

Instructions for Using the NORAC Signal Package

0. Introduction

This package provides a comprehensive railway signal library for Train Director inspired by NORAC (Northeast Operating Rules Advisory Committee) operating rules and by the signaling practices historically adopted by major North American railroads.

The purpose of this project is not to reproduce the signaling system of a single railroad, but rather to provide a consistent and coherent library suitable for simulating railway lines, stations, yards, sidings and interlocking plants according to NORAC operating principles.

The library includes signals inspired by devices currently used or historically used by:

- Amtrak
- SEPTA
- NJ Transit
- CSX
- Norfolk Southern
- Union Pacific
- BNSF
- Canadian National
- Canadian Pacific Kansas City

as well as by other North American railroads operating under rules compatible with NORAC practices.

Some special low signals (DRF, DIA, VCL and DDS) are derived from actual installations observed on former PRR, SEPTA and Amtrak territory or have been developed to satisfy specific simulation requirements. They do not necessarily correspond to signal types formally described in NORAC Rule Books.

1. Installation

The signal package is distributed in the archive `Norac.zip`.

It is recommended to extract the archive into a dedicated directory and configure that directory as the “Directories with signal scripts” in the `Preferences | Environment` within Train Director.

2. Direction of Movement

When placing signals, it is important to remember that North American railroads generally do not distinguish between legal and illegal tracks as is common in some European railway systems. The reference is always the direction of train movement.

- Right-hand side (`_nr/_ar`): signals are normally placed on the right-hand side of the train's direction of travel.
- Left-hand side (`_nl/_al`): alternative icons are provided for placement on the left-hand side of the train's direction of travel, for example on signal bridges, cantilevers or where physical clearances require it.

3. Simulated Signal Types

Historically, each railroad developed its own signal structures while generally remaining fully compatible with NORAC operating principles, except in a few special cases.

Type	Structure	Company
pl — Position Light	One- or two-head signals. Indications are displayed by illuminated bars reproducing the historical positions of semaphore arms. On two-head signals, the upper head may display three illuminated positions formed by two or three amber lamps, while the lower head may display four positions. These arrangements mimic the indications formerly provided by semaphore signals.	Amtrak (former Pennsylvania Railroad territory on the Northeast Corridor), SEPTA, NJ Transit and Norfolk Southern (NS). These signals are gradually being replaced by LED installations.
cpl — Color Position Light	An evolution of the Position Light signal. The structure is very similar to a traditional Position Light signal, except that the lamps display red, yellow (amber), green and lunar instead of amber indications only.	Amtrak (former Pennsylvania Railroad territory) and CSX, including former Baltimore & Ohio territory. These signals are also progressively being replaced by LED installations.
srl — Searchlight	One-, two- or three-head signals.	Union Pacific (UP), BNSF, Canadian

	Each signal head uses a single lamp capable of displaying red, yellow, green and, on some installations, lunar indications.	National (CN) and Canadian Pacific Kansas City (CPKC). Many installations are currently being converted to LED technology.
rcl — Round Color Light (Type-G or Type-N)	One-, two- or three-head color-light signals. Each head contains three lamps arranged either in a triangular pattern with the apex downward (Type-G) or in a vertical arrangement (Type-N). Displayed colors generally include red, yellow, green and, in some cases, lunar.	BNSF Railway, Union Pacific (UP) and Amtrak.

3.1 B&O Color Position Light (CPL) Family

The B&O signal family included in this package is based on the operating principles of the Color Position Light (CPL) signals historically used by the Baltimore & Ohio Railroad and later incorporated into operating practices compatible with NORAC rules.

The objective of the project was not to reproduce every historical variation developed by the B&O, but rather to provide a consistent and operationally complete representation of the aspects genuinely useful within Train Director.

The aspect charts adopted as reference led to the definition of a simplified operational matrix consisting exclusively of the following aspects:

- Clear
- Approach
- Approach Medium
- Approach Slow
- Medium Clear
- Medium Approach
- Medium Approach Medium
- Medium Approach Slow
- Slow Clear
- Slow Approach
- Restricting
- Stop and Proceed
- Stop

During the analysis of B&O signal rules, several historical indications were identified that have not been implemented in this package because they provide little operational benefit within the simulator or are not directly compatible with the adopted NORAC logic. These include:

- Permissive
- Medium Permissive
- Take Siding

The historical Permissive indication has been conceptually assimilated into the Restricting aspect, which reproduces its essential operational behavior.

The function historically performed by Take Siding indications may be reproduced through the use of the special sid.tds signal, which authorizes movement into a siding while simultaneously keeping the corresponding exit signal at stop until the intended movement has been completed.

The B&O aspect charts used as reference also do not include the Limited-speed aspects that were later introduced or adopted in other NORAC implementations.

For this reason, the following aspects have not been implemented in the B&O CPL family:

- Limited Clear
- Limited Approach
- Approach Limited

The omission of these aspects does not affect the operation of the simulated signaling system nor does it limit the representation of the principal operating conditions normally encountered on Northeastern United States railroads.

The resulting B&O family preserves the fundamental operating philosophy of the original CPL system while maintaining a coherent, uniform and practical structure suitable for use within the Train Director environment.

4. Naming Convention for .tds Files and .xpm Icons

CONFIGURATION FILES (.TDS)

`nor_[group]_[type]_[automation]_[position]_[direction].tds`

Where:

- `nor`: NORAC unified signal association.
- `group`: operational function of the signal (see Section 5 for detailed descriptions).
- `type`: physical signal construction type.
- `Automation`: `a` = automatic / permissive, `n` = normal / absolute (non-automatic)
- `position`: location of the signal relative to the direction of movement. `r` = right side (Right), `l` = left side (Left)
- `direction`: E, W, N, S.

In particular:

group identifies the operational purpose of the signal:

- `app` → simplified approach signal, normally preceding a home signal.
- `block` → line signal without turnout-related aspects.
- `com` → signal governing departures from multiple tracks.
- `dds` → dwarf repeater signal.
- `dep` → departure signal controlled by the protecting entrance signal (`fixedred=0`).
- `dia` → diamond-shaped low signal.
- `drf` → dwarf signal.
- `home` → home signal.
- `leav` → siding departure signal.
- `stat` → station or yard entrance signal controlling departure signals.
- `vc1` → vertical color-light signal.

type identifies the physical signal family. The number `x` indicates the number of signal heads:

- `plx` → Position Light
- `cplx` → Color Position Light
- `sr1x` → Searchlight
- `rc1x` → Round Color Light (Triangular Color Light, Type G or Type N)
- `b&o` → Baltimore & Ohio Color Position Light

Example: `nor_home_cp12_nr_W.tds` represents a two-head Color Position Light home signal, non-automatic, placed on the right-hand side of the direction of travel and facing west.

ICON FILES (.XPM)

`[group]_[aspect]_[color]_[automation/position]_[direction].xpm`

Whenever possible, aspect names follow standard NORAC terminology.

For Position Light and Color Position Light signals, the color code identifies the illuminated bar positions.

Example: `sr13_LC_rbr_nr_E.xpm` is an icon belonging to the `sr13` family. The aspect is **Limited Clear**, displaying the colors red-black-red and intended for eastbound operation.

5. Operational Details of Simulated Signal Groups

As a general rule, three-head signals (`sr13` and `rc13`) should be used exclusively as home signals protecting complex interlockings. These signals should normally be preceded by a two-head approach signal (`_app`).

Automatic signals are supplied with scripts that automatically define them as permissive, allowing them to be inserted using the one-head signal icon in the Train Director editor. If such a signal is also defined as **Intermediate**, the Intermediate property takes precedence.

NOTE: automatic signals (`ar/a1`) should be activated at the beginning of the simulation using: `Run | Set Sig. to green.`

HOME SIGNALS

`nor_home_*_nr/nl` — Absolute home signal. Automatic operation is not permitted. When used in stations, it does not control departure signals located at platforms.

`nor_stat_*_nr` — Station or yard entrance signal. Automatic operation is not permitted. If followed by a `_dep` signal, the departure signal is held at a fixed stop when the route is established through a diverging movement. If the route is aligned for the main track, the departure signal remains free to clear and the train may proceed without interruption. A blocked departure signal is released once the train passes the corresponding `stat` signal.
This signal may also be used to protect passing sidings, storage tracks, industrial tracks and other secondary routes whenever it is desirable to control an associated departure signal.
If the protected departure signal does not belong to the `_dep` family, a fictitious `sd` station should be placed immediately beyond the turnout. This prevents unrestricted movement and allows the script to operate correctly.

APPROACH / SIMPLIFIED PROTECTION SIGNALS

These signals normally precede a home signal. Because they provide only a reduced set of aspects, their use is not recommended if the protected block contains turnouts. In such cases a home signal should be used instead.

`nor_app_*_ar/al`: Automatic permissive block signal. The signal clears automatically when a route is lined, without requiring the user to manually set automatic signals to green. Insert using the one-head signal icon.
`nor_app_*_nr/nl`: Absolute non-automatic signal. Normally placed ahead of a home signal. Insert using the one-head signal icon.

LINE SIGNALS

Line signals are intended for long stretches of track operating with or without automatic block signaling. In these situations it is recommended that the `Intermediate` option be selected in the signal editor. A line signal should always be followed by either an `_app` signal or a `_home` signal.

`nor_block_*_ar/al`: Automatic permissive block signal. Clears automatically when a route is established. Insert using the one-head signal icon.

`nor_block_*_nr/nl`

Absolute non-automatic block signal. Insert using the one-head signal icon.

Used on long stretches of line. When protection of access to a siding or secondary track is required, use of a `stat` signal is generally recommended because of its greater flexibility.

Departure Signals

Departure Signal Family `_dep_`

Departure signals may be controlled by the associated `stat` signal.

They may be either high signals or dwarf signals.

`nor_dep_*_nr`

High departure signal.

When the preceding `stat` signal establishes a diverging route toward it, the signal remains locked at stop. It is released when the train passes the `stat` signal.

`nor_dep_drf_*_nr`

Dwarf departure signal.

When the preceding `stat` signal establishes a diverging route toward it, the signal remains locked at stop. It is released when the train passes the `stat` signal.

Siding Exit Signals `_leav_`

This signal governs movement from a siding back to the main track. It was developed to reproduce NORAC rules governing movements from secondary or non-sigaled tracks.

`nor_leav_*_nr`

When using this signal, a fictitious `sd` station must be placed immediately after the siding entrance.

The `_leav` signal should be regarded as the counterpart of the `stat` signal that protects entry into the siding.

Low, Repeater and Vertical Signals

`nor_dia_ped_nr` (Diamond)

Column-mounted low signal capable of displaying all aspects available on a two-head high signal. Intended for confined spaces and flat junctions.

`nor_vcl*_nr`

Vertical color-light signal with three or four vertically arranged lamps.

`nor_drf_*_nr` (Dwarf)

Low yard or shunting signal.

`nor_dds_*_nr` (Dwarf Distance Signal / Repeater)

Low repeater signal displaying the aspect of the signal ahead.

It must not be confused with a conventional approach signal. It does not itself authorize train movement and does not replace either an approach signal or a home signal.

Other Signals

Plain Text

bumper

Mostra piÃ¹ linee

End-of-track bumper.

Plain Text

YL

Mostra piÃ¹ linee

Yard limit sign.

Conclusions

The signal families included in this package cover the vast majority of operating situations governed by NORAC rules. Although not every historical, local or company-specific variation has been reproduced, the package represents the principal signaling systems and operational aspects used by Northeastern United States railroads, including former PRR, B&O, Conrail, Amtrak, CSX, Norfolk Southern, SEPTA and NJ Transit territory.

The current release contains 95 TDS configuration files and 1439 XPM icons. All references between TDS files and icons have been verified and found to be fully consistent. No missing icons, unused icons or incomplete directional icon sets remain.

Plain Text

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Mostra piÃ¹ linee

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