. trolleys, buses, subways) as well as intercity trains and buses dwindled. Where there was a need, city buses provided a cheaper alternative for the lighter usage patterns.

General Rules and Regulations

General Rules and Safety

Passenger and visitor safety requires constant vigilance on the part of all streetcar crew members.

Museum visitors may not expect movement of rail equipment on the grounds. Therefore, it is the responsibility of the crew to provide for the safety of passengers and Museum visitors on the ground.

Make liberal use of the whistle, gong or horn to alert visitors to the movement of the streetcar. Stop the car if there is any doubt as to whether a person is aware of an approaching vehicle.

Children near the track are critical. Stop the car if a toddler is not being held by the hand of an adult. Be sure that older children are aware of the approaching car and are not teasing a run onto the track or racing along with the car.

Requirements for Crew Members

Safety is of the first importance in the operation of vehicles. In case of doubt, the safe course must be taken. Operation demands the faithful, intelligent and courteous discharge of duty. Obedience to the rules is essential to safety and to remaining in service.

Crew members whose duties are prescribed by these rules must have a copy immediately available for reference while on duty. A copy of these rules is maintained in each operating streetcar.

Crew members must be conversant with and obey all rules and instructions. Carelessness, negligence and/or indifference in the performance of duties will not be tolerated. Violations will result in corrective action being taken.

Crew members must attend required classes and pass required examinations to qualify to operate any Museum vehicle. Crew training will include knowledge of all streetcar controls, operating precautions, the electric power supply and procedures for properly energizing and de-energizing the streetcar.

Crews must cooperate and assist in carrying out the rules and instructions, and must promptly report to the supervisor on duty any violation of the rules or instructions, any condition or practice which may imperil the safety of trains, passengers or employees, and any misconduct or negligence affecting the interest of the Museum. Crews must report to the supervisor on duty by the first means of communication any accidents, personal injuries, defects in track, or any unusual condition which may affect the safe operation of the streetcars. A written report must follow promptly when required.

Crew members must not report for duty, or be on Museum property under the influence of, or use while on duty, or have in their possession while on Museum property, any drug, alcoholic beverage, intoxicant, narcotic, medication, or controlled substances, including those prescribed by a doctor, that will in any way adversely affect their alertness, coordination, reaction, response or safety.

Crew members reporting for duty must be clean and neat in appearance. They must be courteous and orderly while on duty. Museum Identification Card must be worn while on duty. The use of tobacco by crew members on duty while serving patrons is prohibited. Smoking is not permitted in the cars.

Crew members must expect the movement of trains, engines, cars or other movable equipment at any time, on any track, in either direction. They must inform themselves as to the location of structures or obstructions where clearances are close.

Crew members must conduct themselves in such a manner that the Museum will not be subject to criticism or loss of goodwill. They must not discriminate between patrons of the Museum.

Crew members are responsible for their own safety. Constant presence of mind to insure safety to themselves and others is the primary duty of all crew members and they must exercise care to avoid injury to themselves or others. They must observe the condition of the equipment and tools which they use in performing their duties and, when found defective, will put them in safe condition, reporting defects to the proper authority.

Crew members must see that fire extinguishers and safety equipment are supplied on all equipment carrying personnel or passengers. Crew members must be conversant with the current emergency response plan.

Crew members are prohibited from having firearms or other deadly weapons, including knives with a blade in excess of three inches, in their possession while on duty or on Museum property, except those authorized to have them in the performance of their duty or those given special permission by the proper authority.

Crew members must report for duty at the designated time and place. They must devote themselves exclusively to the service at hand while on duty. They must not absent themselves from duty or use cell phones or pagers while on duty except in an emergency.

The Conductor must pay particular attention to the safety and needs of the passengers. The Operator's primary concern will be the safe operation of the car. When the car is stopped, the Operator may assist in dealing with the passengers.

Operating Rules

The operator's position will be occupied at all times when Museum visitors are present and the streetcar is energized. No one but a trained operator will occupy the operator's seat. No one other than the operator will operate any of the streetcar's controls including the gong/whistle.

Only qualified Museum volunteers shall operate turnouts or other Museum hardware.

The streetcar will not be operated close to any obstruction such as parked locomotives, passenger cars, etc. If such an obstruction is located at the streetcar's termini the operator will stop the car no closer than 20 feet from the obstacle. If the obstruction negates the use of the designated loading zones, then the operator will not initiate operations until the obstacle is removed. The operator will inform the museum supervisor on duty and try to resolve the situation.

All streetcar doors will be kept closed at all times when the streetcar is moving except the end doors on car #44. The only other exception is for maintenance or testing with a crew member stationed at the open door.

It is highly recommended that all passengers be seated before the streetcar starts moving and when the streetcar is in operation. If standing they must be positioned so that they do not obstruct the drivers vision or the doorways. Warn standing adults to hold on to a handrail or seat to avoid falling in case of a sudden stop. Children must be seated at all times. Children must not stand on the seats.

No food or drink in open containers is allowed on the cars. This applies to the crew as well as the passengers.

Smoking is not allowed on the cars.

Passengers shall board and alight from cars only at the designated areas. Platforms allow safe access to the car steps at these two locations.

The Conductor shall give a brief talk describing the streetcar, urban transit history, the restoration program at the Museum and our operating and maintenance program. This talk can cover as much of this material as the Conductor is comfortable with. Review the facts regularly to be sure you are giving accurate information. (See p.20)

When there already is any other vehicular traffic on the roadway alongside the Abbott Building, the Streetcar is to yield to the other traffic so as to not confuse or rattle Museum guests on the roadway. As with all other safety issues, even if the other vehicle causes the problem by coming into the area after the streetcar, stop the streetcar until the other vehicle clears the congested area.

Signals

Whistle

Note: Reference to conductor's whistle signals apply only to Car #10.

The conductor's signal to the operator to proceed is one short sound of the whistle on cars so equipped.

The operator's signal to move forward, East or West, North or South, is two blasts of the whistle or bell.

The operator's signal to move backward relative to his position on the car is three blasts on the whistle or bell.

When the car is brought to a stop and it is safe for people to get on or off, the operator shall sound one blast of the whistle or bell. After making this sound, the car shall not be moved until a signal is given to the motorman by the conductor that the car is ready to go.

Hand

A general up and down arm movement or over the head wave signals **forward** movement.

A circular movement of the arm indicates a **backup** move to the operator.

An arm movement across the body indicates **stop**.

Response to signals

The operator shall act only in response to these signals as long as he can see the person assigned to give signals.

The operator shall STOP IMMEDIATELY if visual contact is lost of the person giving the signals. The operator shall STOP if a signal being given is not understood or if, in the operator's judgment, it is not safe to move even if being signaled otherwise.

Crew Communication on Cars 44 and 2740

On these cars, it is necessary for the Conductor and Motorman to communicate verbally. All communications shall include reinforcement. For example: Conductor to Operator: "We're all clear to proceed." Not just "OK." Before acting on the instruction, the Motorman shall respond in a similar way: "Car 44 leaving the platform East-bound." When backing the PCC, hand signals are required.

Start Up Sequence

The signs warning of train movement on the tracks shall be placed along the track before operations begin.

Crew members will survey the track before operation to ensure that the track is clear and rail switches are locked in the proper position.

All equipment will be test operated without passengers on board and before passenger trips are run.

Energizing and De-Energizing the Streetcar Overhead Line

The energizing and de-energizing procedures contained in these instructions must be followed religiously and in the order described. High voltage AC and DC electricity are utilized in the operation of the streetcar. While every effort has been made to minimize risks to the crew, nothing is foolproof and your life could be at stake if you are not alert and conscientious in performing the activities involved in operating the streetcar.

Energizing the Power Supply

The Museum shop superintendent should be informed of the specific times that the overhead wires will be energized other than scheduled days of operation.

The trolley overhead wire is energized in two steps, each at a different location.

1- Restoration Building



Power from Union Electric enters the top of the main breaker panel (left) The panel provides 480-volt, 3 phase power to the Restoration Bldg. and to the diodes that convert AC power to 600 volts DC for the streetcar overhead wire. The breaker (right) operates by way of a large toggle switch. It will be padlocked. When energizing the streetcar lines, unlock the breaker switch and turn it on FIRST. Then proceed to the breaker panel and move the breaker labeled T-1 to the on position SECOND. (Both switches take a good deal of effort.) When the overhead wires on the streetcar line are energized, the ceiling indicator fixture lights (left) will be on.



NOTE: If a HOLD OFF tag is wired to the breaker toggle switch, DO NOT ENGAGE the switch. It means that someone is working on the overhead wires and could be seriously hurt.

In the case of the streetcar, power then goes thru the diode cabinet and then to a gray, wooden box high on the wall containing two single-pole, single-throw switches. The left switch is for the streetcar, the right switch is not used at this time. Except in rare circumstances, the streetcar switch will **always be in in the energized (handle hidden) position**. The right switch is for powering the overhead wire in the shop.

[If the switch is in the de-energized position, its handle is visibly protruding from the underside of the box. A streetcar lock seals this box. It will be necessary to close the left switch before energizing the breakers at floor level as described above.]

In summary, energizing the trolley wire requires two steps:

First: Turn the streetcar toggle breaker on.

Then: Turn the labeled T-1 breaker in the main breaker panel to the on position.



2. Abbott Building: The actions in step one will energize the trolley wire from the Roberts Building , around the loop, and to the tunnel. The next step is to energize the trolley wire in the Abbott Building so that the streetcar can move from its parked position onto the main track. This is done as follows:

On the north side of the Abbott Building is a locked push handle. It is mounted on the east face of a building column. Unlock the handle and push it up vertically. Observe the actual switch above to see that it is securely engaged. Keep the lock handy for re-locking the switch when the car is pulled out.

Energizing the Streetcar

See Individual instructions for each streetcar for complete details of steps 1, 2, and 3.)

1. Be sure that the trolley poles are in their roof retainers to ensure that they do not unintentionally contact the trolley wire during the energizing process.
2. Have an operator in the seat or at the operating position. Raise the rear trolley pole to make contact with the trolley wire.
3. Remove and store the chocks in the car in case they are needed out on the line.
4. On the initial movement of a car from its parked position, do a test brake application. If the brakes do not function properly, park the car and use another streetcar.
5. Move the streetcar to the point where the Abbott Bldg. overhead wire parallels the mainline wire near the west end of the Roberts Bldg. Stop the streetcar and transfer the trolley pole to the mainline overhead wire. **STAY FOCUSED ON THIS REQUIREMENT WHEN PULLING A CAR OUT OF STORAGE.**
6. After the streetcar has moved from its parked position onto the main track, the conductor will go to the switch handle at the Abbott building and pull the switch vertically down. Lock the handle in this down, off position. This ensures that the overhead wire in the Abbott Building is only energized during the time it takes to move the streetcar from its parked position to the main line. After the streetcar runs are completed for the day, the operator will re-energize the siding to position the streetcar in its parked position. We do not want the Abbott Building line energized when the streetcar is in operation on the mainline.

De-energizing the Streetcar

The streetcar must be driven to the point where the mainline overhead wire parallels the Abbott Bldg. wire. The trolley pole must be transferred to the Abbott Bldg. wire and the streetcar moved to its parking space in the Abbott Bldg.

Place the wheel chocks at the front and rear, door side wheels of one truck. The trolley pole should be disengaged from the trolley wire and placed in the retainer on the streetcar's roof.

The energizing operations at the Abbott Building and in the Restoration Building described in **Energizing the Power Supply, steps 1 and 2** shall be undone in the reverse order. Therefore, all overhead lines are de-energized, properly locked out and left in an absolutely safe condition.

Leave no money in any of the streetcars. Place all money and the Operator's Log Slip in a dated envelope in the red mail box in the locked tool crib in the Restoration Building.

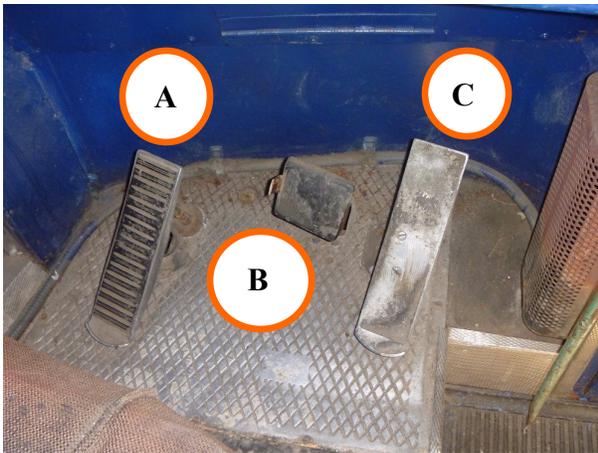
Short Breaks

If the streetcar is to be shut down for a short time, say for lunch break, the operator will park the car in a suitable location. He will then remove all operating levers and stow them in the appropriate place on the car. The wheels shall be chocked. The trolley pole shall be disengaged and stored in the rooftop retainer. The doors will be closed and locked.

PCC Car No. 2740

PCC Car No.2740 was constructed in St. Louis by the St. Louis Car Company in 1947 for the Philadelphia Transportation Company (PTC). It remained in operation until 1994 when it was purchased by Museum Trolley Volunteers and brought to the Museum of Transportation in 1995. Here the streetcar group re-gauged its trucks to fit our rail spacing and performed maintenance in preparation for operation. It has performed yeoman service being operated on Saturdays and Sundays since 1998. In 2002 the car exterior was restored by the MTTV to its as-built livery of the PTC. It was repainted again in 2014.

Controls and Devices



The **DEADMAN'S PEDAL (A)** is located on the left side of the floor at the operator's position. This pedal must be depressed for the streetcar to operate.

The **BRAKE PEDAL (B)** is located to the right of the deadman's pedal and to the left of the accelerator pedal. The brake pedal is used to slow and stop the streetcar. Initial depression of the brake pedal will engage the dynamic braking mode of the traction motors. Further depression of the brake pedal will also engage the drum brakes on the traction motors. Total depression of the brake pedal will engage the electromagnetic track brakes as well. When the track brakes are fully activated, a buzzer sounds. The

normal practice when the streetcar is not moving is to depress both the deadman's pedal and the brake pedal, then lift your foot off the deadman's pedal which locks the brake pedal in the down position. A buzzer will sound if this operation is not performed properly in which case the operation should be repeated. **NOTE:** When the brake is locked down, be sure to place a foot on the brake before depressing the deadman pedal to avoid "popping" the brake.

The **ACCELERATOR PEDAL (C)** is located on the right side of the floor. Depressing this pedal will provide power to the traction motors driving the streetcar. The further the pedal is depressed the faster the streetcar will accelerate. The accelerator pedal causes a drum contactor to operate. The contactor provides power to the motors through a set of resistors. As long as the accelerator pedal is pressed down, the drum rotates decreasing resistance in the motor circuit. When the accelerator pedal is in the up position, the drum contactor reverses taking power off the motors and initiating dynamic braking. The brake pedal operates in a similar fashion using a drum contactor to activate various levels of braking.

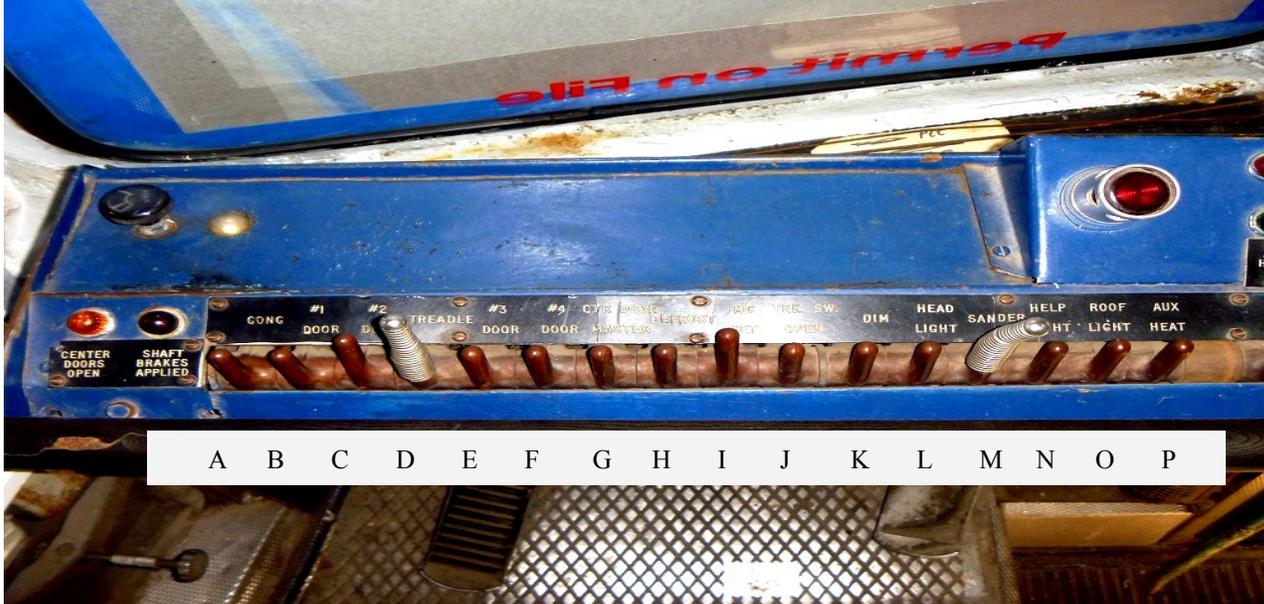
To minimize maintenance on the contacts of the controller, the accelerator pedal should be depressed to a position where the streetcar accelerates. When the streetcar reaches the desired speed the accelerator pedal should be released until braking is desired or acceleration is again desired. Releasing the accelerator pedal will activate dynamic braking

The **SHIFT LEVER** is located on the floor on the right side of the operator's seat. In the fully forward position, the streetcar is in a parked mode in which it will not move. When the shift lever is moved back to a nearly vertical position, (first detent) the streetcar is configured to move forward. When the shift lever is moved completely to the rear position, the streetcar is configured to move backward. After the streetcar completes a trip and it is loading/unloading, it is recommended that the shift lever be moved into the parked (full forward) position until the car is loaded and ready to make a trip. The shift lever can be difficult to move if the accelerator is slightly depressed. The shift lever should be removed when the streetcar is taken out of service or the operator leaves the streetcar unattended and placed in the compartment above and to the left of the driver's position.



The streetcar **BATTERY CABINET SWITCH** is located on the front of and to the right of the operator's position. It houses the battery switch which is turned on when the streetcar is energized and off when the car is de-energized.





The Control Panel (f)

The control panel is located in front of the operator at rib height. It contains 21 switches, 4 lights and a voltmeter that are used in the operation of the streetcar.

1. Switches: In order from left to right

Gong (A) - This switch is spring loaded in the back or off position. The gong will sound each time the lever is pushed forward. Our practice is to sound the gong two times before moving the streetcar forward, three times before the streetcar is backed up and as necessary to warn pedestrians that the streetcar is in motion.

1 Door Switch (B) - Pushing this switch forward will open the number 1 door. Moving the switch backward will close the door.

2 Door Switch (C) - Same as #1 door switch except for door # 2.

Treadle (D) - This switch when energized will detect the presence of a person at the # 3 and # 4 doors. If the streetcar is at rest it will open and/or prevent the closure of these doors with someone standing there.

3 Door Switch (E) - Same as # 1 door switch except for door # 3.

4 Door Switch (F) - Same as # 1 door switch except for door # 4.

Center Door Master Switch (G) - This switch has no function on this streetcar .

Defroster Switch (H) - This switch will energize the fan located to the right of the operator's position.

Motor Generator Switch (I) - When placed in the forward position this switch will energize the motor generator set on the streetcar. In the back position the set will be de-energized.

Track Switch Open (J) - The function of this spring loaded switch was to move switches in the track. It serves no function in our operation.

Dimmer Switch (K) - In the forward position this switch will dim the streetcar's headlight.

Head Light Switch (L) - In the forward position this switch will turn the streetcar's headlight on. In the rear position the headlight is off.

Sander (M) - This switch has no function on this streetcar.

Help Light (N) - This switch has no function on this streetcar.

Roof Light (O) - The roof headlight has been removed from this car.

Auxiliary Heat (P) - In the forward position this switch will energize the resistance heater located to the right of the operator's post.

[beyond photo to the right]

Cab Heat (Q) - In the forward position this switch will energize the resistance heater to the left rear of the operator's position.

Left Interior Lights (R) - In the forward position this switch will turn on the left row of lights in the streetcar. The lights are turned off in the back position.

Right Interior Lights (S) - In the forward position this switch will turn on the right row of lights in the streetcar. The lights are turned off in the back position.

Left Windshield Wiper Switch (T) - Rotating this switch clockwise will energize the left windshield wiper., (This switch is currently missing from the control panel)

Right Windshield Wiper Switch (U) - Rotating this switch clockwise will energize the right windshield wiper .

Impact Switch (V) - This switch has no function on this streetcar .

2. Lights [not pictured]

Center Doors Open Indicating Light (W) - Yellow light at the left side of the control panel is lighted when the # 3 and/or # 4 doors are open.

Shaft Brakes Applied Indicating Light (X) - Red light on the right and next to the “center doors open indicating light” is lighted when the motor shaft brakes are energized.

Auxiliary Heat On Indicating Lights (Y) - Red and green lights on the right side of the control panel are lighted when the auxiliary and cab heater are energized.

3. Voltmeter [not pictured]- The voltmeter indicates the voltage to the streetcar's control system. The normal reading is 34 to 36 volts.

Operating the PCC

This car will not be operated around the loop since it cannot be operated backwards around the loop.

Energizing The Streetcar

1. Unlock both front and rear doors

2. **Open the streetcar operator's window. Activate the “MG Set” and the “#1 Door” switches by placing them in the forward position. There will be no response at this time.**

Push open the front door for access to the car.

3. The battery switch in the streetcar's fuse box should be placed in the closed (up) position.

4. With an operator in the driver's seat, raise the trolley pole to make contact with the trolley wire.

5. The motor/generator should start up with a noticeable hum. The streetcar is now fully energized and ready for operation. CAUTION: The doors will open or close depending on switch position. Be sure nothing is crushed.

6. Engage the shaft brakes by pushing the levers in on each set of wheels (4 places). They may already be in the engaged position.

7. Remove and store the chocks.

8. As you pull out, perform a test brake application. If the brakes do not function properly, park the car and use another streetcar.

9. Move the streetcar to the point where the Abbott Bldg. overhead wire parallels the mainline wire near the west end of the Roberts Bldg. Stop the streetcar and transfer the trolley pole to the mainline overhead wire.

NOTE: If the car was stored outside in front of the tamper, the pole must be changed twice due to the insulators in the overhead wire.

STAY FOCUSED ON THIS REQUIREMENT WHEN PULLING THE CAR OUT OF STORAGE.

Parking and De-energizing the Streetcar

Re-energize the Abbot Bldg. power.

1. The streetcar must be driven to the point where the mainline overhead wire parallels the Abbott Bldg. wire. The trolley pole must be transferred to the Abbott Bldg. wire and the streetcar moved to its parking space in the Abbott Bldg.
2. The trolley pole should be disengaged from the trolley wire and placed in the retainer on the streetcar's roof.
3. The battery switch in the streetcar's fuse box will be placed in the de-energized (down) position.
4. Place the wheel chocks at the front and rear wheels of the front truck on the right side of the car. All dash switches should be moved to the off position (back).
5. Close and lock the operator's window. Close the doors and secure with a streetcar lock. Make sure that all windows in the streetcar are closed in the up position.
6. If the streetcar is to be shut down for a short time, say for a lunch break, the operator will park the streetcar in a suitable location. He will then remove the shift lever and store it in the compartment above the operator's seat. The wheel chocks will be set. He will then disengage the trolley pole from the overhead wire and store it in its rooftop retainer. The battery switch will be turned off so that the battery does not discharge. The doors will be closed and locked.



St. Louis Waterworks Car #10

St. Louis Waterworks Car #10 was built for the Waterworks Division of The City of St. Louis in 1914. It was built at the St. Louis Car Company in Baden Missouri. This car along with several others provided the means for transporting waterworks employees from the Baden Waterworks to the filtration plant at Chain of Rocks. Later on it became a popular way for people to commute to and from the Chain of Rocks amusement park.

In 1936, in an economy move, the operation was shut down and replaced with buses. In 1944 the railway operation was resumed and the cars ran until April 30, 1955 when car nos.10 and 17 operated for the last time.

Cars nos.10, 11 and 17 were donated to the Museum Of Transport. Car No.11 was in bad shape and shortly after its arrival at the Museum was scrapped with only the trucks and other minor components saved.

In 1997 the MTTV began the three and a half year renovation of car number 10. Everything on the car has been renovated. Rebuilt trucks were installed.

The traction motors were disassembled and rewired. The car roof was replaced. The wood trim inside the car was removed, sanded down and re-stained. The car exterior was repaired and repainted. Everything was done to make the car as it was in the late 1920s.

We began operating this car at the Museum Of Transportation in June 2001.

Control Description

The waterworks car has identical controls at both ends of the car. There are also two trolley poles. The car has three basic controls, a drum controller, a directional key and a brake. All three controls have removable handles.



The tools are stored under the seat on the door side of the car end #1 in a locked ammunition box.

Return them here when parking the car at the end of the run.



As the handle on the drum controller is advanced clockwise, resistance in the motor circuit is reduced allowing the motors to run faster and increasing the car's speed.

The directional key is mounted on the near, right hand side of the drum controller. When this lever is set away from the operator, the car will go forward. When it is set toward the operator the car will go backward.

Note! Other than in very unusual circumstances the car will never be operated in reverse.



The **brake handle** is mounted on the window sill to the right of the operator. It has three positions and an air pressure gauge. With the handle in the right position the brakes are applied. When the handle is in the left position the brakes are released. With the handle in the mid (lap) position the valve holds the existing pressure in the brake cylinder.

The **air pressure gauge** has two needles. The red needle shows the reservoir pressure and the white needle shows the braking pressure from 10 psi and up. This reading is unlikely to get to 30 psi except for an emergency brake application.

A **hand brake wheel** is located on the right side of the car at the B end. This brake should be applied whenever the car is parked without air in the brake system and should be used in case of an emergency.

A **fuse box** is mounted on the vestibule wall at the A end of the car. Mounted in it are fuses for all of the cars electrical circuits and switches for the inside car lights. This box is to be kept locked at all times except when the operator has specific business inside.



A **headlight switch** is above and to the left of the operator's position at both ends of the car. This is a center-off, double throw switch. The headlight is energized by moving the lever to the right.



Immediately above the operators position is a **breaker** that controls the car's power. The breaker can be re-activated by pulling the handle to the energized position.



A **door handle** to the right of the operator at the A end of the car is manually operated to open and close the doors. This handle is mounted on the left side at the B end of the car.

A **whistle** is mounted above the brake handle at each end of the car and is actuated by pulling the attached rope.

Operating the Waterworks Car

1. Close the drain valve on the air reservoir.



2. Check the compressor oil and top off if necessary.

3. Raise the pole.

4. Wait until the air compressor builds up at least 70 psi pressure before moving the car. After this reservoir pressure is reached, apply the brakes. Release the hand brake and remove the chocks.

5. Turn on the headlight in the direction of travel.

6. Controller Operation

When operating the controller, never allow it to be in any control notch longer than three seconds. Move the lever to the first position to start the car moving. After three seconds, move the lever to the second position and on to the third position if more speed is required, again holding it in no position for longer than three seconds. The controller can be left only in the full series position without time limit. With the control lever in the off position the car will coast. The recommended operation is to energize, then coast, energize and coast. Never back the controller down one notch at a time. Instead, snap the controller to the de-energized or first position in one quick motion.

Any other operating mode will result in overheating the resistors and damage to the car wiring.

7. A light touch is required in operating the brake. The brakes can be applied harder or bled off as the car slows. For a smooth stop, apply the brake relatively hard at first. Then back off as the car slows. The brakes become more effective as the car slows. You will have a rough stop (even sliding the wheels) if the cylinder pressure is too high.

When stopped at the end of a run, watch the brake pressure gauge. Do not leave the operating position for more than a few minutes because the air pressure may bleed off and allow the car to roll.

8. Always have a pole on the overhead wire. At the end of a run, raise the forward trolley pole to the wire before removing the trailing pole.

Never wrap the trolley rope around the headlights.

9. In the unlikely event of a functional failure of the air system, it could be necessary to stop the car using the hand brake wheel located at the B-end of the car. You would know this failure had occurred or was occurring by a loud air exhaust as when the reservoir valve is opened or a total ineffectiveness of the air brakes. If the power controller is not off, move it to the off position immediately.

If the operator is at the B-end of the car, then go to the brake wheel and wind up the brake. Use the foot pawl to hold the braking action. If the conductor is at the B-end of the car, the operator should holler to the conductor to apply the hand brake. If necessary to get the conductor's attention, the operator should go through the car to the conductor.

The hand brake is not as effective as the air brakes, but will bring the car to a gradual stop.

10. When reaching the tunnel stop where you will change ends, sound the whistle once to indicate that it is safe for passengers to get up. Douse the headlight. Set the brake pressure. Change poles. Do not turn on the headlight at the other end of the car until you are ready to run.

11. When leaving the car, the operator should remove and store the controller and reversing handles under the seat. This is also where the log book is kept.

12. If the car is to be shut down for a short time, say for a lunch break, park the car in a suitable location. Remove the controller and reversing levers and store them under the seat. Set the hand brake and chock the wheels. Lower the poles. Close and lock the doors.

13. When shutting down for the night, park the car in a suitable location. Remove the controller and reversing levers and store them in the locked box under the seat.

Disengage the trolley pole from the overhead wire and store it in its rooftop retainer.

Set the hand brake and chock the wheels.

Close and lock the doors.

14. After the car is parked for the night, relieve the air system reservoir pressure by opening the drain valve at the reservoir on the left side of the car. Leave this valve open.

15. Do not allow the passengers to operate the windows, they are too fragile. The operator should open or close the windows as required.

16. At the end of the day, record operating hours (the time the trolley pole is up), the passenger count and the money collected in the log book. Money collected should be counted and placed with the Operator's Log Sheet in an envelope, sealed and initialed and dated and put in the red mail box in the locked tool crib in the Restoration Building.

STOPPING POSITIONS

Tunnel end: A) doors on your left: stop with nose of car at middle of paved area
B) doors on your right: stop with car nose at the number 311 on the tender

At Roberts Building

A) Heading into the loop—stop nose of car at the end of the brick wall
B) Coming out of the loop—stop nose of car just before steps on high platform

Chicago Elevated Car #44

Chicago Elevated Car #44 was built in 1960 by the St. Louis Car Company using components (trucks, motors, seats and controls) from retired Chicago PCC cars which had been built by the Pullman Co. in 1945 and 1946.

#44 ran in Chicago until about 1992. We obtained it in December 1998. It has been operable most of the time that we've had it. However, we did not have a place to load and unload passengers until the loop track was completed to the boarding platform.

We repainted the car in the winter of 2003.

Important Safety Issues

Do not allow visitors in the cab when the car is being operated. When parked, it is good P.R. to let people see the cab and explain the operation to them.

No one shall ever ride anywhere on the outside of the car.

When the Operator leaves the operators cab, they must take a door key with them or risk being embarrassed by getting locked out. The Operator is not to leave the cab door open when he steps out and passengers have access to the car.

Keep the chains latched across the ends of the car at all times.

Miscellany

In starting the car and changing ends, since the battery switch is engaged, keep the Motor-generator set running as much as possible.

Encourage kids to ride the railfan seat in the front left of the car.

Important Features of the Car

Battery switch - A rotary switch located on the battery box under the #1 side of the car. Batteries power the control circuits on the car and run down if this switch is closed and the Motor-generator set is not running.

The shaft brake actuator levers - Two located on each truck. They engage the motor shaft brake. The main handle for each is on opposite sides of the truck. The end with the large yellow handle must be pulled toward the outside of the car to engage the shaft brakes. All four shaft brakes must be engaged to operate the car. In most cases these levers will be left in operating condition from run to run.



Auxiliaries switch panel - This panel to the left of the operator contains a variety of switches to operate lights and other auxiliaries on the car. Two lower switches labeled Power Reset and Control Positive are important operating controls.





The main controller handle - This is the main operating device on this car. It takes the place of all three pedals on the PCC.

The deadman safety is overridden by pressing down on the outer end of the controller handle. It must be held down while operating the car. Releasing the handle will shut down the car and set the brakes quickly.

The **coast** position of this controller is with the controller pointer in the center forward position. This cast-in mark is longer than the others on the controller. There is no power applied or brakes engaged in this position.

From this coast position, moving **clockwise**, the three positions are **accelerate** notches and apply increasing power at an increasing rate.

Moving the handle **counterclockwise**, each position applies increasing degrees of **braking**.

Brake Position 1. Dynamic brake

Brake Position 2. Shaft brake

Brake Position 3. Track brake

Position 4. **Park** and hold the car with power on.

Position 5. **Store** position. Shuts off the power.

In brake positions 2 thru 5, the shaft brake is engaged and the car will not roll.

Door operator switches - The door switches that we use are located behind the Operator. The door key is required in the lock to operate the doors. Each switch operates only one door. The train door switches on the outside wall of the cab will not be used in our operation.



Exterior operating switch for door - Along side each door on the number 2 end, there is a key switch that allows the opening of that door when the car is energized. Since the end doors open manually, it will not be necessary to use this method of entry on a regular basis.



The Train Control Box - This box is on the upper right of the front of the cab. These are various automatic control overrides that have no function in our operation.

Starting up and Running the Car



To operate this car, you will need one door key and a Cineston key.

Before boarding the car, turn the rotary switch on the side of the battery box to connect the batteries. The blue light on the next box to the right on the car will come on when the batteries are engaged.



Make sure all the shaft brake actuator levers on the trucks are in the operating position. The end with the **large yellow handle** must be pulled **toward outside** of the car.

Remove the wheel chocks. Stow the wheel chocks in the open box under the car under the door at the #2 cab.

The work on the ground is finished at this point. The Operator should now board the car. Hook all the safety chains across the door openings and close the end doors. Keep the end doors closed at all times except when standing in the doorway to change poles.

The Conductor may stay on the ground at this point to throw the track switch and move the pole at the mainline. The Conductor must still keep watch on the rear of the car to see that no one comes into an unsafe location. The Conductor may board the car at the high level platform.

With an Operator in the cab, raise the pole at the opposite end of the car.

On the auxiliary panel, see that the Control Positive Switch is on. (On is toward the front of the car. See Photo #1.)



Insert the Cineston key into the controller stand. Move it away from you to the forward position. Hold down the deadman handle, move the controller handle clockwise one notch to the park position. The motor-generator set should come on at this point. If it does not, re-check your start up procedure up to this point.

Press the controller handle down and move it clockwise to the third brake position, a yellow mark.

At this point, the car is ready to run. Sound the horn appropriately. Move the controller clockwise through the coast position to the first accelerate notch. **DO NOT STAY** in the COAST POSITION long enough

to let the car roll backwards. Applying power while the car is rolling backwards will fry the motors.

If the car does start to roll backward, stop it by pressing the manual track brake button alongside the controller stand. Then release the button as you apply power.

As soon as the car is in motion, make a brake application to test the brakes. If the brakes do not function properly, park the car and use another.

Operate the car similar to the PCC. Control the speed by applying power, then coasting. To apply braking, move the controller handle counterclockwise past the coast point. To achieve more braking, move the controller handle further counterclockwise up to the third brake position.

To make an **emergency stop**, just let up on the controller handle. The deadman application will occur stopping the car quickly.

Door Operation - The Operator should stop the car with the closer door at the boarding platform. When you turn to operate the doors, put the controller handle in the park position (Position 4) and release it. The Conductor must be at the door before the Operator opens it.

Only one door will be at the platform. Be extremely careful to open the NEAR DOOR ONLY on the correct side of the car. The floor of this car is 44 inches above the ground.

The Conductor will be at the door to set the dockboard and assist passengers with exiting and entrance. The Conductor, or on busy days, a third person on the platform will open the gate on the platform after the car is in place blocking the entire edge of the platform.

Signals: On this car, it is necessary for the Conductor and Operator to communicate verbally. All communications shall include reinforcement.

For example: Conductor to Operator: "We're all clear to proceed." Not just "OK."

Before acting on the instruction, the Motorman shall respond in a similar way: "Car 44 leaving the platform Eastbound."

High Level Platform Procedures - Passengers are not to congregate on the track side of the fence whether or not the car is stopped at the platform. Other than at the dockboard, there is a 16" gap between the platform and the side of the car. It would be undesirable to loose a man, woman or child into this gap.

Departing passengers are to be politely guided directly from the car through the gate. Allow them time to gather their party and then move them to the South side of the fence.

Passengers waiting to board the car are not to be allowed through the gate to the car until departing passengers are off the car and through the gate. Boarding passengers are to be guided directly to the dockboard and onto the car. If someone wants to take photos of a child in the window, they must do so from behind the fence.

After the passengers are changed, the Conductor will close and lock the platform gate, raise the dockboard and reboard the car.

The Operator will close the door. Check to see that the dockboard has been raised. Press down on the deadman, and you are ready to go.

Changing ends.

At the Tunnel end of the line, tell the passengers that they will be going back to the starting point because we have only one loading platform.

Changing ends normally will only occur at the tunnel end of the line or when putting the car away. Since you will not be at a platform, the doors will be closed. When changing ends, everything in the operating cab is shut down as if the car were being totally shut down. When you go to the other end, you start up as bringing the car on line.

Shutting down the cab:

Press the silver button that is left of center on the top of the controller cabinet. Move the controller handle counterclockwise to the "store" position. The M-G set will shut down.

Move the Cineston key to neutral and remove the key.

Remove the key from the door control panel.

It is not necessary to turn the control positive switch off.

Take all keys and go to other end of the car.

When changing ends, get the Motor-generator set back up and running as quickly as possible to prevent drawing down the car's batteries.

While the Operator is doing these things, the Conductor can be changing poles while standing in the end doors of the car.

Before moving the car at any time, the Operator MUST check to see that the front pole is down.

Putting the car away

Pulling into the Abbott Building follows the same procedures as with the other cars. When the car is in its final parked position, take the following steps.

Press the silver button and move the controller handle to the store position.

Move the Cineston key to the neutral position and remove it.

Remove the door key from the door actuating switch. Store the keys in the lockbox.

Pull the pole. Set the wheel chocks. Turn off the battery switch.

If it's the end of the operating day, follow the power shutdown procedures as well.

SUGGESTED CONDUCTOR NARRATION WITH NEW BROCHURE

Welcome aboard *CAR_NAME/CAR_NUMBER*! This is one of three vintage streetcars maintained and operated by the Museum of Transportation Trolley Volunteers. This car was built for *CITY_NAME* in *YYYY*. It ran in revenue service until *YYYY*. Shortly thereafter the car was obtained for the Museum and brought here.

INCLUDE INFORMATION ABOUT THE STREETCAR AND TROLLEY LINE HERE AS YOU NORMALLY DO.

Currently we are in the process of expanding the trolley line and restoring a Saint Louis streetcar to add to our operational fleet. This brochure tells more about it and provides information on how you can become involved in supporting our Trolley Heritage Partnership.

Information is included on becoming a volunteer.

If you would like to make a donation of funds for materials to enable our volunteers to expand our line and fleet, please use the fare box or send a tax deductible gift to the address in the brochure. Thank you for your support and enjoy your day!

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