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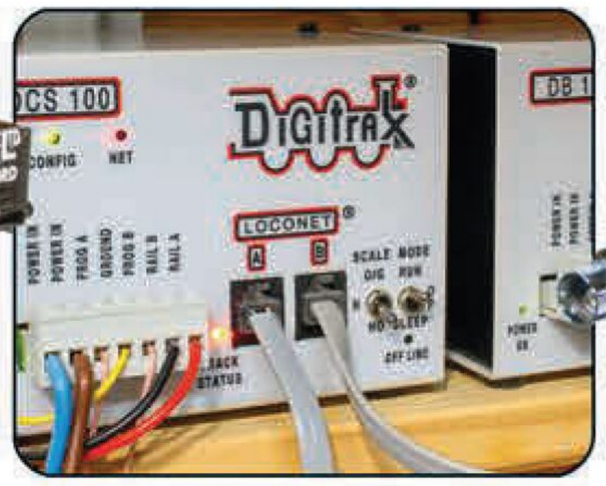
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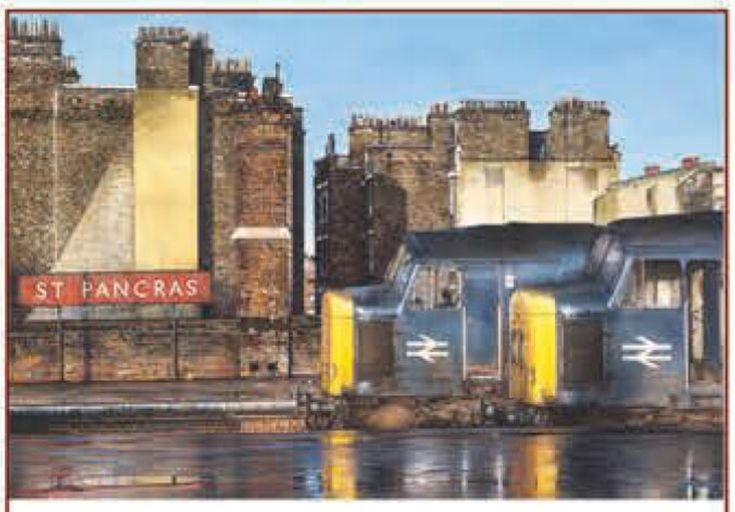
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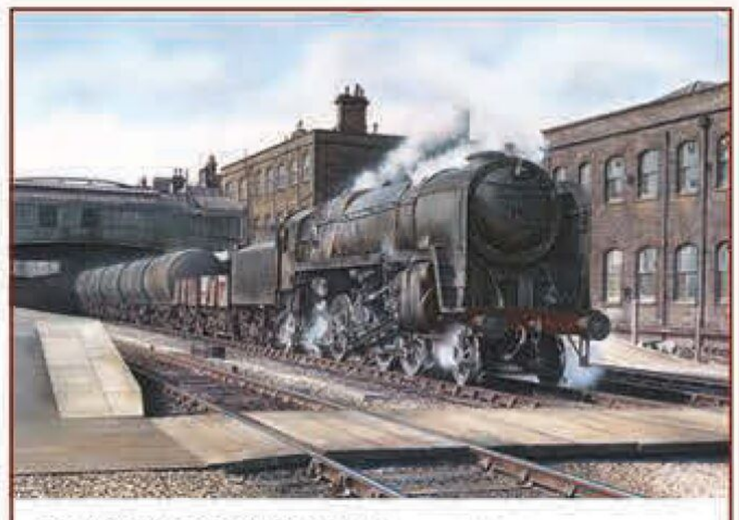
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RAILWAY MODELLING has to be one of the most remarkable hobbies to get into and one of the most immersive too. It can be a time machine, transporting you back to long gone eras of travel in glorious coaching stock behind iconic steam locomotives as portrayed by the LNER *West Riding Limited* stock or *Coronation* 'beaver tail' observation cars now available as scale models.

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What's in the Shops

From *Deltic* to LNER *Coronation* stock, manufacturers both large and small have been releasing models of quality and variety.



↑ Heavy metal in the form of the prototype *Deltic*, No. DP1 has arrived from Hornby. It is part of its new era Dublo range and comes with an HM7000 TXS digital sound option.

Dublo Deltic delight

PERHAPS THE most anticipated new model of recent times has been the Hornby Dublo *Deltic* No. DP1 which follows the tradition of the Dublo brand in being composed primarily of cast metal. The model represents the prototype as it ran in the mid-1950s, finished in lined blue to a very high standard.

Its immense weight for a 'OO' gauge model is remarkable and the primary reason for its long development time. The drive and motor has to be of sufficient strength and durability to cope with such a heavy body shell and locating suitable motors that could deliver the fine performance that Hornby wanted from this model has taken some time.

We believe the wait was worth it. The delivered model has considerable finesse, even though it is primarily composed of metal, supported by smaller plastic mouldings including a magnetic cover over the decoder bay.

Detailing is to museum standard, applied using numerous tiny details from handrails to the cab fittings, which includes driver and second man figures. Etched metal radiator fan grilles and other details associated with contemporary standard 'OO' gauge models are apparent. The model has all of the quality we would expect to see of a high-end model in this price range.

Testing showed that Hornby has delivered what it promised in terms of its running qualities, with some of the finest performance from a new model observed to date. It is offered with a TXS digital sound option which works well in the



NO. DP1 FEATURES

- Model covers the 1955-1960 period.
- DCC ready and TXS digital sound versions.
- 21-pin DCC interface.
- Decoder bay located in the roof with magnetic cover.
- All-wheel drive with frame-mounted coreless motor.
- Twin flywheels.
- Cast metal frame with engine details visible through the side windows.
- Multi-layer bogie assemblies.
- Motorised radiator fans.
- Fully detailed cab interior with illuminated driver's desk.
- Fully working running lights and engine room illumination.
- Room for a stay-alive power bank and bass enhanced speakers.
- Price: £349.99 - £404.99.

model. The sound system includes sensors in the bogies to simulate flange squeal when the model negotiates curves in the track.

Also noteworthy is the wealth of electronics built into the model. They include engine room lighting, fully functioning running lights and motorised cooling fans, the control of which is enhanced with the TXS digital sound version.

Supplied in an appropriately decorated box, the model itself is fitted to a transport cradle which doubles up as a neat display unit.

The DCC-ready version with 21-pin DCC interface and factory installed speakers is priced at £349.99. HM7000 TXS digital sound versions are priced at £404.99. Will we see a production Class 55 locomotive built to the same standard for the Dublo range?

New Models



↑ Rapido Trains No. 45106 modelled in 1980s heritage condition is one of 12 new Class 45 and 46 models tooled to cover their life span from the 1960s.

CLASS 45 FEATURES

- Models cover the 1960s to heritage status.
- DCC ready and DCC sound versions.
- Injection moulded body with fine integral detail.
- NEXT18 DCC interface.
- Simple clip-on bodyshell.
- Twelve-wheel drive with frame mounted coreless motor.
- NEM coupling pockets.
- Cast metal chassis frame.
- Neat leading bogie wheels with exposed axle ends.
- Etched radiator grille with fan detail.
- Detailed cab interior with flush glazing.
- Fully working LED marker, head and taillights.
- Price: £144.95 - £212.45.

Peak performance in 'N'

AT THE OPPOSITE end of the scale to *Deltic* is the brand new 'N' gauge Sulzer Class 45 and Class 46 model released by Rapido Trains UK which has won much acclaim from modellers for its fine detailing and quality running. The model is a development of the Class 44 'Peak' locomotive model released a couple of years ago and utilises the smooth running chassis fitted to the first model.

Rapido has tooled quite a range of bodyshells for the Class 45 and Class 46 so it can offer models from introduction through to their last years in service. Variations in the tooling account for headcode boxes, train heating boilers and the later marker light versions with and without square framed headlights.

Rapido Trains UK has captured the character of the type very well with a model which has an excellent shape and accurate proportions. It sits well on the heavy plate bogies which gives it the same impression of size and weight as the real locomotives. After all, they were quite large beasts weighting in around 135 tons!

The test model is finished in heritage BR green condition as Class 45/1 No. 45106. It was applied to the full-size locomotive in 1988 along with Tinsley depot plaques. At the start, the numerals 106 were applied to the bonnet front at both ends until the autumn of 1988. It looked as if it would become Tinsley's celebrity locomotive and initially earned its keep on tour and service trains as well as being a regular at depot events until a fire saw it condemned in 1992. The heritage green livery has been researched properly and applied reasonably well with sharp printing and smooth paint finishes observed on the whole.

When first placed on a layout for intensive testing, the model ran superbly from the start. It also demonstrated excellent track holding capabilities.

Despite the large bogies, it ran through ten-inch radius curves without difficulty. It could pull too and managed quite long trains.

Excellent layout performance combined with its good proportions and fine detailing, especially the bodyside grilles, has given this model its well-deserved good reputation, particularly given its competitive price of £144.95 for a DCC-ready model.









↑ In 2025, Drax power station in Yorkshire celebrated its 50th anniversary. A GB Railfreight Class 66 was painted in a special gold livery to mark the event. Hornby has produced the Drax gold locomotive in 'OO' gauge along with a single biomass wagon painted in the same livery.

DRAX GOLD CLASS 66 FEATURES

- 2025 to present.
- Single drive bogie with two powered axles.
- Powered wheels fitted with traction tyres.
- Replacement buffer beam sections.
- Brake pipe detailing.
- Metal nameplates.
- 21-pin DCC interface.
- NEM coupling pockets fitted to the bogies.
- Flush cab glazing fitted.
- Separate moulding for buffers and other details.
- Price for the locomotive: £94.99.
- Price for the biomass wagon: £44.99.

Drax gold

THE HUGE DRAX power station in Yorkshire celebrated its 50th anniversary in December 2024 and to commemorate the occasion, GB Railfreight painted one of its Class 66s, No. 66301, in a gold livery scheme. It carries the name *Drax Power Station 50* and the Drax 50 logo in addition to a striking gold finish.

This has been reproduced by Hornby on its 'Railroad' range model which is released in various liveries from time to time. The model is at the budget end of the Hornby range, being priced at £94.99 for the DCC-ready model. No HM7000 TXS sound version was offered, although the decoders are available separately.

Hornby's Class 66 is the ideal entry-level model originating from the old Lima range which was upgraded with a new drive, additional current pick-ups and refinement of some detail. Internally, a single drive bogie and 21-pin DCC interface socket are fitted, although it lacks running lights. It offers a great deal of modelling potential for those on a limited budget and HM7000 TXS sound is available for the model.

The single power bogie has wheels fitted with traction tyres to assist with haulage. Generally speaking, the Class 66 model performs well and has reasonable haulage capacity although a full set of Hornby's biomass wagons might challenge it!





Detailing packs are included in the box such as complete buffer beam sections for fitting to the bogies when the couplings are not required – usually a favourite job for those modellers intending to use the supplied brake pipe detail. Metal nameplates are also supplied in the box.

One of the large wagons, used to deliver biomass fuel to Drax was also painted in the same livery. Only one wagon, No. 83700698001-0, was painted making it one for enthusiasts to look out for. It was reproduced by Hornby and was expected to sell out fast.





↑ The second run of the museum quality Cavalex Models Class 56 covers a lot of ground using the extensive suite of tooling developed for this model. Era- and locomotive-specific detailing comes as standard on each model including BR Trainload Coal No. 56134.

Cavalex Models 'Grid' returns

FIRST RELEASED in 2024, the Class 56 'Grid' was the first locomotive model to be produced by Cavalex Models and what a beauty it is too. A great deal of care went into the design to achieve a high level of fidelity to the prototype supported with exquisite detailing and without making it too complex.

The second run covers a new set of locomotives in a range of liveries from original BR blue as applied when first released through to Railfreight, Trainload Freight and privatisation schemes. Each model has detail to match its identity, build features and livery, including revisions made to locomotives when in late life condition.

Within the crisply detailed bodyshell is a five-pole motor driving two axles in each bogie. The middle axle is floating to allow the bogies to gain maximum traction on uneven track.

Technical features, of which there are many, include independently controlled radiator fans powered by their own coreless motors. Advanced running light operation backed by an onboard power bank provides a realistic level of control when operated on DCC power. The circuitry allows a range of running light effects to be used including separated control of the headlights and forward marker lights for mainline, yard operation and light engine operation. This takes advantage of the installed 21-pin MTC decoder connection and advanced decoders such as the ESU Lokpilot 5 which have sufficient function outputs to control all of the onboard features.

When a sound version is operated, sensors detect when the model is entering curves and activate flange squeal sounds, a feature which may also be triggered manually too if desired.

The Cavalex Models Class 56 achieved five-star status based on its specification and performance measured against its price point of £189.95 for a DCC-ready version. It is an extremely good value for money model which delivers all that was promised by the manufacturer during its development. The reality is that its features and attributes are so extensive, to list them all in a review is not easy to do.

The key ones are its superb running qualities, high level of technical specification, excellent quality of assembly where individual parts are well seated and do not have those remnants of sprue seen on other models.

CLASS 56 FEATURES

- 1976 to present.
- Locomotive and era specific detail applied to each model.
- Four axles out of six powered(A1A-A1A).
- Centre axle unpowered in both bogies.
- Five-pole motor with twin flywheels.
- All-wheel stub axle current collection.
- Comprehensive running lights.
- Subtle lighting and colour appropriate to each model.
- Independently powered cooling fans.
- Etched metal grilles and small details.
- NEM coupling pockets.
- 21-pin MTC DCC interface.
- Stay-alive power bank.
- Removable decoder bay panel in roof.
- Price: £189.95 - £289.95.









The striking DB Cargo livery sits well on the Hornby Class 67 which was reissued in March 2026. The model is a useful one for modellers interested in Transport for Wales locomotive-hauled services which use Mk.4 stock and driving van trailers.

DB Class 67 from Hornby

HORNBY REISSUED its Class 67 in up-to-date DB Cargo livery in 2026 as No. 67015, finished in pristine condition. No. 67015 is regularly used on Transport for Wales (TfW) passenger services in this condition, working with TfW Mk.4 coaches which have been produced by Hornby in the past.

It is an older model in the Hornby range, but has many features demanded of high-end models including all-wheel drive, running lights and DCC sound compatibility. Class 67 sound files are available for the TXS sound decoder range.

A small accessory pack is supplied with the models which contains brake pipes and ETH fittings to detail the buffer beam. The lower section of the buffer beam plate is a separate moulding which clips neatly onto the chassis when the NEM coupling pockets are not used.



DBC CLASS 67 FEATURES

- 2018 to present.
- Finished in DB Cargo red.
- Die cast chassis with frame mounted motor.
- Etched radiator grilles.
- All wheel drive in both bogies.
- Correct body tooling including the fluted sides.
- Flush glazing.
- Etched metal roof grilles.
- Working head and taillights.
- 21-pin DCC socket.
- Digital sound speaker chamber.
- NEM coupling pockets fitted to frame-mounted coupling cams.
- Price: £214.99.

On test, smooth performance was observed throughout the speed range, the model being tested straight from the box. The model weighs 630g which means it does not need traction tyres and can manage quite long trains. It is fitted with a 21-pin DCC interface socket and can accommodate the Hornby TXS decoder along with a speaker.

The paint finish has good colour tones and sharp printed legends and logos. The body can be a little awkward to remove on these models and a set of glue spreaders will unclip the body without the risk of damaging it.



Two more 'Salmon' wagons are added to the Hornby range, both of which offer more options for modellers. The nearest model is fitted with rail cranes which are brand new toolings. The wagon deck has also been modified to accept separately tooled safety rail stanchions.

Hornby 'Salmon' wagons surface

HORNBY DOES NOT produce as many wagons as it does coaches, so a new or partially new wagon model from the company is always an event worthy of note. Hornby released its brand new model in 2025 and has followed up with a second run of two different models.

The 'Salmon' track panel wagon dates back to LMS days and the modelled BR versions are based on that design. As each batch was constructed by BR, changes were made to the bogies and other features. Further, 'Salmon' were modernised with air brakes in the 1980s along with rail cranes and canopies.

The second run of the model includes a BR YMO version with bolsters for carrying rail. It is finished in BR bauxite livery and carries the number DB996184.

The second model is a modernised version with airbrakes and hand operated rail cranes, the first time this feature has been modelled, requiring some new tooling work. It is numbered as DB996995 and coded under the BR TOPS system as a YFB.

Construction of both models is around a cast metal underframe which gives the models good weight for reliable running. Both models are supplied with bolsters and stanchions as separate fittings for the modeller to fit. The Hornby 'Salmon' wagon is a popular model and this is shown by the sell-out of the crane fitted version at the time of writing.

'SALMON' WAGON FEATURES

- 1949 - 2006.
- Numerous detail variations between models.
- Both plate bogie and LMS bogies modelled.
- Close coupling cams.
- NEM coupling pockets.
- Separate underframe trussing detail.
- Removable stanchions.
- Metal sub-frame for weight.
- Price: £46.99 - £49.99.





↑ Hornby has produced the LNER The Coronation 'beaver tail' coach in 'OO' gauge and it is a premium standard model supplied with a specially decorated box.

LNER 'BEAVER TAIL' FEATURES

- Operated from 1937 to 1939 and in preservation.
- Finished in the condition of preserved No. 1729.
- Working taillights and interior lighting.
- Sub axle current collection.
- Flush glazed throughout.
- Modelled with individual armchairs.
- Upholstery colours applied to the armchairs.
- Silver detail applied with foil.
- Sprung metal buffers.
- Close coupling cams and NEM pockets.
- Price: £81.99.

LNER 'beaver tail' in 'OO'

ONLY TWO 'BEAVER TAIL' observation coaches were built by the LNER for *The Coronation*, a premier train service between Kings Cross and Edinburgh Waverley introduced in 1937. The idea behind the saloon's shape was to match the streamlined profile of the A4 Pacific locomotives which were painted garter blue with red wheels to match.

The latest model, which was announced as part of the Hornby 2026 catalogue along with stock for the LNER *West Riding Limited*, brings back the glory days of steam to 'OO' gauge. The model is finished in the special blue livery designed for the service with the same garter blue applied to the lower panels as applied to the A4 locomotives that hauled the train. Marlborough blue applied to the upper panelling made for a quite a classy livery.

Both saloons survived storage during WW2 and operation on the Scottish Region with BR, although the saloons were modified to improve the view from the observation end. One of the saloons, No. 1729, has been restored to its original condition and is currently part of the One:One collection. It is in this form that the model is presented.



Hornby has done a superb job of both the livery and detailing of the model which is fitted with internal illumination. Clearly visible through the flush glazing are armchairs which have coloured upholstery effects. Also visible are some wood panelling effects too.

Current for the lighting circuits is collected through stub axles which run in metal bearings in the bogie side frames. It is a low friction current collection system that is generally more reliable and quieter than conventional wiper pick-ups. The power supply is supported with a stay-alive power pack to prevent light flicker.

Hornby's *Coronation* 'beaver tail' saloons are well priced for the specification and level of detail. The paint finish is as striking as the real trains, with excellent colour density and silver trim which is applied with foil (avoid excessive handling). It should be noted that 'beaver tail' saloons did not operate with the stock build for the *West Riding Limited* which is featured on the next page, even though the livery is the same as that used on *The Coronation*.



↑ Four articulated twin packs of stock specially built for the LNER *West Riding Limited* Kings Cross-Leeds-Bradford service are modelled by Hornby to a very high standard.

LNER *WEST RIDING LIMITED* FEATURES

- From 1937 to the BR era.
- Matches Hornby's LNER A4 Pacific locomotive models.
- Working interior LED lighting.
- Sub axle current collection.
- Stay alive power packs fitted.
- Flush glazed throughout.
- Modelled with interior seating and tables.
- Alternative gangway parts supplied in the box.
- Sprung metal buffers.
- Close coupling cams and NEM pockets.
- Price: £149.99.

LNER *West Riding Limited*

TODAY, the *West Riding Limited* still operates on the East Coast Main Line, running between Bradford Forster Square, Leeds and London Kings Cross, but 'Azumas' are not quite the same as the classy train introduced by the LNER in 1937. It was one of the iconic named trains of the LNER operated with specially constructed stock finished in garter blue and Marlborough blue livery. The stock was almost identical to that used in *The Coronation* train sets except there was no observation saloon and some differences in the interior fittings. Each train consisted of four twin articulated coaches which had two kitchen cars and could seat 48 First Class and 168 Third Class passengers.

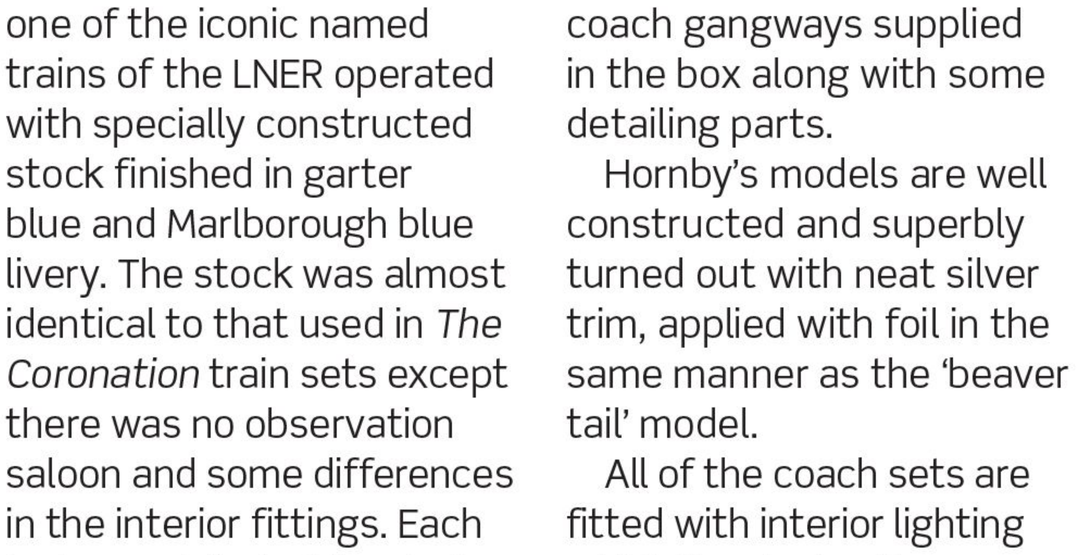
Hornby has produced a set of eight cars in four twin packs finished in the same livery as *The Coronation* except the stock is branded *West Riding Limited*. The packs consist of double Open First set; Open Third and Kitchen Third set; Open Third and Brake Third set and finally a Brake Third and Kitchen Third set. The sets are all articulated with alternative parts for the coach gangways supplied in the box along with some detailing parts.

Hornby's models are well constructed and superbly turned out with neat silver trim, applied with foil in the same manner as the 'beaver tail' model.

All of the coach sets are fitted with interior lighting which illuminates the detailed interiors. The LEDs emit a warm colour resulting in a soft level of lighting. The stock is fitted with stay-alive power packs which keep the LEDs lit for about five seconds, sufficient to prevent light flicker.

Current collection is through stub axle contacts instead of wiper pick-ups. Consequently, the articulated sets are free rolling. Pick-ups are only fitted to the outer bogies of each set, making the power packs important.

Each twin set is price at £149.99 and supplied in themed boxes appropriate to the named train.







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New wagons in the yard

THE bread and butter of rail operations (in complete contrast to the glory of LNER's named trains) are freight wagons and engineering equipment. An exciting re-release is the highly detailed EFE Rail 'OO' gauge Plasser and Theurer 12t crane (YOB) in BR yellow and Balfour Beatty liveries. The first run was almost a complete sell out within weeks of release, with only the Javis/Fastine model remaining in stock with retailers.

New Railfreight era air braked wagon arrivals include the Cavalex Models JXA bogie scrap wagons and PXA steel carriers produced in conjunction with Rails of Sheffield.

Modern container trains can be strengthened with another new set of models from C-Rail Intermodal in the form of Railfreight/Freightliner FSA/FTA wagons. They were introduced in 1991 and are still in operation today.



Not quite a wagon as such, but the EFE Rail 'OO' gauge Plasser and Theurer YOB 12t crane is an unpowered model which means it can only be moved by a shunter or within a train. The full-size cranes usually only moved under their own power in yards or work sites. The model is included in the second run and is priced at £99.95.



Co-Steel JXA bogie scrap wagons (1995-2007) arrived from Cavalex Models to the delight of privatisation era modellers. The wagons are a joint venture with Rails of Sheffield and prices start at £49.95 for a single wagon. Double and triple packs are also available.



The Cavalex Models PXA steel coil carriers have also made an appearance (operated between 1986 and 2004). They too are a joint venture with Rails of Sheffield, being offered in twin and triple wagon packs with prices starting at £99.95.

MANUFACTURER WEBSITES

Accurascale and IRM: **www.accurascale.com**
Bachmann, Graham Farish and EFE Rail: **www.bachmann.co.uk**
Cavalex Models: **www.cavalexmodels.com**
Clark Railworks: **clarkrailworks.com**
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Rapido trains UK: **rapidotrains.co.uk**
Realtrack Models: **www.realtrackmodels.co.uk**
Revolution Trains: **revolutiontrains.com**



↑ Graham Farish has neatly hidden a weight under the hopper floor of the 'N' gauge NER 20t hopper wagons. Note the black National Coal Board internal user wagon. The models are priced at £29.95 each.



↑ MHA wagons are a development of the MGR wagon produced in 'TT:120' by Hornby. It uses the same underframe in the same manner as the real world wagons which were built on the frames of redundant MGR hopper wagons. The wagons are offered as single and triple packs priced at £27.99 and £80.99 respectively.



↑ A lovely triple pack of three seven-plank wagons which would have been used for coal transport. The wagons portrayed by the models are typical of freight stock from the steam era. The liveries are well researched and applied to the models. The pack of three wagons is priced at £69.99.



← The wagon round up is completed with this set of delicately modelled private owner 12t tank wagons with Royal Daylight markings. The underframes are quite fine in appearance and moulded detail in the tank barrels is well defined. In common with all of the wagon triple packs, the wagons have individual numbers and all of the Hornby 'TT:120' models are fitted with NEM pockets and close coupling cams.



↑ New 'N' gauge models of a BR Railfreight and Freightliner container wagon have been released by C-Rail Intermodal. The FSA and FTA are outer and inner wagons which are operated in sets as required. The models are priced at £60 for a two-wagon set and £120 for four.



↑ Another spin-off from the Hornby 'TT:120' MGR hopper wagons is the CDA china clay wagon which has been produced with original ECC markings and blue cradles. They too are offered as a single wagon (£27.99) and a triple pack (£80.99).

At the opposite end of the spectrum are the Graham Farish NER 20t hopper wagons, many of which saw use as internal user wagons at collieries in the north east until the 1980s.

Hornby has also produced more rollingstock for its growing legion of 'TT:120' fans including steam era stock and modern wagons. The MHA ballast/spoil wagons will go well with the Class 66 model and CDA china clay wagons will suit Cornish clay workings from the late 1980s onwards.

Model more railway, trains and scenery with 'N' gauge

'N' gauge has come of age in the last two decades and is attracting more modellers than ever before. How does one make a start in the smallest mainstream scale?



Welcome to the world of 'N' gauge railway modelling, a scale that delivers a number of benefits including the modelling of mainline railways with scale length trains in manageable spaces. The quality and accuracy of models has advanced significantly in the last two decades as demonstrated by the Graham Farish Class 350 EMUs seen in this view of the editor's West Midlands themed layout.

WHEN LOOKING AT SOME of the new models being produced by mainstream manufacturers, who could fail to be attracted to 'N' gauge as it is in 2026? It is growing in popularity, particularly amongst newcomers to railway modelling with no preconceived ideas about the scale. Quality improvements have encouraged experienced modellers to move from 4mm scale to take advantage of the potential to model more extensive railway systems and scale length trains. One can get many times more railway into an 'N' gauge space. Alternatively, smaller and physically more manageable layouts can be built offering as much operating fun as larger scale layouts.

This was explored by your editor in the construction of two 'N' gauge layouts a number of years ago. One is a continuous run layout with double track main line which has been used in this



↑ Two GWR 'auto coach' models, both produced by Bachmann, show the relative sizes of 'N' gauge and 'OO' gauge. Not only is the length and width of the models a consideration, but the relative volumes too!

article to showcase some of the high fidelity 'N' gauge models available today whilst the other, featured elsewhere in this issue, is a 'micro' shunting layout with a scenic area measuring 40 inches by 23 inches. They were built to test the potential of new and better 'N' gauge models emerging from various manufacturers including Dapol, Bachmann (Graham Farish) and most recently, Revolution Trains together with Rapido Trains UK. Both layouts quickly demonstrated that 'N' gauge has come of age and has caught up with its larger scale counterparts in terms of quality, accuracy and fun.

What is 'N' gauge?

Like many things in British outline modelling, 'N' gauge is an accepted working compromise between scale and track gauge. The models are built to a scale ratio of 1:148 and are designed to run on 9mm gauge track, an historical compromise to take advantage of existing track systems, a situation repeated with 'N' scale models in other countries where slight variation in the scale to ratio exists.

European and US outline 'N' scale models are made to a scale ratio of 1:160, to run on standard 9mm track gauge.

The reason for larger 1:148 scale bodies used in British commercial 'N' gauge is an historical throwback caused by manufacturers wanting to use existing motors and drives in British outline models for commercial reasons. However, the smaller British loading gauge, when scaled down to 1:160 scale, produced models too physically small to use available motors at the time. To fit the drives in, a slightly larger scale and therefore models was adopted.

Today, tiny but powerful coreless motors are commonplace in the hobby, allowing small locomotives to be modelled in 'N' gauge including tiny tank engines and shunters. Despite advances in micro-electronics and motors, commercial constraints mean that the 1:148 scale to 9mm track gauge compromise remains to this day. That said, the more extreme adjustments, including over-scale body shells which were common when British 'N' gauge became mainstream in the 1970s are a thing of the past.

Readily available and low cost 9mm gauge track systems are another factor. Understandably, there is little desire by mainstream manufacturers to correct the gauge compromise because scale 'N' gauge 9.42mm gauge track is not currently available off-the-shelf, only being produced as kits by specialist suppliers. It is unlikely that any mainstream manufacturer will invest development money in producing such a track system and to instigate a change at this stage will both discourage modellers and introduce a transition period which might prove costly and difficult to manage. The current interchangeability between products would be lost, at least for a while.



↑ Today, almost the same level of detail can be found on 'N' gauge models as one would expect to see on their larger counterparts. The 'autoballaster' wagons are by Bachmann.



↑ Small locomotives were not that common in 'N' gauge at one time. The advent of tiny powerful motors has brought 0-4-0 and 0-6-0 locomotives to the scale. A fine example is the Dapol 'Terrier' locomotive.

Why model in 'N' gauge?

The biggest benefit of 'N' gauge modelling is space. One can have more railway in a given space or can have a decent operating layout in a smaller space than would be possible with larger scales. For all modellers, both newcomers and experienced, space may be the biggest barrier to modelling something they have observed in real life, particularly modern operations. 'N' gauge eases many of the issues with space assuming that the limitations of the scale are acceptable.

It is possible to create the impression of a railway in the landscape much more effectively, or alternatively, look to its smaller size to achieve a serious operating railway within the narrow shelf layout concept or compact design without loss of operating potential.

1:160 scale models ('N' scale)

European and US prototypes have a larger loading gauge making motor size less of an issue, hence being modelled to 1:160 scale (also called 'N' scale) which is a better fit to 9mm gauge track. The difference in scale is one reason why you should be wary of buying 'N' scale models which, while they appear to be correct, are too small to fit the larger scale British 'N' gauge standards (unless modified to suit). For example, modellers wanting to load intermodal trains found that the beautiful 'N' scale containers by Deluxe Innovations, a US based manufacturer, are slightly too small to fit British outline wagons. That slight difference in 1:148 and 1:160 scale is significant and should always be taken into consideration when buying items that are absolute in size such as containers, rolling stock and so on.

The scale difference is not so critical for lineside details such as structures, figures, road vehicles and scenery products. Many modellers exploit European and American 1:160 scale ranges to detail their layouts.

2mm to the foot scale

There are modellers who are not satisfied with the compromise of operating 1:148 scale models on 9mm gauge track, preferring to use track gauged at 9.42mm which equates to 2mm to the foot scale. 2mm to the foot works out at 1:152 scale ('2mmFS' or '2FS') making it a closer-to-scale standard than commercial 'N' gauge.

Modellers working in 2mm scale are specialists in their field, often very experienced and supported by the 2mm Scale Association (**www.2mm.org.uk**), a dedicated organisation that promotes the scale which is a very close fit to commercial 1:148 scale models. The association offers help and support to those interested in 2mm scale modelling and also designs and sells products to assist with converting commercial models including track components for 9.42mm gauge and wheels to suit. More work is needed to achieve a working layout in 2mm scale than is necessary for 'N' gauge.

Scale limitations

All railway modelling is a compromise, whether it's a limit to train length, distances between stations, how sharp track curves are and the same with respect to turnouts. 'N' gauge has past limitations which are now largely overcome with considerably better quality models. Nonetheless, do not expect to find that the models move and roll with the same feel as models in larger scales.

There is less room in 'N' gauge locomotives for the same technical features found in 4mm and 7mm scale models, although miniaturisation of electronics now sees models routinely fitted with DCC digital sound. The development of the NEXT18 decoder interface has added more DCC functionality such as realistic running lights.

Shunting operations did not play to the strengths of the scale in the past until wheel standards were upgraded and NEM coupling pockets adopted. The latter offers the chance to replace the obsolete 'Rapido' coupling with better designs, although this remains an area in the scale which needs innovation to better match the improved quality of models (the 'Rapido' system was introduced by Arnold with the first commercially available 'N' gauge models over 50 years' ago).

Limitations are no reason why a particular scale and gauge should not be adopted. Look to the strengths of 'N' gauge when considering it as a choice for a layout. Longer trains can be run for a given layout size and experiments have shown that even large locomotives can traverse quite sharp curves, down to 10-inch radius without loss of performance, helping layout builders achieve more with a given space.

What's available: locomotives and rollingstock

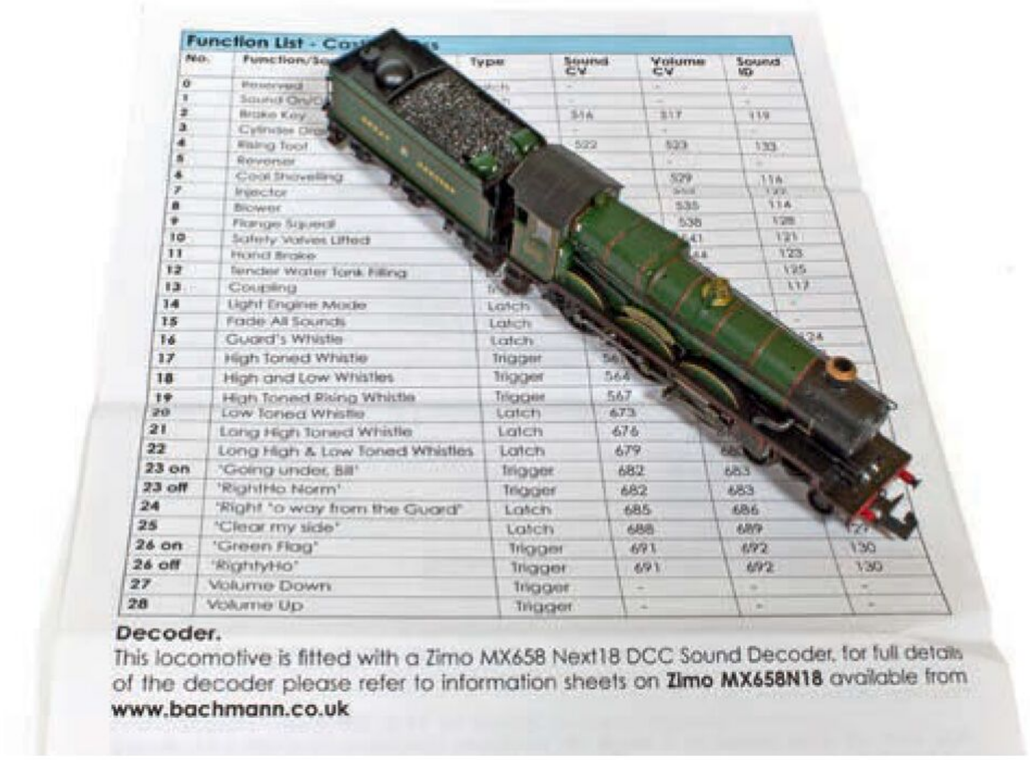
Virtually any railway era from the Big Four companies to modern day operations in almost every corner of Britain can be modelled in 'N' gauge with few gaps thanks to the fairly aggressive development programmes of both Bachmann and Dapol, the two main manufacturers in the UK.

Both Dapol and Bachmann, with its Graham Farish and EFE Rail ranges, are long-established names in the business. The Graham Farish range is perhaps the most comprehensive. The brand was acquired by Bachmann Europe Plc. when it was an independent company operating from a small factory in Poole, Dorset. Since then, there has been a programme to redevelop much of the former Graham Farish catalogue with better drives, wheels, electronics and hi-fidelity body shells featuring much improved levels of detail. In 2026, the transition between models produced by the independent Graham Farish company and the new generation of Bachmann Graham Farish models has been largely completed, with the company concentrating on upgrading its range with new electronics and digital sound options.

Dapol has started to rework some of its first 'N' gauge models such as the popular Class 56 and Class 66 diesel-electric locomotives to bring them up to the standard of newer models such as the lovely



From tiny tank engine to the mightiest of main line steam locomotives, there is a wide choice of equipment available to cover most themes from the Big Four companies to present day operations. This contemporary model of GWR Castle Class locomotive No. 5029 *Nunney Castle* is by Graham Farish.



Factory installed digital sound is fitted to 'N' gauge models and decoders with 28 sound functions is the norm. All squeezed into models not much larger than a chipolata sausage.



The GWR Castle Class models take advantage of space in the tender to fit in a speaker and NEXT18 decoder interface. In this case, the decoder is a Zimo MX658N18.



One of the main areas of improvement in diesel and electric locomotive models is in electronics which have become miniaturised. The advent of the 18-pole NEXT18 decoder sockets and matching decoders with six or more function outputs has allowed the development of more advanced lighting effects including cab lights, marker lights and through-wired speakers for digital sound.



Advances in the quality of models extends to steam locomotive classes. The valve gear and mechanisms are vastly improved, producing smooth running models which are as refined as those in 'OO' gauge.



The wheels on the front bogie of steam locomotives are sometimes smaller than scale to allow operation through typical 'N' gauge track curves and turnouts. A spare bogie with correctly-sized wheels is frequently included with some models for display purposes.

Class 68. It continues to reissue models such as its tiny 'Terrier' 0-6-0T locomotive from time to time.

In the last decade, there have been new entrants in British outline 'N' gauge. In 2014, Revolution Trains appeared with a new model of the Class 390 'Pendolino' high speed EMU currently operated on the West Coast Main Line. Since the release of the Class 390, the company has completed a number of rollingstock projects along with locomotives, the most notable being the Class 92 electric locomotive. Its choice of rollingstock has been designed to fill in important gaps in modern



↑ The relative size difference between 1:160 scale as seen on BNSF No. 722 and the 1:148 scale Dapol Class 66 (original model) which is actually not as tall.



↑ A comparison between 2mm scale wheel sets fitted to the Class 31 bogie (nearest the camera) and the original 9mm gauge wheels supplied with the Graham Farish model.



↑ Two Graham Farish Class 37s sit side by side, but are they the same? The nearest one is an older 'Poole' designed model which has less refined detailing and has a basic split-frame chassis. It has no lighting, no decoder socket and is hard to convert for DCC control. The one on the right is the current model as of 2025 and is more refined. Take care not to buy what appear to be bargain used Graham Farish models. They may be of an older design similar to the one on the left.



↑ 'N' gauge modelling is not restricted to buying off-the-shelf models and just running them. Kits and conversions are available including self-adhesive vinyl overlays produced by small scale producers to change rollingstock liveries or to convert commercial models into different vehicle types. They are often found on Ebay and other online marketplaces.



↑ 2mm fine scale modelling is a specialist area where modellers strive to achieve a closer match between the track gauge (9.42mm) and the scale of the models. It involves a change in the wheels supplied with commercial 'N' gauge models which are designed to run on 9mm gauge track. This view shows a Graham Farish Class 31 fitted with wheels produced for the 2mm Scale Association.



↑ A completed BR Railway Technical Centre test train set which was converted with vinyl overlays and finished with selective painting and weathering. The rollingstock in this train is not available commercially off-the-shelf, hence undertaking the conversion.

freight stock and it has produced coaching stock too.

Rapido Trains UK (**rapidotrains.co.uk**) has not played such a central role in 'N' gauge, but has offered some Pre-Grouping South Eastern and Chatham Railway and GWR wagons in the scale along with models of the BR 'Conflat P' and one of the first modern BR air braked wagons, the OpenAB or OAA.

Its first diesel-electric locomotive was the Class 28 Co-Bo which has since been followed up with the Class 44, 45 and 46 'Peak' locomotives which have received much acclaim.

In a more specialised position is C-Rail Intermodal (**shop.c-rail-intermodal.co.uk**) which offers a small number of ready to run wagons from time to time and a comprehensive collection of intermodal



The colourful TransPennine Express Class 350 EMU in this picture is a Graham Farish model reliveried with Electra Rail Graphics overlays. It contrasts with the unmodified Class 350 model posed alongside it.

containers in 1:148 scale and 1:160 scale. Kits and transfers are also available. Whilst on the subject, it is worth noting that kits are available to produce various items of rollingstock from numerous eras, many of which are managed by the N Gauge Society which also offers a limited number of ready to run models as a member benefit (**ngaugesociety.org**).

Peco track

Peco is an important name in the hobby, a company that manufactures commercial track systems covering the popular scales together with accessories and lineside scenery products. It offers two universal track systems for 'N' gauge modellers: Code 80 standard track including turnouts and crossings together with its newer Code 55 system, both featuring flat bottom rail with wooden and concrete type sleepers.

The code number refers to the height of the rail. Code 80 rail (80-thou) about 2mm tall which is quite bulky for the scale. Code 55 rail (55-thou) is about 1.4mm tall which gives it



Peco Code 55 track was used in the layout being used to showcase various 'N' gauge models. The turnouts and crossing are readily available, but now in a form called 'Unifrog'. The plain track is flexible track which is cut to length to fit given locations.



A comparison between Peco Streamline 'N' gauge code 55 track suitable for British outline and 'N' scale code 55 track by Atlas as used for US-outline modelling. The sleepers of the latter are closer together reflecting US practice and other features of US base track are also different to those in the UK.

a finer appearance and is often the preferred choice of most 'N' gauge modellers. All current 'N' gauge models will run on the code 55 track system comfortably. Older models with deep flange wheels are less likely to be compatible with Code 55 track.

www.peco-uk.com

Kato 'Unitrack'

Mention should be made of Kato 'Unitrack' set track which is an integral track and ballast system where each piece has a moulded base with a simulated ballast shoulder. It is tough enough to withstand repeated set up and dismantling, making it suitable for temporary layouts which can be set up on a table or floor for a few hours of operation and then put away when the fun is over.

Kato Unitrak is from Japan where it is popular for that very reason. Apartment living dominates the crowded population centres of Japan and there may be little or no space for a layout as we know them. Laying out a temporary layout for an evening or weekend is the solution and a tough track system like 'Unitrack' is ideally suited for the job.



There are several main manufacturers of 'N' gauge models including Bachmann with its Graham Farish range, Dapol and Revolution Trains. There are smaller and specialised suppliers and one is the N Gauge Society which has a range of comprehensive kits and other products available to its members. It commissions ready to run models too, including this refined Hunslet 0-6-0 industrial diesel shunter.

British Finescale track products

Whilst new modellers may not wish to dip their toes in the finescale waters at the start, it is worth noting for experienced modellers of other scales wanting to try 'N' gauge that a finer track system is available, one that has flexible plain track products as well as turnouts.

The Finetrax track system utilised Code 40 rail and all the track pieces, including turnouts have to be assembled from kits. This makes them quite advanced, even though common crossing pieces and point blades are pre-made ready for use.

2mm finescale track is also produced under



The quality of British commercial 'N' gauge has reached a stage that not only are the trains more accurate, they run far better too. This Dapol HST formation only needs one motorised power car, even when the non-motorised power car model is leading.



↑ Numerous kits for rollingstock and lineside features are readily available or produced by the specialist societies. Kit building rollingstock is perfectly feasible in 'N' gauge including quite sophisticated prototypes like the Scottish Malt Distillers Limited bulk grain hopper wagons which are built from plastic mouldings and fitted out with metal detailing parts.



↑ The completed bulk grain hoppers painted and weathered to represent their use in lime traffic.



There is a comprehensive variety of wagons and parts available for modelling all eras from the 'Big Four' companies. The diesel and Electric era has benefitted as much as any, with excellent coverage of classes and rollingstock types. Containers are produced by C-Rail Intermodal for 1:148 scales along with kits and transfers.

The Class 90 electric locomotives seen in this picture are by Bachmann and are relatively new models with lighting, NEXT 18 decoder sockets and are also produced with digital sound.

the Finetrax label but unfortunately is only available through the 2mm Scale Association, which restricts its availability and therefore the chance that a modeller might want to give '2FS' gauge a try.

www.britishfinescale.com

What's available: accessories, kits and scenery

It is possible to find useful products from more specialised companies that produce products for 'N' gauge modellers including Ratio Scale Models (Peco) and the useful Peco Lineside kits for platforms and structures. The advent of resin 3D printing has seen a rise in the number of parts and scratch building aids commercially available from numerous small, specialist suppliers, many of whom only sell their products on online marketplaces.

Building kits and accessories are produced by Scale Model Scenery (and others) using laser-cut wood, vinyl and printed papers (**www.scalemodelscenery.co.uk**).

West Hill Wagon Works has a range of lineside details, alternative



This layout is only 260cm in length and 90cm wide, but shows that a mainline scene can be convincingly modelled in a small area. The Class 56 locomotive (modelled in mid-1990s condition) is by Dapol and has been produced for a number of years. A new tooled Class 56 model arrived from Dapol in 2026.



Kato not only produces the excellent 'Unitrack' track system but has a very nice model of the Hitachi GWR IET in its catalogue, a five-car set being shown in this photograph. This up-to-date train set (introduced in 2017) is produced to 1:148 scale and is also available in LNER 'Azuma' livery and was due to be released for TransPennine Express, Lumo and Hull Trains liveries in 2026.



↑ **Revolution Trains tackled the modern Class 92 dual voltage electric locomotive in 'N' gauge, releasing a range of models in numerous liveries including this early 1990s version. The model has fully working lights and a NEXT18 decoder socket. Class 92s were introduced between 1993 and 1996. The nearby blue KFA container wagons are also by Revolution Trains. They are loaded with C-Rail Intermodal containers.**



↑ **Models of the Class 320 and Class 321 AC electric EMUs were released by Revolution Trains in 2022. The models are sophisticated and have fully detailed interiors and lighting. The trains were introduced between 1988 and 1990, and Class 320 EMUs remain in squadron service with ScotRail in 2026.**

couplings and some rollingstock parts (**westhillwagonworks.co.uk**).

In short, there is tremendous trade support for British 'N' gauge and construction of a layout from micro size to large ambitious designs can be undertaken and with a good degree of accuracy with regard to era, geographic location and railway company.

Making a start

Before investing a great deal of money in the purchase of 'N' gauge equipment, as exciting as that can be, consider buying a trainset or a couple of locomotives and some rolling stock to become familiar with the equipment.



One of the few ‘N’ gauge models produced by Rapido Trains is an early BR air braked wagon, the OpenAB or OAA (built in 1971). The models shown in this picture are finished in 1980s BR Railfreight livery of red and grey.



Large vans are produced in ‘N’ gauge including the Cargowaggon operated ‘Holdall’ vans in the foreground which are a Revolution Trains product.



The technology built into current standard ‘N’ gauge models allows fully illuminated interiors to be a standard fitting along with realistic running lights. The Class 319 EMU in this view is a Graham Farish model released in 2022. The real-world trains were introduced in 1988 and some remained in service in 2026 as bi-mode units.



Another new model released by Bachmann in 2024 is the Class 158 two-car multiple unit. It is an advanced model with full lighting effects, a digital sound option and a high level of detail. The drive is hidden under the floor allowing the interior to be comprehensively modelled.



This quick trot around some of the superb ‘N’ gauge models produced in the last decade or so is concluded with the Rapido Trains UK Class 28 and associated BR ‘Conflat P’ wagons which were released in 2023. Class 28s were short-lived locomotives, being introduced in 1958 and lasting just ten years.

If you decide it is not for you, the outlay is relatively small and part of it can be recovered too. It is useful to become accustomed to the scale, see how things are constructed, how well they run and to experiment with flexible track and sharp curves to see if your ideas for a layout will actually work.

This is part and parcel of layout concept and design (as well as venturing into a new scale). It is advantageous to see the limitations and benefits of the scale for yourself, to determine what is and is not possible on a layout. From this a modeller can draw up a list of givens and desired features for the project layout. The givens are determined by the space available to construct the layout together with the performance of the models on features such as sharp curves.

The scale can open up a wide range of possible projects, including main line themes that can be built on a layout that will fit a spare bedroom and could be made to be portable and easily stored. When doing research into the hobby, give ‘N’ gauge serious consideration!

Build a compact shunting layout in ‘N’ gauge

In our guide to modelling in ‘N’ gauge, the methods used to build this compact Cornish china clay themed layout are described in detail. They can be used to create a layout of any era.



China clay country is the inspiration for this compact small ‘N’ gauge shunting layout which was designed for both detail and operation. Its small footprint makes it perfect for the smaller home and it will be fun to exhibit too.

The layout concept

THE OBJECTIVE OF this layout project was to create a compact shunting layout in 1:148 scale ‘N’ gauge using Cornish china clay operations as inspiration. With the advent of high-quality locomotive models and accurate rollingstock, compact ‘N’ gauge layouts are more fun to build and operate in this smaller scale than ever before. Locomotives now run so well that one can operate trains at slow speeds and shunt wagons with accuracy.

Layout objectives

Compact or micro shunting layouts in ‘N’ gauge were not common in the past and the primary reason was poor running locomotives and an archaic coupling system. Shunting operations have been hard to replicate well without a great deal of dedication on part of the modeller. Historically, none of this has helped the image of ‘N’ gauge.

Matters have changed significantly in the last two decades which has seen a significant leap in the standards of ‘N’ gauge equipment. Fidelity to the prototype, quality of running and assembly have all advanced in the last ten years to include advanced electronics and onboard digital sound.

With the improvement in standards across the

board, can modern 'N' gauge equipment be used on a shunting layout? This china clay themed layout called 'Wheal Annah' was conceived to test this very point.

Planning

With a theme decided upon (it could just have easily been timber, paper or chemical traffic in the North West or Teesside for example), establishing the layout parameters was the next step. A great deal of research was completed using books, the Internet and personal reference material to come up with some ideas for the layout design.

Creating a plausible theme which fits the compact space and allows a good degree of operation is important if it is to successfully keep two people engaged over a two-day exhibition. It has to be an immersive project where an hour of operating goes quickly. To help achieve this objective, the modelled location needed a variety of traffic and rollingstock. Further, choosing locations with potential for spanning two time eras without structures looking too out of place will expand operations dramatically. Transition periods offer some of the greatest modelling variety.

At first, a theme based loosely on Nanpean Wharf in Cornwall was considered. It is a former GWR goods station and loading wharf with a lot of operating potential. It offered visual interest and a tricky little kick-back track arrangement which could tie an operator up in knots in no time if shunting moves were not carefully thought through. Not one for a relaxing operating session, however.

In the end, the plan evolved around a fictitious location with inspiration from several locations on the Burngullow to Parkandillack line (Newquay and Cornwall Junction Railway) together with the Newquay line (Cornwall Mineral Railway). This is referred to as prototype-freelancing where recognisable scenic elements are brought together to create a (hopefully) believable layout theme.

Parkandillack, with its bulk clay loading shed and bagged clay store will generate lots of rail traffic. Ball clay would travel in covered hoppers such as 'Clay Tigers' and the bagged clay store would be served by vans including European ferry vans and BR vans such as 12t ventilated vans and in the Railfreight era: VAA, VBA and VDA long wheelbase vans.

The attraction of sites such as Carbis Wharf, located on short, little used branches which are barely more than sidings themselves could also be incorporated. The network of short lines which existed in china clay country was considerable and included the lightly used but fascinating Retew Branch which closed for good at the beginning of 1980s. As John Vaughan wrote in his excellent book, The Newquay Branch and its Branches (OPC 1991), the Retew Branch had a significant number of works along its four-mile length. It had gated crossings and sidings radiated from it in all directions. Most importantly for layout designers, distances were short, with compact sites and relatively sharp curves – perfect for compact layouts. Such layouts could be operated with 0-6-0PT steam locomotives and short wheelbase clay wagons.

Choosing a time line for the layout

Close study of numerous references revealed that many locations in china clay country saw little change in the 1970s and early 1980s. Clearly, as time passes, everything changes. However, change may be very gradual in places with track becoming more overgrown, minor changes to buildings and the odd sidings being disconnected from what could be generously described as the main line in china clay country.

An example of such a location which has buildings I particularly like is Parkandillack. I found pictures of the location taken in 1974 which demonstrated that the loading sheds and silos were essentially unchanged when compared to pictures taken in the 1980s and early 1990s. There are places where little modernisation of the railway had been undertaken and many features have survived for years, including bullhead track, short platforms with weeds and decay, manual gates on crossings and overgrown sidings.

To make two eras work well on one layout, one may have to contemplate building two sets of structures to suit each era or chose layout design elements which would serve both time frames. Parkandillack and the Carbis branch provided the inspiration for both eras without the need to build interchangeable structures.

THE LAYOUT DESIGN PARAMETERS

- Theme: Cornish china clay.
- Layout type: Portable for exhibition use with detachable fiddle yard.
- Layout design: Layout to fiddle yard shunting layout.
- Era: BR 1970s using vacuum braked stock together with 1980s Railfreight era.
- Layout size: 48 inches by 23 inches plus fiddle yard (off-scene staging area).
- Main traffic base: Outbound: bagged and ball clay together with clay slurry. Inbound: coal delivery.
- Control: Digital Command Control using a Digitrax Zephyr system.
- Track: Peco Streamline Code 55.
- Baseboards construction: Plywood box frame with 12mm plywood top.
- Point control: Wire-in-tube.
- Structures: modern clay works and an older coal-fired clay drier works.

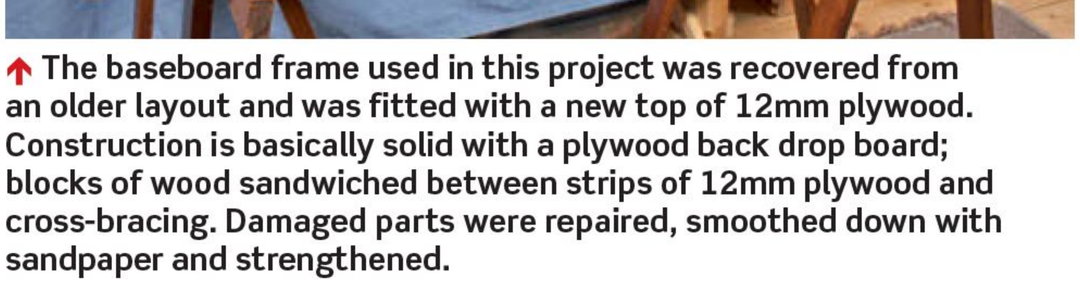
Track planning (on paper)

To keep costs down and simplify matters, planning was done with paper turnout templates together with a selection of rollingstock destined for the layout. One common mistake is to allow insufficient room for turnouts when drawing out track plans making templates a useful tool.

Templates are easily made by photocopying or scanning the turnouts. Templates for the Peco Code 55 track used on the layout may also be downloaded from the Peco website. They can be laid out on a large sheet of



The baseboard frame used in this project was recovered from an older layout and was fitted with a new top of 12mm plywood. Construction is basically solid with a plywood back drop board; blocks of wood sandwiched between strips of 12mm plywood and cross-bracing. Damaged parts were repaired, smoothed down with sandpaper and strengthened.



Planning was done using the old school method with paper, track, templates and examples of the stock to be run on the layout to check the length of shunting necks and loops. 'Tracksetta' is also useful for checking curve radii. Are they likely to be too sharp for reliable operation?



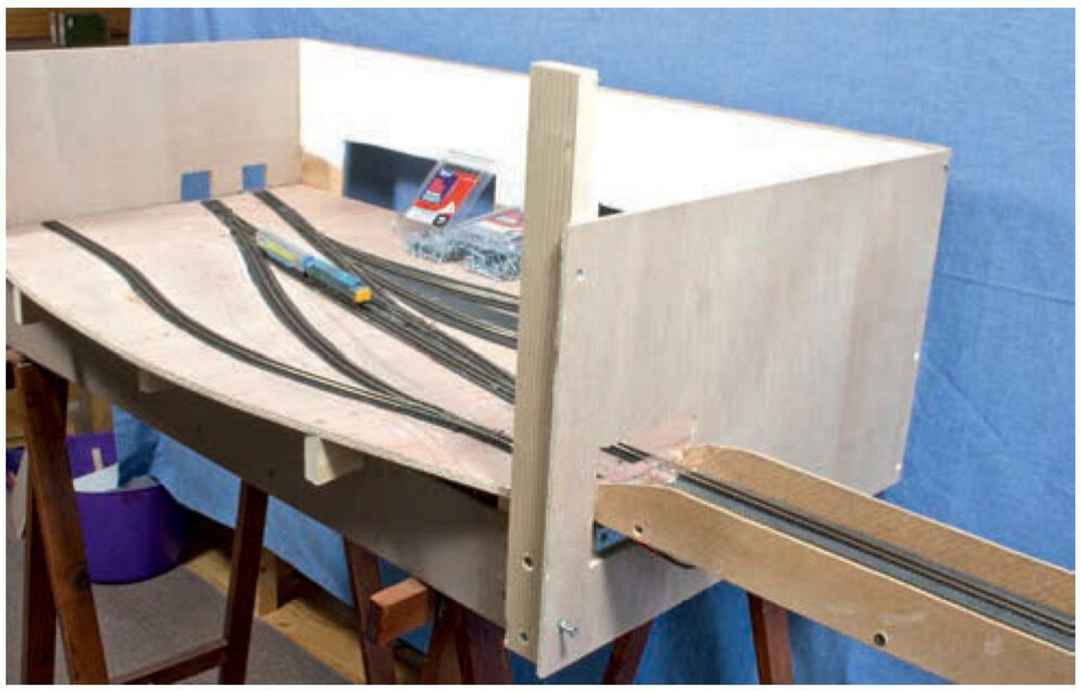
This picture shows good progress on the layout, which is confined to one baseboard, initially with a short fiddle yard. Peco Code 55 track was chosen for its good availability and finer appearance. A Graham Farish MGR wagon stands in for a CDA china clay hopper wagon to determine ideal siding lengths.

paper cut to the size of the baseboards. It is an absolute planning method which provides visual proof of what will and will not fit. Nanpean Wharf was ruled out because paper planning together with simulated operation showed that it would not fit the available recycled board unless sidings were unacceptably short, head shunts and loops too tight and curves ludicrously sharp.

The final layout design included a short run round loop (essential for good shunting operations), a relatively modern works and a branch serving a small clay drier works for short trains, including propelling of trains with brake vans. The design includes lines running off the edge of the baseboard at both ends allowing for future expansion and for off-scene train staging.



The tricky task of transferring the track plan onto the boards is undertaken with double checks for siding and shunting neck length. Next, strips of dense track underlay foam are glued in place. Underlay raises the track above board level and creates a shoulder for ballasting.



A fiddle yard or off-scene train staging area is an important part of the plan. A narrow one was 'borrowed' from another layout to save time and materials, utilising the same attachment method. Making universal layout fittings saves money and storage space.

Controlling build costs

A key objective of the project was to minimise the build cost. It pays to consider how baseboards and equipment can be reused in the future. Both glue and screws are used to assemble baseboard frames, trestles and legs. When it comes to risers and baseboard tops, screws alone are used so the top can be discarded, leaving the frames ready for the next project.

The main baseboard was recovered from an older project, repaired and fitted with a new baseboard top and back drop boards. Had the frame been built

TEN TIPS FOR LOW COST LAYOUT CONSTRUCTION

- Reuse materials such as switches and wiring from old layouts.
- Buy used track, particularly turnouts.
- Never throw baseboard frames away – keep them for reuse.
- Reuse legs, drapes and trestles recovered from old layouts.
- Save any material that can be used in construction: cardboard, clear plastic from food trays etc.
- Consider manual point control.
- Buy quality used rolling stock – less often is more.
- Share equipment amongst layouts including fiddle yards, lighting and drapes if they suit.
- Take care when choosing used control equipment. It's one thing better bought from new!
- Test used locomotives before purchasing and ask for a guarantee should something go wrong.

from scratch, plywood box construction using 12mm plywood with plywood spacers and cross-bracing to create a strong reusable frame would be the choice.

Another cost saving made at the time of construction was to use slide switches for manual wire-in-tube control. They work as point activators whilst switching the power polarity in the common crossings (frogs) of the turnouts at the same time. Motors could be fitted at a later date.

This takes us neatly to a closer look at the choice of track itself. When budgets are tight, consider used track instead of buying new. One can wander around exhibitions, poking in rummage boxes under various trade stands to find turnouts in good to excellent condition. Such a search turned up six used and one unused Peco Streamline Code 55 small radius turnouts for about £5 each (even recently, a show turned up Peco Unifrog points in near perfect condition for £10 each). All were fully working and in more or less good condition. Several were missing the outer ends of sleepers which could be located under paved track areas common to china clay works. Recycled flexible track was avoided. That was bought new so it would be clean and undamaged. Allowing for six yards of new track, the cost of track for the project came in at a modest £45 at the time.

With budget layout construction in mind, material offcuts from larger layout building projects were used as much as possible, although if you are starting your first layout, you may not have any to hand. Remember to save offcuts from your first project to help with future ones. This includes underlay foam which was used to raise the track above the baseboard top and building materials too. In fact, the total cost of the project to the track laying stage was as little as £120 including timber, brass tube, piano wire, track and adhesives. If you are contemplating your first layout, new timber for frames, trestles and the backdrop boards would add around £80 at 2025 prices including hardware and fixings.

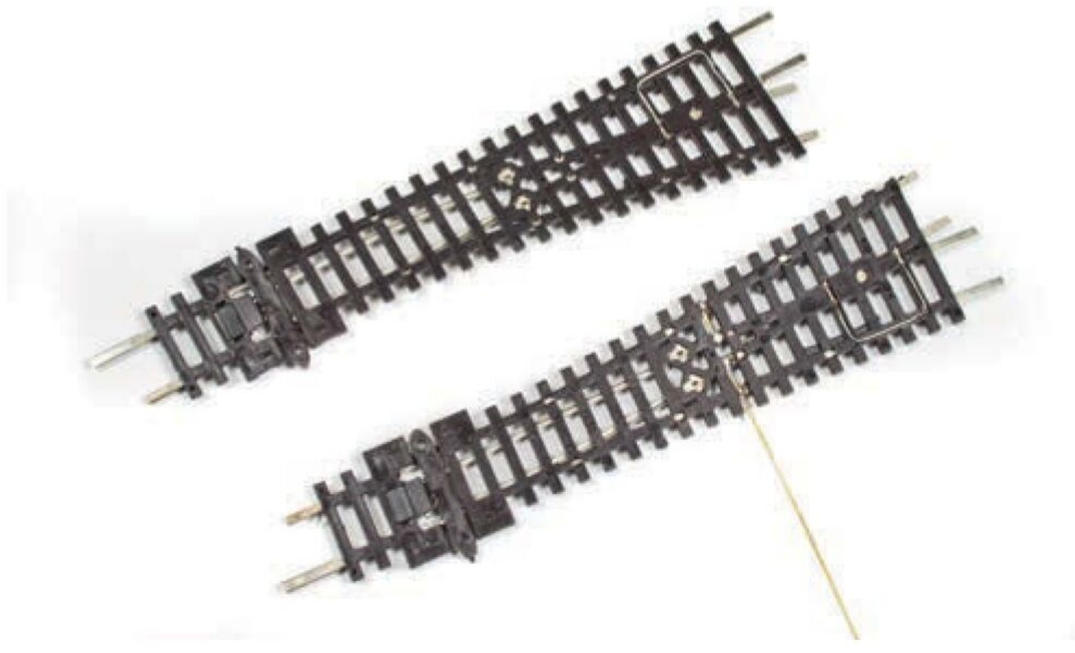
BASEBOARD BUILDING TOOLS

- Hand mitre saw for cutting accurate right angles.
- Hand ratchet screwdriver.
- Wood working square.
- Spirit levels – long and a short torpedo type.
- A selection of woodworking drills from 2mm to 10mm.
- Combination countersink and drill set.
- Cordless drill and screwdriver.
- Cork sanding block.
- G-clamps and spring clamps of various sizes.
- Soft lead pencil.
- 300mm steel rule.
- Tape measure.
- Hand saw suitable for cutting plywood.
- Junior hack saw.
- Planed square edge softwood: 18mm by 44mm which is regarded as 2 by 1 inch for risers.
- Planed square edge softwood: 9mm by 12mm for back drop frames.
- A single sheet of 12mm plywood for the baseboard top.
- Countersink cross head screws: 3.0 x 25mm, 4.0 x 30mm and 4.0 x 40mm.
- Bright steel M10 bolts (75mm length), washers and wing nuts for attaching the controller board to the main baseboard.
- Moisture resistant woodworking glue.
- Sandpaper.

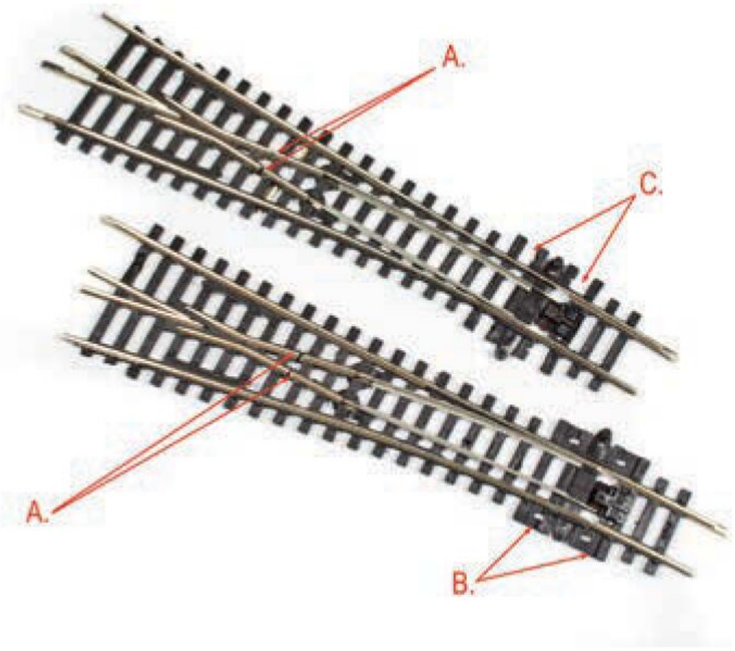
Preparing the track

Track laying on a compact layout can be completed relatively quickly when care is taken to cut short lengths of flexible track accurately. Peco Code 55 track was chosen for its finer rail profile although it has an additional groove in it. The groove is embedded in the plastic sleeper web and allows it to be used with Code 80 without special rail joiners. The result is bulky-looking sleeper web which can be challenging to disguise, but when done with care, leaves a fine-looking track.

The original Peco Streamline turnouts can be modified to improve their electrical reliability for conventional DC (analogue) control and DCC. They were prepared by making a modification to isolate the crossing vee from the rest of the rails. Two slots are cut in the closure rails close to the crossing vee (also called a common crossing or frog). Turning the turnout over, the stock rails and closure rails on the toe side of the isolation cuts are connected by soldering a short piece of wire across them. This means contact between point blades and the stock rails is not needed for electrical conductivity.



↑ Improving the reliability of older Peco 'Streamline' turnouts involves two modifications. Stock rails and closure rails are electrically connected together to improve contact between them instead of relying on the switch rail to stock rail contact. The crossing vee is isolated from the closure rails by cutting a slot in them with a cutting disc.



In addition to cutting the rails to isolate the crossing vee (A), the plastic web between the sleepers at the points end of the turnout (B) are cut away to improve its appearance (C).

The power to the crossing vee or frog has to be controlled through a switch to ensure the correct power polarity is present depending how the turnout is set. Many point motors and solenoids have auxiliary switches which will do this job automatically when the points are changed. The slide switches used as point actuators in this project do the same job when wired up.

Spare sleepers moulded as part of the turnout base were cut from the turnouts ready for use after track laying is completed. I also ensured I had a good supply of rail joiners, track pins and 0.6mm diameter drills to hand.

Laying the track

Track laying commenced with the passing loop. Because it is short, it was assembled on the work bench. The whole assembly was placed to the layout first as a dry run to check its length and curvature met the designed track plan. When fitting Peco Streamline track pieces together, a sleeper has to be removed at the end of each length of track after it has been cut together with the plastic web so rail joiners can be fitted. An insulated joiner was applied to rails leading away from turnout crossing vees to ensure they are isolated.

Cutting the rails was done with Xuron track cutters which leaves a pretty clean cut which needs just the slightest cleaning with a file. The web at the rail ends is also tapered slightly with a file to make fitting rail joiners easier.

The loop formation was glued into place using water resistant PVA glue. Branch track work was next, followed by the works sidings. Some track was

TRACK LAYING TOOLS AND MATERIALS

- Xuron track cutters.
- Mini drill and carborundum cutting discs.
- Fine nose pliers.
- N gauge 'Tracksetta' (12-inch radius, 15-inch radius, 18-inch radius and 10-inch straight).
- 25W Soldering iron with a 1.0mm tip.
- Pin vice and a selection of small drills.
- Map pins.
- Marker pen.
- Cordless drill.
- 10mm wood drill bit.
- Modelling knife and blades.
- A variety of heavy objects (paint tins, bricks etc.).
- Grade 1200 wet and dry paper.
- PVA adhesive.
- Fine Peco track pins.
- Metal Peco rail joiners.



Work out where holes are needed to accommodate the point activation wire which was run under the baseboard as part of the wire-in-tube system. A 10mm diameter hole was drilled through the baseboard for the point activation rod before the track was glued down.



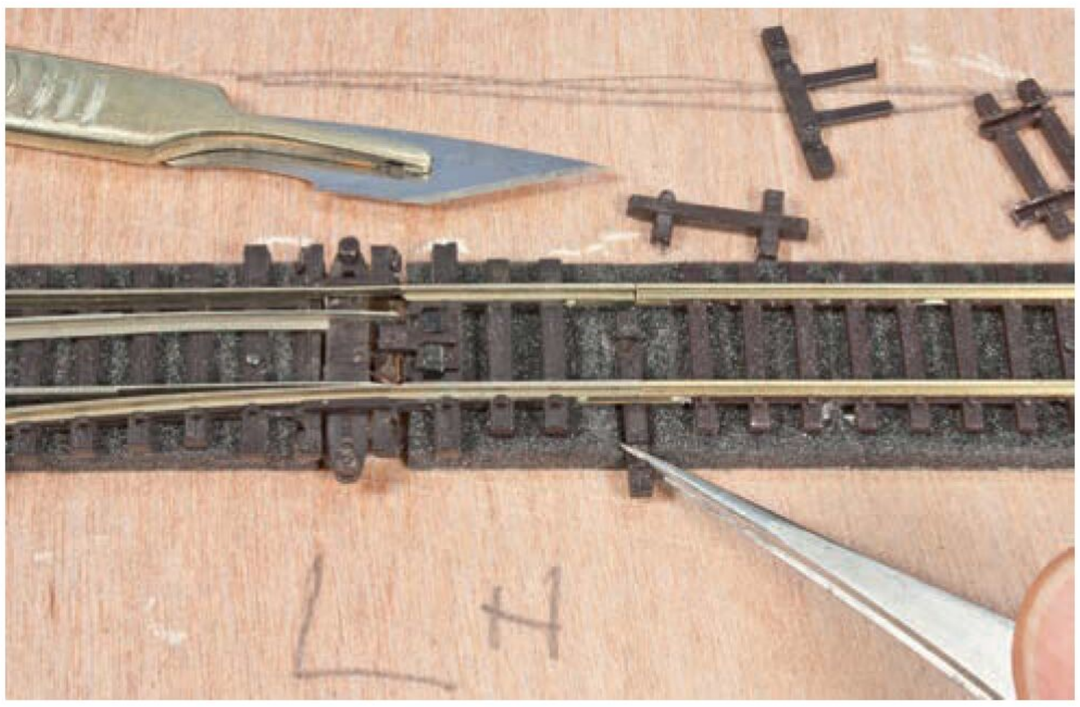
A scrap of foam is used to spread the glue to avoid squeezing too much glue up between the sleepers when track is placed. Glue is preferable to track pins for laying track.



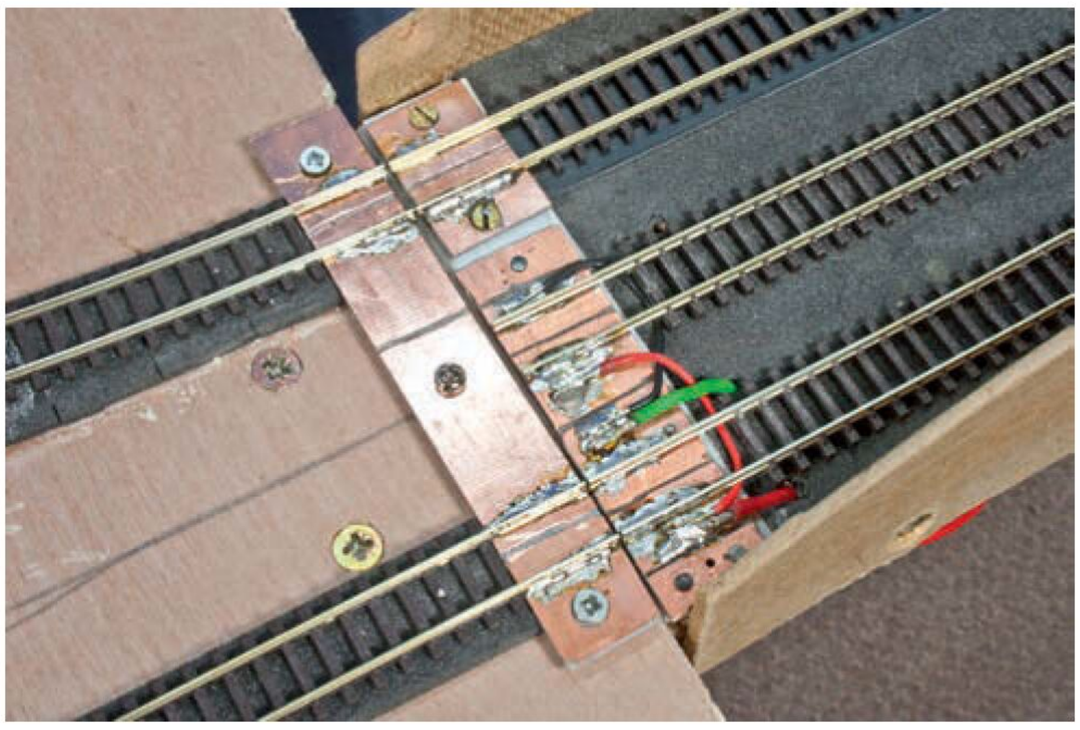
You can apply weight to the track to hold it in place whilst glue sets using a piece of plywood to distribute it evenly. Alternatively, use map pins to secure the track in place until the glue has dried. Do not press the pins in hard or the foam underlay will become compressed. In areas where the track is curved, track pins are used to hold it in place until it is ballasted. The pins are then removed and the holes filled.



Central to the track plan is the loop. This is assembled first and checked for size and positioning. Track adjacent to turnouts may need to have sleepers trimmed to ensure the formation fits together neatly.



The spare sleepers recovered from the turnouts and from offcuts of flexible track are used to fill in the gaps between plain track and the turnouts.



The rail ends are anchored to strips of copper clad PCB where they cross baseboard joints. This picture shows the join between the fiddle yard and the scenic baseboard.

secured with track pins along with the glue so that curved formations could be held in the correct place. Where track runs off the edge of the baseboard into the fiddle yard, it is securely anchored using copper clad strip.

Track pins can be removed when ballasting is complete because experience shows that well applied ballast glues track down very effectively indeed. Spare sleepers are inserted in gaps where needed and the rails are given a good clean with very fine wet and dry paper to avoid excessively scratching the rails ready for wiring and test running.

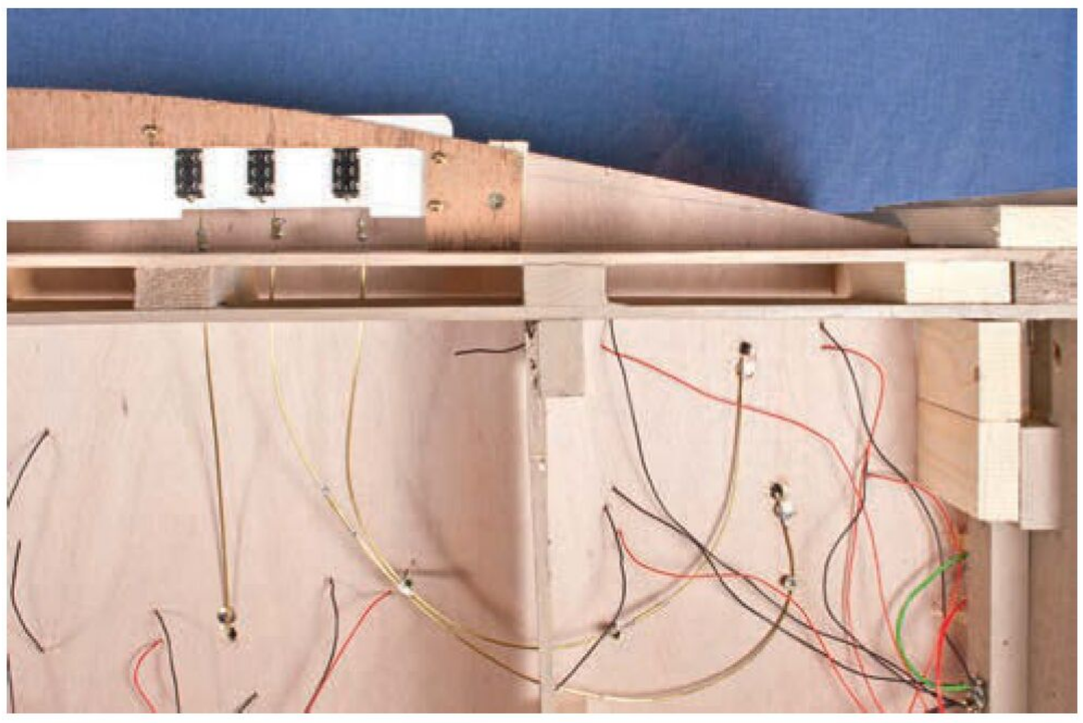


The completed track formation ready for wiring and point control.

Point control

In keeping with the minimalist approach to layout construction, the turnouts are operated using traditional wire-in-tube control. This is a simple and low cost technique which is ideal for small and compact layouts which is easily applied to single baseboards. Wire-in-tube can be a short-term solution until funds become available to buy servos or point motors to operate the points. Note that running the tube for wire-in-tube across baseboard joins of portable layouts is not easy.

There are seven turnouts on 'Wheal Annah', all of which are less than 500mm from the front of the layout which is an ideal length for wire-in-tube control. To simplify the connection between the wire and the turnout stretcher bar, the wire was bent to a right angle and fed it through a 0.5mm diameter hole drilled through the stretcher bar of the points. It was found that the points moved equally well with or without the centring spring.



The control wire in this version of wire-in-tube control is of 0.5mm diameter piano wire. It is fitted to 1.6mm inner diameter brass tube. The connection between the control wire and slide switch is made with the screw adjuster stripped from electrical connectors and 0.8mm brass wire. A drop of fine model oil is applied to the tube before inserting the control wire.

A narrow shelf was fitted to the front of the layout to hold seven double pole, double throw (DPDT) slide switches which have enough throw to activate the Peco Streamline and Unifrog turnouts. This method would also work with the Kato 'Unitrack' turnout design and other brands of track too.

When the layout fascia was cut and fitted, they were be recessed out of harm's way but easily seen and used. Each slide switch both changes the points via 0.5mm piano wire in 1/16th inch (1.6mm) diameter brass tube and changes the crossing vee polarity at the same time. The cost per turnout was about £2 to £3 at the most. It need to be explained in greater detail in a future article.

Basic DCC wiring suitable for a small layout

Operations on 'Wheal Annah' would need no more than two locomotives active on the layout at any one time (one on the branch and one on the main). 'N' gauge locomotives draw very little current and consequently, the demand on the power bus will be light.

With a possible layout expansion in mind, the DCC bus wires are of 24/0.2 gauge wire. Dropper wires of 7/0.2mm connected the bus to the track. In keeping with DCC wire colour practice, wire with red and black coloured insulation was used.

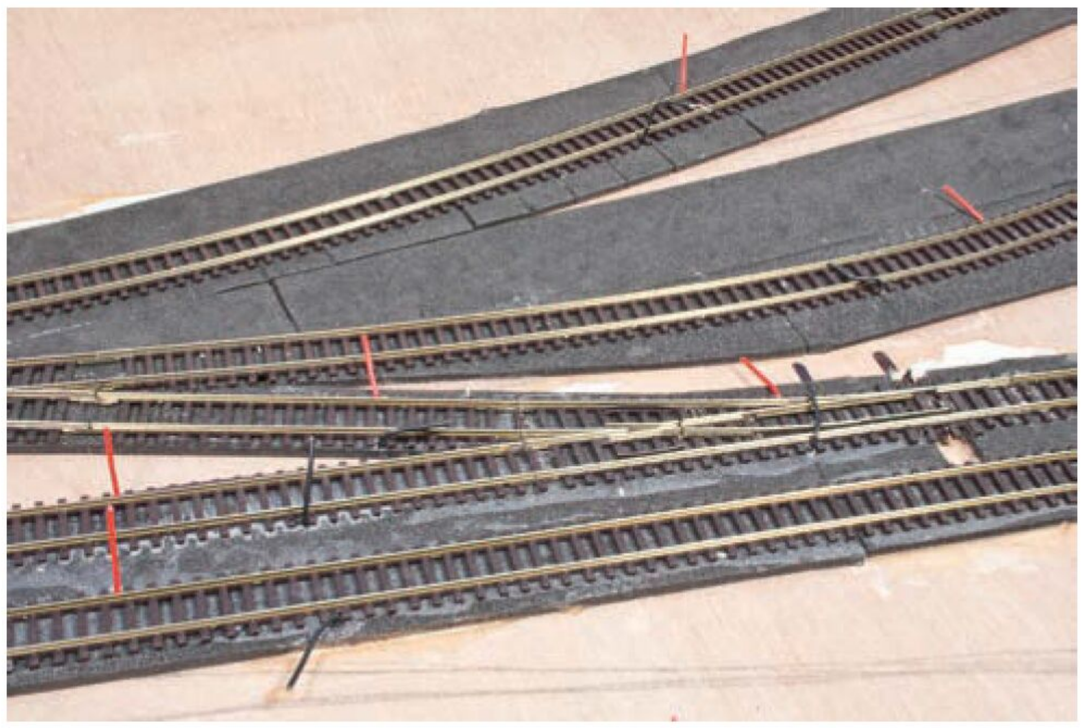
Connections to the DCC control system and the small fiddle yard were made using twin-pole Tamiya style electrical connectors which are more than capable of carrying the anticipated current demand of the layout. They were recovered from a dismantled layout. Consequently, the wire insulation colours did not match the main wiring. However, the convenience of reusing them was too good to pass up.

To install the dropper wires, 2mm diameter holes were drilled through the baseboard top. Every individual piece of rail is connected with a dropper so there is no reliance on the rail joiners to carry power. A dropper is soldered to each turnout common crossing vee ready for connection to a polarity change switch.

The connection between the power bus and dropper wires was a simple soldered one on this layout. A short piece of insulation is stripped from the power bus as intervals along its length



↑ **Good wiring practices for DCC must still be followed no matter how compact the layout. The power bus wires consist of 24/0.2 cable whilst the droppers are of 7/0.2mm equipment wire. The end of each dropper is wrapped around stripped lengths of power bus and flooded with solder to complete the connection.**



↑ **Each piece of rail is supplied with power via a dropper wire. Rail joiners are not trusted to conduct power from one piece of track to another.**



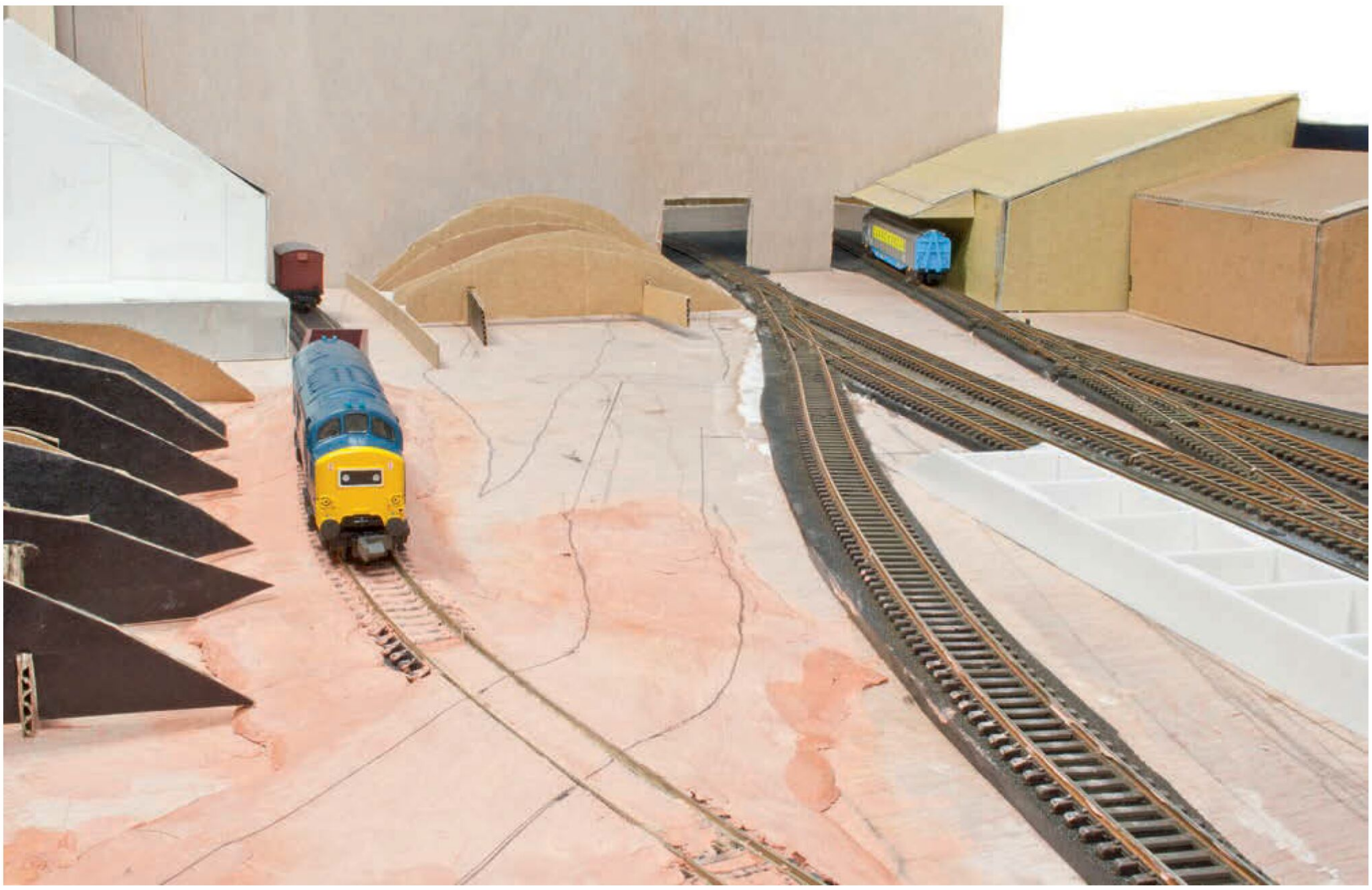
↑ **At four feet in length, and with no more than two locomotives likely to be the layout at a time, demands on the layout wiring are light. Lower power entry-level DCC systems such as the Digitrax Zephyr can be used. A small shelf built at the opposite end to the fiddle yard holds the control system and it allows the layout to be operated from the front.**



↑ **Testing was undertaken over a number of days with as much equipment as possible. Fixing snags in the track and electrics is important before starting on scenery.**



↑ The time to paint the track and start scenic work is approaching as de-snagging work and test running is completed.



↑ A sign of things to come in the next instalment including landscaping, scenery, structures and track ballasting!


TRAFFIC SERVICES
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and the exposed end of the dropper wire wrapped around it for about five turns before flooding with solder.

Bus wires should be labelled so we know which wire supplies rail A and rail B. Some peripheral DCC devices have to be wired in sync with the control system and identifying the bus wires is important. The wiring work was completed by wiring up the turnouts to polarity change switches so common crossing vees can be switched when the points are changed. A small box was made up to be attached to the end of the layout to hold the DCC control system and as a tray to keep uncouplers and other tools safe during an operating session. No control panel was required because the turnout switches for were located along the front of the layout.

Finally, the low track power demand provides the option to tap the power bus for layout lighting and other features via a bridge rectifier. Normally, all of the available current would be needed for track power on larger layouts and a secondary power supply should be considered or accessories. However, this layout is small and can afford to spare some power!

Fine tuning and adjustment

Always run a new layout to look for bugs and faults before applying ballast and scenery. Your layout operating team will always find something to de-snag even if you do not. Use as much equipment including the longest wheelbase models that you have to test every likely move that is possible on the layout. You are seeking cold solder joints, faulty wiring, burrs on rail ends, unwanted operating restrictions such as overly short head shunts and kinked rails. Anything that will prevent you from enjoying the layout. Solder spots may also affect running where dropper wires have been connected. Either solder them again or rub down with wet and dry paper. If there is a marked mismatch in the track across a join, lift and adjust if you can. Resist the temptation to file the rail down or its top profile will be lost.

In a future issue, the next phase of building will cover back drop boards, painting and scenery. Work will then start on structures followed by track detailing, painting and ballasting. In common with many china clay works, some track will be paved, other parts overgrown, part buried in clay and mud, and we will show how that is modelled.

INSPIRATION FROM CHINA CLAY COUNTRY



← Wharves such as the loading dock at Nanpean were common throughout Cornish clay country. Nanpean wharf also acted as the shunting neck to access Drinnick Mill where the line passed under the main branch line. A wharf could be incorporated into a freelance plan to good effect. Calcified seaweed and other commodities were once loaded at this location which was full of redundant slurry tank wagons when photographed in 1992.



↑ A grainy but invaluable reference photograph of a loading shed at Parkandillack with a 'Clay Tiger' covered hopper wagon in attendance.



↑ The country that inspired the layout plan. Parkandillack is located at the end of the truncated line to Newquay and is the home to several china clay loading points making it a busy location in the past, certainly by china clay country standards!



Landscape topography or terrain is when the fun begins with layout building. Quite dramatic scenes can be created such as the steep hillside in this scene which was built up from low-cost plaster bandage, card strip and masking tape. The scene is typical of shelf layouts with baseboards wide enough for the railway and some terrain.

Low-cost topography

There is nothing more enjoyable in railway modelling than turning a bare baseboard into landscape with rocks, trees, water and ground cover. We present six different methods for modelling terrain ready for ground cover, rocks, trees and vegetation.

LANDFORM, TERRAIN OR TOPOGRAPHY is the foundation on which scenery can be built up and that includes rocks formations, ground cover, shrubs, bushes and trees. It is the first stage of covering bare layout baseboards (the general principles of which was covered in the first volume of *The Guide to Model Railways*).

Very little topography is totally flat, not even in East Anglia or the plains of the US Mid-West, unless humans have exerted his total influence over it for buildings, industry, roads and railways. Even so, roads and railways are built on inclines and land has slopes around buildings too.

Railways carve their way through the landscape, following contours wherever civil engineers could plot a route over the easiest ground to save money. Material from the excavation of cuttings was frequently



↑ **The Borders Railway was reopened in September 2015. It cuts its way through the topography with embankments and cuttings which are easily modelled with low-cost household and modelling materials.**



↑ **Embankments do not have to be particularly tall as observed in this view of the West Coast Main Line north of Norton Bridge in Staffordshire. Even flat country has undulations and slopes which add character to a layout when modelled.**

used to create adjacent embankments, something which looks good when modelled well. The six techniques described here can be used for all of the popular scales, from 'N' gauge to 'O' gauge and everything in between. They need simple materials that are easy to find and inexpensive.

Before starting on topography

Prepare and plan for topography at the layout design stage. Working out how landscape and ground cover materials are to be applied to the layout is as important as track planning. Landscape modelling starts with the baseboard tops that will support the track (track bed) and how it is fitted to the baseboard frames.

In some instances, the track bed must be fitted to risers above the baseboard frames so scenic features such as rivers, streams and drains can be created below track level. Railway over-bridges can be incorporated too, with roads and other railways placed at different levels.

This usually means that baseboard tops composed of large sheets of plywood should be reserved for locations such as freight yards and stations where few undulations exist. Out in the country, cut the track bed so it is slightly wider than the permanent way. This brings greater flexibility for modelling the landscape and civil engineering structures too. A study of some of the best layouts show that they have different levels of topographic terrain which makes them visually more interesting.

Consider baseboard depth and width when planning landscapes. Wider is not necessarily better (as seen in the first picture) and this view is reflected in a growing trend in North America towards layouts with narrow baseboards which are also known shelf layouts. In addition to the shelf layout concept, there is an increasing number of modellers building micro-layouts with superb looking landscaping in small spaces.

Consequently, the modelling of railway property and a small amount of the surrounding landscape is generally all that is desired. Baseboard size has to be appropriate to the desired landscape, however. Creating mountains on really narrow baseboards is not going to work. On the other hand, clever topography can make a given space appear larger by effectively tilting some of the landscape at an angle which increases the physical area of the scene.

Narrower scenes save time and materials whilst still achieving the character of a given area if the scenic treatment is carefully done. It has been calculated that reducing the baseboard frames of a moderately sized layout by just a couple of inches reduces the cost of landscaping and scenery materials dramatically, but for virtually no impact on the overall appearance of the model or its operating potential. Creative modelling with rock faces, retaining walls and cuttings will give more vertical interest to narrow scenes making the layout appear larger and these can be incorporated when building up the landscape.

Landscape and terrain modelling is messy!

Scenery and landscape terrain modelling can be and usually is a messy process and it does not go well with model trains, so first remove them from the layout. After that, collect protective materials together before starting on the project – they will save a lot of the remedial work needed after spills on unprotected areas.

Use newspaper, sheets of cardboard and decorating drapes to protect floors and other surfaces from liquid adhesives, paint and plaster. Apply covers to layout backdrops and back scenes. Place masking tape on the track to save it from blobs of plaster, glue and anything else you are using. Keep a few food trays to hand to catch liquid materials and to hold containers to catch spills.

Technique 1: Foam board terrain

Extruded foam insulation sheet (XPS sheet) differs from the more familiar white, expanded polystyrene foam (EPS) used for packaging and cheap insulation. Extruded foam board and sheet has been used by modellers in the US for many years and brands such as 'Styrofoam' are very popular.

XPS has a closed cell structure which makes it very strong indeed, with good compressive strength. The major benefit of this material is that it is easy to use, cut and shape using a kitchen knife (buy a cheap one because the stuff takes the edge off knife blades very easily), drywall saw, rasp and sanding blocks. It takes glue very well and filler will bond to it very efficiently.

Unlike EPS expanded polystyrene, XPS extruded polystyrene is quite hard and does not disintegrate into a mass of loose beads when cut or shaped with a knife although there will be some dust when sanded, so it is advisable to wear a face mask. It is also possible to cut and form the material with a hot wire cutter. Modellers should be aware that extruded polystyrene does give off harmful fumes when cut with a hot wire and this should not be attempted in a poorly ventilated area.

Thicker material has been used for baseboard tops by some modellers and the weight-saving advantages for portable layouts is clear. It can be carved away for ditches and other small topographic features. It can have track laid on it and it is strong enough to support structures such as buildings, bridges, tunnels and viaducts. When used on hillsides and mountains, it is tough enough to have trees 'planted' directly into it and carved into rock formations instead of using rock castings, saving considerable weight. Diorama modellers will use thinner sheets of XPS for small projects. There are challenges with its use as baseboard tops, including the routing of layout wiring, how turnout or point motors are secured to it along with protecting it from knocks and bashes.

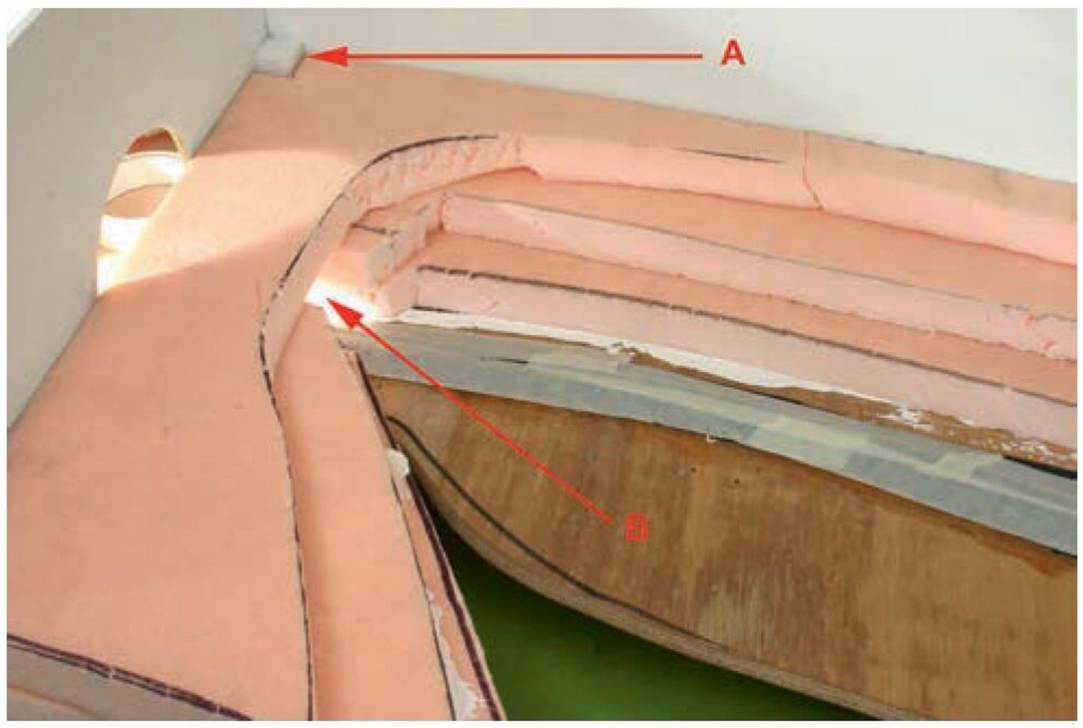
Locating XPS insulation sheet in the UK can be difficult, because few building centres routinely stock it. However, a number of specialist modelling material suppliers stock XPS foam for crafting, although it can be expensive. A search on a popular online marketplace brings up numerous suppliers of XPS board with a 1200mmm by 600mm by 30mm sheet being priced around £13-£15 plus shipping.

Pros and cons of using foam board

- Benefits: It is inherently strong and light weight making it ideal for use on portable and exhibition layouts. Its strength means that it can be used for steep mountain terrain as well as rolling countryside without concerns about its strength, unlike EPS. It can be painted and be treated with scenic materials after shaping with a saw, rasp, sanding block and



↑ Underneath the rock work on this diorama is a woven lattice of cardboard and masking tape, materials that are as cheap as they come!



↑ Extruded polystyrene sheet (XPS) has advantages over expanded polystyrene (EPS). XPS is easily cut with a kitchen knife to shape it to fit any location on the layout including baseboard fittings (A). It is strong enough to be used as covers for tunnels (B) too.



↑ Foam can be measured and cut with the aid of paper patterns. They are used to transfer the desired shape to the extruded polystyrene sheet for accurate cutting.



↑ Once the first layer of foam board has been applied, a paper pattern is drawn up with the shape and size of the next layer of foam. The size of each layer depends on the angle the slope required. For an angled slope, the new layer will be cut to a slightly smaller size than the previous one, 'stepping' the layers.



↑ Choose an adhesive that will not attack the expanded polystyrene sheet! Most 'no nails' builders' adhesives will work well, grabbing the sheet and holding it in place. Glue is applied to the underside of each layer and spread out with a putty knife.



↑ Is quite easy to add small pieces of expanded polystyrene to places where some filling is required. A small mistake was made in the cutting of the second layer which required a repair with a couple of small pieces as shown by the red arrow.

knives without needing a complete layer of plaster bandage or filler.

- Disadvantages: Extruded polystyrene is a relatively technical product to use. It has to be cut to shape and whilst the cutting is relatively easy to do, it blunts knives and saws very quickly indeed. It is not always easy to find for reasonable prices and storage and



↑ Extruded polystyrene is easily cut with a kitchen knife and shaped with a woodworking rasp to tidy up the slope. Wear a mask when sanding and rasping this material. Clean up the dust with a vacuum cleaner as you progress – it saves a great deal of clean up later.



↑ The landform is built up in layers, like contours. Each subsequent layer is measured and cut to fit the location using paper templates. The benefits of using thinner sheets is that it is easier and less wasteful to build up topographical features. The resulting bare landform can be smoothed over with lightweight filler.

transport of the typical sheet can cause practical difficulties. Sawing and shaping produces some dust and it requires a degree of skill with tools to achieve the desired result. There are environmental considerations with using and eventually disposing of polystyrene products. Finally, it is relatively expensive per square metre of layout compared to other landscaping methods.

Technique 2: Paper and plaster technique

An effective but inexpensive landform modelling technique is the simple use of plaster bandages formed over crumpled newspaper to create rounded contours. This is potentially one of the cheapest methods of creating topographical features, especially rolling countryside and may offer a low tech but effective lightweight solution for many modellers.

All that is required is a quantity of plaster bandage and lots of newspaper. A largish bowl of some description is filled with a couple of inches of water to soak the plaster bandages. Nitrile gloves are worn to protect hands when working the plaster bandage into place. Plaster bandage is easily cut to size with scissors and is very easy to use without making a mess if you are careful.

Crumple the newspaper to make a former and secure it on the layout so that it will not move using hot glue or similar. Dip the prepared pieces of plaster bandage in water for about a second or two before removing it and allowing excess water to run off – it cannot be too wet. Swiftly transfer the bandage to the layout and drape it over the newspaper. Continue the process, one strip at a time until there is an even layer of plaster bandage about three layers thick and leave to set. Work quickly because plaster bandage sets after about ten minutes or so, especially in warm conditions.

One of the risks of this technique is that excess water will be transferred to the layout which may damage plywood used to construct the track bed and the baseboards. When planning to use a technique such as this, paint the baseboard first to seal it.

The crumpled newspaper former could also become saturated with water which would take some time to dry out and could lose its integrity resulting in the topographical feature 'sagging' just a little. So, when using this technique, be sure that all the excess water has completely dripped from each piece of plaster bandage.

Subsequent layers can be applied and smoothed over hardened layers without the risk of soaking the newspaper formers. Do not apply too many layers in one go. The resulting hard shell should be left long enough to dry out. If it feels cold to the touch in a warm room, it is still damp and must be left until the cold touch has gone.

Pros and cons of paper and plaster

- Benefits: This technique is very cheap and simple



↑ The newspaper and plaster method uses crumpled up newspaper as a former for a plaster hard shell. Manipulate the newspaper so that it is roughly the desired shape of topographical feature that you wish to make.



↑ Lay the dry plaster bandage on the newspaper to measure the size of strips required to cover it. Spend a little time with a pair of scissors to prepare as many strips of plaster bandage that you think will be required to complete the job before progressing to the 'wet' stage.



↑ Following a brief dip in water, each piece of plaster bandage is laid gently on top of the crumpled newspaper former. The first layer of bandage is only barely wet as seen in this picture. This will prevent water from being transferred to the newspaper. Soaking the newspaper is not desirable because it would take too long to dry out.

to apply. It ideal for rounded landform modelling and the finished hard shell is strong. It can be enhanced with rock castings.

- Disadvantages: The use of crumpled newspaper as a support former means that it is hard to create a particular landform shape unless it is supplemented with cardboard and blocks of wood. Plaster bandage can be messy and protection of the surrounding area is necessary. The resulting shell can take days to dry out and it has to be completely dry before applying scenery. Further, such a hard shell is not easy to plant trees and other scenic features into.

Technique 3: Mesh and plaster landscape

A traditional method of landform terrain modelling that goes back many generations is to use steel wire mesh (chicken or rabbit netting) as the support frame upon which plaster bandages and rock castings can be applied. In common with many established modelling techniques, it is the result of using what was available at a time when the range of products was not as broad as it is today.

It is still a valid technique which results in a hard shell which is relatively lightweight and strong thanks to the rigidity of the supporting mesh. The advantage of wire mesh is that it retains any shape folded or bent into it and it can be used to create some fairly wild landscapes. It needs little support which means the space underneath the hard shell can be used for anything you like, including somewhere to locate electrical components or additional storage tracks.

Modellers will find that cutting and applying the wire mesh framework is time consuming and pretty hard on the hands. The sharp ends of the wire can catch clothing and easily scratch and cut hands. Folding the sharp ends of cut wire into a position on the layout where they would not be a hazard during construction and handling can be difficult, especially for layouts designed to be portable. Securing it to the baseboard frame usually involved hammer, tacks and staples – all heavy stuff. Storing large quantities of such materials during layout construction is also a problem when space is tight.

An alternative is plastic mesh which offers a safer and easier way of using this landform technique. It has the advantage of being easy to cut and handle with the benefit of reduced risk of injury to the hands. It is more elastic than steel mesh and might not retain any shape bent or folded into it. However, it can be supported from underneath with pieces of wood, cardboard or off-cuts of expanded polystyrene from packaging to form topography. Once glued into place, plastic mesh can be covered with plaster bandage and rock castings as required. It is not suitable as a support structure for vertical rock formations or for landscapes requiring a high level of relief such as steep hillsides. Further, the additional support needed to hold it in place may remove the usefulness of the space underneath unless the supports can be removed after the hard shell has set.

Plastic mesh is easy to find and relatively inexpensive to buy from DIY shops and garden centres. It can be secured to the baseboard frame with a hot glue, silicon glues and staples. It is pretty tough and difficult to tear or damage. The following pictures demonstrate how a combination of greenhouse shading mesh and plaster bandages can be applied to a bare baseboard frame quickly and effectively.

Pros and cons of using the plastic mesh technique

- Benefits: Plastic mesh and plaster landform is cheap and straightforward to build. The materials are easy to find, inexpensive and simple to use. Plastic mesh can be cut with scissors and easily glued in place with hot glue or a 'no nails' type adhesive. The



The basic materials and tools for mesh landscape include a hot glue gun, sharp scissors, plaster bandage and of course, greenhouse shading mesh. Some ordinary drawing pins are also useful to have at hand to pin the mesh down whilst gluing. You will also need a large basin of water for soaking plaster bandage and vinyl gloves to protect the hands when applying it.



Hot glue is applied to the mesh, applied to one edge first and then after the mesh has been shaped and stretched over the opening. Hot glue bonds mesh to wood without any trouble at all. Vinyl gloves will provide a degree of protection from the hot glue should your fingers come into contact with it.



Strips of plaster bandage are briefly soaked in water, for about a second, and applied to the mesh in small manageable pieces. It is quickly worked into place and joined as seamlessly as possible to adjacent pieces by smoothing over it with fingers.



Greenhouse shading mesh is easy to cut with scissors, a distinct advantage over traditional steel wire mesh. It is shown being used to cover an area of open baseboard where sheet plywood has not been used as a baseboard top to save weight.



Excess mesh is carefully trimmed away with a Stanley knife blade and discarded or saved!



Green plastic mesh was used to build up a low embankment leading to an overbridge. Careful cutting is needed to fit the mesh precisely between the bridge, track and back drop boards.

resulting hard shell is durable and strong. It is ideal for gently sloping embankments, cuttings and hillsides.

- Disadvantages: The method requires the use of plaster bandage which, as mentioned above, is potentially



↑ **The same location with plaster bandage and rock castings placed on it. The plaster is left to completely dry until it is no longer cold to the touch before being coloured.**

messy and covering of the area surrounding the layout with sheets will be necessary to protect carpet and furniture from spillage. The resulting landform is hard and not easy to plant trees and structures into it. It takes some time for the plaster bandage to dry out completely before paint and ground cover materials can be used.

Technique 4: Soaked paper towel technique

There is frequently reference to 'plaster-soaked paper towels' in books that describe landscape and terrain modelling techniques and investigation found that there are numerous variations of this technique.

The reason for including this method (which can involve the use of a cardboard mesh covered with paper towels soaked in plaster) is that it offers a very cheap way of making a lightweight hard shell landform. If there is a great deal of landscape to be modelled, techniques that could potentially save a great deal of money are always worth trying.

There are two types of paper towel that can be used: the industrial towel that is supplied in rolls (usually blue in colour) and those individual paper towels dispensed out of a box at petrol filling stations, service area toilets and public loos (usually green). Both can be purchased at industrial and building material suppliers. Be aware that they can be formed of 2-ply sheets which should be separated before use. The key feature of industrial paper towel is that it is relatively strong and does not readily disintegrate when wet and that's pretty important! It is likely that some kitchen paper towel brands may also perform equally as well.

Part of the technique is to collect together a large quantity of cardboard. Ideally, not the usual corrugated cardboard used for packaging boxes but the thinner, more rigid cardboard used in product packaging. This was cut into long strips and applied to the layout as a lattice with the help of hot glue to bond it all together. Once again, one of the benefits of using hot glue is to speed up the process, which otherwise could be very laborious, although a good quality PVA wood glue can be used too. The lattice is covered with PVA adhesive next, followed by a single sheet of paper towel which is gently pressed onto the adhesive. Once it has dried, there is the option of applying a second layer of paper towel using PVA adhesive or proceeding to the next stage.

A quantity of casting plaster such as Woodland Scenics 'Hydrocal' is mixed to a creamy consistency and applied to the paper towel membrane with a brush and fingers. It should be spread over the paper towel membrane and along the edges so that joins are well disguised.

The paper towel sheets can be dipped in the plaster before application too. Each layer should be applied after the last one has set. It should be noted that the same drying conditions for this technique apply as for other plaster hard shell methods.

Although this technique has the potential for low-cost landform modelling, there can be difficulty in preventing the underlying lattice structure from becoming damp and showing signs of sagging, even around any supporting blocks of wood and lumps of expanded polystyrene packaging material. Its inherent strength may also be insufficient if heavy scenic items are to be placed on it such as rock castings. Further, it may be insufficiently strong over large areas and unsuitable for use on exhibition layouts.

Pros and cons of using plaster-soaked paper towels

- Benefits: It is a dead cheap technique and will be of benefit to modellers on a really tight budget. The materials are easy to collect together and those items that have to be purchased can be done so at relatively little cost.
- Disadvantages: This technique is the messiest of them all and was the most time-consuming during tests on a diorama. The resulting landform is not particular strong unless multiple layers of paper towel and plaster are used. Ultimately this does not result in a strong, lightweight hard shell



A Chiltern Trains push-pull train leaves a deep cutting near Hatton North Junction on October 12, 2015, on its way to Banbury and London Marylebone. The cutting and adjacent rolling hills could easily be created using either foam, mesh or card strip landscape modelling.



Paper towel dipped in liquid plaster makes is a cheap landscaping material. It can be applied over newspaper or mesh to make the surface of the landscape hard shell.



Layers of paper towel can be glued together and coated with plaster to form a hard shell.

which is needed for portable layouts. Moisture from the plaster may soak into the cardboard lattice causing it sag whilst the resulting structure may not be strong enough to support rock castings.

Technique 5: Card lattice and plaster landscape

A very similar method to the plaster-soaked paper towels described above uses plaster bandage to make the hard shell surface. The underlying land form is made up of strips of cardboard in the form of a lattice, supported where necessary with scraps of wood, foam and other materials as described above. It is covered in several layers of inexpensive masking tape after the glue holding the lattice together has set. Once again, hot glue speeds



↑ Cardboard strips and hot glue is a great landscaping combination and cheap too. Remember to collect cereal packets and quality cardboard boxes to cut into broad strips for this method.



↑ After being cut to the desired length, the strips are loosely woven together.



↑ Hot glue is applied in spots to secure the strips to each other and the baseboard. Not every point where a strip crosses another has to be glued.

up the job of making the lattice.

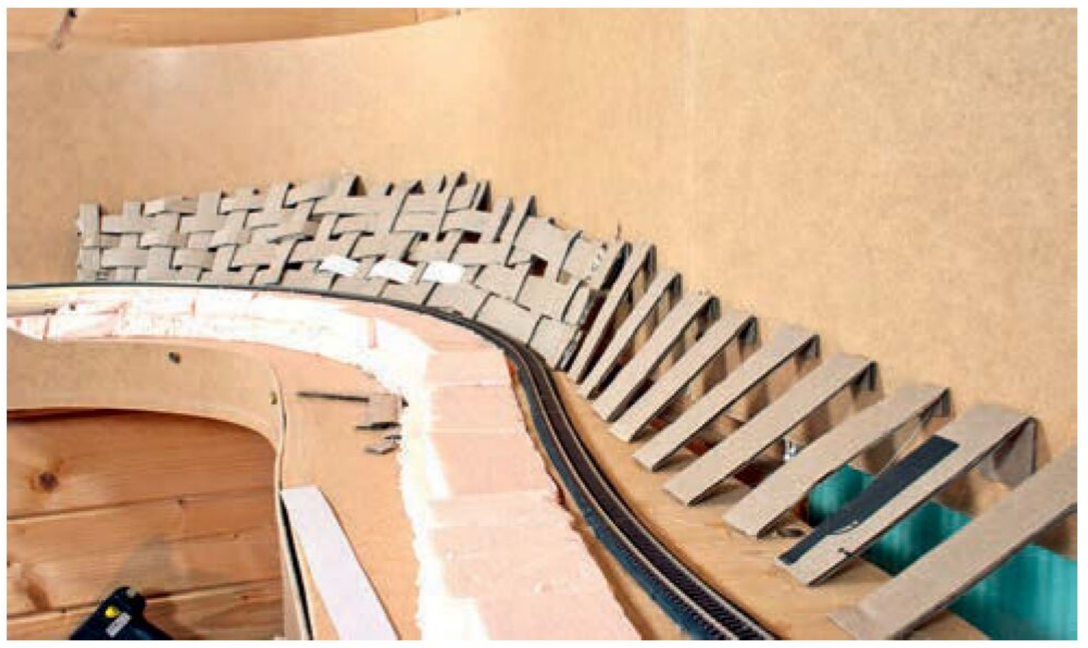
Plaster bandage is cut to size, soaked in for a few seconds and drained of excess moisture. It is applied over the masking tape which protects the lattice from the moist bandage. It is built up in layers and each one is applied after the last one has set. It is an excellent method for filling small gaps between plywood baseboard tops and for making rounded land forms.

A variation on the theme would be to try and use strips of plastic packaging material. It has to be rigid enough to support the hard shell while it sets.

Pros and cons of card lattice landscape

- Benefits: Lattice landform is another very cheap land form and terrain technique and again will interest modellers working with a really tight budget. The materials are easy to collect together and bought at relatively little cost.

- Disadvantages: Cardboard lattice landform is not the strongest of those described in this guide, although, the more layers of plaster bandage applied to it, the better the strength will be. There is always the risk of excess moisture from the plaster soaking into the masking tape and cardboard lattice causing it sag. It is worthwhile finding masking that is moisture resistant, although that will add to the cost, or consider plastic strips instead.



↑ Strip lattice construction completed with heavier cardboard from postal boxes. The technique can be used on steep slopes as well as shallow ones. The greater the span, the thicker the card should be.



↑ The land surface is finished with a layer of low-cost masking tape before a thin layer of plaster cloth is applied to form the hard shell.



↑ The embankment behind the Class 73 models was constructed of cardboard strip, hot glue and plaster bandage! It is strong enough to support trees and ground cover.



↑ The same layout location before the plaster hard shell, trees and ground cover was applied.

Technique 6: Hollow landforms

The concept of hollow land formation has been touched upon above with wire mesh and plaster bandage landform method. This is where the land form is deliberately applied as a strong, thin layer to free up space underneath for hidden train storage. The materials can be as simple as a piece of hardboard or thin plywood. Thin extruded polystyrene foam can also be used because it is strong enough to be self-supporting as discussed above.

The pictures below show how pieces of 6mm hard board were cut to fit across the concealed staging tracks at an angle to create a sloping embankment and clearance for the trains. It is designed to be removed.

Care was taken with measurements to ensure adequate clearance for the rollingstock. Making the pieces removable to deal with derailments and track cleaning was an important consideration when planning this feature.

The finished panels can be painted and treated with scenic materials when they have been fitted satisfactorily. Scenery work can be done at the workbench if desired which brings us neatly on to removable landforms. The use of sheet material such as extruded polystyrene and thin plywood can be adapted to create removable landforms so they can be painted and finished at the workbench. A method of securing the landform sections on the layout and in precisely the same place is needed along



↑ Sheets of hardboard were placed at an angle to make a sloping railway cutting whilst leaving room underneath for additional train staging tracks. Clearances were measured carefully before construction started and the panels are removable to reach trains in the storage area.



↑ A length of wood supports the lift-out scenery boards along the front. Foam was used to complete the slope towards the track.

with a way of disguising the inevitable joins between them and permanently attached features.

Pros and cons of hollow landforms

- Benefits: A thin landform can be used to hide 'off-scene' areas from such as storage tracks, thus making the very best use of the space available for the layout and its landscape. It will be inherently light in weight and can be finished at the workbench, better controlling any mess. Offcuts of sheet material left over from other projects can be used.

- Disadvantages: The sections have to be removable to reach what is hidden underneath. Disguising the joins between removable sections and surrounding scenery could be awkward to achieve convincingly. The material has to be strong enough for handling and must be able to remain in place with minimal support.

Closing notes

In reality, separating out individual techniques such as the six described above is not always a realistic way of looking at the modelling of landforms, terrain or landscape. It is more likely that a combination of techniques will be needed for the desired result.

The choice of landform modelling technique or combinations of them is also a matter of personal preferences and the amount of money in the layout budget. The key to this (and most other scenery techniques) is to mix, match and experiment. Be bold with your bandage!

As you may have gathered from this guide, creating convincing land forms and terrain is not necessarily difficult, nor does it have to be expensive. It is fun to see the bare baseboards covered in landscape ready for scenery materials. When the first earth-coloured paints are applied to seal the landscape ready for the first ground cover application, you will feel that the layout is beginning to really take shape.

TOOLS NEEDED FOR LANDSCAPE MODELLING

The required tools are more likely to be found in the tool shed or a DIY shop than at the model shop. For example, when modelling with extruded insulation foam or polystyrene, a drywall saw, rasp and sanding block will be useful. Old kitchen knives, spatulas and scissors are essential. They should be tools you can discard without major cost because they will become worn out after a while.

- Sharp scissors.
- Old or cheap kitchen knives.
- Hot glue applicator and spare sticks of glue (Woodland Scenics offers a glue gun and sticks that work at lower temperatures for use with foam).
- Protective gloves (vinyl or nitrile).
- A variety of plastic dishes (vegetable trays).
- Old newspapers.
- Tweezers.
- Scalpel and blades.
- 'Stanley' knife or similar.
- Paint stirring sticks.
- Old teaspoons.
- A variety of jars or containers for mixing glue and pigments.
- Old cloths.
- Protective sheets.
- Vacuum cleaner (essential!).

MATERIALS USED IN LANDFORM TECHNIQUES

- Planed timber offcuts and waste.
- Extruded polystyrene sheet (XPS).
- Scraps of plywood left over from baseboard construction.
- PVA wood glue (used both neat and diluted for use as a scenery adhesive).
- A good supply of cardboard from cereal packets.
- Masking tape (artists' frame tape or decorating tape).
- Earth coloured acrylic paint (raw umber) to seal the plaster landscape.
- Plastic mesh (horticultural or shading mesh).
- Plaster bandage.
- Lightweight plaster such as Woodland Scenics 'Hydrocal'.
- Instant grab adhesives ('no-nails' type).
- Kitchen towel.
- Aluminium foil.
- Corrugated cardboard.
- Cereal packets.
- Hot glue sticks.
- Newspaper, cardboard and dust sheets to protect floors.



↑ One would not guess that there are three staging tracks under the embankment behind the train or that the scenery is removable.



It is hard to believe, but almost everything in this view of Didcot is history. Didcot A power station closed in March 2013 and was demolished soon after. The Great Western main line is now electrified and the HSTs that once dominated it have been retired. EWS No. 66083 was about to run round its train of HTA coal hopper wagons when this photograph was taken on September 19, 2006. It is a 'hold out locomotive', retaining EWS livery as late as 2025 despite being part of the DB Cargo fleet.

Coal wagons through the ages

Although coal traffic, once a major source of traffic for the railways, is all but gone, considerable interest in modelling coal trains exists with modellers. Quite a range of models exist in 'OO' gauge and in this profile, we take a look at what is available to model coal traffic.

BLACK DIAMONDS may be gone from the railways for good, particularly power station traffic which one was the backbone of BR's freight operations, but 'OO' gauge modellers have a lot of scope and product support to model this once important traffic. But what is available and for what era?

Coal was one of the first bulk commodities to be hauled by the railways in their early years and this traffic has been represented in part by the 4t Chaldron waggon and North Eastern Railway. (NER) 20t hopper wagons models produced in 'OO' by Accurascale. The NER 20t wooden hooper wagons evolved into steel designs which were perpetuated by British Railways. Other railway companies relied on large and varied fleets of wooden bodied wagons for coal transport, most of which were privately owned. This large and varied fleet of wagons is covered by numerous models by Hornby, Bachmann and others.

BR standard coal hopper and mineral wagon designs evolved into the large modern wagons of the diesel era when air brakes became standard. The first air braked MGR hopper wagons were built from the mid-1960s to serve the growth in large electricity generating stations. This development was closely followed by the construction of the first really dedicated high horsepower freight locomotives.

After privatisation, MGRs gave way to high-capacity coal hopper wagons which lasted until carbon tax policies intended to eliminate coal fired electricity generation came into effect.

This policy placed the operators of the large fleets

of HAA, HTA, HYA, HXA and IIA coal hopper wagons in a difficult position.

However, the demise of coal traffic does not mean that it cannot be modelled for almost any railway era on your layout. From a couple of loco coal wagons being delivered to a steam locomotive depot to long trains of MGRs and high-capacity bogie hoppers, there is plenty of scope to add it to your layout plans, assuming you have the room. There is one caveat and that is the way that models are produced in batches. This can make collecting sets of wagons for modern block trains difficult at times, so when models are announced, be ready to place orders for what you need.

Chaldron waggons.

For modellers interested in very early Pre-group and colliery railways such as those found in the northeast of England, the 4t Chaldron produced by Accurascale is a very useful model. They date from around 1835-45 and worked on the main line until displaced by the larger NER 20t coal hopper wagons, although they worked together in trains for a time, the latter being adapted for the non-standard buffing and coupling arrangement of the Chaldrons.

Remarkably, Chaldron waggons lasted to see service as internal user wagons at many collieries until the 1960s.

Their primary use at many north-east collieries was to carry spoil and other waste materials as well as the internal transfer of coal products from colliery to dockside as was the case at Seaham. They worked alongside modern steel carrying wagons within the same yards, but not in the same trains. Their frame end buffers were too low for conventional draw gear requiring the internal shunting locomotives to be fitted with extended dumb buffers. Braking was crude, with blocks applied to two wheels using a long brake lever, the length of which could be used to manually apply brake force. Chaldron waggons survived to be preserved, with quite a collection present at Beamish Museum in County Durham (**www.beamish.org.uk**).

NER hopper wagons

The NER 15t and 20t hopper wagons were constructed in huge numbers from 1902 to replace Chaldron waggons in a successful effort to boost train capacity and reduce discharge times. They were built to several designs including Diagram P6 with a capacity of 15t to win over conservative-thinking colliery owners. A taller wagon of 20t capacity, Diagram P7, followed and over 12,000 of them were placed in service. Initially, the wagons were equipped with large wooden end stanchions which were extended below the headstocks to allow Chaldron waggons to operate with them.

The LNER continued to build them after Grouping. They continued to see regular mainline service after Nationalisation when British Railways continued to use them until more modern wagons could be introduced.

This was not the end of the story for the NER wagons. NCB collieries used a considerable number as internal users and they could be found in the North East until the 1980s. Due to their remarkable survival in industrial use, some have been preserved.

This railway pioneer has been modelled by Accurascale in 4mm scale, a model released in late 2025. LNER developed the hopper wagon concept by introducing steel bodied designs which survived into BR ownership.

LNER/BR 21t steel hopper wagons

The LNER built large numbers of rivetted steel hopper wagons of 21t capacity which were used to replace and supplement the fleet of wooden bodied wagons. They were built up to Nationalisation and beyond by BR which rebodied many of the survivors in the 1970s with welded bodies in the same manner as the BR standard 21t hopper wagons. They were unfitted wagons and those working in the 1970s were coded HTO in the BR TOPS system.



↑ Accurascale 4mm scale, 'OO' gauge Chaldon waggon models decorated with Stella Coal Company markings. Stella Coal operated several collieries in the North East until the formation of the National Coal Board in 1947.



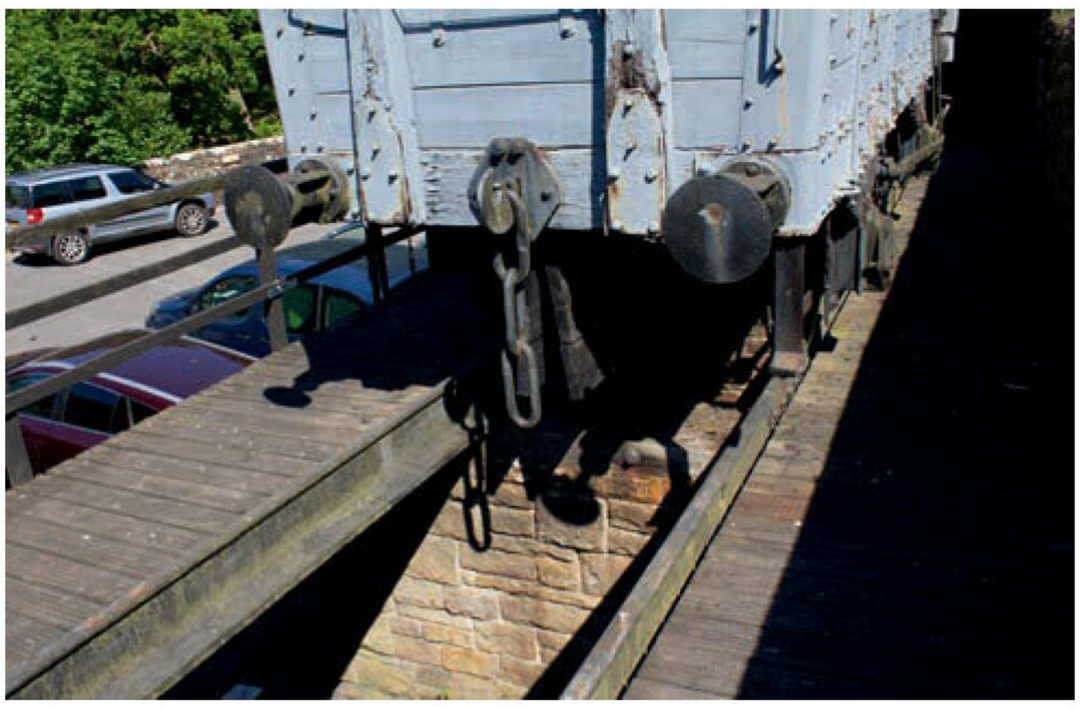
↑ NER 20t wooden bodied hopper wagons are produced by Accurascale which usually offers its models in packs of three models.



↑ The Ashington colliery railway network was once a fascinating place to visit. A single 20t hopper wagon was documented on March 4, 1987. Colliery railways and yards make great layout subjects.



Two NER 20t hopper wagons are present on the North Yorkshire Moors Railway. They were in pretty good cosmetic condition when photographed at Goathland in the summer of 2023.



The wagons are fitted with eight discharge doors for coal discharge over coal drop pits such as those restored at Goathland.



One of the triple wagon packs of NER hoppers offered by Accurascale was a mixed set of NCB internal user wagons comprising of two Diagram P7 20t wagons and one Diagram P6 15t hopper wagon dressed in NCB red.

A model of the type is produced by Hornby and it has appeared again in the range for 2026 decorated in BR freight grey and Coalite Fuels livery.

BR 16t mineral wagons

The once common 16t mineral wagon is produced as scale models by Bachmann and latterly Accurascale which revealed its range of BR 16t mineral wagons in September 2023. So far, Accurascale has produced models of unfitted wagons to Diagram 1/108 with welded bodies and 1/109 with rivetted bodies featuring a mix of end doors. They were fitted with top flaps and Morton brakes. The models cover the 1950 to the 1970s when 16t mineral wagons



Early 21t coal hopper wagons to an LNER design are produced by Hornby and issued from time to time in BR grey or industrial liveries.

with good underframes were rebuilt with welded bodies. Rebodying included welded doors and removal of the top flap doors. This version is also covered by the Accurascale model.

The Bachmann models cover 16t mineral wagons in the same 'as-built' condition with Morton brakes and both body types. A sloped version along with the TOPS coded MCV vacuum braked wagon is also covered by the company in 'OO' gauge. Between the two manufacturers, there is quite a choice of different models to represent this once huge fleet of wagons which could be found in almost any part of the BR network until the 1980s.

BR 21t mineral wagons

Coal21 or MDO/MDV wagons were ordered by BR to meet the demand for higher capacity wagons compared to 16t mineral wagons. They were similar in design to the 16t mineral wagon with end, and side doors. The wagons were for industrial and power station flows, worked in block rakes or mixed with other types including 21-ton coal hopper wagons.

Construction of a rivetted wagon design was completed in 1950 and 1951 when 1000 were built. They were followed by the BR standard Coal21 wagon which was of welded construction and did not have top flaps above the side doors to avoid weakening the wagon. 1500 wagons were built by different builders to Diagram 1/107 and this type was unfitted, being painted in BR freight grey. Diagram 1/107 is represented by models produced by Accurascale. They survived until the 1980s and were TOPS coded as MDO in the 1970s. Some unfitted wagons were fitted with vacuum brakes



BR Diagram 1/108 and 1/109 16t mineral wagons as produced by Accurascale. Industrial versions along with rebodied wagons are also modelled in the range.

and others were rebodied during the 1970s.

Further lots of 21t mineral wagons were built from 1961 and this time, they were fitted with vacuum brakes from new with empty/loaded change-over levers (Diagram 1/119, 1000 wagons) or a self-adjusting brake device (Diagram 1/120, 3950 wagons). Accurascale produces models of the latter type which were built from 1961. A small number of the fleet lasted until the early 1990s, coded as MDV and they survived despite the widespread introduction of air braked wagons.

BR 21t hopper wagons

A big gap in the range of 'OO' gauge models of coal carrying wagons for many years was the standard BR 21t hopper wagon. In May 2024, Accurascale announced a range of models covering the original type and rebodied wagons.

The HOP21 as it became known was based on the LNER 21t steel hopper wagon design mentioned above and featured a hopper with five reinforcing ribs and an unfitted underframe. Diagram 1/146 accounted for around 16800 vehicles by the mid-1960s, making it a common sight throughout the country. They became coded as HTO under the TOPS system.

Many surviving HOP21 wagons were rebodied and fitted with vacuum brakes during the 1970s. They were coded as HTV.

Rebodying of worn-out hopper wagons was a common practice during the 1970s and not all received vacuum brakes during rebuilding. Other improvements were made including the fitting of roller bearings, upgraded suspension springs, upgrading to carry increased payloads and different types of buffers.

As you can see, this is an important wagon type for BR era modellers and the story did not end there, with wagons being used on sand, coke and aggregate traffic before surviving wagons were rebuilt into engineering wagons of various types.



An Accurascale model of an 'as-built' Coal21 or MDO 21t mineral wagon (unfitted version). They were used on industrial coal flows and offered a better capacity over the similar 16t minerals.



This view shows Accurascale vacuum braked 21t mineral wagon models nearest the camera and the unfitted version to the rear. Note that they have a top flap above the side doors whereas the unfitted type were not equipped with top flaps.

BR 24t hopper wagons

The common HOP21 hopper wagon has a big brother! The HOP24 could be considered as a precursor to the modern air braked MGR wagon. They were constructed between 1954 and 1965, with a total of 5263 wagons being built by Shildon Works in nine batches together with a single batch assembled by Pressed Steel.

HOP24 wagons were designed for bulk flows of industrial coal and coke, working between collieries, coke works, power stations and other industrial locations. They were unfitted, having no continuous air or vacuum train brakes. A guards van was used at the end of a rake or with one located



Accurascale offers its wagon models in packs of two or three wagons to help modellers build up their fleets quickly. In common with the 16t and 21t mineral wagons, the 21t hopper wagon models are supplied in packs of three. The vacuum braked HTV model is shown in this picture suitable for the 1970s through to the early 1990s.

at each end of the train partly to save time when running round and to provide additional brake force. Operating speeds were low as a consequence. They lasted until the mid-1980s despite being unfitted, although their numbers were much reduced by that time.

Accurascale has produced two batches of HOP24 wagons including a set of wagons finished as internal users once used at Onllwyn Colliery. Most of the models are finished in BR freight grey with various marking depending on the era.

HBA/HEA/MEA air braked wagons

In the 1970s, the existing fleet of mineral and hopper wagons was showing its age and rebodying could only do so much to extend the working life of some wagons. Further, BR decided that the wagon load delivery of coal to small dealers in station yards was becoming increasingly uneconomical, resulting in larger coal concentration depots for domestic coal distribution.

With that plan came the air braked coal hopper wagon, coded HBA, a vehicle specially designed to manually discharge coal at coal concentration depots. As the BR Speedlink network developed, the HBA was fitted with new suspension springs to allow higher running speeds making it more suited to Speedlink operations. The wagons also received a new TOPS code to reflect this change and they became known as HEA.

HEAs could be found working in block rakes of various lengths or smaller blocks within mixed freight trains. Their role was not



Displaced HTVs wagons were used in aggregate traffic, with flows from Peak Dale in Derbyshire seeing large numbers of HTVs in regular use in the 1980s. HTVs Nos. B340329 and B340406 from the last batch of rebodied 21t hopper wagons are visible. Note the heavier suspension springs and spindle buffers. This view was recorded on September 18, 1986, and by this date, the 21t hopper wagons were soon to be replaced with modern air braked wagons.

Five-rib HOP21 or HTO 21t hopper wagons to Diagram 1/146 are part of the Accurascale range and can be used to model coal traffic from the 1960s to the early 1980s.



BR HUO and Onllwyn Colliery internal user wagons are seen in this view, with the latter nearest the camera. HOP24/HUO wagons worked in block rakes and were rarely used for single wagon load coal movements. That role fell to the 21t hopper wagon.



A regular flow of industrial coal supplied the power station at Spondon near Derby which was transported in 24t HUO wagons of the same type as modelled by Accurascale. The station produced power and heat to the nearby British Celanese chemical plant. Trains ran from Gedling Colliery to Spondon on a daily basis using Class 20s as traction. No. 20094 and No. 20108 hauled the train on January 18, 1986.



↑ The Hornby HEA wagon finished in Railfreight livery. Currently, neither Hornby nor Bachmann have current releases of the HEA.

restricted to coal with block trains of HEAs used to transport industrial coke.

As domestic coal traffic fell away to nothing in the 1990s, many HEA wagons were stripped of their hoppers and fitted with a ribbed body. The resulting MEA wagons were general user box wagons which were used on coal and aggregate traffic.

HEA and MEA wagon models are produced by Bachmann in 'OO' gauge from time to time, along with the cut-down MEA wagons. The models all use the same underframe tooling.

Hornby also has an HEA in its catalogue, but has not produced it for some time.

The HAA family (MGRs)

By the standards of modern air braked freight operations, the HAA family is huge and with a long build and operating history.

Modernisation of power station coal trains in the 1960s required a wagon capable of being unloaded in a continuous operation without stopping or being uncoupled from the locomotive. The term 'Merry-Go-Round' (MGR) arose from the way trains were operated as continuous circuits between colliery and power station, with unloading being as automatic as possible.

The HAA wagon was designed for such operations. It was introduced in 1964 and built in large numbers from 1965, with over 11000 wagons entering traffic. The large hopper enabled swift loading at the colliery, whilst the mechanical unloading door controls were activated by lineside equipment ('Daleks') at the power station or industry such as a cement works without having to stop the train to discharge each wagon.

To meet operational requirements, MGR wagons had a number of variations including top canopies and differences in braking equipment. Rebodying of earlier wagons to strengthen the top edges of the hopper instead of using cross bracing was also undertaken.

MGR wagons are produced by several manufacturers. There has been a model in the Hornby catalogue for many decades. A highly detailed model was introduced over twenty years ago which appears from time to time. The original tooling first produced in the 1980s has been re-run as part of the 'Railroad' range.

In 2022, Accurascale released the first of its range of highly detailed MGR wagons in various guises and liveries including early HAAs with cross bracing.



↑ The classic modern power station coal train with a Type 5 freight engine as traction. Class 58 No. 58004 was recorded at Thoresby Colliery with a train for High Marnham power station in May 1987.

Cavalex Models announced a model in partnership with KMS Railtech and Trains4U around the same time and both companies had put sufficient development time into their respective projects that to cancel them would have been costly. The Cavalex Models range arrived in 2023.

Containerised coal

Containerised domestic coal traffic overcame a number of issues for the distribution of the fuel in several markets. The complex (and conservative) domestic coal market in Scotland was better served by containerised coal which was easy to transfer to different modes of transport. One of the first applications was the conversion of air braked long wheelbase VCA vans and SAA steel carriers to carry 30ft coal containers. They could be stacked and easily moved from one transport form to another. No ready to run models are available for this traffic.



↑ Cavalex Models HAA wagons with the later body style with reinforced hopper sides.



The Accurascale HAA model with original style of hopper body with cross bracing. This became damaged after a time and was removed before the wagons were rebodied.



MGR wagon liveries were simple, with an unpainted hopper and black underframe. The cradle offered the chance of some different colours as seen on this trio of Accurascale HMA models. Yellow was applied by Railfreight Trainload Coal, replacing Railfreight red. MHA wagons are appropriate to the 1990s and 2000s, lasting until the end of MGR wagon operations. The HMA is an HAA with upgraded brakes and suspension for higher speed operation.



Bachmann HKA model decorated in DB red livery and carrying an international number and wagon code (Fabnooss).



Hornby still produces the HAA model it introduced in the early 2000s in various guises from time to time.



An Accurascale PFA wagon loaded with a Cawoods coal container.



Another bulk coal hopper part of the Bachmann range is the EWS HTA wagon. Some of the real-world wagons remain in traffic today, primarily used on coke haulage to Scunthorpe steel works.

Export coal was also transferred to containers. A fleet of 172 PFA four-wheel container wagons were constructed by Standard Wagon in three batches between 1986 and 1988 for Cawoods Container Services. The change to containers for export and domestic coal reduced direct handling and therefore damage to the delicate coal loads.

PFAs were run in block rakes to ports for export and in small blocks for domestic distribution. The Cawoods PFA fleet and containers were also operated by British Fuels and CPL. Accurascale has produced models of the low platform PFA wagon along with the distinctive containers used in coal haulage. When the traffic ceased, the wagons were used in containerised gypsum and nuclear waste traffic.

Mention should be made of the small fleet of forty PFA four-wheel wagons built by Procor for hire to Kellys. They were used for export coal traffic in South Wales. No ready to run model or kit exists to model this traffic flow.

High-capacity bogie coal wagons

In the run up to privatisation in the mid-1990s, one of the first ventures into private haulage on the rail network was by National Power which ordered a small fleet of Class 59 locomotives and JMA hopper wagons for coal haulage to Drax power station. The operation only lasted for a few years before it was sold to English, Welsh and Scottish Railways (EWS). The wagons remained in service, eventually recoded as HKA and fitted with new bogies. Bachmann produces a model of the HKA wagon with the replacement bogies.

Privatisation of the railways saw large fleets of bulk coal hopper wagons constructed for power station and industrial coal flows. EWS ordered a fleet of 1144 HTA bulk coal wagons between 2001 and 2004 which were built at York. They were intended to replace remaining MGR wagons. Bachmann



Models of the HYA and IIA high-capacity bogie coal hopper wagons are part of the Accurascale 'Powering Britain' range.



Accurascale was not content with producing the HYA and IIA coal hopper wagons, but tooled parts for the biomass wagon conversions too. IIAs fitted with top hatch covers designed to protect the load remain in traffic today on flows of biomass to Drax power station.

produces a model of the HTA wagon from time to time.

A 400-strong fleet of HYA/IIA high-capacity bogie coal hopper wagons were constructed over a four-year period from 2007 by IRS Romania and WH Davis for GB Railfreight and Fastline Freight. The wagons are modern, with TF25 low track force bogies and an uncluttered appearance which includes unpainted hopper bodies adorned with operator logos and the brown lines where the hoppers were welded together which is unique to this wagon type. The HYA/IIA wagons are produced by Accurascale.

Freightliner also ordered large numbers of hopper wagons for coal haulage. One type is produced in 'OO' gauge and that is the wagon HHA coal hopper which is part of the Bachmann catalogue. A total of 446 wagons were built between 2000 and 2005 by Greenbrier in Poland.

With the dramatic decline in coal traffic, the wagons were transferred to aggregate traffic for which their large payload volume was unsuitable. The story for many coal hopper wagons ends with cut and shut conversions to reduce the size of the wagons making them more suited to aggregate traffic, fitting of covers for biomass, scrapping to recover useful components or storage with little or no future.



The fleet of 446 Freightliner HHA wagons are very similar to the JMA/HKA wagons built for National Power. Bachmann produces a model of the HHA in 'OO' gauge.



Coal trains and semaphore signals were once a common sight at Barnetby where this record of Freightliner No. 66510 was taken on July 22, 2007. The signals and import coal traffic are gone, as are most of the HHA wagons built for bulk coal traffic. Nearly half have been scrapped to recover components whilst others were cut down for aggregate traffic.

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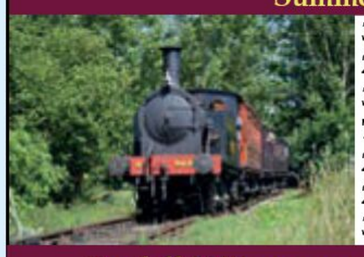
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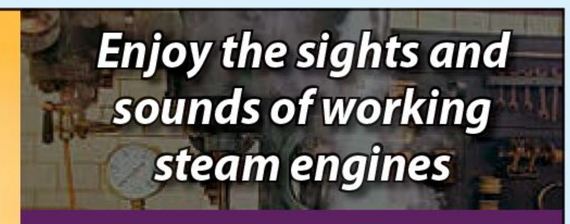
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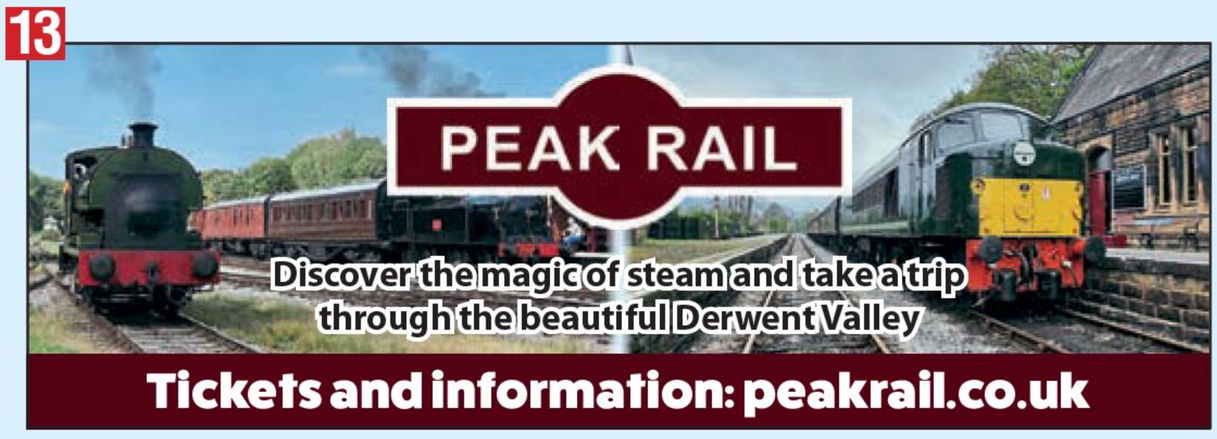
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The West Highland portion of the Caledonian sleeper had just arrived at Fort William, its final destination on March 21, 2025. Traction was a Class 66 and Class 73/9. There is a loop at the station to allow charter and sleeper locomotives to run round their trains, a feature which is invaluable to include in a model railway track plan.

Ten tips for successful layouts

Mistakes cost money in railway modelling and can be discouraging too. Here are our top tips for avoiding common layout mistakes in any scale.

WHILST THIS PUBLICATION is all about helping newcomers to the hobby along with inexperienced modellers get the best out of model railways, it has to be said that mistakes will be made when it comes to layout planning and building and sometimes, they can be costly. Even experienced modellers and model railway club members have made mistakes which sometimes results in a complete layout being prematurely scrapped.

Experience shows that common mistakes are easily avoided by careful planning and research.

Successful layout builders research and plan their projects with care before the first piece of wood is cut. Planning covers everything from train length, scenery, structures, minimum curve radius and the smallest turnouts or points that will work on the layout. You can do the same with your first project to reap the benefits of the hobby from the start.

Tip 1: Use the Givens and Druthers planning method

There is a concept used by modellers in the US which is to make a list of givens and druthers when planning a layout. It is a useful starting point to see what you need to look into before starting more detailed planning.



↑ Layout planning should include careful measuring of train length to check that they will fit passing loops like the one at Forres which was being used by the Royal Scotsman tour train on May 31, 2006. As it happens, the tour train was overlength which causes operational issues at times. The east bound Class 158 had to wait until the tour train was clear.



When planning, ensure that your rollingstock is appropriate to the curves and length of turnouts you plan to use on the layout. Not only will operations look better, they will be more reliable.



Model railway curves are generally sharper than is prototypical. Consequently, distances between the tracks on a double track layout (or more tracks) has to be checked carefully to avoid coaches and long wagons catching when they pass each other. The measurement will be greater than would be found on the real railways.

Givens are realities we can do little about such as the available space for a layout, where it is to be built, stored and transported; all of which determines its size and what you can run on it. A notable given is the layout budget, although it is likely that most layouts eventually exceed the original build cost! The question remains: How are you going to pay for it? Time is another given. Will you ever finish it to your satisfaction? Can you balance the construction time into the project to complete it to a reasonable level against other time demands such as work and family?

Druthers, on the other hand, is the layout wish list. Things not determined by constraints such as size. Scale is one. Okay, you will achieve more with 'N' gauge for a given space than 'O' gauge, but it is a choice, not something that would be solidly determined by physical constraints. Choice of scale, control system, era and locations are all 'druthers'. Will the layout be based in winter or summer? Whose models do you prefer?



Large steam locomotives such as the impressive Bachmann Southern Railway 'Atlantic' H2 look great, but do you have room for them if your layout is compact or micro-sized? It is worth researching locomotive and rollingstock lengths to see if the models will fit your plan.

Tip 2: Choose models to suit the layout size

Do not make the mistake of trying to squeeze too much into your given space, particularly if the layout is a compact design. Try to keep rollingstock choices in line with the layout size. Consider how long the platforms of a station are likely to be and be sure the trains will fit. Large steam engines make amazing models, but unless you are modelling a motive power depot, they might overpower a small layout. HSTs with their 23m trailers might not look great on 24-inch radius curves in 'OO' gauge (12-inch in 'N' gauge) or running over short radius turnouts.

During planning the layout, avoid the temptation to use short turnouts with long wagons and coaches unless you can make the track formations 'flow'. Test your rollingstock on the sharpest curves you intend to employ on the layout to see that it will actually run round it without derailing, buffer-locking or couplings snagging. When manufacturers quote minimum operational curves as second radius, that is usually the right figure for reliable operation. Further, the excessive overhang that results from running trains on sharp curves and turnouts do not look realistic and require more clearances for lineside structures too. And that brings us neatly to the next common mistake.

Tip 3: Check clearances for rollingstock

Model railway clearances usually have to be greater than scale so our scale trains will run on curves and turnouts that would be too sharp on the real-world railways. The sharper the curves on a double track layout (or more tracks), the greater the distance between each running line has to be to avoid coaches and long wagons catching when they pass each other. When planning the track layout, allow for the overhang of long coaches and bogie wagons when deciding where to place the track.

There are several techniques to build in sufficient clearances for curved track. Take the longest item of rollingstock you are likely to run and attach a pencil to one



The Royal Scotsman tour train makes regular trips to Kyle of Lochalsh where it was recorded on October 13, 2005. The Class 47 is about to run round its train using the short length of track ahead of it. This has to be measured carefully for a model railway to ensure the longest model locomotive will fit comfortably. Don't forget to leave room for the buffer stop.

end so the pencil point is in line with the extreme corner. Place the curved track on paper and run the rollingstock around the curve. The pencil will overhang with the vehicle corner and scribe a line which will be the absolute minimum clearance for platforms and lineside features (tunnels, bridges etc.). Do the exercise for both the inside and outside of the curve, taking careful measurements. The scribed lines can also be used to determine the absolute minimum distance between two or more curved tracks. Ideally, a margin of error should be built into the measurements.

Another technique is to run the longest vehicles through the curves during track laying to see if they touch when passing on the double track section. It is also a good check of measurements determined by the pencil technique.

Modellers of electrified railways have a further clearance issue to factor into layout planning and design. Pantographs need to be accounted for along with space that overhead wires would occupy under bridges and tunnels. This may add around 100mm to some clearances to ensure raised pantographs are not caught and destroyed!

Tip 4: Include a run-round loop

Whilst the inclusion of a run round loop is a personal choice, it is a good idea to design one into the track plan for operational purposes. They are common on the real railways to allow locomotives to change ends of a train so it can run back in the direction it came from, say at a terminus station or after unloading at a freight terminal. They are not quite so vital when

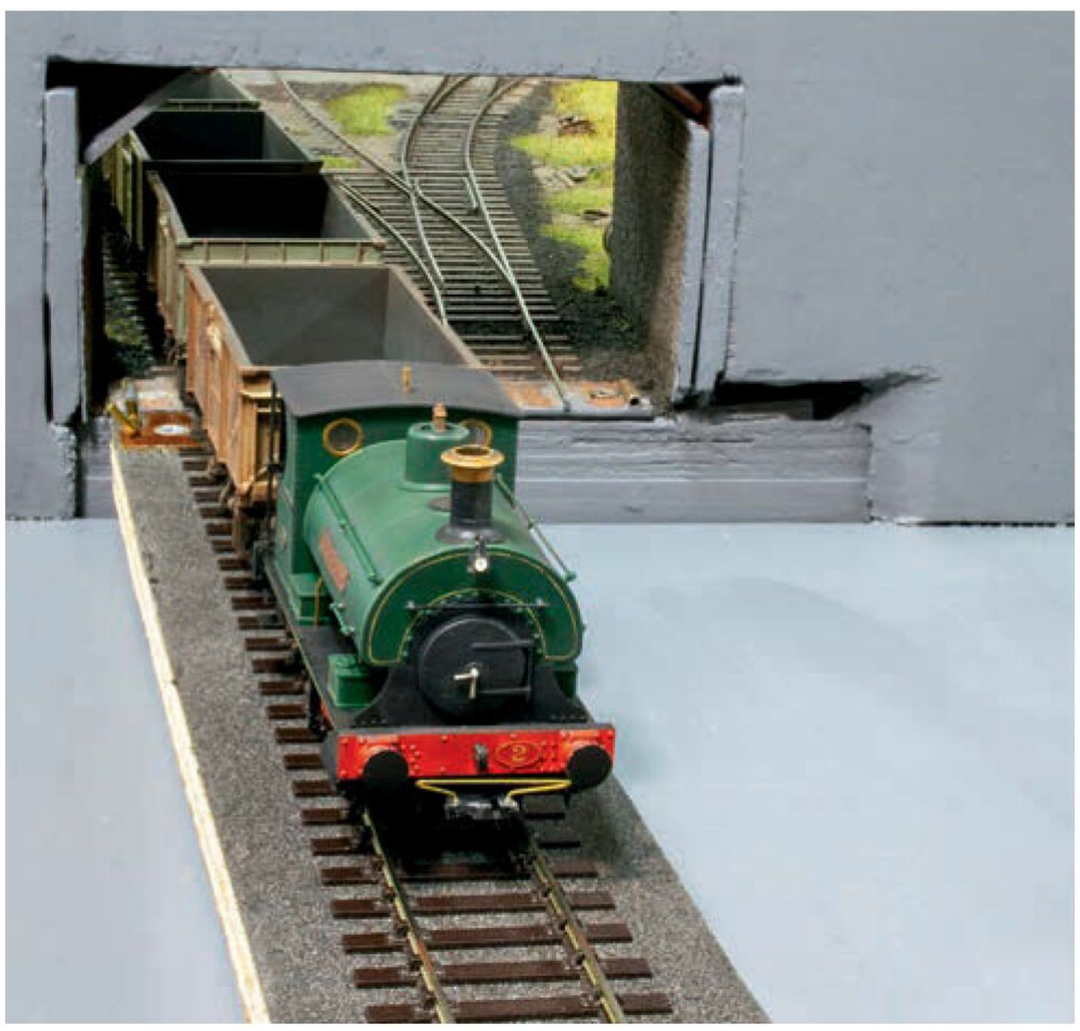


Fitting a passing loop for shunting and delivery of wagons to various buildings was a challenging feature to incorporate in this micro layout. A simple but effective planning trick is to use the off-stage fiddle yard or staging area (visible through the bridge) as part of the run round loop.

LAYOUT PLANNING



↑ The track between (A) and (B) forms a loop which was measured to take the longest freight train that will fit in the layout's staging or fiddle yard.



↑ The staging area has a single track panel which is pivoted to serve three separate tracks. It completes the opposite end of a passing loop. In effect, running round a cut of wagons uses the staging area.



↑ The pivoted track panel transfers locomotives and trains from various tracks to save the space that turnouts would require. It is also a low-cost option for one end of the layout, avoiding the need to buy two turnouts and point mechanisms.



↑ A view of the off-scene train staging area showing the pivoted track panel and separate track panels that store additional trains. they are designed to plug in to the end of the scenic track sections.



↑ Train lengths were measured before the staging area and movable track panels were built. They had to be accurately measures to ensure that the planned maximum train lengths could be accommodated. Also remember to plan for layout and turnout controls! Where are you going to locate them?



↑ The same need to measure everything carefully applies to all scales including this 'N' gauge layout which has an off-scene staging area composed of plug-in track panels or 'cassettes'.

modern multiple unit operation is involved, but even so, there may be a need to run round freight or engineer's trains in a yard.

Unless you plan for some way of running a locomotive around its train on a fiddle yard to terminus style layout, you will need two locomotives to work the layout at any one time and that might not be that convincing for rural stations. The run round loop means that only one locomotive is required as one would observe on the real-world railways. Locomotives are expensive assets and excess is always avoided by operating departments.

There are exceptions of course. A freight could be delivered to a private siding where wagons are shunted in and left for a privately owned shunter to move them into place. The wagons would be returned to the mainline railway in the reverse order, negating the need for a loop.

On the flip side, the turnouts needed for loops are space consuming and may be too much for a compact or micro-layout. There are techniques to overcome such space issues and one is to use the fiddle yard or staging area as the far end of a loop. A locomotive can be switched from one track to the other on the fiddle yard traverser, sector plate or cassettes in lieu of a set of points. This saves a lot of space at the price of having to leave part of a storage track free for such moves. A further consideration would be how to disguise the far end of the loop where it leaves the modelled scene to enter the train staging area.

Tip 5: Avoid hidden track

You can guarantee that trains will derail in tunnels and hidden track or train storage areas under scenic boards. Whilst hidden track can be used to save a lot of space and take advantage of areas under scenery for staging, be sure to make it accessible in case you experience a collision or derailment!

Scenery sections can be made to be removable. This is a good idea to track can be cleaned and repairs made. The same applies to buildings used as a cover for hidden track. By all means take advantage of such layout design techniques, but make it accessible.

Tip 6: Making heads hunts and loops too short

It is surprising how often this issue arises, and usually on small layouts. When planning and laying out the track formations, use your longest locomotives to determine the minimum length of head shunts or shunting necks which are the short lengths of track needed for a locomotive to run clear of turnouts at the start and end of a loop. This includes the short length of track between the end of a loop and buffer stops.

The same applied to loop length. Are they going to be long enough for the trains you plan to run? Is there enough room for two trains to pass each other? Matching their length to the longest train you plan



↑ Train lengths were measured to determine the length of the freight loop on the left (it had to fit a container train of a pre-determined length) and the distance between signals where the Dapol Class 67 stands and the rear of the mail train. The approximate signal position is marked with map pins. This determined where the turnout to enter the loop was to be positioned when the layout was designed.



↑ A small industrial shunter occupies a head shunt at in an exchange siding scene. The head shunt was measured to take an 0-4-0ST locomotive and three 21t hopper wagons comfortably.



↑ A head shunt on an 'N' gauge layout is carefully measured during the track cutting and laying stage to be sure the longest locomotive will fit.



↑ This scene has a head shunt that accepts a Class 08 and brake van. As a result, it is long enough for the main line locomotives that will operate on the layout.



↑ This view shows a Hornby Class 755 'Flirt' being used to determine how long the platform should be to accommodate it. There has to be room for signals and buffer stops too. In the event, the four car Class 755 was 75mm too long and a three-car will be used instead!

to run may sound obvious, but sometimes a forgotten consideration. Also think about matching the length of the loops on the scenic areas of the layout with the longest trains that can be held in the off-scene train storage area.

When measuring loops and storage tracks in staging areas, think about leaving a little breathing space between the train, the end of the track and turnouts. Also consider how storage loops can hold more than one train if the trains are short, such as multiple units. If your station platforms are

long enough for a three-car Class 158, they will also take a two-car Class 156, two-car Class 158 plus a single car unit such as a Class 122 or Class 153. Make your storage tracks long enough to do the same!

Tip 7: Plan to use suitable materials

Baseboard frames will have to do quite a tough job for a number of years if your layout is to last. They are the stable foundation for track, buildings, structures and the electronics which one hopes will remain stable for years of reliable train operation. We expect this of our baseboards and then expose them to storage in damp conditions (sheds, garages and club rooms) and constant assembly and breaking down at shows if it is a portable layout. Scenery materials, glue, and water-based paints will be thrown over them during the construction phase too. Thin and inadequate materials will soon show their weakness with warping and distortion.

The price of good quality plywood is eye-watering at times, so there will be the temptation to use 5mm ply instead of 9mm or 12mm plywood (thickness depends on the board size) to save money when building full-size baseboards (usually around 1200mm or 4-foot in length or larger). If you are building a micro-layout with small boards, thinner material can be used for the frame as long as the supporting track bed or baseboard top material is thick enough to resist bowing between the supports.

Some compact and micro layout builders have successfully used foam board for their layouts and this requires some specialised construction techniques to be effective. There is no limit or restriction to what can be used as long as it is strong and stable. Even MDF board can be used for small baseboards if it is properly braced against warping and is properly sealed before track and scenery is applied.



↑ **Planning for layout equipment is as important as track planning. Where are you going to locate electrical devices, controllers, plug-in panels and point motors? It is important to plan baseboard bracing and supports in relation to where turnouts may be located so point motors will fit, for example.**



↑ **Don't go cheap! use the best quality wood you can afford with baseboard building (although high specification birch ply is not always necessary) and do not skimp with plywood thicknesses. Warped boards are ultimately a complete waste of money and loss of modelling time.**



↑ **Seal baseboard frames by painting them if the layout is to be stored and used in cold and relatively damp locations. Paint also reduces the chances of splinters!**

Anything over 40-inches long and 20-inches wide will need a minimum of 9mm ply and 12mm is better. It will need to be braced too (emphasis is placed on the importance of bracing). The same goes for the use of planed timber for frame building. Avoid using material that is too cheap or thin.



↑ A successful 'N' gauge layout built on frames of 12mm plywood which was braced to prevent warping during the life of the layout. Note the clearances allowed for the modelling of overhead line equipment and electric locomotive pantographs.

The strength of baseboards increases as fascia and back drop boards are fitted along with the baseboard top, so give that consideration along with baseboard weight when looking at a portable layout design.

Tip 8: Plan for layout equipment

Before assembling baseboard frames, give consideration to the placement of topographical features and structures including bridges, embankments, cuttings, and tunnels. Raising the track bed board (sub track bed) above the level of the baseboard frames allows features below track level to be modelled. It also allows more clearance for the machines (point motors or solenoids) that will operate the points or turnouts. Take care to position cross bracing to avoid places where point motors and other equipment has to be fitted to the underside of the baseboard top. There is nothing worse than



finding that the points of a turnout end up right over a baseboard riser or brace with no room for the motor on the underside. The solution usually needs some creative thinking to disguise a surface mounted point motor!

Whilst on the subject of turnouts and points, make sure your track planning avoids placing a turnout or crossing over a baseboard joint. This is not such an issue for fixed layouts, but can be a cause of unreliability in portable and exhibition layouts. Always plan your layout design to be as resilient as you possibly can!

Tip 9: Seal your baseboard frames and tops

You have planned your layout and now keen to get going on construction. There are two techniques you should consider that will deliver benefits for your layout in the future before you start any work. They will help stability and longevity of baseboards, making the frames reusable for many years to come.

The first is to store the new and unused plywood and planed timber in the room where the layout is to be constructed for a couple of weeks. It will help to stabilise it with the immediate environment. Avoid this step if the storage place is excessively damp.

The second is to paint the baseboard frames, fascia, backdrop boards and track bed top with several coats of paint to seal the wood and prevent damp from being absorbed by it. Undertake this task as soon as the frames are constructed and adhesives are dry. This is an important step if the layout is to go to shows or be stored in a less than ideal location such as a garage. A further benefit is sealing in any splinters and slithers of wood that might be a problem when the baseboards are handled.

Finally, use the glue and screw technique to construct frames, trestles and legs for the layout. However, avoid glue for baseboard tops and track bed boards. Fitting them just with screws makes the baseboard frames easy to recover for another project!

Tip 10: Do not go cheap!

Tight household budgets adds to the challenge of building a model railway. One reason for the growth in micro-layouts is limited funds for modelling. However, one can go too cheap. Whilst the second-hand market may provide some quality stock for a reasonable price, false economies will make a layout frustrating to build and operate.

Old rollingstock and locomotives in 'OO' and 'N' gauge can be bought from traders at shows for a few pounds and may seem like bargains at the time. Unfortunately, they will lack the finesse of current models, particularly 'N' gauge.

The lack of decoder sockets, the use of split frame chassis in older 'OO' gauge steam locomotives and 'N' gauge models of all types together with basic couplings and coarse wheels are all factors to consider.

They may not run as well as current models and not be capable of the slow running speed needed for a compact layout. Wheels will be coarser than current models and will require a minimum of Code 100 track to work properly. If you want fine looking track, you will need models with the current wheel standards (RP25/110 in 'OO' gauge for example). Satisfactory operation needs good models with current drives, electronics and all-wheel current collection.

If the top end models produced by some manufacturers are not within reach, the Hornby 'Railroad' range provides a different approach to budget modelling. Quite a number of very experienced modellers take advantage of this range (which can be discounted by dealers) to create very convincing layout scenes. Models have current features such as digital sound, decoder sockets and authentic liveries, but are priced for the budget end of the market. There is the option to upgrade when funds become available.

The quality of current equipment, locomotives, multiple units and rollingstock, means that a smaller fleet of models may work better. It is the principle of 'less is more' which is being adopted by modellers. A greater emphasis is on detailed operation including digital sound. Perhaps two or three high end models will deliver the same enjoyment as a large collection of cheaper models.

Final thoughts

It is so easy to dive into a layout project without much thought beyond the trains one wants to run, but it pays to take a step back and do a little more planning and research at every stage. It will deliver benefits in a better model railway.

Our ten tips are based on experienced gained through the building of numerous layouts. Perhaps the most frustrating problem has always resulted from baseboards which have failed to do their job properly. After that it has been the results of poor planning of track formations and clearances. Keep these issues in mind as you doodle track plans on note pads and eye up that handy space in the spare room!

Painting Basics:

Airbrush essentials for modellers

Painting is one of those necessary evils of railway modelling that we all come across sooner or later. However, making a start with airbrushing is easier than you might expect.



There is a huge variety of different airbrushes and accessories suitable for hobby painting. How do you choose an airbrush and equip your spraying station with the right tools?

Why buy an airbrush?

Painting can be a fascinating part of railway modelling and experienced modellers thoroughly enjoy the process of painting, decaling and finishing models to give them a customised appearance and new identities compared to off-the-shelf models. Finishing a custom painted locomotive in any scale is hugely satisfying.

Experience has shown that an airbrush is the best way of applying paint and varnish to achieve a good finish (etching primer being the exception – use an aerosol can). Airbrushing is a relatively simple skill to master and will help you produce excellent results and that applies to more than rollingstock. Spray painted effects can be applied to scenery too, along with weathering techniques and matting down your models for a uniform finish.

Airbrushes come in all shapes and sizes, yet to a certain degree, are all designed to do a specific job. They have different features, different ways of accepting colour medium and deliver subtly different results depending on needle and nozzle size. So how do you choose an airbrush for railway modelling applications?

For modellers, repainting locomotives and rollingstock is the primary reason for owning an airbrush followed by the need to apply weathering

and painting small details on a layout. What airbrush suits this purpose? Which type of airbrush works for tinting and adjusting scenery colours? Well, there is no single answer to that question because everyone has a different approach to painting and weathering which demands slightly different things from an airbrush.

Your editor's personal preference is for mid- to higher-end dual-action airbrushes with gravity feed and internal paint to air atomisation. However, choices are personal and painting station set-ups will vary depending on the desired results. Some modellers achieve great things from budget airbrushes and may find the simplicity of external mix airbrushes better than more refined internal mix types. There are other factors to consider, some of which are determined by the paints we use in model railway applications.



Most of the modelling in this suburban railway layout has been painted with an airbrush at some point, whether it be livery application on the kit-built EMU or the background building.

Making a choice

You have to decide what you need from an airbrush (or two if your needed applications vary a great deal). The most important one will be your level of painting experience. High-end airbrushes may be too much for a newcomer to model railway painting, yet provide fine spray patterns suitable for the fine grained paint finishes needed for 'N' gauge modelling, fine weathering and detail painting in larger scales.

On the other hand, some entry-level airbrushes cope well with the coarser paints we regularly use and are less likely to be too picky about spraying them. The factors that influence the choice of an airbrush start with that point.

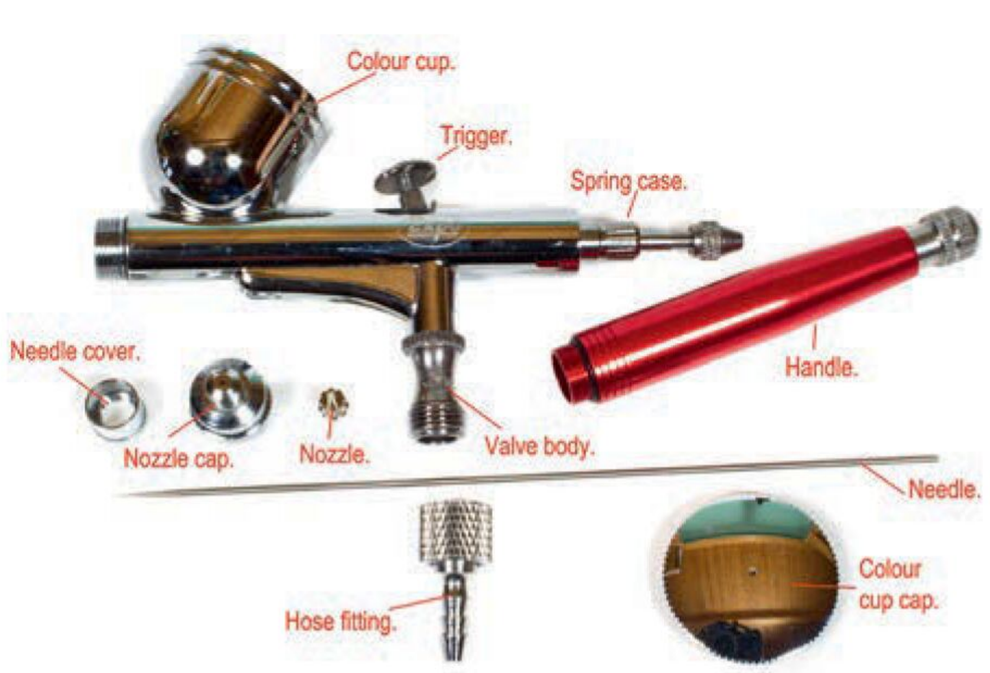
1. **What type of paints will you need to spray?** Primarily, railway modellers use acrylic and enamel-based paints, which are relatively coarse compared to artist inks and other media. This precludes airbrushes with very fine needle assemblies. The smaller the needle and nozzle diameter, the finer the spray pattern. However, do you really need a fine spray pattern from needle and nozzle assemblies smaller than 0.35mm? They can be awkward to clean of solvent based paints and require particular care. Ideally the optimum balance between paint quality and fine spraying might be met with a 0.5mm needle and nozzle assembly.

2. **What is the budget for equipment?** Bear in mind you may need a compressor, moisture trap and some personal safety equipment too when allocating scarce fund to setting up a spraying station.

3. **Desired performance is an important factor.** Most quality airbrushes can spray down to a fine line with practice, including



An airbrush is considered to be an essential piece of equipment for many modellers. They produce better paint finishes and can be used for fine weathering effects.



The essential parts of an internal mix, dual action airbrush.

entry-level ones. The Iwata Revolution series is an excellent entry level airbrush which can spray very fine lines and works well with detail painting too. On the flip side, a higher-end airbrush may provide more control for fine painting and weathering compared to an entry-level one. Furthermore, the level of control is determined by whether the airbrush is single action or dual action. This may be a factor when deciding what you want to paint – be it weathering, fine detail or broad stroke repaints of larger models.

4. **What are you planning to paint?** This comes down to whether you planning to do full repaints of ready to run and kit-built models or plan to do fine weathering work. The size of models is also a consideration. Good finished are always the desired objective no matter the scale, 'N' and 'TT:120' scales will need more care to achieve fine surfaces on the paint. The choice of airbrush and its needle and nozzle assembly will be determined by these parameters.

5. **How good is your air supply?** The power and specification of your air supply is very important. How powerful it is and if it has an air-receiving tank are things you need to check. Does the airbrush work well at low air pressures?

6. **How experienced are you?** Airbrushes are designed for skill levels too. Experience has a part to play to achieve in achieving the best from them. A forgiving budget airbrush will be a better place for a novice to start where the risk of damaging the airbrush is not too costly or if spraying does not suit.

So, what features should be considered when selecting an airbrush beyond the tip and needle size?

Internal or external mix?

The function of the airbrush is to mix the paint with the air supply to atomise it for spraying as very fine drops. This is done in two ways. The first is within the body of the airbrush at the tip but within the cap of the airbrush providing a very fine level of spray and finer spray patterns which can be brought down to a fine line. This is the function of an internal mix airbrush.

In contrast to that, external mix airbrushes do not mix the paint and air in the same way. The air flows over the spray tip to atomise paint outside the body of the airbrush. This difference means that both types have different applications. Experienced modellers usually prefer internal mix because it delivers a finer spray pattern and provides better control over paint flow. external airbrushes are better for spraying larger quantities of paint and probably more than the average moulded body shell will need for good coverage.

Single action airbrush basics

There is a clear link between needle and nozzle size and spray patterns. Another factor is the generic airbrush type. Single-action hobby airbrushes are generally simpler and lower in price than dual action airbrushes and may come with larger needle and nozzle assemblies, being used for more generic spray painting.

Control of air and paint flow are independent of each other. Paint flow is pre-set using a screw fitted at the end of the airbrush handle which adjusts the position of the needle. The air flow is started by pressing on the trigger but that is all the control the operator has during painting. To reduce or increase paint flow, spraying must cease to allow the needle position to be adjusted. They are useful airbrushes for long spraying bouts using a single colour applied over a large area. Some modellers also have difficulty with dual action triggers making this type a better option.

Double action airbrushes

In this type of airbrush, control of air and paint flow is done together using the trigger. Airflow commences when the trigger is pressed. At this point, no plaint flows through the airbrush until the trigger is gradually pulled back to withdraw the needle from the nozzle. Paint flow increases gradually from nothing to full flow as the needle is pulled back. Whilst the trigger action takes practice for newcomers to get used to, it provides a greater range of control which is particularly useful for weathering and fine painting technique.

The clear benefit of dual action airbrushes is the greater control over paint flow which can be adjusted instantly during painting to vary the spray pattern Control like this is especially helpful when applying weathering effects. It also reduces splatter through build-up of paint at the tip.

Gravity feed airbrush

Gravity feed refers to airbrushes equipped with a paint cup moulded integrally on top of the airbrush. The paint flows downwards into the paint chamber itself before flowing to the tip where the air flow atomises it for spraying. It is by far the most convenient type for modelling.

Paint cups can vary in size depending on the airbrush and some, like the Iwata Neo model, has interchangeable cups for different quantities of paint. Lids are supplied with gravity feed airbrushes fitted with cups to prevent spillage. Those with what appears to be a slot in the



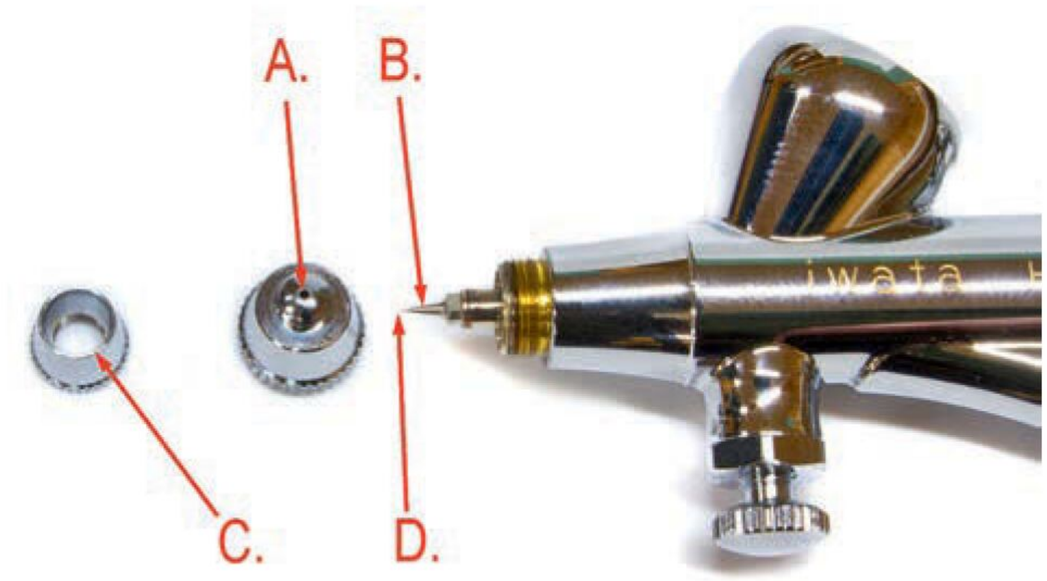
↑ **The principles of a dual action airbrush. Air flow is controlled by pressing the trigger whilst paint is controlled by pulling the trigger back and forth.**



Painting in progress on Hornby Class 73 models. All completed with a dual action Iwata Revolution airbrush.



A Neo by Iwata is an excellent entry level airbrush (including the price) with performance fine enough for weathering and dusting effects as well as full painting.



The needle and nozzle assembly of a typical airbrush. This part should be kept perfectly clean at all times. A: Nozzle cap. B: Nozzle. C: Needle cover. D: Needle tip.



Pre-set handles have a screw ring at the end (A) which is used to pre-set the needle and trigger to prevent them from being pulled back too far and delivering too much paint to the work piece with the risk of flooding it with paint. Cutaway handles (B) allow the needle to be pulled back further for the discharge of unused paint from the colour cup.

top of the airbrush body, called a fluid cavity, are not suitable for model railway applications, being designed to handle tiny quantities of colour medium such as inks.

Side feed

There are designs with a tube built into the side of the airbrush body. Paint cups or bottles with a compatible feed tube slot into the tube by a tight or interference fit. They provide a different range of handling positions over a top cup-down gravity feed type. Line of sight along the top of the airbrush is clear of a moulded cup which can be important for fine artistic work. Whilst they are perfectly good designs, they are not always favoured by railway modellers.

Bottom suction paint feed

They are similar to side feed airbrushes except they are only used with a paint jar. The jar or bottle is clipped into the bottom of a bottom suction feed airbrush. A tube leads to the bottom of the jar to siphon the paint up and into the body of the airbrush. Bottom feed airbrushed are ideal for larger spraying jobs where a sizeable quantity of paint is required. Large scale modellers will find the larger paint capacity ideal for covering large areas on 'S' and 'O' gauge models without having to constantly stop and top up paint cups. On the flip side, paint jars and their lids take a little more cleaning than a moulded paint cup. However, spillage is far less likely to occur.

Pre-set handle

In a sense, dual action airbrushes fitted with a pre-set handle is a hybrid design which sits between single and dual action airbrush designs. A screw is fitted at the end of the handle which pre-sets the flow rate by limiting how far back the needle can be pulled with the trigger. If you find that you have a tendency to apply to much paint or struggle to control the pullback action on the trigger, a pre-set handle is a very useful feature.

Cut-away handle

A feature of higher end airbrushes is a cutaway handle. They are a feature of dual action airbrushes which provides access to the needle securing nut. It allows you to pull the needle back further than is possible with the trigger to clear the airbrush of colour and makes cleaning easier too. It saves removing the handle to reach the securing nut.

What else do you need?

You have decided on your painting needs and have selected an airbrush that

will deliver the required performance. What else do you need to set up your spraying station?

Some of your budget should be set aside for safety equipment and in *The Guide to Model Railways*, we plan to cover the necessary safety issues surrounding painting with an airbrush.

There is a variety of equipment designed to make the task of spraying easier and in some instances, it is easy to be carried away with buying stuff, some which you might not need at all. The first one is to consider how you are going to look after your investment and keep it in excellent working order.

Keep airbrushes safe during painting

Don't forget to buy an airbrush stand or dock when setting up your spraying station. These simple devices usually clamp to a tabletop and provide a stable place to stow airbrushes during painting sessions so that they are not damaged or knocked over causing spillage of paint from the paint cup. You can buy a stand that will hold more than one airbrush if you're doing complex layered weathering effects needing more than one airbrush to be in use at a time.



↑ **A powerful compressor is an essential piece of equipment. The Sparmax Zeta compressor kit is small enough to suit the needs of most modellers when it comes to storage bit has good power and kits come with an airbrush holder and stop switch when the airbrush is 'docked'.**

Universal spray out pot

A universal spray-out pot provides a safe way to discharge excess paint and solvents needed to clean an airbrush, ensuring that the liquids are trapped safely in a secure vessel. A filter is fitted to the lid of the pot to allow air to escape when an airbrush is being unloaded and cleaned.

Features of the Iwata universal spray-out pot includes a tough rubberised sleeve which protects the glass pot from breakage and prevents it from sliding across the tabletop. A hole in the side of the lid is fitted with a tight sleeve to accommodate most airbrushes, providing a tight seal when spraying out work is under way. Part of the design includes a single hangar for holding an airbrush and a stabilising stand to prevent the pot assembly from tipping over when an airbrush is docked in the pot. It is perfect for a painting workstation or for moving around a layout when painting scenery, track and other features.

The key benefit of a spray-out pot is to eliminate overspray when cleaning and discharging an airbrush after use or between colours. Instead



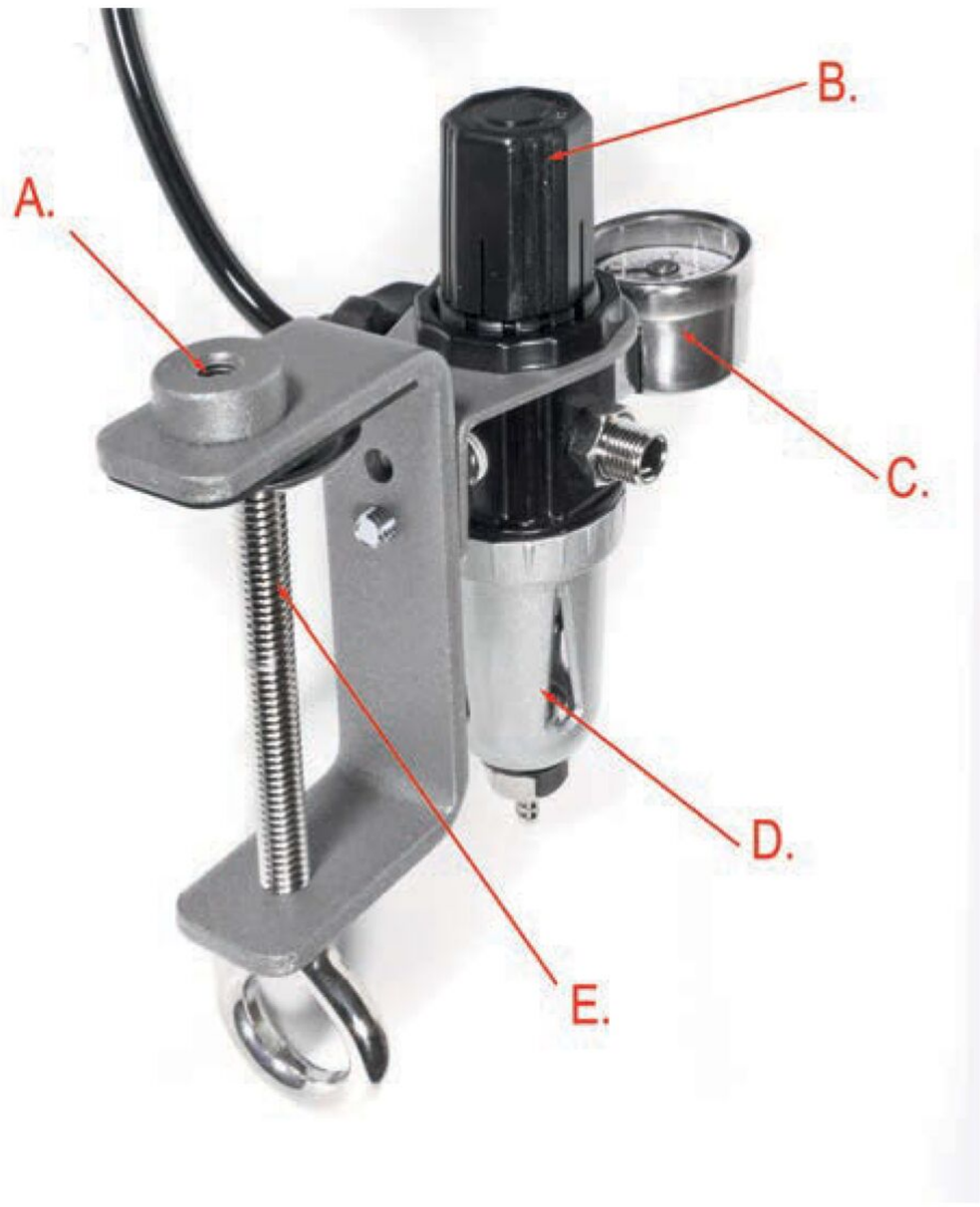
↑ **The compressor is connected to an air tank that is charged as air is used by the airbrush. This smooths the air supply and produces better spraying results. The metal casing protects the delicate equipment from knocks and bumps. A domestic consideration regarding compressors is the noise they produce. Is the level of noise likely to upset anyone?**



↑ **A simple table stand for two airbrushes. It clamps to the edge of a table and provides a safe place to dock your airbrushes.**



The Iwata universal spray out pot clamed to the table stand. The airbrush may be temporarily 'docked' in a spray out pot when spraying in areas away from a workbench, such as an area of the layout.



A typical air regulator and pressure gauge assembly suitable for hobby use. It may be attached to the work bench or the casing of the compressor itself. A mounting hole for a rocking stop switch and airbrush stand (A) is located on the bracket. It activates when an airbrush is docked in the stand. Other features include the regulator knob (B); pressure gauge (C); moisture trap (D) and work bench clamp (E).



Spray out pots are used to discharge small quantities of paint and solvent where it is not convenient to set up a spray booth. The pot is glass which gives it weight, stability and glass will not be affected by solvents. There is a small filter located in the top.



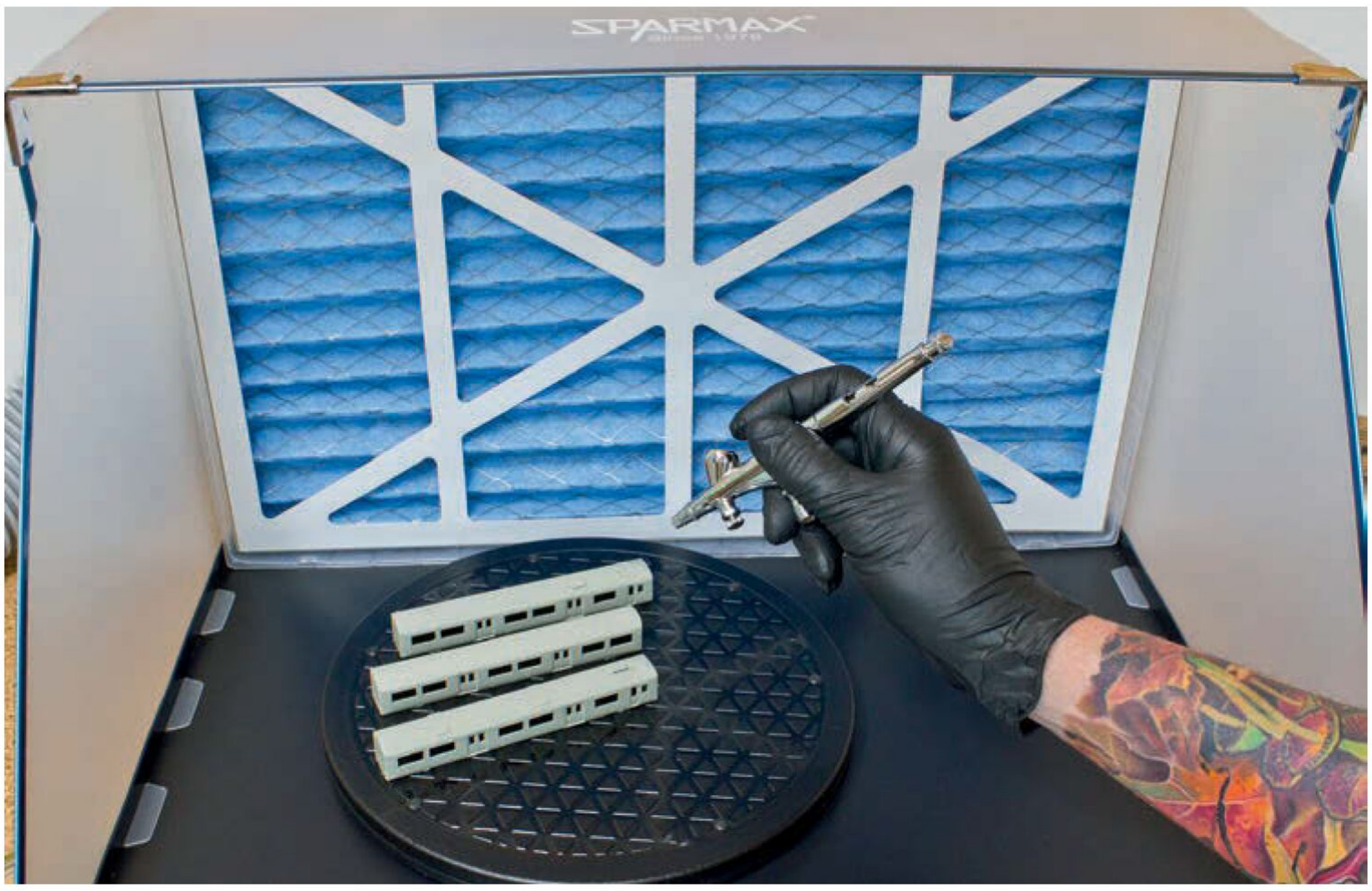
Spray booths and extractor units are a very desirable piece of kit for those intending to spray regularly. Most modellers may only need a hobby grade one suitable for occasional and short spraying bout use such as the Sparmax spray booth. It is shown before assembly.

of discharging it into the filter of a spray booth (filters are expensive), the pot captures the waste liquids so they may be safely disposed of (check local recycling regulations regarding the safe disposal of paint products). The glass pot is easy to clean, provides enough weight for stability and is dishwasher and solvent safe.

Spray booth

A simple extractor to draw paint fumes and dust away from you during painting is one of those things many modellers think they can avoid buying due to the expense. One messy spraying bout later where paint and solvent fume has filled the room will show that it is an essential item to buy. One thing you will be particularly keen to catch in the filter is paint over-spray dust which if uncontrolled, will go everywhere and coat almost every surface including other models waiting to be painted or have just been sprayed.

Spray booths are the answer and like most painting equipment, they come in various grades from hobby use to professional grade kit. They usually have a two-stage filtration system for capturing paint particles and fumes. The first is a wide fabric or fibre filter, the second is a fibre filter fitted in front of the fan entrance port. Some come



With turntable fitted, the booth is ready for use. It may be protected from paint by covering leads, the hose and the bottom with clear food wrap and newspaper.

with a carbon filter which is located behind the wide fabric type filter. Filters have to be fitted the correct way round to be effective and are replaced once clogged with paint.

Moisture trap

As compressors warm up, condensation may be formed in the air tank and air hoses. This eventually makes its way to the airbrush tip and will be discharged over the work piece. Moisture droplets are not ideal for achieving good finishes!

A moisture trap is fitted to the hose between the airbrush and compressor. They come in all shapes and sizes, being designed to fit various locations. Some compressor assemblies are supplied with them as standard, fitted to the side of the compressor.

Air pressure valve

There are times when the air flow pressure needs adjusting to suit the type of painting you are doing. Some paints spray well at lower pressures whilst others such as acrylic paints need a little more air to atomise properly. It takes a little trial and error to set the pressures correctly, but as one gains experience in airbrushing, knowing pressures will become second nature.

Cleaning kits

Cleaning is absolutely essential for good airbrush performance. When you return to the painting area, you want to be able to warm up the compressor and charge up your airbrush ready for the paint job you have prepared. If the airbrush is clogged with old paint or the trigger does not move smoothly through the body of the airbrush when the trigger is pulled back, you won't be doing any painting until cleaning has been completed.

Having psyched yourself up to do a painting session, this can be quite a let-down. So, what can be done about it? Cleaning materials are available to clean out hardened paint and to get an airbrush active again in a fairly short time.

The Airbrushes Co. offers a 'Save our Spray' cleaning kit designed to restore an airbrush to full working order. It includes 'Premi Air' Liquid Reamer which will soften the spilled enamel paint sufficiently for cap, nozzle and needle cleaning. Withdrawing a dirty needle can damage the internal needle bearing, so cleaning is done as far as possible before an airbrush is dismantled to complete cleaning work.

Another problem is the build-up of tiny paint flecks in the paint cup if cleaning



That airbrush is a disgrace! It looks pretty dirty and gummed up with old paint due to poor care. How would one clean it so it may be used again?



↑ **There are numerous airbrush cleaning products available and even paint solvent can be used carefully to clean an airbrush. When it is very dirty, special cleaners designed to soften paint to help remove it are available. It is sprayed on, left for a short time and the paint cleaned away.**



↑ **After the airbrush has been dismantled and cleaned thoroughly, the needle should be treated with special lubricant which will prevent it from sticking in the internal needle bearing or the tip. The result should be a smooth trigger action.**

is not done properly. They will become mixed in fresh paint and will eventually clog the nozzle, stopping a spraying bout part way through which is highly undesirable. Back flush the airbrush by pressing the trigger whilst your finger covers the nozzle cap. This blows air back through the cleaning solvent in the paint cup to clear the needle and mixing chamber of paint flecks.

Once confident that the airbrush is cleaned thoroughly, it can be reassembled. Apply Iwata lubricant to the needle before refitting. This will ensure the needle moves freely through the needle bearing which is also important for smooth control of paint flow.

What's next?

In forthcoming issues of *The Guide to Model Railways*, we will look at how to make airbrushing and painting as safe as possible for the domestic environment. This will be followed up on our top tips for successful painting and finishing.

A useful resource for Iwata and Sparmax products: **airbrushes.com**



↑ **The Sparmax Max 4 is another high-quality entry-level airbrush suitable for occasional hobby use.**



↑ **Do not dismiss the value of airbrushing for layout building such as track painting and weathering effects! A spray out pot will be useful for this type of spraying, but be aware of fumes and paint particles!**



↑ DCC brings numerous benefits to a model railway, including operations that are closer to the train driving experience as is possible with scale models. Double heading of trains is one feature and this type of scene can be replicated more simply than with analogue control. The location is Aviemore and the train is the Highland sleeper to Inverness with GB Railfreight No. 66705 *Golden Jubilee* leading Caledonian Sleeper No. 73966 on August 19, 2016.

Making a start with Digital Command Control

Looking at Digital Command Control for the first time? Our introductory guide gives you all the facts about how it works and what to think about before making a start.

DIGITAL COMMAND CONTROL (DCC) has become the leading method of controlling model railways of all shapes and sizes in the last two decades. The number of manufacturers offering complete control systems together with accessory hardware and complete digital train sets has expanded dramatically as modellers have embraced the benefits of DCC. The attraction of the system is that it brings realistic train driving to the layout in a manner not possible with traditional control systems (called traditional Direct Current or analogue control).

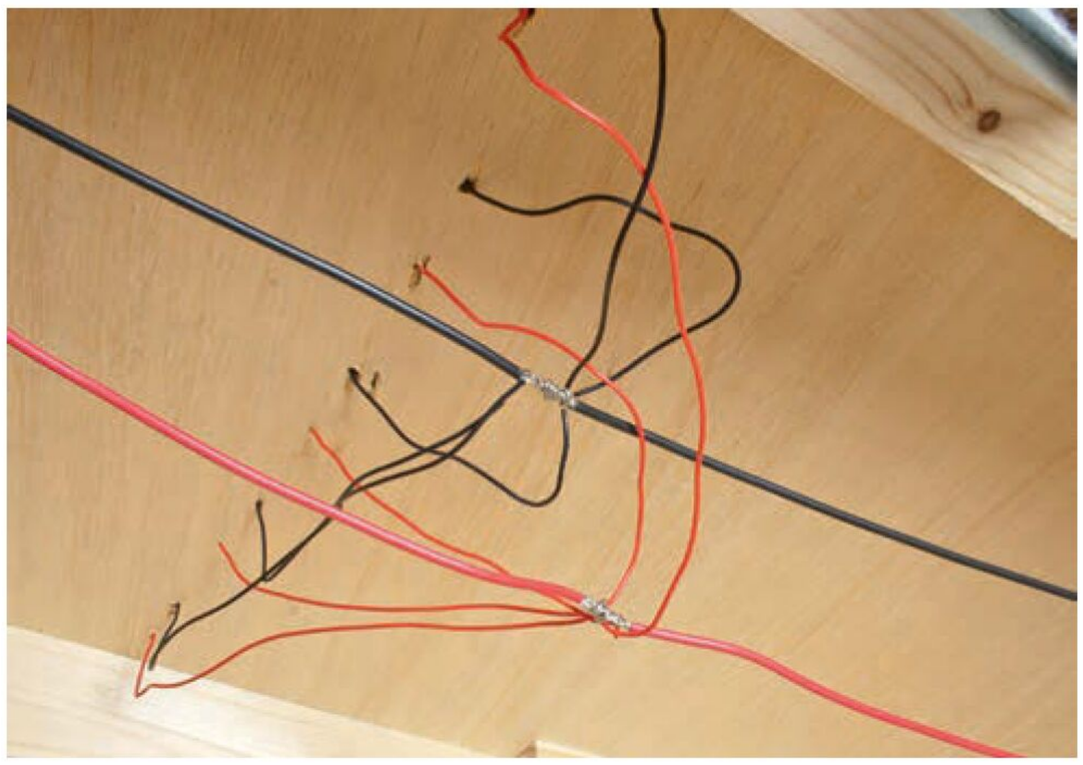
New modellers are usually attracted to DCC because they have no preconceived ideas about control systems and DCC is immediately seen as a logical and flexible way of running a layout. DCC systems are no harder for new modellers to use than any other system and in some instances, the special operating effects most desired by modellers are easier to implement with DCC than traditional direct current (DC) control.

Why DCC?

DCC is very flexible method of operating a model railway compared to direct current control and as close to



DCC is very flexible compared to conventional DC or analogue control. Electrical blocks are not needed to divide up even small layouts to achieve realistic operations. This pair of shunters can operate together in this yard scene without a single block switch being needed to separate them.



All of the track in a DCC layout is powered including sidings and fiddle yard tracks unless the modeller chooses to fit isolation breaks to specific tracks for operational purposes. The wiring is significantly simplified over conventional DC control. This underside view of a DCC layout shows five tracks all wired to the track power bus wires using simple connections.



A constant supply of power to the track brings several benefits including independent control of locomotives and their onboard systems. Digital sound and running lights can be switched on and off at will. The lights remain illuminated whether the locomotives are moving or at rest.



'Operational detailing' comes with DCC control where models are fitted with highly sophisticated electronics which are controlled through a decoder. They can include cab and engine room lights in addition to the head and taillights. The radiator bay of a Cavalex Models Class 60 is fitted with lighting on a circuit separate to the running and cab lights.



Manufacturers are making life easier for modellers by building decoder bays into models where they can be reached without having to remove body shells.



Multiple units benefit from DCC power as well as locomotives. Interiors are illuminated and independently switched through the decoder along with door lock lights on modern rollingstock. The model is a Bachmann two-car Class 158 finished in Northern livery. It has electrical connection in its couplings to power the complete set with one decoder.

driving the real thing as you can achieve with a model railway. The benefits of DCC may not seem obvious until it is tried for the first time. There is a realisation that it is a very realistic way of driving trains, for train driving rather than operating a layout is what DCC is all about!

The first-time experience can feel very liberating. There is no need to remember to throw electrical block or section switches to set up the power in the track. The risk of interfering with another operators route setting is removed. The ability to control running lights and other lighting effects in the locomotive being driven, independently of track power, is often a revelation to newcomers to the hobby.

With the recent development of specialised decoders, one can now drive trains with realistic digital sound, most of them controllable at the press of a button, evoking fond memories of favourite locomotive classes. All of this is done through the driving controls or handset (also called a 'throttle' or 'cab') which represents the driver's desk in diesel and electric traction or the regulator and brake in a steam locomotive. Wireless handsets are now also very common which means that it is possible to follow the train as it traverses the layout, as if driving it. Everything is independently controlled as if you were in the cab of a real locomotive.

Is DCC difficult to use?

Little technical knowledge is required to use a DCC system on any size of layout and the practicalities of using DCC have become even easier now manufacturers routinely fit decoder interface sockets together with models with decoder and on-board digital sound options if you don't want to do decoder fitting yourself.

Newer 'OO' gauge models are also being designed with decoder bays in locomotive underframes or in the roof to avoid the need to remove body shells to reach the decoder interface socket. Steam locomotives may have the decoder interface circuit board fitted in the smoke box of tank engines or in the tender under the coal load. It is a simple matter of removing a smoke box door to reach the circuit board, remove the analogue board and pop the decoder in its place.

'TT:120' and 'N' gauge diesel and electric traction models are usually fitted with body shells that are fitted with simple clips making them easy to remove. Larger steam locomotives may have the decoder interface located in a tender instead of the engine itself, again making a decoder installation easy to do.

Sound speakers are not as tricky to install as once was the case. Factory fitted speakers are becoming common place in all scales, wired to the decoder interface socket through the model's circuit board. To install digital sound in such models only requires the appropriate sound decoder plugging into the model.

Where no speaker is fitted, it is worth looking for speaker connection pads on the circuit board, usually marked with the letters 'Spk-' and 'Spk+' or something along those lines. Speaker leads are soldered to them. Some decoder types such as the Hornby HM7000 TXS sound decoders may have connectors to plug in a speaker without the need to solder the leads.

What are the benefits of DCC?

A key feature of DCC is that the track is constantly live. All of the track is usually powered including sidings and fiddle yard roads unless the modeller chooses to fit isolation breaks to specific tracks for operational purposes. The decoders fitted to locomotives and multiple units are onboard control units which draw upon the track power supply, even when the locomotive is stationary. Driving control is through the decoder fitted to the locomotive (or multiple unit) and not by regulating electricity in the track. The constant power supply in the track means that locomotive lighting and digital sound are always operational, no matter where the locomotive happens to be, stationary or moving.

That key feature is the one that delivers all of the benefits of DCC. We have already touched upon the 'driving experience', but let's take a closer look at what that means.

Fully powered track brings the capability of operating trains in a more prototypical fashion including running more than one train on a section of line, even on a small layout, without having to resort to isolating sections or electrical blocks to keep them apart. This is a feature of DCC which is especially useful in fiddle yards and off scene staging where a multi-track yard can gobble up a lot of isolation switches and cable!

Double heading, locomotive depot and stabling point operation, yard operations or having station platforms long enough to accept two trains is all possible with minimal wiring and no electrical block switching. It is something modellers become used to very quickly indeed. In reality, operations become so intuitive that modellers do not realise its value until returning to operating a direct current layout control afterwards!

Modellers for whom operations are an important part of the hobby find the ability to independently

TYPICAL FEATURES OF DCC CONTROL

- Constant power supply to the track.
- Independent control of locomotives (and multiple units):
- Simplified wiring.
- No section switches necessary to separate locomotives.
- Walkabout control with handheld driving controls with more advanced systems.
- Compatibility between systems from the command station to track and decoders.
- Decoders can be mixed and matched to suit the model, not the digital system.
- DCC has become increasingly easier to use with plug and play decoders and equipment.
- Manufacturers are offering a growing range of DCC-fitted products ready for use on the digital layout.
- Integration of handheld devices such as smart phones and tablet computers is now commonplace.

control locomotive running lights by simply pressing a button or two very valuable. For example, the Cavalex Models sound fitted Class 60 can take you through the complete locomotive starting sequence including the sound of cab doors being opened, battery isolators being switched and a full engine start.

A major benefit is to concentrate on driving your trains in a realistic manner without the chore of switching electrical blocks on a console or control panel. You can stay with your train and that has benefits when shunting in a yard or industrial siding away from a fixed console. Turnout control can be localised too. That is perhaps the greatest benefit of all. Digital Command Control provides that truly flexible operational experience which, with the addition of advanced digital components such as reversing modules, circuit breakers and accessory decoders, can be made as authentic as possible.

It is now better understood that DCC technology changes the way that one looks at layout concept and design – hitherto awkward electrical situations can be avoided and operating opportunities enhanced. All of this technology is available to modellers in all mainstream scales including 'O', 'OO', 'TT:120', 'N' and 'Z' gauge.

How is a DCC system made up?

DCC systems are made up of a command station, a power station (or booster) and throttle or cab (driving controls). A transformer is needed to power the system and power ratings for 'N' and 'OO' gauge can range from 1 Amp for a basic entry-level system up to 5 Amps for advanced systems. Entry level systems may have all of these components, including the driving controls, incorporated in one box or console.

In summary:

- **Command Station:** The intelligence centre that receives instructions

THE BENEFITS OF DCC

- Simple wiring is all that is required to get up and running.
- Drive trains like the pros.
- Drive locomotives and multiple units up to each other independently of each other.
- Simple double heading of locomotives.
- Speed match and adjust trim of locomotives to balance performance.
- Adjust decoder settings for speed and inertia control to simulate braking distances, loads and the type of train being operated.
- Set maximum speeds according the type of locomotive.
- Constantly illuminated locomotive and rollingstock lighting.
- Lighting can be controlled independently regardless if the locomotive is in motion or not.
- No need for isolation or electrical blocks for multiple locomotive control.
- Flexible operation, which is particularly beneficial for small layouts.
- Simple plug and play wireless operation is now available with many systems.
- A wide range of plug and play peripheral devices are available to enhance operations such as turnout and signal control.



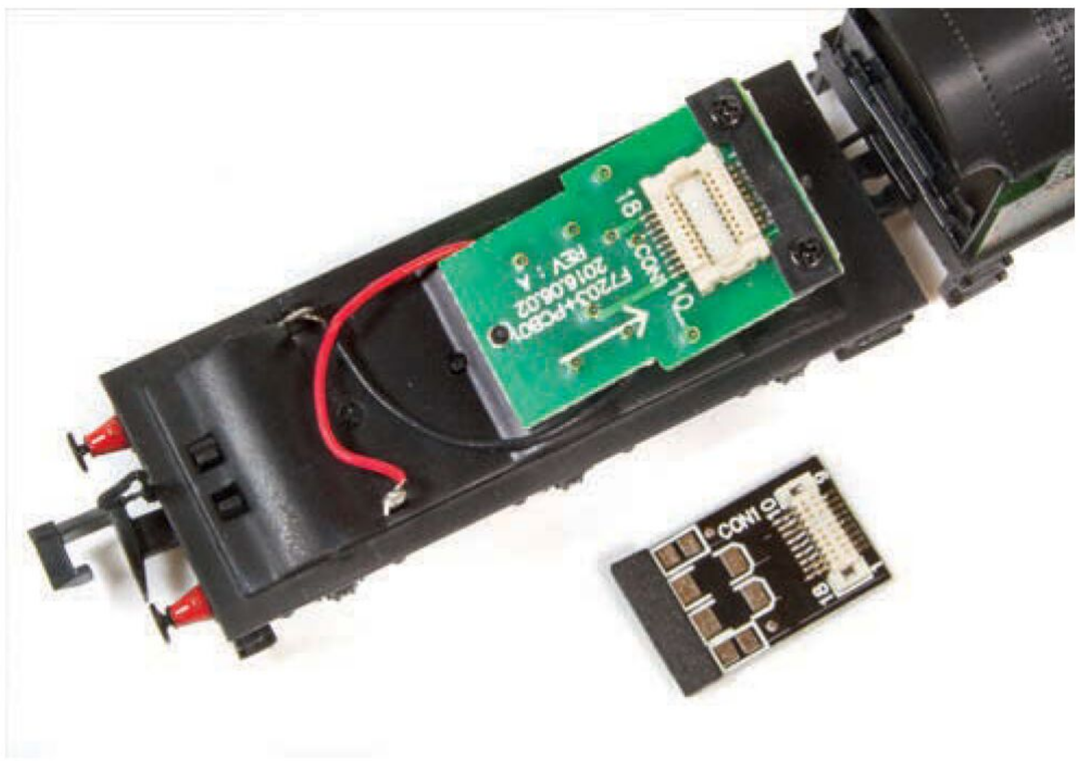
A vital part of a DCC system is the decoder, the control device fitted to each locomotive, multiple unit and even some rollingstock. They come in all shapes and sizes, being produced by numerous manufacturers. Decoders interpret digital signals from the DCC's command station and translate them into driving actions. This is an ESU digital sound decoder fitted to an Accurascale Class 60 locomotive. Most decoders are fitted by plugging them into an interface made up of a number of contact pins.



Even the smallest locomotives are fitted with decoder connections or 'interface'. The Bachmann 'OO9' narrow gauge Baguley-Drewry 70hp model has a NEXT18 decoder interface.



Most 'N' gauge locomotives are now fitted with decoder connection interfaces as standard and the 18-pole NEXT18 socket is now commonly found. The Dapol Class 22 diesel -hydraulic locomotive model is quite small, but has room for a decoder and LED running lights. This version has an earlier six-pin interface.



A NEXT18 DCC socket hidden in the tender of an 'N' gauge steam locomotive model. NEXT18 decoders simply click into place with gentle pressure.



Newcomers being concerned about decoder fitting is understandable. Today, decoders are plug and play fittings that plug into interface sockets. Further, a lot of work has been done to make the interface circuit board more accessible such as placing them in steam locomotive smoke boxes behind a removable smoke box door.



Models as complex as the Hornby 'OO' gauge Hitachi electric and bi-mode multiple units (Class 800-series trains) might appear daunting to work on. However, they are fitted with a decoder bay which is easy to reach without taking the model apart. It is located in the underframe.



This is the underside of the powered TransPennine Class 802/2 car with the underframe module removed to reveal the decoder interface. It is fitted with the analogue plug to enable the train to be operated on conventional DC control. This is removed and a decoder fitted in its place.



In addition to the decoder interface, models are being equipped with digital sound speakers at the factory to save you having to fit one yourself. They are connected to the decoder interface through the circuit board as is the case with the Bachmann 'OO' gauge Class 40.

from the driving controls and converts them into digital signals or packets that decoders can translate to control the action of locomotives, multiple units, turnouts and signals. The digital signal is embedded in the track power which transmits it to the decoders.

- **Power Station:** The power house of the system which boosts (amplifies) the digital signals from the command station. Signals are embedded in the track power supply so the signals can be efficiently transmitted through the wiring and rails of the layout. Track power is always present on a digital layout allowing decoders to keep in touch with the command station. A decoder always listens for its unique address and any instructions.
- **Driving Controls:** The controls used by the layout operator to drive trains – they may be hand-held or incorporated in the control system base station. A decoder address is entered into the driving controls to call up a locomotive or multiple unit. Each address will be unique in most instances. The driving controls do not directly control the power in the track in the same manner as DC, but send instructions to the command station for it to transmit data packets to the decoder of the selected locomotive. In effect, they directly replicate driving controls as if the modeller is in the locomotive cab – and some digital systems are set up with controls that visually replicate some or all of the fittings of a locomotive cab. One set of driving controls is required per train; it being difficult to drive more than one train with one controller.
- **Decoders:** They are the onboard controllers which operate and control the locomotive or accessory.

What to consider when adopting DCC

In reality, DCC systems consist of components that are plug and play. The precise details of wiring up the host layout has to be determined by the modeller simply because all layouts are unique and require a different approach. There is no need to know how computers function to make a DCC system work and work well. Everything you need to know will be found in the instruction manuals. They and such manuals are usually quite detailed in nature, providing a great deal of advice on how to connect the system to a layout, how to program decoders and how to get the best out of your investment. This may seem like an obvious point but it must be emphasised that all DCC manufacturers and suppliers will work with you to overcome problems.

Some modellers believe that DCC only benefits large layouts and that small layouts gain nothing by being operated with a DCC system. In fact, all layout types gain from DCC including micro-layouts. DCC makes them more flexible to operate without having to install numerous electrical blocks in a small area and provides the opportunity for operational detailing such as the aforementioned lighting and digital sound.

Concerns regarding equipment compatibility between different manufacturers systems arise with newcomers to the hobby. This has been addressed by the National Model Railroad Association (**www.nmra.org**) in the United States and was primarily done for US consumers in the early days of DCC.

Standards and Recommended Practices have been established by the NMRA to ensure that the 'downstream' part of DCC from command station to layout, i.e., the track side, is the same for all equipment stated to be NMRA conformant. This ensures that the decoders from one manufacturer will work on a layout equipped with the command station and boosters from another, a feature called 'interoperability'.

Those standards and recommended practices are important in the UK and Europe too and are generally adopted by manufacturers. Purchasers of DCC equipment place a high value on NMRA conformity and compatibility when deciding on which system to purchase.

The side of DCC systems that is not governed by NMRA Standards and Recommended Practices is the controller side which can include the throttle bus wiring, feedback systems, controllers, wireless communication and many others. The NMRA has left the design of throttles and the method of communication together with other DCC-related technologies to the manufacturers' individual discretion, leading to differences in design. Differences in the method used for communication between devices (via the controller bus) also means that compatibility with other manufacturers devices may not be possible. Unless the manual for a device states that it will work with another manufacturer's system, assume that it will not.

That said, in recent years, throttle bus wiring, the system of wiring into which the handheld controllers are plugged into to communicate with the command station, have become more standardised as some manufacturers decide not to reinvent the wheel. Systems like the Digitrax 'LocoNet' or Lenz 'XpressNet' networks have been adopted by other system manufacturers and in some cases DCC systems may have sockets for all of the main systems incorporated in the box.

Is layout wiring limited to just two wires?

There is a much quoted myth about DCC layout wiring and that is the one that a layout only needs two wires to get started. It is often called a two-wire system and that is taken literally by many modellers who become discouraged to see that more than two physical pieces of wire are needed.

Whilst it is strictly correct that it is a two-wire system, the practical reality is that

a layout will need more than two lengths of wire if the whole layout is to be correctly powered with no loss of digital transmission or voltage drop.

A power bus of two cables, usually 24/0.2 gauge, is run around or along the length of the layout (not forming a loop) with dropper wires linking every piece of rail to it. This ensures a stable and constant supply of power to every corner of the layout. Certain types of turnout will need some modification too; for common crossing (frog) power, making them fully live and in the case of older designs of Peco points, changing them from power routing to fully live. The more recent design of Peco turnout, the 'Unifrog', is better designed for DCC operation.

A second bus, the controller or throttle bus mentioned above, is also needed to connect controllers to the system from points around the layout. Some of the controller bus systems also support other devices such as receivers for wireless control or Bluetooth operation with mobile smart phones, so it is a vital component of layout wiring.

What do you need to buy?

Deciding on a DCC system is not as difficult as it might first appear. Firstly, try as many different brands of system as you can and that is possible thanks to the numerous specialised DCC retailers that offer the chance to look at several systems to see which suits best. Don't go for the most expensive one because it may have features you do not need. Before popping out to the model shop and making a purchase, give some thought to the following points which will help in making a decision.

Layout size: Size counts and that will determine the type of system you choose to buy. Compact and micro-layouts may only have room for half a dozen locomotives at the most and so you have to query if the range of 0-9999 addresses are really necessary unless you are planning to build a larger layout in the future. Larger layouts will benefit from the large range of addresses and ports in the back of advanced system base station for extending a throttle bus to operating positions at other convenient locations on the layout.

Number of operators: You quickly discover that the ability to use more than one throttle at a time becomes very important when your friends turn up for an operating session. If the starter system you are considering does not support a throttle bus network that allows more than one controller to be used (most do); look for a more advanced system. Being able to share throttles with friends is also important: you may wish to buy the same system as theirs or one that uses the same throttle bus architecture so you can take your favourite throttle with you to the club or an operating night with friends.

Number of locomotives and multiple units: It's fair to say that most of us have more locomotives than we ever need at any one time on our layouts. Check the numbers carefully because even the most advanced of the basic starter sets with 0-99, 2-figure addressing may not be sufficient for your needs. Another factor is the total power consumption when using more than ten locomotives at a time, not all of them not necessarily running. This becomes critical for power if they have power-hungry systems such as digital sound and large stay-alive power banks, a feature increasingly fitted to models as standard. You will need a base station that will handle higher current demands of around 5 Amps in such cases.

Expanding the system in the future: Check to see if your choice of system can be expanded in the future with software updates. If it looks as if it's likely to be a dead-end system, consider another.

Controlling points, signals and other accessories: Work out how many accessories you wish to control and check to see if your preferred system has sufficient capacity to do so. Some are quite limited in accessory control and that may be a deciding factor. On the plus side, accessory or stationary decoders fall in the 'downstream' side of the system and you should be able to control any NMRA conformant stationary decoder with any system. Be aware that some require a secondary power supply and hence a secondary transformer is needed in addition to the one supplying the digital system.

Making provision for on board systems such as lighting, smoke units and digital sound: If you wish to indulge in such levels of operational detailing, be aware that devices such as sound decoders and power banks are hungry things and can cause power spikes when powering up. Choose a system that will support higher power levels for such on board systems and sufficient function buttons to operate all of the functions on advanced decoders such as sound decoders. Twenty-eight train control functions for lights, sound and driving features such as braking is now considered to be the norm. Do not be concerned about this, it all adds to the fun!

Layout operating technique: Operation style is a very personal thing and could be a determining factor in the choice of throttles or controllers. Some modellers prefer an old fashioned console type controller and some starter sets offer a combined command station/booster/throttle base station in one box that sits on the layout in a similar style to a DC controller. Some designs have ports for plug-in handheld throttles in the rear or side of the base station. More experienced modellers have come to enjoy the freedom of roaming operation, using handheld or 'walk-round' throttles so they can follow the train, at least for a short distance for which wireless equipment may be required.

Next, there is the choice of control knob versus control buttons for controlling locomotive speed. Function buttons on some controllers are marked to operate specific locomotive functions such as lights or sound. They are clearly marked with a symbol. Others have numbered buttons. Systems such as Bachmann

'Dynamis' and ESU systems allow the operator to 'name' locomotives which may be used instead of decoder addresses. Other have large address stacks making selection of the most used locomotives considerably easier to do.

Programming: Are you likely to want to activate advanced operating features in a decoder? Many entry-level sets only offer basic programming 'through the main' in which the programming instructions are broadcast through the layout track and will be picked up by any locomotive that is present on the layout. You would either have to remove all locomotives other than the one being programmed from the layout or allocate a convenient siding or fiddle yard road for programming and install a method of isolating it with a DPDT switch. More advanced systems allow programming on the main using specific decoder addresses to keep the programming instructions specific to the target model. This avoids the need to isolate other models.

Sometimes, such programming methods do not support advanced programming of high end decoders or provide a readout of CVs. A system that provides a separate programming output and more than one programming mode together with a suitable readout display may suit your needs better. That could mean choosing an advanced set from the beginning.

If fine tuning decoder control becomes of interest, separate programming devices and applications are available. A universal one is the SPROG II decoder programmer.

Additional devices: Do you plan to add controls using a personal computer or WiFi? Is a working signalling system or block detection part of your plans? Ensure that the system throttle bus architecture or the command station can handle such equipment. It is worth checking to see if the manufacturer offers suitable peripheral devices.

Budget: The crucial question and that is one that only the modeller can answer is how much money is available for a system. Whilst budget is important, consider a point made by a DCC equipment vendor: "Sometimes, you can buy a system with a vastly expanded level of functionality just by paying a few pounds more..."

Additional devices for digital systems

The range of additional devices available to enhance DCC operation grows by the year. One of the more valuable ones is a train detection unit (feedback modules). They detect when power is being taken by a model from a given track section and shows track occupation by illuminating an LED on a console. They may be important components for automated operations or hidden areas of the layout.

Similar devices can be used to establish two-way communication between decoders and the system command station. One of the simplest devices reads a decoder's address when the model is on the layout (track occupation) allowing specific models to be identified and their position



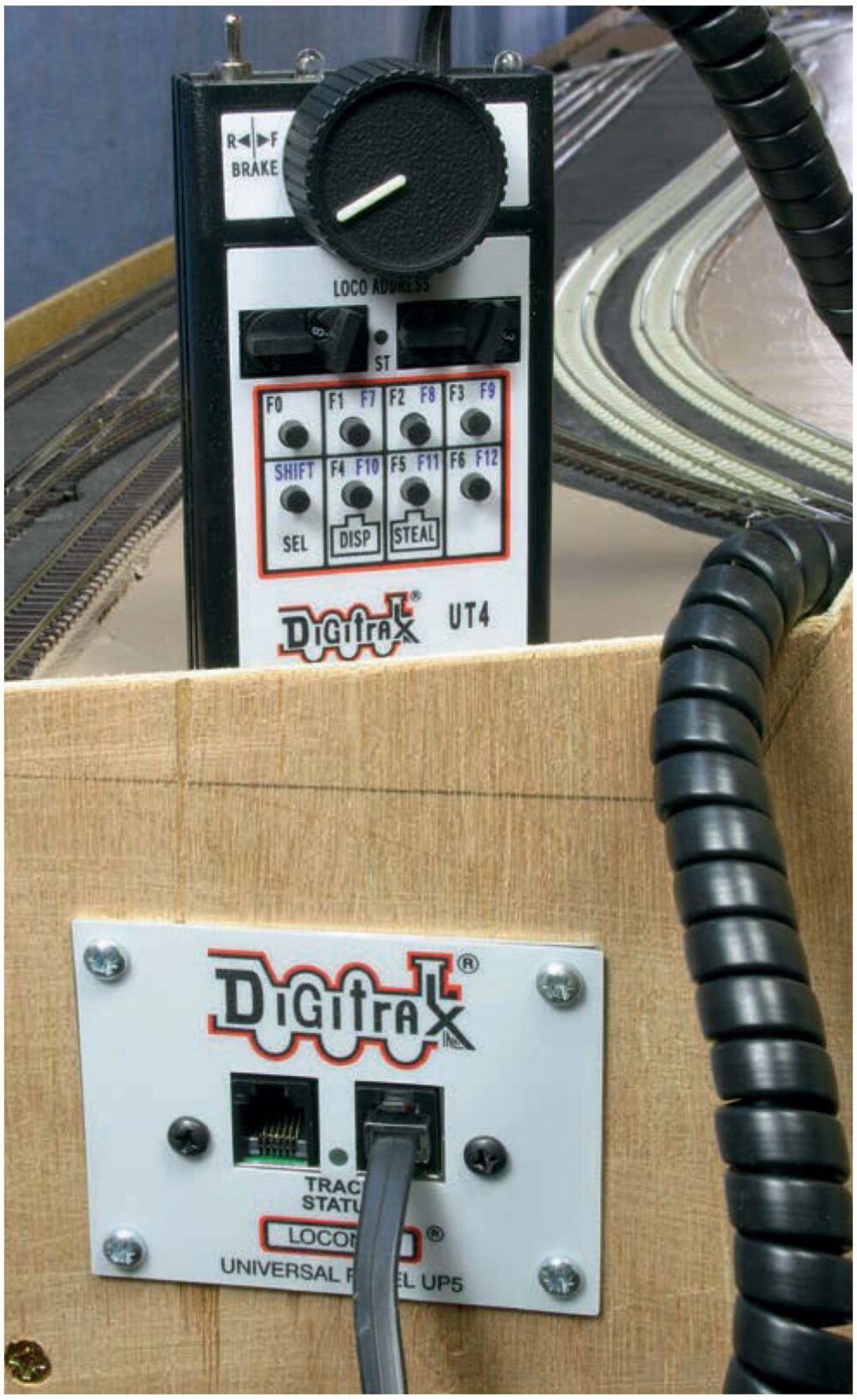
↑ A typical starter system will consist of a lower powered base station such as the Digitrax Zephyr and a single handheld throttle.



↑ High end systems do not look much different, and will consist of a base unit with power and command station enclosed in one box. Control of the trains is usually through handheld controllers or 'throttles'.



↑ Handheld throttles are either connected to the command station through a throttle bus network or by a wireless connection. The connection is usually through a specially designed connection port which can be built into the layout in a convenient place. They are made by most DCC equipment manufacturers.



↑ A Digitrax utility throttle is plugged into a throttle bus connection port which is a neat layout fascia panel that looks good on the layout.



↑ The opposite ed of the throttle bus network is plugged into the DCC system box. There are several different throttle bus network protocols and it is worth checking which one will suit you best. Your club may use a system with a particular throttle protocol and choosing a DCC system with compatible throttles to those used by friends or your model railway club is a consideration.

on a layout determined. It is more advanced than simple train detection.

RailCom, developed by Lenz, is one such system and has been adopted by other European manufacturers including the Roco Z21 system, ESU ECoS and Uhlenbrock. Decoders from numerous manufacturers are being RailCom enabled as standard including those produced by independent manufacturers like the Train O Matic Lokommander 2 series decoders.

Smart phone apps

As an alternative to potentially expensive wireless handheld controllers or throttles, Wi-Fi devices can be plugged into the throttle bus allowing mobile devices to control the layout. The phone or tablet has to be loaded with a suitable app (several are available free of charge) which provides the controls for locomotives, in effect a handheld cab or throttle.

Systems are emerging which offer both conventional throttle bus networks, wireless control along with smart phone app control (Roco Z21). The app may be specific to the control system such as the forthcoming Bachmann 'Kinesis' system.

There are variations on the theme, such as using JMRI (Java Model Railway Interface), the foundation of model railway computer control, an entire subject in its own right. JMRI can be run on a computer



↑ When planning to buy a DCC system, give some thought as to the size of your layout. Whilst some lower powered systems may seem to be cheaper to buy, a large layout may need more current for satisfactory operation.



↑ One of the major advances in DCC, which has become a mature system, is the use of mobile devices and Wi-Fi to drive the trains instead of a handheld throttle. Control apps are available to download from several sources. Hornby has taken this a step further with Bluetooth enabled decoders which can be directly controlled using a mobile app, bypassing the command station. A Hornby HM7000 Bluetooth TXS digital sound decoder, which has a Bluetooth receiver, is shown connected to a power bank and speaker. The leads are fitted with micro-connectors to make installation easier.

and wi-fi router to control locomotives with handheld devices.

Perhaps the most interesting app control method to emerge in recent years is Hornby's HM7000 digital control system. It uses a combination of a dedicated app and Bluetooth for wireless control of specially designed decoders. The layout's track is directly supplied with power for the decoders to use and control is direct from a dedicated free app to the decoder, eliminating the need for a DCC system of any kind. The app also allows programming of decoders along with loading digital sound files on Hornby TXS sound decoders. It can be used with an existing DCC layout through a 'legacy dongle' and Hornby's Bluetooth decoders will also work with conventional DCC systems.

Closing notes

Modellers have recognised that DCC is making the driving experience on a model railway much more realistic and enjoyable thanks to the way DCC works. The key feature is constant power in the track which decoders use to work independently of each other. Lighting and sound systems are supplied with power at all times, just like a real-world locomotive which would have an independent power supply (even electric locomotives and multiple units are connected to a constant power source when in operation).

DCC can be as simple or as complex as the modeller needs it to be. Those with limited budgets or a desire for simple control can choose from a range of entry-level systems. Others may like the advanced features of something more expensive and powerful. In short, buying DCC systems is very much a personal choice and it is advisable to try some first before deciding which one to buy. Read the manuals for hints and tips on how to get the best of the system and look at how you control your layout to make changes to make operations more realistic. In other words, enjoy the greater flexibility that Digital Command Control will bring to your layout.



↑ A compact or micro layout won't need much power and could be operated with a starter DCC set or lower powered DCC unit. Choose one with full throttle bus functionality that will allow the system to be expanded with a wireless throttle or smart phone app or Wi-Fi.



↑ Consider the number of locomotives that are likely to be operating at one time or likely to be stationary on the layout in a motive power depot scene and in staging areas when choosing a DCC system. A decoder will draw a small amount of power, even when its host model is not moving.



↑ Quite a crowd of locomotives were found at Tonbridge West Yard as night fell on May 24, 2009. Class 66s and Class 73s sit among a variety of infrastructure wagons (most of which are available as models in 'N' and 'OO' gauge). DCC enables the driving of locomotives right up to each other making the creation of scenes like this possible in any scale thanks to the unique addresses allocated to each decoder.



2025 was a year of significant new model releases from across the board. All manufacturers delivered noteworthy models to the highest standard and in all scales. The Accurascale Class 60 arrived during the year, a model packed with technical features wrapped in a well modelled bodyshell positively dripping with intricate detail.

Top motive power picks from 2025

As a guide to newcomers to the hobby, we look back on the extensive range of superb new (and fun) locomotive models released during the year.

SMALL AND EMERGING manufacturers continue to raise standards in accuracy and technical innovation, something they have been doing over the last five years. The delays resulting from a mix of the pandemic and the global shipping crisis have largely worked through the system and the lead-in times between the unveiling of new models to their arrival in the shops has shrunk to more agreeable levels. 2025 saw newer producers make some significant releases alongside established mainstream manufacturers and their presence has shaped the model railway market significantly in recent years.

Every new model seems to have some new innovation or improvement as manufacturers strive to compete at the high-fidelity end of the 'OO' gauge market, whilst 'N' gauge manufacturers are upgrading existing models if not retooling them completely, including electronic upgrades. The ratio of 'N' gauge to 'OO' gauge models continues to widen because the number of new 'N' gauge models released in recent years is lower than perhaps it should be.

Niche modelling areas are still being developed, with Hornby building on the success of its 'TT:120' scale range and Heljan releasing some interesting new 'O' gauge models during 2025, at very attractive prices including a very cute Class 02 shunter. The same could be said for Hornby's 'Railroad' range which is mostly based on tooling from the former Lima range for diesel traction and older steam locomotive models originally tooled by Hornby, suitably upgraded with new drives and electronics. It is priced at the budget end of the market, yet there are 'Railroad' range models with factory installed digital sound and authentic liveries.

Hornby has started to tool new models for this market segment including a new Class 60 diesel-electric locomotive which is set for release in 2027.

New 'Railroad' Hitachi Class 800 series units and



↑ ‘O’ gauge modellers are seeing some very fine models emerge from Heljan including its new-tooled Class 45 which was produced in late life form in 2025. The other significant new release for 2025 was the Class 153 rail car in numerous liveries.



↑ English Electric power in ‘00’ gauge arrived in the shape of the Class 50 from Accurascale. Like the Class 60, it has a wealth of technical features enclosed in a model which is an excellent facsimile of the full-size locomotives.



↑ Heljan’s efforts were not restricted to large main line diesel-electric locomotives. The tiny Yorkshire Engine Company Class 02 shunter was beautifully produced in ‘O’ gauge with a number of different features. A ‘00’ gauge model also arrived from Heljan in 2025.



↑ Bachmann made life difficult in choosing a top models’ picks list by releasing its newly tooled Class 66 and Class 69 at about the same time at the end of the year – both models being a match to anything available in late 2025 in terms of accuracy and technical features.



↑ Cavalex Models is not forgotten with its top-of-the-range Class 60 in ‘00’ gauge. It is also packed with innovative features including comprehensive lighting effects and a digital sound option. Because both it and the Accurascale models are equal in quality and accuracy, we decided not to try and choose between them in a top picks list. Both deserve to be a top pick for Railfreight and privatisation era modellers.



↑ An idea of how buoyant the hobby is with new products, Hornby delivered two brand new ‘TT:120’ scale diesel-electric locomotives in 2025 starting with a fine Class 66 in various forms and finishing the year with a Class 37. ‘TT:120’ models offer a smaller than ‘00’ gauge scale for those with less space, running on readily available 12mm gauge track.



↑ A beautifully detailed Class 74 diesel electric locomotive arrived from EFE Rail (Bachmann) late in 2025. This is a remarkable model in that it covers a class of just ten locomotives which carried one livery. A commercial model might have been unlikely a few years ago due to the commercial risk of producing a class with a short life span (1967-1977) and operated in a relatively restricted part of the Southern Region.

intermediate coaches were released at the start of 2026. The Hitachi model is the modern equivalent of the InterCity 125 model that grabbed the imagination of enthusiastic young modellers in the 1980s and 1990s.

Narrow gauge modelling, primarily ‘009’ gauge, is gaining traction and with a good track system available from most model shops, the delights of small steam locomotives and tiny coaches are matched by the ability to fit a railway

into small layout footprints thanks to the sharper curves and tighter turnouts that can be used.

There are two noticeable trends in locomotive model development. One is the replacement of existing models with new tooling from the rails up including drive systems and electronics. It is driven partly by the need to replace worn out tools and partly to make improvements in accuracy and the level of detail. Bachmann leads the way in this area with new 'OO' gauge Class 08s and Class 66s appearing during 2025 along with Hornby with its 'OO' gauge J52 0-6-0ST.

The second trend is driven by the need to find locomotives not previously modelled to current standards. With most, if not all, of the popular locomotive classes represented with quality models, the search for new ground is taking manufacturers into the world of small locomotive classes and those from the Pre-Grouping era. Industrial steam locomotives such as the Port of Par Bagnall 0-4-0ST locomotives released by Rapido Trains and diesel shunters such as the BR Class 02 which also ran extensively in industrial service are finally being produced after years of demand by modellers. Classes making up a small number of locomotives such as the ten Class 74 electro-diesels are commercially risky, yet have seen a mainstream model arrive from EFE Rail. Single locomotive prototypes including the Class 89 released by Accurascale in 2025 seemed unlikely a few years ago but are now produced to a high standard.

Duplicated models

For the newcomer to the hobby, duplication of specific locomotive classes may seem to be pointless and a waste of resources that modellers feel could have been used elsewhere. Why produce a model of the same locomotive class as another manufacturer? Would that not split the market?

Not necessarily. There is a commercial belief that certain locomotive and rollingstock types are essential to make up and complete a basic range. Further, not all models are the same. Hornby's 'Railroad' range models such as the Class 47 are quite different to the Class 47 model offered by Bachmann. In some instances, locomotive classes were so large and long-lived that two different manufacturers could produce the same locomotive class for years in different liveries and different configurations and not duplicate specific locomotives.

A final thought is that competition and choice is never a bad thing. To be able to choose from more than one range is only to the benefit of the consumer and modeller! Here are our top locomotive picks from 2025.

Steam locomotives

Hornby J13/J52 0-6-0ST

The new Hornby model of the J13 and J52 effectively replaces an older version. They were common shunting locomotives used throughout the GNR, LNER and BR Eastern Region, surviving until the early 1960s. The locomotives saw detail differences between class members depending on their age and if they were rebuilt. Differences are covered by Hornby's comprehensive tooling package which covers the modelling of specific locomotives at specific times of their working lives.

The boiler, smoke box and running plate has been cast in metal to add weight to the model. This overcomes the issue of making room for fully detailed cab interiors and to fit a sound speaker and DCC decoder. As a result, the models weigh around 235g depending on the added detail and the cab is finished with numerous tiny control details and flickering effect from the firebox which is controlled with DCC. Two models were released in 2025, covering GNR J13 No. 1257 in lined green and LNER J52 No. 4225.

- 4mm scale, 'OO' gauge.
- 1897-1961.
- Finely tooled cast metal body shell.
- Sprung metal buffers.
- Separately applied wire handrails and handrail knobs.
- Five-pole can motor.
- Designed to accept a 21-pin decoder.
- Room for a Hornby HM7000 power bank unit.
- All-wheel current collection with conventional sprung wipers.
- Illuminated firebox with fire glow.
- Detailed cab with separately fitted pipes and controls to the backhead.
- Brake details fitted in line with the driving wheels.
- Length: 126mm over the buffers.
- Weight fully assembled: 235g.

Accurascale GWR 5700 0-6-0PT Pannier Tank

Filling in gaps in the range of models available for a given class by modelling features hitherto not covered in the past is a speciality of Accurascale. Its GWR 57xx, 67xx and 8750 Class Pannier Tank range demonstrates this admirably. Although produced by other manufacturers in the past, the Accurascale models covers backplate feed variants as well as variations in contractor details such as the use of rivets for tank construction (the locomotive type was built by several different workshops in addition to Swindon Works).

The GWR needed a single standard design with standardised features to replace the numerous small tank engines inherited by the GWR from constituent



↑ **Two models of the brand-new Hornby model of the J13 and J52 reached the shops in 2025. GNR No. 1257 is a J13 locomotive from the Pre-Group era, whilst the second model, No. 4225 covers the LNER period when the locomotives were reclassified as J52.**



↑ LNER No. 4225, finished in unlined black covers the 1926 'Grouping' date through to the 1946 renumbering of LNER locomotives when it became No. 8224. The J13 and J52 locomotives generally worked short-distance goods workings and undertook shunting duties.



↑ GNR No. 1257 dates back to 1901 and was constructed at Doncaster works. It is modelled with a Safari cab roof ventilator, Ramsbottom safety valves and GNR tapered buffer shanks.

companies. It had to be simple to maintain, lightweight enough for branch line work and powerful enough to hold its own on the mainline. The design was successful, seeing several variations including the no-heat and unfitted 6700 Class intended for shunting and trip freights. The 8750 Class was fitted with a larger cab and even that had a freight-only variation, the 6750 Class.

The model was tooled with a comprehensive catalogue of parts allowing Accurascale to produce almost every variant, of which there are many due to the numerous contractors involved in their construction. The featured model is No. 7754 which was one of 100 locomotives constructed by the North British Locomotive Company in Glasgow.

It was acquired by the National Coal Board in 1959 for industrial use which saw its future in preservation secured. It was withdrawn in 1975 and donated to the National Museum of Wales. The plain green livery of NCB No. 7754 could be altered to fit any number of industrial models, matched with a varied and eclectic collection of internal-user wagons!

Its vital details are summarised thus:

- 4mm scale, 'OO' gauge.
- 1929-1966.
- Injection moulded plastic cab and tanks with detail variations in both tooled.
- Smooth and rivetted tanks.
- Sprung metal buffers.
- Separately applied wire handrails and handrail knobs.
- Coreless motor.
- Designed to accept a Next18 decoder.
- Magnetic smoke box door cover.
- Decoder socket located in the smoke box.



↑ GWR 0-6-0PT Pannier Tank locomotives have been around in the hobby for years and have been modelled in 'OO' gauge by several manufacturers in the past. Accurascale took on some of the more unusual types as well as typical 5700 Class locomotives in the first run of its brand-new model.



↑ One of the first 11 models is an industrial version depicting No. 7754 which was sold to the National Coal Board after withdrawal by British Railways. Industrial versions like NCB No. 7754 are authentic models which offer modellers the freedom to create freelanced and industrial layout themes.



↑ Accurascale's GWR Pannier Tank is well-appointed with fine detail including an impression of the inside motion located between the frames.

- Power bank unit fitted as standard (operates with DCC control).
- All-wheel current collection with conventional sprung wipers.
- Illuminated firebox with fire glow.
- Turned metal whistles.
- Brake details fitted in line with the driving wheels.
- Length: 124mm over the buffers.
- Weight fully assembled: 220g.

Accurascale J67/J68/J69 *aka* The 'Buckjumper'

Accurascale had six steam locomotives on its roster at the end of 2025, five of which are small tank engines of various types. One, the Hunslet Austerity 0-6-0ST remains to be released at the time of writing.

Arguably, one of the most compelling models is



‘Buckjumper’ locomotives are generally associated with suburban trains working out of London Liverpool Street. In reality, Holden’s J67 and J69 locomotives together with the similar Hill’s J68 worked in other parts of the country making them more useful than they might first appear. It is a complex group of 0-6-0 tank engines to model well, something Accurascale has done well which is why it is the second Accurascale steam locomotive to make it into our favourites of 2025.

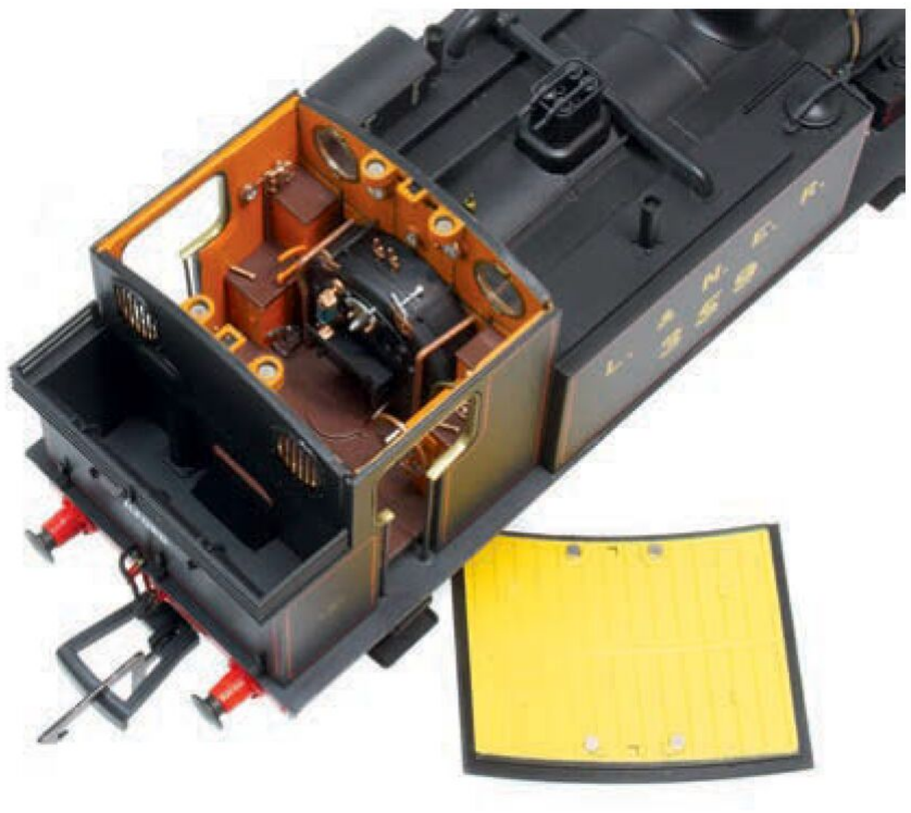
the ‘Buckjumper’, produced in a wide range of guises from GER J67 No. 84 dating back to 1904 through to LNER J68 and J69 locomotives and finally, BR black. Whilst associated with suburban workings from Liverpool Street, they spread their wings across large areas of the UK and worked passenger and freight trains as well as undertaking shunting duties. It is the perfect small locomotive type for compact and micro layouts.

Detail variations found in the class are numerous, the real locomotives seeing a huge array of changes, rebuilds and improvements. Tooling such a design to cover as many variants as possible was an immense undertaking, the kind of project that Accurascale specialises in. The resulting bank of tooling covers both narrow and wide cab designs and cab doorway shape along with differences in the side tanks. Small details such as hand and coal bunker rails, smoke box doors and wheel spokes were carefully researched and matched to create bespoke models of individual ‘Buckjumpers’.

The model was the first tank engine to be produced by Accurascale and its second steam locomotive. The model in the photographs represents L. & N.E.R J69 No. 359, finished in 1923 lined black. The model is in 1904 rebuilt condition with larger side tanks and the original narrow cab.



One can find the NEXT18 decoder interface and circuit board tucked away in the smoke box.



The cab roof can be removed to reveal the cab interior which is detailed to a very high standard. Adding a driver and fireman to the locomotive is straightforward. Note the wooden plank detail in the cab roof along with the securing magnets.

- 4mm scale, ‘OO’ gauge.
- 1890-1962
- Injection moulded plastic cab and tanks with detail variations in both tooled.
- Finely tooled cast metal boiler.
- Sprung metal buffers.
- Coreless motor.
- Designed to accept a Next18 decoder.
- Magnetic smoke box door cover.
- Decoder socket located in the smoke box.
- Removable, magnetically secured cab roof.
- Comprehensively detailed and coloured cab interior.
- Power bank unit fitted as standard (operates with DCC control).
- All-wheel current collection with conventional sprung wipers.
- Illuminated firebox with fire glow.
- Length: 110mm over the buffers.
- Weight fully assembled: 179g.

Hornby GWR Saint Class

No. 2920 *Saint David* is one of three Saint Class locomotive models released in ‘OO’ gauge by Hornby in 2025, the other pair being GWR No. 2975 *Lord Palmer* and heritage No. 2999 *Lady of Legend* which is a modern rebuild from a GWR Hall Class locomotive based at the Great Western Society at Didcot.

To model the seventy-seven members of this class of GWR express passenger locomotives numerous main components including the running plate and frame part which is squared on No.

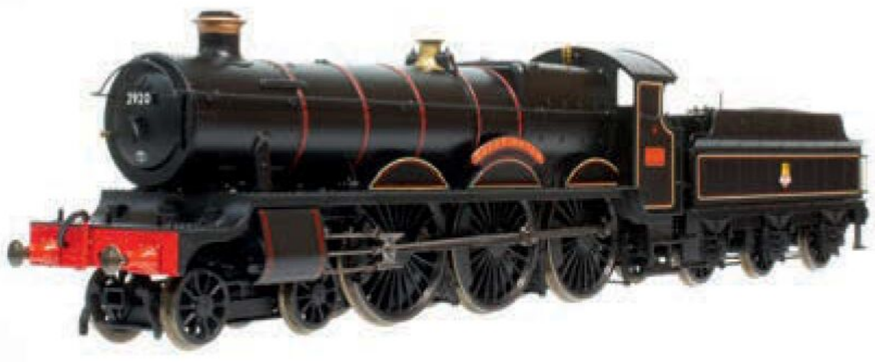
2975 and rounded on No. 2920 were tooled.

Other details cover GWR specifications along with later modifications made to the locomotives as they were modernised during their lives. Consequently, No. 2920 *Saint David* is modelled in late condition and paired with a neatly moulded rivetted Churchward tender.

Technical specifications include a 21-pin DCC interface and all wheel electrical current collection. An easily released connector provides a coupling between the locomotive and tender.

Hornby's Saint Class locomotives are beautifully appointed models with excellent running characteristics. They will be a good match for Hornby's range of GWR coaching stock. They may be summarised thus:

- 4mm scale, 'OO' gauge.
- 1902-1953.
- Cast metal chassis frame and running plate.
- Sprung metal buffers.
- Separately applied scale wire handrails and handrail knobs.
- Five pole skew wound motor.
- Designed to accept a 21-pin decoder.
- Fully enclosed electrical connector between locomotive and tender.
- All-wheel current collection with conventional sprung wipers.
- Fully detailed cab and back head.
- Metal cab drop plate.
- Illuminated firebox with fire glow.
- Length: 255mm over the buffers.
- Weight fully assembled: 220g.



A significant new release for Hornby in 2025 was the GWR Saint Class of which seventy-seven were built. Forty-seven survived to see service with British Railways. The model is supplied with a variety of small details for the modeller to add to the locomotive. They include a driver, fireman, lamps brake rigging and nameplates.



No. 2920 was one of the locomotives to pass into British Railways ownership and was painted in lined black as seen on the model. Note the curved running plate which is a variation found within the class. The model is paired with a beautifully tooled Churchward tender and a later chimney design along with safety valve detail and the top feeds.



Cab detailing is comprehensive and includes a flickering firebox effect. Note that the gauges are also painted and finished.

Diesel and electric locomotives

Bachmann BR Class 08 and Class 09 350hp shunters

Class 08 and Class 09 350hp 0-6-0 shunting locomotives were so universal on BR that a model is considered to be an essential part of any 'OO' gauge range. Bachmann has produced a good model with outside frames, five pole motor and fully detailed cab for decades.

Like all models, there comes a time when the tooling can no longer be used without expensive refurbishment or the model no longer meets standards set by newer models and the Class 08 family needed completely retooling.

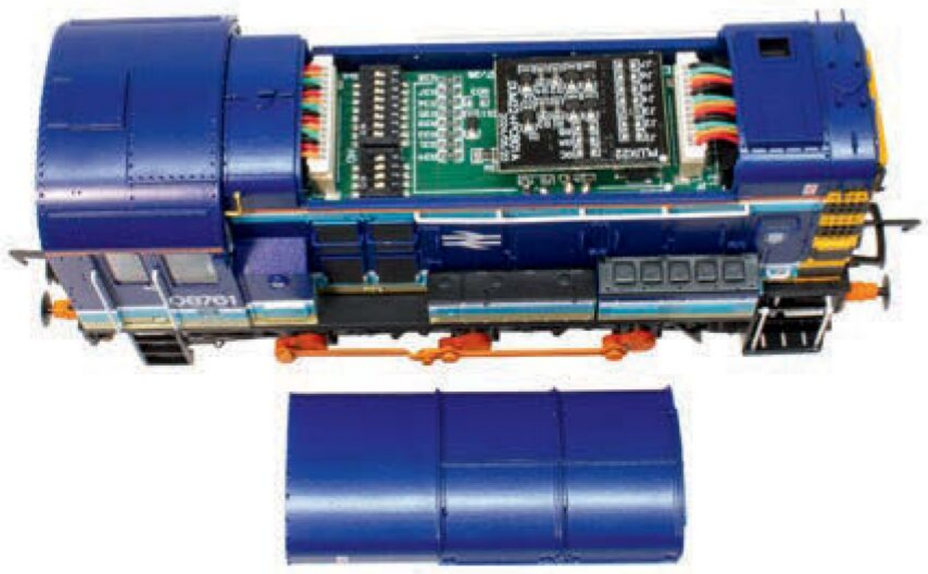
Bachmann has now included running lights along with a cab light and provision for more class variants. The result is a finely detailed model which can represent specific class members at any point in their working lives.

The field is a wide and deep one where BR's 350hp shunters are concerned, with a very long career under their belts. Such a long career (which has not ended) along with numerous liveries should keep Bachmann busy with this delightful and beautifully appointed model for years.

For newcomers to the hobby, the universal nature of the Class 08 family in the BR and early privatisation era makes it a good choice for a first locomotive. This impressive model's features include:



No. 08761 was one of two Class 08s painted in 1980s BR Provincial Sector livery by Haymarket Depot. It was included in the first batch of the new, retooled Class 08 released in 2025.



A removable panel in the bonnet top covers the decoder bay with its PLuX22 interface. It makes decoder fitting much easier than having to remove the body. The banks of tiny switches are used to choose lighting effects when the model is operated with traditional direct current control.



Detailing of Bachmann's new Class 08 and Class 09 locomotives is specific to the locomotive number and livery, as can be seen on No. 08761. This extends to the position and number of marker lights, cab doors and underframe parts.

- 4mm scale, 'OO' gauge.
- 1953 to present.
- Injection moulded bodyshell composed of bonnet and cab sub-assemblies.
- bespoke to the locomotive age, number and livery.
- Detailed cab interior.
- Removable engine room hatch access to the decoder bay.
- PLuX22 decoder interface.
- Analogue control of lighting through dip switches.
- Individually controlled marker lights and cab lighting.
- Fully detailed cab interior.
- DCC 'stay-alive' power pack.
- All-wheel drive through the outside coupling rods.
- All-wheel current collection.
- Five pole motor and flywheel.
- Gearing is set up for near scale speed operation.
- Length: 247mm over extended buffers.
- Weight: 220g.

Bachmann Class 69

Just pushing in to the frame for 2025 releases comes the remarkable Bachmann GB Railfreight Class 69, a mainline diesel electric freight locomotive choice for our top pics for 2025. Why this particular model, you may wonder?

Developing a high-quality model of the Class 69 was always going to be challenging. The locomotives are rebuilt BR Class 56s fitted with new GM engines and upgraded electronics to extend their operational lives and improve efficiency.

Sixteen Class 56s were converted between 2021 and 2025 for GB Railfreight, with many of the locomotives receiving special and unique liveries. To further complicate matters, converted locomotives were chosen at random from surviving Class 56s and some of the features of different builds of the large Class 56 fleet are incorporated in the new locomotives.

Bachmann has successfully followed development of the Class 69s as they were rebuilt by Progress Rail and has produced detail rich models with tooling covering most of the unique features of each Class 69. To produce mainstream models of such a small but diverse fleet of locomotives so accurately and with the same technical features fitted to other 2025 standard models is a remarkable feat by any



Rebuilding of 16 BR Class 56 locomotives into Class 69s changed the cosmetic appearance of the locomotives including the loss of the front air horn box and grille. However, some features such as the cab shape, bogies and other features are easily recognised as Class 56 in origin!



Etched metal is used extensively throughout the Bachmann Class 69 including the radiator cooling fan grilles.



A number of special liveries are applied to the small Class 69 fleet including No. 69001. The paint finishes and printed details are very well executed on the models.

standards, hence placing the Class 69 in our top picks!

- 4mm scale, 'OO' gauge.
- 2021 to present.
- Body shells specific to certain Class 69s.
- Delicately etched radiator fan grille work.
- All wheel drive with frame mounted five-pole motor.
- Metal axle bearings and inner bogie frames.
- LED running and cab lights of the correct colour hue.
- PLuX22 DCC interface.
- Stay-alive power pack.
- Geared for prototypical operating speed.
- All wheel wiper current collection.
- NEM coupling pockets on close coupling cams.
- Multi-layered bogie assemblies.
- Locomotive-specific detailing.
- Length:
- Weight: 650g.

Accurascale Class 89

Quite a number of superb museum quality models have emerged from Accurascale during 2025 including the 'OO' gauge Class 50 and Class 60 locomotives along with an astoundingly cute 'O' gauge Ruston & Hornsby 88DS.

However, making a choice from this range of exquisite models was made simple by the Class 89, a prototype built as possible electric traction for the East Coast Main line electrification scheme. Four different liveries were offered covering its operational life and current heritage condition.

The model is remarkable in that it is represents a single locomotive prototype with all of the commercial risk that entails. And it has been done to museum quality standards including a working pantograph and operational lighting.

The level of detail applied to the Class 89 model starts with the bogies which are built up of a huge number of small fittings and components. Around the cab are properly modelled hand rails, cab glazing and of course, the distinctive shape of the cab front headlights. Cab interiors are detailed



A very fine replica of No. 89001 has been produced by Accurascale in partnership with Rails of Sheffield. The commercial risks involved in producing a model of a single prototype locomotive, particularly an electric locomotive, are significant, making the Class 89 a remarkable release for 2025. The version of the model shown in the photographs is finished in InterCity executive livery (1986-1988) as delivered from Crewe Works.



The Brecknell-Willis pantograph is operational and may be closely controlled when the model is on DCC control.



↑ Accurascale successfully captured the unique shape of the Class 89 cab well, including the handrails, running lights and windows. The interior of the cab is also well appointed and coloured accurately.

to a high standards and illuminated too.

So, selecting the Class 89 for our list was not difficult to do. As far as modellers are concerned, this locomotive is high speed East Coast Main Line traction and long rakes of modern rollingstock such as the Mk.4 coach will suit it well. It will be at home on a main line themed layout modelled with overhead line equipment (OHLE) and long runs of track.

An overview of the model includes the following impressive features:

- Highly detailed body equipped with numerous small parts.
- Comprehensively detailed and coloured cab interiors.
- Cab and control desk lighting.
- DCC-controlled Brecknell-Willis pantograph.
- Pantograph height can be selected to suit the OHLE of most layouts.
- Frame mounted close coupling cams.
- Five pole motor and twin flywheels.
- All-wheel drive and current collection.
- Sophisticated bogie assemblies fitted with numerous tiny details.
- 21-pin decoder interface.
- Running light analogue control switches.
- DCC power pack for flicker-free lighting.
- Length: 257mm.
- Weight: 805g.



↑ The Heljan Class 24 is good value for money for an ‘O’ gauge ready to run model, particularly when compared to the cost and time required to build and finish an etched and cast metal kit. It is a convincing representation of the ‘skinhead’ Class 24,

Heljan Class 24

Heljan announced a Class 24 model for ‘O’ gauge in November 2023 including the Cass 24/0 and Class 24/1 variants. The first model represents the ‘skinhead’ variant which was delivered during in the late Spring of 2025. The model is based on the No. D5000-D5019 (pilot scheme batch) and No. D5020-D5113 locomotives built in 1958 and 1959. The locomotives were fitted with train reporting discs and as a relatively small Bo-Bo four-axle locomotive, they make an excellent entry level model suitable for a small layout based on either the green diesel to steam transition era or the later 1970s BR blue era.

The models share some rich technical features including an independently controlled cooling fan, cab lighting and a powerful twin motor bogie drive which makes the model capable of slow speed control suitable for small layouts and with the grunt



Many Heljan 'O' gauge models are supplied without running numbers. Modellers can research and choose the number of their preferred locomotives!

A powerful twin motor bogie drive mechanism enables the Heljan Class 24 to cope with heavy trains and gives it the finesse of control for shunting and slow speed operations.

to manage a fair-sized train on a larger layout. The model is competitively priced for a large-scale model particularly with its extensive features which are common to all versions.

- 7mm scale, 'O' gauge.
- 1958-1980.
- Electrically powered cooling fan.
- Separate electrical circuit for the cooling fan.
- Twin motor bogie drive with flywheels.
- Prototypical wheels with weight-saving holes.
- Extensive use of etched components.
- Modelled cab interiors including controls and seats.
- Flush glazed with windscreen wipers.
- 'Plug and play' decoder interface.
- Controlled forward marker lights, red tail lights and cab lights.
- Ample supply of plastic train reporting discs.
- Working screw couplings.
- Length: 354mm.
- Weight: 1935g.

Hornby 'TT:120' Class 37

The Class 08, Class 50 and Class 43 HST power cars were among the first British outline D&E models to be released by Hornby in 'TT:120' gauge (1:120 scale running on 12mm track). The Class 37 followed late in 2025 with three quite different models being released. Hornby has produced tooling to cover numerous eras and sub-classes of Class 37 as seen in the first three models.

The first years of the Class 37 are covered by BR green No. D6700 with split headcode boxes and communication doors. BR in the 1980s and 1990s is represented with Class 37/4 No. 37408 *Loch Rannoch* which is a centre headcode box locomotive rebuilt as part of the 1980s heavy general repair programme. Class 37/4s were fitted with electric train heating supply for regional passenger services in Scotland and Wales.

The third model is a Class 37/7, No. 37704 decorated in English, Welsh and Scottish Railway (EW&S) maroon and gold. It too represents one of the locomotives that went through the heavy general repair programme, emerging as a ballasted or 'heavy weight' freight engine with its split boxes removed in favour of flush bonnet fronts.

Small fittings have been used to add detail to the plastic body shells including etched grilles, wire handrails and bufferbeam fittings. The bogies are also well detailed with separate fittings used extensively.

Internally, there is a heavy chassis frame with the motor mounted in it. Both bogies are powered with all-wheel drive which provides good haulage capability. The specification also includes a NEXT18 decoder socket, working lights and factory-fitted TXS sound in No. 37408 and No. 37704.

- 2.54mm (1:120) scale.
- 1960 to present.
- Heavy cast metal chassis.
- Chassis frame-mounted motor.
- Powerful six-axle drive.
- Close coupling cams and NEM pockets.
- Extensive use of etched grilles.
- Modelled cab interiors including seats.
- Flush glazed with windscreen wipers.
- Bufferbeam detailing pack supplied with the model.
- 'Plug and play' NEXT18 decoder interface.
- Controlled forward marker lights, red tail lights and cab lights.
- Separate train reporting discs.
- Length: 157mm.
- Weight: 175g.



Despite only being a touch under 160mm in length, the new Hornby 'TT:120' Class 37 is packed with details and features.



'Heavy weight' Class 37/7s are freight locomotives designed for heavy block freight trains. They were developed as part of the 1980s heavy repair programme. The model has different features including bonnet front features compared to the other two models.



No. D6700 takes us back to the very first years of Class 37 operation, being the first Class 37 to enter traffic in 1960 and it survives today. The model has 'as built' features including the green livery without yellow panels, four-character headcode boxes, train heating boiler and bufferbeam cowls.



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