



APT STANDARDS DEVELOPMENT PROGRAM

## RAIL STANDARD

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# Operations Control Centers

**Abstract:** This standard provides guidance for the development and operation of operations control centers (OCCs).

**Keywords:** central control, controller, dispatcher, operations control centers (OCC)

**Summary:** The OCC serves as a command and control facility usually associated with rail fixed guideway (RFG) systems. The OCC serves as the main location from which all aspects of the system are controlled and operational decisions are made regarding normal and non-normal operations. The facility also serves as the primary, but not necessarily exclusive, point of coordination for all operational decisions affecting rail service. This coordination usually includes both internal disciplines as well as external elements involving emergency response agencies.

**Scope and purpose:** This document addresses the operating standards and practice requirements in two general categories. Primary elements will involve the general design/function requirements of an OCC and establishing the overall level of authority that is essential in an OCC facility vis-à-vis the total system operation. This includes functional requirements of personnel within the facility and their applicable roles relating to field operations.

This *Rail Standard* represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a transit system's operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual transit agencies, may be either more or less restrictive than those given in this document.

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## Introduction

(This introduction is not a part of APTA RT -OP-S-005-03 Rev 2, *Standard for Operations Control Centers*).

This Standard for Operations Control Centers represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards or recommended practices contained herein is voluntary. In some cases, Federal and/or State regulations govern portions of a Rail Transit System's operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual rail transit agencies, may be either more or less restrictive than those given in this document.

## Note on alternate practices

Individual rail transit systems may modify the practices in this standard to accommodate their specific equipment and mode of operation. APTA recognizes that some rail transit systems may have unique operating environments that make strict compliance with every provision of this standard impossible. As a result, certain rail transit systems may need to implement the standards and practices herein in ways that are more or less restrictive than this document prescribes. A rail transit system (RTS) may develop alternates to the APTA standards so long as the alternates are based on a safe operating history and are described and documented in the system's safety program plan (or another document that is referenced in the system safety program plan).

Documentation of alternate practices shall:

- Identify the specific APTA rail transit safety standard requirements that cannot be met;
- State why each of these requirements cannot be met;
- Describe the alternate methods used; and
- Describe and substantiate how the alternate methods do not compromise safety and provide a level of safety equivalent to the practices in the APTA safety standard (operating histories or hazard analysis findings may be used to substantiate this claim).

# Operations Control Centers

## 1. General requirements

The functional aspects of the OCC vary greatly among rail transit systems (RTS) due to mode difference (streetcar, light rail, or heavy rail rapid transit), system size, level of technology associated with the operation, and system specific functional requirements. In most modern LRT systems incorporating various levels of technology, OCC facilities adopt a minimalist approach in terms of staffing and technology applied, while larger, or more technologically advanced systems usually apply a greater degree of functionality (staffing and technology) within the OCC.

The RTS should establish OCC hours of operation based on their requirements. Most larger systems may require the OCC to be operational 24/7 even though their actual revenue service hours may be less. This would enable major maintenance activities to be performed during non-revenue hours and can best be controlled from the OCC. Some smaller systems may be able to operate their OCC on less than a 24/7 basis.

## 2. Operational authority

The operational authority of the OCC shall be clearly stated in all operating rule books, emergency and standard operating procedure (SOP) manuals, or other applicable documents. The standard for RFG systems requires that designated control center personnel, usually controllers or dispatchers, are the responsible individual(s) having authority for mainline train movement. Decisions affecting such movements may be made in conjunction with designated field personnel. Additionally, control center staff usually exercise authority over remotely monitored and controlled support systems, such as ventilation systems, water pumps and valves, emergency telephone systems, etc.

This is effective for overall system safety, as it establishes the primary focus to control system operations in a manner that allows this functional authority to be rigidly controlled and not allow field intervention in the decision-making process, which might compromise safety.

## 3. Selection and training of personnel

Selection and training of personnel assigned to the OCC varies greatly and depends largely upon the functional responsibility the individual is assigned to and his or her level of authority over field operational elements. Since the authority and responsibility of the positions varies greatly, from having full authority for field operations and personnel to minimal responsibility (e.g., clerical or passenger information interface), so does the level of effort applied to selection and training within specific categories of employment or assignment. Guidelines for selection of personnel are provided in the annex to this document.

### 3.1 Training of personnel

The core elements of any training program shall require full exposure to applicable rules, regulations procedures, and applicable line-specific physical characteristics. This is best achieved through both classroom orientations/lectures, field experience and simulated scenarios complemented by on-the-job training (OJT) alongside qualified personnel. As the trainee begins to become more familiar with the duties and responsibilities of the position, he or she can be provided with increasingly more freedom to perform required

functions under the direction of the trainer/employee. Each critical task shall be satisfactorily demonstrated by the trainee and certified by the OJT instructor or trainer.

In keeping with industry practices, all training components shall be documented and included in formal training material. Each student shall be provided a complete copy of the training materials in either hard copy or an electronic version for reference. Formal records of testing and student progression should be maintained. All training material and records shall be available for review by both internal and external oversight agencies. The training program shall, at a minimum, include the following elements:

- A course syllabus outlining the total requirements of the training program, inclusive of facility and physical characteristics familiarization, classroom training, testing requirements and on-the-job training.
- Introduction to the philosophy, goals and objectives of the OCC facility.
- Field training or review to ensure working knowledge of the functional elements of the RTS system, such as train operations, station operations, yard/tower operations, line supervision, police/security requirements, wayside facilities, etc., including, but not limited to the following:
  - workstation operations
  - SOPs and management guidelines
  - control and support facilities, such as power distribution, train control, communication, SCADA systems, etc.
  - safety-related practices and functions, inclusive of the agency emergency plan.
  - operating strategies
  - radio protocol and phraseology
  - incident management
  - headway adherence
  - restoration of service techniques
  - on-the-job training plan for each critical function within the control center facility
  - roadway worker protection and track access

Upon satisfactory completion of all required training, the employee will receive formal certification or qualification in the appropriate category. Certification may include an oral examination with senior staff and shall include a written comprehension exam and practical examination.

### 3.2 Re-certification/requalification of personnel

Given the dynamic nature of operating rail transit systems, where methods and procedures change frequently, personnel assigned to the control center environment must receive periodic retraining or recertification. While the method and approach may vary from system to system, the requirement shall be established and accomplished. The purpose and intent of recertification/ requalification is to ensure that OCC personnel are current with regard to newly developed standards, procedures and rules as they apply to the operating system. Further, as requirements and standards are implemented or modified for the OCC, it is essential to determine the extent to which assigned personnel are conversant with such changes. The process shall include, but not be limited to, presentation material and comprehension exams. When recertification/ requalification is achieved, appropriate documentation shall be included in the employee's personnel record or training file. The RTS shall determine and document the required frequency of recertification/qualification.

### 3.3 Specialized/familiarization training

This category of training is usually provided to expose control center personnel to essential elements that enhance their job-related skills. Such training may be provided off-site or in a classroom seminar environment. Training may be associated with management principles or new system technology, such as

computer hardware or software. The intent is to provide the employee with a selected training module in an atmosphere that allows concentration and focus without normal control center distractions. Familiarization training may also include the riding of trains in order to continue employee familiarity with physical characteristics.

## 4. Fitness for duty

There are many elements that apply under this category. Safety-sensitive categories for designated personnel and fatigue awareness are addressed in Section A.5 of the annex to this document.

The RTS shall establish requirements to determine fitness for duty for OCC personnel.

### 4.1 FTA drug and alcohol testing requirements

Personnel designated as “safety sensitive” shall comply with all required alcohol and drug-testing requirements as mandated by the FTA and other regulatory authorities. This includes pre-employment, recertification, special circumstances, post-accident and random testing. State or local authorities may mandate additional testing requirements. Reference 49 CFR Parts 655 and 40 for all testing procedures and requirements.

## 5. Hours of service of OCC personnel

All safety-sensitive OCC personnel may be subject to FTA, FRA or state and other regulatory oversight standards. Therefore, it is essential that all applicable standards related to hours of service be reviewed, and if none found, the RTS shall develop and adopt relevant standards that determine minimum time between work shifts and maximum on-duty assignment time.

Consideration should be given to extraordinary conditions that may require the extension of work assignments beyond normally established limits. The OCC manager or designee shall, based on adverse operating, emergency conditions or situations beyond the control of the RTS, be empowered to declare an emergency, suspending any or all the hours of service standards. This action shall be clearly communicated to all affected parties describing the reasons for the declaration, job classes affected, and the expected duration of the order. Return to normal operation shall occur as quickly as the situation allows.

## 6. OCC standard operating procedures

RTS shall develop SOPs to address normal, special and emergency operations, which may include, but not be limited to, the situations listed in Section A.8 of the annex. See also Section A. 8.1, 8.2 and 8.3 for additional information on SOPs.

## 7. OCC access

For the purposes of safety and security, the RTS shall develop a means of controlling access to the OCC.

## 8. References

American Public Transportation Association, “Moving People Safely,” Third Edition, 1977.

Code of Federal Regulations:

49 CFR Part 40, Procedures for Transportation Workplace Drug and Alcohol Testing Program, October 2001. [http://www.dot.gov/ost/dapc/NEW\\_DOCS/PART40.pdf](http://www.dot.gov/ost/dapc/NEW_DOCS/PART40.pdf)

49 CFR Part 653, Prevention of Prohibited Drug Use in Transit Operations, October 2000. [http://www.access.gpo.gov/nara/cfr/waisidx\\_98/49cfr653\\_98.html](http://www.access.gpo.gov/nara/cfr/waisidx_98/49cfr653_98.html)

49 CFR Part 654, Prevention of Alcohol Misuse in Transit Operations, October, 2000. [http://www.access.gpo.gov/nara/cfr/waisidx\\_00/49cfr654\\_00.html](http://www.access.gpo.gov/nara/cfr/waisidx_00/49cfr654_00.html)

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U.S. Department of Transportation “Partnering for Safety: Managing Fatigue,” March 1999.

## 9. Abbreviations and acronyms

ADA	Americans with Disabilities Act
APM	automatic people mover
ATO	automatic train operation
ATP	automatic train protection
CCTV	closed-circuit television
CFR	Code of Federal Regulations
CRT	cathode ray tube
FAA	Federal Aviation Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
LRT	light rail transit
OCC	operations control center
OJT	on-the-job training
RFG	rail fixed guideway
RTS	rail transit system
ROW	right-of-way
SCADA	supervisory control and data acquisition
SOP	standard operating procedure
USDOT	United States Department of Transportation

## Annex A (informative): Additional information on OCCs

### A.1 Overview

This informative annex provides additional information that should be considered by the RTS in utilizing this standard for developing operating rules pertaining operations control centers. The scope and purpose of this standard are provided on the cover page.

### A.2 General design/functional requirements

Some smaller RTSs apply a minimal level of functionality and application of technology. This minimal functionality takes the form of assigned OCC personnel (train controllers) who maintain radio communication with field services (trains and other personnel). This application may or may not provide remote monitoring of train location status or control of field equipment, including signal indications and track switches.

Larger RTSs usually provide the capability of monitoring the location of all trains on the system on a dynamic status basis. This status information may also include schedule adherence, all track switches, wayside signals, interlockings, intermediate track circuits, and traction power distribution. Additional non-train operation elements may also be monitored and/or controlled. These elements usually include the following, but are not limited to:

- Tunnel fan ventilation status.
- Fire control elements.
- Station facilities, including escalators, elevators and ancillary room intrusion alarms.
- Closed-circuit television (CCTV) monitoring and other security.
- Passenger information coordination, including but not limited to public address announcements, station electronic messaging and schedule information.
- Automatic fare collection status information.
- Bus dispatching/other modes. While not a universally accepted practice, certain multi-modal agencies incorporate bus dispatching/monitoring in an expanded control center environment to include other modes, including bus operations, paratransit services, APMs, etc.
- Operations support functions, i.e., car equipment, wayside equipment, technical support, crew dispatching, etc.

Depending upon the application, the OCC may contain track and information display panels or CRT desktop display elements. These elements are usually in conjunction with monitoring/operating control consoles/workstations where personnel can effect control, command or communication actions.

Because there is significant interface with computers and communication, the main OCC room may be augmented with an adjacent communications equipment room or other ancillary facilities. The associated room provides proximity for support elements that apply to the OCC facility. The main OCC room usually is a low-light, accessible and ergonomically designed facility with sound absorption material in order to maintain the minimum noise levels. OCC facilities may also contain adjacent personnel quarters, e.g., conference/training/briefing room(s), lunch/break room, locker rooms, restroom facilities, etc. Further, the location of OCC facilities will also vary, but in most cases, it is a secure facility with controlled access, integrated into one of the agency's existing facilities (yard facility structures or main administrative office building) and in close proximity to the operating system.



### A.3 Functional elements

The functional elements within the OCC depend on the size of the RFG system, the level of technology applied and the transit modes monitored within the facility. The functions and workstations may include the following:

- Central control shift supervisor/manager
- Train operation/monitoring/display panels
- Traction power distribution and monitoring
- Passenger/customer services/communications
- Communication systems
- Police services/security
- CCTV
- Wayside/facilities maintenance
- Rail vehicle maintenance
- Clerical support
- Bus operations (if collocated)

### A.4 Staffing

The actual number of personnel assigned to the OCC is largely a function of the size of the RFG system and the functional elements mentioned above.

The number of personnel in each category, functions they perform, or whether the position exists at all is system specific and is also determined by system size, technology and other priorities.

Depending on the level of technology applied and functional authority that rests within the OCC, the variety of position categories include, but is not limited to the following:

- **OCC manager:**  
Sometimes called control center supervisor, the position and function that assumes management responsibility for the efficiency and effectiveness of all personnel on the shift.
- **Train controllers or dispatchers:**  
Also known as system supervisors, the function that directs and coordinates the movement of trains as called for in the daily service schedule and implements delay mitigation and emergency strategies. Decisions affecting such movements may be made in conjunction with designated field personnel. Train controllers' tasks may include responsibility for bad order train management, processing of routes at switch networks, activation of emergency procedures, oversight of maintenance activities on the ROW, etc.
- **Traction power supervisor/power distribution director:**  
Function that operates controls and coordinates activities related to traction power and auxiliary power distribution systems.
- **Passenger/customer services representative/supervisor:**  
Function responsible for transmitting pertinent service related information, including ADA elements, by telephone, radio and public address system and other mediums to the riding public and news service organizations.

- **Communication console operator:**  
Function responsible for coordinating all communication elements at a particular console or workstation. As the “voice” on the radio, this position usually works in coordination with the train controller.
- **Security/police services dispatcher:**  
Function responsible for handling 911 calls, dispatching police officers or security personnel as appropriate, providing telephone assistance and monitoring CCTV and other electronic alarm systems.
- **CCTV observer:**  
Function responsible for monitoring CCTV and providing related passenger assistance.
- **Facilities supervisor/station manager:**  
Function responsible for managing the daily activities that occur at passenger stations or termini, such as providing customer service, ensuring equipment (fare collection, elevators, escalators, video displays, etc.) is in proper working order, assisting with managing emergencies, etc.
- **Wayside/equipment maintenance supervisor:**  
Function that dispatches, manages and coordinates activities conducted by the maintenance department, within the right-of-way envelope, in support of routine maintenance or emergency maintenance response.
- **Rail vehicle maintenance supervisor:**  
Function responsible for directing field technical support personnel in troubleshooting and recovering of train equipment failures.
- **Clerical support:** Function that provides all OCC administrative support functions, such as computer data entry, typing, filing, etc.
- **Bus dispatcher or other intermodal coordinator:**  
Function responsible for managing the daily distribution of buses or other modes of transportation per the published timetable. This position is also responsible for delay emergency response and alternate rail service management.

## A.5 Selection of personnel

Selection of personnel varies widely based on position within the OCC and level of responsibility. Lower-level assignments (i.e., communication or public information personnel) require less stringent scrutiny and can be processed in conjunction with the agency’s standard internal human resource policies related to the specific position. However, the greater the level of responsibility (train controllers/dispatchers, traction power console operators, etc.), the greater the degree of evaluation required.

The essential requirements for selection of personnel include the establishment of a policy related to internal hiring of experienced agency personnel or external hiring of individuals with a non-transit background. The preference is to hire internally based on an employee’s substantial knowledge of system operational elements and standards and practices. However, some agencies have opted for external hiring and providing a more substantial level of training spread out over a greater length of time. The latter usually requires a thorough and extended familiarization and orientation training experience for the new hire to have an understanding of the unique interdisciplinary elements associated with the transit operating environment. Once this is achieved, then training can more appropriately focus on control center operations and associated requirements.

These requirements should include an individual’s ability to function in a confined environment, frequently with little or no external access or stimulation. Other characteristics include low light environment and extended periods being in a seated position at a workstation or console. Other elements include specialized skills, including multitasking and abstract reasoning. Because of the specific nature of the OCC environment

and its uniqueness, many agencies have adopted psychological testing to determine whether a potential candidate possesses any personal psychological characteristic that would manifest itself in such a way as to create adversity or conflict.

Selection of personnel varies depending on current human resource/hiring policy. The process may also include a battery of tests that assess an individual's general intelligence, computer skills, management or supervisory knowledge, and even more substantive tests that include personality profiles and abstract reasoning. The latter tests are administered to determine an individual's ability to function in a control center environment and the extent to which he or she is intellectually capable of multitasking. Some agencies have patterned their selection of OCC personnel to that of the Federal Aviation Administration (FAA) in the selection of air-traffic controllers.

## A.6 Safety-sensitive category for designated personnel

The FTA has established a series of guidelines that identify the elements that classify individuals as safety sensitive. These include personnel who are directly or indirectly involved in a decision-making role relative to the dispatch or movement of revenue service vehicles, who provide security and carry a firearm, or who are in a position of controlling field equipment and operations. Reference 49 CFR Parts 653, 654, 655 and 40.

## A.7 Fatigue awareness

Employees should receive orientation related to elements that generate fatigue and thus impact performance. Such elements include prescription medication use or unusual shift assignments. Employee training involves:

- Knowledge of physical-biological factors related to fatigue;
- Awareness of the high cost of fatigue to the transit industry;
- The ability to apply a "toolbox" of countermeasures; and
- Knowledge of methods and recommendations to manage fatigue issues.

NOTE: Increased interest has been focusing on interactions among prescribed drugs, in that certain drugs by themselves are not inclined to create drowsiness but in combination with the use of certain other drugs, they will. Reference the U.S. Department of Transportation's "Partnering for Safety: Managing Fatigue."

## A.8 OCC standard operating procedures

In order for the OCC to exercise appropriate command and control over field operations, it is essential to incorporate a series of SOPs. These SOPs are used in conjunction with other applicable rules and regulations and provide OCC personnel with an RTS-approved method of maintaining service levels and handling field occurrences (emergency and otherwise). These SOPs encompass a wide range of categories and generally provide a prescribed method of effectively and safely dealing with any occurrence on the system. The SOPs take into consideration passenger and employee safety, safeguards for RTS facilities, and generally accepted "best practices" for dealing with occurrences involving operations, safety/security, incidents involving natural disasters and accidents or other major incidents. The development of such SOPs usually involves personnel from appropriate disciplines within the system, as well as outside emergency or governmental agencies having jurisdiction or responsibility for response.

The RTS shall establish procedures for distribution of the SOP's. These procedures should include the requirement that recipients sign for all SOPs.

Examples of possible SOPs to consider are shown below but are not meant to be an exhaustive list.

**A.8.1 Normal operations**

1. Terminal station interlocking operation
2. Making station stops
3. Mixed/street traffic operations
4. Wheelchair boarding requirements/placement/securement
5. Bicycles onboard trains
6. Automatic train operation (ATO)
7. Ground inspection of in-service trains
8. Characteristics of automatic train protection (ATP)
9. Station operations (fare gates, restrooms, agent booths, etc.)
10. Express train operations

**A.8.2 Special operations**

1. Track out of service
2. System failure/service recovery techniques
3. Special events service, including charter train operation
4. Medical occurrences
  - Onboard trains/in stations
  - Sick or injured passengers or employees
  - Death or injury on the right-of- way
5. Establishing slow/work zones (protection of workers/contractors)
6. Reverse traffic operation
7. Manual block operation
8. Failure of train doors
9. Movement of a disabled train
10. Cutting out train brakes and/or propulsion
11. Civil unrest/protest demonstrations, onboard trains and in stations or other facilities
12. Establishing “bus bridge” and other supplemental service
13. Protection of on-track maintenance equipment, shunting and non-shunting
14. Broken crossing gates, operational requirements/restrictions
15. Loss of signal control, cab or wayside
16. Rotating power outages
17. Removal and restoration of traction power (non-emergency)
18. Intrusion into the right-of-way (vehicle, trespasser, other)
19. Preparation and use of a rescue train
20. Crowd control
21. Unruly passenger(s)

**A.8.3 Emergency operations**

1. Earthquakes and/or volcanic eruption
2. Flood in trackway/subway stations/tunnels
3. Fires
  - Wayside fires
  - Fire on a train
  - Fire on the right-of- way
  - Fire on an elevated structure
  - Fire in a tunnel
  - Fire in a station

4. Extreme weather
  - Hurricanes
  - Tornadoes/high winds
  - Heat or cold
  - Ice or snow
5. Bomb threats
6. Bomb detonations
7. Total system shutdown and restoration
8. Partial system shutdown and restoration
9. Civil unrest
10. Terrorist acts:
  - Use of intelligence
  - Hijacked equipment
  - Hostages/barricaded subject
  - Bio-chemical hazards (on trains/in stations)
  - Unauthorized person in control of train
  - Cyber-criminal/terrorist computer system attacks
11. Hazardous materials spill (non-terrorist act)
12. Derailments
13. Passenger evacuations, trains:
  - From tunnels
  - From elevated structures
  - From open right-of-way
14. Passenger evacuations, stations
15. Overhead wire down
16. Removal and restoration of traction power (emergency)
17. Emergency reporting/notification list (agency/local/state/federal)
18. Train/pedestrian/trespasser/employee accidents
19. Contacting outside emergency response agencies (police, fire, paramedic, hazardous material, bomb squad, etc.)
20. Collisions, train to train and other
21. Broken rail
22. Track irregularities (rail kinks, misaligned track, etc.)
23. Activation/control of tunnel ventilation systems
24. Loss of station power
25. Continuity of operations
26. Loss of signals, switches and power