



**CONDUCTOR/EES EXAM
STUDY GUIDE**

Purpose of this study guide:

This STUDY GUIDE has been developed to prepare candidates for the upcoming PATH Conductor/EES written, practical, and oral exam. It is the responsibility of each candidate to download, review, and memorize information contained in this study guide prior to taking the examination.

Candidates will not be allowed to access the study guide while taking the exam.

DO NOT bring this study guide to your scheduled examination session.

Disclaimer: Information contained in this document may not reflect current PATH operating rules, policies, or procedures. All test material will be based on information as it is presented in this document.

GENERAL RULES OF CONDUCT

A. Required Books and Notices

Employees while on duty or accessing PATH must properly display and/or produce required identification credentials to supervision, Port Authority Police, security personnel, or any authorized representative upon request.

Employees on duty must have a copy of the following in their possession or at an accessible location for checking by a Supervisor upon demand:

1. Book of Rules
2. Any books or manuals required by their craft
3. Any notices and forms required to perform their duties correctly
4. Any identification or certification required for the performance of duties

B. Rules and Special Instructions

1. Employees are required to know and obey all general rules, and also those rules and special instructions, including General Notices, applicable to their respective occupations. If in doubt as to their meaning or application, employees must ask a Supervisor for an explanation.
2. Ignorance of the rules, regulations, and special instructions will not be accepted as an excuse for neglect or omission of duty.

C. Attention to Duties

1. Employees must devote themselves exclusively to PATH service while on duty, render every assistance in their power to carry out rules and special instructions, and report to the proper official any violation thereof.
2. Participation in any unauthorized activity while on duty or while on PATH property which may interfere with the performance of the work of any employee is prohibited. Employees must not permit employment or activities not connected with PATH to prevent them from performing their normal duties for PATH, or cause them to be in violation of the Hours of Service Law.
3. Employees shall, while on duty, perform all tasks assigned or directed to them by proper authority.

D. Prohibited Conduct

1. To enter or remain in the service, employees must be of good character and must not act with indifference or neglect, or commit a dishonest, immoral, illegal, violent, insubordinate, disruptive, destructive or reckless act. They must conduct themselves at all times, whether on or off PATH property, in such a manner as to not bring discredit upon PATH.

E. Treatment of Customers

1. The traveling public must be treated with courtesy and consideration. Employees must not engage in disputes or quarrels with customers and under no circumstance may an employee have unnecessary physical contact with a customer.

F. Drugs and Alcohol

1. The possession or use of intoxicants or narcotics by employees while on duty is prohibited. No employee shall present themselves for or perform any service for PATH while under the influence of intoxicants or narcotics. "Intoxicants" includes unauthorized use or abuse of

prescription or over-the-counter medication that may impair work performance or safety of oneself, coworkers, or passengers.

2. An employee shall refuse to permit another employee who appears to be unfit for duty, to relieve them or perform any service for PATH. In such case, the employee, must notify his Supervisor or other appropriate authority immediately.

G. Attendance

1. Employees must maintain a satisfactory attendance record. PATH retains the right to establish the length of time an employee may be absent before remedial action may be taken.

H. Safety Rules

1. Employees must know and comply with all PATH Safety Rules, the PATH Emergency Preparedness Plan, and the specific safety rules or procedures of their Division or occupation.
2. Employees must report at once any unsafe work condition that could endanger themselves or others.
3. Employees must use the proper safety equipment while performing their duties. Dust masks, respirators, goggles, safety glasses, hearing protection, work gloves, flashlights, disposable suits, respirators, approved steel or composite toed safety work shoes, and other personal protective equipment are provided, and must be worn for prescribed work efforts.
4. PATH will issue reflective safety vests, which must be worn at all times when walking or working on or adjacent to tracks.
5. Employees shall not enter track areas without prior authorization from the Trainmaster, Train Dispatcher/Terminal Supervisor, Yard Supervisor, or Tower Operator.
6. Walking on or crossing tracks is prohibited except in the discharge of duty. Employees who are authorized to walk or work in track areas must comply with applicable rules, regulations and policies.
7. Employees must not cross the tracks immediately after a train has passed. Employees must first look in both directions for approaching trains before crossing tracks. When crossing tracks in front of or behind standing equipment, allow at least 25 feet from the equipment to cross safely.
8. Employees must expect movement on any track, in any direction, at any time. They must identify and be aware of an available place of safety at all times.
9. When necessary to cross over the Third Rail, employees must avoid the area of the Third Rail side incline. Employees must not sit upon and are to avoid stepping on the Third Rail cover-board.
10. Employees must not walk on or step on running rails, train stops, switch movements, transponders or other field mounted equipment.

SIGNAL RULES

A. VISIBLE SIGNALS

1. **Visible Signals** are those signals that may be given by hand, flag or flashlight. Employees whose duties may require them to give signals, must provide themselves with the proper equipment, keep the equipment in good order and ready for immediate use. Flags of the prescribed color must be used in daylight and lights of the prescribed color must be used in the tunnels and at night or when outside light may be inadequate to easily distinguish flag colors.
2. **Color Indications** that may be used are:

Signal Color	Indication
Red	Stop
Yellow	Proceed at reduced speed
Green	Resume normal speed
Blue	For use when working on or about train cars
White	For hand signals. Flashing white indicates personnel in track area.

3. **Hand, Flag, and Flashlight Signals.** In giving visible signals by hand, flag or flashlight, it must be done clearly so that no misunderstanding can result from imperfect signals. HAND, FLAG AND FLASHLIGHT SIGNALS must be performed in the following manner:

Hand Signal	Indication
Swung at right angle to track	Stop
Raised and lowered vertically	Proceed
Swung vertically in a circle at half arm's length at right angle to track	Back Up

B. AUDIBLE SIGNALS

Note: The signals prescribed are illustrated by "o" for short sounds; "_" for long sounds.

1. Train Whistle Signals

A continuous blast of the train whistle is an emergency signal for Conductor to pull emergency cord and apply parking brakes on train.

Sound	Indication
—	Apply Brakes. STOP
— —	Release brakes. PROCEED
o o o	BACK UP , used by engineer after receiving a signal to back up before starting the backup movement

---	Used to call for Car Inspector when entering train station
----	Used to call for signal
-----	Used to call for Police when entering train station

Engineers must not use the whistle unnecessarily, but must sound warning signals as soon as it appears to them that a person on or near the track or station platform is not taking the proper precautions for safety.

2. **Buzzer Signals** (onboard communication system used between Conductor and Engineer)

Sound	Indication
—	STOP at once
--	START
o o o	BACK UP , used when standing
---	Stop at next station or employee stop , used when running
-----	Apply or Release Brakes , used during air brake test
o _ o	Request for the Conductor to contact the Engineer

Train crews must ensure that the buzzer system is functioning prior to leaving an initial terminal. If the buzzer system is not working, a functioning alternate system must be used.

3. **Interlocking Whistle Signals**

Sound	Indication
—	All movements within interlocking limits STOP immediately
o o	Resume normal movement after receiving the proper signal or permission of Tower Operator
---	Call for Car Inspector
-----	Call for Signal Maintainer
o o o o o	Call for Trackman or Power Rail Maintainer

C. FIXED SIGNALS

1. Fixed Signals are divided into three classes:


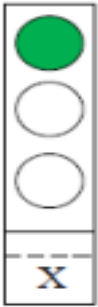



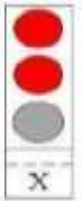

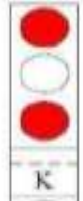

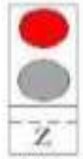
- A. **Interlocking Signals** is a fixed signal at the entrance of a route to govern trains entering and using that route. It will be identified by a plate showing both the signal's number and letters which will include the letter "X".
 - B. **Automatic Block Signals** is a fixed signal at the entrance of a block or track section to govern the movement of approaching trains using that block. They will be identified by number, plus the letter Z or D.
 - C. **Miscellaneous Indicators** do not indicate block status but give information of various kinds to Engineers in the operation of their train. (i.e. Train Order, High Water, etc.)
2. Signal aspects shall be shown by the color of lights, flashing of lights, or any combination thereof. They may be identified by number plate, letter plate, or any combination thereof.
 3. Fixed signals do not dispense with the need to obey other signals that may be of a more restrictive nature (i.e. flag or lamp).

In the event of a conflict between fixed and other signals, the Engineer will be governed by the most restrictive indication.

4. Interlocking signals are the fixed signals of an interlocking. They govern train movements over routes within an interlocking. Interlocking signals are normally designated by use of the letter "X" on their number plates.
5. To pass an interlocking signal in the Stop position, the train crew must receive Verbal Authority from the Trainmaster. Permission must not be given until the Engineer brings the train to a complete stop. After the Trainmaster issues permission to pass a signal in the Stop position the Engineer will proceed at "**Restricted Speed**" until all cars have cleared the interlocking:

EXAMPLES OF INTERLOCKING SIGNALS

Note - the color grey signifies lunar white and the color white signifies a blank space.

<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>FIG. 1</p> </div> <div style="text-align: center;">  <p>FIG. 2</p> </div> </div> <p>INDICATION: PROCEED</p> <p>NAME: CLEAR</p>	<div style="text-align: center;">  </div> <p>INDICATION: PROCEED LEFT HAND ROUTE PREPARING TO STOP AT NEXT SIGNAL.</p> <p>NAME: STDS LEFT APPROACH</p>
<div style="text-align: center;">  </div> <p>INDICATION: PROCEED RIGHT HAND ROUTE PREPARING TO STOP AT NEXT SIGNAL.</p> <p>NAME: STDS RIGHT APPROACH</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>FIG. 1</p> </div> <div style="text-align: center;">  <p>FIG. 2</p> </div> <div style="text-align: center;">  <p>FIG. 3</p> </div> <div style="text-align: center;">  <p>FIG. 4</p> </div> <div style="text-align: center;">  <p>FIG. 5</p> </div> <div style="text-align: center;">  <p>FIG. 6</p> </div> </div> <p>INDICATION: PROCEED AT RESTRICTED SPEED</p> <p>NAME: RESTRICTING</p>

UNUSUAL OPERATING CONDITION PROCEDURES

1. When a train becomes disabled between stations, the following train, on instructions from the Trainmaster, will couple and push it slowly to the next station where customers should be requested to disembark and take the next following train. The disabled train will be immediately helped to the nearest terminal, unless otherwise instructed. Should the forward car of a train become inoperative requiring the Engineer to operate from other than the head car, the Conductor must be stationed in the Engineer's cab of the first car of the train and from there, observe signal indications in advance and relay signal information to the Engineer by means of the intercom, public address, radio or buzzer system.
2. Whenever a train is delayed at a station platform due to a stoppage ahead, the Conductor will leave the train doors open to permit any customers who desire to leave the train to do so. If the car doors have been closed and the "proceed" signal passed forward before it is realized that there is a stoppage ahead, the Conductor must inform the Engineer before opening the car doors.
3. Each car is equipped with a Conductor's emergency brake valve. This valve is equipped with a handle that gives control of the brakes to the Conductor. The pulling of this handle opens the valve and applies the brakes in emergency. This control of the brake is given to the Conductor for the sole purpose of preventing accidents and they must not use this emergency feature except for that purpose.
4. Should the train crew be directed to evacuate the train, the crew will remove the emergency stairway and platform from the Emergency Closet behind the Engineer's cab and put it in place.

MOVEMENT BY TRAIN ORDERS

1. Train Orders will be issued for the following reasons:
 - For movement of work trains, self-propelled vehicles and Hi-Rail Vehicles to work sites.
 - To identify the limits of work rights of any work equipment.
 - For any maintenance of way equipment that is under 100 feet in length
 - For any railcar of a length of less than two coupled units or under 100 feet long operating on the mainline.
2. Train Orders shall be written and issued by authority of the Superintendent of Transportation. They must be brief and clear, on the prescribed forms when applicable, and without erasure or alteration.

ON-TRACK SAFETY

1. No employee may enter a track area except in the performance of duty. Employees must request and receive permission from the Trainmaster, Train Dispatcher/Terminal Supervisor, Yard Supervisor, or Tower Operator prior to entering the track area. Upon clearing the track area, employees are required to report clear.
2. All employees assigned to work in track areas must be trained on PATH flagging rules and procedures. Employee qualification cards must be presented on demand by any Employee In Charge, PATH

Supervisor or FRA representative. All employees assigned to work in track areas must be trained Annually.

3. Flags and/or lamps and portable train stops, when used, will be placed in the following manner:
 - **Green and yellow flags/lamps** are to be placed on the side of the approaching Engineer's cab, approximately 2 feet to the right of the railroad tie and approximately 4 feet high. Flags/lamps must not be placed in such a manner as to obscure other signals.
 - **Red flags/lamps** are to be placed between the running rails.
 - **Portable train stops** will be clamped to the outside of the running rail on the side opposite the approaching Engineer's cab.
4. When it is necessary to remove a track from service due to an emergency, unexpected event, or in the case of a quick repair or other reason of short duration, the Trainmaster, Train Dispatcher/Terminal Supervisor, Yard Supervisor, or Tower Operator will issue Foul Time to an employee by holding all trains clear of the defined area of track by use of all necessary ATS vital blocks and/or establishing a Zero Speed ATS Work Zone until the employee reports clear of the track area and releases foul time.

The employee receiving Foul Time must repeat the track letter or number, track limit and time limit back to the Trainmaster. He may not permit movement of equipment into or within the working limits protected by Foul Time.

5. All employees assigned to work in track areas must be trained on PATH flagging rules and procedures. Employee on track safety (OTS) qualification cards must be presented on demand by any Employee In Charge, PATH Supervisor or FRA representative. All employees assigned to work in track areas must be trained annually.

BLUE SIGNAL DISPLAY

1. The display of Blue signals signifies that workers are on, under, or between rolling equipment. When so displayed the equipment may not be coupled or moved. Other rolling equipment may not be placed on the same track that will reduce or block the view of a blue signal. Rolling equipment may not pass a displayed blue signal. Blue signals must be displayed in accordance with by each group of workers prior to their going on, under, or between rolling equipment and may only be removed by the same group that displayed them.

REQUIREMENTS OF THE HOURS OF SERVICE LAW

1. Employees whose legal hours of service are restricted by law must take action through the proper officer to avoid excess periods of service. They must keep an accurate log of their hours.

Train service employees engaged in the movement of trains are not permitted to work in excess of twelve (12) consecutive hours. After working a full twelve consecutive hours, an employee must be given at least ten (10) consecutive hours off duty before being permitted to return to work.

2. Train service employees engaged in the movement of trains are not permitted to continue on duty or go on duty unless he has had at least eight consecutive hours off duty within the preceding twenty-four hours.

CONDUCTOR JOB SPECIFIC INFORMATION

1. Conductors report to and receive instructions from the Trainmaster, Assistant Trainmaster, Operations Examiners and Train Dispatcher/Terminal Supervisor.
2. Conductors are responsible for the safety and proper care of their trains, for the conduct of the crew and for their attention to the rules and the safety of the passengers.
3. Conductors and Engineers are jointly responsible for ensuring their trains are kept on schedule and that the proper station stops are made.
4. Conductors on duty must be neat and clean in appearance; uniformed employees must wear the prescribed uniform and badge.
5. Before leaving a terminal or yard, they must inform their Engineer as to the number of cars in the train. They must see that proper end destination and side signs are properly displayed.
6. Conductors must see that all door enable and drum switches on their train are set in proper position before leaving the terminal. They must see that the front door of the first car and the rear door of the last car are kept locked. They will be responsible for the proper function of heat, lights and air conditioning on their train.
7. Conductors must be familiar with and follow procedures contained in Operating Instruction Manuals. The normal Conductor's operating position is in the first and second car. If for any reason the Conductor has to change operating positions he must inform both his Engineer and the Trainmaster of this fact.
8. Conductors are required to personally perform their duties and under no circumstances will they allow anyone to perform any of their duties except persons authorized to do so for the purpose of training and familiarization of the road.
9. Conductors must be at their position on trains, ready to proceed, no less than two minutes before leaving time.
10. Conductors must not leave their posts while train is in transit except in the performance of their duties. They must have a flashlight and safety vest available for emergency use.
11. Conductors must announce clearly and distinctly over the public address system the destination of the train and advise customers to please step back and avoid the closing doors before closing the doors at each station. The name of the next station must be announced as soon as the train starts and again when it arrives at the station.
12. Conductors finding articles on trains or in stations must deliver them as promptly as possible to the Train Dispatcher/Terminal Supervisor.
13. Conductors must give their badge number in lieu of their name to any customer upon request without delay or argument. They must be vigilant and devote themselves exclusively to the performance of

their duties. Conductors are not permitted to bring newspapers, magazines, books, radios, or other similar electronic devices, food, beverage containers or other items onto trains.

14. Conductors must not permit customers to leave cars to walk to a station or emergency exit except during an extreme emergency or when directed to do so by the Trainmaster.
15. Conductors must promptly notify the Trainmaster or Train Dispatcher/Terminal Supervisor in case of defects in the cars that would interfere with the safe operation of trains.
16. Conductors must not permit the playing of musical instruments, the sale of newspapers or merchandise or the soliciting of alms of any description on trains. Smoking is not permitted on the train or in any stations.
17. At stations where starting lights are used, they must not close doors until the starting lights are lighted (constant) unless assured the starting lights are out of order.
18. Conductors must report dirty or unserviceable conditions on their trains to the Trainmaster or Train Dispatcher/Terminal Supervisor.
19. Conductors must not give orders to skip stations except in case of emergency and must notify the Trainmaster immediately when this occurs. Car doors must be opened promptly after the train makes a proper station stop and must be closed promptly when customers are aboard. The Master Key must not be left unattended in the Master Key Switch. In order to avoid an accident, extreme care and vigilance must be exercised and reasonable opportunity given to all customers to board and leave trains with safety. Car doors must be opened at all station stops irrespective of whether there are customers to leave or board the train. Special care must be used to see that infirm or elderly persons or persons with children are in safe position before closing doors.
20. Should a customer be caught or held by a closing door when train is not moving, Conductors must prevent the train from starting (using the emergency brake valve if necessary) until the customer is released. Should such a condition not be known until after the train is moving, the Conductor must immediately pull the emergency brake valve and bring train to a stop, then release the customer.
21. Conductors must remain at their operating position, in position to observe the platform, while the train is departing from stations so that they may take instant action to prevent injuries to customers. Should an employee wish to disembark from a train at any point between stations, the Conductor must not open the car door until the train has come to a full stop and must not close the door to give the starting signal until positively assured that the employee has reached a position of safety.
22. Conductors must make a complete report when so ordered of any unusual occurrences to their train, giving full particulars by submitting a written statement or Unusual Occurrence Report without delay, upon the direction of PATH.
23. Conductors must not use any device, electronic or otherwise, or reading material that interferes with work is prohibited. Personal electronic or electrical devices, including those used for voice communication, must be turned off and stored out of sight. Any earpieces, headphones or other similar peripheral devices must be stored out of sight during the performance of service, on trains, station areas and platforms inside the fare zone, in the Control Center, Train Dispatcher's Offices and Towers.

24. Conductors shall not sleep nor give the appearance of sleeping while on duty.
25. Conductors shall change their operating position should a disabled person require the use of the space.

ENGINEER JOB SPECIFIC INFORMATION

1. Engineers report to and receive instructions from the Trainmaster, Assistant Trainmaster, Operations Examiners and Train Dispatcher/Terminal Supervisors.
2. Engineers are under the orders of Conductors in regard to general train movement between terminals, but they must not obey any order that may endanger the safety of the train or require a violation of the rules.
3. Engineers are responsible for operating their trains in compliance with the PATH operating schedule. Engineers must exercise discretion, care and vigilance in moving trains or cars, using necessary precautions to prevent damage to property and injuries to persons and to avoid collisions and derailments. Engineers must promptly notify the Trainmaster of any case of damage to property, injury to persons, collisions or derailments that result from the movements of trains or cars and other rail equipment.
4. Engineers must thoroughly understand the operation of the mechanical, electrical and airbrake equipment on the cars and must be familiar with and follow procedures contained in Operation Instruction Manuals.
5. Engineers are required to carry the proper equipment when operating trains, including but not limited to brake handle, reverser key, cutting key, flashlight, safety vest, PATH issued Engineer switching gloves, and all other required safety equipment.
6. Engineers are required to carry their valid Engineer Operating Certificate on their person at all times while on duty.
7. Engineers must report promptly to the Trainmaster and Conductor any defect in the equipment and make a written report on the prescribed form before completion of their tour.
8. Engineers must be in their operating cab, ready to proceed, no less than two minutes before leaving time. The Engineer's cab door must be kept closed while the train is in transit. Engineers must be vigilant in the performance of their duties and are not permitted to bring newspapers, magazines, books, radios, or other similar electronic devices, food, beverage containers or other items into the Engineer's cab.
9. Engineers must not permit any person to ride in the operating cab except Operations Examiners, Car Inspectors, and Track Supervisors in the performance of their duties or persons authorized to do so for the purpose of training and familiarization of the road.

10. Engineers are required to personally perform their duties and under no circumstances will they allow anyone to perform any of their duties except those persons authorized to do so for the purpose of training and familiarization of the road.
11. Engineers must give their badge number to any customer in lieu of their name upon request, without delay or argument.
12. Smoking is prohibited in the Engineer's cab and any other place on the train or in stations.
13. Engineers shall wear the proper uniform while on duty and it shall be maintained to present a neat and clean appearance.
14. Engineers must make a complete report when so ordered of any unusual occurrences to their train, giving full particulars by submitting a written statement or Unusual Occurrence Report without delay, upon the direction of PATH.
15. Engineers must inspect their cab's operating equipment, including cab seats, and all switch positions prior to operating their train.
16. Engineers must comply with Rules & Regulations of the Federal Railroad Administration and PATH pertaining to Qualifications for Locomotive Operators.
17. Engineers, working as Pilots, will be responsible for properly and legibly signing radios in and out and for performing satisfactory radio checks.

DEFINITIONS AND ACCEPTED ABBREVIATIONS

Absolute Block – A block that must not be occupied by more than one train.

“A” Car – Rail car equipped with an Engineer’s cab.

Adjacent Tracks – Two or more tracks with track centerlines spaced less than 25 feet apart.

Adjacent Controlled Tracks – A controlled track whose track center is spaced 19 feet or less from the track center of the occupied track.

Aspect – The appearance of a fixed signal viewed from the direction of an approaching train. (e.g. green light).

Automatic Block Signal System – A series of track sections or blocks governed by block signals actuated by trains and controlling the spacing of trains.

Automatic Block Signal – A fixed signal at the entrance of a block or track section to govern the movement of approaching trains using that block. They will be identified by a number, plus the letter Z or D.

Automatic Train Control (ATC) – A system to enforce compliance with cab and wayside signal indications.

Automatic Train Operation (ATO) – ATC Carborne equipment operates the train to and from stations, and opens and closes the doors. The Conductor supervises the operation and the Train Engineer depresses an Alerter button periodically while the train is in motion to indicate his presence to the Carborne equipment.

Automatic Train Stop – A device consisting of an arm which engages the tripper valve on a rail car, causing a full emergency application of the brakes if a train fails to stop prior to a signal indicating **STOP**.

Ballast – Sized rock or concrete placed on the roadbed to support the track structure, the ties and rail, and to hold the track in line and surface. It also distributes the load, provides drainage and resists plant growth.

Block – A length of track of defined limits, the use of which by trains is governed by block signals or verbal block indication, i.e. manual block.

Bridging – The condition that occurs when a rail car becomes a conducting element between an energized section and a de-energized section of Third Rail.

“C” Car – Rail car without an Engineer’s cab.

Clearance – The suitable amount of space or distance required to allow a train or other vehicle to pass without obstruction.

Collector Train – A train operated without customers for the collection of revenue at stations.

Consist – Two or more cars coupled together to make up a train, e.g. an eight car consist.

Contact Shoe – Device which conducts electrical current from the Third Rail to the railcar.

Control Center – The central location from which PATH operations are controlled.

Crossover – A set of switches and crossing frogs that connect one track with another, allowing rail vehicles to move between tracks.

Current of Traffic – The movement of trains on a main track in one direction.

Derail – A track safety device designed to guide a car off the rails at a selected spot as a means of protection against collisions or other accidents.

Dynamic Envelope – The Space a railcar may occupy while in motion.

Engine – A unit or combination of units propelled by any form of energy (i.e. diesel or power rail) used for maintenance or other purposes.

Engineering Station Marker – A method of measurement along the centerline of track that defines location relative to a point of origin. Stationing increases along the normal direction of traffic.

Extra Train – A train not authorized by the normal and published schedule but operated under the authority of the Trainmaster. May also be designated as Passenger Extra, Work Train, Collector Train, Gap Train, Light Train, Shop Train, Test Train or Scraper Train.

Facing Point Switch – Refers to the direction in which a Train or other Railroad Equipment approaches a turnout. A facing point switch is one where the train or railroad equipment approaches from the single-track end.

Fixed Signal – A signal located at a fixed position adjacent to a designated track, indicating a condition affecting the movement of a train on that track.

Flagging – Any means of visible or audible communication to convey the movement of equipment.

Flagman – Person whose sole responsibility is to either allow or restrict the movement of trains through a work site to provide on-track protection for roadway workers consistent with the 500 series rules for major work on in-service obstructed track. The Flagman also warns the Watchman, if the latter is present, of an approaching train.

Foul Time – A method of establishing Working Limits on controlled track. The Trainmaster or the Terminal Dispatcher notifies the requesting employee that no trains will operate within a specific segment of controlled track during a specific time period. Foul time shall remain in effect until the employee to whom the foul time was issued has returned the track to the Trainmaster or Dispatcher.

Fouling – A track is fouled (obstructed) when a person or equipment could be struck by a moving train or on-track equipment, or is within four feet of the field side of the near running rail. Benchwall, safety niches, and other designated safety zones are considered Close Clearance and must remain unobstructed. Tunnel niches and clearing areas less than four feet from the nearest rail may be used if they are visually inspected and deemed safe by the EIC/lone worker prior to use, and if there is adequate sight distance to clear up at least 15 seconds before equipment passes. The EIC/lone worker has the absolute right to choose another place to clear up.

Frog – A track device, part of a turnout, located at the intersection of two running rails, which permits the wheels of a rail vehicle to cross the intersecting rail.

Gap Train – A train operated to replace or augment a regular schedule or portion thereof.

Indication (Signal) – The information conveyed by a signal aspect (e.g., proceed).

Interlocking – An arrangement of signals and signal appliances installed at various locations where it is necessary to route trains from one track to another, at drawbridges, and at various "holding" locations throughout the system. They are so designed that no conflicting or opposing movements can be made. An interlocking may be controlled locally or remotely from a distant location. Interlocking limits are the tracks between the opposing home signals of an interlocking.

Interlocking Signal – A fixed signal at the entrance of a route to govern trains entering and using that route. It will be identified by a plate showing both the signal's number and letters which will include the letter "X".

Lamp – Flashlight or other lighted instrument.

Light Train – A train operated without customers.

Locomotive (MU) – Rail rolling equipment self-propelled by any power source and intended to provide transportation for the general public.

Lone Worker – An individual employee who is not being provided on-track protection by another employee, is not a member of a work group and is not engaged in a common task with another employee.

Manned Automatic Train Control (MATC) – Operating mode in CBTC in which the train operates automatically under CBTC protection. The Train Engineer supervises the operation and depresses an Alerter button periodically while the train is in motion to indicate his presence to the Carborne equipment. The Train Engineer must push the ATC Start Button to operate in MATC mode after every stop. Door operation is the responsibility of the Conductor.

Manual Cab Signal (MCS) – Operating mode in CBTC in which the Train Engineer operates the train manually under CBTC protection. Door operation is the responsibility of the Conductor. Train Engineer is required to depress Alerter button periodically if the Master controller is not moved for a period of time.

Movable Bridge – That section of a structure bridging a navigable waterway so designed that it may be raised to permit passage of river traffic on the waterway.

MPH – Miles Per Hour - used with a numeral to indicate the speed of a train.

No Clearance – Insufficient space to avoid being struck if passing or being passed by an object, structure or equipment.

On-Track Safety – The state of freedom from the danger of being struck by a moving railroad train, or other equipment, provided by operating and safety rules that govern track occupancy by personnel, trains and on-track equipment. Also known as Roadway Worker Protection (RWP).

Operating Car – Controlling Locomotive or Car from which the train is being operated by the Engineer.

Operating Mode – Determined by the positions of the ATC Mode and BYPASS switch(es) along with the territory the train is operating in.

Normal Operating Modes – ATO, MATC, MCS

Failure Recovery Modes – ATC Bypass and Release Mode

Pilot – A qualified employee assigned to a self-propelled vehicle when the driver or operator is not qualified on the physical characteristics or operating rules of the system.

Qualified Employee – An employee of PATH, the Port Authority or of a contractor to PATH who has successfully completed all required training for his job and has been authorized to perform the duties of a particular position or function.

Qualified Person (QP) – A person who has received, as part of a Training, Qualification, and Designation Program required under Federal Law, instruction and training necessary to perform selected functions.

Regular Train – A train authorized by schedule.

Release Mode – ATC Carborne equipment limits the speed of train movement to 12MPH, but does not otherwise constrain movement. Provided for use when it is necessary to make the train movement not permitted by ATC, or recovery from failure.

Restricted Speed – Proceed not exceeding 12MPH, prepared to stop short of train, obstruction, workers fouling the track, or switch not properly lined and to look out for broken rail. A speed that will permit stopping within one-half range of vision.

Roadway Worker – A PATH employee, PA employee or employee of a contractor to PATH whose duties include inspection, construction, maintenance or repair of track, bridges, roadway, electrical, signal and communication systems, traction power systems, roadway facilities or roadway maintenance machines on or near track with the potential of fouling a track and employees responsible for on-track protection.

Route – A series of switches and signals which establishes a course of travel for a train. (See also, Interlocking)

Route Indicator – An illuminated device used in conjunction with an interlocking signal to indicate a left or right hand route.

Running Rail – The rail upon which the wheels of the train rest.

Running Schedule – The document which contains the departure and arrival times of all scheduled trains at PATH. Also known as Table R.

Scraper Train – A train operated without customers for the purpose of removing snow or ice from the Third Rail and tracks.

Shunt – An electrical condition caused by the wheels of a car or Maintenance of Way Equipment on the track which indicates track occupancy.

Speed Marker – A sign which indicates the maximum permissible speed in a track section, using miles per hour.

Speed Zone Marker – A "T" sign which indicates the beginning of time control for a speed control signal.

Speed Control Signal – A fixed signal so arranged that it will act as a speed control device through the use of a timer to delay the signal ahead from clearing. If all other conditions are favorable and the speed of the approaching train is in accordance with the posted speed, a speed control signal will clear to an aspect more favorable than stop as the train approaches.

Station – A designated place at which trains may stop to receive or discharge customers.

Station Stop Markers – A series of numerals at stations that are normally located on the Third Rail protection board. These markers are to be used as a guide by Engineers in stopping their trains so that

the doors of all cars will be platformed correctly. The numerals correspond to the number of cars in the train.

Switch (Sw.) – A track structure, part of a turnout, designed to move a train from one track to another, normally operated remotely as part of an interlocking.

Table “R” – See Running Schedule.

Third Rail – The rail which provides traction power for the operation of a train. Also known as a power rail or contact rail.

Third Rail Cover-Board – A wood, fiberglass or other similar non-conductive material board, that typically attaches to a series of brackets and provides cover over the Third Rail.

Third Rail Side Incline – An electrified extension along the side of the Third Rail which allows the contact shoe to ride up onto the Third Rail at switch locations. These extensions project out beyond the protection board.

Track Indicator – An illuminated device used in conjunction with an interlocking signal to indicate the track to which the train will be routed.

Transponder – A passive device mounted in the road bed which the train will interrogate to identify its current location.

Trailing Point Switch – Refers to the direction in which a Train or other Railroad Equipment approaches a Turnout. A trailing point switch is one where the train or railroad equipment approaches from one of the two diverging route.

Train – One or more rail cars, coupled together, displaying proper front and rear lights and has a crew and destination.

Train Stop – The roadway element that when engaged will automatically result in an emergency brake application.

Turnout – An arrangement of a switch and a frog which permits a train or other rail vehicle to be transferred from one track to another.

Watchman – Person designated at a worksite to warn the work group of an approaching train and who can communicate with the Engineer of an approaching train consistent with 500 series rules.

Wayside Mode – A territory where CBTC has no control over CBTC equipped trains. CBTC Train automatically transitions to Wayside Mode. Wayside Mode is a temporary territory.

Work Train – One or more non-passenger cars for the purpose of supporting construction or maintenance work activity on PATH.

Yard – A system of tracks provided for the making up of trains, storing of rail cars and other purposes.

Yard Mode – ATC Carborne equipment limits the speed of train movement in CBTC yard to 12MPH, but does not otherwise constrain the train movement. Yard Mode is only available when ATC Mode switch is MCS position or any time the Carborne controller is reset.

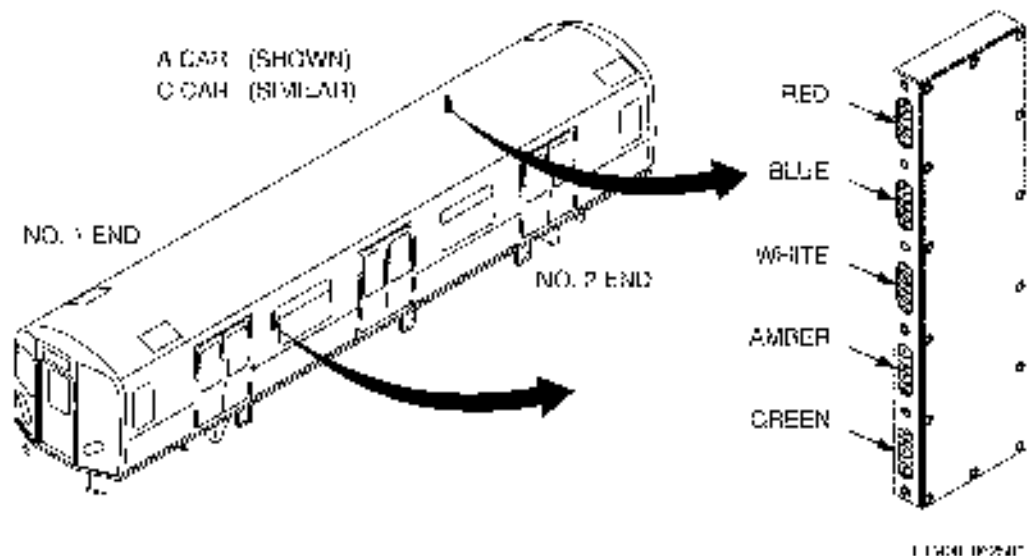


Figure 1-3. Exterior Indicator Light

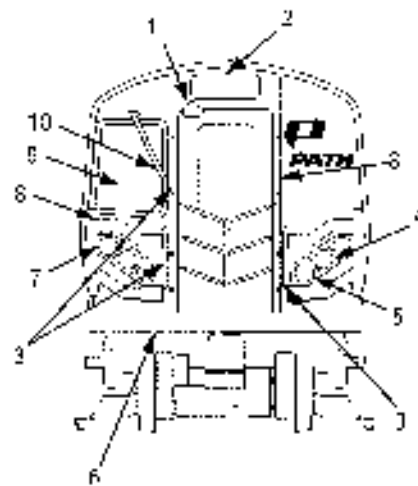
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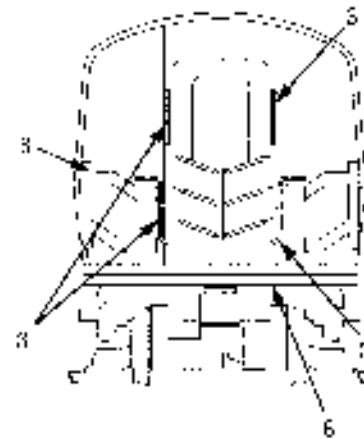
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Table 1-1. Exterior Indicator Light Local Indications

Color	Pattern	Indication
Red	Illuminated (steady)	Any door not closed and locked (Exterior Guard Light)
Blue	Illuminated (steady)	Impulsion not operating
Blue	Flashing (even duration)	ATC BYPASS activated
Blue	Flashing (short-short-short-long)	Emergency not operating and ATC BYPASS activated
White	Illuminated (steady)	Parking brake applied
Amber	Illuminated (steady)	FCIL activated
Amber	Flashing (even duration)	PEI activated
Amber	Flashing (short-short-short-long)	FCIL and PEI activated
Green	Illuminated	Factor bars applied



A CAR NO. 1 END



A CAR NO. 2 END
C CAR BOTH ENDS

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Figure 1-4. Exterior View, End View A and C Car

(Figure 1-1 callouts)

- | | |
|--------------------------------|-----------------------|
| 1 - Evacuation Light | 6 - Anticlimber |
| 2 - End Destination Sign | 7 - Tail Light |
| 3 - Grab Handle | 8 - End Gate |
| 4 - High Beam (150W) Headlight | 9 - Wind Aided |
| 5 - Low Beam (60W) Headlight | 10 - Windshield Wiper |

1.2.3 Exterior Equipment, Undercar (See Figure 1-5, page 1-20)

The underfloor exterior equipment arrangement is nearly identical for A and C cars. The only difference is that the A cars are equipped with a horn and a horn solenoid valve.

1.2.3.1 Drum Switch

The drum switch (1, Figure 1-5, page 1-20) is a pneumatically actuated rotary switch that serves to isolate the high current traction lines prior to physical coupling. It also prevents undesirable arcing as the contact pins move out of contact with each other. If required, the drum switch can be manually operated via a handle on the unit. There is one drum switch at each end of the car (two per car).

1.2.3.2 Parking Brake Release Reset Reservoir

The parking brake release reset reservoir (2, Figure 1-5, page 1-20) stores enough pressurized air to momentarily release parking brakes one time if there is no main reservoir air available. A check valve prevents the PBR/R from losing its air in the event of MR repairs.

1.2.3.3 Main Knife Switch

The main knife switch (3, Figure 1-5, page 1-20) allows third rail or slip current to be connected or disconnected from the car electrical circuits. There is one main knife switch per car.

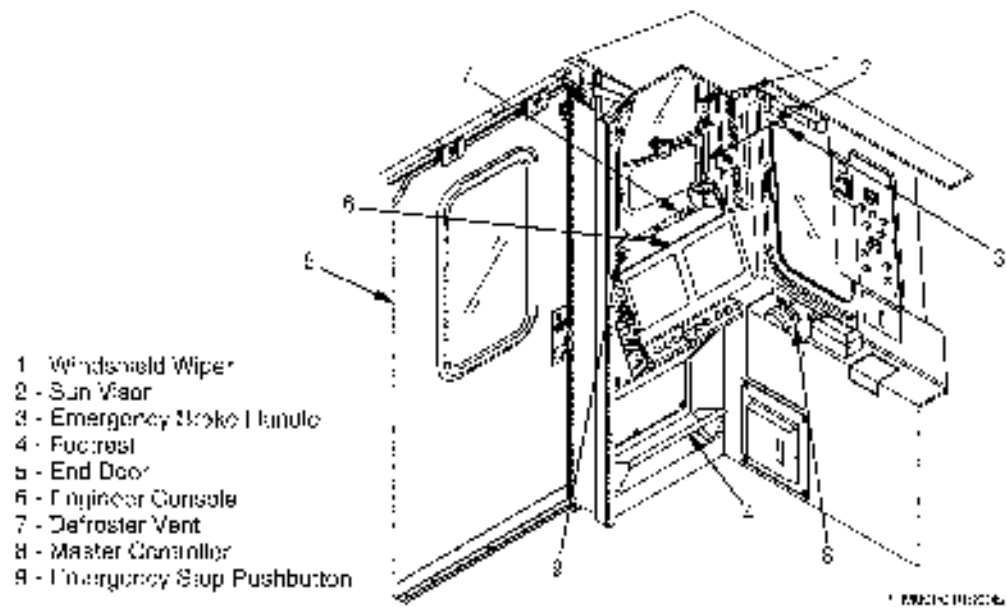
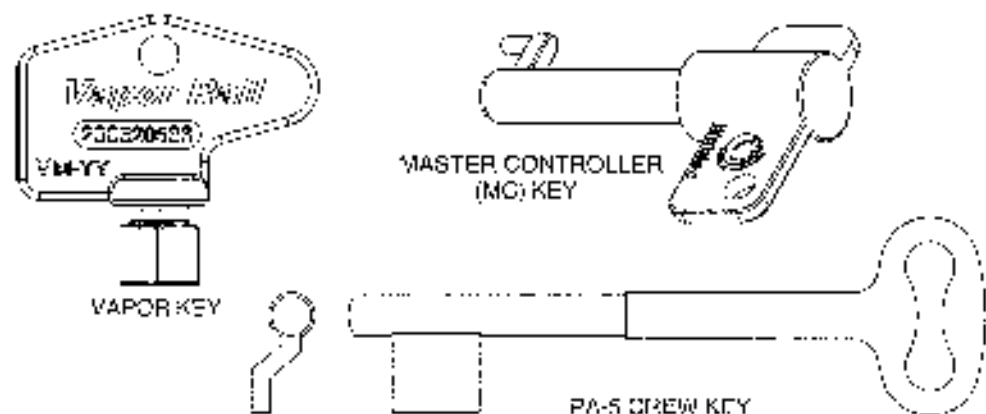


Figure 1-12 Engineer Use, Front Console Area



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Figure 1-11. PA-5 Keys

1.3 PA-5 OPERATION KEYS (See Figure 1-11, page 1-37)

The Master Controller (MC) key is used to activate the MC. The positions of the MC switch are OFF (all controls inactive) and RUN (all systems energized and cab controls active). Keying up the MC switch also establishes that rail as the lead cab in the consist.

Vapor key is used to operate the following:

- Access panels for output cocks inside cab,
- Passenger Emergency Brake Unit (PEBU) reset,
- Access panel for parking brake manual release handle,
- Interior Crew Key Switches (ICKS) and Exterior Crew Key Switches (ECKS)
- Handset,
- Electronic lockers in cab,
- Low voltage circuit breaker panels,
- Access panel in cab for windshield wiper motor
- Mechanical lock / output switches on door posts

PA-5 car key (PA-5 crew key) is used to operate the following:

- End door locks,
- Cab door locks,
- Sliding windows.

(Figure 1-10 is lost)

- | | |
|---|--|
| 1 - Interior Emergency Handset* | 11 - Auxiliary Microphone |
| 2 - Door Closing Warning Light** | 12 - Door Control Panel |
| 3 - Fault Light* | 13 - Buzzer |
| 4 - Passenger Visual Announcement System Display Unit | 14 - Passenger Emergency Handle/Jail |
| 5 - Passenger Emergency Intercom | 15 - Conductor Panel |
| 6 - Guard Light | 16 - Handset |
| 7 - Interior Information Sign | 17 - Mechanical Lock / Control Switch* |
| 8 - Interior Crew Key Switch | |
| 9 - Remote Control Bypass Handles (ECO, EBCO, PSEF) | |
| 10 - Color Vision Camera | |
- * Typical for all door panels
 ** Typical for all door openings

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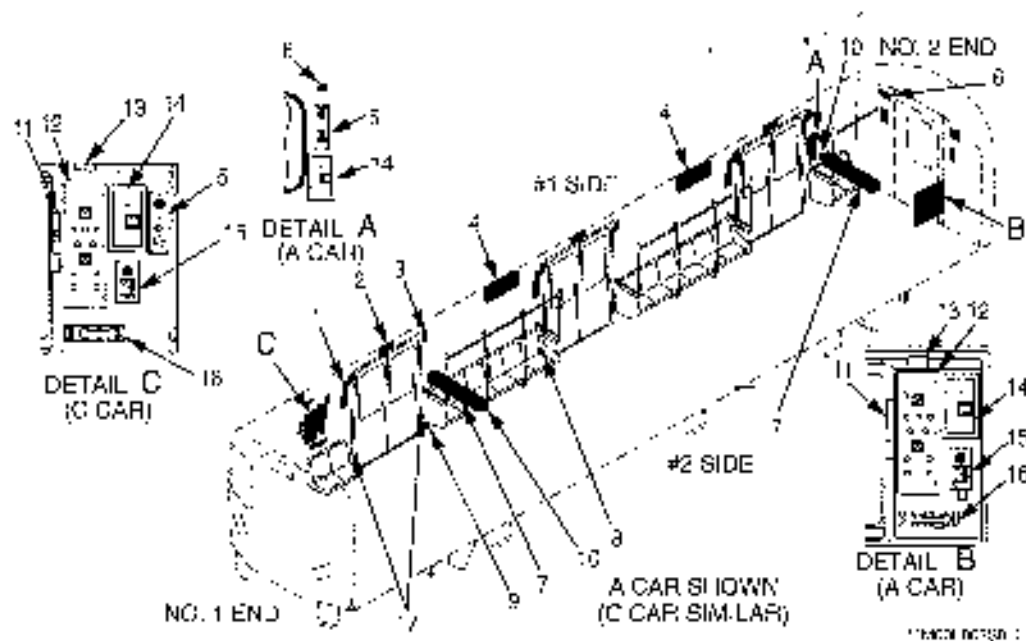


Figure 1-10. Interior View
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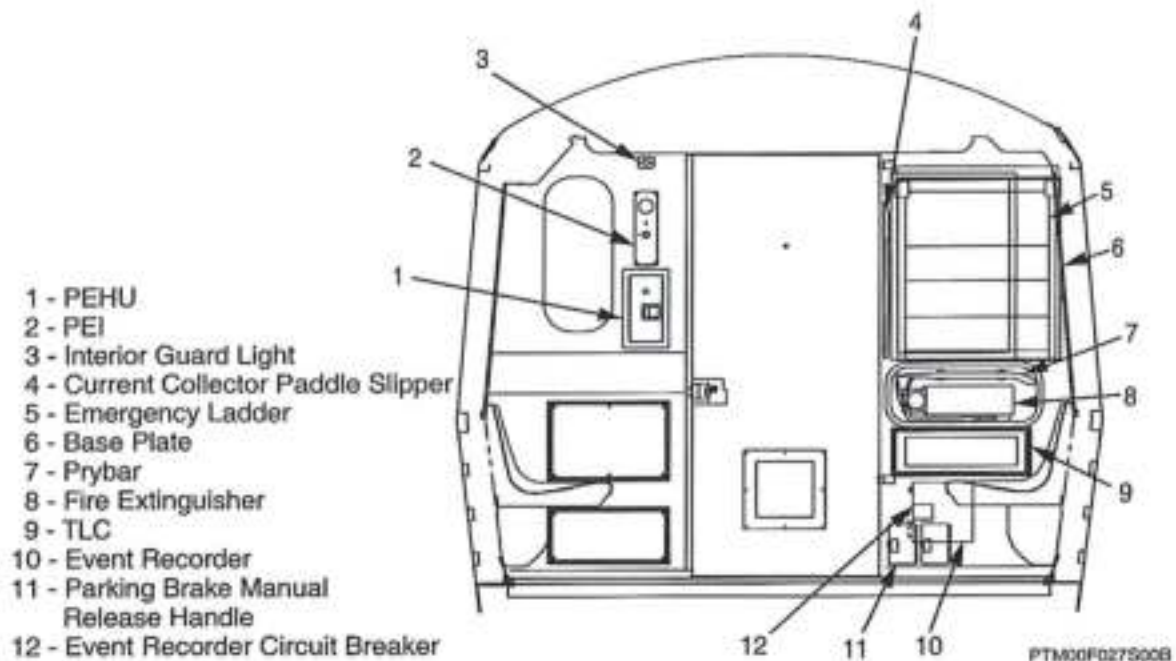


Figure 1-27. A Car No. 1 End Partition

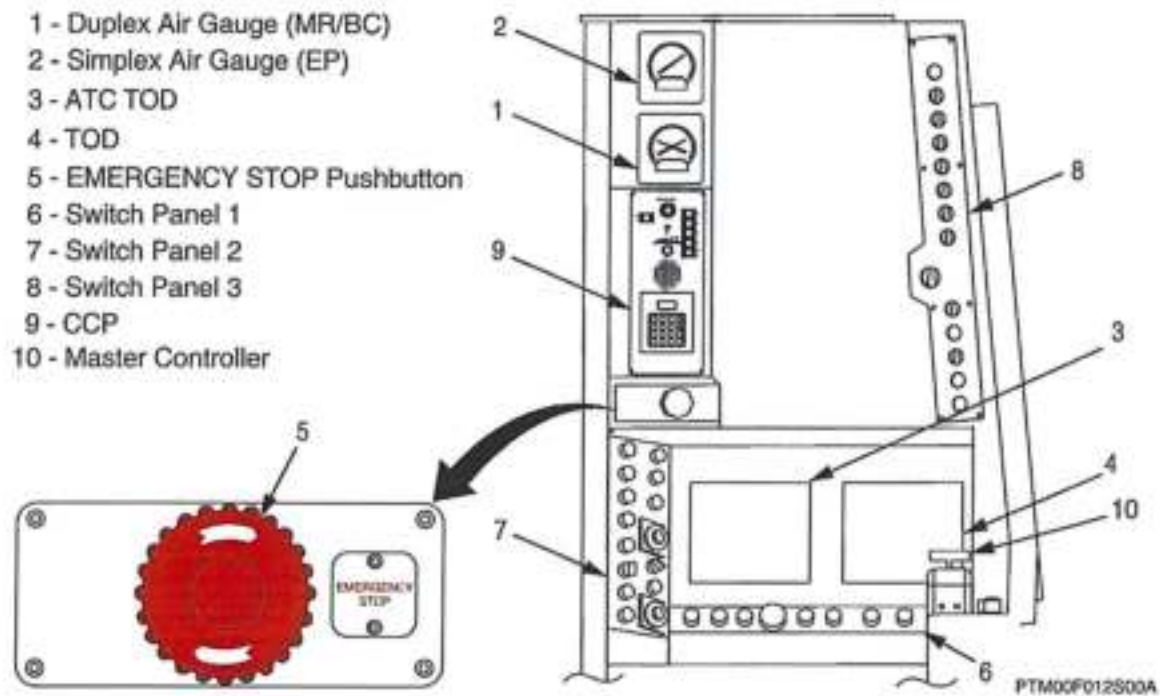
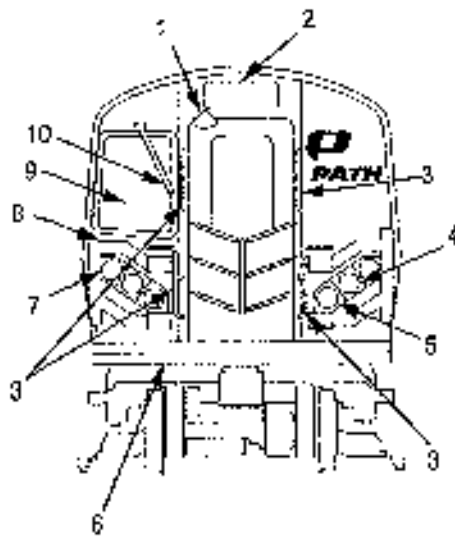
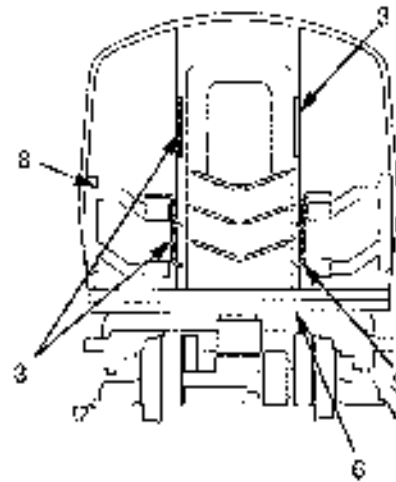


Figure 1-13. Engineer Console



A CAR NO. 1 END



A CAR NO. 2 END
C CAR BOTH ENDS

(Figure 1-4 callouts)

- 1 - Evacuation Light
- 2 - End Destination Sign
- 3 - Grab Handle
- 4 - High Beam (150W) Headlight
- 5 - Low Beam (60W) Headlight

- 6 - Anticlimber
- 7 - Taillight
- 8 - End Gate
- 9 - Windshield
- 10 - Windshield Wiper

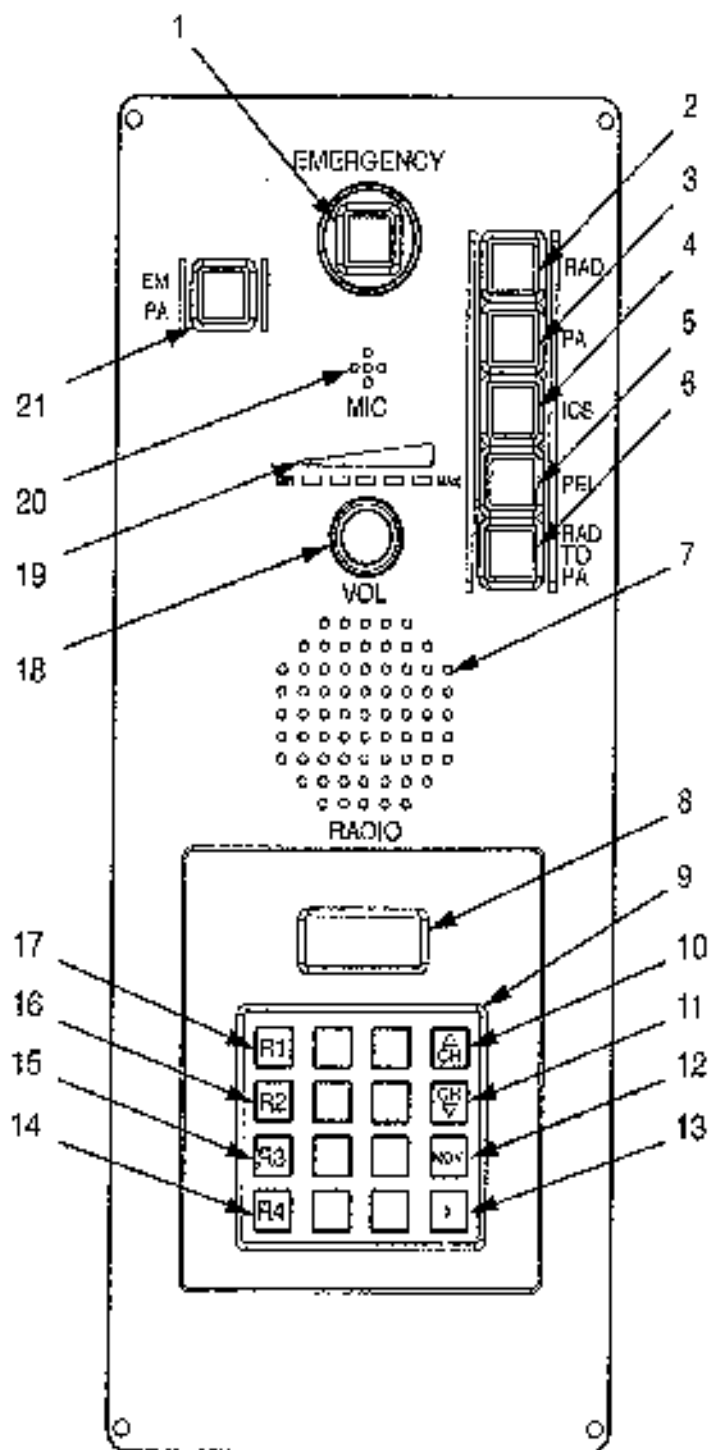


Figure 1-19 Item No.	Description	Function
1	Emergency ID Pushbutton	Press this button to transmit the radio ID. Transmission is automatically repeated ten times, once every 10 seconds. NOTE: Wayside equipment does not currently support this feature.
2	Radio Function (RAD) Button / Indicator	Radio Function: Use to listen to and transmit audio information between train and Control Center. To transmit: Press and release RAD button, to enable radio function. Indicator will go steady on. Press PTT button. Radio ID is transmitted and a go-ahead beep is provided through CCP speaker. Speak into microphone from a normal seating position. When message is complete, release PTT button. Radio ID is transmitted. Indicator will go steady on. No action is required to listen to radio messages when RAD button is selected. The CCP defaults to radio function when no other function is active.

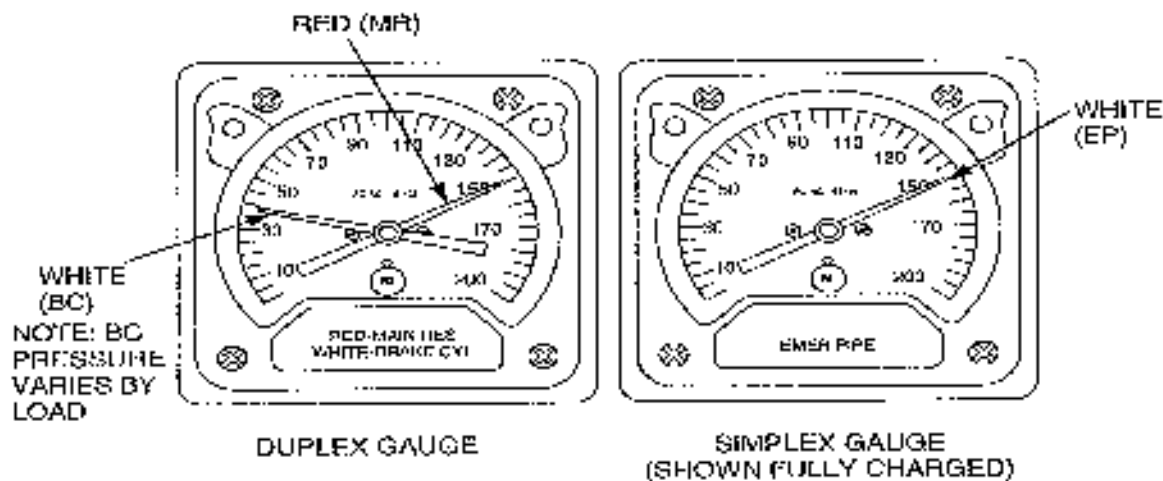
Figure 1-19 Item No.	Description	Function
3	PA Function Button / Indicator	Public Address (PA): Use to transmit audio message to train external speakers, internal speakers, and other CP speakers / handsats. (The PWS is not affected). Use this function to make manual announcements when Automatic Announcement System (AAS) is not working. 1. Press and release PA button to enable PA function. Indicator will go steady on. 2. Press and hold PTT button. Indicator will blink. 3. Speak into microphone from a normal seating position. 4. When message is complete, release PTT button. Indicator will go steady on. 5. Press and release PA button to turn off PA function. Indicator will go off.

Figure 1-19 Item No.	Description	Function
4	ICS Function Button / Indicator	Intercom System (ICS): Use to establish 2-way communication with another CP or a CCP. To Call: 1. Press and release ICS button to enable ICS function. Indicator will go steady on. 2. Listen to audio from other CP through CP speaker; press and hold PTT button while speaking into microphone to transmit audio to other CP. 3. Press and release ICS button to turn off ICS function. Indicator will go off. To Respond to a Call: 1. The CP speaker emits a call tone and the ICS Indicator begins flashing about once a second. 2. Press and release the ICS button. The Indicator will go steady on. 3. Listen to audio from other CP through CP speaker; press and hold PTT button while speaking into microphone to transmit audio to other CP. 4. Press and release ICS button to turn off ICS function. Indicator will go off.

Figure 1-18 Item No.	Description	Function
5	PEI Function Button / Indicator	<p>Passenger Emergency Intercom (PEI): Use to respond to one or more PEI calls.</p> <p>NOTE: When a passenger initiates a PEI call, the amber exterior indicator light will begin to flash and a trouble message is displayed on the TOD.</p> <ol style="list-style-type: none"> Once a call button on a PEI unit has been pressed, the CP speaker emits a call tone (high-pitched intermittent beeping, two times) and the PEI indicator begins flashing about once a second. A Trouble Message is displayed on the TOD. Press and release the PEI button on an active CCP to establish communication with the PEI. Indicator will go steady on. Press and hold PTT button while speaking into the microphone to transmit audio to the PEI from a normal, seated position. Release the PTT button to listen to audio from PEI through the CP speaker. Press and release any other audio selection button to place PEI call on hold. PEI indicator on CCP will begin to flash. To resume the PEI call, press and release the PEI button on the CCP. The PEI indicator on CCP will go steady on. Press and release PEI button on the CCP again to end the PEI call. Indicator will go off.

Figure 1-19 Item No.	Description	Function
5 (cont'd)	PEI Function Button / Indicator (cont'd)	<p>NOTE: If a call from another PEI is made prior to completion of an in-progress call, the CP speaker will emit a new call tone (high-pitched intermittent beeping, one time). Pressing the PEI button answers calls in the order they were made; subsequent PEI calls are placed on hold.</p>
6	RAD TO PA Function Button / Indicator	<p>RAD TO PA: Use to output radio messages received from the Control Center over the PA system. The message is output to train external speakers, internal speakers, and other CP speakers / headsets.</p> <p>To output a message:</p> <p>Press and release the RAD TO PA button, to enable RAD TO PA function. Indicator will go steady on.</p> <p>One-way communication continues until another function is selected.</p> <p>NOTE: The RAD TO PA function is available in a cab when the MC is in the RUN position or when the MKS on switch panel 2 is in the COMM or ON position.</p>
7	Speaker	<p>Use to listen to radio communications only. The speaker is muted while the PTT button is pressed.</p> <p>NOTE: CCP speaker is only for radio. All other functions are audible through the CP speaker.</p>
8	LCD Display Unit	<p>Displays currently selected radio channel. Displays radio ID when # key is depressed.</p>

Item No.	Description	Function
9	Radio Control Head	Engineer interface to the radio assembly. Provides tactile and audio feedback for all keypad entries.
10	CH Up Button	Use to select the next higher radio channel. LCD display changes to represent new radio channel selected.
11	CH Down Button	Use to select the next lower radio channel. LCD display changes to represent new radio channel selected.
12	MON Button	Use to monitor all radio traffic on selected radio channel. Disables Continuous Tone Coded Squelch System (CTCSS) that filters out other users of the selected radio channel by using a tone that is specific to the user.
13	# Button	Use to display radio ID on LCD display unit.
14	R4 Button	Use to select radio channel 4.
15	R3 Button	Use to select radio channel 3.
16	R2 Button	Use to select radio channel 2.
17	R1 Button	Use to select radio channel 1 (default channel).
18	Volume Control	Rotary control knob for adjusting speaker audio output level.
19	Volume Level Indicator	Liquid Emitting Diode (LED) display indicating relative speaker audio output level.



1.4.3 Duplex Air Gauge

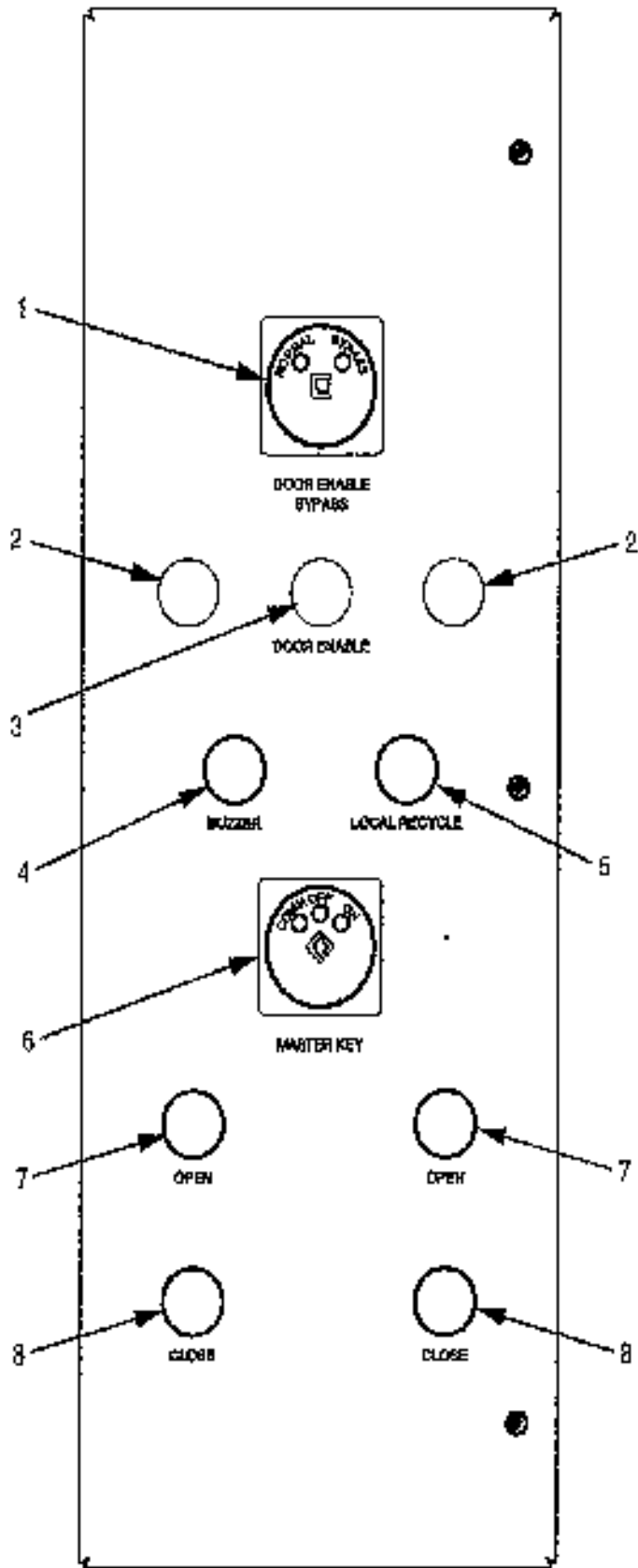
The duplex air gauge (Figure 1-15, page 1-47) is located in the cab to the left of the windshield. The gauge reads from 0 to 200 psi and has the following indicators:

Red Needle	Main Reservoir (MR) Pressure	130 - 150 psi
White Needle	Brake Cylinder (BC) Pressure	28 - 30 psi (normally charged if no brake)

1.4.4 Simplex Air Gauge

The simplex air gauge (Figure 1-15, page 1-47) is located directly above the duplex air gauge, to the left of the windshield. The gauge reads from 0 to 200 psi and has the following indicator:

White Needle	Emergency Pipe (EP) Pressure	0 - 150 psi (same as MR after charging)
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No.	Name	Function
1	DOOR ENABLE BYPASS Switch	When Door Enable command from cab is not available, enables operation of doors from DCP. Requires use of the Vapor key. NORMAL - Allows opening of doors when doors are enabled by engineer or ATC. BYPASS - Allows doors to be enabled from the DCP. Placing Door Enable Bypass in BYPASS will interrupt All Doors Closed and Locked (ADCL) signal.
2	Zone Signal Light (left) Zone Signal Light (right)	Lit when all doors to the left of the DCP are closed and locked. All MKSs to the left of the DCP are in OFF position. Lit when all doors to the right of the DCP are closed and locked. All MKSs to the right of the DCP are in OFF position.
3	DOOR ENABLE Indication	Flashes when the MKS is ON and the cab DOOR ENABLE or DOOR ENABLE BYPASS Switch is activated (door OPEN and CLOSE pushbuttons are active).
4	BUZZER (pushbutton)	Used for communicating signals to PATH personnel at different locations in a train. The BUZZER pushbutton is activated when the DCP is in ON or COMM position.
6	LOCAL RECYCLE (pushbutton)	The LOCAL RECYCLE pushbutton is pressed when obstructions prevent the door from closing. Normally, all doors on a train close when the CLOSE pushbuttons are pressed. Obstructed doors recycle twice and motor keeps forcing door closed. Pressing LOCAL RECYCLE pushbutton only recycles the door that did not fully close and lock. Pressing this pushbutton will initiate one recycle sequence.

No.	Name	Function
6	MASTER KEY Switch (MKS)	Activates / Deactivates OPEN, CLOSE, and BUZZER pushbuttons. Requires Vapor key. OFF - (Deactivates Panel) Door OPEN, CLOSE, and BUZZER pushbuttons are inoperative. Vapor key can be removed. Doors remain in last commanded position. ON - (Activates Panel) All Door OPEN and CLOSE pushbuttons are energized. Trainline circuits are arranged to allow operation of doors to the left and to the right of the DCP. LOSS OF PROPULSION. Moving MKS to ON position while train is in motion will interrupt the ADCL signal, removing propulsion. BUZZER pushbutton, zone signal lights, and conductor panel (CP) on conductor station are activated. COMM - Door control pushbuttons are deactivated. BUZZER pushbutton, zone signal lights, CP on conductor station and auxiliary microphone remain activated.
7	OPEN (left) OPEN (right)	When pressed momentarily, opens doors to the left of the active DCP when enabled. When pressed momentarily, opens doors to the right of the active DCP when enabled. NOTE: Activation of DCP OPEN pushbuttons requires engineer to press DOOR ENABLE pushbutton first. OPEN pushbuttons remain active for 10 seconds after the DOOR ENABLE pushbutton is pressed.
8	CLOSE (left) CLOSE (right)	When pressed momentarily, closes doors to the left of the active DCP. When pressed momentarily, closes doors to the right of the active DCP.

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