Positive Train Control Pocket Guide

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Overview

This pocket guide is designed to assist NS employees in operation of Positive Train Control. This guide will cover from initialization of the system to operating alerts and any problems that may arise. It is important to remember that the Engineer is responsible for safe and efficient train handling and it is the responsibility of the crew to comply with all rules and signals.

PTC System Function

The system will download all of the required information for the territory on which the train will operate.

- Train Clearance's
- Mandatory Directives
- Visual aspects of the system: signal aspects, messages and warning banners
There is constant communication between all elements of the system to ensure safe and efficient train handling.

PTC Display—Graphics
## Track Line Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Symbol</th>
<th>Signifies</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td><img src="#" alt="Red Line" /></td>
<td>PTC track not on train’s calculated route, and PTC covered by a zero (0) MPH target.</td>
</tr>
<tr>
<td>YELLOW</td>
<td><img src="#" alt="Yellow Line" /></td>
<td>PTC track covered by a non-zero speed target due to a mandatory directive or a signal indication other than a passenger target speed.</td>
</tr>
<tr>
<td>GREY</td>
<td><img src="#" alt="Grey Line" /></td>
<td>Non-PTC track or PTC entry track. Track on the trains calculated route is governed by a signal in advance of the train where the indication to that signal has not been determined. Track in a non-synchronized subdivision/district for which the on-board segment has valid track data.</td>
</tr>
<tr>
<td>GREEN</td>
<td><img src="#" alt="Green Line" /></td>
<td>Authorized PTC track on train’s route not covered by a non-zero speed target due to a mandatory directive or signal indication or zero MPH target.</td>
</tr>
</tbody>
</table>

## Track Line Overlay Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Symbol</th>
<th>Signifies</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td><img src="#" alt="Red Hash" /></td>
<td>Stop required. Example: end of track authority, a signal requiring stop, an</td>
</tr>
<tr>
<td>Hash</td>
<td><img src="#" alt="Hash" /></td>
<td></td>
</tr>
<tr>
<td>YELLOW</td>
<td><img src="#" alt="Yellow Hash" /></td>
<td>Restricted speed. Example: signal indication, track circuit</td>
</tr>
<tr>
<td>Hash</td>
<td><img src="#" alt="Hash" /></td>
<td>Does not include head-end only restricted speed track targets</td>
</tr>
<tr>
<td>BLUE</td>
<td><img src="#" alt="Blue Hash" /></td>
<td>Work Zone</td>
</tr>
</tbody>
</table>

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For Internal Use Only
# Locomotive Orientation Legend

<table>
<thead>
<tr>
<th>Color</th>
<th>Symbol</th>
<th>Signifies</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td><img src="image" alt="Symbol" /></td>
<td>Front locomotive orientation</td>
</tr>
<tr>
<td>Blue</td>
<td><img src="image" alt="Symbol" /></td>
<td>Back locomotive orientation</td>
</tr>
</tbody>
</table>

# Banner & Prompts Legend

<table>
<thead>
<tr>
<th>Name/Color</th>
<th>Example</th>
<th>Signifies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braking</td>
<td><strong>BRAKING IN PROGRESS</strong></td>
<td>A brake application is occurring</td>
</tr>
<tr>
<td>Predictive Warning</td>
<td><strong>WARNING: BRAKING IN XX SEC</strong></td>
<td>Warning for impending braking based on time or estimated time to braking</td>
</tr>
<tr>
<td>Reactive Warning</td>
<td><strong>WARNING: OVERSPEED</strong></td>
<td>Warning for speed inside a target location</td>
</tr>
<tr>
<td>Non Enforceable Warning</td>
<td><strong>WARNING</strong></td>
<td>Warning for authority violation</td>
</tr>
<tr>
<td>Blue</td>
<td><strong>Mandatory Directives</strong></td>
<td>Access to function or response to crew prompt</td>
</tr>
<tr>
<td>Green</td>
<td><strong>Menu 1</strong></td>
<td>Access to menu</td>
</tr>
<tr>
<td>Yellow</td>
<td><strong>Accept/ Reject</strong></td>
<td>Crew acceptance / rejection is required</td>
</tr>
<tr>
<td>Red</td>
<td><strong>Target Prompt</strong></td>
<td>Pending prompt requiring crew interaction or indicating the arrival of trains for conditional authority</td>
</tr>
<tr>
<td>Flag</td>
<td>Example</td>
<td>Signifies</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Brake Interface</td>
<td>BRK INTFC</td>
<td>The I-ETMS penalty brake cut out switch is in the &quot;cut out&quot; position or the air brake system state is &quot;cut out&quot;.</td>
</tr>
<tr>
<td>Cab Signal</td>
<td>NO CAB</td>
<td>The four-aspect cab signal system is cut out or partial cut out.</td>
</tr>
<tr>
<td>Departure Test</td>
<td>DEPART</td>
<td>Departure test is required in order for the on-board segment state to become ACTIVE.</td>
</tr>
<tr>
<td>Network Communication</td>
<td>NON COMM</td>
<td>The on-board segment is out of communication with the office.</td>
</tr>
<tr>
<td>Park</td>
<td>PARK</td>
<td>The parking function is enabled.</td>
</tr>
<tr>
<td>Recorder</td>
<td>RECORDER</td>
<td>The on-board segment does not have a Class D connection to the crash hardened memory unit.</td>
</tr>
<tr>
<td>Synchronizing</td>
<td>SYNC</td>
<td>The onboard datasets are out of sync with the office for a subdivision/district that the train is approaching or occupies.</td>
</tr>
</tbody>
</table>
System Start-up & Self Test

Upon start-up the system will perform a self-test.

After the self-test has completed, you will see the screen below. You will now initialize the system by pressing the "Init" soft key.

You will see this screen after starting the initialization of the system.
The "Init" soft key is only available from Menu 1 which can be located in the Main Menu. The "Init" soft will only be available when the following conditions are met:

- The system is in Active, Disengaged or Cut-Out state
- The locomotive air brakes are set-up in "Lead"
- The locomotive is stopped. (If the locomotive is moved, the "Init" key will be removed.)

After pressing "Yes" you must select the correct railroad from the list.

Once selected, it will show *****ADDED***** next to the selection.
After selecting the correct railroad, you will press the "Submit" soft key and the system will begin configuration.

Next you will see the Usage Policy, and press the "Accept" soft key.
*If there is new software available: you will see the following screens and follow the prompts to install.

After the brakes have applied and the software is installed, you will repeat the initialization process.
Crew Log-On
After selecting the correct railroad, you will be prompted to log-on using your employee ID number and Mainframe password.

After entering both, press the "Done" soft key and the system will display "Please Wait for Verification".
Next you will be prompted for your Clearance Number. After entering the number press the “Submit” soft key.

Next is the Train ID Selection screen. This message will be shown.

Choose your train and press the “Select” soft key.

If the wrong train ID is chosen or the process fails, all PTC functions will not be activated.
Obtaining Consist Summary & Consist Modification

After verifying train information, you will get a message that reads "Please wait for consist summary"

When the "Consist" key is pressed the main summary consist screen is displayed. This information must be verified with the paper copy by the Conductor and Engineer.

The consist information can be edited manually if there are changes to be made. Those items are:

- Number of locomotives in the train
- Trailing tonnage
- Operative brake count (excluding locomotives)
- Axle count (cars)
- Loaded and empty count
- Equipment speed restrictions
Consist Modifications after set-out or pick-up

If there is a set-out or pick-up, the conductor must notify the engineer in order to update train consist information.

This is done by pressing the "Modify" key and choosing the item that needs changed.

After making changes, press the "Accept" key.

You can also change locomotive information, to include:
- Adding a locomotive
- Deleting a locomotive
- Isolating a locomotive
- Placing a locomotive in Run
Communications and Office Synchronization
After the consist is accepted, authority to operate and train clearances will be delivered to the lead unit.

When "View Bulletins" is pressed, you will see a list of bulletins.

Select an item and press the "View Item" key.

Compare the bulletin item with the paper copy.
Departure Test
When a Departure Test is required, it can be performed by the operator. The items that follow are for when all of the train information has been previously entered.

When stopped with sufficient brake pipe pressure, the “Begin Test” key will appear.

The system will verify the software version and software modules, then make a full service brake pipe reduction.
The “Fail Test” key will be displayed until the BP has been reduced by 26 psi.

After the brake pipe test, you will be prompted to perform the audible test. You will listen for 3 beeps to verify that the audible portion is working properly.

Next choose if you heard or did not hear the audible alert.

Finally after all items are completed, it will read that the Departure Test was successful. Press the “Exit” key.
System Synchronization
The system assembles the map and track profile. It also incorporates the train clearance information and track conditions.

The engineer will select the track that will be operated on, Main Trk, Main 1, Main 2, etc.

Choose the "Select Location" key.

Use the arrow keys and select the correct track.

The system then requires you to verify that you have chosen the correct track.
Park Brake Function
Whenever the locomotive is stopped and the reverser handle is centered, the "Park On" key will be displayed on the Main screen.

When the "Park On" key is pressed the display will show a message that reads "This will cause a brake application if the locomotive moves. Do you want to continue?". You will choose either "Yes" or "No".

When you are ready to resume movement, press the "Park Off" key and at the prompt press the "Yes" key.
If the locomotive is moved for 5 seconds with the Park Brake function enabled you will receive an alert as shown above and the system will make a Full Service application of the brakes. Upon stopping, the air must be recovered and the park brake function turned off before movement resumes.
The system will prompt you when there are working limits or conditional stop signs in effect, this is shown by the display of a red box with red hash marks. After receiving permission to proceed through the work location, press the "Received" key. After pressing "Received" the red box will disappear. If your train stops in the work limits, the red box will appear again and you will have to obtain permission a second time from the employee in charge of the working limits before movement is resumed.
Upon receiving a Mandatory Directive about a crossing malfunction, the system will provide an alert in advance of the location and will display a “Proceed” key.

Protection of the crossing must be established as outlined in the Norfolk Southern Operating Rules prior to pressing the “Proceed” key.

If the crossing requires protection, you must acknowledge that it is protect before proceeding.
When the "Crew Logoff" key is pressed you will receive a prompt stating "This will cause system logoff, Do you want to continue?" and you will press "Yes" or "No" as appropriate.

When "Yes" is pressed, the system will discard the stored railroad name, employee ID and pin, information stored during initialization, train clearance information and train ID data. The system state will change to Cut Out.
System Cut-Out
If it is determined that the PTC system is inoperative, the crew MUST notify the Train Dispatcher. The Train Dispatcher will:
1. Instruct the crew to cut-out the PTC system.
2. Establish an absolute block in advance of the train.
3. The train may proceed according to block signal indications, not exceeding 79 MPH.
4. Train must not pass a Restricting Signal without permission from the Train Dispatcher.

PTC Cut-Out Process
1. Locate the Train Control Cutout switch panel. (Often found in the nose of the locomotive)
2. Remove the seals and pins from the Emergency, Penalty and Horn switches.
3. Operate the switches to the cut-out position and reinsert the pin.

Picture 1

Picture 2

Picture 3
Conductor Information
The conductor's display screen is not equipped to make changes to the train's data, however the conductor will be required to examine the electronic train list and compare it to the paper copy. If there are any discrepancies between the paper copy and system, the paper copy will supersede.

The conductor is responsible for complying with Operating Rule 81 which require communication of wayside signals between crew members and calling of all signals over the radio. Also they must comply with Rule 91 which requires communication of all restrictions 2 miles before reaching the restriction.

The system is designed to assist the crew in safe and efficient train operation, however the conductor remain responsible for observance and enforcement of all rules and instructions. Also if the Engineer fails to control movement in accordance with signals or other conditions, crewmembers must communicate with him/her at once. If he then fails to immediately control speed properly they must take necessary action to stop the train.