A TikZ library for track schematics
by the project contributors
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1. Introduction

1.1. About tikz-trackschematic

The TikZ-trackschematic library is a toolbox of symbols geared primarily towards creating track schematic for either research or educational purposes. It provides a TikZ frontend to some of the symbols which maybe needed to describe situations and layouts in railway operation. The library is divided into the following sublibraries:

- topology,
- trafficcontrol,
- vehicles,
- constructions,
- symbology,
- electrics, and
- measures.

1.2. Acknowledgement

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 826347. If you want to cite this project please use the follwoing informations:


1.3. Requirements

The library uses TikZ and it is based the following packages:

- tikz,
- xcolor, and
- etoolbox.

Further more it uses the following TikZ libraries:

- calc,
- intersections,
- patterns, and
- arrows.meta.
1.4. License

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1.5. Alternatives

Apart from this library, there is also the Signalschablone with german (Deutsche Bahn) symbols for MS Visio.

2. Usage

2.1. A complete minimal example

The command `\usepackage{tikz-trackschematic}` will load the library; place it somewhere in your preamble. Here is a complete working minimal example which will produce a single PDF file with the figure on the right:

```latex
\documentclass{standalone}
% loading the library
\usepackage{tikz-trackschematic}
\begin{document}
% LaTeX
\begin{tikzpicture}
% TikZ
% draw a track with (x,y) coordinates
\maintrack (0,0) -- (6,0);
% place a train on the track
\train[forward] at (5,0) label ();
\end{tikzpicture}
\end{document}
```

2.2. Placement

To place symbols in a track schematic, they need to placed and oriented correctly. The placement is done through the given TikZ coordinate. There are a few assumptions made about the placement:

1. Parallel tracks are drawn at a distance of 1 cm (which is the base unit of TikZ).
2. Tracks are only drawn at an angle of $n \cdot 45^\circ$.

2.3. Orientation system

The orientation is controlled via given TikZ options or pgfkey. The orientation options/pgfkeys inhibit their meaning from reading left to right as `forward` and relate `left/right` to that movement.
2. Usage

The main option/pgfkey is the `face` option to control in which direction an object will face. The key can take one of the following two values: `forward`, and `backward`.

```latex
\train[face=forward] at (coordinate) label ();
\train[face=backward] at (coordinate) label ();
```

As a shortcut you may also just give the option `forward` or `backward` without the `face=` in front of it.

If you have objects which branch either to the left or the right you have to give the `branch` option which takes one of the following two values: `left`, and `right`.

```latex
\turnout[forward,branch=left] at (coordinate) label ();
\turnout[forward,branch=right] at (coordinate) label ();
\turnout[backward,branch=left] at (coordinate) label ();
\turnout[backward,branch=right] at (coordinate) label ();
```

There is no shortcut and the key `branch=` must be given contrary to the key `face=`.

### 2.4. Left- and right-hand traffic

The traffic practice to divide bidirectional traffic has impact mostly on traffic control. The default traffic practice for this library is right-hand traffic. You can change it either globally or locally with the key `traffic practice=left`. There is also the alias `position` for single local entries.
3. Provided Symbols and their commands

3.1. overview

To get a table with all symbols the command `\tsFullSymbology` is provided. It can be used in a normal TeX environment and will list all symbols of all sublibraries.

Each symbol provides a reference name for a symbology entry if there is the need to create an own table with the symbols. It can be used in a normal TeX environment and will show the named symbol with a length of 6.2 cm and a height of 1 cm.
3. Provided Symbols and their commands

There is also a table with snippets for various situations. Each snippet and each symbol must be used inside a TikZ environment. Each sublibrary provides different symbols. The following section will go through each symbol their command and options.

3.2. Topology

3.2.1. Tracks

Drawing a track follows the same principal as drawing a line in TikZ. There are two general options of tracks with different commands: main tracks, and secondary tracks.

Main track

\maintrack (coord1) -- (coord2);
\maintrack (coord1) -- (coord2) -- (coord3) -- etc.;

No options available.
This command is equivalent to:
\path[draw=foreground,line width=2pt] (coord1) -- (coord2);

Beware of the placement assumption by the library (see Section 2.2).

Symbology entry as seen at top:
\Symbol{main_track}\TeX{} environment

Secondary track

\secondarytrack (coord1) -- (coord2);
\secondarytrack (coord1) -- (coord2) -- (coord3) -- etc.;

For the secondary track you may also use the following alias:
\sidetrack (coord1) -- (coord2);

No options available.
The command is equivalent to:
\path[draw=foreground,line width=0.7pt] (coord1) -- (coord2);

Beware of the placement assumption by the library (see Section 2.2).

Symbology entry as seen at top:
\Symbol{secondary_track}\TeX{} environment
3. Provided Symbols and their commands

- **Track number or track label**

  \texttt{\textbackslash tracklabel} at \texttt{(coord)} label \texttt{(number)};

  No options available.
  This command is equivalent to:

  \texttt{\node\[fill=background,text=foreground\] at \texttt{(coord)} \texttt{(number)};}

  Symbology entry as seen at top:

  \texttt{\textbackslash tsSymbol$\{track\_label\}$ \TeX \textit{environment}}

- **Buffer stops**

  \texttt{\textbackslash bufferstop\[options\] at \texttt{(coord)};}

  values for options (comma separated):

  - \texttt{forward} or \texttt{backward} (mandatory)
  - \texttt{friction=\textit{length unit}} (optional)
  - \texttt{foreground=\textit{color}} (optional, default: black)

  Symbology entry as seen at top:

  \texttt{\textbackslash tsSymbol$\{bufferstop\}$ \TeX \textit{environment}}

  \texttt{\textbackslash tsSymbol$\{friction\_bufferstop\}$ \TeX \textit{environment}}

- **Track closures**

  \texttt{\textbackslash trackclosure at \texttt{(coord)};}

  No options available.

  Symbology entry as seen at top:

  \texttt{\textbackslash tsSymbol$\{track\_closure\}$ \TeX \textit{environment}}
3. Provided Symbols and their commands

3.2.2. Turnouts and similar

### Turnouts

```
\texttt{\textbackslash turnout[options]} \texttt{at (coord) label (name)};
```

values for options (comma separated):

- **forward** or **backward** (mandatory)
- **branch=left** or **branch=right** (mandatory)
- **operation=manual** (optional)
- **fouling point** (optional)
- **points=left, points=right, or points=moving** (optional, default: none)
- **shift label={ (label-coord) }** (optional, default: (0,0))
- **foreground=color** (optional, default: black)

Symbology entry as seen at top:

- `\texttt{\textbackslash tsSymbol\{turnout\_fouling\}}` \textit{TeX} environment
- `\texttt{\textbackslash tsSymbol\{turnout\_manually\}}` \textit{TeX} environment

### Diamond crossings

```
\texttt{\textbackslash crossing[options]} \texttt{at (coord) label (name)};
```

values for options (comma separated):

- **branch=left** or **branch=right** (mandatory)
- **fouling point** (optional)
- **shift label={ (label-coord) }** (optional, default: (0,0))
- **foreground=color** (optional, default: black)

Symbology entry as seen at top:

- `\texttt{\textbackslash tsSymbol\{diamond\_crossing\}}` \textit{TeX} environment
3. Provided Symbols and their commands

**Slip switches or slip turnouts**

\texttt{\slipturnout[options] at (coord) label (name1)(name2);}  

values for options (comma separated):

- branch=left or branch=right \textbf{(mandatory)}
- slip=double \textbf{(default)}, slip=none, slip=left or slip=right \textbf{(mandatory)}
- operation=manual \textbf{(optional)}
- fouling point \textbf{(optional)}
- forward points=left, forward points=right, or forward points=moving \textbf{(optional, default: none)}
- backward points=left, backward points=right, or backward points=moving \textbf{(optional, default: none)}
- shift label=\{\textit{(label-coord)}\} \textbf{(optional, default: (0,0))}
- foreground=color \textbf{(optional, default: black)}

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol\{slip\_ turnout\}} \textit{TeX environment}

**Derailers**

\texttt{\derailer[options] at (coord) label (name);}  

values for options (comma separated):

- forward or backward \textbf{(mandatory)}
- branch=left or branch=right \textbf{(mandatory)}
- shift label=\{\textit{(label-coord)}\} \textbf{(optional, default: (0,0))}
- foreground=color \textbf{(optional, default: black)}

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol\{derailer\}} \textit{TeX environment}
3. Provided Symbols and their commands

3.3. Vehicles

Parked vehicles

\parkedvehicles[options] at (coord) label (name);

values for options (comma separated):

- length=\textit{length unit} (optional, default 4cm)
- shift label=\{\textit{label-coord}\} (optional, default: (0,0))
- label align=left or label align=right (optional, default: center)
- foreground=\textit{color} (optional, default: black)
- background=\textit{color} (optional, default: white)

The value for \textit{(label-coord)} is relative to \textit{(coord)}. An absolute \textit{(label-coord)} can be specified with the \texttt{TikZ coordinate} command.

Symbology entry as seen at top:

\texttt{\textbackslash{}tsSymbol(parked\_vehicles)}

Shunting movements

\shunting[options] at (coord) label (name);

values for options (comma separated):

- movement (optional)
  - forward or backward (mandatory)
- length=\textit{length unit} (optional, default 4cm)
- operation=manual or operation=automatic (optional)
- bend left at=\{\textit{bend-coord}\} (optional, default: \texttt{none})
- bend right at=\{\textit{bend-coord}\} (optional, default: \texttt{none})
- shift label=\{\textit{label-coord}\} (optional, default: (0,0))
- label align=left or label align=right (optional, default: center)
- foreground=\textit{color} (optional, default: black)
background=color (optional, default: white)

The value for (label-coord) and (bend-coord) is relative to (coord). An absolute (label-coord) or (bend-coord) can be specified with the Ti\textit{k}Z \texttt{coordinate} command.

Symbology entry as seen at top:
\begin{lstlisting}[language=TeX]
\texttt{\textbackslash tsSymbol(train_shunting)} \\% Te\textit{k}Z environment
\end{lstlisting}

\begin{itemize}
  \item Train runs
\end{itemize}

\begin{lstlisting}[language=TeX]
\texttt{\textbackslash train[options] at (coord) label (name)};
\end{lstlisting}

values for options (comma seperated):
\begin{itemize}
  \item run=slow, run=normal or run=fast (optional)
  \item forward or backward (mandatory)
  \item length=length unit (optional, default 4cm)
  \item operation=manual or operation=automatic (optional)
  \item ghost (optional)
  \item bend left at={ (bend-coord) } (optional, default: none)
  \item bend right at={ (bend-coord) } (optional, default: none)
  \item shift label={ (label-coord) } (optional, default: (0,0))
  \item label align=left or label align=right (optional, default: center)
  \item foreground=color (optional, default: black)
  \item background=color (optional, default: white)
\end{itemize}

The value for (label-coord) and (bend-coord) is relative to (coord). An absolute (label-coord) or (bend-coord) can be specified with the Ti\textit{k}Z \texttt{coordinate} command.

Symbology entry as seen at top:
\begin{lstlisting}[language=TeX]
\texttt{\textbackslash tsSymbol(train_moving_fast)} \\% Te\textit{k}Z environment
\texttt{\textbackslash tsSymbol(train_ghost)} \\% Te\textit{k}Z environment
\end{lstlisting}
3. Provided Symbols and their commands

3.4. Traffic control

3.4.1. Stationary signals

Generic signal command

\texttt{\textbackslash signal[options] at (coord) label (name);}  

values for options (comma separated):

- at least one of the following: distant, speed type, block, route, shunt,
  limit, shunting and/or berth
- forward or backward (mandatory)
- speed=value (optional)
- distant speed=value (optional)
- locked=false (default) or locked=true (optional)
- position=left or position=right (optional, default: \textit{traffic practice})
- shift label={ (label-coord) } (optional, default: (0,0))
- foreground=color (optional, default: black)

Distant signal

\texttt{\textbackslash distantsignal[options] at (coord) label (name);}  

values for options (comma separated):

- forward or backward (mandatory)
- distant speed=value (optional)
- position=left or position=right (optional, default: \textit{traffic practice})
- shift label={ (label-coord) } (optional, default: (0,0))
- foreground=color (optional, default: black)

This command is equivalent to:

\texttt{\textbackslash signal[distance,options] at (coord) label (name);}  

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol[1.4](distantsignal)} \textit{\TeX \ environment}
3. Provided Symbols and their commands

**Speed signal/sign**

\[ \texttt{\textbackslash{speedsignal}[\texttt{options}] \ at \ (\texttt{coord}) \ label \ (\texttt{name});} \]

For the speed signal you may also use the following alias:

\[ \texttt{\textbackslash{speedsign}[\texttt{options}] \ at \ (\texttt{coord}) \ label \ (\texttt{name});} \]

values for options (comma separated):

- forward or backward (mandatory)
- speed=value (optional)
- position=left or position=right (optional, default: traffic practice)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- foreground=color (optional, default: black)

This command is equivalent to:

\[ \texttt{\textbackslash{signal}[\texttt{speed type},\texttt{options}] \ at \ (\texttt{coord}) \ label \ (\texttt{name});} \]

Symbology entry as seen at top:

\[ \texttt{\textbackslash{tsSymbol}[1.4][\texttt{speed_signal}] \ TeX \ environment} \]

**Block signal**

\[ \texttt{\textbackslash{blocksignal}[\texttt{options}] \ at \ (\texttt{coord}) \ label \ (\texttt{name});} \]

values for options (comma separated):

- forward or backward (mandatory)
- speed=value (optional)
- position=left or position=right (optional, default: traffic practice)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- foreground=color (optional, default: black)

This command is equivalent to:
3. Provided Symbols and their commands

\signal[\text{block, options}] \text{ at (coord) label (name)};

Symbology entry as seen at top:
\text{\texttt{\textbackslash tsSymbol[1.4](block\_signal) \textbackslash\textsf{\TeX\ environment}}}

\begin{itemize}
\item \textbf{Route signal}
\end{itemize}

\\text{\texttt{\textbackslash routesignal[options] \text{ at (coord) label (name)}};}

values for \texttt{options} (comma separated):
\begin{itemize}
\item forward or backward (mandatory)
\item speed=value (optional)
\item locked=false (default) or locked=true (optional)
\item position=left or position=right (optional, default: \textit{traffic practice})
\item shift label=\{ (label-coord) \} (optional, default: (0,0))
\item foreground=color (optional, default: black)
\end{itemize}

This command is equivalent to:
\\text{\texttt{\textbackslash signal[route, options] \text{ at (coord) label (name)}};}

Symbology entry as seen at top:
\text{\texttt{\textbackslash tsSymbol[1.4](route\_signal) \textbackslash\textsf{\TeX\ environment}}}

\begin{itemize}
\item \textbf{Shunting signal}
\end{itemize}

\\text{\texttt{\textbackslash shuntsignal[options] \text{ at (coord) label (name)}};}

values for \texttt{options} (comma separated):
\begin{itemize}
\item forward or backward (mandatory)
\item locked=false (default) or locked=true (optional)
\end{itemize}
3. **Provided Symbols and their commands**

position=left or position=right (optional, default: traffic practice)

shift label={ (label-coord)} (optional, default: (0,0))

foreground=\textcolor{color} (optional, default: black)

This command is equivalent to:

\texttt{\textbackslash signal[shunting,options] at (coord) label (name);}

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol[1.4]\{shunt_signal\}\$ TeX environment}

| Graphic \hspace{2cm} Shunt limit

\texttt{\textbackslash shuntlimit[options] at (coord) label (name);}

values for options (comma seperated):

forward or backward (mandatory)

position=left or position=right (optional, default: traffic practice)

shift label={ (label-coord)} (optional, default: (0,0))

foreground=\textcolor{color} (optional, default: black)

This command is equivalent to:

\texttt{\textbackslash signal[shunt limit,options] at (coord) label (name);}

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol[1.4]\{shunt_limit\}\$ TeX environment}

| Graphic \hspace{2cm} Berth signal/sign

\texttt{\textbackslash berthsignal[options] at (coord) label (name);}

For the speed signal you may also use the following alias:

\texttt{\textbackslash berthsign[options] at (coord) label (name);}
3. Provided Symbols and their commands

values for options (comma seperated):

forward or backward (mandatory)
position=left or position=right (optional, default: traffic practice)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)

This command is equivalent to:

\signal[berth,options] at (coord) label (name);

Symbology entry as seen at top:
\tsSymbol[1.4]{train_berth_sign} \& TeX environment

3.4.2. Non-stationary locations

View point

\viewpoint[options] at (coord);

values for options (comma seperated):

forward or backward (mandatory)
position=left or position=right (optional, default: traffic practice)
foreground=color (optional, default: black)

Symbology entry as seen at top:
\tsSymbol[1.4]{view_point} \& TeX environment

Braking point

\brakingpoint[options] at (coord) label (name);

values for options (comma seperated):

forward, backward or bidirectional (mandatory)
3. Provided Symbols and their commands

position=left or position=right (optional, default: traffic practice)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)

Symbology entry as seen at top:
\tsSymbol[1.4]{braking_point} \textendash TeX environment

End of movement authority

\movementauthority[options] at (coord) label (name);
values for options (comma separated):
  forward, backward or bidirectional (mandatory)
  position=left or position=right (optional, default: traffic practice)
  shift label={ (label-coord) } (optional, default: (0,0))
  foreground=color (optional, default: black)

Symbology entry as seen at top:
\tsSymbol[1.4]{end_of_authority} \textendash TeX environment

Danger point

\dangerpoint[options] at (coord) label (name);
values for options (comma separated):
  forward, backward or bidirectional (mandatory)
  position=left or position=right (optional, default: traffic practice)
  shift label={ (label-coord) } (optional, default: (0,0))
  foreground=color (optional, default: black)

Symbology entry as seen at top:
\tsSymbol[1.4]{danger_point} \textendash TeX environment
### 3. Provided Symbols and their commands

#### 3.4.3. Clearing points

**Generic clearing point**

```latex
\texttt{\textbackslash clearingpoint\{options\} at (coord) label \{name\};}
```

values for options (comma separated):

- at least one of the following: standard, block and/or route
- forward (default) or backward (optional)
- position=left or position=right (optional, default: traffic practice)
- shift label={\{label-coord\}} (optional, default: (0,0))
- foreground=color (optional, default: black)

**Standard clearing point**

```latex
\texttt{\textbackslash standardclearing\{options\} at (coord) label \{name\};}
```

values for options (comma separated):

- forward (default) or backward (optional)
- position=left or position=right (optional, default: traffic practice)
- shift label={\{label-coord\}} (optional, default: (0,0))
- foreground=color (optional, default: black)

This command is equivalent to:

```latex
\texttt{\textbackslash clearingpoint\{standard, options\} at (coord) label \{name\};}
```

Symbology entry as seen at top:

```latex
\texttt{\textbackslash tsSymbol\{clearing\_point\}\& TeX environment}
```

**Block clearing point**

```latex
\texttt{\textbackslash blockclearing\{options\} at (coord) label \{name\};}
```

values for options (comma separated):
Provided Symbols and their commands

forward (default) or backward (optional)
position=left or position=right (optional, default: traffic practice)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)

This command is equivalent to:
```
\clearingpoint[block,options] at (coord) label (name);
```

Symbology entry as seen at top:
```
\tsSymbol{block_clearing_point}\ TeX\ environment
```

Route clearing point

```
\route[options] at (coord) label (name);
```

values for options (comma seperated):
forward (default) or backward (optional)
position=left or position=right (optional, default: traffic practice)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)

This command is equivalent to:
```
\clearingpoint[route,options] at (coord) label (name);
```

Symbology entry as seen at top:
```
\tsSymbol{route_clearing_point}\ TeX\ environment
```

3.4.4. Routes

Route

```
\route[options] at (coord);
```

values for options (comma seperated):
3. Provided Symbols and their commands

forward or backward (mandatory)
foreground=color (optional, default: black)

Symbology entry as seen at top:
\texttt{\penalty0 Symbol\{route\}} \texttt{\ TeX\ environment}

\section*{Direction control}

\begin{center}
\begin{tabular}{c|c|c}
\hline
& & \\
\hline
& & \\
\hline
& & \\
\end{tabular}
\end{center}

\texttt{\directioncontrol[options] at (coord)};
values for options (comma seperated):
forward, backward or bidirectional (mandatory)
foreground=color (optional, default: black)

Symbology entry as seen at top:
\texttt{\penalty0 tsSymbol[1.4]\{direction\_control\}} \texttt{\ TeX\ environment}

\subsection*{3.4.5. Transmitters}

\texttt{\Balise[options] at (coord) label (name)};
values for options (comma seperated):
forward, or backward (mandatory)
position=left or position=right (optional, default: traffic practice)
switched (optional)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)

The basic state is one in which the individual balises are not shown. The direction of the balises is the same as the direction of action. The direction of the balises is indicated by the orientation of the label. The \texttt{switched} option changes the symbol over the entire length.
3. Provided Symbols and their commands

along={comma separated list of integers} (optional)
oppose={comma separated list of integers} (optional)
along switched={comma separated list of integers} (optional)
oppose switched={comma separated list of integers} (optional)
index (optional)

If individual balises are to be shown, they are indicated via the along or along switched with the direction of the balise and with oppose or oppose switched against the balise. A list with integer values is passed to the parameter. The list starts with 0. For example, three individual balises are drawn with the list \{0,1,3\} and the balise at position 2 is left out. With the option index, the index number can also be displayed. If one of the options along, along switched, oppose, or oppose switched is set, the switched option is ignored.

Symbology entry as seen at top:
\texttt{Symbol{balise\_group}} % TeX environment
\texttt{Symbol{balise\_individual}} % TeX environment

\begin{itemize}
  \item \textbf{Loop}
  \begin{verbatim}
  \trackloop[options] at (coord) label (name);
  \end{verbatim}
  values for options (comma separated):
  \begin{itemize}
    \item position=left or position=right (optional, default: traffic practice)
    \item shift label={ (label-coord) } (optional, default: (0,0))
    \item foreground=color (optional, default: black)
  \end{itemize}
  Symbology entry as seen at top:
  \texttt{Symbol{trackloop}} % TeX environment
\end{itemize}

3.5. Constructions

\begin{itemize}
  \item \textbf{Platform}
  \begin{verbatim}
  \platform[options] at (coord);
  \end{verbatim}
\end{itemize}
3. Provided Symbols and their commands

values for options (comma separated):

- side=left, side=right or side=both (mandatory)
- length=length unit (optional, default 4cm)
- width=length unit (optional, default 0.5cm)
- foreground=color (optional, default: black)

Symbology entry as seen at top:

\texttt{\texttt{\texttt{\texttt{\\texttt{\texttt{\texttt{\texttt{textsymb[1.4][platform]} TeX environment}}}}}}}

\textbf{Level crossings}

\begin{center}
\begin{tikzpicture}
\draw (0,0) -- (0,1) -- (1,1) -- (1,0) -- cycle;
\end{tikzpicture}
\end{center}

\texttt{\texttt{\texttt{\texttt{\\levelcrossing[options] at (coord);}}}}

values for options (comma separated):

- barrier=none (default), barrier=semi or barrier=full (optional)
- side=both (default), side=left or side=right (optional)
- road width=length unit (optional, default 0.4cm)
- width=length unit (optional, default 0.5cm)
- no road (optional)
- foreground=color (optional, default: black)

Symbology entry as seen at top:

\texttt{\texttt{\texttt{\texttt{\\texttt{\texttt{\texttt{\texttt{textsymb[2.0][level\_crossing]} TeX environment}}}}}}}

\textbf{Bridge}

\begin{center}
\begin{tikzpicture}
\draw (0,0) -- (0,1) -- (1,1) -- (1,0) -- cycle;
\end{tikzpicture}
\end{center}

\texttt{\texttt{\texttt{\texttt{\\\texttt{bridge[options] at (coord);}}}}}

22
values for options (comma separated):
length=length unit (optional, default 4cm)
width=length unit (optional, default 0.5cm)
shift left=length unit (optional, default 0cm)
shift right=length unit (optional, default 0cm)
side=both (default), side=left or side=right (optional)
foreground=color (optional, default: black)
background=color (optional, default: white)
no background (optional)

Symbology entry as seen at top:
\texttt{\textbackslash tsSymbol[2.0][bridge]} \texttt{\textbackslash TeX environment}

\begin{itemize}
  \item \textbf{Interlocking}
\end{itemize}

\texttt{\textbackslash interlocking \textbackslash at \{coord\};
No options available.

Symbology entry as seen at top:
\texttt{\textbackslash tsSymbol\{interlocking\} \textbackslash TeX environment}

\begin{itemize}
  \item \textbf{Hump}
\end{itemize}

\texttt{\textbackslash hump \textbackslash at \{coord\};
No options available.

Symbology entry as seen at top:
\texttt{\textbackslash tsSymbol[1.4]\{hump\} \textbackslash TeX environment}
3. Provided Symbols and their commands

**Pylon**

\[\text{Symbol}{pylon}\]

values for options (comma seperated):

- side=right (default), side=left or side=both (optional)
- foreground=color (optional, default: black)
- background=color (optional, default: white)

Symbology entry as seen at top:

\[\text{Symbol}[\text{pylon}]\]

3.6. Electrics

**Distant power off**

\[\text{Symbol}[1.4]{distant\_power\_off}\]

values for options (comma seperated):

- forward, backward or bidirectional (mandatory)
- position=left or position=right (optional, default: traffic practice)
- signal color=color (optional, default: ts-signal-blue)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- foreground=color (optional, default: black)
- background=color (optional, default: white)

The color ts-signal-blue is defined as HTML: 013ADF. The value for (label-coord) is relative to (coord). An absolute (label-coord) can be specified with the Ti\kZ\coordinate command.

Symbology entry as seen at top:

\[\text{Symbol}[1.4]{distant\_power\_off}\]
3. Provided Symbols and their commands

**Power off**

\texttt{\textbackslash poweroff\{options\} at (coord) label \{name\};}

values for options (comma separated):

- forward, backward or bidirectional (mandatory)
- position=left or position=right (optional, default: traffic practice)
- signal color=color (optional, default: ts-signal-blue)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- foreground=color (optional, default: black)
- background=color (optional, default: white)

The color ts-signal-blue is defined as \textit{HTML: 013ADF}. The value for (label-coord) is relative to (coord). An absolute (label-coord) can be specified with the Ti\textit{kZ} \texttt{coordinate} command.

Symbology entry as seen at top:

\texttt{\tsSymbol[1.4]\{power_off\} \textbackslash TeX \textit{environment}}

**Power on**

\texttt{\textbackslash poweron\{options\} at (coord) label \{name\};}

values for options (comma separated):

- forward, backward or bidirectional (mandatory)
- position=left or position=right (optional, default: traffic practice)
- signal color=color (optional, default: ts-signal-blue)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- foreground=color (optional, default: black)
- background=color (optional, default: white)
3. Provided Symbols and their commands

The color ts\-signal\-blue is defined as HTML: 013ADF. The value for (label-coord) is relative to (coord). An absolute (label-coord) can be specified with the TikZ \coordinate command.

Symbology entry as seen at top:
\texttt{\textbackslash tsSymbol[1.4]\{power\_on\}}

\begin{itemize}
\item \texttt{\textbackslash distantpantographdown[options]} at (coord) label (name);
\end{itemize}

values for options (comma seperated):
\begin{itemize}
\item forward, backward or bidirectional (mandatory)
\item position=left or position=right (optional, default: traffic practice)
\item signal color=color (optional, default: ts\-signal\-blue)
\item shift label=\{(label-coord)\} (optional, default: (0,0))
\item foreground=color (optional, default: black)
\item background=color (optional, default: white)
\end{itemize}

The color ts\-signal\-blue is defined as HTML: 013ADF. The value for (label-coord) is relative to (coord). An absolute (label-coord) can be specified with the TikZ \coordinate command.

Symbology entry as seen at top:
\texttt{\textbackslash tsSymbol[1.4]\{distant\_pantograph\_down\}}

\begin{itemize}
\item \texttt{\textbackslash pantographdown[options]} at (coord) label (name);
\end{itemize}

values for options (comma seperated):
\begin{itemize}
\item forward, backward or bidirectional (mandatory)
\item position=left or position=right (optional, default: traffic practice)
\item signal color=color (optional, default: ts\-signal\-blue)
\end{itemize}
3. Provided Symbols and their commands

\begin{itemize}
  \item shift label={\texttt{(label-coord)}} (optional, default: \texttt{(0,0)})
  \item foreground=\texttt{color} (optional, default: \texttt{black})
  \item background=\texttt{color} (optional, default: \texttt{white})
\end{itemize}

The color \texttt{ts-signal-blue} is defined as \texttt{HTML: 013ADF}. The value for \texttt{(label-coord)} is relative to \texttt{(coord)}. An absolute \texttt{(label-coord)} can be specified with the Ti\texttt{kZ}\ coordinate command.

Symbology entry as seen at top:
\begin{verbatim}
\texttt{\textbackslash{tsSymbol}[1.4](pantograph\_down)} \texttt{\TeX\ environment}
\end{verbatim}

\begin{itemize}
  \item \texttt{\textbackslash{pantographup}[options]} at \texttt{(coord)} label \texttt{(name)};
\end{itemize}

values for \texttt{options} (comma separated):
\begin{itemize}
  \item forward, \texttt{backward} or \texttt{bidirectional} (mandatory)
  \item position=\texttt{left} or \texttt{position=right} (optional, default: \texttt{traffic practice})
  \item signal color=\texttt{color} (optional, default: \texttt{ts-signal-blue})
  \item shift label={\texttt{(label-coord)}} (optional, default: \texttt{(0,0)})
  \item foreground=\texttt{color} (optional, default: \texttt{black})
  \item background=\texttt{color} (optional, default: \texttt{white})
\end{itemize}

The color \texttt{ts-signal-blue} is defined as \texttt{HTML: 013ADF}. The value for \texttt{(label-coord)} is relative to \texttt{(coord)}. An absolute \texttt{(label-coord)} can be specified with the Ti\texttt{kZ}\ coordinate command.

Symbology entry as seen at top:
\begin{verbatim}
\texttt{\textbackslash{tsSymbol}[1.4](pantograph\_up)} \texttt{\TeX\ environment}
\end{verbatim}

\begin{itemize}
  \item \texttt{\textbackslash{wirelimit}[options]} at \texttt{(coord)} label \texttt{(name)};
\end{itemize}

values for \texttt{options} (comma separated):

\begin{verbatim}
\end{verbatim}
3. Provided Symbols and their commands

forward, backward or bidirectional (mandatory)
position=left or position=right (optional, default: traffic practice)
signal color=color (optional, default: ts-signal-blue)
shift label={ (label-coord) } (optional, default: (0,0))
foreground=color (optional, default: black)
background=color (optional, default: white)

The color ts-signal-blue is defined as HTML: 013ADF. The value for (label-coord) is relative to (coord). An absolute (label-coord) can be specified with the Ti\kZ\coordinate command.

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol[1.4]\{wire\_limit\}}% TeX environment

3.7. Measures

Track distance

\texttt{\textbackslash trackdistance} between (coord1) and (coord2) distance (value);

No options available.

Symbology entry as seen at top:

\texttt{\textbackslash tsSymbol[2.0]\{track\_distance\}}% TeX environment

Train berth

\texttt{\textbackslash berth[options]} at (coord) length (value);

values for options (comma seperated):

forward, backward or bidirectional (mandatory)
length=length unit (optional, default 4cm)
position=left or position=right (optional, default: traffic practice)
foreground=color (optional, default: black)
3. Provided Symbols and their commands

Symbology entry as seen at top:
```
\Symbol{train_berth}\% TeX environment
```

**Measure line**

```
\measureline (coord1) -- (coord2);
\measureline (coord1) -- (coord2) -- (coord3) -- etc.;
```

No options available.
This command is equivalent to:
```
\path[draw=foreground!50!background, dashed, shorten <=0.75cm, shorten >=0.75cm] (coord1) -- (coord2);
```

Symbology entry as seen at top:
```
\Symbol{measure_line}\% TeX environment
```

**Hectometer**

```
\hectometer[options] at (coord) mileage (name);
```

values for options (comma seperated):
- hectometer base=\{(base-coord)\} (mandatory)
- orientation=left or orientation=right (mandatory)
- shift label=\{(label-coord)\} (optional, default: (0,0))
- hectometer color=color (optional, default: foreground!50!background)
The value for \((base-coord)\) and \((label-coord)\) is relative to \((coord)\). An absolute \((base-coord)\) or \((label-coord)\) can be specified with the \texttt{TikZ coordinate} command. Specify a common hectometer base and orientation if you have to place multiple hectometers, i.e. with: 
\texttt{\tikzset{hectometer base={(base-coord)},orientation=right}};.

Symbology entry as seen at top:
\begin{verbatim}
\texttt{Symbol\{hectometer\}} % TeX environment
\end{verbatim}

\textbf{Track Marking}

\begin{verbatim}
\texttt{trackmarking[color]} (coord1) -- (coord2);
\end{verbatim}

\textit{color} (optional, default: foreground with opacity 40%)

This command is equivalent to:

\begin{verbatim}
\texttt{path[}
\texttt{draw,}
\texttt{line width=8pt,}
\texttt{opacity=0.4,}
\texttt{arrows={}
\texttt{Bar\{line cap=round,line width=1pt,width=12pt\}-}
\texttt{Bar\{line cap=round,line width=1pt,width=12pt\}}
\texttt{),}
\texttt{shorten >=1pt,shorten <=1pt}
\texttt{]} (coord1) -- (coord2);
\end{verbatim}

Symbology entry as seen at top:
\begin{verbatim}
\texttt{Symbol\{track\_marking\}} % TeX environment
\end{verbatim}
## A. Symbology

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Symbol</th>
<th>See section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>main track</td>
<td>![main track symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>2</td>
<td>secondary track</td>
<td>![secondary track symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>3</td>
<td>track label</td>
<td>![track label symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>4</td>
<td>bufferstop</td>
<td>![bufferstop symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>5</td>
<td>friction bufferstop</td>
<td>![friction bufferstop symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>6</td>
<td>track closure</td>
<td>![track closure symbol]</td>
<td>3.2.1</td>
</tr>
<tr>
<td>7</td>
<td>turnout</td>
<td>![turnout symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>8</td>
<td>turnout with fouling point indicator</td>
<td>![turnout with fouling point indicator symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>9</td>
<td>turnout operated manually</td>
<td>![turnout operated manually symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>10</td>
<td>turnout with points in right position</td>
<td>![turnout with points in right position symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>11</td>
<td>turnout with points in left position</td>
<td>![turnout with points in left position symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>12</td>
<td>turnout with moving points</td>
<td>![turnout with moving points symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>13</td>
<td>diamond crossing</td>
<td>![diamond crossing symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>14</td>
<td>double-slip turnout</td>
<td>![double-slip turnout symbol]</td>
<td>3.2.2</td>
</tr>
<tr>
<td>15</td>
<td>derailer</td>
<td>![derailer symbol]</td>
<td>3.2.2</td>
</tr>
</tbody>
</table>
### A. Symbology

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Symbol</th>
<th>See section</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>parked vehicles</td>
<td><img src="image1" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>17</td>
<td>train in shunting mode</td>
<td><img src="image2" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>18</td>
<td>train shunting</td>
<td><img src="image3" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>19</td>
<td>train</td>
<td><img src="image4" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>20</td>
<td>train moving slow</td>
<td><img src="image5" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>21</td>
<td>train moving</td>
<td><img src="image6" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>22</td>
<td>train moving fast</td>
<td><img src="image7" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>23</td>
<td>train ghost</td>
<td><img src="image8" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>24</td>
<td>train operated automatically</td>
<td><img src="image9" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>25</td>
<td>train operated by human</td>
<td><img src="image10" alt="Symbol" /></td>
<td>3.3</td>
</tr>
<tr>
<td>26</td>
<td>distant signal</td>
<td><img src="image11" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>27</td>
<td>distant signal with speed indicator</td>
<td><img src="image12" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>28</td>
<td>speed signal</td>
<td><img src="image13" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>29</td>
<td>block signal</td>
<td><img src="image14" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>30</td>
<td>route signal</td>
<td><img src="image15" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>31</td>
<td>combined signal (distant, block and route signal)</td>
<td><img src="image16" alt="Symbol" /></td>
<td>3.4.1</td>
</tr>
<tr>
<td>32</td>
<td>shunt signal</td>
<td><img src="image17" alt="Symbol" /></td>
<td>3.4.1</td>
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</table>
### A. Symbology

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Symbol</th>
<th>See section</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>shunt signal locked</td>
<td>![symbol]</td>
<td>3.4.1</td>
</tr>
<tr>
<td>34</td>
<td>shunt limit</td>
<td>![symbol]</td>
<td>3.4.1</td>
</tr>
<tr>
<td>35</td>
<td>train berth sign</td>
<td>![symbol]</td>
<td>3.4.1</td>
</tr>
<tr>
<td>36</td>
<td>view point</td>
<td>![symbol]</td>
<td>3.4.2</td>
</tr>
<tr>
<td>37</td>
<td>braking point</td>
<td>![symbol]</td>
<td>3.4.2</td>
</tr>
<tr>
<td>38</td>
<td>end of movement authority</td>
<td>![symbol]</td>
<td>3.4.2</td>
</tr>
<tr>
<td>39</td>
<td>danger point</td>
<td>![symbol]</td>
<td>3.4.2</td>
</tr>
<tr>
<td>40</td>
<td>clearing point</td>
<td>![symbol]</td>
<td>3.4.3</td>
</tr>
<tr>
<td>41</td>
<td>block clearing point</td>
<td>![symbol]</td>
<td>3.4.3</td>
</tr>
<tr>
<td>42</td>
<td>route clearing point</td>
<td>![symbol]</td>
<td>3.4.3</td>
</tr>
<tr>
<td>43</td>
<td>route</td>
<td>![symbol]</td>
<td>3.4.4</td>
</tr>
<tr>
<td>44</td>
<td>direction control</td>
<td>![symbol]</td>
<td>3.4.4</td>
</tr>
<tr>
<td>45</td>
<td>balise group</td>
<td>![symbol]</td>
<td>3.4.5</td>
</tr>
<tr>
<td>46</td>
<td>balise individual</td>
<td>![symbol]</td>
<td>3.4.5</td>
</tr>
<tr>
<td>47</td>
<td>track loop</td>
<td>![symbol]</td>
<td>3.4.5</td>
</tr>
<tr>
<td>48</td>
<td>platform</td>
<td>![symbol]</td>
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</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Symbol</td>
<td>See section</td>
</tr>
<tr>
<td>-----</td>
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<td>-------------</td>
</tr>
<tr>
<td>49</td>
<td>level crossing</td>
<td><img src="image" alt="symbol" /></td>
<td>3.5</td>
</tr>
<tr>
<td>50</td>
<td>bridge</td>
<td><img src="image" alt="symbol" /></td>
<td>3.5</td>
</tr>
<tr>
<td>51</td>
<td>hump</td>
<td><img src="image" alt="symbol" /></td>
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</tr>
<tr>
<td>52</td>
<td>interlocking</td>
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</tr>
<tr>
<td>53</td>
<td>pylons</td>
<td><img src="image" alt="symbol" /></td>
<td>3.5</td>
</tr>
<tr>
<td>54</td>
<td>distant power off</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>55</td>
<td>power off</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>56</td>
<td>power on</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>57</td>
<td>distant pantograph down</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>58</td>
<td>pantograph down</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>59</td>
<td>pantograph up</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>60</td>
<td>wire limit</td>
<td><img src="image" alt="symbol" /></td>
<td>3.6</td>
</tr>
<tr>
<td>61</td>
<td>track distance (in m)</td>
<td><img src="image" alt="symbol" /></td>
<td>3.7</td>
</tr>
</tbody>
</table>
### A. Symbology

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Symbol</th>
<th>See section</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>train berth shape</td>
<td><img src="image" alt="Symbol" /></td>
<td>3.7</td>
</tr>
<tr>
<td>63</td>
<td>Measure line</td>
<td><img src="image" alt="Symbol" /></td>
<td>3.7</td>
</tr>
<tr>
<td>64</td>
<td>hectometer</td>
<td><img src="image" alt="Symbol" /></td>
<td>3.7</td>
</tr>
<tr>
<td>65</td>
<td>track marking</td>
<td><img src="image" alt="Symbol" /></td>
<td>3.7</td>
</tr>
</tbody>
</table>
B. Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Author(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>2018-09-14</td>
<td>MS</td>
<td>Basic concept of a library with railway topology symbols and some examples.</td>
</tr>
<tr>
<td>0.2</td>
<td>2018-12-19</td>
<td>MS</td>
<td>Added transmitters and minor improvements.</td>
</tr>
<tr>
<td>0.3</td>
<td>2019-04-04</td>
<td>MS</td>
<td>Moved snippet folder to root folder and defined and used color foreground and background.</td>
</tr>
<tr>
<td>0.4</td>
<td>2019-07-21</td>
<td>MS</td>
<td>Reworked library for common tikz library layout.</td>
</tr>
<tr>
<td>0.5</td>
<td>2020-01-14</td>
<td>MS</td>
<td>Introducing new syntax and providing a documentation.</td>
</tr>
<tr>
<td>0.5.1</td>
<td>2020-02-10</td>
<td>MS</td>
<td>Modified symbol &quot;end of movement authority&quot;; added symbols &quot;braking point&quot; and &quot;danger point&quot;.</td>
</tr>
<tr>
<td>0.6</td>
<td>2021-01-02</td>
<td>MS</td>
<td>Added symbols for &quot;direction control&quot;, &quot;track marking&quot;, &quot;pylons&quot; and electric wiring; changed symbol for &quot;friction bufferstop&quot;; created an encapsulating package for future flexibility - changed load command for library to \usepackage{tikztrackschematic}.</td>
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<tr>
<td>0.6.1</td>
<td>2021-09-30</td>
<td>MS</td>
<td>removed package requirement lmodern, minor correction in manual, added citation information</td>
</tr>
<tr>
<td>0.6.2</td>
<td>2021-10-15</td>
<td>MS</td>
<td>fixed spelling error and documented (slip-) turnout option: points=moving; updated link to signalschablone; automated testing and releasing</td>
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<tr>
<td>0.6.3</td>
<td>2022-02-15</td>
<td>MS, GW</td>
<td>revised symbol and syntax for balises; replaced \gettikzxy with \path let&quot; syntax; fixed PackageWarning Error in development mode; fixed foreground of sidetrack (alias)</td>
</tr>
<tr>
<td>0.7.0</td>
<td>2022-04-02</td>
<td>MS, GW</td>
<td>handeling color background and foreground with native xcolor alias \colorlet instead of pgf macro</td>
</tr>
</tbody>
</table>

Gregor Wehrle (GW), Martin Scheidt (MS)