

COUPLING SYSTEMS FOR NEM POCKET FITTED STOCK

Achieving reliable, easy to use and feature rich NEM coupling of locomotives and rolling stock can be fraught with problems especially in the UK where the manufacturers do not necessarily conform to the standards set out in the OO Gauge Association guidelines as defined by the NRMA. And for those seeking to further combine a close coupling of coaching stock many are left wondering what works best.

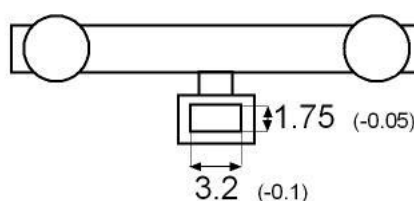
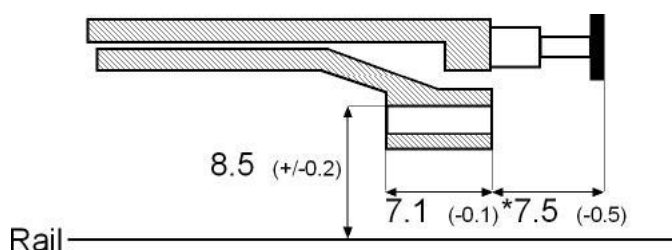
Most European and American HO stock does not suffer the same issues as the UK stock and certainly overseas manufacturers have conformed to the standards set out more willingly than those who make UK outline products.

The major issue on UK models is that the NEM pockets vary in position from one model to another (height and inset). A MK1 coach might have its pocket centre set at 7.25mm from the top of the rail and a loco from the same manufacture could have its pocket centre set at 9mm from the top of the rail. This means that even with standard tension hook couplings, issues would arise. To combat this, stepped couplings are often used to overcome the differences in height and different length shanks to overcome inset issues. It should be said that the big manufacturers affected by this are on the case and hopefully these inconsistencies will be resolved at some point in the future.



ABOVE: A 4575 shown against a Tender from 9F using a slip bar to demonstrate height inconsistencies

LEFT: The OEM solution is to fit different couplings across the range. Note the differences between the two shown.



Setting the standard and just what are these NEM pockets anyway

Normal European Modelling Standards are set down as guidance for many aspects in model railways: track curvature, clearance between two lines (load gauge) etc and in this instance the specification for use with couplings. Although the topic is somewhat of a mine field involving the European Union of Model Railroad and Railroad freinds (MOROP) and National Model Railroad Association (NMRA) in the USA to name just two of the prominent organisations involved in defining standards.

When we talk about NEM 362 we are referring to the standard adopted in June 2007 by DOUBLE O GAUGE ASSOCIATION "Mounting Socket for Interchangeable Couplers" on

OO Stock" and it is this standard that we are interested in. The diagram above shows the size and distances adopted to make sure all couplings are set at an appropriate height and inset to allow the interchangeability of couplings on our stock.

By having a NEM pocket built in to our models the task of changing couplings should be fairly simplified and as more manufacturers produce new or revised tooling these standards are slowly being adopted. There are other standards, NEM 363 (limited space guidance for example) which mean that it is incorrect to just say NEM pocket when referring to the coupling pocket of a piece of stock as it needs to be refined to the correct standard by adding 362, 363... for it to be meaningful.

So why would we want to change the couplings in the first place? "My stuff all works fine" I hear you yell. Well the short answer is we don't. If you are happy with the supplied coupling and just want to run trains there is no reason why you would need to contemplate any changes. However, still do make a note of the couplings used in case the originals become damaged and be aware that unintended un-coupling is often caused by incompatible systems.

The longer answer is why this article was written. Some would like more functionality, others have suffered reliability issues and many just want something less obtrusive. But by far the biggest "want" is for closer coupling! This is usually because the gap between two coaches if scaled back from 4mm (OO) scale can be as large as 1.5 mtrs. Imagine trying to jump that in the real world. Thankfully this is resolvable without resorting to cutting or hacking bits off your nice new coach or locomotive providing it has the NEM362 Pocket and you are aware of the issues raised.



***ABOVE:** Probably the worst we could find - two Bachmann Collett coaches from current production but produced to the inherited Mainline moulds. Changing these is a long, expensive job, due to the lack of NEM coupling pocket and old bogie design. But it can be done and finishes these otherwise excellent coaches of nicely.*

Not all manufacturer's couplings are compatible with each other's. This causes more headaches. It is even possible to find couplings from the same manufacturer not being compatible with each other. A Hornby Railroad large loop coupling will not work reliably with the one fitted to a super detail Castle class for instance. Certainly both Hornby and Bachmann have altered the size of their couplings over the years. Any modeler considering running older stock with newer is advised to replace the couplings on the older stock with the latest version from that manufacturer if possible.

For the purpose of this article we shall only be covering rolling stock fitted with NEM pockets (regardless of their compliance with the standards) This is mainly so we don't have to do any none irreversible work to our stock Also with the vast range of rolling stock available to choose from it would

require a whole set of Encyclopedia Britannica to cover every type of "bolt-on" solution available today.

Ready To Roll (RTR) couplings are ok at what they do in keeping the stock separated enough to enable it to negotiate curves without running the risk of what is referred to as "buffer lock", the term used to describe the buffer on one item sliding behind that of the item it is coupled to resulting in a derailment. The curves required on model railways are far more dramatic than those in the real world, and this is just something we have to live with on our model railways as most of us do not have the huge area required to create curves prototypically. On the whole this is not a problem until we start adopting the coupling system we prefer where we must make sure there is sufficient clearance between stock ends to avoid possible damage.

It's worth investigating the types used in the real world before we look further at the models by taking a quick look at the systems employed by the Railway Companies so that we can understand the realism we are after.



Above: Here we see a screw link coupling as fitted to the tender of new build 60163 A1 class Tornado.



Above: Class 52 no D1010 Western Campaigner confirming that even diesels have screw link couplings.



Above: End of a MK1 Coach, As you can see the hook still allows for coupling to the locomotive via its chain coupling but that it has a British development of the automatic Buck-eye originally invented in Ohio in the USA by Eli Janney in 1879 and named after the nickname given to the state of Ohio "the Buckeye State"

In the pictures above, you can just make out the weighted bar that runs through the screw, this allows for quick tensioning of the coupling. Once the lower chain link is over the hook of the next item in the rake this bar is used to draw stock closer together by pulling the outer links together until the buffers are just touching. The draw back with this type of coupling is plain to see in that a rail worker must physically get between stock to couple and uncouple items, this can be quite dangerous and has led to fatalities in the past.

Most modern stock in use on the non heritage lines use the buckeye throughout in one form or another.

To allow coupling to the locomotive the coupling needs to be in the "down" position as in the photo but obviously when coupled to another coach this would be in the "up" horizontal position.

Ok so that's the full size couplings looked at. Let's now take a look at the types that are available in the model railway arena including those that can be employed to improve reliability, functionality and those that can shorten that "jump gap" between corridors connections.

As already mentioned, it is important for the modeller to take a note of the couplings fitted when they purchase a new item of stock and if contemplating a coupling change it is good practice to store the removed couplings in the retail box the stock came in or individually packed in poly bags marked with the model number in ones spares box.

There are many different types of coupling on the market, a small selection of the more easily accessible are shown below.

Tension hook
Hornby and
Bachmann
standard fit RTR

Buckeye
Kadee, Bachmann EZ
Mate

Pipe
Bachmann

"Slip bar" Close
Coupling
Roco and Hornby

Chain link
Romford or Smiths 3
link, Screw and
Instantan couplings



Tension hook:

These couplings are good at what they do in keeping the stock separated enough to enable it to negotiate curves without running the risk of buffer lock. They can be used to auto couple and there are plenty of devices available to enable auto uncoupling as well from manually operated ramps to electromechanical types. They are fairly reliable and the manufacturer should have done all the height and length adjustments to prevent cornering problems.

Some brands are also supplied with the NEM pocket, these pockets have a dove tail which fits neatly into a corresponding cutout in the loco body

The Pipe:

Bachmann's pipe couplings look to all intents like the vacuum brake pipes that are fitted between coaches in the 1:1 scale prototype.

These are ideal for those of us that tend to keep coaches stored in rakes and rarely uncouple them. They are also flexible enough to overcome most length or height inconsistencies. For this reason

The Hornby/Roco Close Coupling:

The original Roco Couplings are harder to come by in the UK but as Hornbys' close coupling solution is based closely on the Roco design albeit slightly longer (which in some cases is a good thing) It is really worth considering.

A big advantage of these is that once fitted the coaches can be auto coupled and uncoupled as the couplings inter-lock together via a latch, and a loop is provided underneath to allow the use of a ramp style un-coupler.

These couplings provide much closer corridor connections and easier hand uncoupling than tension hook types as one item

Buckeye:

The Bachmann EZ-Mate version is not that easy to get in the UK but the Kadee version is available from many sources so it is the Kadee we will look at in detail here.

The Kadee buckeye Magne-matic^(tm): Obviously just from the name you can tell it's a proud upbeat product from the USA

and can be very useful for other projects where you wish to make a bespoke pocket. They do have one draw back in that they can droop and the pocket cutout is oversize. This can be remedied with a shim but this just adds work that should not be needed if they were made to "specification"

They are not overly tolerant of undulations and gradients on the layout. But it is mainly the gap and toy like appearance that causes a lot of people to look for something better.

alone they are the simplest to implement as once fitted and in service they are worry free.

There are disadvantages though, they are hard to fit whilst the stock is on the track and typically the rake needs connecting together before being railed. Also there is no way to employ auto uncoupling. Despite this they are well worth considering as a reliable coupling system.

can be lifted out of a rake without disturbing any other part of that set

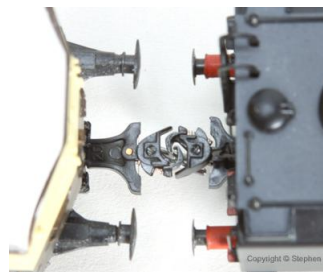
There are also a few alternatives to e.g. in-track uncoupling to reduce the "Hand of God" effect.

The coupling mechanism is quite strong once linked but they ideally need to be precisely centered in order to allow trouble free one shot coupling. Some stock is a little tricky to autocouple if the stock is to be tightly coupled and may need a little fiddling to get them to latch.

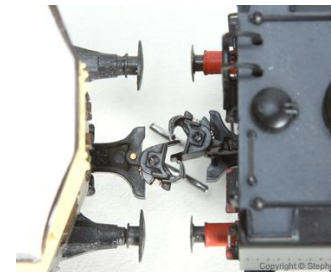
and with good reason. These quality couplers, although not prototypically correct in appearance to the UK Buck-eyes used between coaches, are one of the best couplings available and do not just provide a way of keeping stock together.



The Kadees also allow you to auto couple, un-couple and shunt in the uncoupled mode. This feature is referred to by Kadee as "delayed uncoupling" this makes them amazingly versatile in operation. You can uncouple your rake of coaches and then shunt them back into a siding whilst they are still uncoupled. Once the technique is mastered by the driver (not hard) onlookers will be most intrigued at how you managed to pull into an area on your layout having just completed a run then shunt and leave behind the rake before shuffling down the line to collect another train. This is achieved using an in-track magnet that tugs the droppers in opposite directions once the couplings are relaxed, you then pull forward slightly. As the magnet is still holding the knuckles open when you shunt back they do not fully engage. See pictures Right



ABOVE: Kadees in coupled mode. Note the knuckles of the buck eyes engaged. Once over the un-coupler the tension is released and they spring apart allowing them to be dis-engaged. As shown **above right**



the stock can then be pushed with the couplings re-engaged in the open position so they are now in delayed uncoupled mode. We've used over length couplings in this demonstration for clarity.

A word to the wise here; there are many couplings in the kadee range and there is one to suit almost every eventuality although most require the addition of a draft box to hold the coupling in place and a certain amount of modeling skills to implement. As we are discussing the NEM362 versions here we have the option of the no. 17, 18, 19 and 20 couplings which are available in 4 lengths and help overcome manufacturing inconsistencies that move the pockets "off spec"



LEFT: Number 17 being the shortest (left) and 20 being the longest (right). Typically Bachmann and Hornby stock is mostly compatible with number 18 and 19 and these give the best clearance on radius 2, 3, 4 and greater curves.

Chain Couplings: For those that prefer the very realistic prototypical type there is always the Romford or Smiths chain link couplings which are usually self assembly etched brass kits and are available in the three most popular styles of 3 link, Screw and Instanter types.

Some versions can be purchased ready made for those that do not want to bother making them up themselves.

A lot of modellers also incorporate these into one end of their locos typically at the front and they can greatly improve the look of your locos no end especially if you do not run locos tender first or always have the driver figure of your class 37 at the front.

3 link chains were mainly used on loose coupled wagons where passenger comfort was not an issue, this saved time and expense when making up rakes of mineral wagons as the operator only had to hook the coupling up.

The screw link type are very popular on locomotives and by using the screw bar in the middle of the links the slack could be removed lessening the bounce between the loco and first carriage, whilst this is not a feature one

would be willing to perform on a model there was once a OO version of this coupler that had working screws

Instanter couplings were similar to the screw type and were able to remove the slack due to the shape of the centre link which was basically an acute triangle shape with one edge shorter than the others, coupling was performed with this link set along the longest edge then rotated to the shorter edge to draw in the slack. *see diagram below right*

As the fitting of these involves some modeling skill and does not plug into the NEM pocket they are not covered further in this document but it was felt that they were still worth mentioning as they still can be used to close couple freight stock or improve further the appearance of your locomotives and brake stock.

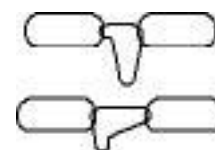


ABOVE: Smiths screw link supplied as a DIY kit of parts.

BELOW: A romford version supplied ready made and of better detail.



BELOW Simplified Instanter Coupling diagram



Bachmann 9f and Airfix Auto Trailer fitted with Smiths couplings



The prototype looks like this. Notice the buffers are retracted.



Bachmann and Hornby do this RTR



But You can do this and still corner. Very Prototypical! and yes they are coupled

As already mentioned one problem is the curves. Attention needs to be made to not getting the stock so close or inflexible that it cannot negotiate curves or double S bends in your layout

Thankfully most new stock fitted with NEM pockets already has this covered - Note below how the coupling is pushed out on corners effectively increasing the clearance - Both Hornby and Bachmann employ similar systems.



Not all new stock has this mechanism though old tooling new stock items such as Bachmann Colletts and Bullied do not have NEM pockets and the coupling is fixed to directly to the bogie which requires a lot of effort and modification to convert.

Some of the newer stock has sprung buffers and for greater clearance these can be set retracted (as they are in real life) by slipping some wire insulator or heat shrink tubing over the inner protrusion of the buffer which has a convenient shoulder to aid the retention of the sleeve. **If using heat shrink sleeving be especially careful not to apply too much heat as the body of the model will melt,** it is better to use a smaller size and stretch it over the shoulder of the buffer pin.

Once you have determined the correct coupling to provide curve clearance your next consideration is pocket height so that they a) work with the relevant un-coupler. b) do not foul the bodywork or buffers and C) are uniform across your stock.

This sometimes can be overcome simply by turning the plug in pocket shown right (where fitted) upside down, others by slipping a shim (card or better plasticard) into the pocket to reduce droop thus lifting or lowering the coupling height.

When turning these over it is good practice to glue a small wedge of plasticard to the new top facing emulating that shown in the top picture as this acts to reduce friction allowing the pocket to swing more easily around its dove tail end.

Others are more challenging as can be seen in the following pictures.

On the right, this Bachmann GWR Prairie 2-6-2 loco has had to have the original stepped coupling draw bar (loop) removed and then a slot cut into the remaining stepped flat part. A Kadee No. 17 was then trimmed at the swallow tail end to give the correct length and glued into the slot. Bracing was then added before painting (shown before painting) the same technique can be used to create an off-set (under shanked) coupling for other types such as Hornbys close coupling style or Bachmanns Pipe coupling.



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In the picture to the left we see a mk1 coach from Bachmann viewed from below. This time a standard coupling has been used (what Bachmann describe as straight). Again the Loop has been removed and a No 17 Kadee added by super gluing it to the flat surface. It is important to roughen the bonding surfaces to get the glue to work

IMPORTANT NOTE: care is required when gluing not to allow any glue into the swivel of the coupling around the brass pivot or it will not uncouple automatically nor will the shunting function work.

Why the height so important.

Because our layouts may have elevated sections or Helix arrangements if the coupling heights are not standardised across our stock un-intentional un-coupling can occur as the train transitions from the flat to the gradient or whilst traversing point work. When we consider coach to coach couplings (see note ¹) this may not be so important provided they are all the same height and stored in rakes where regular uncoupling is not required.

Kadee produce a gauge for this very purpose for use with their system which consists of a block that sits on the track and a no. 5 coupling that screws to the top. this provides a coupling which meets Kadees specifications setting the coupling knuckle centre at 9.9mm above the top of the rail and the all important trip pin at the correct 0.8mm from the rail top. It should be said that these are quite cheap (circa £5.00) and are an invaluable tool for those seeking to use Kadee, but the experienced modeller can make one themselves from Plasticard and a spare pocket. It is advisable to cement a weight inside your gauge housing in the form of bolts, fishing weights or liquid lead using good old PVA to hold them in place. This stops the light weight of the gauge from accidentally lifting giving false results. The other advantage to making your own with a pocket is you can check the heights of other NEM 362 couplings as well.

¹ with the exception of the first and last coupling in the rake which should match those fitted to your locomotives.

Tension coupling with the non prototypical gaps. Note the different heights



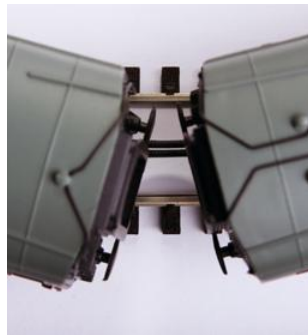
COUPLING WITH STANDARD SYSTEM

Bachmanns Pipe Coupling A selection of coaches coupled with Bachmann pipes. Not bad! Although the two Hornby coaches are still not that close.



3rd Radius Piped Bachmann Mk1

2nd Radius Piped Bachmann Mk1



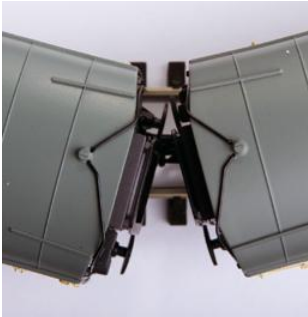
COUPLING WITH BACHMANN SYSTEM

Hornby R2080 Close Coupling That's better and these also look almost prototypical from the side view. However we can not use a track fitted un-coupler as the left and centre sets are too high. It is also necessary to file the top of the coupling to allow clearance with the buffer beam. more worrying though - what is going on with the Hornby coaches on the right? This is still far of the mark and it is their system we're using.



3rd Radius with Hornby Close Couplings

2nd Radius with Hornby Close Couplings



COUPLING WITH HORNBY SYSTEM

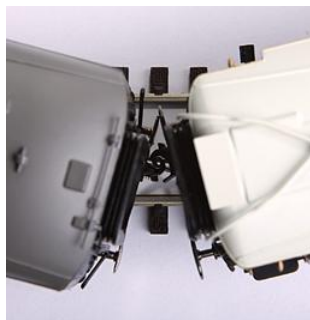
Kadee Magna-Matic (™) Coupling System: The Hornbys are almost there now, Two No.18s closed that gap, but we would need to run with the spring loaded buffers retracted as they are touching. Alas you can not close up completely due to the way these work as they require 1mm overlap for the knuckles too engage with each other. As depicted in the far right set pictured below these actually ran round a radius 2 (R607) without an issue. They need a very gentle bump to couple and no doubt if we went a little further than this articles brief they could be closed almost tight against one another.



3rd Radius Kadee 2nd is similar as the gap is wide



Correct and incorrect height on coach.



COUPLING WITH KADEE SYSTEM

Smiths and Romford Ornimental chain couplings



COUPLING WITH 3 LINK SYSTEMS

The chain couplings sure do a good job of improving the look of your locomotives and whilst not overly strong they can haul a good rake without issue and many modelers do practice this. The drawbacks to hauling this way are plain. the slack allows the rake to bounce on and off the locomotive (more noticeable on DCC) and coupling up is fiddly to say the least.

The Romfords do look better but need some loosening up in order to hang right and they are more expensive per coupling than the Smiths. The drawback with the latter is on close inspection; the swing bar looks like a small nail, mainly because that is what it is but a small length of brass rod can be substituted with a small flat washer glued on each end to stop it falling out. It is even possible to apply a blob of glue or solder to the ends to produce a convincing appearance to the brass pin ends and once painted no one will be any the wiser.

As we have seen there are many options open to you to get that closer looking, more functional coupling on most items and whilst not definitive it is safe to say that most stock can in one way or another use a different coupling system provided the observations made are taken into consideration. With the fantastically detailed and well made items of rolling stock being produced by the likes of Hornby, Bachmann, Dapol etc further enhancement is possible just with a simple change of coupling.

Ultimately the decision is yours,. RTR with NEM362 pockets are always a good starting point when undertaking this endeavour. Making sure that the coupling is not too short or at an incorrect height and that your chosen solution is not too tight for your layouts curves will still leave us many options that will improve the appearance and in many cases functionality of our models, making investigation well worth while

By far the simplest couplings are the ones supplied with your Locos and rolling stock, but with a little imagination and work some really spectacular results can be had.

We have only looked at the five most popular types available in the UK but there are others that you can track down.

The way this author has converted his own stock means that all coaches are connected with either Bachmann Pipe couplings, (if nothing else will do), but given the reliability and ease of uncoupling with the Hornby R2080s then these are best suited to most stock - they are also quite cheap and definitely the preferred choice.

When it comes to the first coach and rear of the loco for pure functionality the Kadees can not be beaten especially thanks to the delayed uncoupling feature. Although it would be helpful at some time if Kadee produced (for the UK market-as HO does not have this issue) Nos 17, 18, 19 and 20 in over, under and centre shanked versions as per their bolt in range. In the future the manufactures hope to have resolved all pocket height and inset issues with new releases and re tooled items from their older popular lines.

We have mostly used Bachmann stock in this article as it is these products that allowed us to demonstrate the issues raised. Most Hornby and newer Bachmann items adapt really well and of the stock pulled for testing it is only a small percentage that were found to have non NEM 362 spec pockets and were older stock. However Hornby coaches can sometimes be difficult to pull close and may require some additional light modification as illustrated in the preceding photos.

We have included a comparison chart of our tests on the final page that shows the coupling by 'coach type' in a column as it was felt this would aid in the visualization of the coupling distances better than those in the main section of this article. There is also a table showing the types we successfully fitted and a list of the stock used in the photos.

I hope you have found this article useful and of some inspiration. Others will be available on the Website soon and if there is anything you think should be covered, or if you wish to discuss this article further, drop us a line and we'll as always be happy to assist in any way we can.

Close Coupling Comparison Chart

Bachmann Early MK1 Coaches



Bachmann Current 2011 MK1 Coaches



Hornby BR 61' & New Pullman coaches



OEM Tension coupling



Bachmann Pipe Coupling



Hornby Close Coupling



Kadee Magna-Matic (tm) Coupling

Other regional stock illustrated with the different coupling systems



Hornby Close Coupling



Bachmann Pipe



Kadee Magna-Matic (tm) Coupling

Stock pictured and used for evaluation testing

West Somerset Railway: BR Mk1 WR TSO 4911 and 5024 coaches
 Bachmann 39-051 BR MK1 Open Second SO Maroon
 Bachmann 39-126 BR MK1 Composite CK Maroon
 Bachmann 39-129B BR MK1 CK Composite Corridor (WR) Chocolate and cream
 Bachmann 39-154B BR MK1 FK First Corridor (WR) Chocolate and cream
 Hornby R4144B Pullman first class Parlour car no.36
 Hornby R4261B BR 81ft 6in Corridor 1st Class (ER) Maroon
 Bachmann 32-856 BR 9f 2-10-0 locomotive no 92002
 Bachmann 32-135A 4575 Prairie Tank
 Airfix GMR 54255-5 GWR Auto Trailer
 P and D Marsh "Don the Driver" white metal figure (unpainted version)
 Bachmann (unknown) Collett Coaches

Bachmann 332-380DS Class 37/5 Diesel 37698 Raifreight coal sector "COEDBACH"
 Bachmann 36-060 Pipe Couplings
 Hornby R8220 Close Couplings Slip bar (Roco design) couplings
 Bachmann (unknown) Cranked couplings (not listed as spares)
 Bachmann 36-030 Straight couplings with Pocket
 Smiths LP-8 Screw coupling kit
 Romford Screw link Couplings pack 17
 Kadee Nos. 17, 18, 19 and 20 MagniMatic (tm) couplings
 PECO SL100 Streamline Flex Trackage
 HORNBY R607 and R609 2nd and 3rd Radius Curved Trackage

All Pictures by the author

All Stock used either from authors own collection or provided by Buffers Model Railways Ltd of Colston Cross, Axminster in Devon.

with the exception of D1010 Western Campaigner, Coaches no. 4911 and 5024 which were provided by West Somerset Railways PLC. 60163 Tornado supplied by The A1 Trust

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