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 safely. 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.

<u>All streetcar doors will be kept closed at all times when the streetcar is moving</u> 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

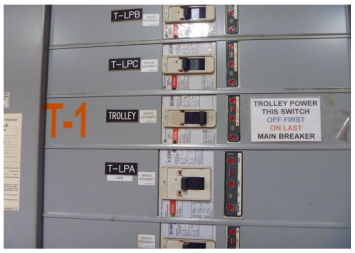
The energizing and de-energizing procedures contained in these instructions must be followed religiously and in the order described. High voltage AC and DC electricity are utilized in the operation of the streetcar. While every effort has been made to minimize risks to the crew, nothing is foolproof 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 over head 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 Ab- bott Bldg.

Place the wheel chocks at the front and rear, door side wheels of one truck. The trolley pole should be disen- gaged 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 Pow- er 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.

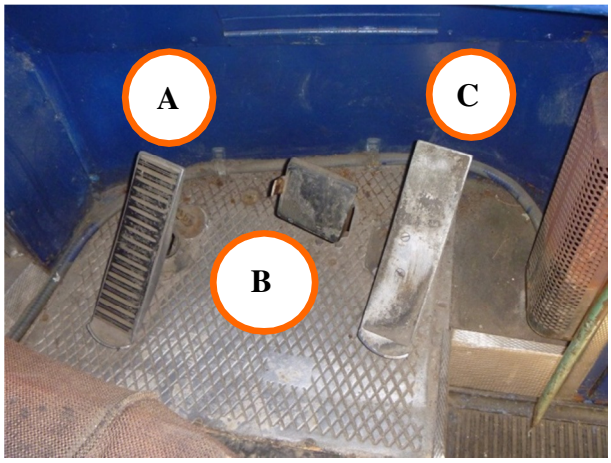
Short Breaks

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 Mu- seum 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 opera- tion. 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



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

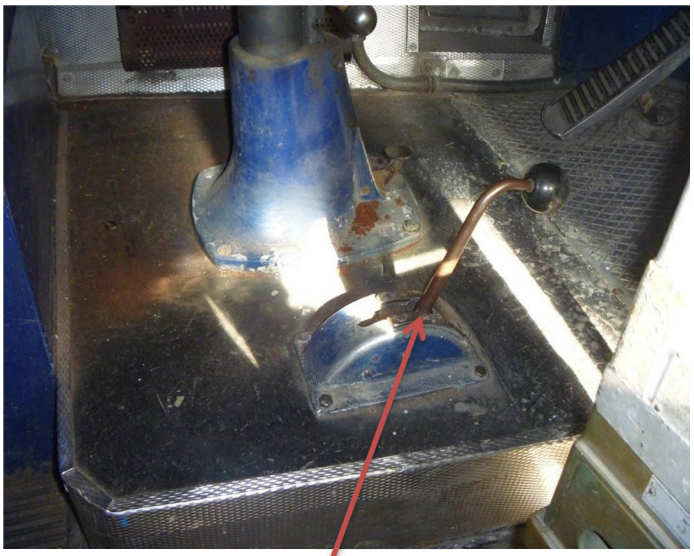
2. The **BRAKE PEDAL (B)** is located to the right of the deadman's pedal and to the left of the accelerator pedal. The brake pedal is used to slow and stop the streetcar. Initial depression of the brake pedal will engage the dynamic braking mode of the traction motors. Further depression of the brake 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.

3. The **ACCELERATOR PEDAL (C)** is located on the right side of the floor. Depressing this pedal will pro- vide 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 de- pressed 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. Re- leasing the accelerator pedal will activate dynamic braking

4. 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) thestreetcar is configured to move forward. When the shift lever is moved completely to the rear position, the streetcar is configured to move backward.

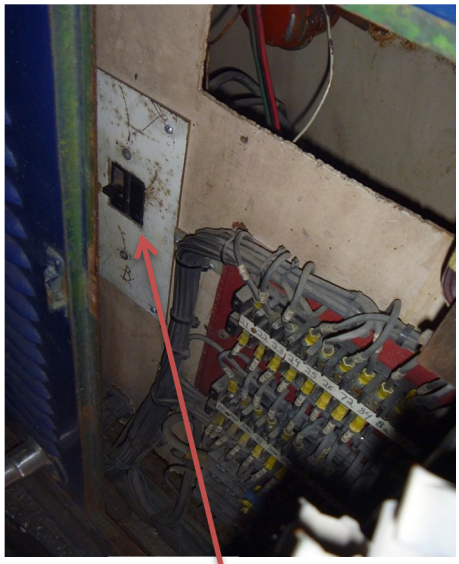
   After the streetcar completes a trip and it is loading/unloading, it is recommended that the shift lever be moved into the parked (full forward) position until the car is loaded and ready to make a trip. The shift lever can be difficult to move if the accelerator is slightly depressed. The shift lever 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.



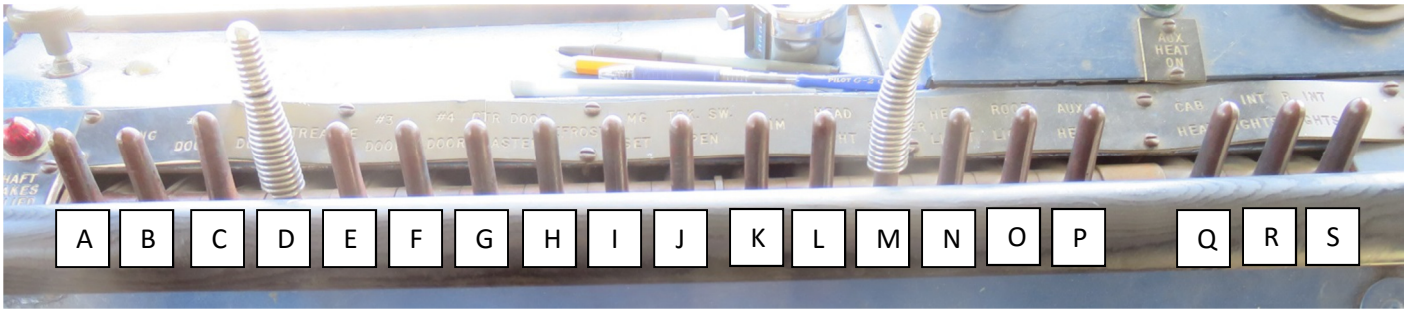
Shift Lever

5. 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.

Battery Cabinet



Battery Cabinet Switch



The Control Panel

6. **Control Panel** - 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
        A. Gong - 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.
        B. # 1 Door Switch - Pushing this switch forward will open the #1 door. Moving the switch backward will close the door.
        C. # 2 Door Switch - Same as #1 door switch except for door # 2.
        D. Treadle - 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.
        E. # 3 Door Switch - Same as # 1 door switch except for door # 3.
        F. # 4 Door Switch - Same as # 1 door switch except for door # 4.
        G. Center Door Master Switch - This switch has no function on this streetcar.
        H. Defroster Switch - This switch will energize the fan located to the right of the operator's position.
        I. Motor Generator Switch - 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.
        J. Track Switch Open - The function of this spring loaded switch was to move switches in the track. It serves no function in our operation.
        K. Dimmer Switch - In the forward position this switch will dim the streetcar's headlight.
        L. Head Light Switch - In the forward position this switch will turn the streetcar's headlight on. In the rear position the headlight is off.
        M. Sander - This switch has no function on this streetcar.
        N. Help Light - This switch has no function on this streetcar.
        O. Roof Light - The roof headlight has been removed from this car.
        P. Auxiliary Heat - 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]
        Q. Cab Heat - In the forward position this switch will energize the resistance heater to the left rear of the operator's position.
        R. Left Interior Lights - 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.

S. Right Interior Lights - 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.
T. Left Windshield Wiper Switch - Rotating this switch clockwise will energize the left wind- shield wiper., (This switch is currently missing from the control panel)
U. Right Windshield Wiper Switch - Rotating this switch clockwise will energize the right wind- shield wiper .
V. Impact Switch - This switch has no function on this streetcar .

2. Lights [not pictured]
1. Center Doors Open Indicating Light - Yellow light at the left side of the control panel is lighted when the # 3 and/or # 4 doors are open.
2. Shaft Brakes Applied Indicating Light - Red light on the right and next to the "center doors open indicating light" is lighted when the motor shaft brakes are energized.
3. Auxiliary Heat On Indicating Lights - 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 Car No. 2740

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 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 street- car'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).

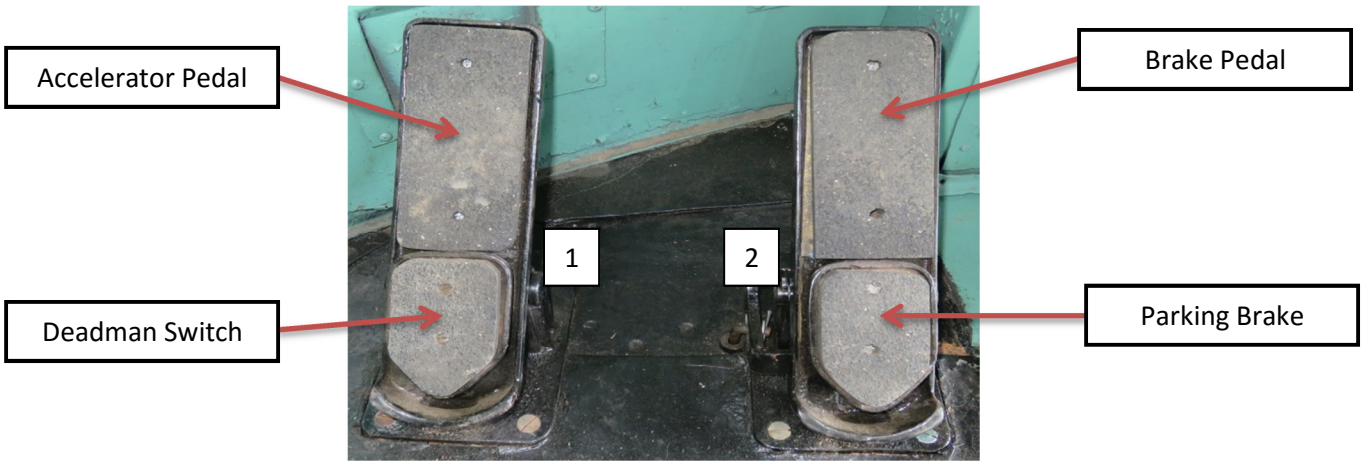
5. Close and lock the operator's window. Close the doors and secure with a streetcar lock. Make sure that all windows in the streetcar are closed in the up position.

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 it's rooftop retainer. The battery switch will be turned off so that the battery does not discharge. The doors will be closed and locked.

PCC Car No. 1743

PCC Car No.1743 was constructed in St. Louis by the St. Louis Car Company during 1945-46 for the St Louis Public Service Company (PSC). It remained in operation in St Louis until 1957 when it was sold to the Municipal Railway (MUNI) of San Francisco. It remained in San Francisco until 1982. It was purchased by Museum Trolley Volunteers and brought to the Museum of Transportation in 200X. At the Museum the streetcar group replaced its trucks to fit our rail spacing and performed restoration, repairs and maintenance in preparation for operation. It was returned to service on May 21, 2016 which was the 50th anniversary of the end of streetcar operations in St Louis. The streetcar is expected to be operated on Thursdays and Saturdays.

Controls and Devices



1. **POWER PEDAL** – The **POWER PEDAL** is located on the left side of the floor at the operator's position. The heel portion of this pedal is the **DEADMAN** switch. The heel switch must be depressed for the streetcar to operate. The remainder of this pedal is the **ACCELERATOR PEDAL**. Depressing the Accelerator Pedal will provide power to the traction motors driving the streetcar. The further the Accelerator Pedal is depressed the faster the streetcar will accelerate. The Accelerator Pedal causes a drum contactor to operate. This 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. 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

2. **BRAKE PEDAL** - The **BRAKE PEDAL** is located to the right of the Power Pedal. The upper portion of the brake pedal is used to slow and stop the streetcar. The lower portion of the Brake Pedal is the Parking Brake. 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.

   To set the parking brake, press the upper portion of the Brake Pedal without having your heel on the Parking Brake portion of the Brake pedal. The Parking Brake portion of the Brake Pedal will raise up and the parking

brake will be engaged. To release the parking brake, depress the Parking Brake portion of the Brake Pedal with your right foot heel.

Shift Lever In "Park"

Shift Lever In "Off"

Shift Lever In "Forward"

Shift Lever In "Reverse"

3. The **SHIFT LEVER** is located on the floor on the left side of the operator's seat.

A. **PARK Position** - In the fully forward position, the streetcar is in PARK mode in which it will not move.

B. **OFF Position** - When the Shift Lever is moved back to the first detent, the streetcar is in OFF mode.

C. **FORWARD** Position - When the Shift Lever is moved backwards to the next detent, the streetcar is in the FORWARD mode and is capable of moving forward under the operator's control.

D. **REVERSE** Position - When the Shift Lever is moved backwards to the last detent, the streetcar is in the REVERSE mode and is capable of moving backwards under the operator's control. **Note:** in the REVERSE position, the Shift Lever can be removed from the selector and used to open/close the Battery Compartment and/or operate the Reverse Controller.

When secured from running, the Shift Lever is to be…??????……?????……..

Battery Compartment On Rear of Streetcar

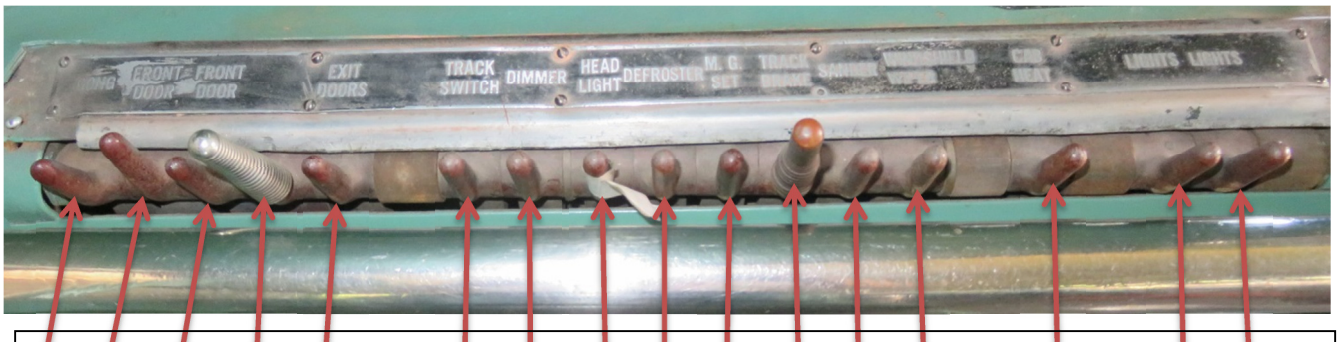
Battery Compartment Fastener & Bottom of Shift Lever

Battery Compartment with Right Door Open

Battery Compartment with Both Doors Open. Battery Switch on Left Side of Compartment

Battery Switch/Breaker On Left Side of Battery Compartment

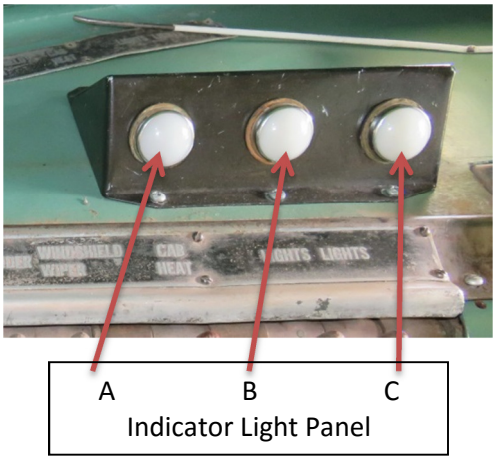
4. **<u>BATTERY COMPARTMENT/BATTERY SWITCH</u>** – The Battery Compartment is located on the rear of the Streetcar. Use the bottom of the Shift Lever to rotate the battery compartment fasteners and open the right hand compartment door. Pull open the left hand compartment door. The **<u>BATTERY SWITCH</u>** (which is also the battery circuit breaker) is on the left side wall of the Battery Compartment. Turn the battery on by moving the switch **UP**. Turn the battery off by moving the switch **DOWN**. Close the left hand door, then close the right hand door and use the end of the Shift Lever to secure the battery compartment fastener.



CONTROL PANEL SWITCHES

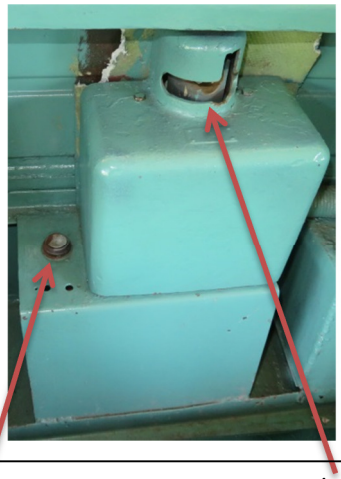
5. **CONTROL PANEL SWITCHES** - The control panel is located in front of the operator at rib height. It contains 16 switches that are used in the operation of the streetcar.

A. Gong Switch - 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.
B. # 1 Front Door Switch - Pushing this switch forward will open the #1 front door. Moving the switch backward will close the door.
C. # 2 Front Door Switch - Same as #1 front door switch except for front door # 2.
D. Spare - This switch is not used.
E. Exit (Rear) Door Switch - Same as # 1 door switch except for the Exit (Rear) door.
F. Track Switch - This switch is not used.
G. Headlight Dimmer Switch - This switch is not used.
H. Headlight Switch – Pushing this switch forward will turn on the headlight. Moving the switch backward will turn off the headlight.
I. Defroster Switch – This switch is not functional.
J. Motor/Generator Set Switch – Pushing this switch forward will energize the motor generator set on the streetcar which charges the onboard batteries. Moving the switch backwards de-energizes the motor/generator set.
K. Track Brake Switch – Pushing this switch forward activates the Track Brakes on the streetcar. Moving the switch backwards releases the Track Brakes.
L. Sander Switch - This switch is not functional.
M. Windshield Wiper Switch – Pushing this switch forward will turn on the windshield wipers. Moving the switch backward turns off the windshield wipers.
N. Cab Heat Switch - This switch has not functional.
O. Left Side Interior Lights Switch – Pushing this switch forward will turn on the interior lights on the left side of the streetcar. Moving the switch backward will turn off the left side interior lights.
P. Right Side Interior Lights Switch - Pushing this switch forward will turn on the interior lights on the right side of the streetcar. Moving the switch backward will turn off the right side interior lights.



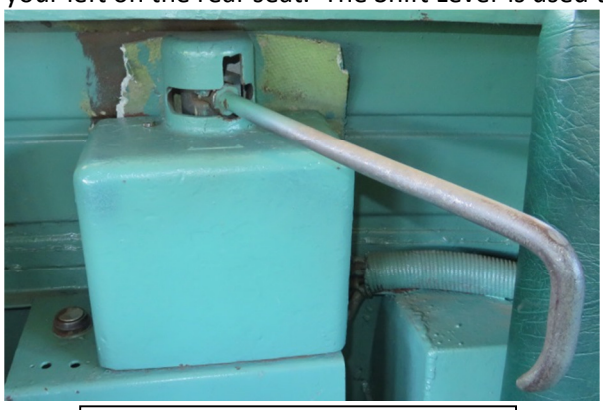
6. **INDICATOR LIGHT PANEL** – is located just above the right end of the Control Panel Switches shown above.

   A. Left Side Light - Yellow light at the left side of the control panel is lighted when the # 3 and/or # 4 doors are open.
   B. Center Light- Red light on the right and next to the "center doors open indicating light" is lighted when the motor shaft brakes are energized.
   C. Right Side Light - Red and green lights on the right side of the control panel are lighted when the auxiliary and cab heater are energized.

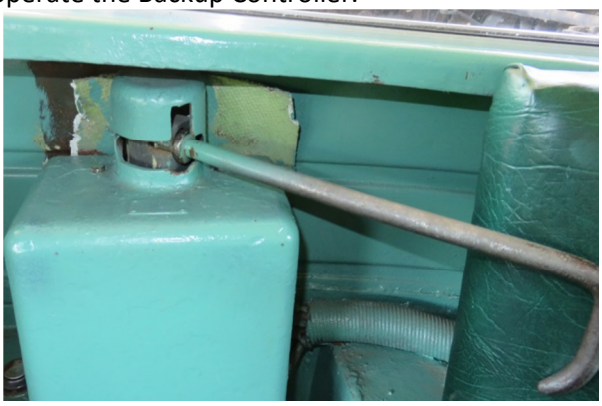


Deadman Switch Accelerate/Brake Control
Backup Controller

7. **BACKUP CONTROLLER** – is located at the rear of the streetcar. It is accessed by removing the right center back cushion by pulling the top of the cushion out and lifting the cushion up. Place the cushion to your left on the rear seat. The Shift Lever is used to operate the Backup Controller.

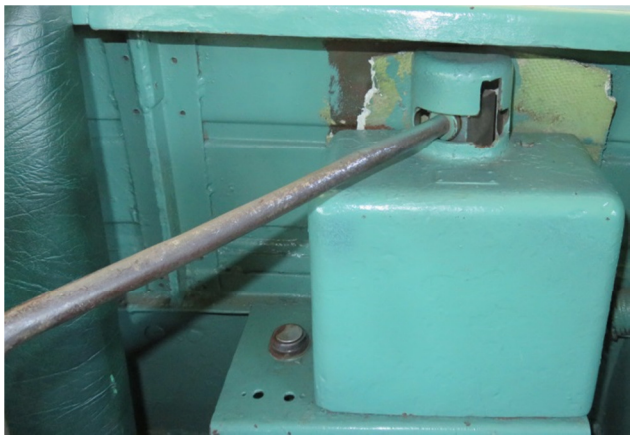


Brake & Shift Handle Insertion/ Removal Position "b"

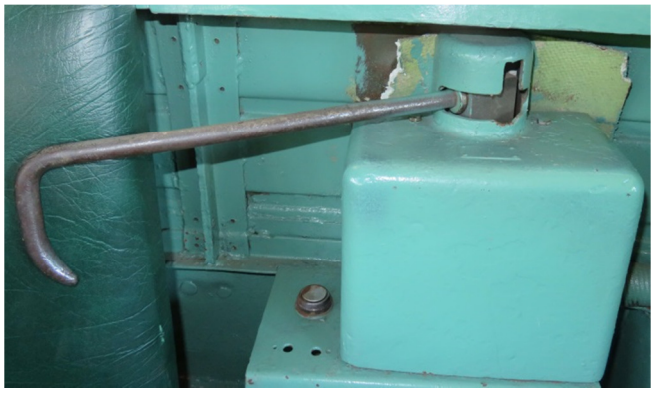


Right Brake Position "a"

Left Brake Position “c”



Right Accelerate Position “d”



Left Accelerate Position “e”

A. Deadman Switch – This pushbutton to the left of and below the Backup Controller must be fully depressed and held down to enable the streetcar to operate in reverse.
B. Backup Controller – This is the power and brake controller for use when the streetcar is operated in reverse. The controller has 5 positions. From right to left, they are:
    a) Brake – Applies the streetcar brakes.
    b) Brake – Applies the street car brakes. This is also the position where the Shift Lever is inserted to operate the backup controller and where the Shift Lever is removed from the backup controller.
    c) Brake - Applies the streetcar brakes
    d) Accelerate – Applies power to the motors and moves the streetcar in reverse.
    e) Accelerate – Applies power to the motors and moves the streetcar in reverse.

Operating the PCC Car No. 1743

1. **Energizing The Streetcar**
   A. Unlock the forward front door.
   B. Enter the car and remove and store barricades from the other front door and the rear (exit) doors.

Front Door Barricade

Rear Door Barricade

   C. Verify all switches on Control Panel are "OFF".
   D. Place the Shift Lever in the reverse position and remove it and take it with you.
   E. Exit car and perform your walk-around on the outside of the car.
      i. Verify all truck brake levers are in the "operate" position.
      ii. Remove and stow onboard all wheel chocks.
   F. Open battery compartment door using the square bottom of the Shift Lever to un-screw the two fasteners, pill open the right door, pull open the left door and turn battery switch "ON". Then close and secure the battery compartment doors using the Shift Lever.
   G. Raise the appropriate power pole (trailing pole.) Verify the other power pole is secure in its roof hook.
   H. Re-enter the streetcar and turn "ON" the Motor/Generator switch.
   I. Set in the Operator's seat, insert the Shift lever back into the control box and move it to the "Park" position.

2. **Forward Operation**
   A. Place heel of your left foot on the Deadman Switch on Power Pedal (left pedal).
   B. Verify the rear power pole is up and the front power pole is down and secured in the roof hook.
   C. Release the Parking Brake on the Brake Pedal (right pedal.)
   D. Move Shift Lever to the "Forward" position.
   E. Sound gong twice.
   F. Apply power to move the streetcar forward and perform a brake test (on initial movement of the car.)
      a. **If brakes do not function, park the streetcar and use another streetcar.**
   G. Whenever you leave the Operator's seat, the Deadman switch should be down, the Parking Brake set, and place the Shift Lever in Park.

3. Reverse Operation

A. Verify the Deadman Switch is depressed and the Parking Brake is set.
B. Change the power poles – raise the front power pole (use the hook stick to reach the retriever rope) and lower the rear power pole and secure it in its roof hook.
C. Move the Shift Lever to the REVERSE position and remove the lever.
D. Proceed to the rear of the streetcar.
E. Remove right center seat back by pulling out and up and set the cushion to the side.
F. Insert the Shift Lever into the Backup Controller – see pictures under Backup Controller.
G. Depress the Deadman Button to the bottom of its travel and hold it there.
H. Move the Shift Lever to the left to the 1st Accelerate position to move the streetcar backwards, move the Shift Lever to the right to a brake position to stop the streetcar
I. When the reverse operation is completed, remove the Shift Lever from the Backup Controller, replace the seat cushion, proceed to the front operator position, insert the Shift Lever in to the control stand and move it to the Park position.
J. Change the power poles – raise the front power pole and lower the rear power pole (use the hook stick to reach the retriever rope) and secure it in its roof hook. Please use the hook stick to guide the retriever rope back into the winder **SLOWLY and from the left side** to avoid damaging the rewinder mechanism.

4. Parking and De-Energizing the Streetcar

A. Temporary Parking – (When the streetcar is to be shut down for a short time (e.g. a lunch break))

a) Park the streetcar in a suitable location.
b) The operator must depress the Deadman Switch and set the Parking Brake.
c) Remove the shift lever.
d) The wheel chocks must be set.
e) The operator must then disengage the trolley pole from the overhead wire and store it in it's rooftop retainer.
f) Use the Shift Lever to open the Battery Compartment, turn off the battery switch and re-close the Battery Compartment. Secure the Shift Lever.
g) The doors will be closed and barricaded or locked.

B. **Parking in the Abbot Building**

a) Verify Abbot Building power is on.
b) 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. NOTE: If the car is to be stored outside in front of the tamper, the pole must be changed twice due to the insulators in the overhead wire.
c) The trolley pole should be disengaged from the trolley wire and placed in the retainer on the streetcar's roof.
d) The battery switch in the streetcar's battery compartment must be placed in the de-energized (down) position.
e) 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).
f) Close and secure the operator's window. Close the rear doors and barricade them. Close the rear front door and barricade it. Close the forward front door and secure with a streetcar lock. Make sure that all windows in the streetcar are closed.