

# Unofficial TSW2 Harlem Line – Signal and Safety System Overview

Developed by: *Cornelius Vanderbilt – Beta Tester*

*This guide is intended to be used for in-game reference only. While all information shown below is correct, in some cases it has been simplified for brevity while still conveying the overall real-world operations.*

## Signal System Overview

There are two signal systems used on the route between GCT and North White Plains. Within GCT, there is a wayside signal system which shows 4 possible signal aspects based on block occupancy ahead. Within the GCT complex, speed is limited to 10MPH on all tracks and cab signals will always show a Restricted Cab.

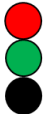
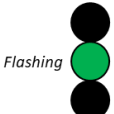

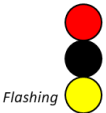
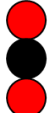

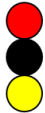

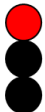


Outside of GCT, the signal system is a cab signal system that only has fixed wayside signals as interlockings. These fixed signals shown at interlockings are unofficially referred to as “Go-No-Go” signals as they will either display a Proceed Cab or Stop Signal. A Proceed Cab signal essentially tells the Engineer proceed based on whatever cab signal aspect is shown on the Aspect Display Unit (ADU). Automatic Train Control (ATC) is a speed control system which enforces train speed based on the cab signals that are received by the train. This system allows for high density signaling including multiple trains within the same block.

## Positive Train Control Overview

Metro-North uses the Advanced Civil Speed Enforcement System (ACSES) system for Positive Train Control(PTC). This system is used on all mainline tracks north of GCT but is not in GCT or yards such as North White Plains. Essentially, ACSES is a system that provides oversight to Engineer compliance with permanent and temporary track speed limits. It is not intended to replace route knowledge and if the Engineer is operating the train properly under normal conditions, the system will provide minimal alerting or acknowledgement.

As an example, if an Engineer is not slowing down at an appropriate rate for a slow curve ahead, it will first sound an audible alarm and eventually apply a Penalty Brake application if the system calculates that the Engineer is exceeding the “braking curve”. If the Engineer was adequately slowing down in advance, they would only need to acknowledge the speed change when they entered the reduced speed limit.

*Important Note: ACSES and ATC are two independent systems that each provide separate information but share the same display unit. You could have a 60MPH ACSES track speed but also be on a Restricted Cab signal due to a train ahead. The more restrictive speed always applies.*

GCT Signals	Mainline Signals	Cab Signals
 <p><b>Terminal Proceed</b> Proceed.</p>	 <p><b>Proceed Cab</b> Proceed on Cab Signal indication.</p>	 <p><b>Normal Cab</b> Maximum Authorized Speed</p>
 <p><b>Terminal Approach</b> Proceed prepared to stop at next signal.</p>	 <p><b>Stop Signal</b> Stop.</p>	 <p><b>Limited Cab</b> Not exceeding 45MPH</p>
 <p><b>Terminal Restricting</b> Proceed looking out.</p>		 <p><b>Medium Cab</b> Not exceeding 30MPH</p>
 <p><b>Stop Signal</b> Stop.</p>		 <p><b>Restricted Cab</b> Not exceeding 15MPH and looking out.</p>
		 <p><b>Positive Stop</b> Stop.</p>
		<i>The “60” Aspect is not used.</i>

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## M3A ADU



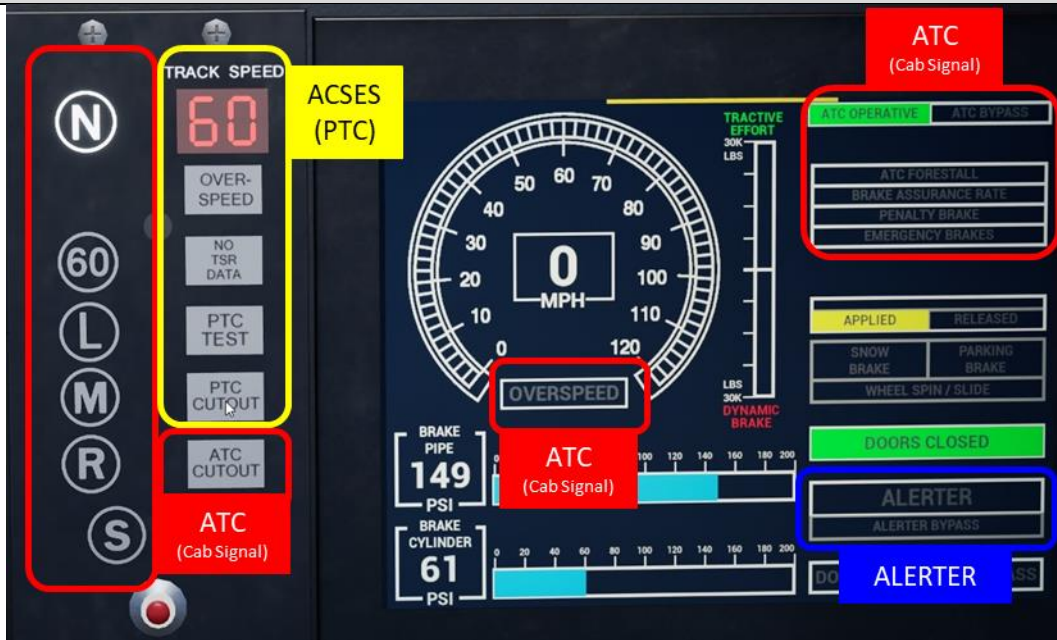
### ATC (Cab Signals)

- CAB SIGNAL ASPECTS
- ATC CUTOUT – ATC System has been manually cut-out by circuit breaker.
- ATC TEST – (Not represented in-game)
- VZ “Velocity Zero” – Train is stopped or <3MPH.
- BA “Brake Assurance” – Sufficient brakes applied to prevent ATC overspeed penalty.
- OVERSPEED (ATC) – Cab Signal/ATC overspeed condition.

### ACES (PTC)

- TRACK SPEED – Current maximum ACSES “Track” speed.
- OVERSPEED (ACES) – ACSES “Track” overspeed.
  - **Flashing:** 3-6MPH over ACSES “Track” speed. (Audible Alert Only)
  - **Solid:** +6MPH over ACSES “Track” speed. (Penalty Brake Application)
- NO TSR DATA – Not implemented.
- PTC TEST – Not implemented.
- PTC CUTOUT – PTC System has been manually cut-out by circuit breaker.

## M7A ADU & Train Operator Display (TOD)



### ADU

#### ATC (Cab Signals)

- CAB SIGNAL ASPECTS
- ATC CUTOUT – ATC System has been manually cut-out by circuit breaker.

#### ACES (PTC)

- TRACK SPEED – Current maximum ACSES “Track” speed.
- OVERSPEED (ACES) – ACSES “Track” overspeed
  - **Flashing:** 3-6MPH over ACSES “Track” speed. (Audible Alert Only)
  - **Solid:** +6MPH over ACSES “Track” speed. (Penalty Brake Application)
- NO TSR DATA – Not implemented.
- PTC TEST – Not implemented.
- PTC CUTOUT – PTC System has been manually cut-out by circuit breaker.

### TOD

#### ATC (Cab Signals)

- OVERSPEED (ATC) – Cab Signal/ATC overspeed condition.
- ATC FORESTALL - Sufficient brakes applied and acknowledgement received to prevent ATC overspeed penalty.
- BRAKE ASSURANCE RATE - Sufficient brakes applied to prevent overspeed penalty.
- PENALTY BRAKE – Penalty Brake Application initiated
- EMERGENCY BRAKES – Emergency Brake Application initiated

#### ALERTER

- ALERTER – Alert has activated, acknowledge required.
- ALERTER BYPASS – System satisfied, will not activate.

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### ATC Operation (Cab Signals & Speed Control)

**Cab Signal Upgrade** - The system will simply beep and not require any input.

**Cab Signal Downgrade** - Acknowledgement is always required within 7 seconds. If the actual train speed is above the new cab signal speed limit, the Engineer must apply the brakes sufficiently so the Brake Assurance indicator appears within 7 seconds to “forestall” (delay) a Penalty Brake application. Do not release brakes until ATC Overspeed light extinguishes.

#### **ATC Penalty Brake Application – Reset Procedures**

- M3A - Acknowledge and apply Max Brake until ATC Overspeed light extinguishes before releasing brakes.
- M7A - Acknowledge and apply sufficient brake to indicate Brake Assurance and wait until Penalty Brake indicator extinguishes before releasing brakes.

### ACSES Operation (Track Speed Limit)

**Track Speed Increase** - The system will simply beep and not require any input.

**Track Speed Reduction** - Acknowledgement is always required within 7 seconds. In addition, if the actual train speed exceeds the new track speed limit or calculated braking curve speed to the new speed limit the ACSES Overspeed light will be:

- (Steady) 3-6MPH over limit. The system will sound audible warning only.
- (Flashing) 6+MPH over limit. The system will activate an immediate Penalty Brake application.

**Exiting ACSES to Non-ACSES** - Acknowledgement is always required within 7 seconds. Note that the system will always display double dashes “- -” in non-ACSES territory.

#### **ACSES Penalty Brake Application – Reset Procedures**

- M3A - Acknowledge and apply Max Brake and wait until ACSES Overspeed light extinguishes before releasing brakes.
- M7A - Acknowledge and apply sufficient brake to indicate Brake Assurance and wait until ACSES Overspeed light extinguishes before releasing brakes.

### ALERTER (Vigilance Device)

The Alerter will sound after 25 seconds without any Engineer input. After alarm initially sounds, the Engineer must acknowledge within 15 seconds to avoid a Penalty Brake application. While stopped and sufficient brakes are applied, the system goes into Alerter Bypass and the system will be dormant.

#### **Alarm Sounds**

- M3A - *4 Quick Beeps, 4 Quick Beeps...*
- M7A - *High,Low,High,Low...*

#### **Penalty Brake Application – Reset Procedures**

- M3A - After stopping, acknowledge to silence alarm, apply Max Brake and recharge air brake system.
- M7A - After stopping, acknowledge to silence alarm, apply Max Brake and recharge air brake system.