



# POSITIVE TRAIN CONTROL (PTC)



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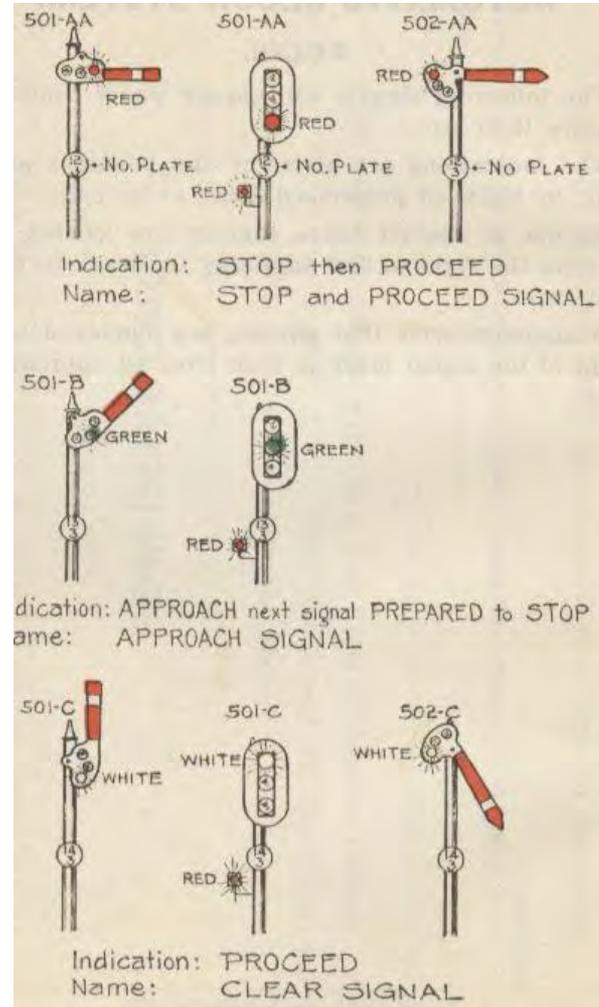
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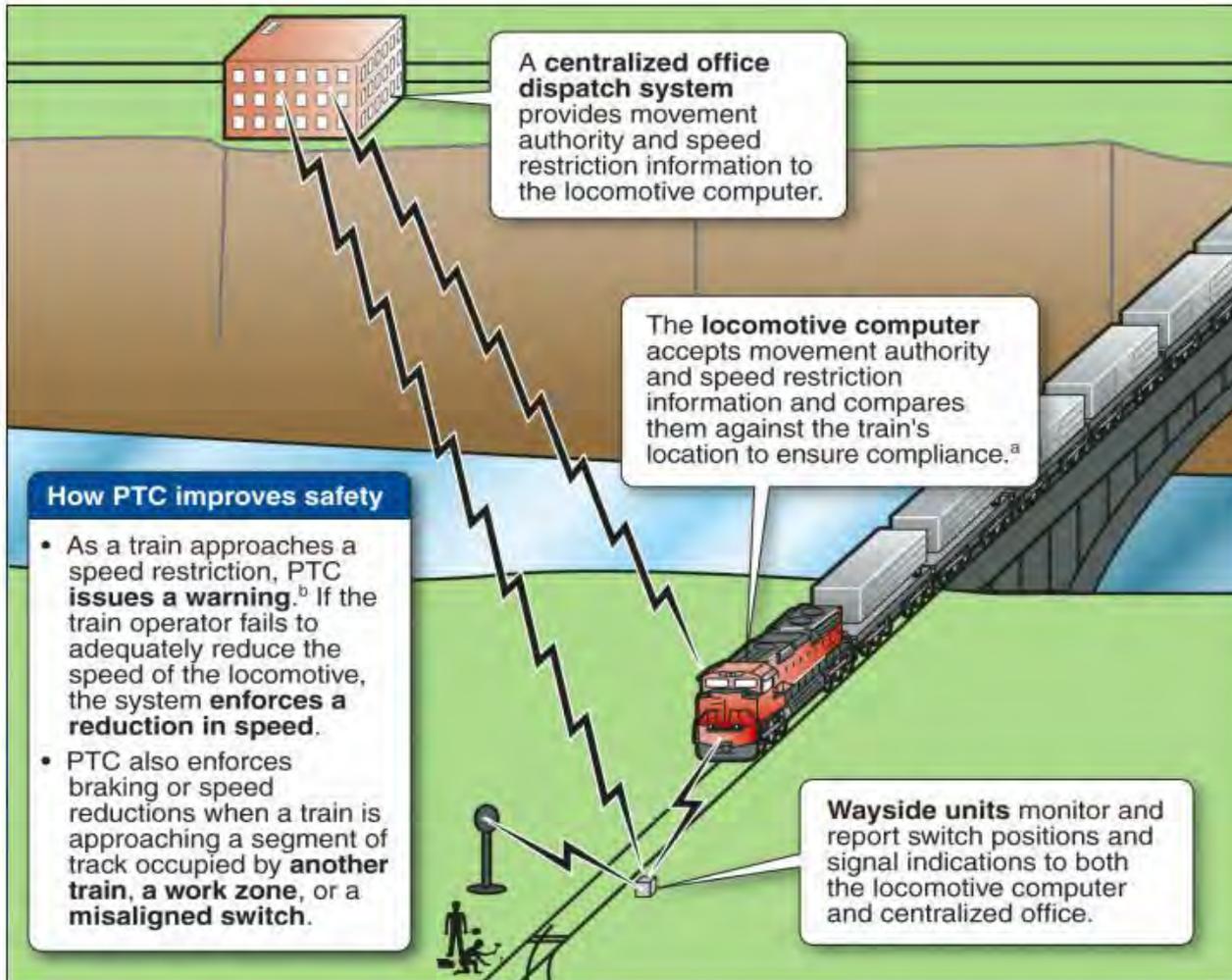


# Controlling Train Movements - Prologue





# How PTC Works





# PTC Goals

PTC is intended to prevent:

- Train-to-train collisions
- Derailments caused by excessive speed
- Unauthorized incursions by trains onto sections of track where maintenance activities are taking place
- Movement of a train through a track switch left in the wrong position



Photos - Joe Taul Collection





# PTC Limitations

PTC will **not** prevent:

- Accidents caused as a result of track or equipment failure
- Improper vehicular movement through a grade crossing
- Trespassing on railroad tracks
- Certain types of train operator error





# PTC Components

PTC uses Global Positioning Systems, Wi-Fi and high-band radio transmission to:

- Ensure that trains do not exceed their authority
- Determine the location, direction and speed of the trains
- Take action by stopping a train if there is not a response by the train crew



Union Pacific Railroad illustration





# PTC Components

There are three main elements of a PTC system, which are integrated by a wireless communications system:

- **Onboard Locomotive System:** Monitors the train's position and speed and activates braking as necessary to enforce speed restrictions and unauthorized train movement into new sections of track.
- **Wayside System:** Monitors railroad track signals, switches and track circuits to communicate movement authorization to the locomotive.
- **Back Office Server:** The storehouse for all information related to the rail network and trains operating across it. It transmits the authorization for individual trains to move into new segments of track.





## PTC and Accident Prevention

Since 1969, the National Transportation Safety Board (NTSB) has investigated 148 accidents that were determined to be preventable by PTC. These accidents resulted in 298 fatalities and 6,763 injuries.





## Legislative Background

The Rail Safety Improvement Act of 2008 (P.L. 110-432), enacted after the Chatsworth accident, required Class I railroad main lines handling poisonous-inhalation-hazard materials and any railroad main lines with regularly scheduled intercity and commuter rail passenger service to fully implement PTC by December 31, 2015.



Los Angeles Daily News photo





# Legislative Background

In the Positive Train Control Enforcement and Implementation Act of 2015 (P.L. 114-73), Congress extended the PTC implementation deadline by at least three years to December 31, 2018, with the possibility of an extension to a date no later than December 31, 2020, if a railroad completes certain statutory requirements that are necessary to obtain an extension:

- a railroad must have all spectrum acquired and;
- all hardware installed, at minimum, before further consideration for extension.





# Challenges In PTC Implementation

**Government Accountability Office, 3/1/18:**

- PTC is a new way of operating and involves technologies that are more complex to implement than many other railroad capital projects
- There are a limited number of individuals with PTC technical expertise available to successfully implement the technology
- Some railroads have faced unexpected delays in obtaining PTC equipment
- PTC is being implemented by different types of railroads using different systems, and achieving interoperability among PTC systems can complicate implementation
- Unexpected issues with components or technology can also require additional time to complete certain activities, causing schedules to slip
- FRA officials stated that reviewing all of the safety plans in a timely manner will be a challenge given staff resources





## CPUC PTC Activities

During 2016-17, the CPUC PTC specialists performed the following:

- Conducted observations of 17 field activities
- Performed 45 PTC surveillance observations
- Monitored and participated in 20 PTC status meetings
- Provided ongoing correspondence with the railroads to determine status, challenges, and issues of implementation
- Provided monthly reports of PTC activities to CPUC management
- **2018 will see a large increase in PTC field activities by CPUC**





## PTC in California – Freight Railroads

In the freight industry, PTC made mixed progress during the first half of 2017. As of June 30, 2017, only 4 of the 36 freight railroads in California were implementing PTC: UPRR, BNSF, Pacific Sun (PacSun), and San Joaquin Valley Railroad (SJVR).

- UPRR and BNSF are required to implement a PTC system as per federal regulations as set forth in 49 CFR 236.1005 (Requirements for Positive Train Control Systems).
- PacSun and SJVR do not fall under the federal requirements to install PTC systems; however, both railroads were served notices by other railroads to equip their locomotives with PTC equipment to allow them to operate on tracks owned by the Class 1 carriers.





# PTC in California – Freight Railroads

	Freight Railroad	Stage of PTC Implementation
1.	BNSF	All subdivisions in California have PTC installed and in revenue service. BNSF reported that 88.8 percent of their PTC runs are uneventful. All of the required BNSF employees have been trained (1,800 employees). BNSF anticipates PTC interoperability with other railroads by the following dates: Metrolink currently; UPRR by the first quarter of 2018, NCTD by the first quarter of 2018, and Amtrak by the first quarter of 2018.
2.	UPRR	As of June 30, 2017, the CPUC is aware of only two subdivisions in Southern California that have PTC in RSD: the Los Angeles subdivision and the Alhambra subdivision. Other subdivisions in the UPRR system are in varying states of installation and implementation. UPRR does not have interoperability with BNSF or Metrolink. A timeline for full PTC implementation has not been announced. The crews who are operating on the PTC equipped subdivisions are receiving training as required.
3.	PacSun	The NCTD served PacSun a notice to equip their locomotives with PTC because PacSun operates on NCTD lines. PacSun has three locomotives, all of which are equipped. They are currently conducting interoperability testing with NCTD. Initial training for the employees has been contracted. PacSun anticipates full operability by December 2017.
4.	SJVR	SJVR shares track with BNSF and UPRR, which have served notice to SJVR to equip their locomotives with PTC. SJVR's parent company, Genesee & Wyoming Inc., plans to start testing on one of their railroads in Oregon in the third quarter of 2017. No SJVR locomotives are equipped with PTC and there is no anticipated date when this will take place.





# PTC in California – Passenger Railroads

While the implementation of PTC has made significant progress in passenger service, not all passenger lines will meet the 2018 deadline.





# PTC in California – Passenger Railroads

	Passenger Railroad	Stage of PTC Implementation
1.	Metrolink	In Revenue Service Demonstration (RSD). Interoperability with tenants is next challenge. Slow implementation by UPRR as a host and tenant is a significant challenge to interoperability.
2.	North Coast Transit District (NCTD)	Waiting for RSD approval for Coaster. Coaster operating PTC seven days a week beginning December 2017. Interoperability testing underway March 2018.
3.	Sonoma Marin Area Rail Transit (SMART)	Waiting for RSD approval to begin passenger service. SMART utilizes signals in the rail versus radio frequencies for PTC operation.
4.	Amtrak	Waiting for interoperability testing. Amtrak is a tenant railroad in California.
5.	Caltrain	Progress is halted due to termination of the PTC contractor, litigation, and new contractor search.
6.	Altamont Corridor Express (ACE)	Waiting for UPRR as host railroad to be ready to test interoperability. On-board equipment for ACE locomotives has been on backorder but should arrive by the end of 2017.

