Templot Companion

USER MANUAL

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Templot 2D Explained

1 Templot 2D Explained

This ***Templot 2D Explained*** starter section is a guide for beginners in Templot track planning and track design.

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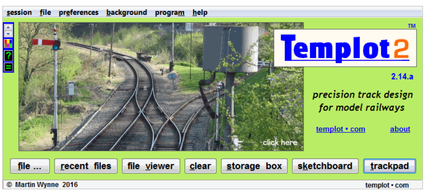
1.1 0. guide for 2D beginners

Templot 2D Explained - for first-time users

please read this section first



Welcome to this new Templot Companion web site. Here you can read all about Templot -- what it is, what it does, and how to use it.

Or at least, you will be able to, when I have written it. 😀

Before all that, if you are here for the first time you may simply want to try printing a paper track template. Click this link to watch a video showing how easy it is to do that: your first printed template [34] .

It won't have escaped your notice that this web site is still under construction. In the meantime there is a lot more information about Templot elsewhere on the Templot web site and on the Templot Club user forum. There is a temporary list of all the existing Templot information sources at: current documentation list. Have a look there if you can't find what you are looking for here.

Martin.

But let's continue with this ***Templot 2D Explained*** starter section. Click to begin: what is Templot? [4]

page last revised 22-May-2016

1.2 1. what is it?

1. what is it?

What is Templot? If you are active in the model railway hobby, especially in the UK, you have probably heard or read about the Templot computer program for track design. But when I'm reading discussions on web forums and in magazine articles I often see misunderstandings about Templot and what it is for.

Please read that again. Templot is a tool for the modeller's workshop. It is not a program to be used in a drawing office alongside hi-tech CAD design software and drawing packages. Templot belongs next to your soldering iron, snips and files and tubs of glue. 😀

Modellers use Templot to print track construction templates in an infinite variety of shapes and sizes. And to create layout designs using them - from a small shunting yard to a complex junction station on a sweeping transition curve. Sometimes as an exact scale track layout designed over an historic map.

Templot was created over a period of 45 years. Originally for my own use. Today it is provided and supported by one retired man in his spare time. Please bear that in mind when comparing Templot with other computer programs. 😀

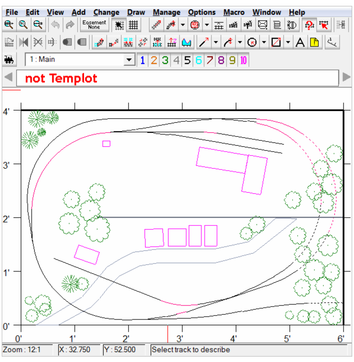
For some history about how Templot came to be the way it is, see origins and intent [40] .

If you prefer to buy ready-made model railway track from makers such as Peco, DCC Concepts, Marcway, Atlas, Tillig, etc., then Templot has little to offer you, and you have probably come to the wrong place. There are many other computer programs available for layout design using such ready-made track. See for example:

SCARM, ***XTrackCad*** (free), ***AnyRail*** (inexpensive, recommended), ***Winrail***, ***3rd PlanIt*** (more expensive), and many others.

But Templot isn't one of them. You can find them via Google, or ask on web forums.

For example, this is ***XTrackCad***:



Programs like this are called "pick and place" drawing programs. You select an item from a list, and then click or draw on the track plan in the place where you want it.

Templot doesn't work that way. To find out how it does work, click next page [4] .

(Only in Templot would the user guide start with a diagram from a completely different program. 😀)

---

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page last revised 11-July-2016

1.3 2. yes, I build track

2. yes, I build track

Still with me? You build model railway track, or you are intending to, or maybe you want to design some trackwork to be built for you.

If so you will know that the first thing you need is a drawing or ***template***, usually printed on paper, on which to construct the trackwork.

Let's go back 40 years to 1978.

Traditionally such printed templates have been available commercially, and from hobby organisations such as the EM Gauge Society. If you are familiar with them, you will have noticed one inescapable fact. Almost without exception they are straight.

Whereas if you are out and about on the railway, especially the traditional steam-era railway, you can't help noticing that a great deal of track is curved -- in some places the majority of it.

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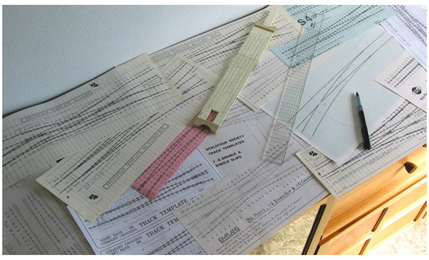
Here for example is a curved outside-slip, and on the left a curved crossover:

And here we have a curved half-scissors, and on the right a sharp curve fitted with a continuous check rail:

I took these photographs at Shrewsbury in 1978. It may not be a coincidence that just a year later in 1979, I started work on what was to become Templot. ☺

Because if you want to model such track, a straight paper template isn't a lot of use. Yes it can be curved after a fashion with scissors and glue, but it's very difficult to match a specific radius that way and to align several such templates together smoothly.

Here is a selection of track-building templates from pre-Templot days. Notice that the only one which is curved is the hand-drawn one. All the others are straight:



Precision hand drawing is not for everyone. On a large layout it is a lot of work, and a change of design means starting again. Which is where computers came in. This computer program was originally conceived as a means to generate and plot curved turnout templates, so I called it "Templot". All those years ago computers were largely unknown in modelling, and it was another 20 years before they were common enough in most homes to make it worthwhile releasing a version of Templot for everyone to use. The first public version was shown to a puzzled model railway hobby in 1998.

I have wandered down Memory Lane here because it helps to understand the workings of Templot if you know where it came from. The original purpose was to print individual model track construction templates, especially curved ones. And in many ways that remains its primary purpose. The complex track layout planning functions came later, and are still in some ways secondary to that.

This also explains why an item of trackwork in Templot is called a "template" -- not at first sight an obvious term, or one used in other track planning software.

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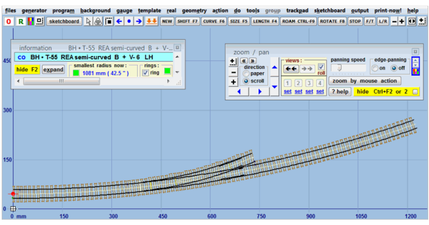
page last revised 23-May-2016

1.4 3. what am I looking at?

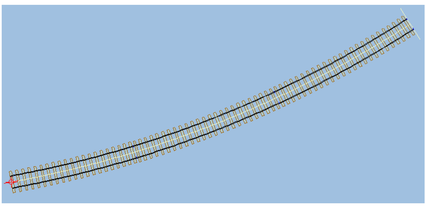
3. what am I looking at?

So Templot generates and prints ***templates***. What you are probably looking at is this - a ***turnout template***:



There are just 3 basic types of template in Templot:

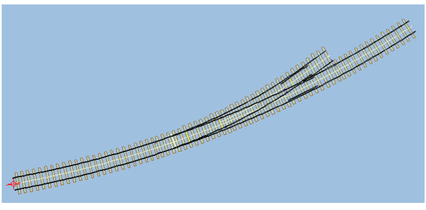
1. ***plain track*** templates:



A length of plain track.

---

2. ***turnout*** templates:



A length of plain track into which a turnout has been inserted somewhere along it. Only one turnout per template.

---

3. ***half-diamond*** templates:

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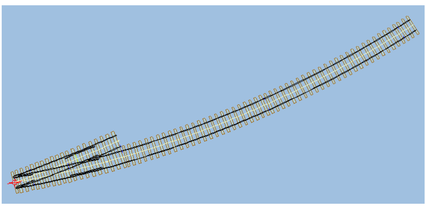
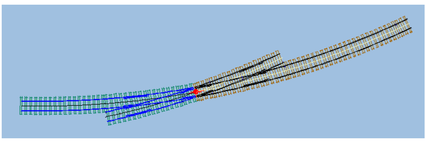
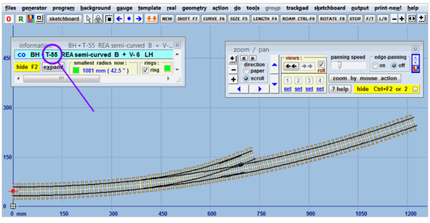


A length of plain track into which half of a diamond-crossing has been inserted at one end. These templates are almost always used in pairs to create a full diamond-crossing or slip, like this:



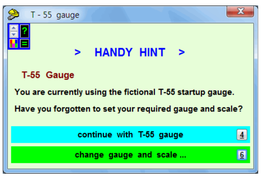
Let's forget about half-diamond templates for now. There is a lot to learn about turnout templates first.

• But note in passing that this diamond-crossing is curved, like everything else in Templot. When you want something to be straight, Templot simply increases the radius to a very large number.



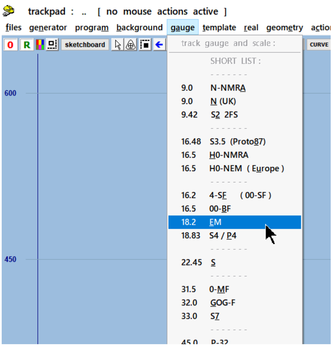
When Templot starts up the template generator engine starts running, and initially it creates a left-hand B-6 turnout template, curved onto 10 chains radius. We shall come back to what all that means later. It also sets the model gauge and scale to T-55 - which needs changing before you do anything else.

If you look at it for long enough you will probably see this message pop up:



Templot can do any scale or track gauge. But on the screen they all look very similar, so it is easy to forget to set your required scale and gauge before you start. Finished track plans can be converted to a different scale or gauge afterwards, but for geometrical reasons the conversion is seldom entirely perfect. For this reason it is much better to start as you mean to go on, and set your required scale and gauge before you begin.

To do that, click on the gauge menu now:



If you don't do that, Templot shows the above reminder message after a few minutes running. Left to itself Templot starts up in an unusual gauge called T-55 (5.5 mm/ft scale, 1 inch track gauge). Almost no-one models this gauge, so if you are still using it after a few minutes, it is a reasonable assumption that you have forgotten to set your gauge.

But you can if you wish click the blue bar continue with T-55 gauge to continue without interruptions.

You will see this style of message often in Templot, with various coloured bars to click in making your chosen response. When in doubt you can always safely click the green bar, or press the **ENTER** key.

Now what? Click next page [4] for the answer.

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page last revised 23-May-2016

1.5 4. where do I start?

4. where do I start?

Templot is a tool for track builders.

Like all tools, where you start depends on what you want to do with it, and how much you already know.

---

construction templates

You may want to print out individual track construction templates. If so, have a look at your first printed template [24] for some help getting started.

You probably already know the basics of UK pointwork geometry. If not you may want to look at this page: turnout basics [15] .

Or you may want to jump to the prototype [12] section to learn about customizing a template to a specific prototype.

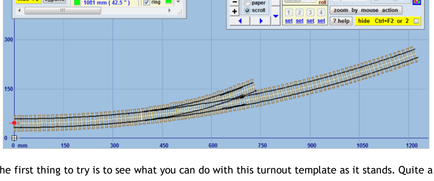
---

track planning

Before printing any templates you may want to design a layout track plan. If so, read on below.

Templot's methods for doing that differ considerably from other model track planning software. It's all quite straightforward, but possibly not quite what you were expecting. 😀

But before starting on a simple track plan, there are some basic functions to learn. Here again is the first screen, showing a *turnout template*:



The first thing to try is to see what you can do with this turnout template as it stands. Quite a lot, actually.

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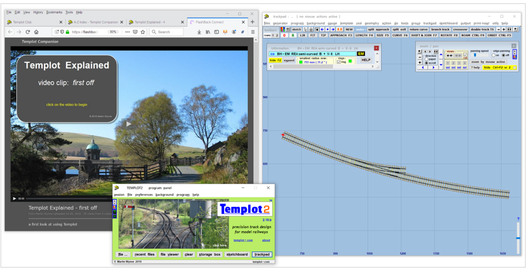
The very first thing is to set your model scale and gauge. Then let's try ***roaming*** this turnout. ***Roaming*** means moving the turnout section to a different position within the confines of the whole template. Here is the first video to watch, and then try yourself:

Before trying more mouse actions, there are some other buttons to learn and try. Here is another video:

---

watching these videos

If you have a wide-screen monitor, you might want to set up your browser and Templot side-by-side so that you can watch the videos and use Templot at the same time:



It is very helpful to see both at once. If you have a smaller monitor, you could perhaps watch the videos on a tablet computer or other mobile device. The videos will re-size to fit.

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page last revised 28-January-2018

1.6 5. basic track planning

5. basic track planning

Unlike most other track planning software, Templot does not use pick-and-place methods. Instead track templates are extended, split, turnouts inserted in them, etc., until the full layout plan has been built up in a prototypical manner. Here is a temporary video clip showing that:

Notice that In Templot there is no list of items to select from. Nothing gets placed in isolation in the middle of the screen. Nothing gets moved and joined on to something else.

Here is another video with audio commentary, showing the above Templot methods being used to create a simple branch terminus with a run-round loop:

more to follow

... Templot Explained beginners pages under construction

In the meantime, you might want to jump forward to: basic working methods [27] , or maybe look at: making a start - turnout basics [30] .

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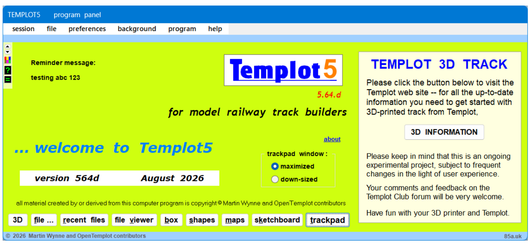
Templot 3D Explained

2 Templot 3D Explained



This ***Templot 3D Explained*** starter section is a guide for beginners in Templot 3D track.

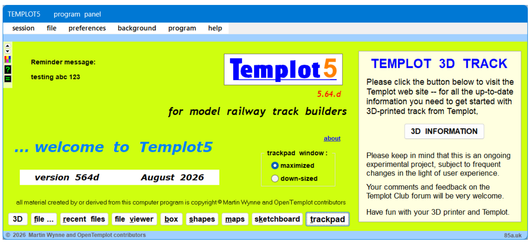
For 3D-printed track and laser-cut plywood.

other sections:	*Templot 3D Explained:*
Templot 2D Explained [4] Templot Videos [11] Templot In Full [12] Prototype [51] Websites and Links [10]	Please click the first link below to begin: 0. guide for 3D beginners [9] 1. a first 3D print [9] 3. more [9]

2.1 0. guide for 3D beginners

Templot 3D Explained - for first-time 3D users

please read this section first



Welcome to this new guide to Templot 3D track. Here you can read all about Templot 3D track -- what it is, what it does, and how to use it.

Or at least, you will be able to, when we have written it. 😀

Before all that, if you are here for the first time you may first need to learn a little about Templot 2D track planning -- see:

Templot 2D Explained [4] .

It won't have escaped your notice that this web site is still under construction. Templot 3D track is still an unfinished experimental project. In the meantime there is a lot more information about Templot 3D track on the friendly Templot Club user forum -- free to join.

page last revised 29-July-2026

2.2 1. a first 3D print

a first 3D print

How to make your first 3D print from Templot. Many thanks to Terry Downes at kosmik.co.uk for this.

(If it doesn't display on your screen, click here.)

page last revised 30-July-2026

2.3 3. more

Some old, mostly out-of-date 3D information is on these pages [33] . Will be updated soon.

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Templot Videos

3 Templot Videos

This section contains screen videos showing how Templot works.

other sections:	*topics in this section:*
Templot 2D Explained 4 Templot 3D Explained 9 Templot In Full 13 Prototype 51 Websites and Links 59	online videos - full list 51

3.1 online videos - full list

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Templot In Full

4 Templot In Full

This is the main reference section of the *Templot Companion User Guide*.

other sections:	*topics in this section:*
Templot 2D Explained [4]	1. download and installation [13]
Templot 3D Explained [9]	2. getting started [15]
Templot Videos [11]	3. the control template [19]
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Websites and Links [50]	5. the storage box [23]
	6. track planning [23]
	7. background shapes [31]
	8. 3D and CAD exports [33]
	9. printed templates [34]
	10. how to ... [36]
	11. utilities and utensils [47]
	12. program [48]
	99. origins and intent [48]

Click through the page headings in the left column on the A-Z Index.

4.1 1. download and installation

4.1.1 program updates

Templot5

Introduction

Templot5 is still an unfinished experimental open-source project.

There is currently an ongoing issue with the automatic update mechanism for Templot, so in order to distribute update versions of Templot5 a trial is underway of providing manual updates.

This release note describes the installation process for Templot5 version 557c, and the modifications applied to Templot5 since version 557a.

The updates are provided in the form of a ZIP file of a folder named **`templot557c`** containing **`templot_5.exe`** (the 557c program), and some PNG image files.

Installation

Quit and close any Templot which is running.

Click here to download the zip file: templot557c.zip

Right-click on the downloaded file and do extract all .

This should create a folder called **`templot557c`** somewhere on your computer, make a note of where it is.

Determine where your existing copy of **`templot_5.exe`** is located, and make a note of the program folder. (This would normally be your **`C:\TEMPLOT_DEV\`** folder and should contain **`templot_2.exe`** in addition to **`templot_5.exe`**)

Rename the existing **`templot_5.exe`** file as **`templot_557a.exe`** (or make a copy of it somewhere safe).

Copy the new **`templot_5.exe`** file from the **`templot557c`** folder extracted from the downloaded zip file, into your program folder.

Double-click on the new **`templot_5.exe`** file and click through the Windows security dialogs until **Templot5** is running. Then quit and close it.

Copy all the **`.png`** files contained in the **`templot557c`** folder into the **`\internal\hlp\`** sub-folder of your program folder. These are some extra help button images.

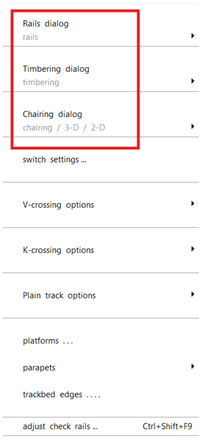
Start up **Templot2** in the normal way & then switch to **Templot5**.

Modifications

1. Real menu - Dialog screens

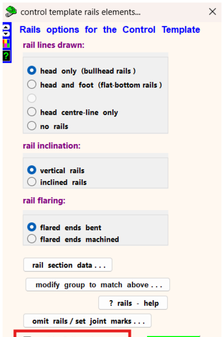
Rails, Timbering and Chairs dialog options added to the real menu, with the original sub-menu entries disabled:-

Real menu



If you prefer to use the sub-menus then tick the relevant enable sub-menu tick-box high-lighted in the screenshots that follow:

Rails dialog screen



Timbering Dialog screen

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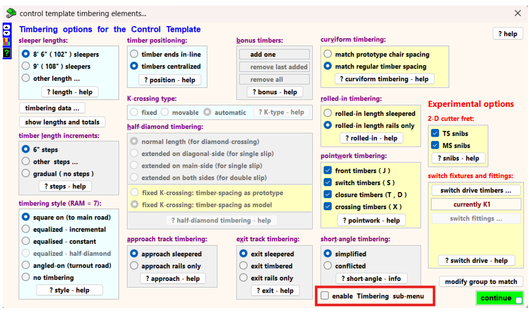
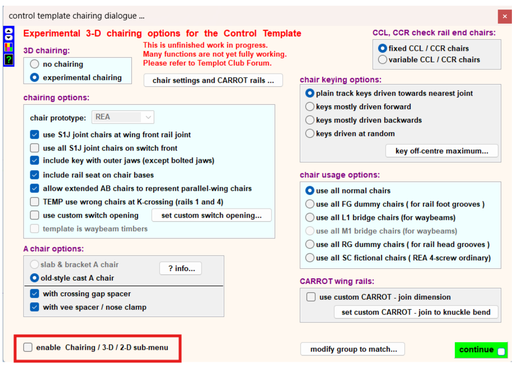
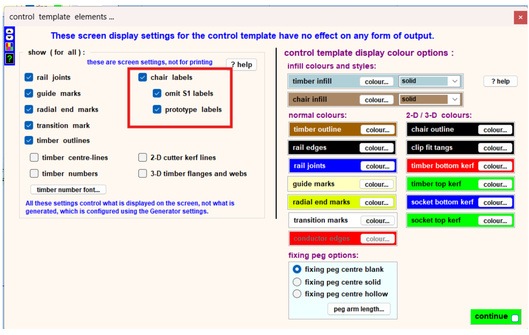


Chairing dialog screen



2. Trackpad - control template display options

A new dialog screen has been added to group together a number of the existing sub-menu options that control how the control template is displayed on the trackpad:



New features added as tick-boxes:-

2.1 omit S1 labels

When ticked chair labels for S1 chairs are omitted from the trackpad. Assume any unlabelled chair to be an S1 chair.

2.2 use prototype labels

When ticked chair labels for the switch block chairs are displayed as:-

1PR, 2PR, 3PR, 4PR, 5PR, 6PR, 7PR, 8PR, 9PR, 10PR, 11PR .... and

1PL, 2PL, 3PL, 4PL, 5PL, 6PL, 7PL, 8PL, 9PL, 10PL, 11PL ....

When unticked the switch block chair labels are displayed as either 1P..2P or 3P..11P

2.3 2-D / 3-D colours

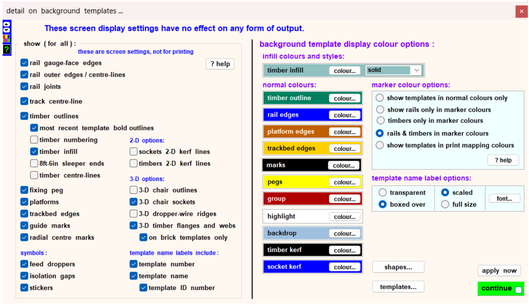
Top and bottom kerf colours can now be amended for the display on the trackpad for both the timber kerf lines and the socket kerf lines.

The timber kerf lines when generated are only displayed if the 2-D cutter kerf lines tick-box is ticked.

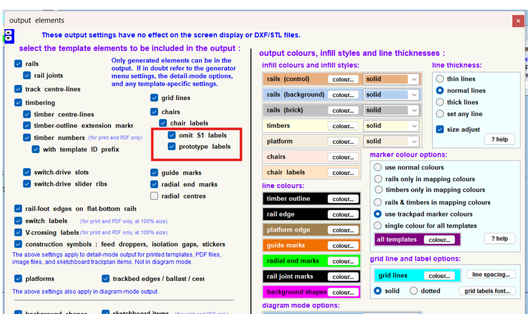
The socket kerf lines also require the 3-D timber flanges and webs tick-box to be ticked, as well as also dependent upon some of the DXF/STL export settings.

3. Trackpad - background template display options

The existing dialog screen has been revised:-



4. Output elements - dialog screen



New features added as tick-boxes:-

4.1 omit S1 labels

When ticked chair labels for S1 chairs are omitted from outputs. Assume any unlabelled chair to be an S1 chair.

4.2 use prototype labels

When ticked chair labels for the switch block chairs are ouput as:-

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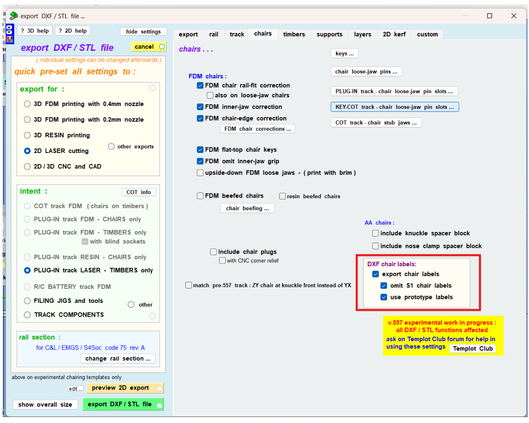
1PR, 2PR, 3PR, 4PR, 5PR, 6PR, 7PR, 8PR, 9PR, 10PR, 11PR …. and

1PL, 2PL, 3PL, 4PL, 5PL, 6PL, 7PL, 8PL, 9PL, 10PL, 11PL ….

When unticked the switch block chair labels are ouput as either 1P..2P or 3P..11P

(*note neither of these two tick-boxes apply to DXF/STL exports or screen display, which are controlled separately)

5. DXF / STL export dialog



New features added as tick-boxes to the DXF chair labels box on the chairs tab of the export DXF / STL file dialog:-

5.1 export chair labels

When ticked chair labels are exported in the chair type labels layer in the 2-D DFX file.

*note When the resultant .DXF is imported & viewed in Inkscape the justification of the labels is ignored (currently an Inkscape feature unfortunately), but when opened using Lightburn the labels are correctly justified. The size of the text generated and the offset from the timbers are controlled by parameters that can be adjusted via the DXF text dimensions … button on the custom tab of the export DXF / STL file dialog.

5.2 omit S1 labels

When ticked chair labels for S1 chairs are omitted from exports. Assume any unlabelled chair to be an S1 chair.

5.3 use prototype labels

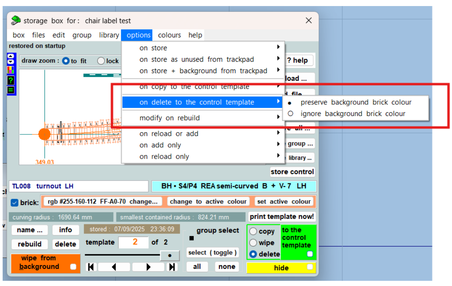
When ticked chair labels for the switch block chairs are exported as:-

1PR, 2PR, 3PR, 4PR, 5PR, 6PR, 7PR, 8PR, 9PR, 10PR, 11PR …. and

1PL, 2PL, 3PL, 4PL, 5PL, 6PL, 7PL, 8PL, 9PL, 10PL, 11PL ….

When unticked the switch block chair labels are exported as either 1P..2P or 3P..11P

6. (Storage) Box menu



6.1 options menu

New sub-menu item on delete to the control template added, containing two radio button menu items:

preserve background brick colour

ignore background brick colour

By default the preserve background brick colour radio button is selected.

If the preserve background brick colour is selected, and the background template is a brick template, then when any delete to the control command is invoked, the Active colour becomes the colour of the background template being deleted, and bricklaying is enabled.

4.2 2. getting started

This section is about taking your first steps in using Templot.

Click the page headings in the Contents List.

See also the Templot Explained [1] beginners guide.

4.2.1 making a start

A page about running Templot for the first time. And some information about turnout basics [2] .

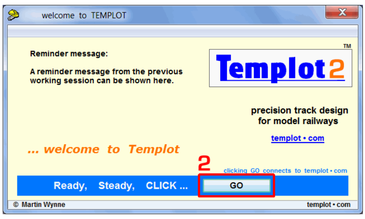
1. Starting TEMPLOT :

To start Templot, double-click the Templot2 shortcut icon on your desktop.

Alternatively, from the Windows taskbar click the Start > All Programs > Templot2 > run Templot2 menu item.

2. Start-up:

This window will be the first to appear. Click the GO button to start Templot running:



(If you ever start Templot accidentally, you can click the red X to cancel without waiting for Templot to start up.)

3. Ready:

When Templot is ready for use, the window will change to this:

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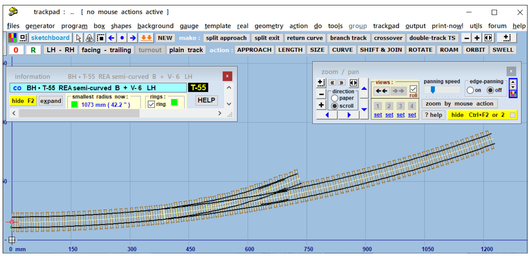
This window is called the *program panel*. Experienced Templot users find it useful, but new users will have little need for it while learning Templot.

As a first-time user, click the trackpad button.

4. Running:

The *program panel* window will then disappear and be replaced with this full-screen window:



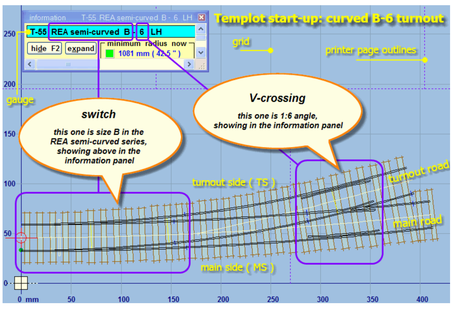
You should now be seeing a drawing of a curved **B-6** left-hand turnout template on the *trackpad* window. This is the window in which all your track design work is done. This start-up turnout template is curved to a scale radius of 10 chains (660 ft) along the *main road*, and is drawn in an odd fictional gauge called T-55. This has a one-inch track gauge at a scale of 5.5 mm/ft. This is fine for now if you have just started Templot for the first time, there is no need to change it while experimenting.

(It is easy to change to your chosen gauge and scale later. Select the gauge menu items.)

Before going any further, you may want to refer to the Templot Explained [4] beginners guide and watch the videos.

---

5. Turnout basics:



A *turnout* is comprised of two basic elements, shown boxed in blue above. The area containing the movable point blades is called the *switch*. Switches are available in several ranges of different sizes, the one shown here is size *B* in the *REA semi-curved* series.

Sizes A, B and C in this series are the most commonly used switches in models based on UK-pattern bullhead track. Size A is the shortest, for use in goods yards and other cramped low-speed areas. The next sizes get progressively longer and therefore easier in radius, up to size F for use in high-speed junctions.

The area in which the outer rail of the *turnout road* crosses the inner rail of the *main road* is called the *V-crossing* (or sometimes the "frog"). V-crossings are available in a range of different angles, the one shown here has a unit angle of *1:6*. This means that the rails separate by 1 extra foot for every extra 6 feet measured along them.

This is the usual way that angles are designated in railway track, common sizes being 1:6, 1:7, 1:8, 1:10, 1:12, 1:14 etc. In-between sizes such as 1:7.5 or 1:13 are used where limited space makes them necessary.

Turnouts can be created in a huge range of *sizes* by combining different switch sizes with different V-crossing angles. For example a C switch leading to a 1:10 V-crossing makes a C-10 turnout. Much of your design work in Templot will consist of selecting these different size combinations, and then perhaps setting a *curving radius* along the main road such that the resulting turnout fits the desired location on your track plan.

For more about switches and V-crossings, see: about real track [16] .

The first thing to do is to switch on your printer and click the help > print F key chart menu item. This will print a chart of the function key shortcuts which can be placed behind your keyboard for reference. (If you find the chart baffling, fear not, all will become clear as you work through these pages.)

	or - key	or = key	or [key	or] key	or ' key	or # key	or \ key	or / key	or , key		or . key	toggle	
SHIFT +CTRL	1st trans. radius	2nd trans. radius		*trans. start*	*trans. length*	*slewing start*	*slewing length*	*shift group*	*rotate group*	*move spacing ring*	*move page origin*	full mouse draw	skeleton mouse draw
SHIFT	make diamond crossing	make cross-over	make double-track TS	make double-track MS	calibrate printer	rotate group 180 deg	cycle notch	rotate current 180 deg	*slide*	or , key shove timbers	*crossing entry straight*	*gauntlet offset*	
CTRL	or 1 key *spot zoom*	or 2 key zoom and pan controls	or 3 key *blanking length*	or 4 key *rail rails and sleepers*	or 5 key *orbit*	or 6 key *snake*	or 7 key *slew amount*	or 8 key *move peg*	or 9 key *roam along*	or 0 key *swell*	print backgnd templates on mouse	centre trackpad templates on mouse	
^ hold down	help	info toggle	*approach length*	*overall length*	*size*	*curving*	*shift*	*rotate*	*V-angle*	*K-angle*	print control template	redraw & show	
press >	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	

TEMPLOT FUNCTION KEY CHART

This chart is intended to be placed behind your keyboard, and shows only the menu shortcuts which use the function keys.
A full list of all the keyboard shortcuts is available in the HELP menu on the trackpad, and can be printed out.
Entries in bold italic are mouse actions. *(Try adjust the length of plain track either F3 or F4 can be used.)*
The alternative single-key shortcuts are also shown.

Templot v2 - v 2.14.a © Martin Wynne

If you don't like the screen colours, click the small multi-coloured button near the top left-hand corner and select a different colour scheme.

The B-6 turnout template which you are seeing is the starting condition for the *control template*. It is waiting there for you to adjust it to the *size*, *length* and *curving line* which you require. There are several ways to do this, but the most frequently used are:

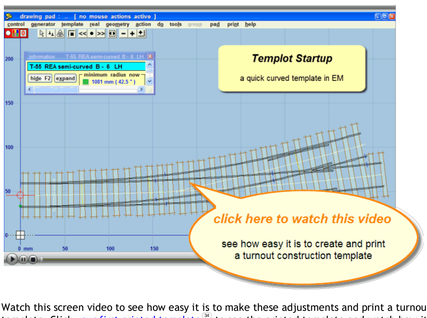
- The *mouse actions*, when you want to make trial-and-error adjustments. To experiment with the many mouse actions available, click mouse actions [12] for a step-by-step guide to using them.
- Changing the settings on the *quick set* window, when the template is a common size, and you know exactly the size and radius wanted. Click the NEW button at the top of the trackpad.
- Using the

  template > switch settings...

  template > V-crossing settings...

  geometry > radius and curving...

and other menu items, when you have more specific requirements.



Watch this screen video to see how easy it is to make these adjustments and print a turnout construction template. Click your first printed template [3] to see the printed template and watch how it was created.

page partially revised for Templot2 April 2012

4.2.2 gauge and scale

About setting your track gauge and model scale. See Templot Explained [4] and in beginner video [4].

(page under construction)

4.2.2.1 custom gauges

About setting up custom gauge and scale settings.

(page under construction)

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4.2.2.2 narrow-gauge tracks

About setting up narrow-gauge tracks.

(page under construction)

4.2.3 utterly baffled ?

A page of explanation for users familiar with CAD and drawing software.

1. basics [37] 2. file handling [37] 3. drawing track [37]

---

1. basics

Modellers with some knowledge of trackwork but with little or no experience of computer drawing software usually find it fairly easy to grasp the basics of Templot, and soon begin printing templates and drawing track plans.

Paradoxically, users familiar with CAD drawing programs often find Templot baffling at first. The confusion arises from the misconception that Templot is simply a specialized version of such software, which is not the case.

Templot is a ***construction template generator*** for hand-built model trackwork.

The important point to understand is that Templot does the actual drawing work, not you. For example, your first instinct might be to draw a wavy line on the screen with the mouse, in the hope that it might somehow be converted into a length of track. This is not the way that Templot works.

What Templot needs from you is the specification for the length of track, which it will then generate and draw for you.

Such a length of track is called a template [4], and a complete track plan is comprised of a collection of discrete templates, arranged on the drawing area in the desired alignment with each other, in much the same way that paper templates would be fitted together on the baseboard of a model railway.

What appears on the screen to be a single track drawing, is in fact a collection of separate template drawings. Some may be several yards long, others only an inch or two, according to the needs of the design. Each one has a name and ID number, and a separate entry in the storage box. The intention is that each one will eventually be individually printed full-size as a construction template, since this is the primary purpose of Templot, not simply the design of layouts.

All the track design work which you do in Templot will be with whole templates like this, there are no other component objects in Templot. If you want separate track parts such as an individual check rail or timber, these are created by having a full template and simply blanking out or omitting all the other parts from it.

The specification required for each template includes such information as:

- Gauge, scale and flangeway standards.
- Prototype details such as rail lengths and sleeper sizes and spacings.
- Sizes and angles of switches and crossings.
- Style of timbering layout.
- Overall length.
- Curving line radius or transition curve radii.
- Position and orientation on the drawing area.

The specification can be set up by entering data directly or by clicking menu options, but most of the time you will set the specification for the next template simply by adjusting the details from a previous one. You do this by means of mouse actions [10], which continuously re-generate the control template as you change the settings by moving the mouse.

This is the reason for the presence of the control template on the screen at start-up, which some users expecting to start with a blank work area find unsettling. Although you can easily hide it temporarily (**HOME** key or **CTRL+ENTER** keys), there is always a control template on the trackpad window, representing the current output from the generator using the current template specification settings. It is not part of your track plan drawing until you make a copy of it on the background.

But you can print it out as a construction template as it stands, so that when using "trim-and-fit" design methods with paper templates, there is no need to create a background drawing at all.

Some users may regard the design of complete layouts on-screen as the primary purpose of Templot, but this is in fact a supplementary function, which some modellers may find too demanding or time-consuming.

The prime purpose is to print out full-size construction templates in infinite variety, so that you can start building track on them. If you have ever tried to curve ready-printed commercial templates by slitting and notching them like a fishbone, you will know how fiddly that can be. Now you can print out a long turnout or length of plain track on a perfect radius or sweeping transition curve with just a few clicks. Don't lose sight of this advantage while struggling to design the perfect railway on-screen.

---

2. file handling

An area in which Templot differs from much Windows software is in the handling of files. In Templot there is no concept of an "open" file or document. Templot comes from an earlier tradition of computing in which there is a rigid distinction between data in volatile RAM memory (your ***storage box***), and data in non-volatile memory on a disk drive (your data files).

In Templot you load data from a file, and save data to a file. The files exist only on the disk drive. The drawing which you may be seeing on the screen is not a file, it does not have a file name, and there is no "close" or "save" button to save it.

There is only one work area, called the trackpad window, you can't open several documents in different windows. This single trackpad displays the current collection of templates in your storage box. You can load these templates from as many files as you wish in building up a collection of templates comprising your track plan. The files do not get "opened" in the process and remain entirely unchanged on your disk drive.

When you want to save your work, you can choose to save all the templates which are in the box to a file, or save only a selected group of them to a file. For example you might choose to save your track plan in three separate files called, say, "main lines", "goods yard" and "engine sheds". You could perhaps have several different versions of each of these, and load them subsequently in various trial combinations.

With this way you of working with files you can very easily mix and match templates from many different designs, and produce several different trial versions of your track plan.

The intention is always to create a new file when saving templates, and Templot will provide a suggested file name which includes the date and time in a format which causes files to be displayed in date order in the file dialog window.

You can of course choose to overwrite an existing file instead, but I would strongly recommend that you don't do this. Unlike text-based applications, technical design work such as this is all about trial-and-error. Two steps forward, one back. You may be quite sure that you won't need a previous file again, but I can assure you that you will!

Creating a new file every time means that you can always revert your drawing to how it was an hour ago, yesterday, last week, whenever. Or extract a valuable group of templates from an old file to incorporate into the new plan which you just dreamed up.

But you should save your work only when there is a good reason to do so. Templot's auto-restore feature (see below) takes care of the risk of losing your data as a result of system failures.

A new file every time means that your **BOX-FILES**\ folder will of course get well-filled with files, but Templot's data files are comparatively small. When the planning is over and you have started building track is the time to delete the unwanted ones, not before.

Auto-Restore:

Entirely independently of your loading and saving of templates, Templot keeps its own rolling backup copy of your storage box contents on disk. This means that Templot is effectively "crash-proof", there is no need to do repeated saves merely as a precaution against a system malfunction or power-failure.

When you start a new Templot session you are offered an automatic restore of the storage box contents as they were when you quit the previous session, and (even if you decline) you can revert to this state of affairs (restore previous) at any subsequent time during the current session, and as often as you wish. This works even if the previous session terminated abnormally, so you could if you wish go several sessions without doing any saves at all, and without any risk of losing your work.

The automatic restore feature is completely self-contained. Your own data files are never used or modified in any way, so this is not the same as a conventional auto-save function.

(A lawyer interrupts: Clearly Templot cannot be 100% crash-proof. If a system malfunction caused massive corruption of data on the disk drive, Templot's files would be lost along with all the others.)

---

3. drawing track

In many drawing packages, movement of the mouse pointer on the screen corresponds exactly to the element being drawn. Although Templot has a ***draw with mouse*** function which works this way, this is not a track drawing function. It is part of the ***background shapes*** feature, intended for setting out baseboard outlines and such-like.

The track template generator works differently. You are not dragging the track itself when you use a mouse action, but using the movement of the mouse to change the dimension settings for radius, length, rotation, and so on. The actual position of the mouse pointer on the screen is immaterial.

You can if you wish imagine an invisible slider device under the mouse pointer when you are using the mouse actions. The reason that it is invisible is that for many of the mouse actions it is infinitely long. You can repeatedly do click-move-click back and forth across the screen to swing a template round a curve, for example, or to extend the length of a template while zoomed in on it. Another reason that it is invisible is that you don't need to hold onto it with the mouse button down as in a conventional drag. Click-move-click works just as well, and is far more comfortable when making precise adjustments.

Templot is still a development project, so your comments and feedback on the above, or anything else in Templot, are always very welcome via the Templot Club user forum.

Martin.

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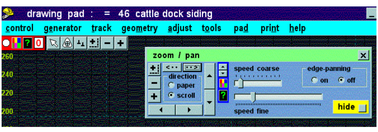
4.2.4 on the trackpad

The most important window in Templot is the trackpad, where all your track design work takes place. It is usually maximized to full screen, but can be dragged and resized in the usual way if you prefer. This is useful if you want to have these Templot Companion web pages on screen below or alongside.

Much of the design work on the trackpad is done with the mouse using the many mouse actions available. For users unfamiliar with detailed track design the mouse actions can be used exclusively, allowing trial template prints to be made without any regard to exact dimensions. For more information about how to use the mouse actions, click mouse actions.

When working on a model trackwork design, you will find that you are repeatedly zooming in and out and moving to and fro across the pad area to see different parts of the drawing. This is inevitable with the nature of railway track, so please be prepared to take your time and adopt a relaxed unhurried approach.

To make things as easy as possible, Templot includes numerous ***zoom*** and ***pan*** functions to use when moving about the pad, but what you won't find here are the conventional Windows scrollbars. This is because they must have end-stops, whereas Templot's trackpad is virtually limitless in size. You can keep adding to your design without ever reaching the "edge of the paper", or pan out far beyond the actual track area to see the radial centre marks, for example.



You can zoom in and out when viewing the trackpad by repeatedly clicking the **+** and **-** ***zoom in/out*** buttons, either in the panel at the top of the pad, or in the window containing the zoom/pan controls which can be positioned anywhere on the pad.

Or you can zoom by pressing the **ADD** and **SUBTRACT** keys on the keyboard. (These are the **+** (plus) and **-** (minus) keys on the number-pad at the right-hand end of the keyboard. They may not work until you have pressed the **NUMLOCK** key off and then on again - indicator light showing.)

To zoom in or out more slowly, press **CTRL-ADD** or **CTRL-SUBTRACT** instead.

► *For laptop users there are some alternative shortcut keys avoiding the number pad - see the full shortcuts list.*

Another way to zoom in is to draw a rectangle on the pad of the area you want to see in more detail. Click either of the **zoom rectangle** buttons (next to the ***zoom in/out*** buttons). Then click down on the first corner and drag (button-down) the mouse to the opposite corner of your rectangle. When you release the mouse button, the pad will zoom in on the area contained in the drawn rectangle. Or if you simply click the pad without dragging a rectangle, the pad will zoom in to the maximum extent centred on the clicked position.

Or you can zoom to a precise size using the **CTRL-F1** ***spot zoom*** and **CTRL-F2** ***scale zoom*** mouse actions.

To move about the pad area, click or hold down the arrowed **panning** buttons in the window containing the zoom/pan controls. You can change the speed at which the pad view moves using the **speed course** and **speed fine** sliders.

A quick way to move the area in which you are interested to the centre of the pad, is to click on it with the ***middle*** mouse button (or with the ***left*** button while the **CTRL** key is held down). With repeated clicks and a little practice you can quickly move about the whole pad area this way. (If a mouse action is in force you will need two clicks, the first one cancels the mouse action.)

Another useful tip is to press the **DECIMAL POINT** key (next to the **0** (zero) key on the number-pad). This causes the pad view to be centralized on the position of the red ***fixing peg*** target mark on the current template. (**SHIFT-F9** also does this). The **0** (zero) key on the number-pad does the same, and then zooms in close on the peg (***examine peg*** function). Pressing the **0** key again zooms back out.

Also very useful are the **`¬** key (top-left of keyboard, below **ESC**) (or **SHIFT-F12**), which causes the pad to zoom in or out to just fit the current size of your whole drawing, and the **.** key (full stop, period) (or **SHIFT-F11**) which fits the ***current template*** only.

Or you can move the pad view using the **CTRL-F4** ***move pad*** mouse action, which is also available by double-clicking on the pad.

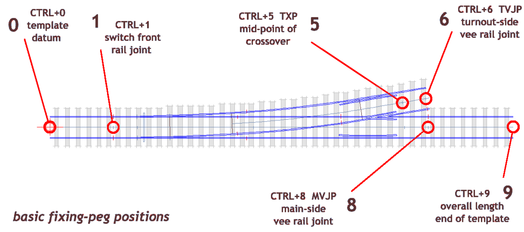
There are also several other ways of changing the pad view and zoom settings, and panning across the pad. Please refer to the various items in the **pad** and **adjust** menus. You can also use the ***paper-bunching*** function to see both ends of a long template at once.

When printing individual construction templates for ***trim and fit*** methods directly on the baseboard, you will probably want to work in the ***zoom free*** mode. This means that the trackpad rescales itself to just fit the template you are working on. Click the **pad > zoom/pan options > zoom free** menu item, or right-button click on the pad and select **zoom free** on the right-click menu, or just press the **PAGE UP** key on the keyboard. Free zooming works best if the current template remains on its green dot ***datum point*** (which it is at startup).

When you start designing complete track plans on-screen, you will want to be in the ***zoom locked*** mode. This doesn't mean that you can't change the zoom setting, it simply means that it won't change by itself. After you make any changes to the zoom setting it automatically enters the locked mode, or you can lock it directly from the free mode by pressing the **PAGE DOWN** key.

When the zoom is locked the coloured panel in the top left corner shows red; when the zoom is free it shows blue.

Also in this panel is the ***peg indicator*** code **0** - **9** in red. This shows the current position of the ***fixing peg*** on the current template corresponding to the keyboard shortcuts **CTRL-0** to **CTRL-9**, and also the letters **S** (meaning that you have Set the peg position directly), **M** (meaning that the peg has been set with a Mouse action), **F** (meaning that the peg position is Free), **N** (meaning that the peg is on a pre-set position for which there is No keyboard shortcut) or **U** (meaning that the peg is on your own User-defined pre-set position). Clicking the **peg indicator** quickly toggles the fixing peg to the opposite end of the current template.



For more information about using the fixing peg, click peg & notch.

You can change the trackpad colour scheme by clicking the multi-coloured button at the top left of the pad, or change colours individually by selecting the **pad > pad drawing colours** menu items. The pre-set schemes include those for 8-bit and 16-bit screen colour settings (16-bit recommended), and for inverse or normal video.

The ***information panel*** contains detailed dimensions and other data about the drawing currently showing. It can be toggled on and off by pressing the **F2** key. The **expand** and **shrink** buttons give rapid access to the whole panel, and the several scroll-bars enable any item of information to remain visible when the panel is shrunk.

To reduce screen flicker, Templot redraws the pad image only when necessary. This may sometimes result in a blank pad, or a double image or a messy pad. Press the **F12** re-draw key at any time to clean things up, or select the **pad > re-draw + show current** menu item. This also shows the ***current template*** again if it has been hidden (**CTRL-W**) to avoid obstructing background items.

If the pad remains blank, there is probably a mathematical problem preventing your requested turnout from being drawn. Select the **track > B-6 turnout reset** menu item (or **CTRL-Z**) to get going again.

Many of the menu items have keyboard shortcuts for rapid access which can also be listed and printed from the **help > show shortcut keys list** menu items. You can also print a handy chart of the function key shortcuts for the mouse actions which can be placed behind your keyboard.

A pop-up menu of the most frequently needed items is available by by right-clicking the mouse on the pad area, or by selecting the **pad > show right-click menu** menu item.

You can minimize the whole of Templot at any time by pressing the **PAUSE** key on the keyboard, which avoids the need to return to the ***control room*** to do this.

PAPER BUNCHING

It is often helpful to be able to see both ends of a long template at once, for example when adjusting the sleepering by swapping end-for-end, or when using the slewing functions. Also when a long template is pegged at one end and adjustments are being made at the other it is reassuring to see that the pegged end is remaining fixed.

These things are all possible by zooming out sufficiently to see all of the current template (**SHIFT-F11** or just the **.** full stop, period key), but for a long template this means that the drawing will be too small to make accurate adjustments.

This is where ***paper bunching*** is useful. A large area in the centre of the pad drawing "paper" can be bunched concertina-fashion into a narrow band, so that two different areas of the pad can be viewed at a much larger scale.

Select the **pad > pad view options > paper bunching on** menu item, or just press the **<** key. To restore the normal pad select **paper bunching off** or press the **>** key.

While paper bunching is in force you can select the **adjust > mouse actions:pad > adjust paper bunching** menu item to adjust the bunching by mouse action. Moving the mouse pointer from side to side adjusts the width of pad area included in the ***bunch zone***, and moving the pointer up and down adjusts the vertical displacement or ***shear*** between the two sides of the bunch zone.

With paper bunching in force you can use all the normal zoom and panning functions to get the two areas you need in view at an appropriate scale. Just experiment with the settings to get the required result. At startup the amount of bunching applied is fairly modest, but by zooming out and then using the mouse action you can adjust the bunch zone to include several metres of pad if necessary. Then zoom back in to see each side in detail.

►*Paper bunching affects only the way your drawing is shown on the screen. There is no change to the actual drawing or the printed pages. All the design work you do with paper bunching switched on has exactly the same effect as when paper bunching is switched off. After switching it off the drawing will be identical to that which would have been drawn if paper bunching had not been used.*

If you have switched the pad grid lines off, the paper bunching function will switch them back on so that you can see the position of the bunch zone. But you can switch them off again if you wish.

---

tech-chat appears in green occasionally on these web pages like this. You don't need to understand any of this to use Templot.

The trackpad is effectively limitless in size. Templot's drawing space is +/- 1.0E7 mm square and drawing is done to the nearest 0.01 mm within it. (That's 20 kilometres or 12 miles square! Which in 4mm scale represents an area over 900 miles square, more than enough to model the entire British and Irish railway networks to scale. If you are planning to do this you should be aware that Templot makes no correction for the curvature of the Earth.)

This is the reason that the trackpad is not navigated using conventional Windows scrollbars or sliders, which have end stops and therefore need a fixed trackpad size.

---

more notes here soon

Templot Companion contents

Templot front page

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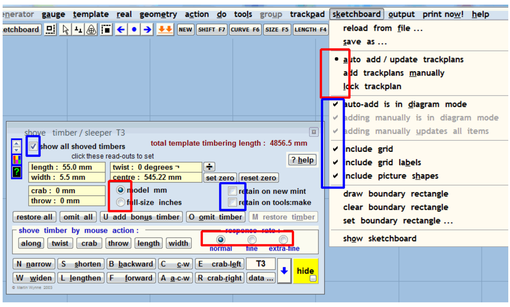
page revised © 22-Sep-2005

4.2.4.1 using the menus and dialogs

Some notes about the meanings of the marks in the margin of the drop-down menus, and on dialog windows.

This screenshot shows a typical dialog and drop-down menu:



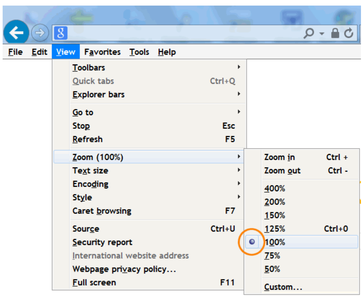
A round dot or bullet mark, in the menus or on dialogs, (outlined red in the above screenshot) is called a *radio* button. So called because it works like an old-fashioned car radio -- when you push one in, all the other buttons pop out.

It is used in a program to make a choice of one from several possible options. You must always have one, and only one, of the options selected. In order to de-select the currently selected option you must select one of the other options. Clicking a radio button which is already selected does nothing. The round dot or bullet mark shows which of the options is currently selected. In a menu the available options in the radio group are separated from other menu items by horizontal lines above and below the group.

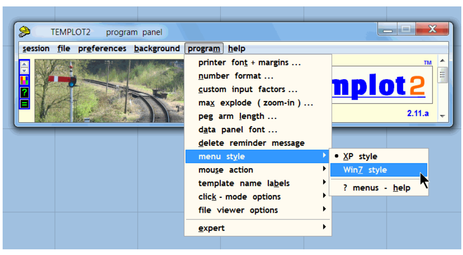
A tick mark, in the menus or on dialogs, (outlined blue in the above screenshot) is called a *toggle*. Clicking the empty square box or unticked menu item causes some function or setting to be switched on, and displays a tick mark in the box. Clicking it again causes the function to be switched off, and the tick mark is removed. Toggles work independently of any other menu items or controls. To switch them on and off you click the same one repeatedly. This is the fundamental difference from a radio button, where clicking the same one repeatedly does nothing.

In model railway terms you can liken a radio button to turning a multi-way rotary switch, and a toggle to an on-off switch.

All your Windows programs work this way, it is not specific to Templot, it is part of Windows. Here for example is the zoom setting menu radio button in Internet Explorer:



As you can see above the actual appearance of the radio button varies in different versions of Windows, but it is always a round dot shape. If you have Windows 7 or later you can change the appearance of the menus in Templot. This changes their appearance only and has no effect on their working. Go to the program > show main program panel menu item, and then click the program > menu style > options:



page last revised 08-July-2014

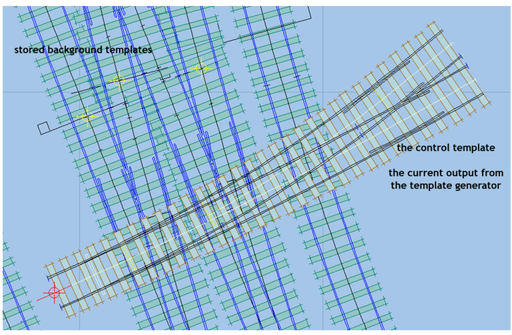
4.2.4.2 using mouse actions

For a guide to how mouse actions work, watch the first video at Where do I start? [1]

4.3 3. the control template

This section is about setting *the control template* to your requirements.

The control template is the current output from the *template generator*. It is displayed on the trackpad in the foreground, floating above any stored templates on the background which may be making up a track plan.



The template generator is the core engine in Templot which takes the input settings for angles and radii etc., and creates a drawing of the resulting template on the screen.

The template generator runs continuously. As soon as you make a change to a setting, a new template is drawn immediately with that setting. It is not necessary to do anything else to see the updated template.

(page under construction)

4.3.1 plain track templates

About plain track templates.

(page under construction)

4.3.1.1 rail lengths and sleeper spacings

About setting rail lengths and sleeper spacings.

4.3.2 turnout templates

(page under construction)

4.3.2.1 inserting a turnout in plain track

dummy text

4.3.2.2 switch

About the switch settings on the control template.

(page under construction)

temporary link:

types of switches [51]

4.3.2.3 V-crossing

About the V-crossing settings on the control template.

(page under construction)

temporary links:

types of V-crossings [51]

knuckle bend radius [20]

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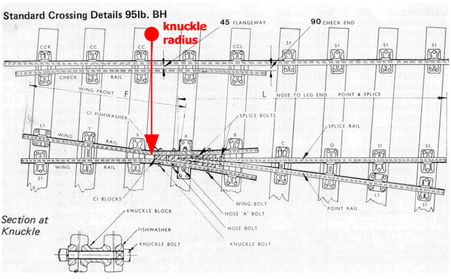
4.3.2.3.1 knuckle bend radius

V-crossing settings - knuckle bend radius

Where the wing rail is bent to form the knuckle, the radius of the bend and the knuckle gap typically varies according to the crossing angle:



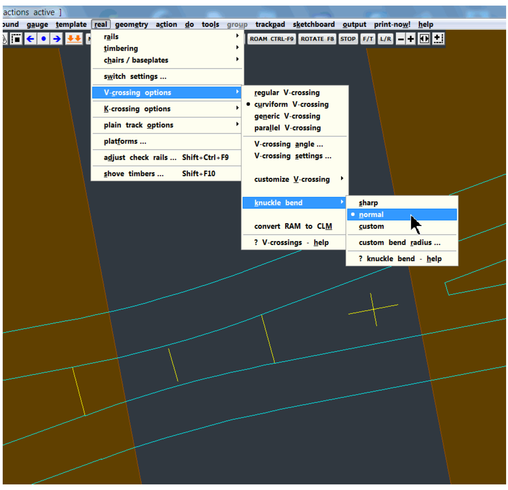
The presence of a radius at the knuckle rather than a sharp bend means that the knuckle gap between the wing rails is wider than the flangeway gap. There is a table of V-crossing data showing knuckle gaps for UK bullhead crossings on this page prototype info .

However, for the normal menu setting Templot has adopted the practice of specifying the length and radius of the knuckle bend rather than the resulting knuckle gap. This is more convenient for model use where flangeway gaps are seldom dead-scale.

For the normal menu setting the knuckle bend radius in feet matches the crossing angle, or in other words the length of the bend is 1ft scale*. For example, for a 1:7 crossing the knuckle bend radius is 7ft scale. This method corresponds to GWR and BR(W) practice for bullhead V-crossings.

*or slightly shorter for very short V-crossing angles below 1:4, in order to fit in front of the vee nose and properly support the wheels.

If it is desired to match the knuckle gaps shown in the table, it will be necessary to do your own calculations and enter the required custom bend radius. This will make sense only if you are using exact-scale flangeways. Some UK pre-group companies (e.g. NER) used a more generous knuckle radius, which again will require a custom setting. To use a custom setting, click the custom menu setting, and enter the required radius at the custom bend radius... menu item:



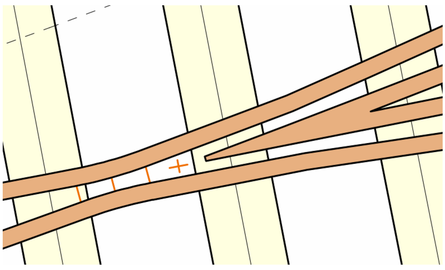
To aid model construction, there are some markers** on the template to show the extent of the bend, and the position of the geometric centre of the bend.

If it is desired for the template to show a sharp bend at the geometric centre, the sharp menu setting can be used. This was the only setting available in Templot versions prior to 214a.

These bend radius settings make no change to the geometry or alignment of the template.

**except for the sharp setting.

This is the result on the printed construction template:



The presence of a radius rather than a sharp knuckle bend allows for smoother running of wheels in the trailing direction, and where the V-crossing is on the inner rail of a curve.

The knuckle bend radius can be changed for an entire group of background templates to match the control template by clicking the real > rails > modify group to match menu item.

page last revised 22-Jan-2017

4.3.2.4 turnout timbering

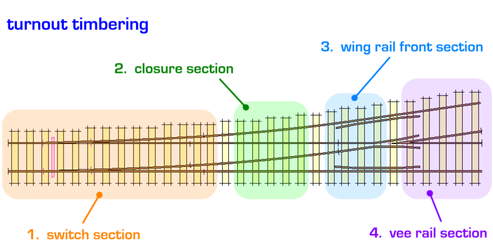
About the turnout timbering settings on the control template.

4.3.2.4.1 timber spacings - overview

Timber spacings in Templot are set using the full-size prototype dimensions in inches. The spacing of a timber is measured from the centre of one timber to the centre of the next one, not by measuring the empty space between them.

> If you want to set the scaled model spacings in mm instead of the prototype dimensions in inches, you can prefix the entered dimension with the letter **s**. For example in 4mm/ft scale, entering **s10** is the equivalent of entering **30** inches (2ft-6in), both setting the model timbers at 10mm spacings. If you want to work this way, you must be sure to set your correct model scale first.

Prototype turnouts do not normally have constant timber spacing. For this reason there is no single place in Templot to set the timber spacings. There are 4 separate sections to a turnout, each of which has its own timber spacing settings:



1. switch section Within the switch section, the timber spacings are determined by the design of the special switch block chairs and baseplates, which must fit the rails in the correct location. To set the timber spacings in this section, click the real > switch settings... menu item, and then click the set custom switch... button. Within this section the location of each timber is set individually, and the spacings can vary.

► Before making settings in the remaining sections, it is important to set the *blunt nose* on the V-crossing. This sets the relationship between the rail geometry and the timber positions. Click the real > V-crossing options > customize V-crossing > blunt nose... menu item.

2. closure section Within the closure section, timbers are evenly-spaced to fit between the heel of the switch and the front of the V-crossing. For this section you can set only the maximum spacing, at real > timbering >

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timbering data... menu item. Set the fill timber spacing dimension. Templot will normally use a slightly closer spacing, so that a whole number of timbers can be fitted within the available space. If you want to set a specific timber at a specific location within this section, you must use the ***shove timber*** functions.

3. wing rail front section Within the wing rail front section, the timber spacings are determined by the design of the special crossing chairs and baseplates, which must fit the rails in the correct location. To set the timber spacing in this section, click the real > V-crossing options > customize V-crossing > wing rail front... menu item. If you want to set varying spacings within this section (for example for GWR crossings) you must first set an average spacing and then use the ***shove timber*** functions. Note that the timber spacing settings in this section control the position of the rail joints in the wing rails.

4. vee rail section Within the vee rail section, the timber spacings are determined by the design of the special crossing chairs and baseplates, which must fit the rails in the correct location. To set the timber spacing in this section, click the real > V-crossing options > customize V-crossing > vee rail... menu item. The spacing in this section is normally the same as for the wing rail front section, but can differ. If you want to set varying spacings within this section (for example for GWR crossings) you must first set an average spacing and then use the ***shove timber*** functions. Note that the timber spacing settings in this section control the length of the vee rails to the rail joints, and hence also the overall length of the turnout.

More about setting:

switch timber spacing [21]
closure timber spacing [21]
wing rail front timber spacing [21]
vee rail timber spacing [21]

More about:

other settings for switches [19]
other settings for V-crossings [19]

timbering of K-crossings and half-diamond templates [21]

sleeper spacings for plain track [19]

page under construction 08-May-2012

4.3.2.4.1.1 switch section

page under construction

page under construction 08-May-2012

4.3.2.4.1.2 closure section

page under construction

page under construction 08-May-2012

4.3.2.4.1.3 wing rail front section

page under construction

page under construction 08-May-2012

4.3.2.4.1.4 vee rail section

page under construction

page under construction 08-May-2012

4.3.3 half-diamond templates

(page under construction)

4.3.3.1 K-crossing

About the K-crossing settings on the control template.

(page under construction)

4.3.3.2 K-crossing timbering

(page under construction)

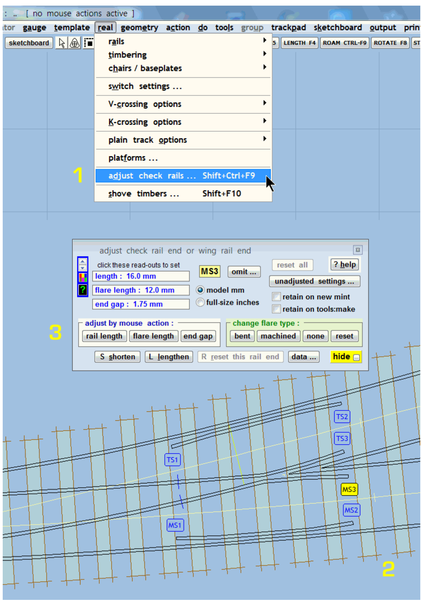
4.3.4 check rails and wing rails

A. adjusting individual check and wing rail ends [21]
B. basic check and wing rail terms and dimensions [22]
C. clearance from nearby rails [22]

A. Check Rail and Wing Rail End Adjustments:

These functions modify the basic settings [22] for individual check rail and wing rail ends. This is intended for situations in complex formations comprised of partial templates.

1. click the real > adjust check rails... menu item, or shortcuts **SHIFT+CTRL-F9** or the **FULL-STOP** (.) (period) key. This dialog appears:

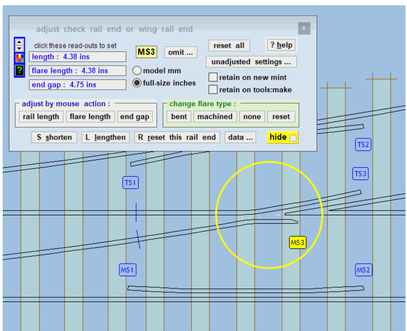


2. labels will appear on each rail end. Click the label (not the rail) to select the rail which you want to adjust. Each end of a check rail is adjusted separately.

> the labels are:
>
> MS1 MS2 MS3 TS1 TS2 TS3 MS4 DS4

3. use the buttons on the dialog to select the required mouse actions, etc., for the selected rail.

▶ In order to reduce a rail length to a very short dimension, it is necessary to first shorten the flare length. The rail length cannot be shorter than the flare length:



If the retain on new mint box is ticked, any adjustments will be preserved when creating a new mint template. (Using the template > new template (quick set)... menu item, or the NEW tool-button.)

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If the retain on tools: make box is ticked, any adjustments will be preserved when creating a new template using the tools > make --- menu items. This is the same setting as the tools > make tools: options > retain adjusted check rails menu option.

check rail flare types:

The dialog has four flare choices: bent, machined, none, and reset.

bent The flare is formed by bending the end of the rail. Normal for bullhead rail (BH).

machined The rail is straight with a flare angle machined into the rail head. Nowadays most heavy flat-bottom rail (FB) in the UK uses machined flare angles on straight check and wing rails. This is mainly to allow for different lengths of flare angle (according to line speed) without the need for special baseplates.

Lighter FB rail, such as that used on industrial, narrow-gauge, and light railways normally has bent flare angles because it is much less expensive to make than a machined flare, and easier to repair on site.

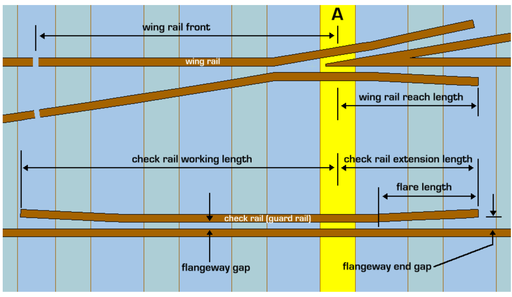
none No flare on this rail end. This is mainly for use in building complex formations from partial templates.

reset Returns this rail end to the basic setting.

These functions are primarily for use on partial templates in complex formations. The basic prototype settings remain as set at real > V-crossing options > customize V-crossing > wing and check rails... menu item, or can be accessed by clicking the unadjusted settings... button on the dialog. The above adjustments modify these basic settings for each rail end individually.

B. Wing and check rail basic terms and dimensions:

This diagram explains the wing rail and check rail (guard rail) terminology used in Templot. Everything is referenced from the centre of the "A" timber -- the one supporting the nose of the crossing vee:



The wing rails are the short lengths of running rail with bent extensions which lie alongside the nose of the crossing vee. The wing rail "reach" length is measured from the centre of the "A" timber (the timber bearing the nose of the vee) to the free end of the wing rail.

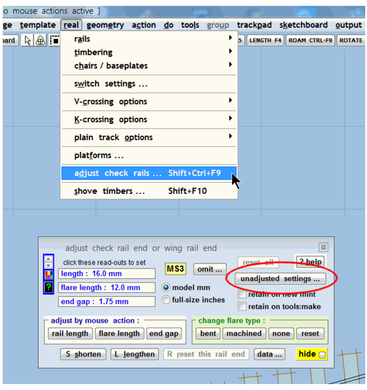
The check rails (guard rails) are the short lengths of rail fixed alongside the opposite running rail to prevent the wheels from taking the wrong path at the nose of the crossing. For dimensioning purposes the overall length of a check rail is divided into two component lengths, named "working length" and "extension length".

The check rail "working" length is measured from the position where it crosses the centre-line of the "A" timber, to the near end of the check rail (the end which is nearer to the switch) (point blades).

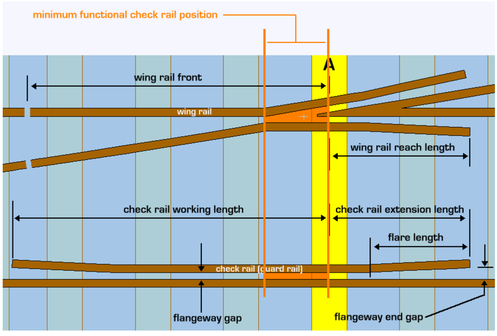
The check rail "extension" length is the remaining length from the "A" timber to the far end of the check rail.

Each exposed end of a check rail or wing rail has an angled "flare" length on which wheel flanges can make contact and be brought smoothly under the control of the rail. In bullhead track the flared part is normally arranged by simply bending the end of the rail, for which special handed chairs are provided. Sometimes in cramped designs the flare angle is machined into the head of a straight rail.

The basic prototype-based settings for the above are set at real > V-crossing options > customize V-crossing > wing and check rails... menu item, or by clicking the unadjusted settings... button on the dialog:



The functional length of a check rail (i.e. the middle section between the flared ends) must at least cover the break in the opposite rail, so that wheel flanges are prevented from striking the nose of the crossing. So for a V-crossing that means from the knuckle bend in the wing rail approximately to the centre of the "A" timber:



In practice of course it would be very unusual to have such a short minimal check rail. It would need a severe speed restriction and is only likely to be found in yards and sidings.

Note that for model gauges with overscale flangeway gaps, the knuckle is further from the nose than on the prototype and hence the minimum check rail will be longer to ensure proper running.

The check rail is much more important for traffic running in a facing direction, so the working length of a check rail is normally much longer than the extension length. If a very short check rail is necessary, the working length should have priority in the design.

The length of the flared end on a check rail is governed by the line speed. High speeds require a longer and easier flare to avoid shock as the wheel makes contact. In yards and sidings the bent flare can be quite short if necessary, maybe just a few inches beyond the last plain check chair.

For running line bullhead track with bent flares, the check flare length is largely determined by the available left and right special angled check-end chairs. This is one reason why modern flat-bottom track uses machined flares instead of bent, so that the flare length and angle can be set to match the line speed.

Templot uses 2 sizes of wing rail reach length, 3 sizes of check rail working length and 2 sizes of check rail extension length, according to the V-crossing angle. These sizes are pre-set in increasing lengths, but can be set to be all the same, or to any desired lengths.

Here is a summary of the way these sizes are used according to the current V-crossing angle:

V-crossing angle:	check rail working length:	check rail extension length:	wing rail reach length:
under 1:6	size 1	size 1	size 1
1:6 to 1:10	size 2	size 1	size 1
over 1:10 to 1:12	size 2	size 2	size 2
over 1:12	size 3	size 2	size 2

When customizing the dimensions at real > V-crossing options > customize V-crossing > wing and check rails... menu item (or by clicking the unadjusted settings... button on the adjustments dialog) be sure that you are changing the settings for the appropriate size according to the current V-crossing angle. Otherwise your changes will have no effect.

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In the majority of cases, the check rail extension length is the same dimension as the wing rail reach length, so that the far end of the check rail is aligned with the end of the wing rail, but this can be changed as necessary by entering the appropriate dimensions.

Be aware that because the check rails are linked to the "A" timber, the position of the check rails will change when changing the style of timbering (equalized, square-on, or angled-on). But their position is not affected by any timber shoving which is applied to the "A" timber.

Continuous check rails

It is not possible for a plain track template to have check rails. However, a length of plain track with a continuous check rail on one side (for use on sharp curves), or both sides (for use in roadways and level crossings), can be created by modifying a turnout template.

First add some approach track (**F3** mouse action) of suitable length.

Then increase the MS1 or TS1 check rail working length sufficiently to extend the check rail(s) back into the approach track.

Then put the fixing peg at the toe joint (**CTRL-1**) and click do > snap to peg menu item.

To create a full length of continuous check rail with flared ends at both ends, peg two such templates together at their **CTRL-1** positions.

Or tick the retain on tools: make box and then click the tools > make mirror on peg menu item.

To swap a single check rail to the opposite side, click the template > invert handing menu item (or **CTRL-X**).

Remember that despite appearances these are turnout templates, so to adjust their length use the **F3** approach length mouse action (not **F4**).

More information: http://85a.co.uk/forum/view_topic.php?id=2580&forum_id=6

C. Clearance from nearby running rails:

For required clearance between the exposed ends of wing rails and nearby running rails, for example in a tandem turnout, see:

http://85a.co.uk/forum/view_topic.php?id=1465&forum_id=1

4.3.5 construction symbols

[page under construction]

4.4 4. background templates

This section is about creating a permanent visible copy of the control template.

(page under construction)

4.4.1 storing and saving

page under construction

4.4.2 pop-up menu

A topic about the pop-up context menu which is displayed on the left of the screen when a background template is clicked.

Sorry, nothing here yet.

(page under construction)

4.4.3 grouping

page under construction

4.5 5. the storage box

About storing, sorting and saving your templates and data files.

(page under construction)

4.5.1 background templates

page under construction

4.5.2 unused templates

page under construction

4.5.3 library templates

page under construction

4.5.4 box data files

page under construction

4.6 6. track planning

This section is about designing track plans.

(page under construction)

4.6.1 mouse actions

This section is about the mouse actions which are used in track planning to make your templates follow the desired alignment.

This section is about mouse actions [19] only. For other alignment tools and functions see alignment tools [26].

4.6.1.1 approach length - F3

Sorry, nothing here yet.

(page under construction)

4.6.1.2 overall length - F4

Sorry, nothing here yet.

(page under construction)

4.6.1.3 size - F5

Sorry, nothing here yet.

(page under construction)

4.6.1.4 curving - F6

Sorry, nothing here yet.

(page under construction)

4.6.1.5 shift and snap - F7

Sorry, nothing here yet.

(page under construction)

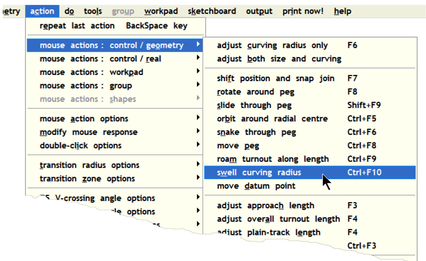
4.6.1.6 rotate - F8

Sorry, nothing here yet.

(page under construction)

4.6.1.7 swell - CTRL+F10

Click the action > mouse actions: control/geometry > swell curving radius menu item or press the **CTRL+F10** keys:



This mouse action [19] adjusts the curving radius while maintaining both ends of a template at fixed locations on the workpad. This is primarily intended as an aid to the alignment of templates over picture shapes [5] containing scanned background maps, track plans and sketches.

This avoids having to repeatedly swap back and forth between the **F6** *curving* and **F8** *rotate* mouse actions to get a good match to a background guide line. It's much easier to do this:

1. Put the fixing peg [9] at one end of the template, if not there already.
2. Use F7 shift [21] mouse action to put that end exactly over the guide line. Zoom in and repeat if necessary.

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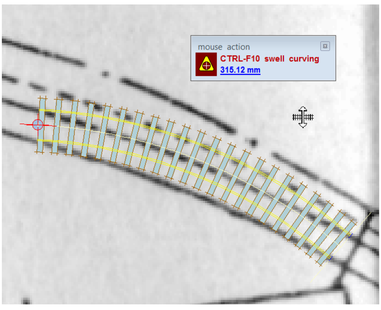
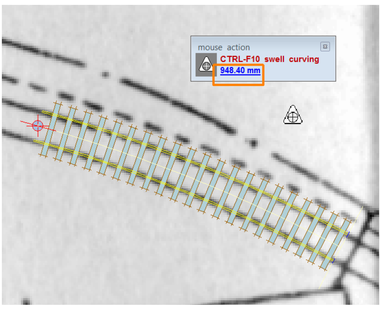
3. Use F8 rotate mouse action to put the other end of the template exactly over the guide line. Zoom in and repeat if necessary.

4. Now you can use the **CTRL+F10** ***swell curving*** mouse action to bulge the curve in or out to exactly match the guide line, while the ends remain fixed on the guide line:





Note that this function destroys any alignment with adjacent templates, so this is not a function to use on a template which is already a part of a track plan. A typical use would be to prepare a couple of short dummy templates some way apart on the guide line. You can then use the make transition function to create a smooth alignment between them which will be a good match to the guide line.

The swell function can also be used as a tool to measure the radius of the guide line -- the radius is displayed in the mouse action panel as shown above.

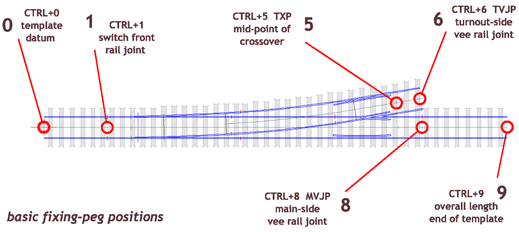
- As an alternative to **CTRL+F10**, on most systems you can simply press the **0** (zero) key on the main keyboard.

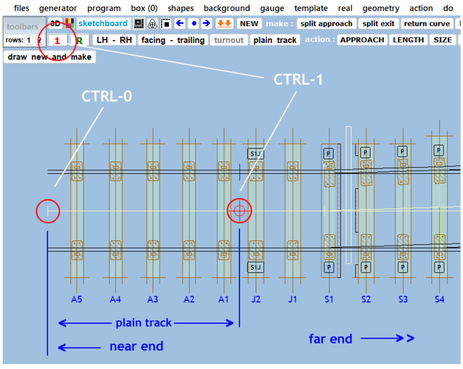
Version history: this function is not available on versions prior to 078c. On versions 091c and earlier the keyboard shortcut is **F10**.

4.6.1.8 turnout-road exit - CTRL+F12

[page under construction]

4.6.2 peg & notch





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page under construction

4.6.3 geometry

A temporary guide to finding lots more Templot information is at: current documentation list .

This topic is about using Templot track design software.

4.6.3.1 double-track spacing

[page under construction]

A temporary guide to finding lots more Templot information is at: current documentation list .

4.6.3.2 constant curves

Sorry, nothing here yet.

(page under construction)

A temporary guide to finding lots more Templot information is at: current documentation list .

4.6.3.3 transition curves

a page about using transition curves in Templot

Transition curves are used often in Templot -- rather more than on the prototype.

On the prototype transition curves are normally found only on fast running lines, where they are invariably canted, i.e. given superelevation where the outer rail is higher than the inner rail. The transition curve provides a length in which the rails can rise and fall from level track. It would be unusual to find pointwork in a prototype transition curve. It would be very unusual to find a transition curve in a goods yard.

On a model we are often working in limited space with very sharp curves in prototype terms. Transition curves, even on the flat, provide a good way to disguise the severity of such curves, and provide a means to create flowing track in cramped spaces. Running a transition curve through some pointwork and along a siding helps to create the spacious effect of the prototype, in a limited model space.

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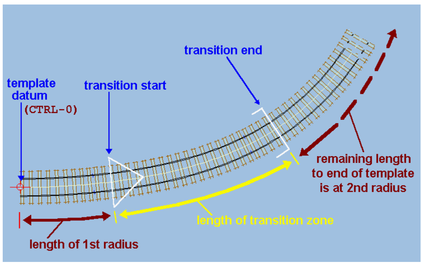
For such needs Templot can create a transition curve between two existing curves. This is the usual way to create a link between two existing templates. For more about that process see link between existing templates [40] .

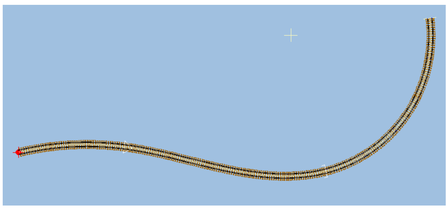


In a transition curve, the curving radius is progressively changed from the 1st or initial radius to the 2nd or final radius within the length of the transition zone.

Any track preceding the start point of the transition zone will be curved at the ***1st radius***. Any track beyond the end point of the transition zone will be curved at the ***2nd radius***.

The 2nd radius can be larger or smaller than the 1st radius, and the transition zone length can be set to zero if an instant change of radius is desired.

It is possible for one of the radii to be straight, but not both. In which case such a transition curve is often called an ***easement*** to or from straight.



If the 1st radius is positive and the 2nd radius negative, or vice versa, an ***S-curve*** effect is achieved, as in the diagram above. For further explanation of the meaning of a negative radius see constant-radius curves [34] .

A transition curve is selected for the control template by clicking the geometry > transition curve > menu items.

Before selecting the easement settings you will normally want to ensure that the fixing peg is at the curved end of the template, so that the newly modified template remains in alignment with the previous curve.

For easements the transition zone length is set to 2 chains (132ft) (scale), unless this is more than 95% of the current length of the control template, and the length of the straight section is set to zero. You will probably want to change these settings afterwards to suit your requirements for each situation.

- Selecting as previous settings sets a new transition curve with the same radii and length settings that were last used for a transition curve. If the control template already contains a transition curve, this option is disabled.
- Selecting new transition settings... brings up the Templot data entry form on which you can enter your required radii and length settings for the new transition curve.

The start and end points for the transition zone section of the curve are indicated by special marks across the track. The transition start mark is a large arrow-head symbol pointing into the transition zone, and the transition end mark resembles a set of "goalposts" (see the diagram above).

To move the whole transition zone along the track, select the move transition start mouse action (**SHIFT+CTRL+F3** or just press the [(left square bracket) key).

To lengthen or shorten the transition zone, select the adjust transition length mouse action (**SHIFT+CTRL+F4** or just press the] (right square bracket) key).

The transition radii are adjusted using the same adjust curving radius (**F6**) mouse action as for a constant-radius curve. To toggle between adjusting the 1st or 2nd radius, click the triangle symbol on the mouse action panel. Or select either of the action > transition radius options > menu items (**SHIFT+CTRL+F1** or **SHIFT+CTRL+F2**), or press the **-** (minus) or **=** (equals) keys for 1st or 2nd radius respectively. You can do this while the mouse action is in force.

► These1st or 2nd radius selections also apply to other mouse actions such as the **CTRL+F5** orbit function. The **BACKSPACE** key continues to work normally to repeat a previous mouse action.

To enter the radius and length settings directly, select the geometry > radius and curving... menu item while a transition curve is in force, or click the figures showing on the lower line of text on the mouse action panel.

> When using the move transition start and adjust transition length mouse actions, there are two options for the way the transition curve is calculated, at the action > transition zone options > menu items.
>
> The radii fixed (normal) option maintains the 1st and 2nd radii constant, and adjusts the transition alignment between them accordingly. The transition fixed (roll-out) option maintains a constant alignment in the transition zone, and adjusts the 1st or 2nd radius accordingly.
>
> This setting reverts to the radii fixed (normal) option whenever a new transition curve is set up.

As for the other mouse actions, the way in which the template responds to transition curve adjustments is determined by the position of the fixing peg within it. Normally, before making an adjustment, the fixing peg should be moved to a position where you want the template alignment to remain unchanged.

A frequent need is to slide a template along a transition curve alignment without disturbing the alignment. This is done using the ***snake*** (**CTRL+F6**) mouse action. Compare the results with the otherwise similar ***slide*** (**SHIFT+F9**) mouse action.

In addition, a transition curve can be combined with a ***slew*** to give a virtually unlimited range of alignments. Click for more information about slewing [35] , or see the notes at the geometry > slew (nudge) > ? slew - help menu item.

When changing from a transition curve to a constant-radius template, geometry > constant radius menu item, the new constant radius will be the radius at the current position of the fixing peg within the transition template.

For more information about the transition mathematics, see the notes for the program > expert > transition maths > custom terms... menu item on the program panel (program **>** show main program panel menu item).

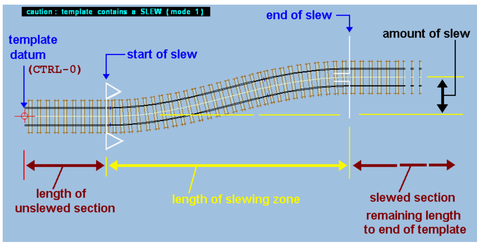
This page will be updated with more information and diagrams soon.

page created: 28/03/2001 latest revision: 02/08/2019

4.6.3.4 slewing

a page about slewing tracks in Templot

The ***slewing*** function shifts a section of the track sideways from its normal position. There is a section between the slewed and unslewed portions called the ***slewing zone*** in which the ***amount of slew*** (sideways shift) is progressively increased so that the slewed and unslewed portions are joined by a smooth reverse curve.



Slewing is a useful means of nudging the track into an alignment to fit the existing site, but should normally be used for plain track only. A turnout placed in the slewing zone is likely to be distorted and/or difficult to construct, and Templot will be unable to warn you about the minimum radius within it.

A common use for slewing is to increase the space between double-track running lines to make room for a fixed obstruction such as a signal post or bridge pier, or perhaps to accommodate an island platform.

Unlike a transition curve [36] , slewing introduces some distortion into the rail lengths and sleeper spacings. This will be negligible if slewing is used as intended to make small or gentle adjustments to the alignment. If you use the slewing functions to generate a sharp S-curve some noticeable distortion is inevitable. It is better to build up such curves with transitions instead whenever possible. The diagram above shows an exaggerated slew to help make things clear.

A slew can be applied to any existing alignment, whether straight, a constant-radius curve or a transition curve. For simplicity, the diagram above shows a slew in straight track.

Slewing is enabled by clicking the geometry > slew (nudge) > slew using mode menu items, and can be cancelled without losing the current settings by clicking the geometry > slew (nudge) > cancel slew menu item. The slew settings can be adjusted by the mouse actions only while slewing is in force.

While slewing is in force a reminder notice appears on the drawing pad. This shows in blue normally (as in the diagram above), but will change to yellow if Templot judges the slew to be excessive.

The start and end points for the ***slewing zone*** section are indicated by special marks across the track. The ***slewing start*** mark is a double arrow-head symbol pointing into the slewing zone, and the ***slewing end*** mark is a double-forked symbol (see the diagram above).

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To move the whole slewing zone along the track, select the move slewing start mouse action (**SHIFT+CTRL+F5** or just press the **'** (quote) key).

To lengthen or shorten the slewing zone, select the adjust slewing length mouse action (**SHIFT+CTRL+F6** or just press the **#** (hash) key).

To change the amount of slew, select the adjust slew amount mouse action (**CTRL+F7** or just press the **7** key on the main keyboard).

To enter the slewing data directly, select the geometry > slew (nudge) > new slew settings... menu item, or click the figures showing on the lower line of text on the mouse action panel.

There are two *slew modes*, using different maths for the reverse curve.

1. *slew mode 1* makes the centre reverse curve as gentle as possible to avoid buffer-locking problems and is suitable for slews in large radius curves or straight track.

2. *slew mode 2* eases the radius at each end of the slewing zone and is therefore more suitable for slews in sharply curving track. But it does this at the expense of a more pronounced reverse curve at the centre of the slewing zone.

For *slew mode 2* there is an adjustable slew factor which permits fine tuning of the alignment within the slewing zone by mouse action, click the action > mouse actions: control/geometry > adjust mode 2 slew factor menu item. (There is no slew factor for slew mode 1.)

As for the other mouse actions, the way in which the template responds to slewing adjustments is determined by the position of the fixing peg within it. Normally, before making an adjustment, the fixing peg should be moved to a position where you want the template alignment to remain unchanged.

A frequent need is to slide a template along a slewed section without disturbing the alignment. This is done using the *snake* (**CTRL+F6**) mouse action. Compare the results with the otherwise similar *slide* (**SHIFT+F9**) mouse action.

In addition, slewing can be combined with a transition curve [24] to give a virtually unlimited range of alignments.

▶ Note that slewing does not change the track radius (except within the slewing zone). The slewed and unslewed sections are of the same radius, and by zooming out you can see the two radial centre marks, one for each section.

▶ If you want the radius of the slewed section to differ, you can combine a slew with a transition curve [24]. By careful adjustment of the starting points and lengths of the transition curve and slewing zone, it is possible to make the slewed and unslewed sections concentric. (If adjusting a slewed transition curve seems daunting, it may be simpler to contain the slewing zone within its own template, and then combine it with separate templates for each section.)

For more information about the individual slew settings, please click the geometry > slew (nudge) > new slew settings... menu item, and then click the ? info button for each setting on the data-entry dialog.

This page will be updated with more information and diagrams soon.

page created: 28/03/2001 latest revision: 15/09/2020

4.6.4 make new template

These topics are about the various functions to make a new template, listed in the tools menu.

All the functions in Templot with the word *make* in their name store the existing control template as a background template, and then create a new connected control template.

Don't store the control template before using these functions, otherwise you will get duplicated background templates on the trackpad.

♦ To create a new *mint* control template, click the NEW button at the top of the trackpad, or click the template > new template (quick set)... menu item. The new control template will appear initially in the middle of the trackpad.

Sorry, nothing more here yet.

(page under construction)

4.6.4.1 make branch track

Sorry, nothing here yet.

(page under construction)

4.6.5 alignment tools

alignment tools - peg / align functions

This section is about the functions available under the peg/align tools > menu item for each background template.

These functions allow the control template to be aligned with, or generated from, the selected background template in various ways.

extend / shorten the control template to meet [26]

4.6.5.1 find intersection

Sorry, nothing here yet.

(page under construction)

4.6.5.2 make transition

For an example of this function in use, see how to... [40] .

For more about transition curves, see transition curves [24].

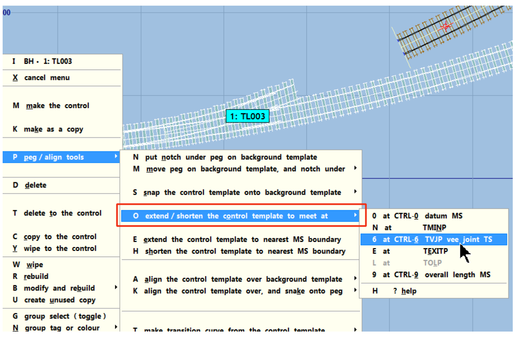
(page under construction)

4.6.5.3 extend / shorten the control to meet

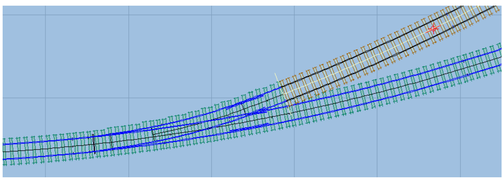
This function is primarily for use after using the make transition [26] function.

For an example of these functions in use, see how to... [40] .

The control template is extended or shortened as necessary to make a neat boundary with the selected background template, at the selected peg position:



With the result:



Note that for this function the control template alignment is not disturbed, and the position of the fixing peg within it is immaterial. The template is extended, not shifted.

If a perfectly neat boundary cannot be achieved, a message will appear showing the extent of any small discrepancies, in order that you can decide whether to accept them.

This function is primarily for use after using the make transition [26] function. For an example of these functions in use, see how to... [40] .

page last revised 21-Jan-2017

4.6.6 a simple track plan

Watch this screen video from Templot to see how easy it is to create a simple track plan. See how the controls in Templot are used to create this small part of a larger layout. A rough sketch can be scanned and used as a design guide as shown here. If it is drawn to a known scale, Templot can display it at the correct size automatically.

Here below is the result with the tracks aligned over the sketch. The plan is ready to be printed out as detailed construction templates.

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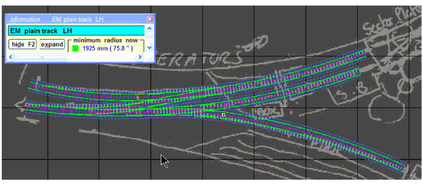


This is just the beginning of Templot. You can go on to link further templates on-screen and create complex formations to build a complete layout track plan. And then print it out to any size.

Many thanks to Russ for the original sketch. It has been converted to a low-contrast negative image in a photo editor program. This makes it less visually distracting while working over it, but is a matter of preference. The Templot screen can be set to any colours of your choice.

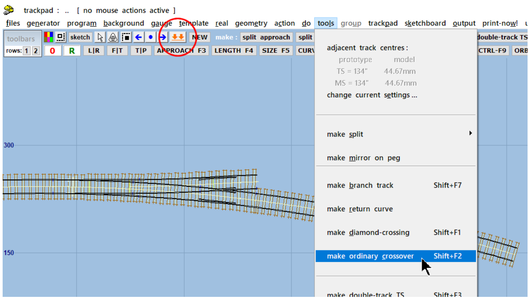
In addition to layout sketches and drawings, Templot can import historic maps from the internet and display them at the correct scale as a background design guide.

4.6.7 basic working methods

Here is a brief guide to a suggested way of working with Templot.

I'm assuming that you have already learned the basics of Templot and started using it. If not, please see the Templot Explained [4] beginners guide. You may also find origins and intent [46] a useful read in understanding the working of Templot.

Let's start with the first template in my intended track plan. I have adjusted it to the size and position I require, and made other changes such as setting the curving radius and the required style of timbering:



(If you don't know how to get this far, stop reading here, and please see the Templot Explained [4] beginners guide.)

What I'm looking at is the control template [30], in other words the current output from the template generator. If I change any of the input settings to the generator it will change instantly. So I need to make a "snapshot" copy of its present state for use in my track plan.

There are 2 ways I can do that.

1. The first way would be to click the button (or press the **INSERT** key). This function is called *store & background*. It will cause a copy of this template to be added to the storage box, and also mark it as a background template [22] so that it gets drawn on the background layer of the trackpad. But I won't be able to see it, because the control template will still be on the foreground layer in front of it. To see it, I would need to temporarily hide the control template by pressing the **HOME** key. My next task would be to move the control template away, and make whatever changes to it are necessary to create my next background template in the track plan.

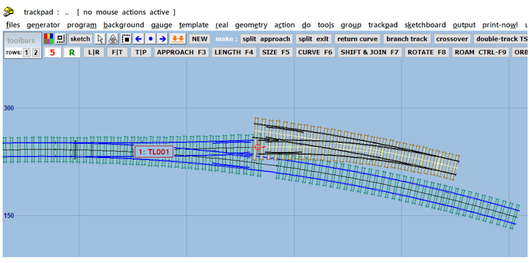
2. But mostly I will be using the second way. Which is to use the *make* functions on the tools menu.

► *Make* is an important word in Templot.

Make means that Templot will do the *store & background* process for me, and then modify the control template settings to create the next template in the track plan. In this case I want to create an ordinary double-track crossover from this turnout, so I click the tools > make ordinary crossover menu item.

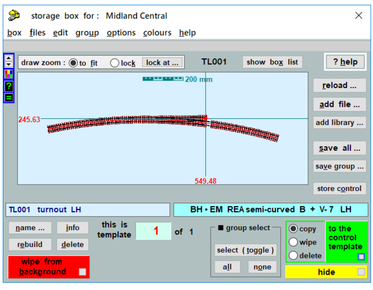
Note carefully that I use the first method, or the second method. But not both, otherwise I would end up with 2 identical templates in the storage box and on the trackpad background.

The result of clicking tools > make ordinary crossover is this:



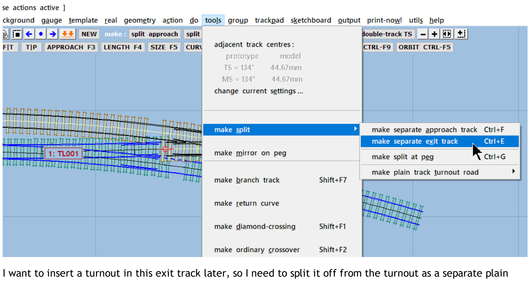
My first template is now a *background template*, and the output from the template generator in the control template is now the matching turnout needed to make a crossover.

Looking in the storage box I can see that my track plan so far consists of just this one stored template:



Templot has given it a serial number of TL001 (Turnout, Left-hand) and it is shown in the box with the track centre-line and co-ordinates in red, to indicate that it is a *background template* and is currently being displayed on the trackpad. The button is also red to indicate that the stored template is a background template, it is not a red error or warning. Other colours are used for stored templates which are not background templates, see later.

Returning to the trackpad I extend some exit track on the control template (**F4** mouse action), and I am then ready to use another *make* tool:



I want to insert a turnout in this exit track later, so I need to split it off from the turnout as a separate plain track template. Note again the word *make*: make split > make separate exit track. Templot repeats the *make* process and I now have 2 templates in the storage box and on the trackpad background:

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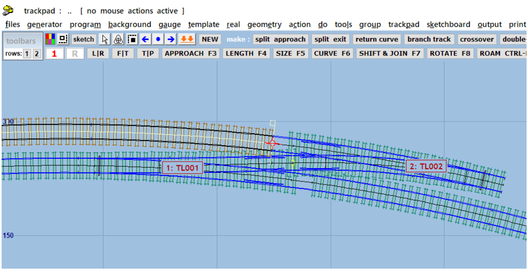
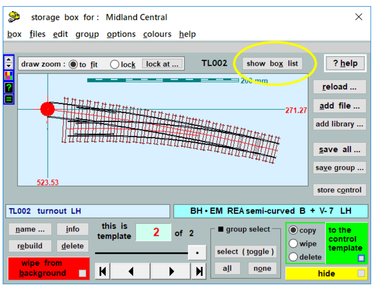
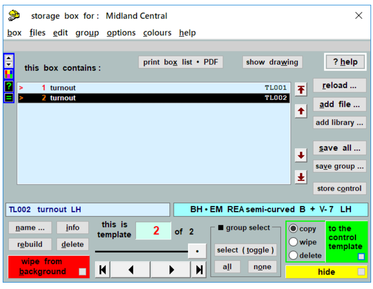
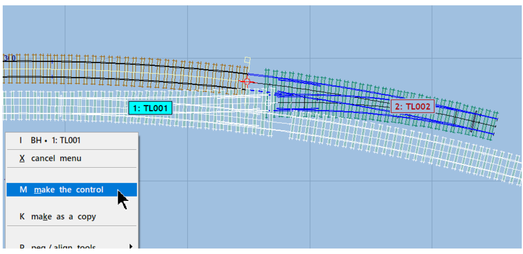






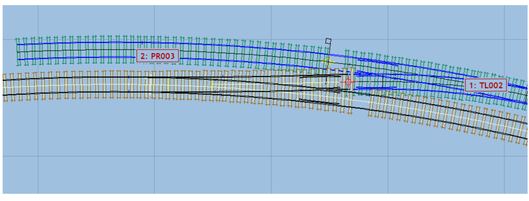
Notice in all these screenshots that the control template is never part of the track plan, it is displayed always in front of it on the screen as the current output from the template generator. The control template can only become part of the track plan if I do a ***store & background***, or Templot does it for me as part of a ***make*** function. There is more about this concept at origins and intent [*].

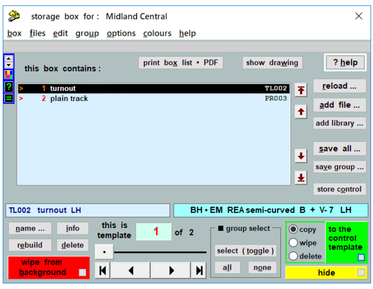
I have decided that I am not yet ready to do any more work on this plain track template, I want to go back and do more with the first turnout template. So I click on it:



It is highlighted and its ***pop-up menu*** appears on the left of the screen. Every background template has a pop-up menu. It contains a great many functions and settings related to this background template. In this case I want the make the control menu item (or press **M** on the keyboard).

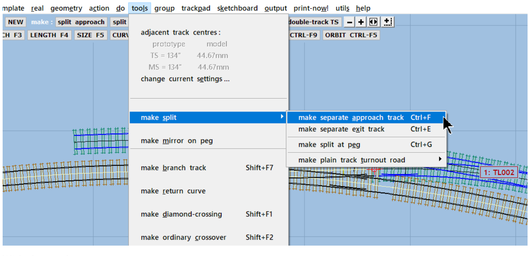
Notice again the word ***make*** there. Which means that Templot will again do a ***store & background*** for me on the current control template (the plain track template). But this time to create a new control template, it will remove (delete) this background template from the storage box and the background track plan, and will copy its settings back into the template generator:



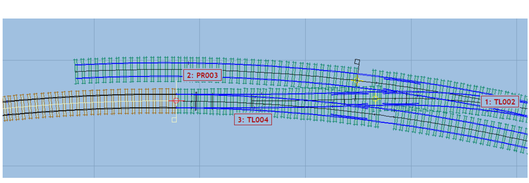


I still have 2 background templates in the storage box. But the first turnout has been removed, and there is now instead the plain track template PR003 (Plain track Right hand). Note that I haven't lost the first turnout, because its settings are now back in the control template where they started. But it is no longer in the track plan as a background template, so I need to keep that in mind if I make any changes to its settings.

What I want to do is to split off its approach track, so again it is a ***make*** tool:



With the result:



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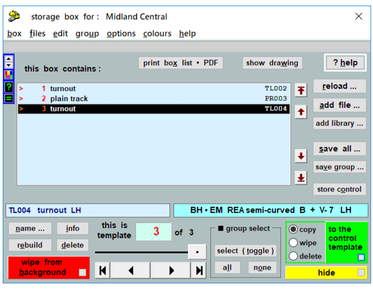
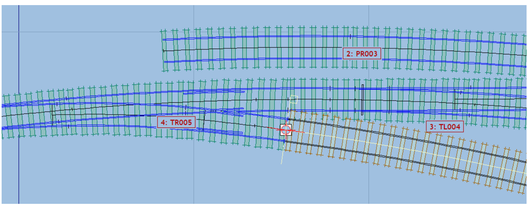
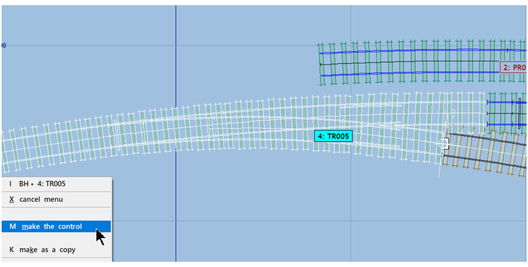


The turnout part is safely back unchanged in the storage box and on the track plan, with the updated serial number TL004.

And I can now do some work on the plain track in the control template. I want to insert a turnout in it and create a siding. So that's another *make* tool, make branch track, and I now have 4 background templates in my track plan:



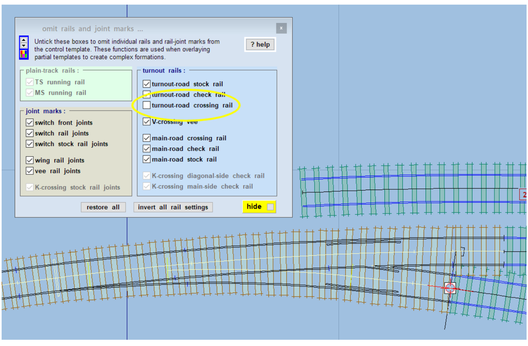
But it is actually the turnout which I want to work on. This siding has actually been taken Out Of Use, and to that end the switch blade and closure rail have been removed from the turnout. Disregarding how likely that is in prototype terms, it will be instructive in some of the further functions in Templot. So clicking on the turnout, I do make the control again to store the siding template and swap the turnout back into the control template:



With the turnout back in the control template, I can now make some changes to it.

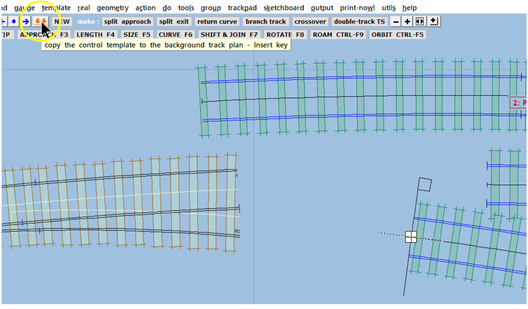
► The control template is the only place I can make changes such as this, it can't be done directly on a background template.

As you can see I have used the do > omit rails and joint marks... function to remove the turnout-road crossing rail:

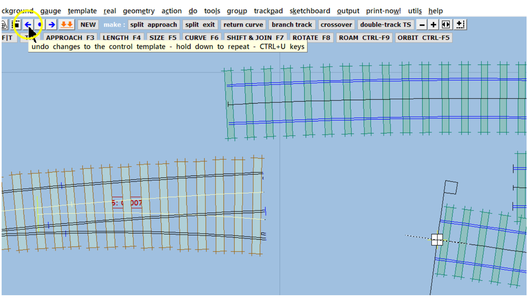


Unfortunately that has also removed the wing rail from the V-crossing. To get it back, I need to split this turnout into 2 partial templates, and store each one separately. The first one will be the section up to the wing-rail joints only.

So after remembering to move the peg back to the **CTRL-0** position (click the peg position indicator [24]), I have shortened this turnout (**F4** mouse action) to the wing-rail front rail joint:



This is now a case where I need to do *store & background* myself, because there is no *make* function which will do this for me, I already have the turnout design in the control template. So I click the button, but very little seems to happen:



That's because the control template is still in front of the copy of it which is now on the background. You can confirm its presence from the name label just visible between the timbers, or by hiding the control template (**HOME** key), or simply by clicking on it. Clicking the control template does nothing, the click will go through to the background template and highlight it (if it exists).

Now the second partial template is needed, which will be remaining section of the turnout, with the wing rail restored.

First I need to undo the shortening of the control template, and the removal of the crossing rail, until it is back to how it was before I did those things. The easy way to do that is to click the blue left arrow a few times undo changes, or **SHIFT+CTRL+ROLL** the mouse wheel back, until you find the control template which you are looking for. If you don't feel happy relying on the 80-slot rollback register, you could be ultra-cautious and park a copy of the control template in the do > parking bay before making those changes. Or you could use the the do > omit rails and joint marks... function again to restore the missing rail.

I used the mouse wheel (easiest and quick), and then the **CTRL+F3** *blanking length* mouse action to blank off the control template up to the wing rail joint.

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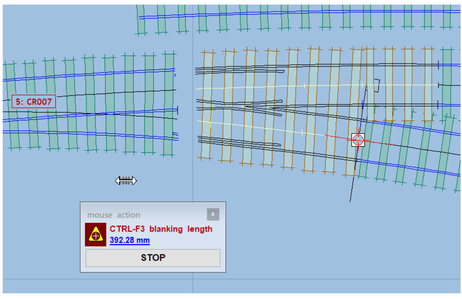
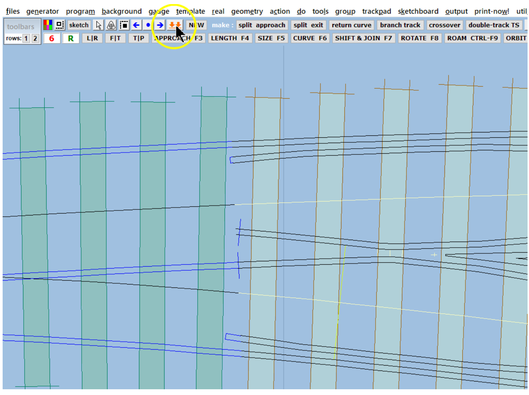
Here I have blanked it too far, so that you can see the effect of this mouse action. Notice a couple of other things - the fixing peg is back on **CTRL-G** after undoing the changes which moved it. The *blanking* function is not affected by the peg position. And the background template has been given the serial number CR007 (Custom Right hand - custom because of the missing rail):



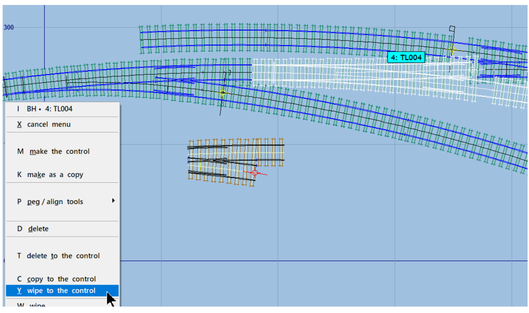
I zoomed in to make an accurate join, and now I'm going to do *store & background* on this too, while I have a coffee and a think, because I'm not yet ready to use the *make* tools again:



Back to work. I moved (**F7** mouse action) the control template into fresh air, so that you can see the finished turnout with a rail removed, comprised of the 2 partial templates, each one stored separately. It is often useful to move the control template out of the way so that you can see what you are doing. Remember that it is not part of your track plan, so it doesn't matter where you put it. This is often the only use for the **F7** *move* function once track planning is under way, unlike in other planning software.

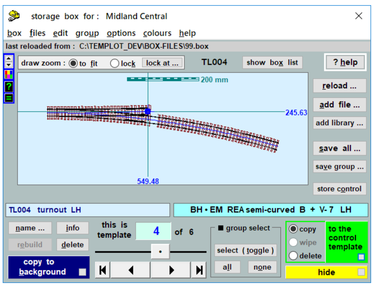
I switched off the name labels (**END** key) because they can get annoying, and are easily switched back on if needed.

Now I've decided that I want the original turnout to have square-on timbering instead of equalized, so I have clicked on it to get its pop-up menu:



This time I don't want to use *make* to get it back into the control template, otherwise I will be creating an unwanted background template from the control template. Which if I hadn't moved it would be a duplicate of the one I stored before the coffee.

However, I'm not entirely sure about this change, so I have decided to do wipe to the control which not only skips that part of the *make* function, but also leaves the template in the storage box as an *unused* template while copying its settings back into the control template. As an *unused* template it is no longer a background template, no longer part of the track plan, and no longer showing on the trackpad screen. But it is still a stored template, and remains in the storage box (and in the data file if the templates are saved):



As an unused template it shows in blue in the storage box. From there it could be quickly copied back to the background, or into the control template, if wanted. So if I change my mind, I can easily get it back. Unlike a conventional undo function, that could be a week later, because it will still be in the template data file.

Obviously a simple change to the timbering style could be made in the control template at any time. But an unused template might contain several more complex settings such as a custom switch, timber shoving, or check rail adjustments, say. By storing a template containing them they can be easily retrieved and re-used at any time if wanted.

In other circumstances you may want to wipe a group of several templates (an entire goods yard for example) while you try a different design wipe group. Having decided that you preferred the original after all, you can easily copy the group of unused templates to the background again. For this purpose the *prefix tags* a very useful, making it easy to recreate the original group when needed.

After making the timbering changes I wanted, I'm ready to do *store & background* again:

And I now have the beginnings of my track plan, and several templates in my storage box:

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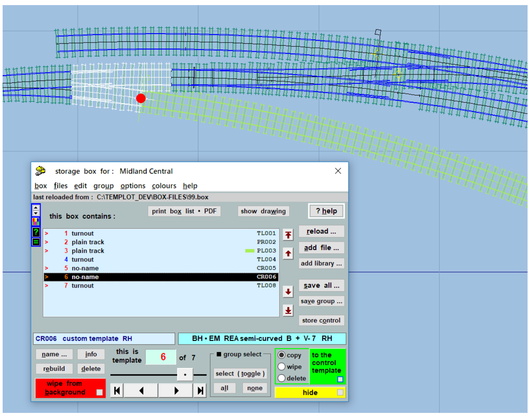


I changed the *marker colour* of the siding template to indicate it is out of use. Notice that the marker colour is indicated in the storage box.

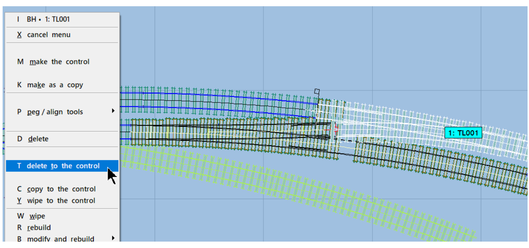
Currently the 6th template is highlighted in the box list, and therefore also shows highlighted on the trackpad while the storage box is showing. By running up and down the list using the arrow keys on the keyboard, you can quickly find the corresponding background template on your track plan.

The unused template is 4th in the list and shows numbered in blue.

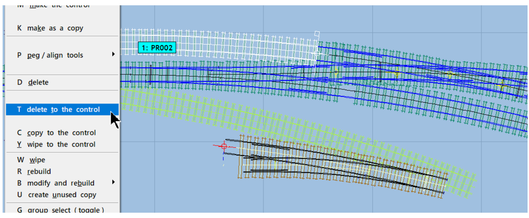
I have now decided that I want the upper turnout to be replaced with a single slip into the goods yard.

There is a *make* tool to do this. But like all *make* tools it needs to start from the control template, and it will be storing a background template. Which means I first need to get this turnout back into the control template, and also remove the existing background template from the track plan to make a clear space for the new one.

So in this case, after clicking on the turnout, I do delete to the control on its menu.

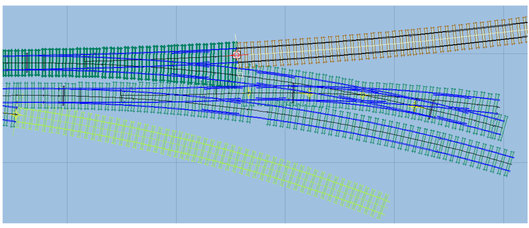


Then I can do tools > make slip to create the slip, and the result is:

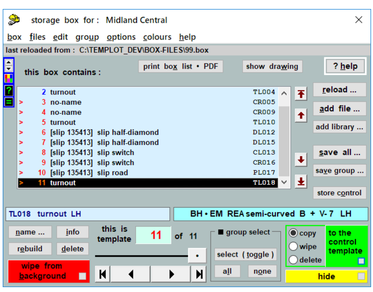


The make slip function doesn't store the original turnout, so in case I might need it again, it throws it to one side. In fact I don't need it, what I want to do is insert a turnout in the upper track. So that's delete to the control again, in the process discarding the thrown aside turnout.

And after inserting a turnout in it, I can do make branch track and add another siding:



I now have 11 templates in my storage box, including 5 making up the slip, and 1 unused:



... to be continued

4.7 7. background shapes

This section is about using the *background shapes* functions in Templot.

(page under construction)

4.7.1 baseboard outlines

Sorry, nothing here yet.

(page under construction)

4.7.2 maps and picture shapes

This section is about using the *background picture shapes*.

crop/combine function [32]

get a map from the web [33]

4.7.2.1 get a map from the web

Maps and aerial images are often useful as a background guide to track planning. Templot can fetch tiled maps from the internet for you, and scale them to match your current model scale. The map is comprised of several square tiles, each of which becomes a separate *picture shape* in your list of background picture shapes [31] . There are functions to combine such tiles into a single map, and to position and twist the maps to suit your track planning.

This video shows you how to get an historic background map from the NLS web site, and align tracks over it:

▶ buttons under construction video: part 1 part 2 part 3 *video created 26/05/2022 using 234c*

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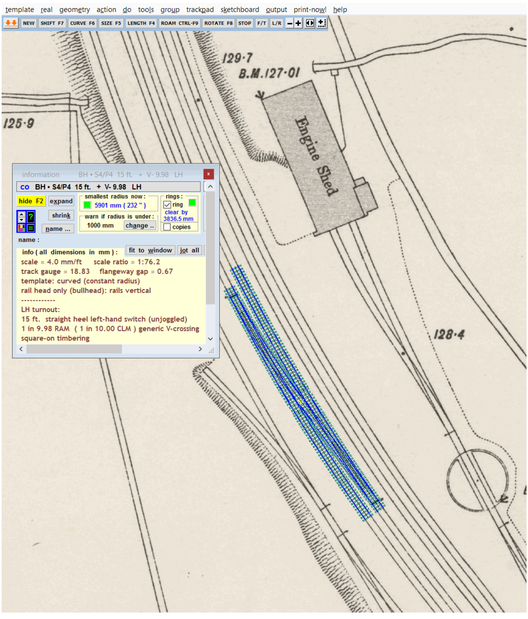
This video below is a clip from an earlier live demo in 2020, showing how to align templates over a map. The map is a 50"/mile more modern map than the one above, which makes it easier to align the tracks. The make diamond-crossing function has been changed since then, but the results are still the same:

If you obtain such maps by making screenshots from web sites, it can be difficult to scale (re-size) them to match your modelling scale. Templot can obtain many such maps for you, and scale them to the correct size automatically.



► page under revision In the meantime, ask on the friendly Templot Club forum if you need more information about using background maps.

page created: 11/09/2017 latest revision: 26/05/2022

4.7.2.2 improve map clarity

Sorry, nothing here yet.

[page under construction]

low-contrast option:

'This function will convert the image in the selected picture shape:||'

+'||to a low-contrast image.'

+'||This can be helpful when working over a background map so that it does not become too distracting and allows the track templates to be clearly seen.'

+'||You can choose the basic grey shade to suit your current trackpad colour scheme, as you prefer.'

+'||You can reduce the contrast further by repeating this function.'

+'||On large images conversion may take some time to complete.'

+'||This function cannot be reversed -- for this reason an unmodified duplicate picture shape will be created and set not to show on the trackpad. You can use this as a backup picture shape if the conversion results are not satisfactory.'

Choose a basic grey shade for the converted image.',

'black','dark grey','medium grey','light grey','white',

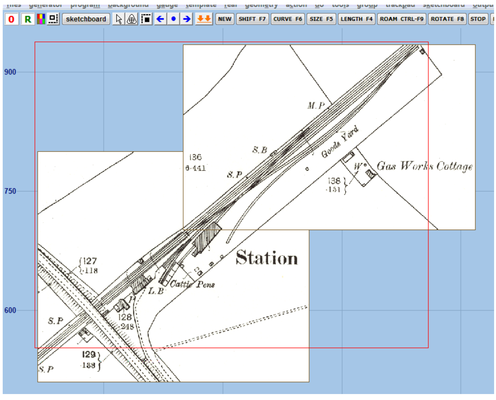
4.7.2.3 crop/combine function

picture shapes - crop/combine function

This function is used to crop or combine one or more picture shapes. A single picture shape can be cropped smaller, or several picture shapes can be combined into a single picture shape.

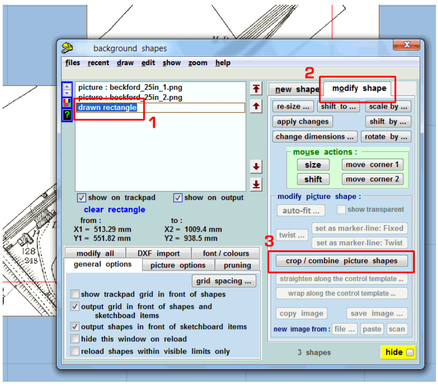
Here below 2 screenshots from historic OS 25" maps have been scaled (sized) to match, and aligned one over the other. If such maps are from the NLS web site, Templot can obtain and scale the screenshots for you. See get a map from the web [76] .

A new background rectangle shape has then been drawn over them (the red rectangle):



At this stage it is a normal rectangle shape, and can be shifted or re-sized in the usual way.

Now we can use the crop/combine function:



1. select the rectangle shape on the list.

2. click the modify shape tab.

3. click the crop/combine picture shapes button.

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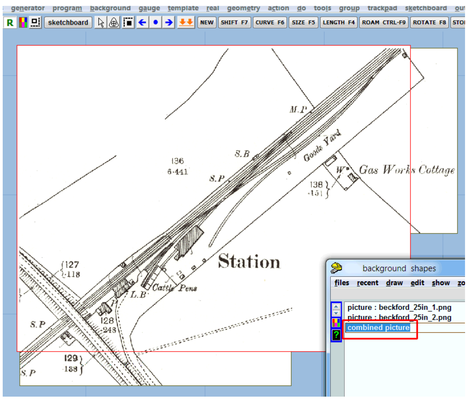
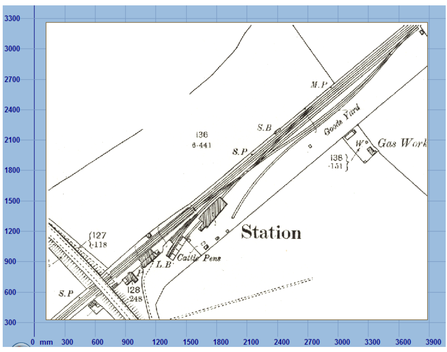
This is the result:

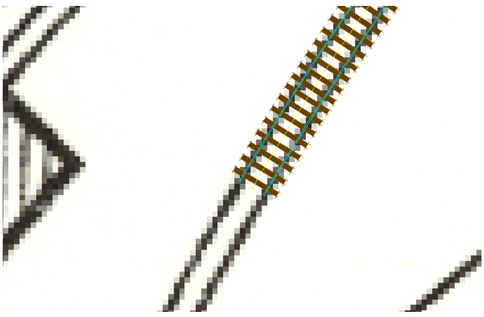


The rectangle has been converted to a picture shape, containing a copy of the underlying picture shapes.

We can now if we wish delete the original picture shapes:



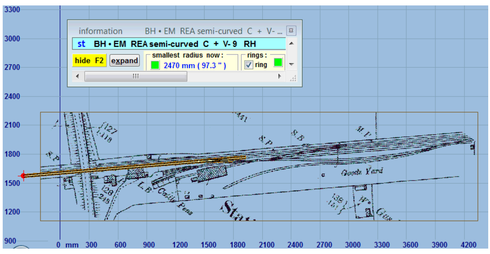
The crop/combine function retains the full resolution of the original picture shapes, as can be seen when zoomed in:



The great advantage of having a single picture shape instead of several is that it can now have further functions applied to it more easily. You may want to shift it to a new position, re-size it, wrap it onto a curve, etc.

Here for example I first twisted it by -35 degrees to a more convenient alignment using the twist... button, and then used crop/combine again to reduce it to a more manageable size.

I have then set it show transparent and started aligning tracks over it. A C-9 turnout is found to fit for the trailing connection from the Goods Yard:



The advantage of performing these picture shape functions in Templot rather than a graphics editor program is that the scaling and full resolution is maintained.

Martin.

page last revised 21-Jan-2017

4.7.3 target marks

Sorry, nothing here yet.

(page under construction)

4.8 8. 3D and CAD exports

Experimental work is under way to create 3D-printed track direct from Templot files.

See also: Templot 3d Explained [9]

These below pages are mostly out-of-date (will be updated soon):

other sections:

1. download and installation [12]

2. getting started [15]

3. the control template [19]

4. background templates [23]

5. the storage box [23]

6. track planning [23]

7. background shapes [35]

9. printed templates [34]

10. how to ... [36]

11. utilities and utensils [37]

12. program [40]

99. origins and intent [40]

Templot 3D Explained:

Please click the first link below to begin:

3D export - prototype notes [34]

omitting end webs from brick [34]

extracting an FDM timbering brick [34]

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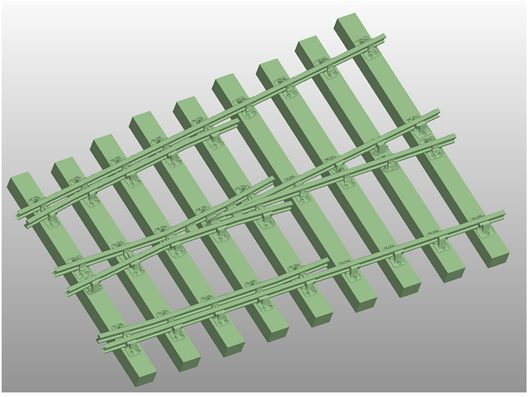


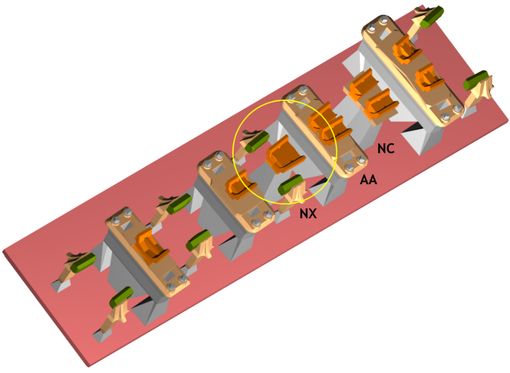
It is already possible to create full bullhead turnouts and plain track using REA-pattern chairs. In any gauge or scale.

For an overview of the project see Getting started with 3D Plug Track

You can follow the Templot software development and get details of the file export functions at Plug Track progress

You can read about other aspects of the project at Plug Track topics

There is more about the practical ideas and methods of building and laying 3D track at Building 3D track



[page under construction]

4.8.1 3D export - prototype notes

Some notes to get you started from James Walters.

4.8.2 omitting end webs from brick

WIKI: This is a page from the Templot Wiki. Click here to visit the full Wiki.

4.8.3 extracting an FDM timbering brick

EXTRACT: This is an extract from the Templot Club forum. Click here to see the full topic.

NOTE: This is a long topic and mostly now out of date.

4.9 9. printed templates

About printing construction templates from Templot and exporting image files.

your first printed template [34]

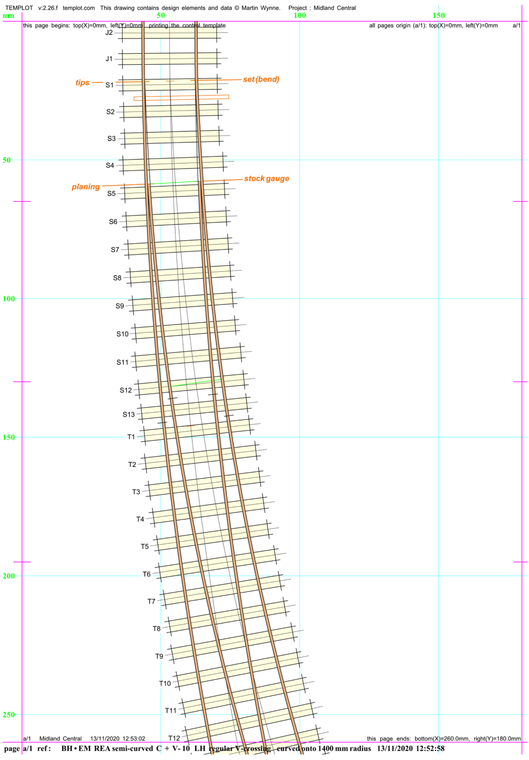
4.9.1 your first printed template

If this is your first look at Templot, you may like to try printing a track template before you learn any more about the program. It's very easy and quick to print a basic turnout template.

Let's make it a curved turnout, which is not a template you can buy ready printed. ☺

Here's a short video to watch, and then try yourself.

Here is a typical printed result. Just trim the pages to the red lines, stick them down and start track building:



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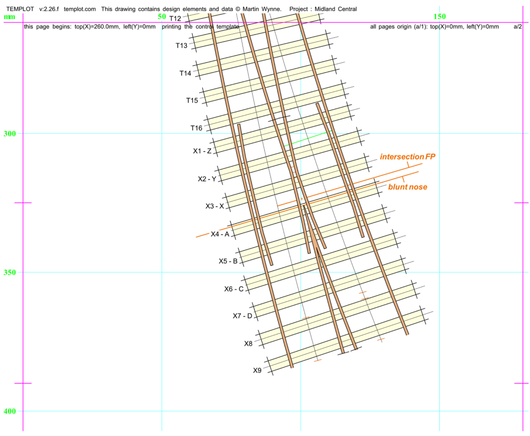


This short Templot screen video shows you how to:

1. change to your required gauge and scale.
2. set the hand and size of a basic turnout.
3. set the outer radius (or a straight turnout if you prefer).
4. print the template.

The resulting inner radius is displayed on the information panel, and flashes red if it is smaller than your specified minimum.

If the template doesn't quite fit your intended layout site, it is easy to come back to Templot, adjust it slightly, and print another one.

This is just the barest beginning of Templot. You can go on to link templates on-screen and create complex track formations on flowing curves to build a complete layout track plan. And then print it out to any size.

To learn more, please go back to the Templot Explained beginners guide section of this Templot Companion web site.

page last revised 29-August-2016

4.9.2 output in detail-mode

[page under construction]

A temporary guide to finding lots more Templot information is at: current documentation list .

4.9.3 output in diagram-mode

For more information click partial templates omitted in diagram-mode.

[page under construction]

4.9.4 printing template pages

Ink on paper - about printing template pages

To print the control template only, click the output > print the control template menu item (or press **F11**).

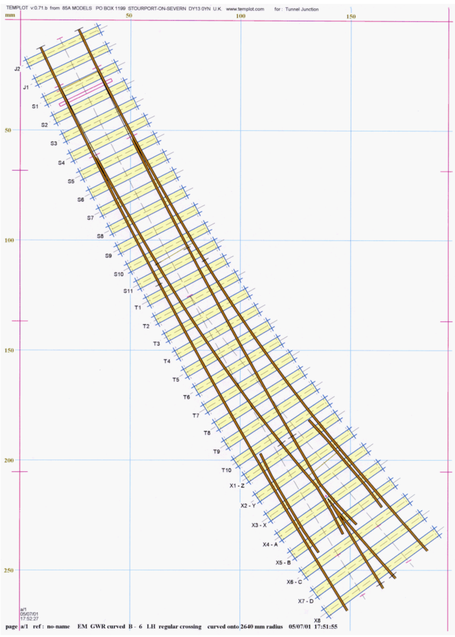
To print an entire track plan, click the output > print background templates (track plan) menu item (or press **CTRL+F11**)

A print preview screen appears, showing how the track plan will be fitted on the pages.

You can print at a reduced size by selecting the output > enlarge / reduce size for print menu options. A useful feature is the fit single page option, which reduces the printout sufficiently to just fit on a single sheet of paper.

Please click the ? help button on the print pages dialog for more detailed notes about printing track plans and templates. The settings also apply to exported PDF files.

Here is a scan showing a typical printed template page:



Page orientation

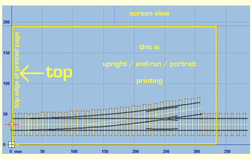
To get the best fit of most track plans on the printed templates, Templot rotates the screen view through 90 degrees when printing. This means that the top edge of the printed page always corresponds to the left edge of the screen view.

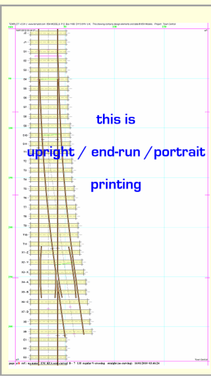
This sometimes causes confusion for new Templot users -- generally you will get the best results if you simply leave Templot on the default setting, which is called *upright / end-run / portrait* printing.

As a guide, Templot displays the printing page outlines on the screen as dotted lines.

Here are some diagrams to explain the orientation settings:

upright / end-run / portrait printing:





sideways / side-run / landscape printing:

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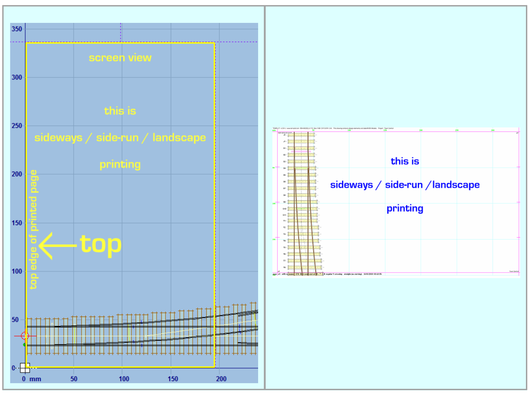


page revised © 22-Sep-2005

4.9.5 exporting PDF files

Templot2 now includes a native PDF generator. This means you can create PDF template files directly from Templot, and there is no longer any need to install one of the virtual printer PDF generator programs.

Creating PDF files is essentially the same as printing templates. The difference is that the data goes into a PDF file instead of being sent to the printer.

Sorry, nothing more here yet.

(page under construction)

4.10 10. how to ...

how to ...

This section is about how to perform specific tasks in Templot.

other sections:

1. download and installation [13]
2. getting started [15]
3. the control template [19]
4. background templates [23]
5. the storage box [25]
6. track planning [29]
7. background shapes [35]
8. 3D and CAD exports [39]
9. printed templates [41]
11. utilities and utensils [47]
12. program [48]
99. origins and intent [48]

topics in this section:

create a run-round loop [36]
create slips [36]
create 3-way turnouts [37]
create catch points [39]
fit a turnout to existing curves [40]
link between existing templates [42]
wrap a picture shape to a curve [43]
fit second turnout close behind first [46]
create inside half-scissors [47]

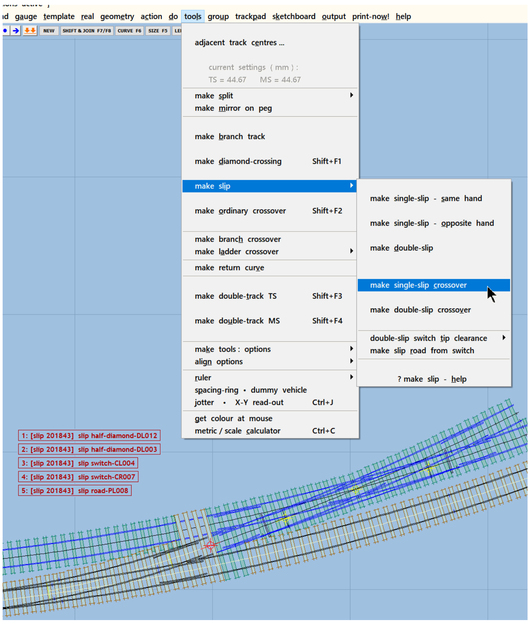
[page under construction]

4.10.1 create a run-round loop

A video for beginners, showing how the Templot methods are used to create a simple branch terminus with a run-round loop:

4.10.2 create slips

To create a single or double slip, click the tools > make slip > menu items:



For more information click the tools > make slip > ? make slip - help menu item:

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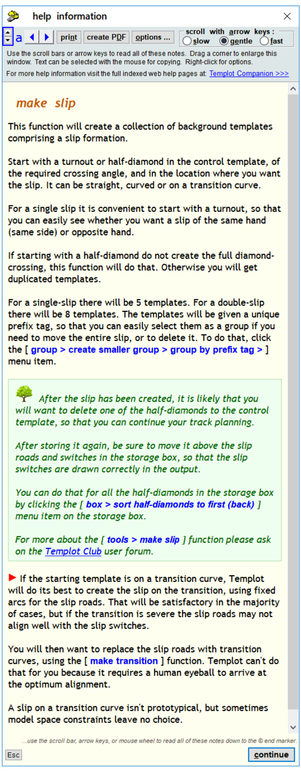


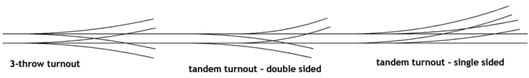
The above function creates a *regular* slip, that is one having all crossing angles equal. To learn more about how slips are created you may want to watch the video below, although you don't need to follow it, the above functions do it all for you.

If you wish to add slip roads to an *irregular* diamond-crossing, in which the crossing angles differ, you can do so manually by following this video tutorial:

page last revised 18-August-2017

4.10.3 create 3-way turnouts

About tandem turnouts and 3-throw turnouts.



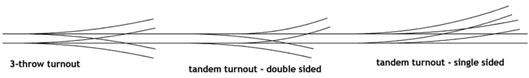
See:

tandem turnouts

3-throw turnouts

4.10.3.1 3-way tandem turnouts

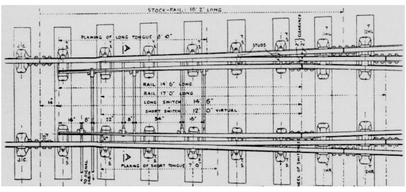
a page about creating 3-way tandem turnouts in Templot



Any turnout having 3 exits is called a 3-way turnout. They are created by combining 2 ordinary turnouts. They are divided into two basic types:

1. *3-throw turnouts*

In these both switches are coincident, with the switch blades overlapping. They are difficult to build and prototypically rare -- used only in sidings and yards, not in running lines, and not at all for many years on UK standard-gauge railways.



A 3-throw switch (Great Eastern Railway)

Creating 3-throw turnouts is a separate subject in Templot, the rest of this page is about creating tandem turnouts .

---

2. *tandem turnouts*

Also called *double turnouts* or *lap turnouts*.

In a tandem turnout the switches are staggered so that the second switch is placed beyond the heel of the first one. They are quite common on the prototype. Like all 3-way turnouts they require one additional V-crossing, but the expense of this is justified by the great saving in space which they permit.

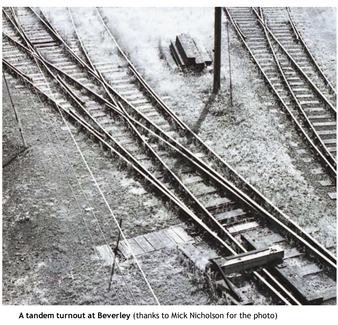
A tandem turnout can be straight or curved through the main road. The main road is the running line which sees no switch divergence, and can therefore have a higher speed limit.

In a *type 1* tandem turnout both switches are in the main road, and such tandems can be double-sided or single-sided.

In a double-sided tandem one turnout is left-hand and the other is right-hand from the main road.

In a single-sided tandem both turnouts are of the same hand from the main road.

In a single-sided *type 2* tandem (much less common) the second switch is in the turnout road of the first turnout instead of being in the main road.



A tandem turnout at Beverley (thanks to Mick Nicholson for the photo)

Tandem turnouts are not simple. The two turnouts can be dozens of different sizes and crossing angles. The V-crossings can each be regular, generic, or curviform type. If regular type, the turnout lead lengths can be adjusted by changing the crossing entry straight.

But you can't just combine any two turnouts at random. The turnout sizes must be selected so that there are no rail conflicts. There must be room for the second switch blade to open behind the first one. All the V-crossings must be able to have their check rails correctly positioned. The ends of check rails and wing rails must not

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obstruct the clearance for wheel flanges on nearby running rails. And the timbering layout must allow the special switch and crossing chairs to be fitted in the proper places on the rails. So that is quite a lot to think about in designing a tandem turnout, and makes them trickier than other formations to get right.

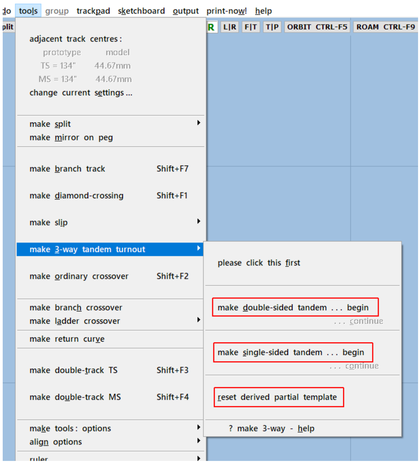
In Templot a tandem turnout is created as a collection of partial templates. You can create a tandem turnout entirely yourself, or you can use the built-in functions to do most of the work. Only most of it, because for the final adjustments it needs a human eye to view the screen and see where adjustments are needed. Generally if you are still track planning you can leave these final adjustments until you are ready to print the templates for construction.

The next part of this page is about using the built-in tandem functions in Templot to create a type 1 tandem turnout.

For details about creating a tandem turnout manually from scratch, including type 2 tandems, click creating custom tandem manually .

---

about the built-in tandem functions



The tools > make 3-way tandem turnout > functions work a little differently from the other *make* tools:

- You can interrupt the process half-way to continue track planning and confirm that the tandem will fit your track plan, or adjust it to do so if necessary. You can then return later to complete the process of creating the tandem turnout. But you must do that before ending the current working session, or creating another tandem turnout.
- The result is likely to need some further final adjustments by you. This is because it needs a human eye to look at the screen and see what is needed. These final adjustments do not affect the geometry and can be left until track planning is complete and you are ready to print the templates for construction. It is not necessary to make these adjustments in the current working session. If you are lucky no adjustments may be needed.
- The created tandem will be comprised of partial templates. When you work from them in further track planning, for example to create a crossover, the partial-template settings will propagate into your new template. It will be necessary to click the reset derived partial template menu item to return the new template to the normal settings.

---

using the built-in tandem functions - 1. double-sided

For a double-sided tandem the original starting turnout becomes the 1st turnout in the tandem, and a new 2nd turnout of opposite hand is created beyond it.

1. Start with the required original turnout in the control template. This can be an existing turnout within your track plan. It should be a longish turnout because the new 2nd turnout will be shorter, and its radius may otherwise be too sharp. A starting size of B-7.5 or B-8 is good, or longer if you have space.

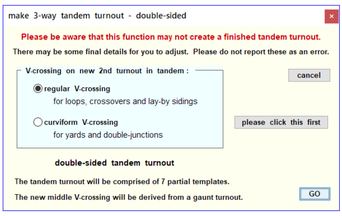
The starting turnout can be straight or curved, but not on a transition curve. If the starting turnout has a *regular*-type V-crossing, the *crossing entry straight* should not extend beyond the default auto-fit length.

If these starting conditions cannot be met, it will be necessary to create the tandem turnout manually .

The geometry of the starting turnout will not be modified. If it is part of your track plan it will remain in alignment.

2. Then click the make double-sided tandem ... begin menu item.

3. This dialog will appear. Select your required option for the V-crossing on the new turnout:



If the connected track will be a loop, crossover, lay-by siding, or other track running generally alongside or close to the first track, select the regular V-crossing option.

If the connected track must curve away from the first track, for example within yards, or in a curved double-junction, select the curviform V-crossing option.

more information about types of V-crossings

If necessary this setting can be changed later when you see the new turnout. But you may then need to adjust the crossing angle to re-align the timbering.

4. Then click the GO button and follow the dialogs which appear.

5.

(page under construction)

Here is a temporary scruff video showing the built-in function for double-sided tandem:

This page will be updated with more information and videos soon.

---

using the built-in tandem functions - 2. single-sided

For a single-sided tandem the original starting turnout becomes the 2nd turnout in the tandem, and a new 1st turnout of the same hand is created in front of it.

1. Start with the required original turnout in the control template. This can be an existing turnout within your track plan. If so make sure there is some space (or approach track) in front of it to allow for the creation of the new 1st turnout in the tandem turnout.

The starting turnout can be any reasonable size, straight or curved, but not on a transition curve. The new 1st turnout when created will often be similar in size and radius.

If the starting turnout has a *regular*-type V-crossing, the *crossing entry straight* should not extend beyond the default auto-fit length.

If these starting conditions cannot be met, it will be necessary to create the tandem turnout manually .

The geometry of the starting turnout will not be modified. If it is part of your track plan it will remain in alignment.

2. Then click the make single-sided tandem ... begin menu item.

3. This dialog will appear:

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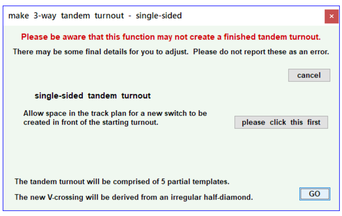


For a single-sided tandem there are no options to select. The new 1st turnout and the additional V-crossing will both be curviform.

4. Click the GO button and follow the dialogs which appear.

5.

(page under construction)

This page will be updated with more information and videos soon.

---

creating a custom tandem turnout manually

A temporary video showing the basic manual process:

---

type 2 tandem turnouts

A type 2 tandem turnout (thanks to Mick Nicholson for the photo)

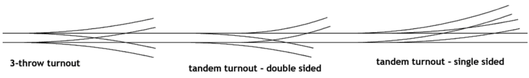
The above photo shows a tandem turnout which would need to be created manually as a custom tandem. This is a type 2 tandem in which the second switch is inserted in the turnout road of the first switch. Despite appearances this is a single-sided left-hand tandem. The main road exits on the left of the picture. The middle road diverges from it with a left-hand switch. The road exiting on the right of the picture diverges from the middle road with another left-hand switch.

This page will be updated with more information and videos soon.

page created: 03/01/2018 latest revision: 04/07/2019

4.10.3.2 3-throw turnouts

About 3-throw turnouts.



For information about 3-way tandem turnouts click tandem turnouts .

(page under construction)

4.10.4 create catch points

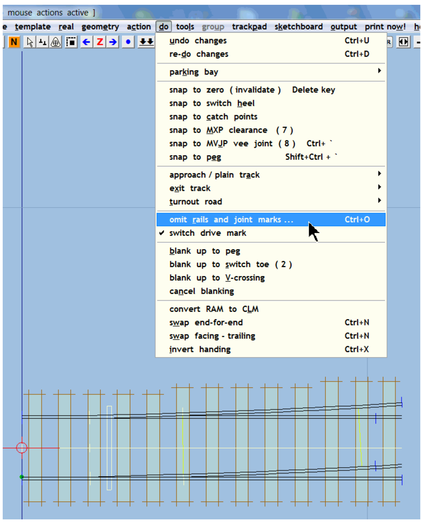
Trap points are provided where goods trains and vehicles could run away and get onto passenger running lines. They are not usually provided where passenger lines interconnect. The intention is to stop the runaway vehicle before it can foul the running line.

Trap points are often implemented using catch points rather than a full turnout and spur or sand drag. Catch points may derail the vehicle and damage the track, but that is far preferable to a collision.

Creating a set of catch points in Templot means shortening a turnout template to contain only the switch part. You can do that manually using the **F4** mouse action, or click the do > snap to catch points menu item. Usually you would use a short switch to save space, such as an REA size "A" switch.

This infographic shows how to insert a set of catch points in your track plan. Click the Play button below it to begin:

Sometimes a catch point consists of a single switch blade instead of a full set of points. In that case simply omit the unwanted rail -- click the do > omit rails and joint marks... menu item (**CTRL+O**):



Then untick the turnout-road crossing rail tickbox:

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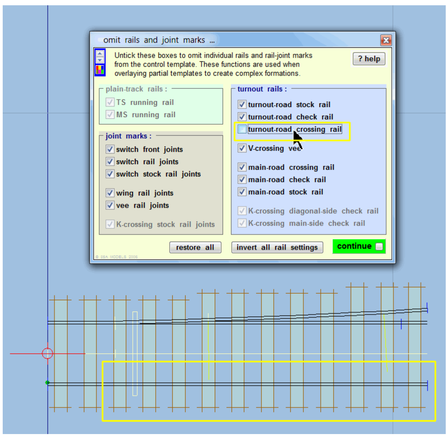


There is more about trap and catch points on Templot Club at:

http://85a.co.uk/forum/view_topic.php?id=179&forum_id=11

http://85a.co.uk/forum/view_postx.php?post_id=12792

page created 04-June-2012, revised 08-April-2019

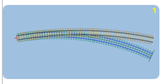
4.10.5 fit a turnout to existing curves

slideshow
click to show the slideshow in a separate window

More information:
curviform and regular V-crossings [39]
inserting a turnout in plain track [30]
switch size [32]
background templates [23]
notch on intersection [36]
F5 turnout size [27]
F3 approach length [33]
make branch track [35]

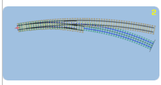
download PDF version for printing / offline viewing: PDF version

plain text version / no script / page print

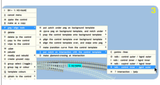


1. Start with the two curves, one in the control template, one as a background template. For best results have the easier curve in the control template as shown. The curves don't have to be exactly tangential as here, but you will generally get better results if they are at least close to being so (for a ***curviform*** V-crossing).

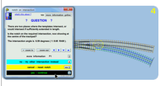
If both tracks are curved to the same radius in the same direction, they won't be tangential, and the result will require a ***regular*** V-crossing.



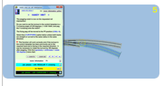
2. You must help Templot by inserting a turnout in the control template, of the correct hand and facing in the required direction. It doesn't matter what size it is, or where in the control template. But the switch size won't be changed, so set an appropriate switch size first. You can change it later if necessary. This one is the default B-6 REA turnout with a B switch.



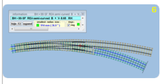
3. Click on the background template, and then this item on its menu. Choose the appropriate combination of rails for the new V-crossing -- this one is on the inner rail on the control template, and the outer rail on the background template.



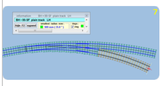
4. Confirm that Templot has found the correct intersection position.



5. And choose the curviform option for the V-crossing.



6. This is the result. Notice the odd crossing angle (1:8.65 here) for an exact match. To be prototypical you may want to change that to a normal size (say 1:8.5) using **F5** mouse action -- and then adjust the side curve slightly to fit.

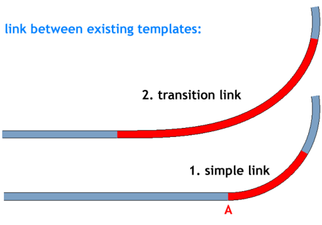


7. I added some approach track on the turnout (**F3** mouse action), and shortened the side curve to the turnout exit (**F4** mouse action). For best results you may want to delete the original side curve and replace it by doing tools > make branch track on the turnout instead.

page last revised 02-Feb-2013

4.10.6 link between existing templates

There are 2 ways to create a track linking between two existing templates:



1. simple link [41] for yards and sidings - similar to the result when clipping together items of set-track.

With a ***simple*** link traffic can sometimes see an abrupt change of radius, as at **A** above. Traffic travelling from left to right suffers a sudden lurch into the curve, leading to unsteady running and requiring a speed restriction.

For this reason ***simple*** links should be avoided on fast running lines - use a ***transition*** link instead.

For details of how to create a ***simple*** link, click: make simple link [41].

---

2. transition link [41] for fast running lines - a smooth flowing transition curve.

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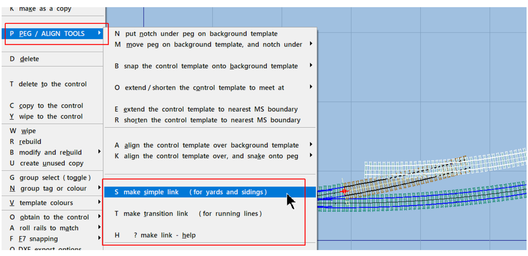
With a ***transition*** link fast traffic is guided smoothly into the curve as the radius is progressively reduced. Unless the final curve is very sharp, no speed restriction is needed.

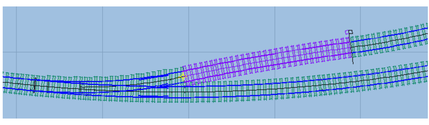
In Templot transition curves are useful in other situations too, such as in yards and sidings, to create smooth flowing trackwork in cramped model spaces and disguise the severity of the curves. However the prototype is unlikely to use mathematical transitions in such locations.

For details of how to create a ***transition*** link, click: make transition link [41] .

To create a link between existing templates, select the target background template, and then click the PEG / ALIGN TOOLS > make link items on its menu:



The result is a simple link template:



How to: make simple link [40] make transition link [41]

See also the ***slew*** functions to create infinitely adjustable alignments between templates.

(page under construction)

page created: 19/08/2019

4.10.6.1 make simple link

This page is about using the ***make simple link*** function to create a linking track between two existing templates.

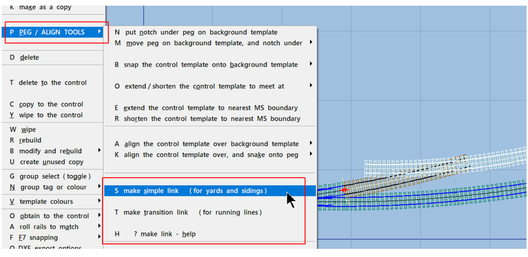
"Simple" means making a tangential alignment at the template boundaries, similar to the result when clipping together items of set-track.

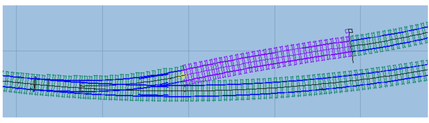
This function creates a template linking from the current peg location on the control template, to make a tangential join with the selected background template, and adjusts the background template to fit.

A simple tangential link is suitable for use in yards and sidings at low speeds. When a smooth flowing connection is needed for fast running lines, it is better to use use the make transition link [41] function instead.

For more explanation about the difference between these functions, see: link existing templates [40] .

To create a simple link track, set the control template as a guide template, select the target background template, and then click PEG / ALIGN TOOLS > make simple link on its menu, or press **P , S** keys:





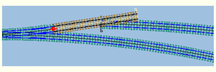
1. Make Simple Link

"Simple" means making a tangential alignment at the template boundaries, similar to the result when clipping together items of set-track.

A simple link like this creates an abrupt change of radius at the template boundary, suitable only for low speeds. When a smooth flowing connection is needed for fast running lines, it is better to use the [**make transition link**] function instead.

The simple link function creates a template linking from the current peg position on the control template, to make a tangential join with the selected background template, and modifies the background template to fit.

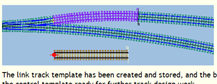
Before using this function, it is necessary to help Templot by creating a dummy "guide" template. The guide template should lead towards the required background template, with its fixing peg at the opposite end, like this:



Such a guide template might typically be the result of using the [**tools > make branch track**] function, as above.

The peg position is important, but the length and radius of the guide template do not matter. It is helpful to curve it towards the background template, so that you can see roughly how the link track is likely to fit.

Select the required background template, and then click the
[**PEG / ALIGN TOOLS > make simple link**] item on its menu.
The result will be:



The link track template has been created and stored, and the background template has been modified to fit. A fresh length of plain track is available in the control template ready for further track design work.

(page under construction)

page created: 19/08/2019

4.10.6.2 make transition link

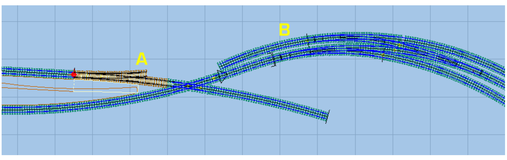
This page is about using the make transition [28] and the extend/shorten [28] functions to create a neat linking track between two existing templates.

For a simpler form of link track suitable for yards and sidings, see make simple link [41] .

For more explanation about the difference between these functions, see: link existing templates [40] .

For more about transition curves, see transition curves [24] .

1.



Here we have a station throat being designed. We need to create a link track between the turnout at A and the running line at B. The approach track on the turnout at B has been split off and stored as a ***dummy template*** to be used in the process.

2.

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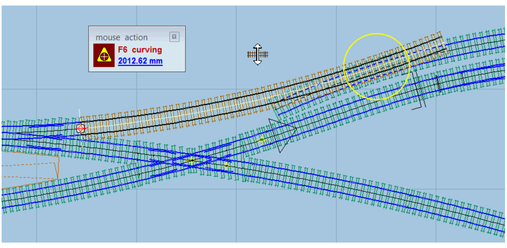
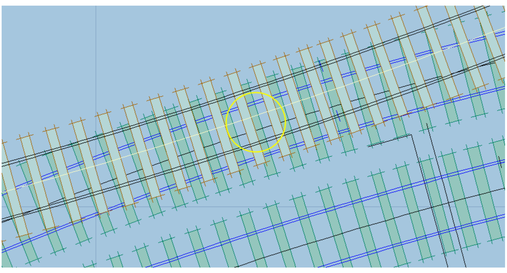


First a branch track is added from the turnout, using tools > make branch track menu item.

To avoid a sudden reverse curve, the link track will need to be an S-curve transition [24] . This branch track will become the other *dummy template* to be used in creating such a curve. The radius is therefore adjusted using the **F6** mouse action to provide a suitable *offset* between the two curves.

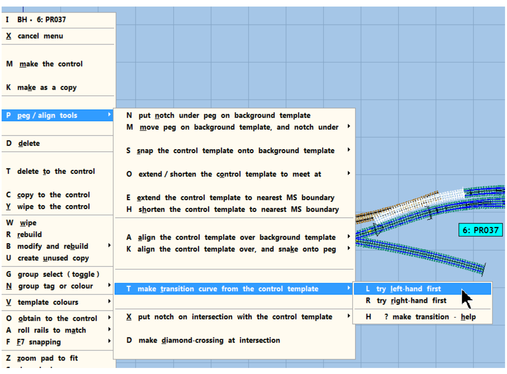
3.



In order to create a transition curve, the two track centre-lines must come close together, but they must not intersect (cross over).

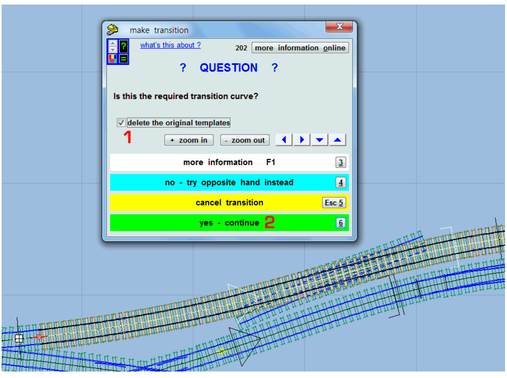
The size of the offset gap between them will determine the length of the resulting transition zone - widening the offset lengthens the transition zone. Setting a suitable offset is something which comes with experience, and often some trial and error is needed. In most cases we want a long gentle transition rather than a short abrupt one. But it can't be too long because it must fit between the two end positions (at A and B above). An offset of about a quarter of the track gauge is usually a good starting point.

4.



The *make transition* function requires that one of the originating templates is a background template, and the other is the control template. So now to create the transition curve between them, click on the background template, and then click this menu item (or just press **P - T - L** on the keyboard).

5.



A transition curve has been created, and we need to decide whether it is acceptable.

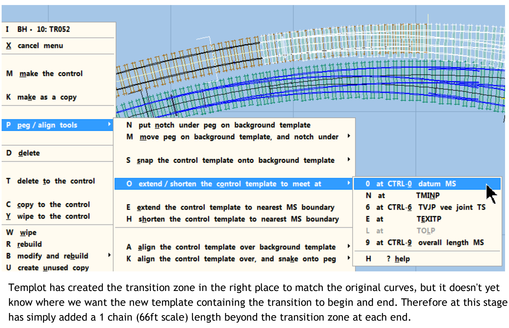
- This dialog is modal (i.e. nothing more can happen in Templot until we respond to it), so if you need to zoom out on the trackpad or pan across in order to see the full transition curve template, it is necessary to use the buttons on the dialog, and not the usual trackpad controls.

This transition is the required hand, so there is no need to try the opposite hand. And the length of the transition zone fits easily within the available space. It could perhaps have been a fraction longer, but not by much because there are only about 6 sleepers on the right between the end of the transition zone and the toe of the turnout. Running a transition zone into or through a turnout template is not prototypical and best avoided, although sometimes unavoidable in cramped spaces.

So having decided that this transition zone is acceptable, we no longer need the original dummy templates and we can tick the box at (1) to have them deleted. Then click the green yes - continue bar at (2) to accept the transition curve template.

Had the transition not been acceptable, we could click the yellow cancel transition bar, and revert to making adjustments to one or both of the original templates before trying again.

6.



Templot has created the transition zone in the right place to match the original curves, but it doesn't yet know where we want the new template containing the transition to begin and end. Therefore at this stage it has simply added a 1 chain (66ft scale) length beyond the transition zone at each end.

Now to tell Templot where the template ends we use the *extend/shorten to meet* functions. The template length will then be adjusted to fit to the specified template boundary. Here at this end of the new track the template is clearly too long, overlapping the background turnout beyond its **CTRL - 0** *datum* position at the toe. So click on the background template, and then click this menu item (or just press **P - O - 0** on the keyboard).

7.

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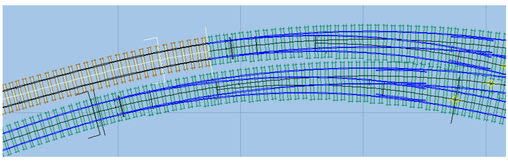
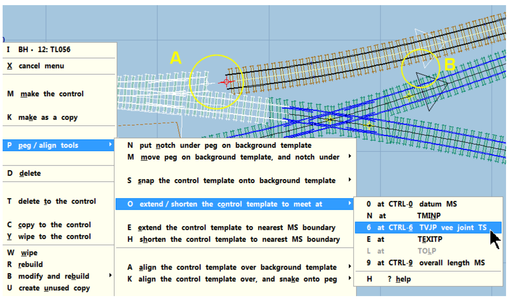


The template is shortened to fit at the specified boundary exactly.

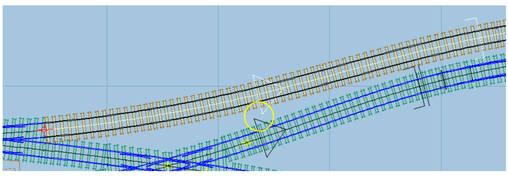
8.



Now to repeat the process at the other end of the new track. Here the template is too short and needs to be extended. This time the required boundary is on the turnout exit side, at the **CTRL-6** ***TVJP vee joint*** position. So click on the background template at A, and then click this menu item (or just press **P - O - 6** on the keyboard).

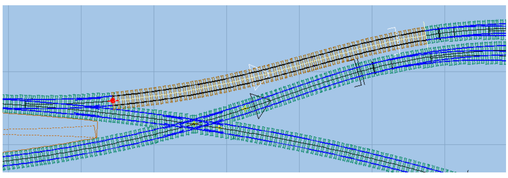
- Unlike most Templot functions, the red fixing peg takes no part in this operation and can be ignored.
- It's important to understand that the template is being extended in length, not shifted into position which would disrupt the alignment at the other end of the template - note the relative positions of the transition markers at B.

9.



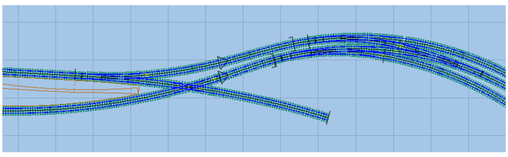
This is the result. The new template has been extended to fit and the transition zone has not been disturbed - note again that the relative positions of the transition markers are unchanged.

10.



The end result is a new template linking the existing templates, and following a smooth S-curve transition between them. All that remains is to store it (press the **INSERT** key, or click the top button).

11.



Attractive flowing curves as the design continues.

page last revised 25th January 2017

4.10.7 wrap a picture shape to a curve

Often a scaled prototype track plan is too large to fit your available layout space, usually because it is too long and mostly straight.

Templot can distort the scanned image of such a track plan by wrapping it onto a curve, so that it will fit your space and can then be used as a background guide for your track planning.

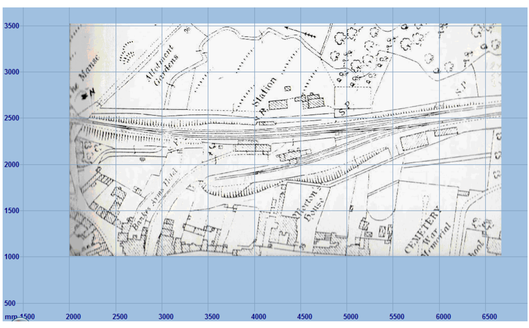
1. preparing the image [43]
2. straightening the running line [44]
3. wrapping onto a curve [5]

1. preparing the image:

There are two ways to display a scanned image on the Templot trackpad. It can be added as a ***picture shape*** as part of the ***background shapes*** functions; or it can be shown as a ***sketchboard*** item.

Either way can be used as a guide for track planning, but for this wrapping function the image must be added as a ***picture shape***.

Here we have a scanned map of Corfe Castle station which I added as a ***picture shape***:



The position of the picture shape on the trackpad doesn't matter because the wrapping function will be changing it.

But it should be correctly scaled to your current model scale. For more information about adding and scaling picture shape images see picture shapes [5] .

The intention is to fit a model based on Corfe Castle into the corner of a room. This will be the result of wrapping the image onto the corner curve, now ready to have the remaining tracks aligned over it:

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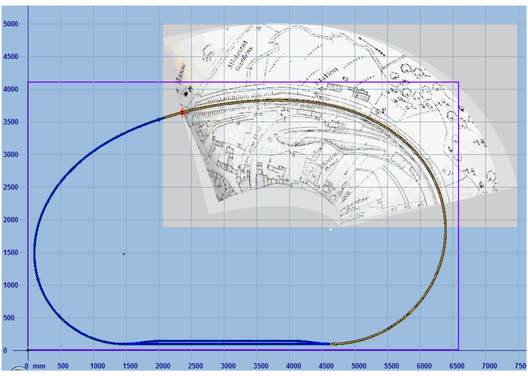


Although this wrapping function can if necessary flip or mirror an image, or turn it the other way round (rotate it 180 degrees), I suggest that you do all that beforehand in a graphics editor program such as PaintShopPro or IrfanView. Otherwise it is too easy to make mistakes and produce unexpected results. Start with the image displayed on the trackpad already suitably oriented for your intended track planning, as above.

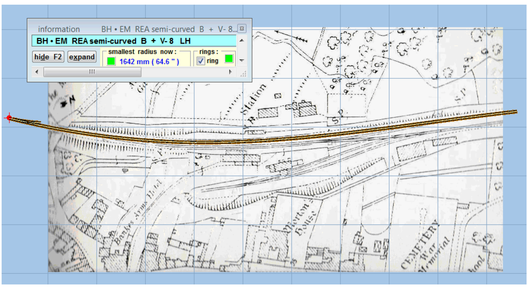
If you want to try it, this original image file is on Templot Club forum at Corfe Castle scan . It is 300dpi resolution and 1:2500 scale. Thanks to Neil Berrington for the scan.

---

2. straightening the running line:

The wrapping process takes place in two stages. Before the image can be wrapped onto the final curve, it must first be straightened along the desired running line.

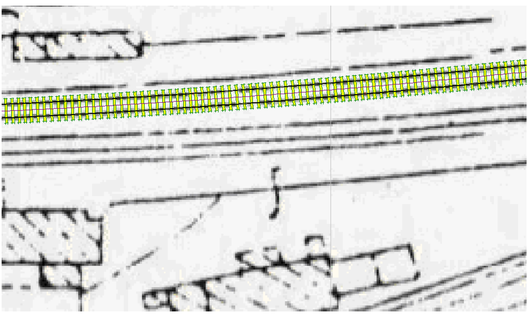
To do this the running line is defined by aligning the control template over it. This control template is not part of your track plan, it is a dummy template used only for this wrapping function:



● The control template should be a left-hand template running from left to right across the image. The easiest way to confirm this is to insert a turnout in it, as above. This will have no affect on the wrapping function which uses the main-road centre-line only. Running from left to right means that is the facing direction for the turnout, with the **CTRL-0** datum position on the left, as above.

If the above conditions do not apply, the wrapped image will be inverted or mirrored. Which may be what you want, but it will likely need some trial and error to get exactly what you intended.

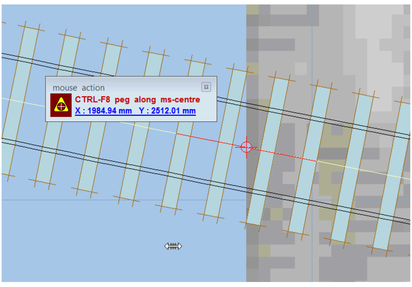
The entire running line must be defined by a single template. This can usually be achieved by using a transition curve, possibly combined with a slew. This one above is a long S-curve transition, which has matched the map quite well:



If the running line can't be defined with a single template, it will be necessary to split the image into two or more picture shapes, and wrap each one separately.

For more information about aligning templates over a background image see the swell [23] mouse action to create dummy templates, and the make transition [30] function to link them with a transition curve.

When you are satisfied with the template alignment, zoom in and slide the peg along to coincide with the left edge of the image (**CTRL-F8** or **8-key** mouse action):



Leaving the peg there, zoom in on the far end of the template and shorten it so that the end of the centre-line coincides with the far edge of the image (**F4** mouse action):

So that the end result is:

At this stage you may want to store this template as unused (main > store as unused menu item), or park it (do > parking bay > park template menu item) so that you can retrieve it again later if you need to re-try the

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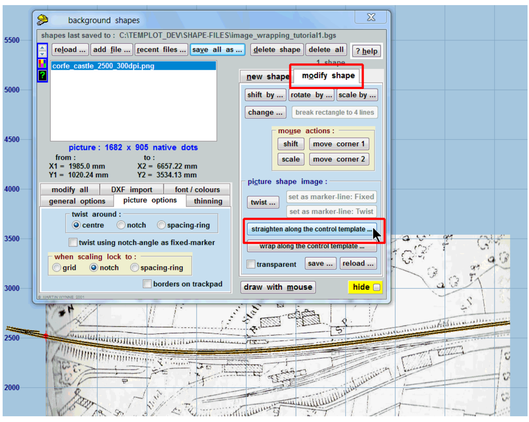
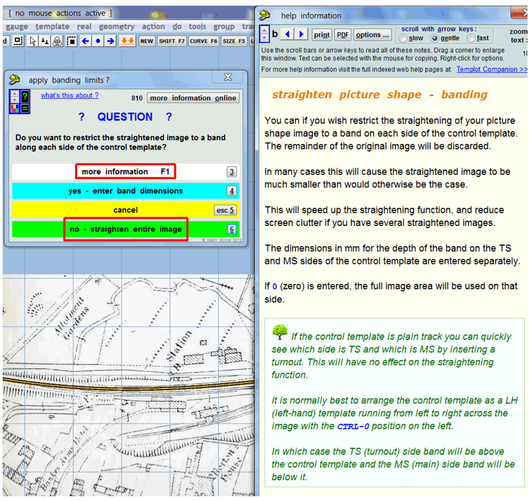
wrapping function. And also save the BGS file for this picture shape (save all as... button on the background shapes dialog).

Now on the background shapes dialog select the picture shape in the list. Then click the modify shape tab and then the straighten along the control template... button:

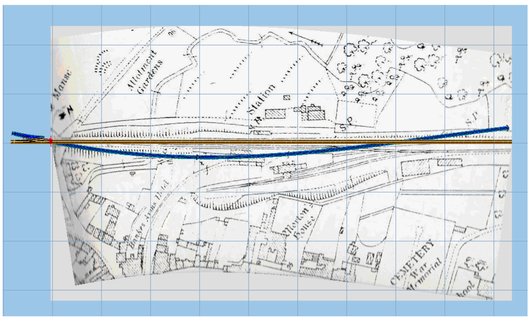


You will then be asked about *banding*. Click the white bar more information to read the notes:



Or for the present tutorial click the green bar to straighten entire image and continue.

After a confirmation dialog and a short wait while Templot does the calculations, this will be the result:



The dummy control template is now straight with the running line in the image aligned along it. The previous control template has been stored as a background template so that you can easily retrieve it if necessary, otherwise you may prefer to delete it as no longer needed.

At this stage it would be wise to save another BGS file now with the modified picture shape.

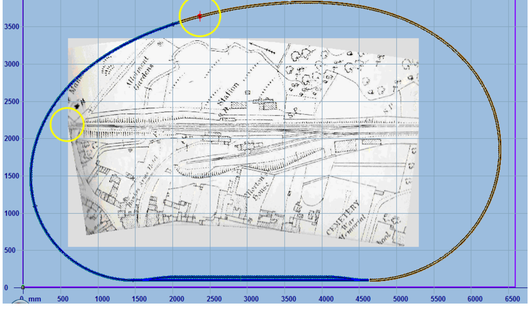
---

3. wrapping onto a curve:

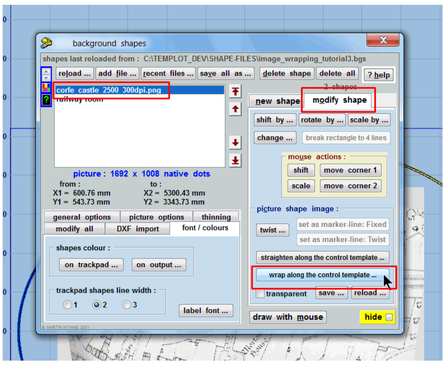
Here is the railway room with an outline of the intended layout.

Again, the control template should run left to right with the **CTRL-0** datum on the left. If necessary click the template > swap end-for-end menu item (**CTRL-N**) to achieve this.

Slide the peg along the control template (**CTRL-F8** or **8-key** mouse action) to the required position for the left edge of the image after wrapping. This may require some trial and error to get a happy result, so before proceeding be sure to save a BGS file to which you can revert if necessary:



Now on the background shapes dialog select the picture shape in the list. Then click the modify shape tab and then the wrap along the control template... button:



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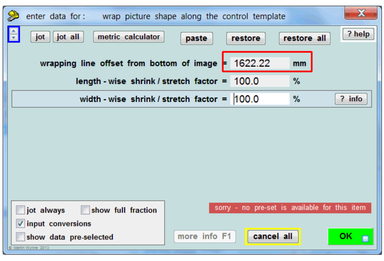
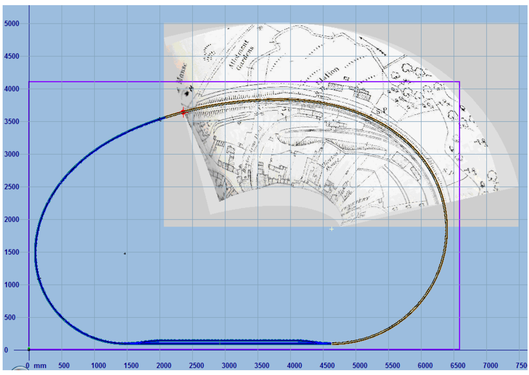
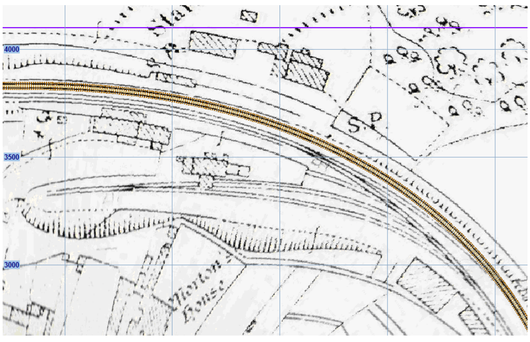
This dialog will then show. For an image which has been straightened, Templot has already calculated the wrapping offset dimension, and you should normally leave it unchanged:



After a confirmation dialog and a short wait while Templot does the calculations, this will be the result:

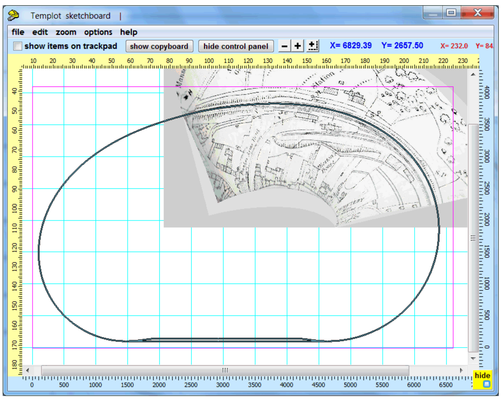


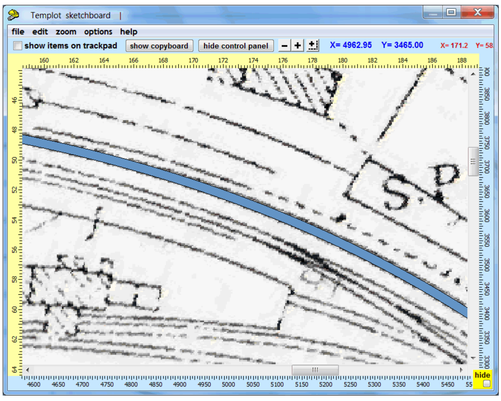
Zooming in, you can see that the map image has been closely aligned to the control template. The remaining tracks can now be added using the map as a background guide:



If you are happy with the result, remember to save a final BGS file with the wrapped picture shape.

Finally here are a couple of sketchboard views:



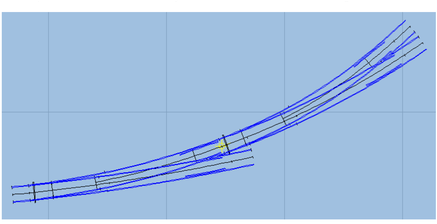


Martin.

page last revised 20-April-2013

4.10.8 fit second turnout close behind first

To save space it is sometimes necessary to insert a second turnout following close behind a first turnout.



This video shows how to do that:

- How to see this video

Click the button to watch the video. If your browser asks what to do with the file, click ***Run*** or ***Open*** or double-click on the downloaded file. It may take a moment to load. It will open

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in a separate window.

If the video is too small to watch comfortably on your screen, on the video window click the [View > Movie Size > Fit to Window] menu item, and re-size the video window larger (drag a corner).

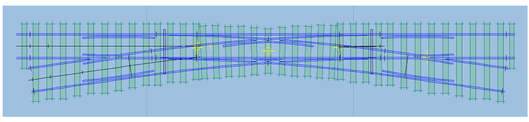
Likewise if the video is too large to fit comfortably on your screen, select the [View > Movie Size >] menu options, and re-size the video window accordingly (drag a corner).

● You need to have Templot installed on this computer in order to watch these videos. If you haven't yet downloaded Templot, please go to the download page [13] . Templot is free to download and use.

If Templot can't be installed on this device, please ask on the Templot Club forum about other ways of watching this video.

4.10.9 create inside half-scissors

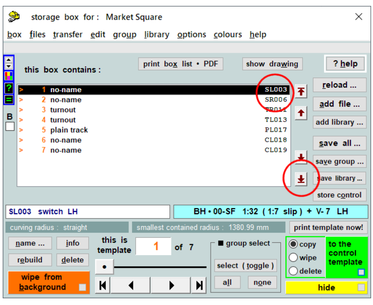
Templot has an automated function to make slips, see create slips [36] . But an ***inside half-scissors*** differs from a single slip in that the main road is along the side road. In a slip the main roads are across the diamond. This means that the switches of an inside half-scissors are of the opposite hand from the corresponding switches in a slip:



For an inside half-scissors it is necessary to build up the partial templates manually. This video shows how to do that:

The video shows a straight half-scissors, but the process is exactly the same if the main road is curved.

► In order for the switches to print properly on the printed templates, the switch templates need to be printed in front of the V-crossings. After creating the half-scissors, if necessary move them to the bottom of the list in the storage box. Their ID number begins with an S. Select each one and click the button to move it to the bottom of the list:



After moving them, if you need to select them on the trackpad, **`SHIFT+click`** on their name label. Otherwise the underlying V-crossings will be selected instead.

Ask on the friendly Templot Club forum if you need more information about creating an inside half-scissors.

page created: 20/05/2022 latest revision: 20/05/2022

4.11 11. utilities and utensils

This section is about using the additional tools and functions in the utils menu.

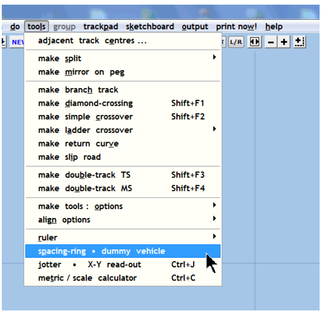
[page under construction]

4.11.1 dummy vehicle tool

The dummy vehicle tool is used to check the running clearances on double-track, especially sharply curved double track where the track centre-to-centre spacing often needs to be increased to allow for the overhang of bogie vehicles.

And also to check the clearance from lineside structures and other fixed obstructions.

The dummy vehicle tool is analogous to the spacing-ring tool [47] , and will often be used at the same time, so they are combined on the same menu item in the tools menu, and the same dialog:



Click the dummy vehicles: > show option to display the dummy vehicle outline on the control template.

To use this tool the dummy vehicle outline is rolled along the control template alignment by mouse action. Copies of it can be left at various locations as required, by copying background templates to the control template. This allows the clearances to be checked as it rolls by. Click the mouse actions: > roll dummy vehicle button:

The above screenshots show 7mm/ft scale vehicles on 1800mm radius (inner track), with 87mm spacing to 1887mm radius for the outer track. The solid outline shows the actual vehicle body dimensions. The dashed lines show a clearance envelope along both sides. The centre of the vehicle is also marked for convenience.

The default sizes used are:

body length: 65ft (780")
body width: 9ft-3in (111")
bogie centres: 46ft-6in (558")

which are typical of the larger UK vehicles. The default side clearance is 6" on each side. These dimensions can be changed to whatever you want by clicking the dummy vehicles: > dimensions... button. Your vehicle dimensions are saved in your program preferences [40] between sessions.

6" clearance means that there is more than 1ft between the bodies in the above screenshot, i.e. more than 7mm clear on the models.

In addition to double-track curve clearances, this dummy vehicle tool will be useful for checking clearances for platform gaps, clearing points in loops and sidings, and clearances for lineside features such as signal posts and bridge parapets.

The curving radius in the control template can be adjusted with the dummy vehicle present, until the desired clearance is obtained. The dummy vehicle remains in position on the control template as it is moved or adjusted in the usual way. However, the copies are not linked to any template and are simply a record on the trackpad of past locations of the dummy vehicle. They remain unchanged if the underlying templates are moved or deleted. You can make up to 32 copies.

There is another mouse action to adjust the dashed clearance marker lines. This makes it possible to measure the clearance between rolling stock and fixed objects. Click the mouse actions: > dummy vehicle clearance button:

(To get a proper result this measurement should of course be made at the vehicle centre-marker.)

Like the spacing-rings, this function works as a design aid only on the trackpad. The dummy vehicles are not on the printed templates or exported to image files, and not included in .box files.

(The calculations assume that the bogie pin is on the track centre-line. This is not strictly true, especially for long 6-wheel bogies on sharp model curves, but is a close enough approximation for practical purposes bearing in mind all the other unpredictable variables in the models. If a more accurate result is needed, the versine on the bogie wheelbase should be calculated, and the running radius adjusted accordingly.)

More about the dummy vehicle tool on Templot Club:

http://85a.co.uk/forum/view_topic.php?id=1835&forum_id=1&page=1#p12045

page under construction: 04-June-2012

4.11.2 spacing-ring tool

Sorry, nothing here yet.

(page under construction)

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4.11.3 ruler tool

Sorry, nothing here yet.

(page under construction)

4.11.4 metric calculator

Sorry, nothing here yet.

(page under construction)

4.11.5 Image foreground darkener

[page under construction]

4.12 12. program

This section describes some of the program features, options and preferences.

(page under construction)

4.12.1 program preferences

About saving your program settings between sessions.

Sorry, nothing here yet.

(page under construction)

4.12.2 accessibility

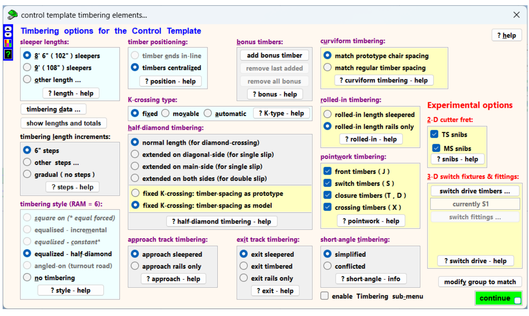
draft page under construction

Templot5 accessibility modifications

real > timbering dialog

As an example of the accessibility modifications here is the real > timbering dialog screen.

If you prefer to use this screen without using a mouse, you can now just use the underlined accelerator characters to navigate, with or without pressing the **Alt** key.

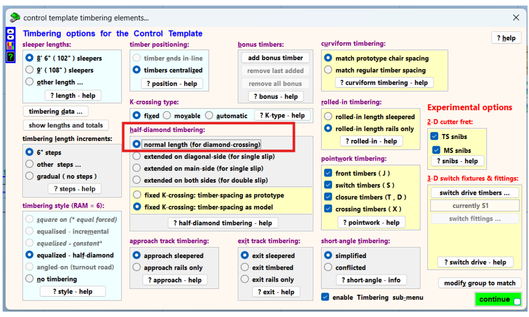


Wherever possible the accelerator characters match those on the previously existing Templot2 menu.

For instance in the *sleeper lengths:* panel, the accelerator keys are **8**, **9**, and **o** match the old menu keys.

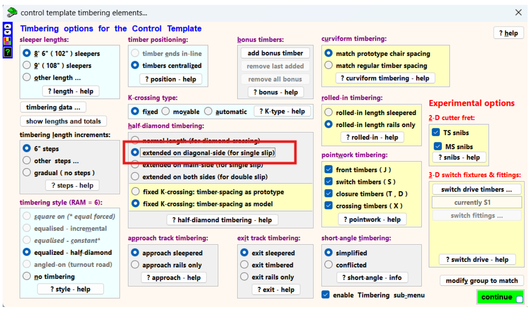
Where a sub-menu has been represented by a panel on the dialog screen, the accelerator key for the sub-menu is included in the caption above the panel, and when you use one of these keys, Templot5 focuses on the first item within the panel. You can then use the down-arrow and up-arrow keys to navigate to the chosen item and then use the space-bar to modify the selected item.

For example, if the control template is a half-diamond, then pressing the **h** key, will focus on the first item in the *half-diamond timbering:* panel, which is the normal length (for diamond-crossing) radio button.



Pressing the down-arrow key will move the focus onto the next item down, which is the extended on diagonal-side (for single slip) radio button.

The **space-bar** will then select that button.



page revised: 29 September 2025

4.13 99. origins and intent

This page is an explanation of the origins of Templot and the ideas behind it.

This is going to be a long-winded ramble because I think I need to recall some of the 40-year history of Templot, to explain how and why things are the way they are. The historical context is key to understanding Templot, and why it differs from other model track planning software.

Templot first saw the light of day in 1980. It was a product of its time in the UK model railway hobby, and much of the original design and intent remains largely unchanged today.

Here I am referring to the section of the hobby that regards model track as a scale model of full-size prototype railway track, in the same way that a locomotive or a signal box might be modelled as a scale representation of the full-size equivalent. Such track has to be built by hand in the home workshop, and often requires some ingenuity to fit it into the available space without departing too far from the original prototype methods and designs. The purpose of Templot is to assist in that design process.

There is a much larger section of the hobby which does not see track in that light, and is happy to buy ready-made items of trackwork without any regard to what prototype they might represent, or even much knowledge of that prototype. There are many computer programs available to design model layouts using such ready-made track, but Templot is not one of them. Templot is a design tool for model-makers who build their own track.

At that early stage in the 1980s the Templot program was primarily for my own use - it was before the days of home computers for everyone. For some explanation of why I needed it, see yes, I build track . I had no idea of where it would lead - the program developed as I needed new functions and bolted them on, Meccano-fashion. Some of that still shows in the program today.

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There are 2 separate and distinct functions in Templot. Please read that again, it's important to the understanding of Templot.

Separate and distinct are not quite the right words nowadays because the two have tended to merge in the later more complex track design functions. But they were certainly the right words originally because there was a 10-year gap between the creation of the two functions.

For this page I'm going to call them the PHASE 1 functions and PHASE 2 functions of Templot.

To see what I mean by PHASE 1, start Templot from scratch and click the NEW button, or the template > new template (quick set) ... menu item.

In these two boxes on that dialog you have almost the entire original 1980s version of Templot. Notice that they refer to prototype turnout sizes and prototype curve radii:

You can use them to change the input settings to the template generator [19], and the result is that a curved turnout template is drawn on the screen and can be printed out as a construction template. To watch a video of that, click your first printed template [34].

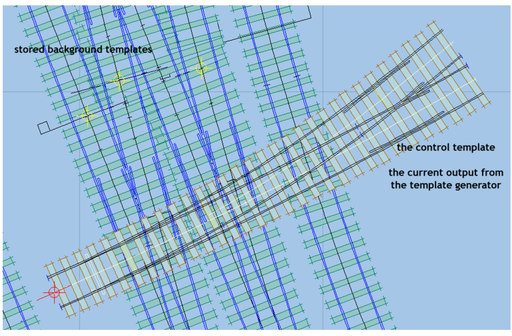
In PHASE 1 of Templot that was all you could do.

The templates so printed would be shuffled about on the baseboard to create a track plan, combined with others from commercial sources or the scale societies, and possibly some hand-drawn templates too. In order for the templates from Templot to align with hand-drawn ones, I adopted RAM unit crossing angles as the default in Templot, rather than strictly prototypical CLM angles.

And of course that is equally valid as a way of using Templot today. If you are happy to create a track plan that way, you don't need to read any further here. It all works almost exactly the same now as it did then.

But by the 1990s increased computing power was available, and I began to think of replicating the physical baseboard as a virtual baseboard on the computer screen. There would be no need to mess about with paper and ink and sticky tape and drawing pins, or to build a baseboard first. You would be able to keep trying different track plans on the screen using a collection of generated templates until you arrived at the optimum plan, without any waste of time, paper and materials if you scrapped any. It could all be printed in one go when the planning was complete.

So I devised a screen display having 2 layers. A background layer which represented the railway baseboard, and on which a track plan could be gradually assembled from previously generated templates. And a foreground layer which would contain the original PHASE 1 template generator functions unchanged. As if they were taking place on a transparent plastic film floating on top of the track plan, but not part of it. I didn't want to do anything to change the PHASE 1 functions, so that they could still be used to print individual templates as before when needed:



So PHASE 2 of Templot was born. It would replicate as far as possible the work flow when track planning on a physical baseboard. There would be a virtual box in which to keep all your generated templates, just like your shoebox of paper templates on the baseboard. There would be a means to select one from the box and try it in position, and reject it if not suitable. There would be a means to pin it in position. There would be a means to link templates together in alignment with one another. And of course there would be a means to create the templates in the first place using the PHASE 1 functions, and to store them in the box ready for use.

So far so good, but I then had to write the program code to do all this. It soon became clear that the storage box was key to the whole process, containing a list of all the stored templates. It also became clear that the position and alignment on the baseboard had to be decided and included in the original PHASE 1 function, rather than trying to add it to a generated template after the event. So my original intent to do nothing to modify the original PHASE 1 code began to crumble. But I have mostly stuck to it, because 40+ years later it is still very useful to be able to switch on Templot, make a few settings, and print off a usable construction template.

Several functions were created to allow the PHASE 1 generated templates to be stored in and retrieved from the PHASE 2 storage box, and to replicate the process of transferring them to and from the virtual "baseboard", when creating a track plan on there.

Jump forward 25+ years, and this original scheme remains the same, underlying all the later changes and developments. The PHASE 1 output from the generator has been given the name the control template [17], to emphasize its unique nature and the fact that it is not itself part of the track plan. The work area on the screen, representing a physical baseboard, is now called the ***trackpad***.

But the original idea that you would first create a collection of templates, and only then use them to plan a layout (replicating physical track planning methods on the baseboard) has been largely forgotten, although you can of course work that way if you wish. It is better to create the templates one at a time as they are needed in developing the track plan. This is a more prototypical approach, making it easier to get a flow of smooth curves through pointwork.

Templot is a tool, so the preferred way of working with it is a matter for individual users. Right from the start when the first public version was released, I made the assumption that users would be familiar with track-building, and would know what they wanted to do. And that it would be useful if there was more than one way of doing things, to fit in with the user's preferred way of working.

In the early years of the public versions of Templot those assumptions were largely accepted, presumably because users were familiar with traditional pencil and paper track planning on the baseboard.

In recent years there has been a demand for a more prescriptive approach - "what do I do next?" - for which see basic working methods [27].

Martin.

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Prototype

5 Prototype

This section is about prototype railway track, and customizing Templot track templates to match specific prototypes.

other sections:	topics in this section:
Templot 2D Explained [4]	real track [51]
Templot 3D Explained [9]	prototype information [95]
Templot Videos [11]	A or B switch ? [56]
Templot In Full [13]	working with slips [57]
Websites and Links [59]	

(page under construction)

5.1 real track

This page is a temporary re-hash from the old Templot companion to keep the information available. It will be re-written with expanded explanations for Templot2 soon.

quick page links:

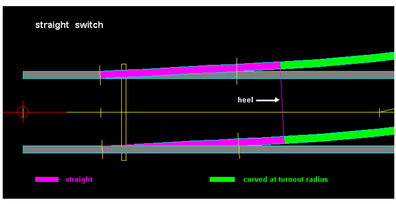
types of switches [51] types of V-crossings [51] setting the stock rail [52] types of switch blade planing [52]

joggled stock rails [53] split-deflection switches [54] planing dimensions [54] wing and check rail dimensions [55]

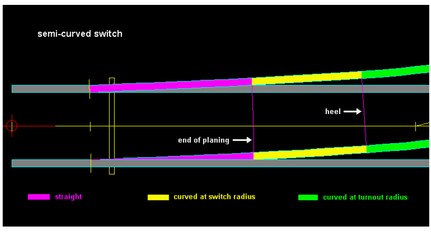
more prototype info [55]

Types of Switches:

There are 3 types of switch available in Templot. These diagrams illustrate the differences between them.To select the type of switch for your turnout, click the real > switch settings... or template > switch settings... menu items.

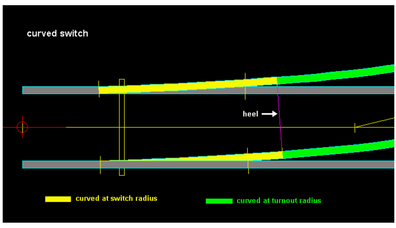


1. In a ***straight*** switch, the switch rail (point blade) is straight over its full length, shown in pink above. The ***turnout curve*** (shown in green above) commences at the heel of the switch, and is tangential to the straight switch blade. This type of switch is usually constructed as a ***loose-heel*** switch, meaning that the switch rails are free to pivot at the heel. The size of a straight switch is normally specified as the length of the switch rails, e.g. 9ft, 12ft, etc. In some designs (including those in Templot) this measurement is taken to a ***virtual heel*** position which is a little way short of the actual rail end.



2. In a ***semi-curved*** switch, the switch rail (point blade) is straight only over the length of the planing (tapered section) shown in pink above. For the remainder of its length to the heel, it is curved at the ***switch radius***, shown in yellow above. The ***turnout curve*** (shown in green above) commences at the heel of the switch, and is tangential to the switch radius. Often the turnout curve radius is less than the switch radius. It is never greater than the switch radius. If the switch radius and turnout radius are equal, this size combination of switch and crossing is called a ***natural*** turnout. This type of switch is usually constructed as a ***flexible*** switch meaning that the switch rails are held rigidly at the heel and movement of the switch blades is achieved by flexing (bending) them.

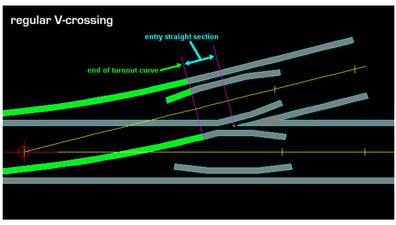
The most commonly used semi-curved switches are the REA bullhead-rail switches used in the UK from about 1923 onwards. The ***size*** of these switches is specified as a code letter, A, B, C, etc., size A being the shortest.



3. In a ***curved*** switch, the switch rail (point blade) is curved at the ***switch radius*** over its full length from the tip to the heel, including the planing, shown in yellow above. The ***turnout curve*** (shown in green above) commences at the heel of the switch, and is tangential to the switch radius. Often the turnout curve radius is less than the switch radius. It is never greater than the switch radius. If the switch radius and turnout radius are equal, this size combination of switch and crossing is called a ***natural*** turnout. This type of switch can be constructed as a ***loose-heel*** switch or a ***flexible*** switch according to the design. Flexible curved switches were used by the GWR from about 1930 (in preference to the REA semi-curved switches used by most other UK railway companies).

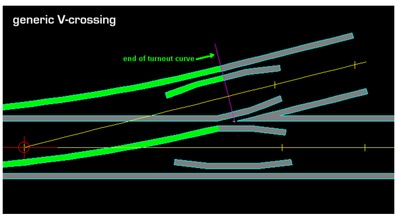
Types of V-Crossings:

There are 4 types of V-crossing available in Templot. These diagrams illustrate the differences between them. To select the type of V-crossing for your turnout, click the real > V-crossing options > V-crossing settings... or template > V-crossing settings... menu items.



1. In a ***regular*** V-crossing, the ***turnout curve*** (shown in green above) finishes a little way short of the ***fine-point*** (gauge-line intersection). The straight section from the end of the turnout curve to the fine-point is called the ***V-crossing entry straight***.

Regular V-crossings are the default type in Templot and are typically used for running-line crossovers.



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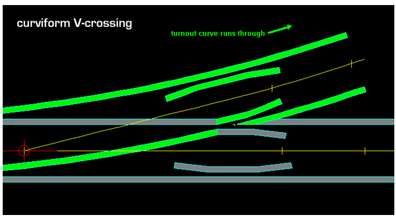
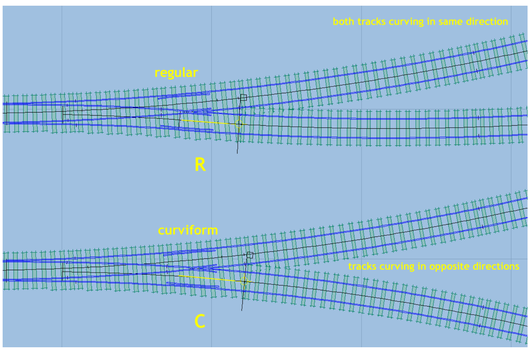
2. In a *generic* V-crossing, the *turnout curve* (shown in green above) finishes at the *fine-point* (gauge-line intersection), and there is no entry straight to the V-crossing.

Generic V-crossings are mainly used in Templot when matching an exact prototype turnout size in exact-gauge models such as P4, S7, etc.

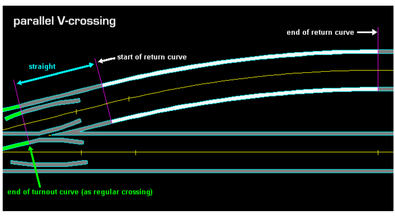


3. In a *curviform* V-crossing, the *turnout curve* (shown in green above) runs through and beyond the *fine-point* (gauge-line intersection). This causes the turnout road to diverge more rapidly from the main road than is the case for regular and generic V-crossings of the same angle.

Curvifom V-crossings are often needed where there is contraflexure curving in the main road (unless it is part of a crossover), and also for double-junctions.



Changing from a *regular* V-crossing to a *curviform* V-crossing causes the curving in the part of the turnout marked in yellow above to change direction, so that it matches the direction of curving in the diverging branch track.



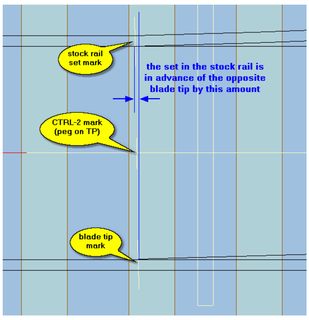
4. A *parallel* V-crossing is a special case of a *regular* V-crossing, in which the turnout road beyond the V-crossing curves back to run parallel with the main road. There is a short length of straight through the V-crossing itself, between the end of the *turnout curve* and the start of the *return curve*.

► In all of the above V-crossing diagrams, the rails shown in grey are straight if the main road through the turnout is straight. If the main road is curved, **all** of the rails shown in grey are curved to that same radius, including any V-crossing entry "straight".

Setting the Diverging Stock Rail :

The diagram below shows the position of the *set* (bend) in the diverging stock rail, which matches the planing angle on the switch blades and is needed to ensure a correct track gauge through the turnout road of the switch. Templot puts a mark across the diverging stock rail at the position of the set, as shown (for a left-hand switch).

The opposite straight (main-road) stock is plain rail, and has no set.



The set is slightly in advance of the tip of the opposite blade, as shown, and in order to ensure that the geometry works correctly the *TP peg position* (**CTRL-2**) is in advance of the blade tip by half this amount.

The diagram shows the set mark at the minimum amount of *set advance*. There is no harm in having a little more, and some prototype companies specified a dimension of 2"-4" for this to help protect the mating blade tip from wheel damage. However, an excessive set advance should be avoided as this can cause a knock to the wheels of trailing traffic. Often for facing traffic, and on all GWR switches, the set is replaced with a *joggle* (see below).

When building a model switch, it is convenient to approximately double the set advance shown, and to align the set to the leading edge of the S1 timber. In making the set (bend) in the stock rail, the angle can be checked by measuring the *stock gauge* dimension. For more information about the stock gauge, see *split-deflection switches* below.

Types of Switch Blade Planing

► *These notes apply to UK-pattern bullhead track only.*

1. Undercut Switch Blades with Plain Stock Rails :

These first diagrams below show the left-hand stock rail and switch blade for a left-hand *undercut-pattern* switch with a plain *unjoggled* stock rail. This is the type of blade planing most often modelled because it requires only a plain *set* in one stock rail only.

A *set* (bend) is put in the turnout-side (**TS**) stock rail at the toe of the switch (blade tip) to match the planing angle on the switch blade. The opposite main-side (MS) stock rail is plain rail.

The switch blade is planed (machined) to a sharp tip, and profiled down below the top of the stock rail to fit under the head of the stock rail (undercut). This is in order to have sufficient strength at the tip.

Such a blade acts only as a guide to the wheel flanges for the first part of its length and does not actually support the weight of wheels running onto it until they have reached some way along it. Undercut switches can often be identified in photographs because the shiny top of the open blade stops some way short of the tip.

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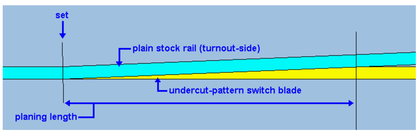
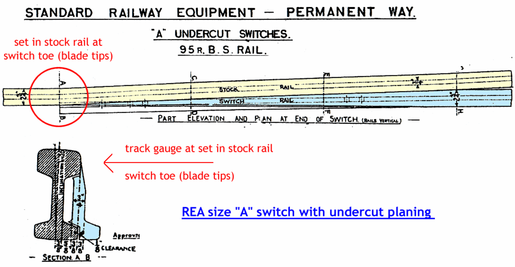
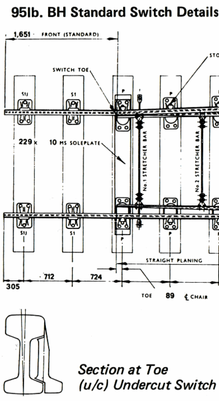
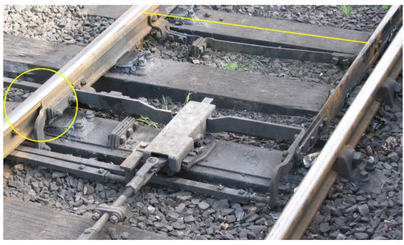
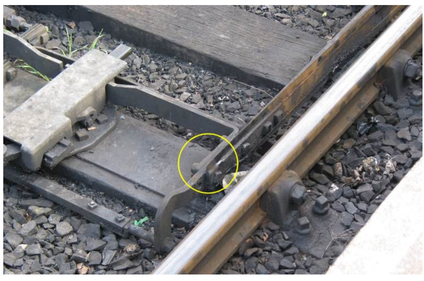






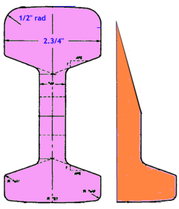
Here are some photos of an undercut switch. You can see from the shiny marks on the top of the blade that it starts to take some part of the wheel load at about the position of the second stretcher bar. Up until that point it is simply guiding the wheel flange, and is dull on top:





You can see that the tip is very thin, and if continued up to the top of the stock rail it would be a knife edge.

The way to model this is to simplify the planing like this:



The final shaping is then done with fine abrasive paper ("Wet-or-Dry" paper from car shops), with the blade clamped against the stock rail. For some notes about this, see:

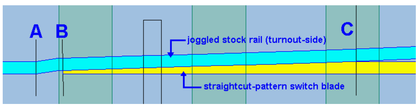
http://85a.co.uk/forum/view_topic.php?id=2802&forum_id=6#p19571

Notice also a seldom-modelled but quite prominent feature, the steel sole plate on the toe timber. It is used to hold the stock rails to gauge, so that the stretcher drive and detection rods can be accurately set. Usually there are strips welded on the ends of the sole plate to bear against the chair bases (just visible under the muck on the lower photo), or the ends of the plate are turned up as a forging for the same purpose. In the photos there is an insulated joint in the sole plate because this track is track-circuited.

---

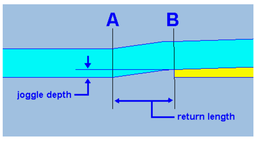
2. Straightcut Switch Blades with Joggled Stock Rails :

When a more robust switch is needed, both of the stock rails are joggled outwards by a small amount to create a housing for the switch blade tips and so protect them from wheel damage. This next diagram below shows this alternative ***straightcut-pattern*** switch with a ***joggled*** stock rail.



Instead of a plain ***set*** in the stock rail at B, it is ***joggled*** sideways between positions A and C, with the maximum deflection from its previous unjoggled alignment being at the blade tip position B. In bullhead track this creates 3 bends in the rail, at A, B and C. In bullhead track the joggled section is always created by bending the rail rather than by machining a notch in it.

The switch blade is planed to a blunt tip (***straightcut***), to a thickness corresponding to the amount of joggle, which has been exaggerated in this diagram for clarity. Apart from a rounded corner at the tip the blade is the full height of the stock rail and plays its part in supporting the wheels along its full length. A straightcut switch can often be identified in photographs by showing a shiny top on the open blade all the way to the tip.



In defining a joggled switch, two additional dimensions are needed. The ***joggle depth*** (sideways deflection) at B, and the joggle ***return length*** in front of the blade tip between positions A and B, in which the rail returns to its normal alignment. (The length between B and C always corresponds to the planing length for the switch blade). These dimensions need to be entered when creating a custom joggled switch in Templot.

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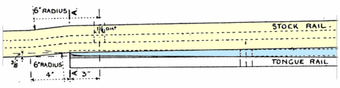
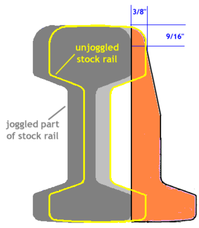
Having entered joggle dimensions for your custom switch, you can choose whether to actually use the joggles for an individual template by means of the joggled stock rails option tickbox.



GER 15ft joggled switch with straightcut planing

The full prototype planing design shown above is difficult to replicate in small-scale models. The diagram below shows how a model blade tip can be prepared to fit into the joggle and align the running edge with the unjoggled part of the rail:



straightcut blade tip for JOGGLED stock rail

The extreme end of the blade is then rounded off to match the top corner radius on the stock rail.

The 9/16" dimension below the rail top is the gauging line, i.e. the position on the rail where the track gauge is measured.

(The diagram shows vertical rail. If you use inclined rail the dimensions remain the same.)

Here is a photo of a GWR joggled switch with straightcut planing. Notice the thicker more robust nature of the blade tip, and that it is full height and shiny all the way to the tip. Notice also that the depth of joggle in the stock rail is very small in relation to the rail width. It is not easy to create such a joggle in models.

Again the sole plate and the insulated joint in it are prominent.

Prototype notes:

REA and straight loose-heel switches can be either joggled or not - normally joggled switches are used only in facing positions on running lines. In trailing positions there is a danger of rough running when wheels hit the joggle return length on the open switch blade side, most severely when the main-road is curved. However, all GWR and BR(WR) switches are joggled .

For REA switches the joggle depth is 3/8" (0.375 inches) and the joggle return length is 6 inches. For older pattern straight loose-heel switches these dimensions vary, but are usually similar.

For GWR old-pattern switches the joggle depth is 3/8" (0.375 inches) and the joggle return length is 4 inches. The later GWR and BR(WR) curved flexible switches have a less severe joggle, the joggle depth is 1/4" (0.250 inches) and the joggle return length is 6 inches.

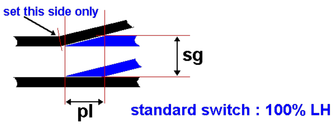
These joggle depths are barely perceptible in the smaller model scales. A 1/4" joggle is only 3 thou (0.003 inches) (0.08 mm) in 4mm/ft scale. Some modellers prefer a more pronounced joggle, and Templot provides for this with the generator > generator settings > rails > overscale joggles menu option, which creates a joggle depth of 3/4" (scale).

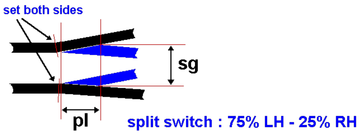
Visitors to the Severn Valley Railway steam heritage line in Kidderminster UK can very easily observe the difference between joggled and unjoggled switches. In platform 1 the engine release turnout at the buffer stops has an REA semi-curved flexible switch with undercut-pattern switch blades (no joggle). In platform 2 the engine release turnout has a GWR curved flexible switch with straightcut-pattern blades and joggled stock rails. The very much more robust nature of the blade tips in the latter case is very evident.

Split-deflection switches :

► The following notes apply to UK terminology. In American terminology a "split" switch refers to a standard switch, so called to differentiate it from the much older type of "stub" switch.

Here is a sketch showing the difference between a standard switch and a "split" switch. The stock rails are shown in black, with the switch blades in blue. For simplicity the switch is shown undercut (unjoggled). I have greatly exaggerated the angles and rail widths to make things clearer:





In a standard switch (upper sketch) one stock rail is bent or "set" to match the planing angle on the blades, and the other stock rail is left as plain rail. Switches in running lines are always of this type, regardless of any curving of the rails, so that there is no deflection either way to vehicles running at full speed on the main road. Vehicles taking the turnout road, however, are abruptly deflected at the planing angle (in this case to the left when running left to right), and a speed restriction is therefore necessary over the turnout road.

In yards and sidings where speeds are low, if there is a contraflexure (Y-turnout or "negative curving radius" in Templot terminology) with the main road curving away from the turnout road (to the right in this case when viewed from the left of the diagram), it is often the practice to "split" the switch as shown in the lower sketch. This means putting a "set" in both stock rails so that the deflection is shared between the two roads.

If the deflection is shared equally between the two roads (50%-50% split), the switch is symmetrical or "unhanded", and the turnout is usually also symmetrical (perfect-Y) with an equal radius in each road. Where the turnout radii are unequal, it is usual to adjust the proportions of the split accordingly, and the sketch shows a 75%L-25%R split.

Note that the dimension labelled sg (sometimes called the *stock-gauge*) is the **same** in both diagrams, and is the distance between the stock rails at the limit of the blade planing. This dimension is equal to the track gauge plus the railtop width. When making the bends in the stock rails it is essential that this dimension is maintained - it is more important than getting the percentage deflections exactly right.

This process is called "setting the switch". Only the stock rails are affected. The blades, chairs, fittings, timber spacings and all other components are exactly as for a standard switch, and the planing angle on each blade does not change.

Sometimes a *joggle* (see above) is made in the stock rails to protect the blade tips, but the *stock-gauge* dimension remains unchanged. Templot can generate switch templates with or without joggled stock rails in versions 0.71 and later. Joggles are not used on trailing switches in running lines, except on the GWR.

The dimension labelled pl is the planing length on the switch blades. It is equal to the total deflection angle for the switch (as a unit angle) multiplied by the railtop width. It is also the same in both diagrams. When constructing model switches, it is important to check the dimension sg between the stock rails at distance pl from the blade tips before fitting the blades. sg can be checked by combining an oddment of rail with a track gauge, or be measured with calipers (gauge+rail-width).

Here is a handy chart of blade planing lengths and deflection angles for different switches:

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switch size	total deflection angle (blade planing angle)	pl planing length (for 2.75" railtop-width)	pl 4mm scale	pl 7mm scale
A or 9ft	1:24	66"	22 mm	38.5 mm
B or 12ft	1:32	88"	29.3 mm	51.3 mm
C or 15ft	1:40	110"	36.7 mm	64.2 mm
D or 18ft	1:48	132"	44 mm	77 mm
E or 24ft	1:64	176"	58.7 mm	102.7 mm
F or 30ft	1:80	220"	73.3 mm	128.3 mm

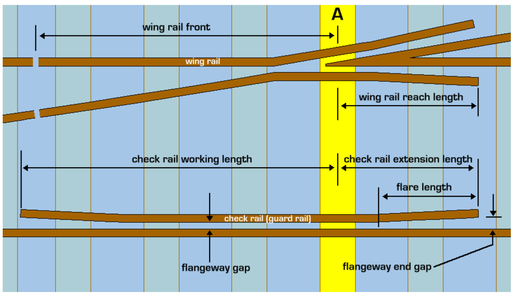
These diagrams and dimensions apply to straight and REA semi-curved switches (straight planing). For switches with curved planing the pl dimensions differ but the principles are the same, and the sg dimension is the same.

See also A or B switch?

Wing and check rail dimensions :

For more information see: check and wing rails.

This diagram explains the wing rail and check rail (guard rail) terminology used in Templot. Everything is referenced from the centre of the "A" timber -- the one supporting the nose of the crossing vee:



These dimensions can be customized from the real > customize V-crossing > wing and check rails ... menu item. The settings there are the defaults applied to all templates. To modify the individual check and wing rails on a specific template, click the real > adjust check rails... menu item. For more information see: check and wing rails.

The *wing rails* are the short lengths of running rail with bent extensions which lie alongside the nose of the crossing vee. The wing rail "reach" length is measured from the centre of the "A" timber (the timber bearing the nose of the vee) to the free end of the wing rail.

(To set the wing rail "front" length from the rail joint to the "A" timber, click the real > customize V-crossing > wing rail front ... menu item.)

The *check rails* (guard rails) are the short lengths of rail fixed alongside the opposite running rail to prevent the wheels from taking the wrong path at the nose of the crossing. For dimensioning purposes the overall length of a check rail is divided into two component lengths, named "working length" and "extension length".

The check rail "working" length is measured from the position where it crosses the centre-line of the "A" timber, to the near end of the check rail (the end which is nearer to the switch) (point blades).

The check rail "extension" length is the remaining length from the "A" timber to the far end of the check rail.

Templot uses 2 sizes of wing rail reach length, 3 sizes of check rail working length and 2 sizes of check rail extension length, according to the V-crossing angle. These sizes are preset in increasing lengths, but can be set to be all the same, or to any desired lengths.

Here is a summary of the way these sizes are used according to the current V-crossing angle:

V-crossing angle:	check rail working length:	check rail extension length:	wing rail reach length:
under 1:6	size 1	size 1	size 1
1:6 to 1:10	size 2	size 1	size 1
over 1:10 to 1:12	size 2	size 2	size 2
over 1:12	size 3	size 2	size 2

► When customizing the dimensions, be sure that you are changing the settings for the appropriate size according to the current V-crossing angle. Otherwise your changes will have no effect.

In the majority of cases, the check rail extension length is the same dimension as the wing rail reach length, so that the far end of the check rail is aligned with the end of the wing rail, but this can be changed as necessary by entering the appropriate dimensions.

Be aware that because the check rails are linked to the "A" timber, the position of the check rails will change when changing the style of timbering (equalized, square-on, or angled-on). But their position is not affected by any timber shoving which is applied to the "A" timber.

5.2 prototype information

revised 4-March-2003

This page contains a miscellany of information useful in Templot, and model railway track in general.

For more information about prototype track, see also the real track page.

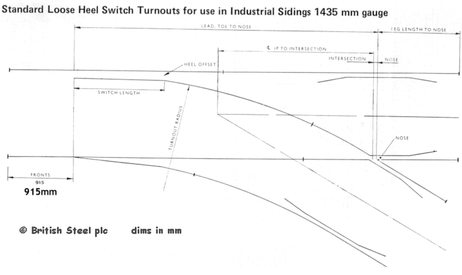
The Gimp

The GIMP is a free image editing package which includes perspective correction tools. This makes it possible to take measurements and make track drawings directly from photographs of prototype trackwork. Click Gimping track photographs for a detailed look at the process and its use in Templot.

You can also use The Gimp in general modelmaking as a way of creating a drawing from a photograph. Click A Gimp example for a worked example.

Industrial Turnouts

Here is some data for use in creating industrial turnouts in Templot. Use this data to set a custom straight switch. The dimensions given are a silly mix of metres and millimetres - direct conversions from what are in fact imperial designs. For example the first dimension in the table is 1.829 metres which is exactly 6ft (72"), 2.743 metres is 9ft (108"), and so on. For BS-95R rail (model code 75) the heel offset is 121 mm (4.75"), giving a heel clearance of 2" for rail 2.75" wide.



© British Steel plc

dims in metres & mm

Standard Loose Heel Switch Turnout for use in Industrial Sidings 1435 Gauge.

Crossing Angle	Switch Length	Turn-out Radius	95 lb BH Rail Heel Offset 121 Nose Width 19			75 FB Rail Heel Offset 125 Nose Width 13			98, 109, 110 FB Rail Heel Offset 143 Nose Width 16			Leg Length to Nose for F.B. Sections	Check	Centre Line IP to Inter-section
			Lead	Inter-section to Nose	Leg Length to Nose	Lead	Inter-section to Nose	Leg Length to Nose	Lead	Inter-section to Nose	Leg Length to Nose			
1 in 2	1.829	12.192	5.895	38	2.692	5.850	25	2.692	5.738	32	3.505	3.048	2.870
1 in 2½	1.829	18.593	6.935	47	2.692	6.877	32	2.692	6.739	40	3.505	3.048	3.588
1 in 3	1.829	26.518	7.971	57	2.692	7.899	38	2.692	7.736	48	3.505	3.048	4.305
1 in 3½	1.829	35.966	9.001	67	2.692	8.922	44	2.692	8.731	56	3.505	3.048	5.023
1 in 4	2.743	46.634	10.949	76	3.454	10.873	51	3.454	10.639	64	3.505	3.048	5.240
1 in 4½	2.743	58.826	11.979	86	3.454	11.876	57	3.454	11.631	71	3.505	3.048	6.458
1 in 5	2.743	72.542	13.010	95	3.454	12.896	64	3.454	12.626	79	3.505	3.048	7.175
1 in 5½	2.743	87.478	14.040	105	3.454	13.914	70	3.454	13.167	87	3.505	3.048	7.893
1 in 6	2.743	103.937	15.068	114	3.454	14.932	76	3.454	14.709	95	3.505	3.048	8.610
1 in 6½	2.743	121.920	16.101	124	3.454	15.953	83	3.454	15.601	103	3.505	3.962	9.328
1 in 7	3.658	141.427	18.043	133	4.216	17.884	89	4.216	17.506	111	4.267	3.962	10.046
1 in 7½	3.658	162.154	19.074	143	4.216	18.904	95	4.216	18.498	119	4.267	3.962	10.763
1 in 8	3.658	184.404	20.103	152	4.216	20.225	102	4.216	19.488	127	4.267	3.962	11.481
1 in 8½	3.658	208.178	21.129	162	4.216	20.937	108	4.216	20.478	135	4.267	3.962	12.198
1 in 9	3.658	233.172	22.160	171	4.216	21.957	114	4.216	21.465	143	4.267	3.962	12.916
1 in 9½	3.658	259.690	23.180	181	4.216	22.974	121	4.216	22.460	135	4.267	3.962	13.633
1 in 10	4.572	287.731	25.124	191	4.216	24.908	127	4.216	24.366	159	4.267	3.962	14.351

Crossing data (BS-95R BH, FB-109, BS-110A, BS-113A-inclined)

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Here is some prototype data for crossings. The dimensions given are a silly mix of metres and millimetres - direct conversions from what are in fact imperial designs. For BH the blunt nose width is 19 mm (3/4"). For FB the blunt nose width is 16 mm (5/8"). (Dimensions for GWR and BR(W) BH crossings differ.)

95 lb. BH Rail Standard Crossing Details **dims in metres & mm** **© British Steel plc**

Crossing Angle No.	Crossing Angle Degrees	Point and Splice Length L	Actual Splice Length	Wing Front to Nose F	Wing Rail Length	Inter-Section to Nose	Knuckle to Nose	Knuckle Gap	Crossing Chairs Required
CLM unit angles									
1 in 1½	36° 52' 11"	2.692	2.692	1.600	2.921	29	19	80	A
1 in 2	28° 04' 21"	2.692	2.629	1.600	2.921	38	130	74	A
1 in 2½	22° 37' 12"	2.692	2.629	2.363	3.067	48	161	70	AB
1 in 3	18° 55' 29"	2.692	2.671	2.484	3.734	57	192	70	XAB
1 in 3½	16° 15' 37"	2.692	2.671	1.702	2.997	67	224	70	XAB
1 in 4	14° 15' 00"	3.455	3.299	2.489	3.734	76	255	70	XAB
1 in 4½	12° 40' 49"	3.455	3.289	2.489	3.734	86	287	67	XABC
1 in 5	11° 25' 16"	3.455	3.283	2.489	3.734	95	319	65	XABC
1 in 5½	10° 23' 20"	3.455	3.277	2.489	3.734	105	350	63	XABC
1 in 6	9° 31' 38"	3.455	3.239	2.489	3.734	114	382	60	YXABC
1 in 6½	8° 47' 51"	3.455	3.239	2.489	3.734	124	445	59	YXABC
1 in 7	8° 10' 16"	4.216	4.000	2.489	3.734	133	405	62	YXABCD
1 in 7½	7° 37' 41"	4.215	4.000	2.489	3.734	143	477	58	YXABCD
1 in 8	7° 09' 10"	4.216	3.975	2.484	3.734	152	509	57	YXABCD
1 in 8½	6° 43' 58"	4.216	4.000	2.489	3.734	162	541	56	YXABCD
1 in 9	6° 21' 35"	4.216	4.000	2.489	3.734	173	572	56	YXABCDE
1 in 10	5° 43' 29"	4.216	4.000	2.489	3.734	191	635	55	YXABCDE
1 in 11	5° 12' 18"	4.979	4.705	2.489	4.496	210	699	53	ZYXABCDEF
1 in 12	4° 46' 19"	4.979	4.705	2.489	4.496	229	702	53	ZYXABCDEF
1 in 14	4° 05' 27"	4.979	4.705	2.484	4.496	267	889	52	ZYXABCDEFG

N.B. CLM unit angles (Templot uses RAM unit angles) **© British Steel plc**

Standard Crossing Details 109.113 A FB Inclined Design. **1435 mm gauge**

dims in metres & mm

Crossing Angle No.	Crossing Angle Degrees	Point and Splice Length L.	Actual Splice Length	Wing Front to Nose 'F'	Wing Rail Length	Inter-Section to Nose	Knuckle to Nose	Knuckle Gap	Crossing Baseplates Required
1 in 4	14° 15' 00"	3.505	3.353	2.489	3.810	63	243	54	XAB
1 in 4½	12° 40' 49"	3.505	3.353	2.489	3.810	71	273	52	XABC
1 in 5	11° 25' 16"	3.505	3.340	2.489	3.810	79	303	51	XABC
1 in 5½	10° 23' 20"	3.505	3.340	2.489	3.810	87	334	51	XABC
1 in 6	9° 31' 38"	3.505	3.340	2.489	3.810	95	363	51	YXABC
1 in 6½	8° 47' 51"	3.505	3.315	2.489	3.810	103	373	51	YXABCD
1 in 7	8° 10' 16"	4.267	4.038	2.489	3.810	111	423	51	YXABCD
1 in 7½	7° 37' 41"	4.267	4.038	2.489	3.810	119	453	51	YXABCD
1 in 8	7° 09' 10"	4.267	3.950	2.489	3.810	127	484	51	YXABCD
1 in 8½	6° 43' 58"	4.267	3.950	2.489	3.810	135	514	51	YXABCDE
1 in 9	6° 21' 35"	4.267	3.950	2.489	3.810	143	544	51	YXABCDE
1 in 10	5° 43' 29"	4.267	3.950	2.489	3.810	159	604	51	ZXABCDE
1 in 11	5° 12' 18"	5.029	4.648	3.251	5.334	175	664	51	ZXABCDEF
1 in 12	4° 46' 19"	5.029	4.585	3.251	5.334	191	725	51	ZXABCDEF
1 in 14	4° 05' 27"	5.029	4.496	3.251	5.334	222	816	51	ZIZYXABCDEFG

Here is some chairing info for bullhead crossings and REA switches :

CHAIRING OF COMMON CROSSINGS.
BULL HEAD TRACK.

Crossing 1 in	Chairs required	Crossing 1 in
1½	A	1½
2	A	2
2½	A B	2½
3	X A B	3
3½	X A B	3½
4	X A B	4
4½	X A B C	4½
5	X A B C	5
5½	X A B C	5½
6	X A B C	6
6½	Y X A B C	6½
7	Y X A B C D	7
7½	Y X A B C D	7½
8	Y X A B C D	8
8½	Y X A B C D	8½
9	Y X A B C D E	9
9½	Y X A B C D E	9½
10	Y X A B C D E	10
10½	Y X A B C D E	10½
11	Z Y X A B C D E	11
11½	Z Y X A B C D E F	11½
12	Z Y X A B C D E F	12
13	Z Y X A B C D E F G	13
14	Z Y X A B C D E F G	14
15	Z Y X A B C D E F G	15
16	Z¹ Z Y X A B C D E F G H	16
17	Z¹ Z Y X A B C D E F G H	17
18	Z¹ Z Y X A B C D E F G H	18
20	Z² Z Y X A B C D E F G H J	20

NOTES.—
The 'A' Chair comes under the nose of the crossing, the centre of the chair being 4" from the blunt nose.
All crossing chairs are spaced at 2' 0" centres except the 'H' and 'J' chairs which are 2' 0" centres.

These are the special chairs used at the crossing. The X,Y,Z chairs count back towards the switch; the B,C,D, etc. chairs count out beyond the crossing. The A chair is always under the nose of the vee. Where no special chair is shown in this table standard chairs are used, or sometimes bridge chairs where space is tight. The indistinct dimensions in the notes are 4in, 2ft 6in, 2ft 0in (the latter is for the rail joint). All chairs are central on their timbers, so these dimensions are also the timber spacings.

FITTINGS FOR SEMI-CURVED SWITCHES.
BULL HEAD TRACK.

Fittings.	Type of Switches.					
	A	B	C	D	E	F
Slide Chairs ('P' or 'P.J.' Chairs) ..	10	12	14	16	20	28
Block Chairs right-handed (I.P.R. etc.)	4	4	5	6	9	11
" " " left-handed (I.P.L. etc.)	4	4	5	6	9	11
Stock Rail Bolts	6	8	8	10	14	18
Stud Bolts	—	—	2	2	2	4
Cast Iron Distance Blocks, Right-handed	2	2	2	2	2	3
" " " " , Left-handed	2	2	2	2	2	3
Stretcher Bars	2	2	2	3	3	4
Switch Anchors	2	2	2	2	2	2
Sole Plate	1	1	1	1	1	1

NOTES :—
The Numbers given above are for one pair of switches.
All switch chairs have four fastenings per chair.

These are the special chairs used for REA semi-curved switches. The numbers are the total for the whole switch, i.e an A switch has 5 P chairs per switch blade.

P chairs are the ones on which the switch blade slides and to which the stock rail is fixed by means of a bolt through the rail web instead of a key. Block chairs come next and hold the both the switch blade and stock rail at the correct spacing (these are handed and numbered 1,2,3 etc.). The bolts and distance blocks fit between the rails to keep everything secure.

So for a B switch each side has (counting from the rail joint) :

2 standard chairs in front of the switch toe,

6 slide chairs,

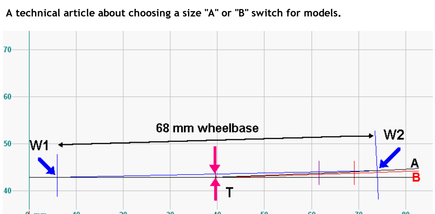
4 block chairs,

Standard chairs and bridge chairs are then used as space on the timbers permits.

PJ chairs are a later design in which the outer jaw is in the form of a separate spacer block, similar to flat-bottom slide baseplates.

5.3 A or B switch ?

A technical article about choosing a size "A" or "B" switch for models.



This diagram shows the running edge of the left-hand stock rail of a left-hand switch. Black line A shows the stock rail running edge for a REA semi-curved size A switch, which has a deflection angle of 1:24 from the "toe" (blade tips). A "set" (bend) occurs in the stock rail at this point, marked T, the bend deflection angle corresponding to the planing angle on the switch blades. Red line B shows the stock rail running edge for a size B switch (deflection angle 1:32).

A 6-coupled steam locomotive having a wheelbase of 8'-6" + 8'-6" (34mm + 34mm in 4mm scale) is represented by the blue line W1-W2, having its outer driving wheels at W1 and W2, and its centre driving wheel at the switch toe T. This is usually the limiting condition.

For simplicity, if we ignore any freedom between the wheels and the track, and the effect of the switch curve beyond the end of the planing (these discrepancies work in opposition, i.e. tend to cancel), we can see that the sideplay (each way from a wheels-in-line condition) needed on the centre wheel in order to remain on the rail at T (pink arrows) is half of 34/24 mm for the A switch shown (= 0.71 mm sideplay). If the wheel at W2 is moved onto the red line for switch B, the sideplay needed at T will be reduced, to half of 34/32 mm (= 0.53 mm sideplay).

If the sideplay is small in relation to the wheelbase (as is usually the case), the formula to find the corresponding effective radius is:

radius = halfwheelbase-squared, divided by centre-sideplay-doubled.

For the A switch, with sideplay needed of 0.71 mm and halfwheelbase of 34 mm, this gives

effective radius = 34^2 / (0.71*2) = 814 mm (32") approx.

For the B switch, with sideplay needed of 0.53 mm and halfwheelbase of 34 mm, this gives

effective radius = 34^2 / (0.53*2) = 1090 mm (43") approx.

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This means that for a 4mm scale 6-coupled loco of 17ft wheelbase, to traverse an A switch requires an ability to run on a 32" radius curve. Traversing a B switch requires an ability to run on a 43" radius curve. (Note that these figures change for different wheelbases.)

There are several factors which have been ignored here for simplicity, but it is clear that the difference between an A and B switch is significant, and for P4 models the effective radius of an A switch is likely to be smaller than is generally advised for steam locomotives other than short wheelbase shunters.

Click for more about switches, deflection angles, etc [53].

Martin. © 17-Oct-2002

5.4 working with slips

An article about how slips are usually worked from the signal box. The practice of some prototype companies may vary.

Diagram 1:

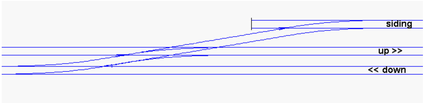

Diagram 1 shows a typical use for a single-slip as part of a ***slip crossover***. A siding on the up side of the running lines makes a trailing connection with the down line via a single slip in the up line. This way of accessing a siding or goods yard avoids the need for facing points, which are frowned on in running lines for safety reasons and have to be fitted with facing-point locks in passenger lines.

The siding is arranged with a short trap spur (or it could simply be a set of catch points as the trap) to keep any runaway vehicles in the siding clear of the running lines.

Diagram 2:

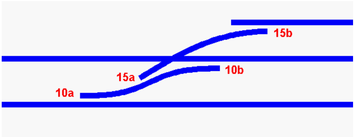

Diagram 2 shows how this might look on the signal box diagram. The siding connection is worked with two levers, numbered here ***10*** and ***15***. (They are not consecutive numbers because it is likely that between them in the lever frame would be the levers for the ground disc signals controlling the movements over this slip crossover.)

Lever ***10*** controls both sets of point blades ***10a*** and ***10b simultaneously***, i.e.one turnout and the ***opposite*** end of the single slip.

Or in model terms one switch on the panel works both point-motors ***10a*** and ***10b***. If the point-motors being used were strong enough, it would be possible to use only one point-motor with a mechanical linkage to each set of blades.

Likewise lever ***15*** controls both sets of point blades ***15a*** and ***15b simultaneously***, again one **turnout** (or trap points) and the ***opposite*** end of the single slip.

The diagram shows how the point blades would lie when both levers are ***normal*** in the frame, i.e. for normal up and down running. Note that the single-slip normally lies with one set of blades set for the straight road (***10b***), and one set of blades set for the curved slip road (***15a***).

The siding would be shunted as follows:

A locomotive on the down line wishing to enter the siding would first draw forward beyond the turnout on the left. Both levers ***10*** and ***15*** are then pulled changing all 4 sets of blades. The locomotive can then set back across the diagonal of the slip into the siding. On the model, because all 4 blades have moved, all V-crossing (frog) polarities will be correct for this move.

A locomotive on the up line wishing to enter the siding would first draw forward beyond the slip to the right.

Lever ***10 only*** is then pulled, changing 2 sets of blades ***10a*** and ***10b***. The locomotive can then set back through the slip onto the down line, and again all V-crossing (frog) polarities will be correct. Finally lever ***15*** is also pulled so that the locomotive can draw forward across the diagonal of the slip into the siding, and all V-crossing (frog) polarities will be correct again.

The lever interlocking in the signal box would prevent lever ***15*** being pulled if lever ***10*** has not been pulled first. And lever ***15*** must be returned to normal before lever ***10*** can be returned to normal. This means that there is never a time when the route is set for both straight roads across the slip.

In practice, of course, it is likely that rolling-stock in the siding would need to be shunted into or out of a train on the running lines, such as a pick-up goods train. For this to be possible for an up train, an additional trailing crossover is needed to permit running-round. This would most likely be situated off to the right of this diagram.

Remember when checking the polarities that every V-crossing (frog) is isolated completely from the surrounding rails by means of 4 rail gaps, and that the polarity of the V-crossing (frog) at one end of the slip is controlled by a changeover switch linked to the blades at the ***opposite*** end of the slip.

For DCC or if only one DC controller is in use, no other gaps are essential.

If two or more DC controllers are in use, running the up and down lines independently, it will also be necessary to isolate the outer stock rail of the slip on the section feed side, and to provide an additional changeover switch on lever ***10*** to switch it between the up and down sections. Although located on the up side, the siding should be part of the down line electrically, with a section switch connecting it to the down controller.

Martin.

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Websites and Links

6 **Websites and Links**

USEFUL LINKS

Links to other websites with information about model railway track.

I am not responsible for the content of these sites and I make no representation concerning their content or ownership. These links are provided here simply as a convenience to you. Listing them here does not constitute any endorsement from me. Martin.

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1. Scale societies :

Societies supporting specific model railway gauges and scales.

2mm Scale Association

3 Millimetre Society

British 1:87 Scale Society

Proto:87 Special Interest Group (SIG)

Double 0 Gauge Association

American 00 Gauge Special Interest Group (SIG)

EM Gauge Society

Scalefour Society

009 Society

S Scale Model Railway Society

5.5 mm Association

Proto-48

Gauge 0 Guild

The 7mm Narrow Gauge Association

ScaleSeven Group

Gauge 1 Model Railway Association

Gauge 3 Society

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2. Other sources of model information:

Historical Model Railway Society

Broad Gauge Society

00-SF notes

Finescale 00 notes

British Nn3

Manchester Model Railway Society (Flat-bottom track notes)

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3. Model trackwork parts suppliers and manufacturers:

Russ Elliott's comprehensive list of 4mm scale suppliers

FinetraX

C & L Finescale

Exactoscale

The P4 Track Company (NewTrack)

Proto87 Stores

Slater's (Plastikard) Ltd

Model-Track

SMP - Marcway

Masokits

Brassmasters

Gauge 3 Society - track parts

Peco printable track templates

Stephen Freeman - Model Maker

---

4. Commercial track builders and layout design:

Stephen Freeman - Model Maker

Greenwood

---

5. Web discussion forums and email groups with track-related content:

Templot Club

RMWeb

S4Web

Western Thunder

Model Rail Forum

New Railway Modellers

Your Model Railway

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6. Miscellaneous track-related sites:

Permanent Way Institution

BR Structure Gauge dimensions

"Yellow Things" Photo Gallery of P.W. maintenance equipment

Picture gallery of Metre Gauge pointwork

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