Northern Line

Point Types

06/09

Point Types book

This is an expanded version of the original 2002 book, and information that was provided in the Line Information Book from 1998 onwards. The purpose of this book is to give a non-technical general description of the different types of points that may be found on the Northern Line and the ways in which they may be used.

It contains the following:
A basic introduction and points information
Reading the route
Movement over points

A description is given of point layouts:
Facing, Trailing, Crossover

A description of the different point types:
Power operated, Ground frame, Spring toggle, Spring, Sprung, Loose

Methods of using points for protection:
Catch points, Trailing points, Wide-to-gauge points

Some locations where the different types of points can be found

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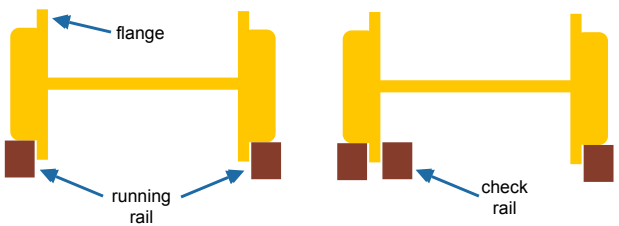
Points information

The wheels of a train guide the train along the track. The bottom of the wheel rests on the running rail and the flange runs along the inside of the rail, following that rail, like on a model railway. The flanges also keep the train on the track by ensuring that the wheels cannot move off the rail. The set of wheels is wedged between the inside of the running rails. Where there is a possibility that that the set of wheels may some off the track, such as where there is a frog (a gap in the junction of the rails at a crossover) or a tight curve, a check rail is usually provided on the opposite side. The bottom of the wheel does not touch the check rail, but the other side of the flange might. Where there are check rails, there are usually “greasers” to ensure that the flange is lubricated to save where and tear should the flange come into contact with the check rail. The screeching, or wheel squeal as it’s usually known, is often due to there being no lubrication.



When it is necessary to move a train from one track to another, points are used. The points consist of two blades that taper at the outer end. One blade is always away from one running rail, the other is flush against the other running rail. Both blades in a set of points will normally be joined and move together. Depending on the purpose and complexity of the pointwork, only one blade may be used.

Where a train has a choice of routes ahead of it, this is known as a diverging junction and the point layout is **facing**. Where a train is joining another line, this is known as a converging junction and the point layout is **trailing**.

The point blade that is flush against the running rail decides the direction of the route and the wheel flanges guide the train over it.

Most points have a **Normal** position. This refers to the normal position of the points and is usually the position that the points return to after a train has passed over them. When there is a signal or points failure, it is important to be able to identify what position the points are in. To help with this, most points have an arrow with an **N** next to the point number. The points are in the normal position when the blade that the arrow is pointing to is flush with the running rail. Where there is a junction with one route straight ahead and the other route at an angle, the normal position of the points is often for the route straight ahead. Likewise with junction signals, often the route that has a plain green signal

is the route where the points ahead of that signal are normal. On the Northern Line, NQ9 (route indicator used to be for platform 1) and G33 (normal is for the buffer) are exceptions to this.

Where points are shown in diagrams, they are usually shown in their normal position.

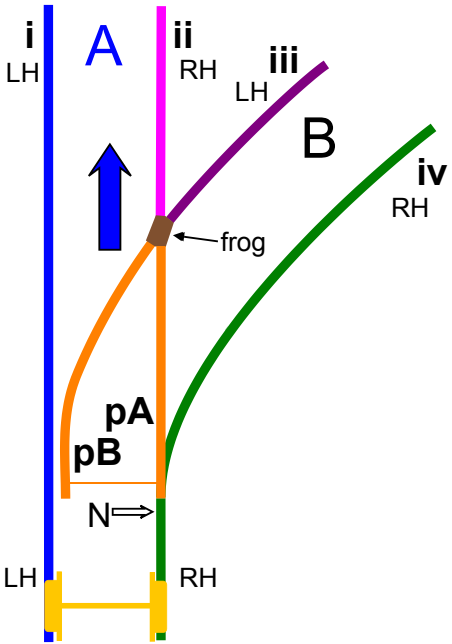
Often there are a pair (or more) of points, such as for an emergency crossover etc. All sets of points that are operated by the same points lever are individually identified by the point lever number, followed by a letter. E.g. 2^{A} and 2^{B}. (2^{C}, 2^{D} etc. if there are more points). The points with the A are normally those nearest the IMR or signal cabin.

Catch, Trap and Wide-to-gauge points are usually used as a means of protection to prevent a train going too far in the wrong direction, or if the route isn't set, or if the train runs back down a slope.
The distinction between catch and trap points is often a bit vague and sometimes either description is used for the same type of points.

Reading the route
The wheel flanges need to have an uninterrupted path along the running rail and point blade (except in the case of spring/spring toggle/loose points, where the wheel flange pushes the points over). They must not cross over (or ride over) another rail and must not pass over a gap in the rail, other than at a frog or the train could become derailed.

Look at a set of points as if you were standing between the running rails or looking at them from the front of a train. Follow the running rails ahead of you. Remember, the wheel flanges guide the trains and run along the inside of the running rails. Follow the inside of the running rails with your eyes and think that you are a set of wheels. Where will you go?. Look at the point layouts on the following pages to see some of the examples of routes that are set up.

MOVEMENT OVER POINTS



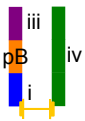
i LH running rail - route A
ii RH running rail - route A
iii LH running rail - route B
iv RH running rail - route B
pA point blade for route A
pB point blade for route B

At a junction, one running rail is continuous for the route concerned - **i** for route A, **iv** for route B
The other running rail has a moveable point blade at the end - **pA** for route A, **pB** for route B

The flanges of the wheels follow the inside of the running rails. When the flange comes to a point blade, the flange follows along that.

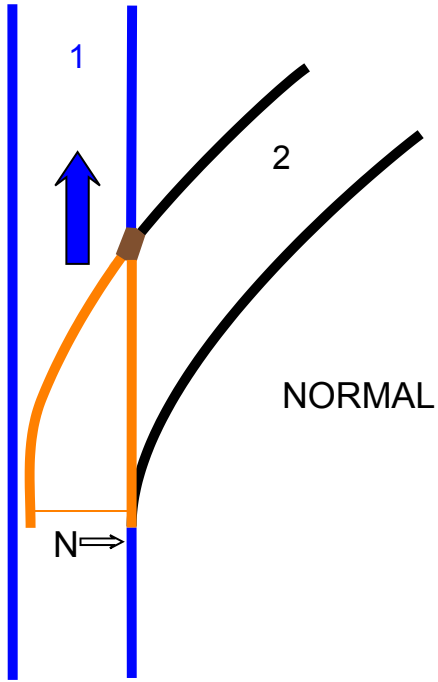
The route a train will take depends on what blade is flush with the running rail.

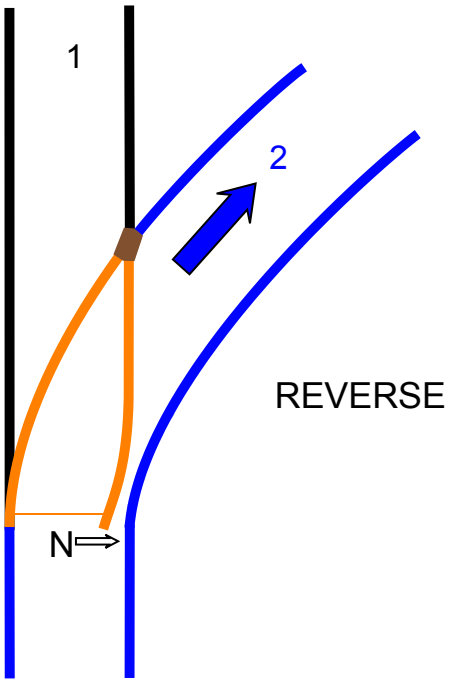
In this example of a facing point layout, the Left Hand wheel flange runs along the inside of the LH running rail **(i)**.
The Right Hand wheel flange follows along the inside of the RH running rail **(iv)** until it comes to point blade **pA** which is against the RH running rail, set for route A. The flange then follows along the inside of the blade until it comes to the RH running rail for route A **(ii)** where it then follows along the inside of the rail.



If the points were reversed and set for route B, blade **pB** would be against the LH running rail **(i)**. The RH wheel flange would follow the RH running rail **(iv)**.
The LH wheel flange would follow the LH running rail to point blade **pB** and along the blade to LH running rail route B **(iii)** where it then follows along the inside of the rail.

FACING LAYOUT





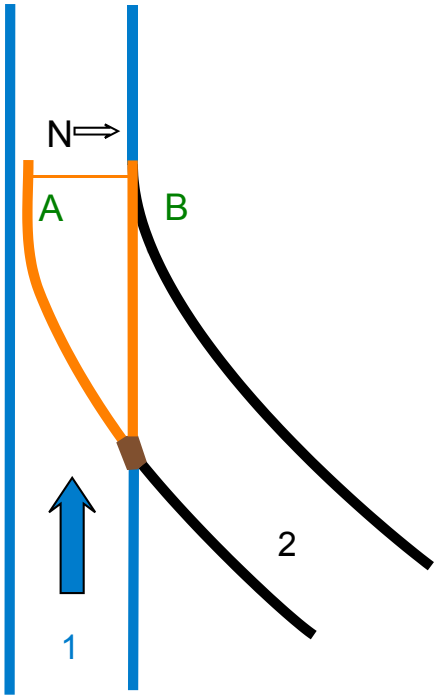
The points are set for a train to go to route 1

The points are set for a train to go to route 2

N⟹ shows the **Normal** position of the points

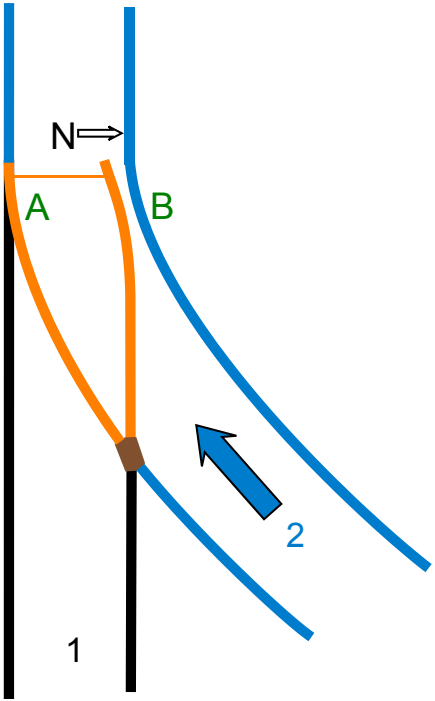
When the points are NORMAL, the point blade nearest the arrow lies against the running rail
When the points are REVERSEd, the point blade nearest the arrow lies away from the running rail - i.e. there is a gap
The points guide the wheels of the train to whatever route is set

TRAILING LAYOUT



The points are set for a train from route 1

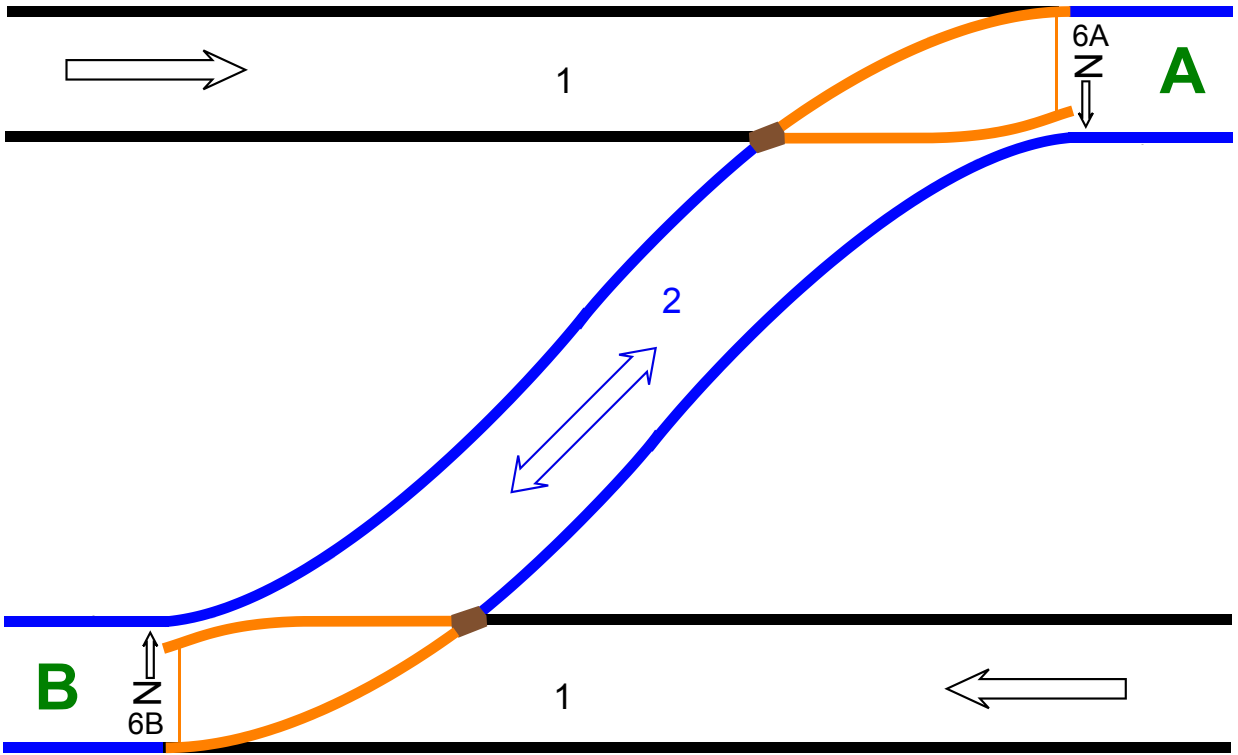
If a train comes from route 2 it may be derailed because the flange of the wheel may ride up over the junction B and blade tip A



The points are set for a train from route 2

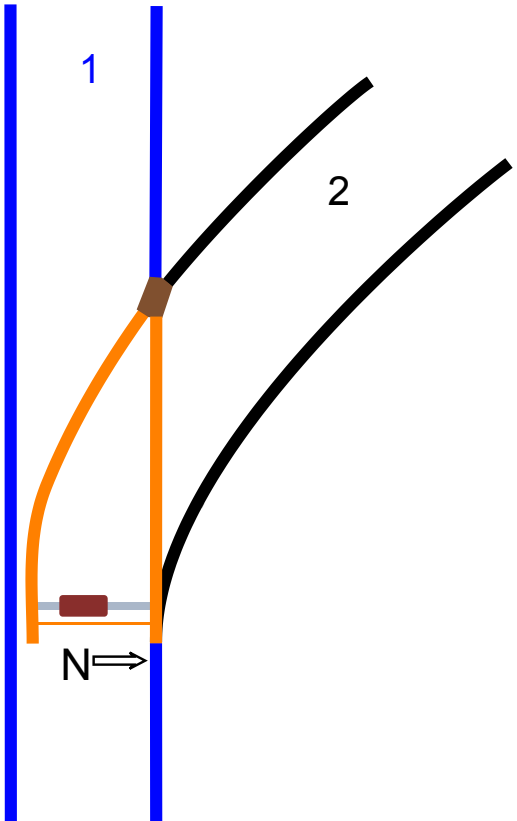
If a train comes from route 1 it may be derailed because the flange of the wheel may ride up over the junction A and blade tip B

CROSSOVER



This is a common type of crossover, such as used as an emergency crossover
BOTH sets of points must be set so as to allow the train to pass from one line to the other
In this example, both sets are REVERSEd. When the points are NORMAL, this will give separate running on each line. A train going from A to B will pass through a facing layout as it leaves the running line, then through a trailing layout as it joins the other running line

POWER POINTS / GROUND FRAME POINTS



Power points
Power points are the most commonly used types of points on the Underground network. They are powered by air or electricity. Air is the standard power at present, although electric points are being installed at various locations.

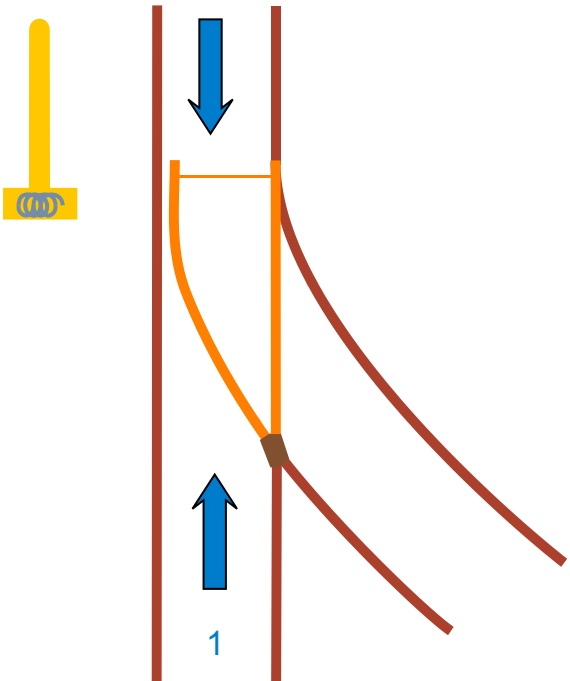
With air points, the air is supplied from the standard air main that also feeds the trainstops, rotates the disc shunt signals and operates the IMR frames, amongst other things.

Electricity opens and closes an electro-pneumatic valve, allowing air to a piston. The piston pushes the point blades over to set the route up as required. Obviously it is rather more complicated than that in practice and the actual operation of the points and control equipment can vary with each set of points.

Ground frame points
Ground frame points are normally hand-worked via levers in a ground frame near the site. Connection between the lever and the points is normally via rodding, although the levers may now operate the points remotely with the points being powered (Morden depot).

The ground frame may be interlocked with signals on the running line and may even control one or more signal (as at Totteridge).

SPRING TOGGLE POINTS



The points are set for a train from route 1 (trailing)
OR
for a train to go to route 1 (facing)

On a passenger railway, spring toggle points are only used as trailing points

The points are pushed over by the first pair of wheels or, in depot, by the operation of a hand-worked points lever. The movement of the points is assisted by by a spring (in the base of the points lever) and they are held in position by the spring. The points remain in that position until moved to the opposite position. When operated by a hand-worked points lever, the points "toggle" between one position and the other by each pull of the lever. Spring toggle points are not powered.

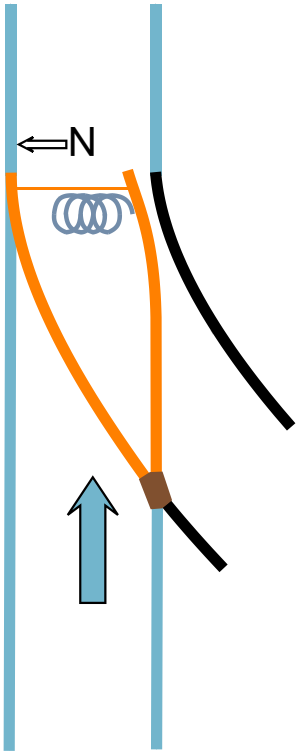
There is no need for them to be secured when a train is passing over them in the normal direction of travel. If they are secured, there is a danger that they may be missed when the points in that area are unsecured later on; this could lead to a derailment.

On a passenger line, as they are not powered, they MUST be secured if a train is to be worked over them in the wrong direction.

In a depot, where the points are hand-worked, trains can travel over the points in both directions without the points being secured.

There is no Normal or Reverse position of spring toggle points.

SPRING POINTS



On a passenger railway, spring points are only used as trailing points.

The points are held in one direction by a spring. As the wheel passes over the points. it pushes the blade away. After the wheel has passed, the spring pushes the points back to their normal position. And so on, until the train has passed.

Spring points are not powered.

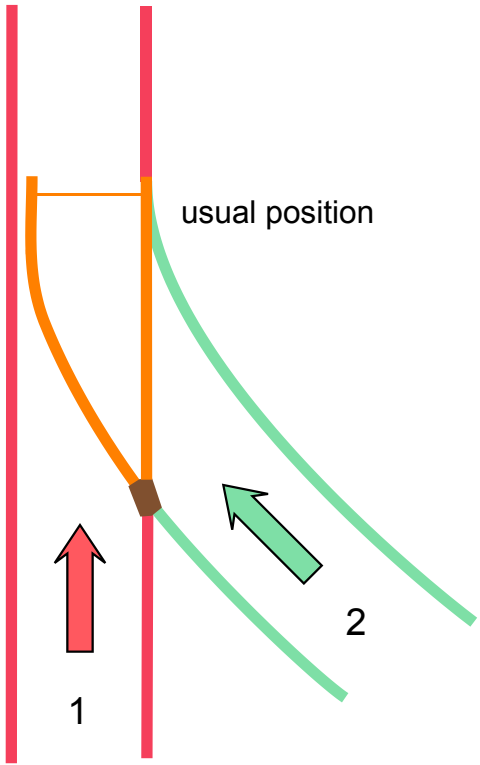
There is no need for the points to be secured when a train is passing over them in the normal direction. If they are secured, there is a danger that they may be missed when the points in that area are unsecured later on; this could lead to a derailment.

They MUST be secured if a train is to be worked over them in the in the wrong direction, or the train could become derailed.

Spring points are often associated with catch points.

Depending on the location, the overrun may end in a sand drag or buffer, or it may just be a short stub. In a tunnel section where space is at a premium, the overrun will be very limited and the blade that is normally closed may terminate in the four foot.

SPRUNG POINTS



On a passenger railway, sprung points are only used as trailing points

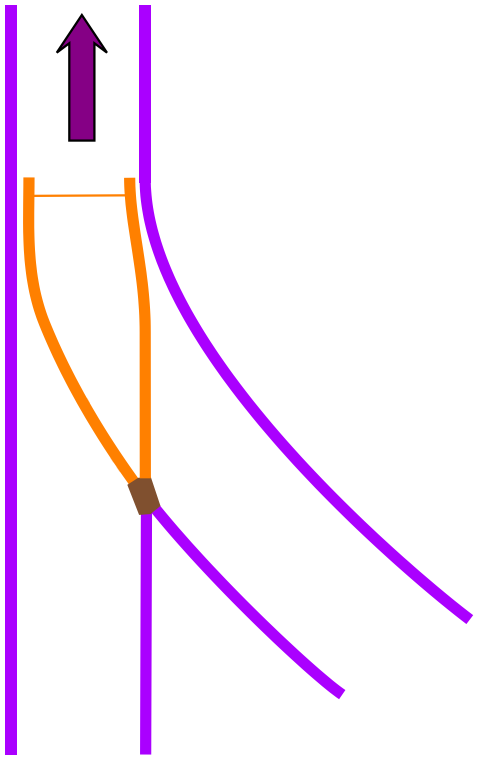
These points are very similar to spring points. The points are trailing points that are set in one direction. If a train passes over them from the other direction, the wheel pushes the points over, the points returning to their usual position after the passage of the wheel, and so on until the train has passed.

The difference between spring and sprung points is that with sprung points, there is no spring holding the point blade in place. Instead, the natural spring of the points themselves return the blade to the usual position.

There is no need for the points to be secured when a train is passing over them in the normal direction. If they are secured, there is a danger that they may be missed when the points in that area are unsecured later on; this could lead to a derailment.

They MUST be secured if a train is to be worked over them in the in the wrong direction, or the train could become derailed.

LOOSE POINTS

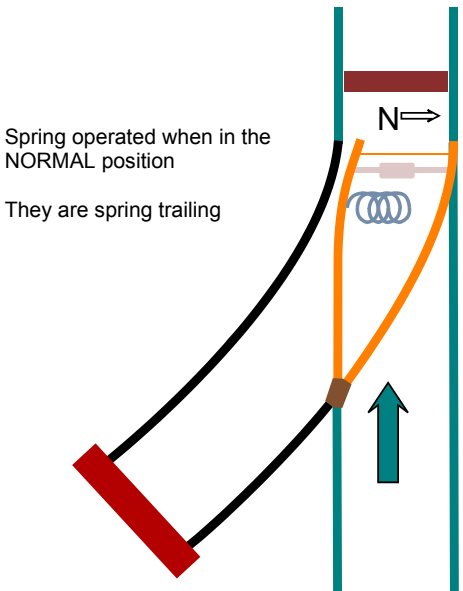


The points are pushed over by the first pair of wheels. They may remain in any position, or they may end up in neither one position or the other.

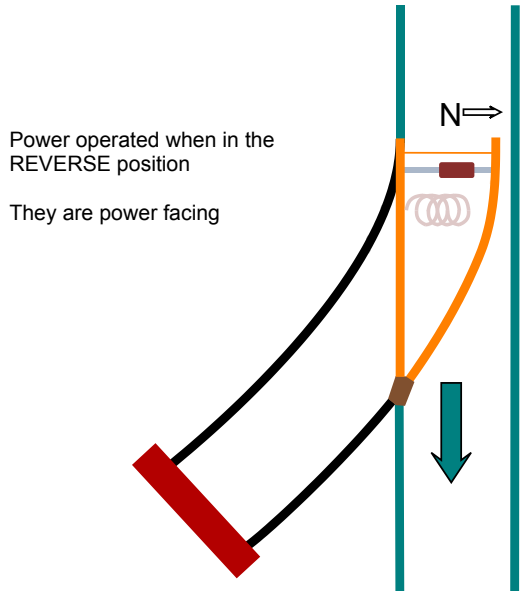
Spring toggle points are not powered and as a consequence are not held in place. There is no need for them to be secured when a train is passing over them in the normal direction. If they are secured, there is a danger that they may be missed when the points in that area are unsecured later on;
this could lead to a derailment.

They MUST be secured if a train is being worked over them in the wrong direction, or the train could become derailed.

CATCH POINTS



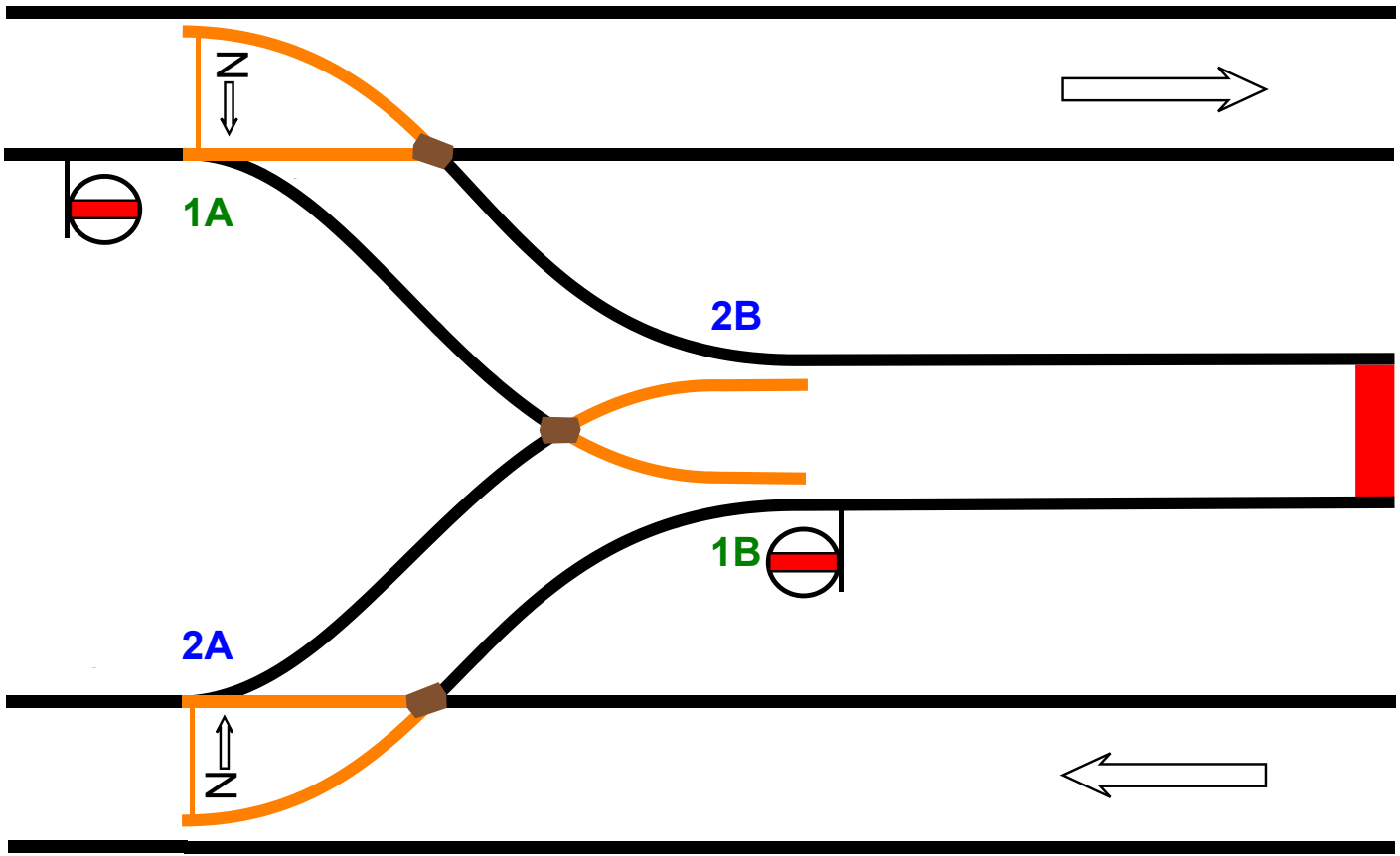
The points are set for a train to go up the gradient.
If the train rolls back, it will go towards the buffer



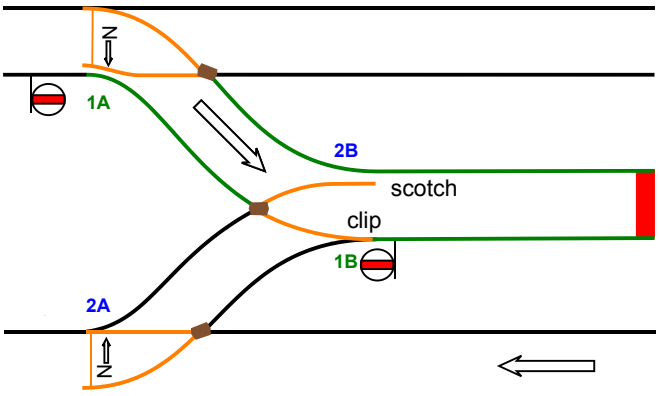
The points are set for a train to go down the gradient

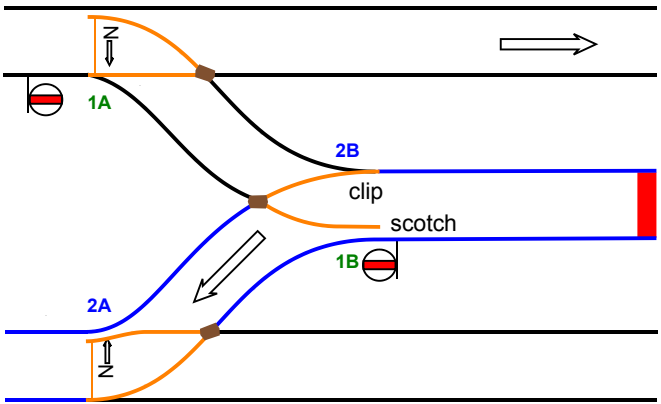
Catch points are often used on an uphill gradient to divert or derail a train if it runs back
The NORMAL position of the points is set for the overrun and they are spring operated in the trailing direction
The points are pushed away then go back to the NORMAL position after the passage of each wheel
They are power operated to the REVERSE position if a train is required to pass over them in the facing direction
Not all catch points have two way working
Catch points can be thought of as catching a train if it rolls back over them

WIDE-TO-GAUGE POINTS



WIDE-TO-GAUGE POINTS





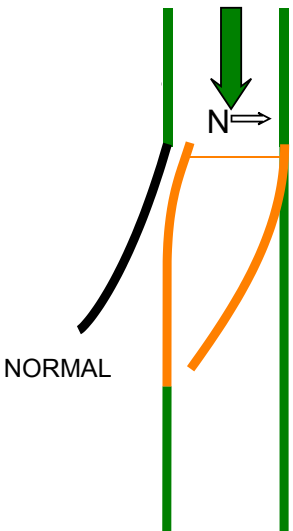
Wide-to-gauge points are are a form of trap points and are normally found in sidings where there is insufficient space to provide an overrun buffer at the points end of the siding. Their purpose is to protect the adjacent running line(s) should a train pass the shunt signal when the route is not set.
There are two sets of points, but they each only have one blade instead of the usual two.

When the points are in the Normal position, the running rails get further apart and it can be seen that if a train were to pass the shunt signal at danger it would eventually get derailed if it carried on.

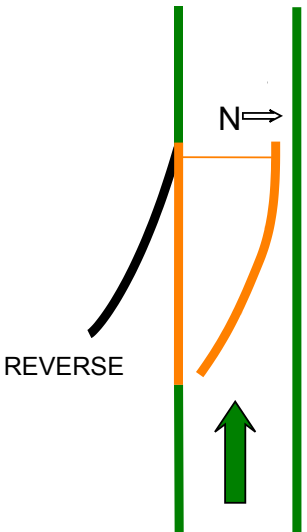
When the route is set to / from the siding, the relevant point blade is Reversed, creating a through route.

If the points need to be secured, then the blade of BOTH sets of points must be secured - the blade in the normal position will need to be scotched, the blade in the reverse position will need to be clipped.

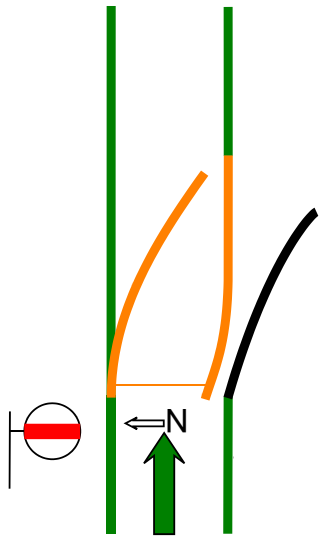
TRAP POINTS



The points are set to derail a train should it travel too far in the wrong direction



The points are set for through running



The points are set to derail a train should it travel too far past the signal at danger

Trap points are very similar to catch points except they are usually power operated in both directions
They can be used to make sure that a train doesn't proceed too far the wrong way, as in the case of a platform that can be accessed from either end, or to prevent a train moving too far if it passes a shunt signal at danger
The NORMAL position of the points is set for the overrun
There may only be one point blade instead of the usual two
Trap points can be thought of as trapping a train if it goes too far or the route isn’t set

Some locations where the different types of points can be found on the Northern Line

Facing points
Usually found where a train can be routed in another direction / leaves the main line. The points guide the train in the required direction.

Eg after a junction signal: B31[A] Kennington, E4 and E11[B] at Camden Town, NP4[B] at East Finchley, etc.
The first set of points when reversing over an emergency crossover

Trailing points
Usually found where one track joins another

E.g. after E6 and E9[B] at Camden Town. Coming from Kennington loop into platform 1
The second set of points when reversing over an emergency crossover

Crossover
An emergency crossover has one set of facing points and one set of trailing points. A train reversing over an emergency crossover will always pass over the facing points first, then the trailing points

Power operated points
This are found almost anywhere

Ground frame points
The emergency crossover at Totteridge. Morden depot (GF2 - GF5 points, and permission levers)

Spring toggle points
Hand-worked points in Edgware sidings and Highgate sidings

Spring points
The catch points at Kennington are spring points. 19 and 21 points at Morden are spring points when going to depot

Sprung points
On the Northern Line, sprung points are only found at Camden Town SB, at the junction of the two Bank branches. (23^B points). Their usual position is for a train coming from CT4. These were loose points, then converted to spring toggle points, then later converted to sprung points. They are still referred to as spring toggle points on the various diagrams, although this is incorrect.

Loose points
There are no loose points on the Northern Line

Catch points
Morden - 19 and 21 points on the approach to Morden depot
Going to depot - they are trailing points. A spring holds the points in the normal position (when the train goes to depot). Going from depot to the platform - they are facing points. They are power operated in the reverse position

Trap points
19 points between NQ28 and platform 1 at Finchley Central, 20 / 21 points G Green, 32 points East Finchley etc.

Wide-to-gauge points
Tooting Broadway, Archway and Finchley Central south sidings

19 Points - normal position

Looking uphill towards the depot from the platform. In this direction, the points are acting as catch points. Each set of train wheels pushes the points over. The points are spring trailing points for a train passing over them in this direction. The normal position is set for the buffer.

The spring which pushes the blade back

19 Points - normal position

Looking towards the platform from depot. In this position, the points are acting as trap points.The points are power operated facing points and will be reversed for a train passing over them going to the platform. The normal position is set for the buffer.

Note the point number, arrow and N denoting the Normal position of the points

Notes