

# Miniature Railway

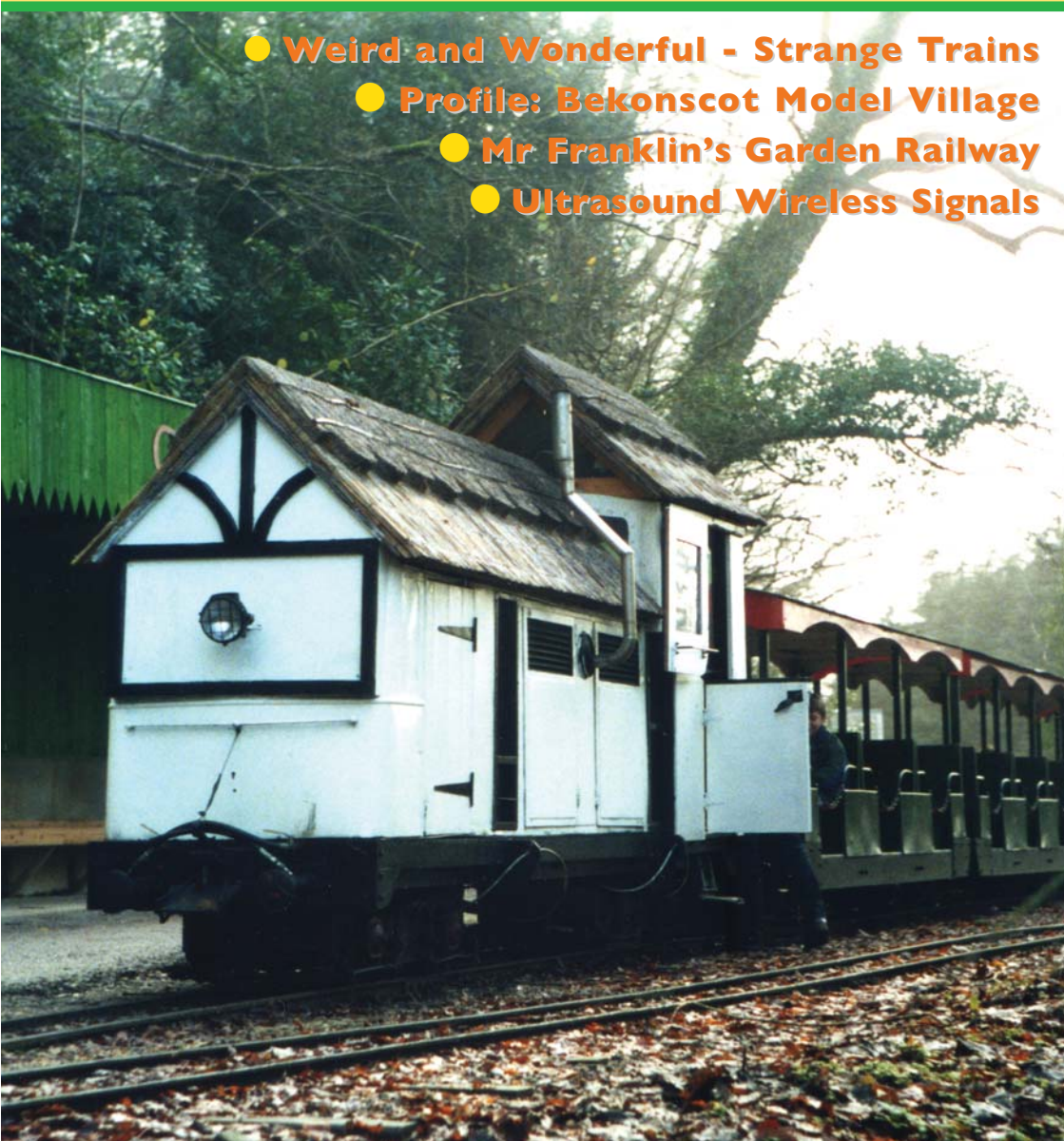
Issue 57

Autumn 2022

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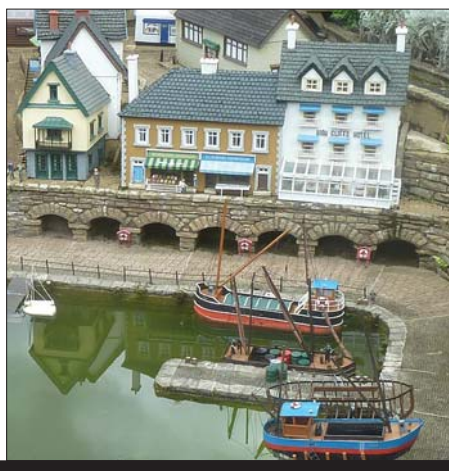
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Next deadline February 2022

We had great fun putting this issue together, from visiting Bekonscot Model Village to a flick through the archives in search of strange trains. There are more lurking out there, so do send us your favourites. Bekonscot is amazing too, and nothing you've heard will prepare you for a model 'village' (more of a district really) on such a grand scale, so beautifully maintained and technologically sophisticated. Please do visit if you get a chance, you won't regret it.

Meanwhile, it's Christmas once again, but the world is still at war, still threatening to burn to a crisp and still riddled with killer viruses. Nevertheless, we look forward optimistically to seeing Christmas 2023 and we hope all our readers see it too, and many more in the future.

DAVID HENSHAW, Tuesday 22nd November 2022



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COVER: Ex-Dudley Zoo locomotive briefly transformed into a half-timbered cottage by Noel Edmonds in the early 1990s PHOTO: Patrick Henshaw

# Letters

*Commercial Locos, Paignton Zoo, Rudyard Lake*

## More Devon Memories

The locomotive illustrated on page 4 of *MR 56* is 'The Pride of California', a 10<sup>1</sup>/<sub>4</sub> inch gauge Bo-Bo diesel built in 1943 by Trevor Guest of Stourbridge for the Dudley Zoo Railway. When that line was regauged to 15-inch in 1946 it was transferred to the Paignton Zoo railway where it appears to have undergone minor modifications (including a change of livery). It is pictured in *ABC Miniature Railways* by B.G. Wilson (Ian Allan c1961) in the same Santa Fe-inspired livery as depicted in MR. I'm not sure I ever saw it but I certainly remember riding behind the line's other diesel, the Western Region Warship-inspired D801 'Jungle Express' back in the 1950s.

Keith Turner  
Kidderminster



Probably not the first response you've had, but the photographs of 'Goodrington Sands' on page 4 of *MR56* are of the nearby, recently-defunct Paignton Zoo Railway - hence the PZR device faintly visible in the centre of the circle on the locomotive in the top photograph. This can be seen more clearly in the upper photograph on page 35 of Peter Scott's book *A History of the Paignton Zoo Railway* (free PDF version at [minorrailways.co.uk/pdfs/paignton.pdf](http://minorrailways.co.uk/pdfs/paignton.pdf)) The broad driveway behind the train which was the main entrance path to the zoo, the hedge and the building behind are all visual clues to those who remember visiting the zoo (and are also partly visible in the lower photograph on the same page of Scott's book).

Kevin Lynch  
Barnstaple, Devon

## Which Commercial Loco?

*In MR56, Jan-Eric Nystrom asked what we would advise for a commercial 7 1/4 inch line at a Finnish railroad museum featuring 1:25 gradients and 40 foot curves?*

Jan-Eric

We have two Abbots Model Engineering Bo-Bo locomotives. These are battery-electric locos, each fitted with four motors. These are very much suited to our needs and will haul two fully-loaded seven foot AME passenger trucks for a full afternoon's running. I believe the trade name for these locos is NEPTUNE.

Hope this is useful.

Dave Lewis

President, City of  
Newport Model  
Engineering Society



*The four-motor 7 1/4 inch Neptune 4 squeezes a lot of horse-power out of a small package*

Jan-Eric

The fact that your existing loco has been in service for a decade and now needs an overhaul says to me that your new locomotive should be another, more powerful, battery-electric. I honestly can't see that there's any case to be made for changing to a petrol or diesel locomotive, which are of course less environmentally friendly than battery-electric. Your passengers (and the driver) get to breathe polluted air and the thing is noisy, smelly, and altogether less civilised than a battery locomotive. IC locos are much more complex than battery-electrics, and hence they are prone to be less reliable and they certainly require more maintenance. We also absolutely need to STOP using fossil fuels, which means a new fuel-burning loco makes very little sense at all.

So go for battery, and a big battery locomotive, with motors of at least 2hp (1.5 kW), twice that if you can get it, and as many batteries as you can stuff into it within reason. If there's room, aim for 200 Amp-Hours @ 24 Volts, or 4.8kWh. This will give you enough juice to keep



*Unlike Neptune, where the driver sits behind, Captain Howey Mk II is a 'ride-in' locomotive, albeit sitting in the engine compartment! The extra weight improves traction, making increased horse-power more practical*

going all day. Get a charger that will recharge the battery in 8-12 hours so you can always start the day with a full charge.

I'd expect that most manufacturers will be happy to do a 'special' for you, with more (or more powerful) motors than standard. Ride-on Railways, Phoenix Locomotives and AME all do locos that would suit your requirements 'out of the box' or with factory modifications. One thing I do like, but I'm not recommending (because I've not seen one in the flesh) is Ride on Railways' 'Captain Howey Mk II'. This is basically a half-size model of one of the diesel locomotives used on the fifteen-inch gauge Romney Hythe & Dymchurch Railway so it's a miniature railway locomotive which is a model of a miniature locomotive, and from the specification on their website it looks like a promising candidate for your railway. It's a re-working of an earlier design to incorporate industrial motors and other parts which should make it very reliable and with motors able to deliver 3.5hp for short periods, it would make short work of your gradients and curves.

Richard Ellam  
Bristol

## Item of Interest?

I have a potential front for a 10 1/4 inch gauge model of a Coronation Pacific that will very soon be in a scrapyard. The section covered would be from the buffer beam to the chimney. Looking inside, the quality of the welding becomes apparent when you try to identify the three panels in each section.

Peter Davies  
Farnham



Hmm! The consensus here is it's a bit of old motorcycle, but Uncle Pod (who knows his motorcycles) says not. Whatever it is, the trouble with turning things like that into something similar, but frankly completely different is that the process can end up absorbing more hours than starting from scratch. Anyway, if someone wants to save it from being melted down, Peter can be reached at [davieshp24@gmail.com](mailto:davieshp24@gmail.com)

## Coming Out

I have owned 'Lady Jane Gray' for almost 20 years, during which time she has been largely hidden from view on my own short line, but after negotiations with Simon Clarke of the Rudyard Lake Steam Railway she went off to Rudyard in December 2021, initially for one season. After a quick inspection she was shunted into the shed and brought up to scratch. She was piped for air braking and had her saddle tank and cab removed so the boiler could be tested. Many other minor tasks needed to be done, including boiler insulation using modern materials.

In the photo taken on my railway she has no dome. As built she had a flat plate on the saddle



tank, similar to Hunslet 'Rough Pup', but this was later changed, and the Fairbourne manager Chris Price gave me the dome from 'Russell' which I adapted to fit. And it looks splendid at Rudyard I must say.

She hauled her first public services on 2nd and 3rd April 2022 when she took part in the Rudyard's 'Super Power Weekend' in conjunction with the railways own large locomotives 'King Arthur' and 'Victoria'. She will be working at the Rudyard Lake Steam Railway in the 2023 season.

Gordon Brown  
Somerford, Cheshire



ABOVE: 'Lady Jane Gray' at the Somerford Light Railway, clearly showing the flat plate on top of her saddle tank

LEFT: departing from Rudyard station with the first train of the weekend, the 11am on 2nd April 2022 with her very own brass dome



# Miniature News

## Moors Valley Country Park, Dorset

The **Moors Valley Railway** is one of the few really busy commercial railways running on aluminium track, which has many advantages over steel, but does inevitably wear faster, causing track to go out of gauge. The sharper curves on the Moors Valley are renewed relatively frequently, but some of the other legendary 'out-of-tolerance' stretches have been in place for a long time. The double-track section between Lakeside Station and Kings Junction dates back to the early 1990s, and is being completely renewed, from a new weed-proof membrane, fresh ballast and new plastic sleepers, to the aluminium rail. Work started in October but will pause over the festive season and resume in January 2023.

**W** [moorsvalleyrailway.co.uk/trackwork-replacement](http://moorsvalleyrailway.co.uk/trackwork-replacement)



Relaying and ballasting at Moors Valley

## Sutton Coldfield, West Midlands

When the **Sutton Miniature Railway** was evicted from its home in Sutton Park in the early 1960s, the site was bulldozed, and it seemed inconceivable that any of the rolling stock would survive, let alone return to Birmingham, but it's happening. The stock wasn't sold off, but left to slumber for nearly 40 years until a National Heritage Lottery grant enabled the Cleethorpes Miniature Railway to begin restoration.

End of the story? Not quite. Pressure gradually mounted for the railway to come home, and the breakthrough came with an agreement to restore the locos and stock and build a line round the Tyseley Locomotive Works. Resurrection of the Sutton Miniature Railway will cost half million pound, but the line will be used as an educational facility for young engineers as well as giving rides to the public. The real prize is to return to Sutton Park. Contacts have been made and negotiations are underway...

**E** [smr@vintagetrains.co.uk](mailto:smr@vintagetrains.co.uk)

## County School, Norfolk

The North Norfolk Model Engineering Club has opened the **Wensum Valley Miniature Railway** at the former County School station north of Dereham. After 17 years at Holt station on the North Norfolk Railway, the group were forced to leave when the site was redeveloped. They were offered suitable land at County School by the Mid-Norfolk Railway back in 2017, but were unable to make the move due to the Covid epidemic. The new 5/3 1/2" raised track is unusual, because County School is a heritage railway station without a rail service. The aim is to restore standard gauge services to Dereham, and thence to the national network, but for all sorts of legal and practical reasons, that remains a long way off.

The Mid-Norfolk does have a railway presence at County School, and even a station master, although he admits 'It will be a while yet before the MNR is able to run trains from Dereham to County School station'. The miniature line will join the nature walks, cafe and museum at the old station, which can now claim to have trains too.

**W** [midnorfolkrailway.co.uk](http://midnorfolkrailway.co.uk)



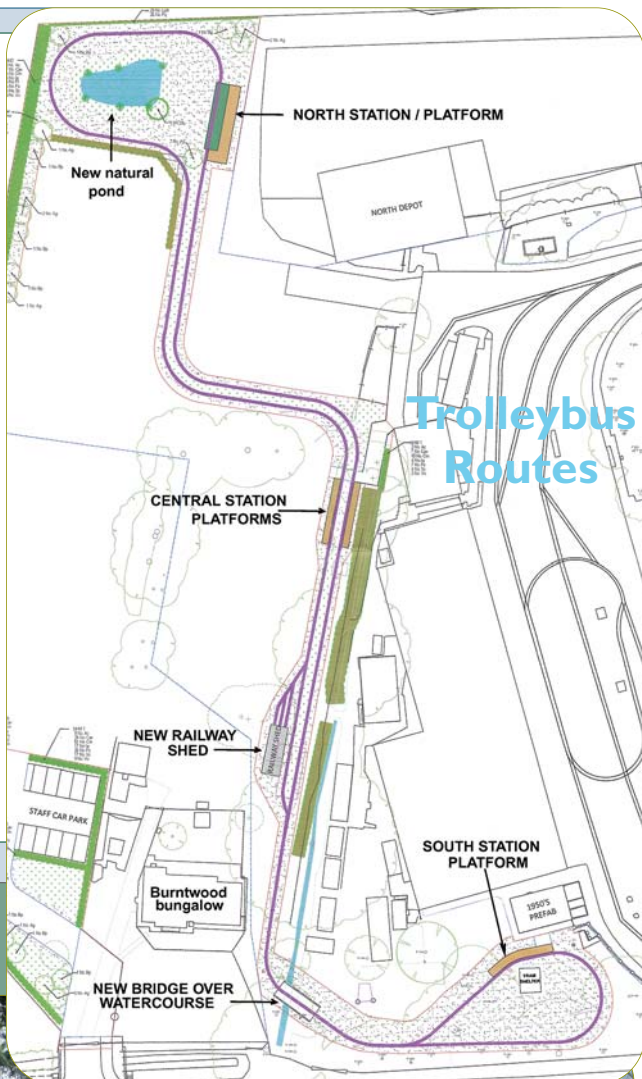
## Doncaster, South Yorkshire

The **Trolleybus Museum** at Sandtoft near Doncaster is opening a new 600 metre miniature railway using track and equipment donated by Frances Terry after he closed his Ise Valley Railway near Kettering.

The 7 1/4" line is expected to be built as a long double track joining two balloon loops, the neck of the southernmost loop closing to a short stretch of single track. Three stations are planned, and a three-road shed. Construction of the 'Sandtoft District Railway' has already begun, and the aim is to open at some point in 2023. The museum already has a network of catenary-equipped trolleybus roads, 15 motor buses, 11 support vehicles and 55 trolleybuses - thought to be the largest collection in the world.

The railway is just one element in a major expansion at the museum, expected to cost some £2 million over ten years.

**W** [sandtoft.org](http://sandtoft.org)



RIGHT: The proposed railway at Sandtoft  
BELOW: Some typical Ise Valley scenes:  
(left) 'Cobber' passing 'Joan' at the woodstore  
(right) 'Cobber' on an open stretch



# Out & About

## Ruislip Lido, London



The 12-inch gauge Ruislip Lido Railway is an unlikely destination for visiting locomotives, not, we hasten to add, because they're an unfriendly bunch in Ruislip, but because very few locomotives are of a suitable gauge to run there. How unlikely? Actually, it may never have happened before. So when 'Albert' from the Littlehampton Miniature Railway arrived for the Gala weekend of 10th-11th September 2022, it was a pretty noteworthy occasion.

Diesel-electric *Albert* started life as a 15-inch locomotive, but in August 2016 it was bought by three associate members of the LHRA, the voluntary group that runs Littlehampton, and regauged to 12 $\frac{1}{4}$ -inch to suit the line. But isn't the Lido 12-inch gauge? True, but tolerances being what they are, some 12 $\frac{1}{4}$ -inch locomotives will run there. The Ruislip Railway is open weekends until Sunday 26th November 2022, followed by Santa Specials on Saturdays and Sundays 4th-18th December. *THANKS TO Matthew Fraser*





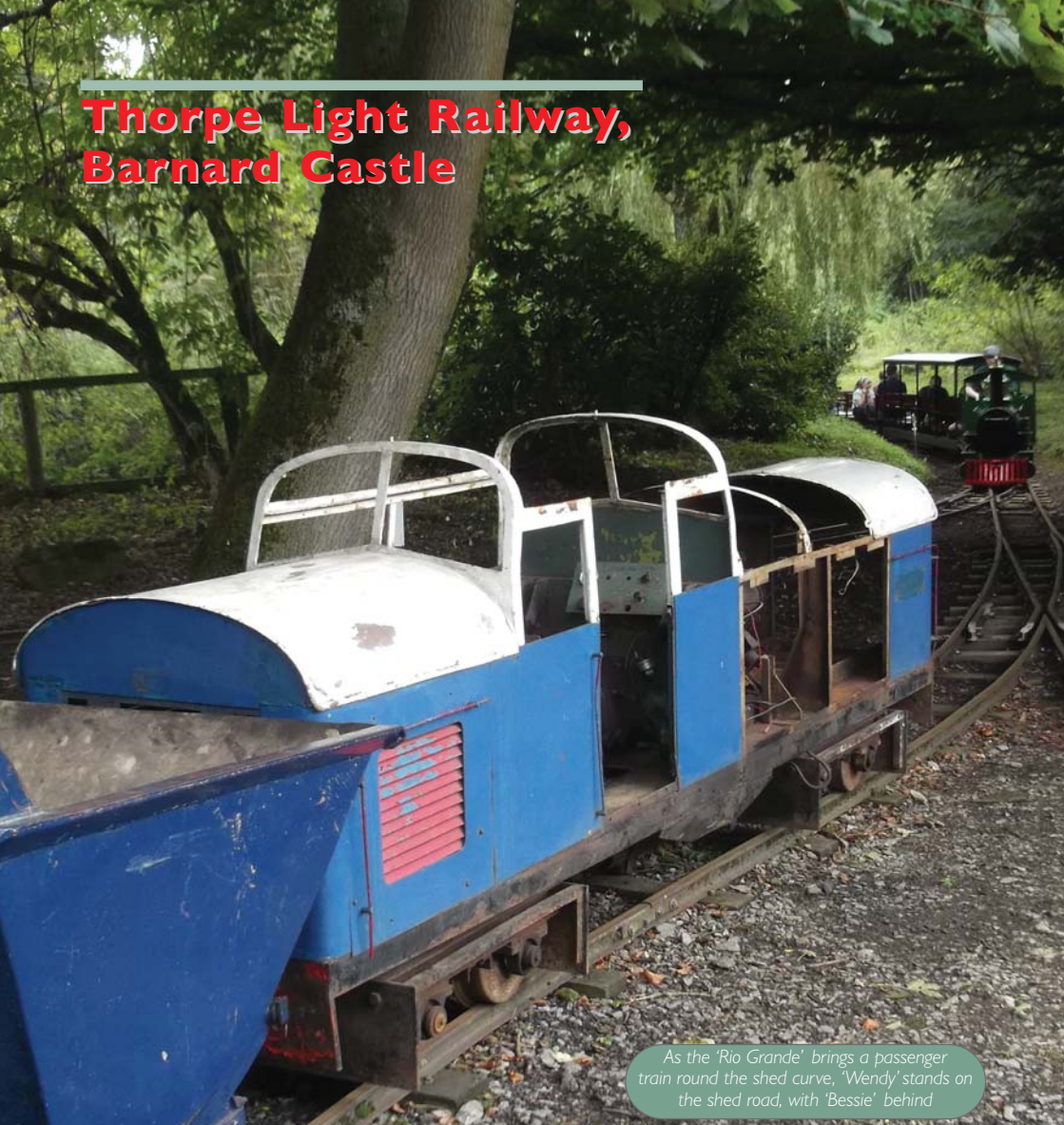
ABOVE: 'Albert' at Woody Bay station, with what looks like a good load

BELOW: On display, but not in action over the weekend, was the magnificent 'Mad Bess', currently under overhaul





# Thorpe Light Railway, Barnard Castle



As the 'Rio Grande' brings a passenger train round the shed curve, 'Wendy' stands on the shed road, with 'Bessie' behind

On 11th September 2022, the 1972-built 4-4w diesel 'Wendy' returned to the former Whorlton Lido Railway - now the Thorpe Light Railway - after ten years in safe storage. The machine was built especially for the Lido Railway in 1972, the operator, Raymond Dunn persuading British Steel at Consett steelworks to make the frames and bogies, and Coleby-Simpkins to build the bodywork and assemble the locomotive. Intended as no more than a standby machine for Bassett-Lowke 4-4-2 'King George', Wendy outlived several locomotives, and ended up running the line alone from the late 1980s until final closure in 2005.

It was vandalised during the long closure that followed, but eventually salvaged and put into safe storage from which it has emerged for this 50th anniversary where she was towed around the circuit by maintenance loco 'Bessie'. Wendy will be restored to service as time allows.

THANKS TO Philip Champion

# Technology

## Miniature Train Speed Monitor

Peter Grossi



The ultrasound transmitter and receiver. These little devices make no physical contact with the train, but detect a signal reflected off the wheels and other parts. The housings are 3D printed PLA plastic

The difficulty of operating signals and measuring train speed on miniature railways is not new, and has presented a substantial problem across the world, where many such installations are to be found.

On a model railway, situated in a benign indoor environment, optical sensing is easy and reliable, the train speed being measured by the time delay between interrupting a pair of visible light or infrared beams. These can work very well even in bright sunlight, but in a permanent outside installation this method is prone to environmental interference. Even in enclosed shelters set back from the track, the beam can be obstructed by leaves or an accumulation of dirt, ice or snow.

On full-size railways, track circuits have been around for a long time. Some miniature lines use a system where one rail is energised (at a modest voltage!) and a circuit is created via the train's wheels and motion to the other rail and hence back to the signal box. Track circuits need reliable and mechanically strong insulation between such 'sections', usually in the form of insulated fishplates and bolts. The resulting circuits can be unreliable in wet weather or through failure of the insulation, and often fail to detect lighter vehicles, particularly when the rails are rusty.

These problems exist on full-size railways, but are much worse on miniature railway signalling systems, which may be called upon to detect a wide variety of locomotives and rolling stock built to different weights and scales, sometimes with insulated wheels, or to different gauges, all mixed in the same train.

A variation tried for outside installations involves making and breaking an electrical circuit along a rail, rather than from one rail to the other. A short section of track is isolated and the system monitors the brief conductivity between a section and its neighbours when momentarily bridged by a metal wheel.

This has been used for signalling, but it brings a variety of problems. A reliable electrical connection must be made by a wheel as it strikes both sections, which would be very brief in any

case, and presents particular difficulties where stock is to be used without modification. The isolating gap needs to be very narrow so that individual wheels can reliably make contact across the gaps without undue hammering as the wheels hit the edges. Also, this arrangement is not weatherproof and depends too much on reliable electrical contact with the wheels and the track. Wet leaves, snow and ice are likely to be an even greater problem than on full-size installations.

***“...The isolating gap needs to be very narrow so that individual wheels can make contact...”***

A widely-used alternative uses track-mounted microswitches to detect passing wheel flanges. This is arguably more reliable than track circuits in poor weather, but locomotive and rolling stock flanges vary widely in size and shape (particularly on dual-gauge track), and the mechanical components are subject to daily wear and tear and are easily damaged by out-of-specification flanges, stones, frost, deliberate tampering or accidental triggering. Like track circuits, they generally control the signal aspect and other indicators through a latching relay, which is activated and deactivated at the beginning and end of a section.

As a result they tend to struggle with unusual locomotive movements within a section, and do not provide a reliable indication of whether a train is still in section, has entered a siding, or



New Romney station on the Romney Hythe & Dymchurch Railway has one of the finest collections of 'real' mechanically-worked semaphore signals on a miniature railway. No electronic solution can match the logic shown by a good signaller, but few railways have the money, time or staff to go down this sort of route!



been removed from the track altogether.

Accidental or deliberate triggering of a microswitch can result in a false negative, giving a green light, or a positive indication (and thus red signals to trains) which can only be cleared by deactivating the relay(s). For signalling purposes cross-track switches seem to be a common solution, but the system is not much liked.

All of these options are complex and rely on a railway having one or more volunteers able to offer expert help with electrical and electronic circuits. And however well-maintained, their limitations can result in certain locomotives being banned from a particular track.

A load gauge or vibration sensor could be attached to a small section of track, but this is not an attractive option as it requires a degree of surgery that could destabilise the track itself. And a vibration sensor may find it difficult to distinguish an approaching train from one that is present, especially if the isolating gaps become clogged.

*“...accidental or deliberate triggering of a microswitch can result in a false positive...”*

*Systems based around microswitch or track-circuit detection can get incredibly complex and are rarely reliable in harsh environmental conditions*



## The Solution

This is the second incarnation of an earlier experimental project to prove the suitability of a method of detecting and monitoring trains on a miniature railway network, but some limitations were discovered that complicated the first installation. These limitations have been overcome by segregating the analog and digital components.

The foregoing seems to be a global problem, for which the author is unaware of any satisfactory and generally usable solution being available. So it appears that a new approach is required to sense speed and position of trains running on a miniature railway. It was considered inappropriate and excessively complicated, to install any sort of device on locomotives operating on the network, as some would be resident and others occasional or one-off visitors. The machine's position on the track and compliance with designated speed limits also needs to be sensed and reported, either by track-side signals or to the signal box.

The sensing device therefore needs to be track or track-side mounted, and weather-proof over all reasonable temperatures and all operable weather conditions. It also needs to be robust against other environmental conditions such as leaves, dust, steam oil and cinders from steam locomotives, and not easily damaged by small animals.

*“...to suit track of 5", 7<sup>1</sup>/<sub>4</sub>" or dual-gauge and able to detect steam, IC and electrically-powered locos...”*

If part or all of the device is to be mounted between the rails, it must be of sufficiently low profile to be entirely below the top of the rails to avoid fouling the train undercarriage. A similar restriction applies if mounted outside the rails, unless it is well clear of the entire allowable loading gauge. Mounting on sleepers may be convenient for stability and simplicity of installation, but this typically limits the height of any part of the unit to no more than 25mm (one inch) for 5-inch gauge, and 21mm for 3<sup>1</sup>/<sub>2</sub>-inch gauge.

In the targeted initial application it was not felt necessary to report the actual speed of a train, but whether it fails to comply with the required average speed limit over a designated length of track. Obviously a device monitoring the entry and exit of a train would also be able to indicate that the designated sector was occupied. All indications need to be reported locally by trackside indications and/or suitable switched signals to a signal box or other devices.

The parameters were chosen to suit track of 5", 7<sup>1</sup>/<sub>4</sub>" or dual gauge, with an ability to detect a variety of steam, IC and electrically-powered locomotives. It was also required to be low or zero maintenance and either permanent or very quick and easy to remove and install as required.

While it was not specifically required to do so, it was considered desirable for the components developed for this application to be easily interconnected in such a way as to allow multiple monitoring points over a whole network, dealing with expansion or contraction of the layout over time. This would allow a greater degree of central monitoring, leading to better overall co-ordination and safety.

## The System

Theoretically a Doppler sonar device could be devised that would measure the speed directly. But with a train travelling at 6mph (eight feet per second or fps), the speed of sound close to 1,000fps, and a transmitted frequency of 40kHz, the return signal would be altered by just 1.6%, or 640Hz. This is detectable for a clean signal, but with a weak return signal and the confusion of reflective structures on a train it seems unlikely to be accurate or reliable enough for this sort of purpose.

Sonar signal delay measurement (bouncing soundwaves off the train) could determine the range of a train at any instant. Using the above estimates, the delay between the outgoing and return signals would change by a millisecond for every



*Hand-held radar devices are now widely available, but even the sports models are not well-suited to detecting very low speed*

six inches of movement. Again, this is technically interesting but could be compromised by multiple reflections from the train.

Hand-held radar or laser devices are available for consumer use, and are seen at some installations, but there are issues connecting them to installed indicators and signal boxes. And as part of a fixed installation they would suffer from some of the problems mentioned above. There may also be a safety problem with unprotected laser light that could find someone's eye.

Because of the issues with a Doppler or sonar-type system, an alternative strategy of using reflected high-frequency ultrasound signals seems to offer possibilities in detecting the presence of a train. But as the devices do not measure speed directly (as with the Doppler effect) this requires transmitter and receiver units at each end of the designated sector. It also requires a control unit to process the returning signal, calculate the elapsed time, and provide the necessary indications. Unlike simple mechanical switches, this solution requires several components and processes:

1. The ultrasound devices placed at each end of the section (transmitter and receiver pairs).
2. Environmentally suitable enclosures for the devices and connections.
3. Power source for the transmitter excitation signals at the precise resonant frequency.
4. Signal processing and amplification.
5. Analysis of relative timing for the required speed and distance.
6. Status indications and reporting.

## Devices & Enclosures

The ultrasound devices used in the developed units are commonly available, inexpensive, environmentally protected and compact. They therefore appear to be eminently suited for this application. The ones chosen are mechanically tuned to a precise frequency of 40kHz, which determines the excitation signal.

The problem of the enclosures is discussed above, and it would appear that a suitable design has been discovered. While this presents a problem obtaining compliant commercial enclosures the design is easily and cheaply produced with 3D printing, for which production files are available.

Whether they employ piezo-electric components or mechanical vibrators, ultrasound devices are specified to operate at a very precise resonant frequency. While this could be provided by simple analogue timing devices, these depend on passive components that have wide tolerances and would need some sort of adjustment to tune them sufficiently accurately.

This represents two problems: adjustable components may not be reliable in the environment,

***“...reflected high-frequency ultrasound offers possibilities in detecting the presence of a train...”***



*The casings for the ultrasound transmitters and receivers are easily and cheaply 3D printed from PLA plastic, and are strong enough to stand on*



even in sealed enclosures, and they are inclined to be temperature-sensitive. It is also a good rule that, when designing electronics to operate in a potentially hostile environment, it is best to avoid using adjustable components, switches and moveable links wherever possible.

***“...in a potentially hostile environment it’s best to avoid using adjustable components...”***

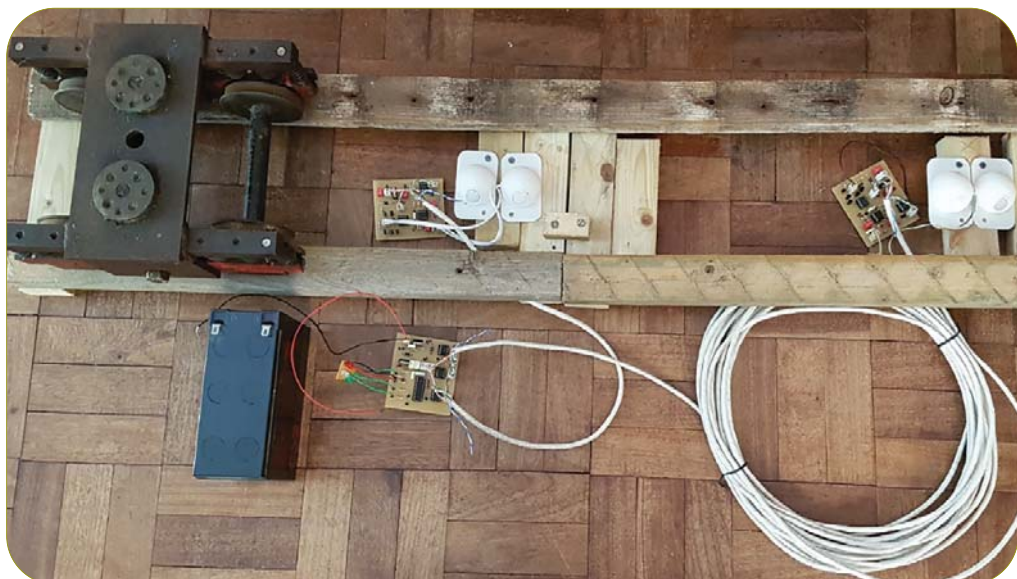
Therefore it was decided to use crystal-controlled oscillators with frequency division to get the accurate timing. Suitable crystals are inexpensive and specified to be accurate to a few parts per million over the temperature ranges expected. In practice the receivers produced a weak 1 mV signal from the reflected ultrasound, which needed to be amplified and made suitable for digital processing.

This project assumes that the track is one-way, although the device can be programmed to accept trains in either direction. The signal analysis needs to allow for several operational possibilities:

1. A train enters the section and leaves it at a normal operational speed (perhaps from a slow walk to about 10mph).
2. A train enters the section and leaves it at an average speed above a designated limit (perhaps 5-10mph).
3. A train enters the section and stops before it reaches the end.
4. A train reaches section end but stops before it has *completely* left the section.

The second possibility represents a potential hazard for the train and it’s passengers, and the last two possibilities also represent a potential hazard for any train that may be following. So it seems advisable to provide some sort of indication, not just for excessive average speed, but for section-in-use and section-obstructed situations.

The speed limit on any particular section of track may change and it would be inconvenient to modify the electronics or programming to suit (remembering that field-adjustable components are



Initial indoor trials showing the 12-volt battery bottom left, the two transmitter/receiver pairs and the relatively simple circuitry needed to amplify and process the reflected signals. In a commercial system the electronics would need to be fully weather-proofed, but only the trackside units would need to be so exposed, because the other circuitry could go undercover some distance away

not a preferred option). So if the train speeds are measured by checking the transit time (leading edge to leading edge), the speed limit can be set simply by placing the sensors at an appropriate distance, something that can be easily changed. Since the programmable device is run from a crystal reference, accurate timings can be determined for the train movements for each circumstance, and digital signals generated accordingly.

*“...the only reliable way of determining whether the track is clear is by looking at it...”*

For a given programmed section, minimum time allowance for the section length can be easily calculated. For example, a three-second time allowance for a speed limit of 6mph would require a section length of 24 feet. The following table shows representative values for different pre-set minimum time allowances and speed limits. The time allowance is programmed into the

Speed limit mph	Sector distance feet	
	Time required 2 secs	Time required 3 secs
4	10.67	16
5	13.33	20
6	16	24
8	21.33	32
10	26.67	40
12	32	48

*Chart showing the section length needed to warn of over-speed with different pre-programmed time allowances. This very short section is obviously biased towards taking a 'snap-shot' of the train speed. A signal section would be longer*

system according to user requirement. It should be understood that if the section sensors are placed on sleepers, the following figures may not be realisable precisely.

So for safety if the nearest sleeper is not close to the required distance, the end position should be brought back to the previous sleeper. The speed would then be marginally over-estimated rather than under-estimated.

In determining whether a train has stopped in the section, another timer is used, with a fixed delay allowance in seconds. For example if a train averages less than one tenth of the permitted speed the warning could be issued through an indicator or switched signal. This would remain set until it is automatically cancelled when the end sensor is eventually triggered. This is programmed into the system according to user requirement.

In order to clear the section-in-use condition, the system needs to know when the last vehicle in the train has passed the end sensor. As the carriages pass over the sensor it will be intermittently triggered as they pass, but there will be gaps when nothing is sensed, for example between carriages. But if the gaps are timed, and a limited allowance is given for each of them, then a reasonable guess can be made when nothing is sensed for a suitably safe length of time. This also is programmed into the system according to user requirement.

But how would the system know if a train stops after the end sensor is triggered, but before it has completely left the section? If the train stops with some item reflecting the ultrasound then the end sensor can determine that the train is still there and the previous comment applies. But if the train stops with a gap between carriages over the sensor, the situation is not clear. In the end, the only reliable way of determining whether the track is clear is by looking at it! But this could be done using a third sensor further down the track at a distance at least the length of the longest train. This is broadly how mainline systems work, with three detection points controlling each of the sector signals. This is not a requirement in this specification but could be considered for further development.

The Cardiff test, showing just how wet the day was. In conditions like these, track circuits would struggle, but ultrasound is unaffected by rain. Note the short twisted paired wires to the trackside unit - a wise precaution again interference finding its way into the weak ultrasound receiver signal. The wires from the trackside unit to the signal box are much less critical in this respect. Note how small the units are - there's clearly plenty of room between 5-inch rails or even narrower gauges

## Site Trials

The system was trialled on a track of the Heath Park Miniature Railway in Cardiff, operated by the Cardiff Model Engineering Society. In order to ensure a consistent position of the ultrasound devices, a mounting plate was made that fits over the devices and interlocks with their bases. This securely locates them to ensure consistent performance. If these sensors are to be used for counting axles, their position in relation to the rails must be consistent to ensure the entire train has left the section.

The track units were placed 20 feet apart between sleepers on a 5 and 7<sup>1</sup>/<sub>4</sub>-inch dual-gauge track. With the time allowance of three seconds programmed into the trackside unit, this distance corresponded with a speed of 5mph, as required by the network. The same 40 foot cable used for the earlier indoor trial was used, and kept safely away from the track.

The photograph shows one of the sensor units mounted on a temporary sleeper. The electronics were placed in waterproof boxes positioned next to the track, with the short signal wire pairs well separated. The weatherproofing was well tested throughout the day because it rained continuously for the entire time!

The trackside unit was placed in a temporary box with the LED indicators exposed (not photographed, but other than improvised weather protection, it was the same one used in the indoor test). No changes or adjustments were made to any of the units or cables.

The site could not conveniently provide their own 24 volt supply, so the test was conducted using a small 12 volt lead-acid battery. A diesel locomotive with several carriages was used to test the unit.

## Results & Future Developments

The devices consistently detected the train and indicated correctly when the allowed speed had been exceeded. The system also accurately responded to the end of the train when detection ceased. As a simple test of vulnerability, a large and very wet leaf was draped over one pair of





devices, but they continued to work accurately.

Overall the exercise was a success, although it was not convenient that day to test the system with a large variety of different rolling stock. It was found that the track units met the functional requirements and could easily be installed on existing track. However some adjustment to sleepers would be needed to fit the units between 3 1/2 inch rails.

It was felt that the new technology could be easily integrated with an existing relay-based signalling system. The provision for connecting the track units over distances of several hundred metres allows the trackside electronics to be placed in the signal box, which is very desirable for installations such as the one used here.

The system demonstrated a capability for use as-is for monitoring train speed, and the potential for being developed into a more extensive monitoring system, either independently or in conjunction with an established relay-based system operating existing signals.

In conversation with the site operators a number of suggestions were made regarding future developments:

Axle-counting is a very desirable further development, so the departure of a train from a section can be more reliably determined, and this should be investigated promptly.

If an axle-counter were sensitive to the direction of movement it would cater for shunting operations, which can take place in both directions, even on a one-way track. It was therefore decided to consider how two closely-positioned sets of devices could be used to count axles or bogies in either direction, and whether the track units in their present form could achieve this purpose. Further trials are to take place when this has been investigated.

If, in service, this system proves reliable within its own limitations, a more fully integrated system could be determined, which can overcome these limitations and be integrated with trackside signals. The units could also be connected with a digital link to the signal box (which could be a laptop computer), enabling the timings and other parameters to be monitored and changed at will during operation.

***Peter Grossi worked as a development engineer on defence contracts for Ferranti before running his own consultancy until retirement in 2014. He is still developing technical ideas such as the ultrasound railway signal, and can supply a PDF of the full report, wiring diagrams and STL files to 3-D print the track unit boxes. Please contact him at [peter@grossi.co.uk](mailto:peter@grossi.co.uk)***

***“...axle-counting would more accurately determine the departure of a train from a section...”***

### Miniature Railway Comment

This is a fascinating development, using some very clever technology to overcome the long-standing issues with existing systems. For those with the necessary skills, the full report covers construction, right down to circuit-board and component level.

The majority of us will never have the ability to build these devices of course, so what's really needed is a commercial operation willing to invest the time and money in turning the raw prototypes into a commercial system.

From our own experience we would like to see something ready-programmed with default settings, in waterproof casings and ready to use - a set of 'plug-and-play' signals in other words. Like most garden railway users, we can deal with the trackside wiring, but have no desire to ever see the innards, or to programme them. Ideally something as simple as a box fed from a 12 volt DC supply, with links to two, three, or more sensors and outputs to colour light or solenoid-operated semaphore signals.

The beauty of a modular approach is that a railway really could start with something as simple as that, then reprogramme the system and slot in additional units as required.

# History

## Mr Franklin's Garden Railway

Reprinted from *Model Railway News*, September 1928

Thanks to Hugh Smith



*'Stanley Baldwin' was a Bassett-Lowke loco, later renamed 'Loadstone', then fully restored and renamed 'Stanley Baldwin' in 2018. It's difficult to judge the exact position of the train, but it looks as though the loco has backed the train round to the limit of construction on a high embankment by the Midland Railway and is now about to haul the party back up to the house*

The members of the Railway Club were evidently pleased with their recent visit to the works of Messrs. Bassett-Lowke Ltd, at Northampton, for this was supplemented soon after by a visit to Mr Franklin's railway at Radwell near Sharnbrook.

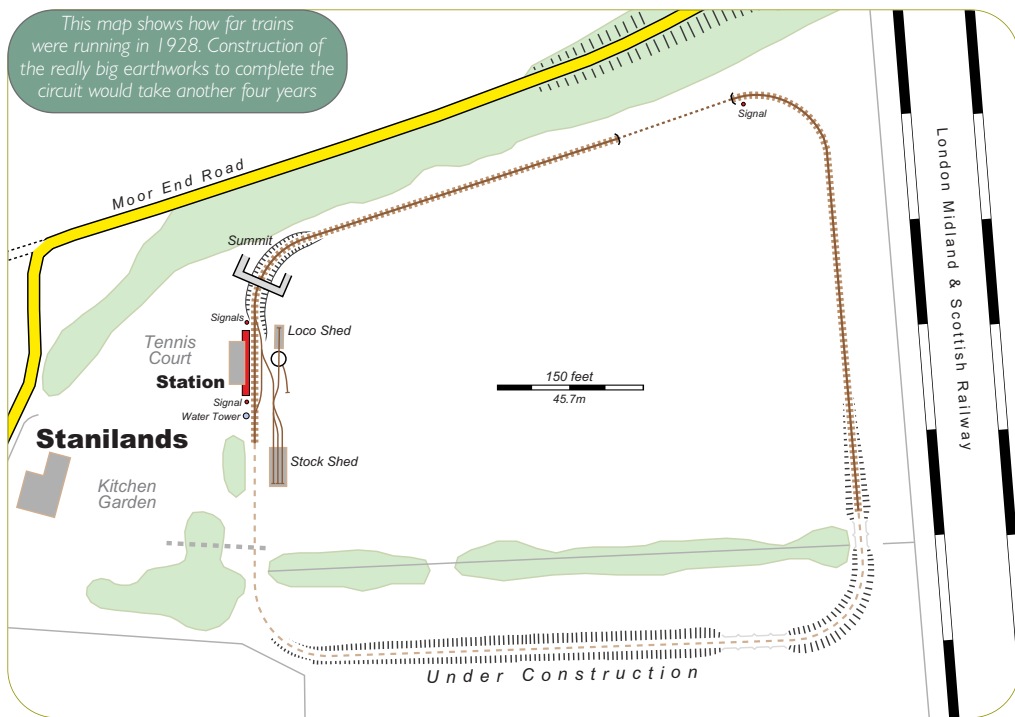
The party were met at Bedford by Mr F H R Franklin, a director of Messrs Bassett-Lowke Ltd, and proceeded from there to Sharnbrook, where they obtained special permission to walk down the LMS mainline to Radwell. Mr Franklin Jnr had steam up on arrival and they were soon keenly interested in the locomotives, rolling stock and equipment.

The railway, which has not before been described on these pages, commences at the bottom of the garden of Mr Franklin's country house at Radwell. A station with platform 70ft long, a round water-tower mounted on a brick base, a spacious engine shed, turntable and sidings, are all situated at this point.

After leaving the station, the line passes through a cutting and under a large overbridge constructed entirely of wood, from the top of which an excellent view can be obtained of the whole of the present railway.

The railway itself runs parallel with the road for a short distance, makes a right-angle curve across the field, and then runs parallel with the LMS main line, the present terminus being at the end of a high bank about six feet from the field level, from which point it will be continued by means of a viaduct through a wide ditch and on through another field, eventually joining the station terminus forming an endless track of nearly one mile.

The engine, named *'Stanley Baldwin'*, will be well known to those who visited the Model Engineer Exhibition two years ago, as it was exhibited on the stand of Messrs Bassett-Lowke Ltd,



'Stanley Baldwin' was to have an extraordinary history. The Radwell line was closed for most of the Second World War, but the locomotives did run on a few occasions, bringing a bit of colour into the lives of displaced refugees. After final closure in the 1960s, the loco became a fairground attraction with Bill Dorman. It then went to headmaster Brian Nicholson who established Bickington, spent time derelict in the USA, was repatriated by Peter Bowers, then passed through several hands before Scott Smythe had her fully restored by Joe Nemeth. She 'came out' as a star attraction at the Ingfield Fete in June 2018



and caused great interest to visitors. It is a 2 $\frac{1}{2}$ -inch scale, 10 $\frac{1}{4}$ -inch gauge model of no particular prototype and is a 4-4-2 'Atlantic' type, with six-wheeled tender. The cylinders are 4 $\frac{1}{2}$ -inch stroke by 3 $\frac{5}{8}$ -inch bore, driving onto front-coupled wheels of 12 $\frac{1}{4}$ -inch diameter. The train in use at present consists of seven four-wheeled vehicles, one bogie vehicle and one six-wheel goods brake van. The rail is 'Vignol' section 12lb to the yard, and is mounted on steel sleepers with intermediate wooden ones.

The visitors expressed their thanks to Mr H F R Franklin and Mr Bassett-Lowke for their hospitality and also to Mr Franklin Jnr, who acted as driver on this occasion.

*The full story of the Radwell Miniature Railway is in **Miniature Railway 43**, available on paper or as a digital PDF*



# Line Profile

## Bekonscot Light Railway



*Battery-electric 'Sprocket' is a Hudson Hunslet, bought from Maxitrak in 2001, but extensively rebuilt at Bekonscot in 2021 after around 50,000 miles*

**Y**ou never quite know what to expect in the leafy suburbs. Walk out of the London-bound platform at Beaconsfield station in deepest leafiest Betjeman Metroland and you'll see a sign to 'Bekonscot Model Village'. Follow it, and there's another, and another and then you're there. In a very ordinary row of mock Tudor and the like, there's a narrow entrance, that opens out, rather magically into a world of miniature trains, people, houses and utter dedication. Welcome to the Bekonscot Model Village & Railway.

Bekonscot was built by exactly the sort of chap you might have expected to find in Beaconsfield at the turn of the 20th century, a London accountant named Roland Callingham who answered the siren-call of Metroland in 1910 and moved from Ascot to Chiltern Lodge, Ledborough Lane, Beaconsfield. After tragically losing his first wife with the sinking of RMS Leinster in the First World War. Roland subsequently remarried and established a noteworthy garden at Chiltern Lodge, which he began to open occasionally for charitable causes.

Roland might have been an accountant professionally, but he seems to have been an enthusiastic model-maker in his spare time, until eventually his long-suffering wife made one of those

'me or the models' announcements. Metroland was still developing at the time and Roland was able to buy odd parcels of land between Ledborough Lane and Warwick Road, until he had acquired around four acres, which was more than enough for the most prolific model-maker to display his craft.

Possibly as a gesture of peace, he used the land to build those most aspirational of Metroland recreational toys, a swimming pool and a pair of tennis courts, craftily extending his new model village out around them.

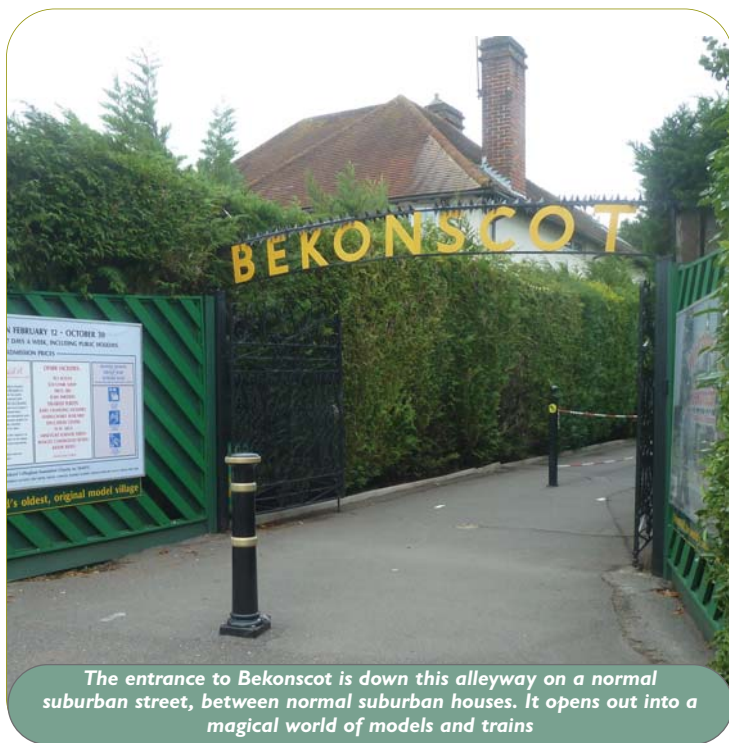
Roland was clearly as passionate about trains as he was about models, and one of the first developments around the pool was a Gauge 1 railway, built with the help of his friend James Shilcock. For visitors, the Callingham's held country house weekends with a difference. When everyone had tired of tennis, splashing about and fox-trotting on the patio, they'd be invited to play trains.

The new enthusiasm seems to have resulted in bigger models, because Roland's first house was too big to go out through the door and had to be passed out the window. He subsequently had a larger door fitted, which suggests that the argument over where models were going to be made had been amicably settled.

Inevitably passersby began to express curiosity as to what this new entertainment might be, and friends suggested opening to the public, which Roland agreed to do, the first open day taking place on Sunday 4th August 1929, the public entering the grounds through the front gate of Chiltern Lodge, making their donation and passing through to the models and railway behind. It was at this stage that the village (more of a small town) was named Bekonscot, 'Bekon' being based on the innumerable early spellings for a beech wood and 'scot' on Roland Callingham's previous home town of Ascot. So the name is vaguely related to the modern town of Beaconsfield, which was first recorded as Bekenesfelde as early as 1184.

In 1932, the entrance to the model village was moved from Ledborough Lane to Warwick Road, which was more convenient for the station and had more on-street parking, although parking seem to have been just as much of a problem then as today, with instances of visitors

***"...he acquired four acres - more than enough for the most prolific model-maker to display his craft..."***



*The entrance to Bekonscot is down this alleyway on a normal suburban street, between normal suburban houses. It opens out into a magical world of models and trains*

being summonsed for illegal and dangerous parking.

As the business grew, things rapidly become more formalised. In 1933, with expenses like wages and maintenance rapidly increasing, entrance charges were introduced, and operating expenses began to be deducted from income, although the profits continued to go to charity, just as they do today. Opening hours became more formal too - initially from 2pm-7pm every Tuesday, Thursday, Saturday and Sunday. Gross income for that year was a shade under £800 or a third of a million pounds at today's prices, taking the increase in GDP and average earnings into account - quite a substantial little business. Of this, exactly half was presented to charity after expenses.

Some visitors who remembered the early carefree days continued to turn up with their swimming costumes, but this practice eventually had to be stopped because of the difficulty of keeping the pool clean.

Perhaps the most controversial change was the sale of the land facing Warwick Road, which yielded seven valuable building plots. With only 4,800 visitors in 1936, this rationalisation made sense, but with two smaller parcels sold to relatives in the 1950s, it left Bekonscot with only two acres, a quarter of which was taken up by workshops and other buildings. Today there are around 140,000 visitors a year and those missing acres are greatly missed.

The model village has always kept up with developments in Beaconsfield, which was still growing rapidly in the 1930s. The impressive Roman Catholic church of St Teresa (described as 'Modern Byzantine') was completed in 1938 just across Warwick Road, but there's still pride at Bekonscot that the model church was completed first. Incidentally, the village has always maintained warm relations with the church, which has a large car park, and provides parking for visitors to this day.

*“...visitors who remembered the early carefree days continued to turn up with their swimming costumes...”*



*Being little more than 20 miles from central London has always been a blessing and a curse. There were some chaotic scenes in the early days, partly because the village was only open on Sundays. This is Sunday 19th April 1936, when Beaconsfield was still visible in the background*



## Post-War Years

The post-war years were about making full utilisation of the limited space to enlarge the model railway and village, while tackling the issues associated with the growing numbers of visitors. The village expanded eastwards absorbing a grass recreation area, and the old swimming pool was turned into the Alexandra Lake, which was spanned by a model of the Sydney Harbour bridge carrying the Gauge One railway.

In 1949, Buckinghamshire County Council gave notice that Bekonscot was in breach of planning regulations, the legal confrontation being launched when a county councillor moved into a house on St Michael's Green near the village entrance. Strange that. This bombshell was followed with an enforcement order in October 1950 that threatened to bring about complete closure. Roland Callingham appealed, subsequently losing to the council in March 1951, and the matter continued to rumble back and forth through the courts until 1952, when it was concluded that the part of the village already open to the public in August 1929 was outside the enforcement order which was based on legislation dating from September 1929, a technicality that allowed Bekonscot to remain open, subject to a five-year planning license. This was subsequently eased to ten years, but even as late as 1997, Bekonscot still had to apply for planning permission on every new house built for the model village! You'd struggle to make that up... According to current managing director Brian Newman-Smith with just a *touch* of ironic humour, '...this was changed and we do not have to apply for planning permission for our miniature residents'. Brian is the first outsider to take on the role, and as an electrical design engineer from Yorkshire, he was - on paper - a slightly unusual choice, but he outclassed 200 applicants to win the role in 1996 and is still very much front of stage after 26 years. These are good, fulfilling jobs.

The authorities were never going to win a moral battle with Bekonscot. As well as making a huge sum for charity, the village employs 30 local casual staff at weekends and during the school

*"...the authorities were never going to win a moral battle with Bekonscot which makes a huge sum for charity..."*



*Bekonscot has always been adept at working the media! This is the opening of Hanton aerodrome in April 1936, with Roland Callingham raising his hat far right. The planes were updated year by year, until a model Concorde was donated and it was decided to keep the village in the 1930s*

holidays, and 16 permanent employees, including model-makers, engineers, gardeners, figure-makers and other 'customer services' people who

*"...friends in high places... In 1939 there had been a visit from Queen Mary, with the two princesses, Elizabeth and Margaret..."*

help by painting models, houses, figures and other maintenance during the winter. One of the big jobs in autumn and spring is bringing the various buildings undercover although increasing business has resulted in a longer season, and only two months of complete closure. Many of the buildings and vulnerable structures go undercover in that time, but not all, depending largely on whether they need maintenance or alteration. Staff are incredibly loyal, and even youngsters can stay for a considerable time. Chief engineer Mervyn Hill has been with the village for 43 years, and doesn't look a day over 44. He must be though, because his son George now works for Bekonscot too.

The model village had some friends in high places, which is always useful. In 1939 there was a visit from Queen Mary, with the two princesses Elizabeth (later Queen of course) and Margaret, and in 1945 Princess Alexandra, Prince Edward, the Duke & Duchess of Kent and Prince Michael of Kent made an appearance. Enid Blyton had been a close neighbour for some years, and even wrote a little booklet for Bekonscot called 'The Enchanted Village' which stills sells in the shop.

After Enid Blyton died in 1968, her house 'Green Hedges' was demolished, something that would be unimaginable today. In 1997, Bekonscot decided to commemorate the centenary of her birth by building a replica of the house. With no official local authority participation, Bekonscot became the focus for the considerable local and international interest in this famous author and the house where she did most of her writing, and rather belatedly the mayor of Beaconsfield launched an appeal, raising £3,000 towards the cost of the model.

There have been a few commissions too. In 1999 local free paper the Bucks Free Press asked if a replica of its offices could go in the village and this was subsequently done. In 2000 a time-capsule was buried beneath it for opening in 2029.



*The village employs around 30 casual staff and 16 full-time employees. The work of restoration and enhancement is never-ending*

## The Model Railway

Over the decades, the village has marched gently forward with time, but the crunch came in the 1970s when Bekonscot was presented with an enormous Concorde model by a friendly travel agent. After some long-overdue debate, Concorde was banished and a decision was taken to fix the village in the 1930s, a suitable historic era in many ways, particularly where the railway is concerned.

The scale of the village is 1:12/1:15, which you might expect to put the buildings way out of

scale with the roughly 1:32 scale Gauge 1 railway, although oddly, everything feels more or less right and the relatively small scale of the railway makes it possible to fit a lot of track and stations into a relatively small area. The track layout looks complex, but it's easier to understand if you think of it as two loops, one single, one double, joined by a long double-track section, plus a short branch. All of the stations are fictitious, except Greenhaily, which really is Beaconsfield in the 1930s.

Gauge 1 turned out to be a good choice. It was quite popular in the early



**ABOVE:** Greenhaily station with 'G K Chesterton' hauling 'The Bekonian'. Many stations are four-track allowing trains to pass

**RIGHT:** Bekonscot Town with three generations of visitors - not unusual

years of the 20th century, before miniaturisation made small powered models practical, and it's becoming increasingly popular today, as model railway suppliers shift from products aimed at children to adults. The track gauge is 44.85mm or 1<sup>3</sup>/<sub>4</sub>-inch, and equipment is big, and potentially very expensive.

Initially, the track was





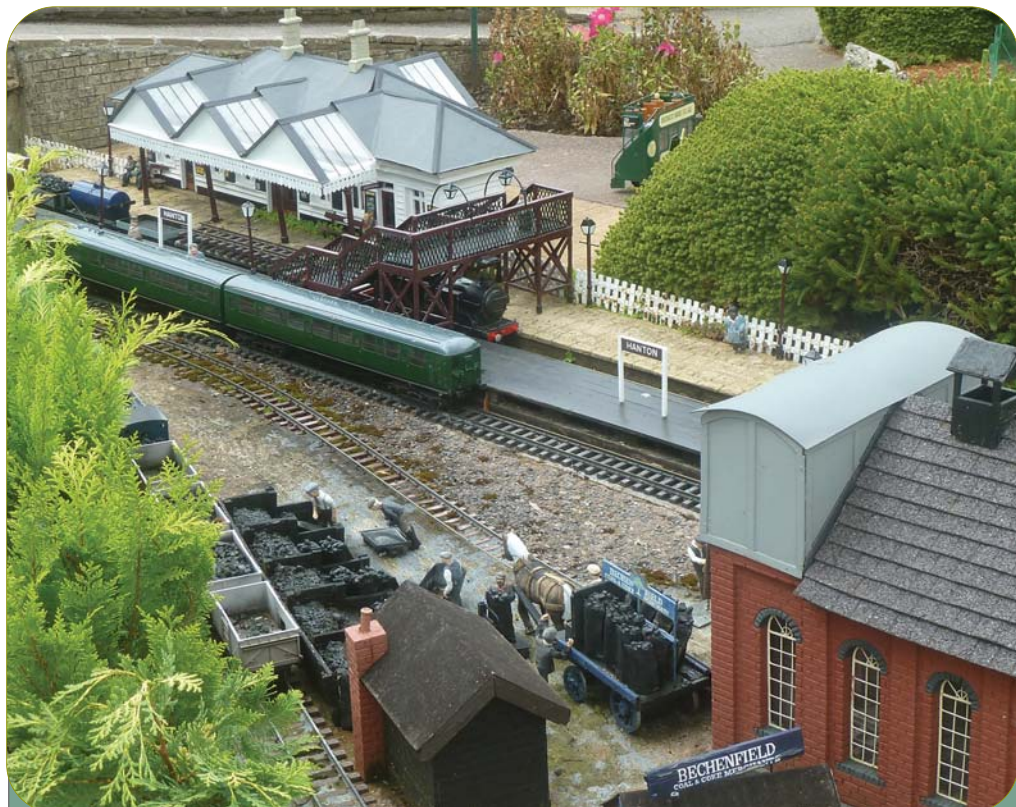
three rail - more or less the norm in those days - but Bassett-Lowke helped convert the whole layout to two-rail operation in the 1940s, and of course this being Bekonscot, W J Bassett-Lowke himself came down to supervise.

***“...the figures are mind-boggling... 1,480 feet of track, 2,500 miles per train annually...”***

The facts and figures relating to the railway are a bit mind-boggling. The total track length is 450 metres or 1,480 feet, which is a huge model layout on any scale. Arguably even more impressive is the fact that each train covers about 2,500 *real* miles annually, enough to clock up some considerable maintenance issues, just one of the tasks for the on-site engineering team.

Train control at Bekonscot has always been rather clever by the standards of the day, and track circuits and full interlocking played a role for many years. Today, the much more complex train movements and station stops are controlled by what most of us electronic numbskulls would call a ‘computer’, but it’s actually an industrial-grade Programmable Logic Controller. We won’t delve too deeply into this, other than to say that it’s a bespoke system and not DCC, as people understandably assume. It knows the identity of each train by reading and memorising its electronic tag as it passes through the signal box, and is aware of its position using track circuits. Coded signals are sent to the trains through the track, overseeing acceleration, deceleration and station stops without any intervention.

Beneath the coding, the track is energised at 28 volts. This figure is a bit of a balancing act on



*Hanton is a charming little station, and the attention to detail is astounding, from the architectural detailing to the coal yard. The dwarf trees - planted since the 1970s - save a lot of work and add to the realism*



**A train crosses the Alexandra Bridge (based on the Sydney Harbour bridge), with Splashing Station top left and the aerodrome behind**

such a long outdoor railway with public access - too low a voltage would cause variable running speed, particularly with heavier trains. Too high and there is inevitably a safety issue and power leakage/corrosion in wet weather. Real-time computer simulation suggests that as many as 20 trains could be controlled at once, but in practice, ('with little fingers interrupting smooth running!') says senior engineer Chris Nickson), 12 or 14 is more practical. This is currently something of an academic issue as there are only ten locomotives available.

Seeing ten trains beetling about, each following their unique predestined stopping patterns, top speed, acceleration rate and so on is pretty impressive. That ten can run simultaneously with few signal stops and other hiccups is something of a tribute to the team of three engineers involved in running the railway.

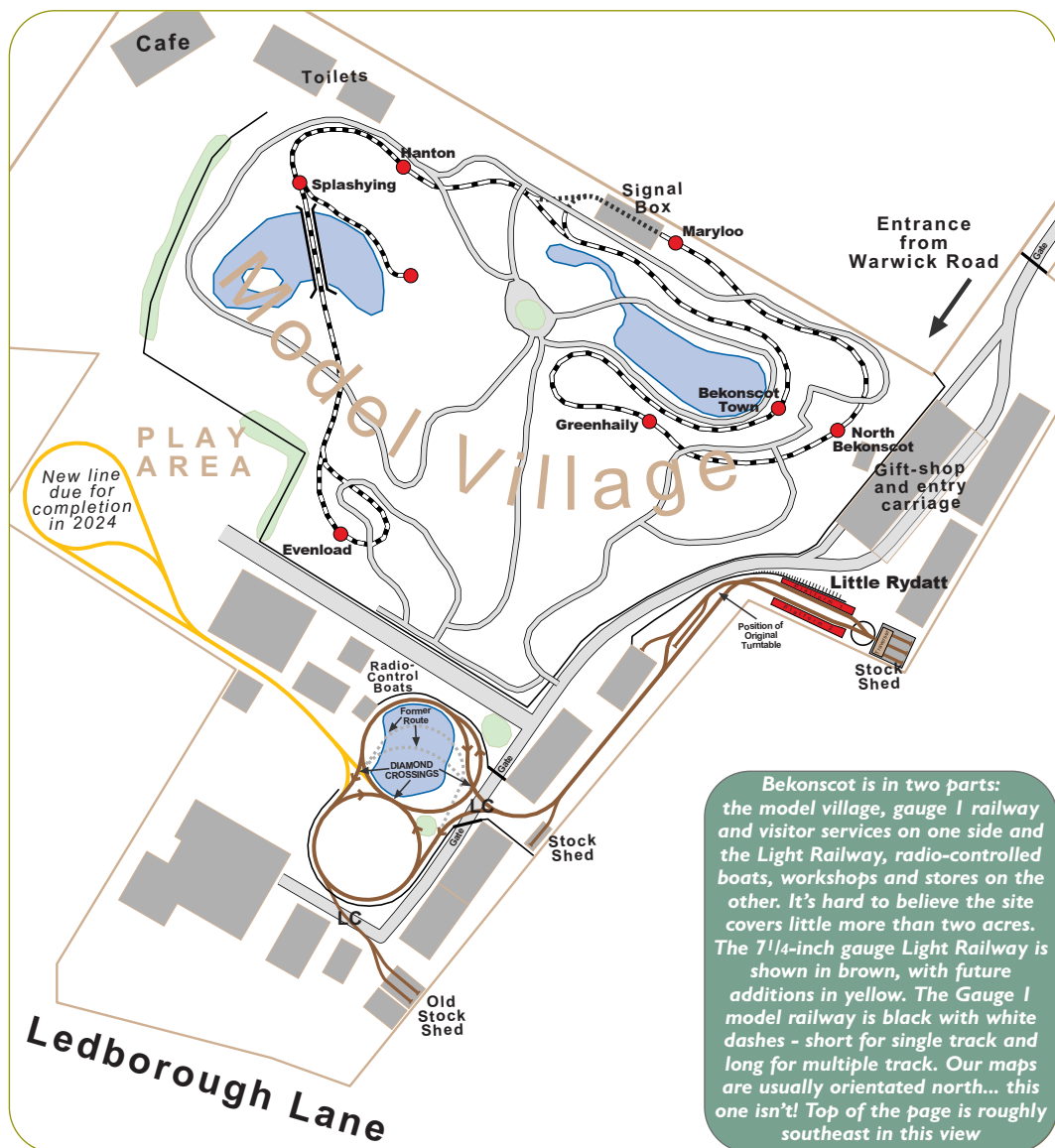
Maryloo, the near full-size signal box houses a Westinghouse power-lever frame donated from Purley Station in the late 1980s. This was the pinnacle of technology in 1929 when it was originally installed, and quite by chance, this was also the year Bekonscot opened!

There's usually someone on duty in the signal box, because it's an ideal cabin for keeping an eye on the visitors and dealing with derailments caused by those questing little fingers, or frogs taking a direct line from A to B. The signals really *can* be operated manually, putting the area around Maryloo under direct control (and thus indirectly controlling the whole railway), but 'driving' ten trains takes continuous signalling work.

Even in the early days, the railway was generally controlled automatically, but this was before the days of realistically 'soft' stops and starts, so an occupied section tended to result in the section behind being de-energised, causing one or more approaching trains to skid to a halt. We're not great software buffs, but the realism today has to be seen to be believed, and you really can sit for quite a long time at one of the stations watching express trains rushing through and locals stopping and starting, without any indication that it's all carefully choreographed.

## The Bekonscot Light Railway

A model village doesn't *need* a ride-on miniature railway, but it's a nice extra, adding a bit of movement and excitement for children of the right age. And any extra attraction help pay the bills and adds to Bekonscot's charitable donations. In 2000, chief engineer Mervyn Hill had a chat to the chief engineer at VAMES (the Vale of Aylesbury Model Engineering Society) at the Buckinghamshire Railway Centre at Quainton Road and it proved very productive. The Centre had 80 yards of portable 7 1/4-inch track and would Bekonscot like to borrow it for a weekend? Obviously they would, and the trial on a straight track from a public area near the entrance to the works yard, was deemed a real success, with plenty of demand for the 40 seconds of out-and-back travel.



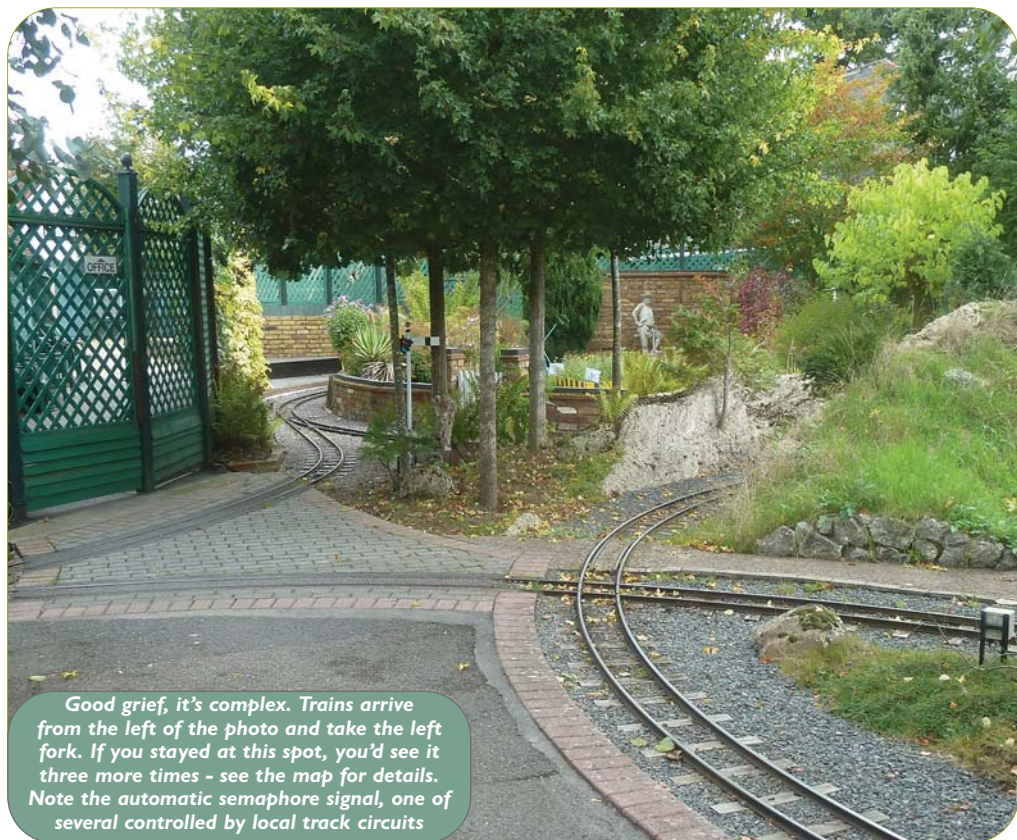




**ABOVE:** Running onto the turntable/switch. The loco could run right through the turntable and reverse off through the facing sprung points onto Platform 2... in other words, a simple run-round loop

**RIGHT:** ...or stop on the turntable, turn, and exit forwards through Platform 2, as here. The loco is still on the turn-out, but that doesn't matter, because it will always exit through the trailing side





**Good grief, it's complex. Trains arrive from the left of the photo and take the left fork. If you stayed at this spot, you'd see it three more times - see the map for details. Note the automatic semaphore signal, one of several controlled by local track circuits**

One observation from the Bekonscot people was that the train went faster *down* the straight track than up, and this was particularly noticeably with one big chap on board! Operating a ride-on railway was going to be very different to operating Gauge 1. When the permanent line was built over the winter of 2000/2001, the gradient was eased by terminating on a low embankment at the south end, giving a ruling gradient of around 1:80. This was a smart move, because although it had been assumed that some 20% of visitors might have a ride, the new Light Railway was actually carrying 70%, a very high proportion.

Luckily Bekonscot had opted for steel rail, particularly in view of the 20-foot radius curves on the line, but the 2lb/yd rail proved a bit light for such intensive use, and the entire line was later rebuilt with heavier 6lb/yd rail. Steel again, and with a satisfyingly chunky look. The intention, incidentally, had been to build a Heywood-style estate railway, earning its keep from the public, but carrying heavy equipment around the site at other times. In the event, the public demand had to take precedence, but the freight capability is there and will be even more useful in the future when the railway is extended.

The layout and operating arrangements were unusual because of the limited space, the line making use of the only land available, a strip down the west side of the site leading to a rectangular chunk around an ornamental pond. Interestingly, some of the route followed the course of the original narrow gauge railway used by the contractors in 1928. This first layout was quite simple, from a turntable and loop ('Lavender Loop') near the public entrance, north along the boundary, sharp right onto the rectangle of land, twice round an oval of track round the pond, and back to the terminus, where the loco would run round. A minor complication was that





**ABOVE:** The old stock shed and lengthy disused tramway section from the mainline  
**RIGHT:** The whole railway was originally laid with 2lb/yd rail, and the siding to the old stock shed is one of the few stretches still in place. The junction with the newer 6lb rail is in the middle of the picture

from a single road, using a traverser to reach three short sidings inside. Another wonderful bit of engineering is the diamond-crossing, or more accurately 'Single Crossing Switch (EKW)' on the approach to the terminus. Another oddity, this challenging bit of metalwork makes it possible for the curves of the Up and Down lines to be of equal radius by crossing them over, but it also has a single switch, so trains departing from Platform 1, the normal arrangement, can run straight down the line, or access Lavender Loop - the only option for trains leaving from Platform 2. This is a great operational time-saver, because a loco typically running round on Platform 2 can cross the diamond part of the EKW, pause

there simply wasn't enough space to reach the east side of the pond from the long straight, so a diamond-crossing was needed to cross the oval circuit, which also meant bridging the pond. A long siding off the oval led across a works area to the two-road stock shed.

In 2006 the line was extended, adding a sharp curve by the shop to bring the newly-named 'Little Rydatt' station to the entrance, the new Light Railway terminus being built on a raised causeway right at visitor eye-level. Ideal! A new turntable was built at the end of the line, on such a cramped site that the crossover to the runround loop actually extended onto the table. A very rare arrangement, if not unique. The points on the turntable are sprung towards Platform 2, but can also be changed pneumatically. Locos that run equally well in both directions can treat this as a simple run-round - others must be turned as well. The severe space restrictions also meant that the shed had to be accessed







*This siding is out of sight of the terminus, often holding stock ready to take over when required. Most trains arrive back at Little Rydatt on the bi-directional main line behind, past the full-size colour-light signal, heading towards Platform 1 over the diamond crossing just visible in the distance. The second train will often be waiting for the road on Lavender Loop in the foreground. And the funicular-style three rail section? Mere whimsy says Merve!*

and back down the switch to rejoin its train in Platform 1. One final oddity... there's a short siding off Lavender Loop that joins the Loop near the public path. Nothing unusual in that you might think, but this siding runs for a short distance from its 'junction' with the Loop using a shared a rail, funicular-style. This track layout serves no practical purpose at all, but was done, says Merve, to 'provide a talking point', which it certainly does. For students of track layout, this terminus is well worth a visit.

At the other end of the line, the ornamental pond was partially filled in to allow construction of a figure-of-eight, and the remaining pond was reshaped to suit this new layout and even squeeze in some radio-control boats, the whole thing representing an incredibly clever use of space. With the new stock shed at the terminus, the old one was abandoned, but not actually lifted (you never know). Swapping and charging locos had meant a long walk, or tying the line up with light locomotive movements, whereas putting the shed in the terminus keeps everything together.

## Operation

The line is usually operated by one to three members of staff, and with true Bekonscot efficiency, they are drawn from a small pool that also services the model railway layout. For the right youngster (or olderster) this must be a dream job.

The railway can be run on a two-train basis, an arrangement that firmly requires three staff - one as 'station master' taking fares, and another two driving - but the more usual arrangement is an intensive single-train service, which can be comfortably run by two. As with the model railway, the figures are quite breath-taking. In 20 years of operation, the line is claimed to have carried 1,547,471 passengers in 186,412 departures, giving a typical loading of eight per train.

In principal, the line can be run by one person on quiet days, but quiet days are rare here. This tiny site can deal with 1,000 visitors at a time, and 1,100 across the working day. Bekonscot has found that these sort of numbers can generate 850 Light Railway passengers, a daily total that can be carried with one train of three sit-astride carriages. It's a slick operation: the 211 yard ride takes three minutes (plus or minus ten seconds says Merve), and with turn-round a single train can run every five, which isn't bad going.

And it stays busy well onto the 'shoulders' of the season. The last weekend in September 2022 was colder than average, but it brought out 800 visitors over two 7½-hour days, many of whom took a ride on the train. This year Bekonscot will open for six weekends during the complete winter shut-down as well.

The Light Railway signalling is pretty foolproof, and it needs to be because of the limited visibility on the many sharp curves. The two platforms, the station throat, Lavender Loop and the single line up to the figure-of-eight are track-circuited and fully signalled, the signals being interlocked with point position detection. The complex figure-of-eight accepts only one train at a time, and the numerous points are automatic, controlled in sequence by proximity switches activated by the train.

Trains are dispatched when the station staff or driver presses a button on the platform to ask for the road. If this request is made by a second train, and the first is close to arriving back, the second has to wait at the station until the first has occupied the vacant platform, but if it gets away in time, the system allows it to advance to Lavender Loop and wait there.

Wherever they pass, once the second train is away, the first loco has control of the station area, because arrivals can only enter a section if it is clear. The full-size colour-light signal







**ABOVE:** Most of the route for the Light Railway extension is squeezed behind sheds and workshops, but the loop at the far end will go round the clock tower, then back, broadly on the route of this footpath, but a level-crossing on the concrete path will give visitor access to this attractive corner

**BELOW:** Bekonscot is home to many inspirational buildings. Students of architecture will know the Firestone building on the A4 arterial road in west London was demolished on a Bank Holiday in 1980, although the equally iconic Hoover building survived to be listed, then controversially converted into flats in the modern era. The Bekonscot factory is not identical, but pays homage to the original





protecting the whole complex from the loop onwards shows a yellow aspect if either the station turntable isn't locked in the correct position and/or the shed traverser is out of

place. Meanwhile, the loco that has possession is free to move forward onto the turntable and run round via Platform 2, but it cannot go beyond Lavender Loop.

The railway has three locomotives, one diesel and two battery-electric, and a battery-electric tram. Merve built the diesel and the tram, and has started work on a long-term project to build a steam engine. He's already got the boiler and is planning on a short Tinkerbell-style wheelbase to suit the Bekonscot curves. Steam would fit well with the broadly 1930s feel of the village and the right locomotive would thrive on the intensive use.

## The Future

Calling Bekonscot a model 'village' is a bit like describing London as a provincial city. It really makes more sense to liken it to a district, or a small county. It's an unusual visitor attraction, and there can be few visitor 'honey-pots' on this scale that are so firmly embedded into a well-to-do suburban neighbourhood. The local authority would probably prefer it if Bekonscot and its visitors simply vanished, but it's much loved, cherished by generations, an excellent employer, and it generates a lot of money for charity. In other words, it ain't going nowhere, and quite right too.

Like all visitor attractions it needs to develop and change.

As part of current plans, the Light Railway is to be extended in a large loop, primarily utilising dead space behind various sheds, but absorbing part of the existing play area too. This exciting project will more or less double the length of the line and greatly enhance operating flexibility. The project is expected to take two years, not because it's unduly complex but because building anything on such a compact busy site in a residential area is going to be difficult.

Not far off it's 100th year, Bekonscot has seen off numerous recessions, ranks of pen-wielding local authority jobsworths, nosy councillors, snobby newcomers, and a world war. In the last year alone, it's had to deal with a European war and a global pandemic. The secret ingredient that keeps this elderly attraction looking fresh and ready for every challenge is its ability to constantly regenerate, so it always looks fresh and has something new and exciting to say to new generations, but without deterring those who have been coming here for many years. It's one of very few attractions that can honestly say it appeals equally to ten-year-olds and their 80-something grandad.

*"...the secret weapon is its ability to constantly regenerate, so it always has something new and exciting to offer..."*

## GETTING THERE

The church of St Teresa's on Warwick Road offers some free parking, and there are several pay-and-display car parks nearby, but it's probably best to avoid travelling by car, especially in peak season, because cars are one of the biggest issues with local residents and authorities. From London,

Birmingham and other centres on the Chiltern mainline, train is by far the best option. Bekonscot is well signposted from the east (London-bound) side of Beaconsfield station and there are trains every half an hour or so from Marylebone, albeit somewhat irregularly.

There are also some irregular through services to Birmingham, Oxford and Aylesbury, and right across the country with a single change, typically at Banbury.

## FACT FILE

### The Bekonscot Light Railway

**Location:** 40a Warwick Road, Beaconsfield HP9 2PL

**Length:** approx. 210 yards (192 metres) [SEE NOTE 1](#)

**Open:** The site first opened to the public in August 1929. Light Railway in 2001

**Gauge:** 7 1/4-inch

**Phone:** 01494 672919

**Locos:** 2001 *Maxitrak*/Bekonscot **Sprocket** 4w Battery-electric

: 2003 Bekonscot **Tram** 4w-4 Battery-electric

: 2006 Bekonscot **Bouncer** 4w-4w

: 2009 Bekonscot **Doordargh** 4w-4w Diesel-hydraulic

[NOTE 1](#) This is the ride length - the track is a little shorter

# History

## Strange Trains



The expression 'Beauty is in the eye of the beholder' is generally attributed to the immortal bard, but according to Google, it originated with author Margaret Wolfe Hungerford in the 19th century. No matter, it is one of those 'all too true' expressions that have us nodding sagely over babies that only a mother could love, or indeed a new or rebuilt locomotive that somehow doesn't *quite* nail the aesthetics.

We'd hesitate to call any of these locomotives ugly as such, because someone somewhere must have loved them enough to create them and cherish them. Some of these machines were created a bit strange - often through a sense of fun in the builder - while others had strangeness thrust upon them, usually because a later owner with a less aesthetic eye decided to make some alterations. Misguided perhaps, but well-meaning in most cases.

The machines we find harder to forgive are the advertising gimmicks, either built or adapted to advertise some dreadful and best forgotten TV show or radio station, or to attract children (and their parents) to part with some cash and take a train ride (misguided again). Adults sometimes forget that children are attracted to good design and attractive machinery, just like adults (more so in some cases) and they are quite prepared to comprehensively reject the ugly, crass and plain wrong.

In other words, dressing a miniature train up as a dragon, cartoon character, thatched cottage or pork pie could be a very poor investment. You have been warned!

## Mis-Nat/Dixie/Sir Duke

*10 1/4-inch Gauge, Hastings Miniature Railway*



**ABOVE:** 'Mis-Nat' was odd in the best traditions of British eccentricity, the JCB rear end having a sort of grandeur to it. Primarily a Hastings loco, it was renamed 'Dixie' and spent a few unhappy months at Brooklands Park, Worthing before moving to Essex. **BELOW:** The front end was adequate too, but it didn't tie-in very happily with the rear. This is at Hastings, where the loco (now 'Sir Duke') awaits a complete rebuild

This glorious monstrosity tops our list, because it's such an honest locomotive: what you see being very much what you get. It was built by the Hastings Miniature Railway in 1985 to replace 'Uncle Jim', the line's long-established diesel, after a nasty accident with a Transit van. The designer is anonymous at present (or perhaps no-one's saying), but Dan Radcliffe of the HMR thinks he might also have invented the tennis-ball launcher, a title claimed by almost every nation on earth, but we're happy to back Hastings.

The locomotive was named 'Mis-Nat', a rather cumbersome attempt to meld together the names of proprietor Pat Talbots two daughters, Misty and Natalie. It was an unusual name for an unusual machine, more JCB than locomotive, a perception reinforced by the three-cylinder Lister





diesel with hydraulic drive to the rear bogie.

A bit rough and ready perhaps, but if they'd stopped there, it would have been fun in a brutish sort of way. Unfortunately, it was also given a rudimentary steam-outline by bolting an immersion-tank on the front and adding, literally adding, a stove-pipe chimney. This originally had the exhaust pipe routed through it, but this apparently made the brass 'boiler' hot enough to flex, making the exhaust rattle.

The kindlier locals called it the 'Meccano' engine for obvious reasons, but it was not widely liked by public or staff. Unfortunately, it was very reliable, experiencing little in the way of breakdowns apart from breaking the odd Robin Reliant brake-drum on boulders (something of a hazard on the HMR. After a decent interval it was either loaned or sold to William Hagger, new owner of the Brooklands Miniature Railway down the coast in East Worthing, where it was renamed 'Dixie'. It seems to have scared the children there too, and was banished to hauling works trains when no-one was about.

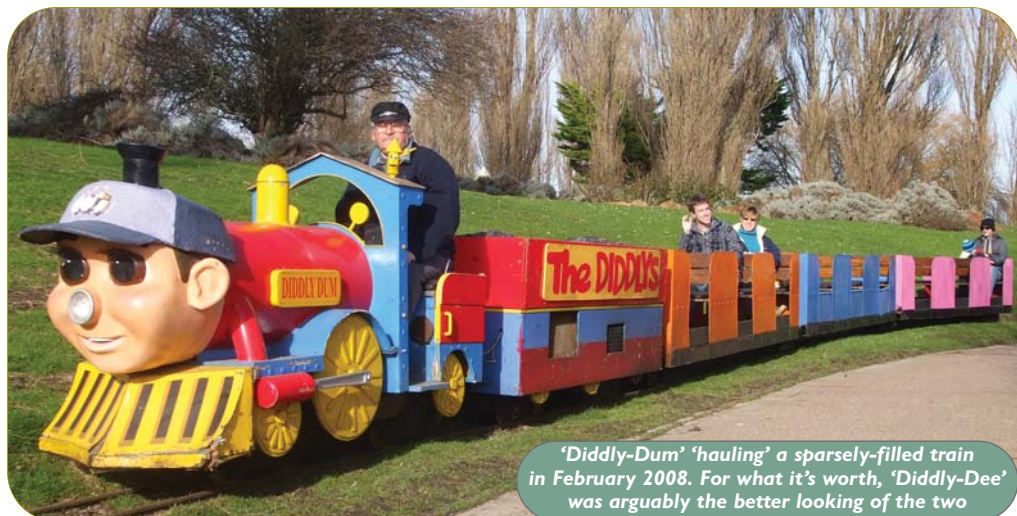
We make no judgement, but feel obliged to mention in passing that it was *chosen* to replace the very decent-looking Uncle Jim at Hastings, and later to replace a Class 52. Western at East Worthing. Built by Severn Lamb, the Westerns were based on one of the most pleasingly styled diesel locomotives ever to grace the UK network.

In 1993, *Dixie* was disposed of to a private railway in North Yorkshire, moving again in 2002 to the Basildon Miniature Railway in Essex, where it did well, remaining in service until 2013. Then to general amazement, Hastings took it back, gave it a full overhaul and restored it to service as 'Sir Duke' from the Reverend Awdrey stories. They're good at tackling challenging projects in Hastings, so it's currently dismantled awaiting a full rebuild. We fervently hope as something else.

Should anyone be wondering what happened to 'Western Comet' it was bought by Joe Nemeth of Bristol and removed to safety before anyone could bolt a water tank to its nose. Severn Lamb only built four of these machines, and 'Western Comet' had been delivered new to Brooklands Park in 1967, so it was quite a rare and important machine. It was later sold to Peter Bowers of the Royal Victoria Park Railway in Southampton, and it remains a star attraction at the railway, where it has been renamed 'Western Explorer'. *Thanks to Dan Radcliffe*

## Diddly Dum & Diddly Dee

*10 1/4-inch Gauge, Brooklands Miniature Railway, East Worthing*



'Diddly-Dum' 'hauling' a sparsely-filled train in February 2008. For what it's worth, 'Diddly-Dee' was arguably the better looking of the two



*'Diddly-Dee'. The real locomotive was the 1700cc diesel engine in the tender behind, as the Diddly locomotives were dummies. This arrangement is not unusual with miniature locomotives, the best-known being Severn Lamb's 'Rio Grande', although they had more acceptable bodywork*

The remarkable *Dixie* was just a precursor to the main event in Brooklands Park. In 2006 William Hagger's son Clive moved on, and the Brooklands Park attractions were taken on by Kevin McCluskey, who had launched a Thomas-style empire based around the 'Diddly' in Hotham Park, Bognor Regis. We won't worry too much about the slightly sordid details of the DiddlyLand venture, but it all ended up in Brooklands Park. *Dixie* had been a well-meaning, if somewhat misguided attempt to build a locomotive, but '*Diddly-Dum*', was *designed* as something of a 'motivum horribilis'. Based around a Hotham Park carriage frame, the fibreglass body needs no introduction or description, other than to say that it was actually a dummy locomotive (or should that be a 'Diddly-dummy'?), the motive power coming from a 1700cc diesel engine in the 'tender'.

DiddlyLand was launched by a nameless thing, and a resting actor in a rubber chicken outfit in April 2006, and the venture was off. *Diddly-Dum* was to be joined by a mechanically identical female character called '*Diddly-Dee*', which was going to sit near the back of the existing train as a ride-on attraction for children. Just a tad sexist? For whatever reason, it never happened, and the idea was quietly shelved, as eventually was the whole attraction, when the council raised the rent, Kevin McCluskey pulled out, failed to sell the railway on eBay and put the operation out of its misery by closing it. A happy ending of a kind. *Thanks to Graham Lelliot*

## Thunderbox

*7 1/4-inch Gauge, Little Melton Light Railway, Norfolk*

The wonderful '*Thunderbox*', so-called because the seat had a hole in (we said some of these machines were a bit tongue-in-cheek), was commissioned by the late Bob Brett for his Little Melton Light Railway, which ran at his home in Norfolk from 1989 until Bob succumbed to cancer in 2001 aged only 64. Miniature railways can be ephemeral things, hanging by a thread of expedience on the life choices - and sometimes end-of-life choices - of one man. The Little Melton closed in 2002 after carrying 35,000 passengers and raising £13,000 for worthy causes.



**LEFT:** It's the detail that's so fascinating. What are the lathe-turned pillars on the bonnet for? An absolute delight

**BELOW:** There was a bit of a party to mark the locomotive's 30th birthday in June 2019, 18 years after Bob's death and three years since 'Thunderbox' had turned a wheel

Bob's business was timber, so naturally when he commissioned David King to build him a locomotive in 1989, he wanted the accent - more or less the entirety of the machine - to be of timber, sweet chestnut in this case. A fabulous material, say those in the know: tough, attractively-grained and hard-wearing. It's certainly done 'Thunderbox' proud, the locomotive now being well past its 30th birthday with little sign of aging.



PHOTO: North Norfolk News/Archant

Beneath the timbering, it's a very conventional locomotive, with a 4w-4 wheel arrangement, and 200cc Honda 4-stroke engine and hydraulic drive, sitting on the front power-bogie - but it's the accoutrements that will delight oddity enthusiasts. It's all rather stylish in a drawing-room sort of way: a stained-glass front grill (featuring a tree, naturally), polished brass fuel tank and lots of wood-turning - mainly knobs and towel rails - a chunky headlight, roof-top bell. We take our hats off to Bob for commissioning such a gem.

'Thunderbox' has seen off two local miniature railways, and will no doubt outlive many more. It ran for a while at Ashmanhaugh after Bob's death brought about the closure of his home line. In 2020 the Ashmanhaugh railway split in two, with one group reopening a small part of the Ashmanhaugh as the East View Farm Railway, and the others heading off to establish the Cromer Light Railway at the Amazona Zoo on the outskirts of the town. 'Thunderbox' went with the latter group, and remains in storage waiting for the project to get underway. *Thanks to Keith Clements*



## 15-inch gauge loco

*15-inch Gauge, Cricket St Thomas Wildlife Park, Somerset*

This unloved little locomotive never seems to have carried a name, and no-one admit to building it, but the strongest suspect would have to be G & S Light Engineering. It started its working life as a rather attractive double-ended diesel in 1957 at Dudley Zoo with an odd wheel arrangement, possibly 4-4w-4 PM, meaning an unpowered bogie at each end and a power-bogie in the middle, although they might have been driven axles with connecting rods, along steam lines. Power was supplied from a petrol Daimler engine via a mechanical transmission. It was swiftly rebuilt along more conventional Bo-Bo lines, with a powered bogie at each end, and in this form it must have worked pretty well, because it stayed at Dudley Zoo until 1978 before finding its way to the



*Three guises, but the same locomotive, below left at Weymouth in original Dudley Zoo form, below right, narrow gauge guise, as rebuilt at Cricket St Thomas, and above in gloriously half-timbered form*



Cricket St Thomas Wildlife Park in Somerset via a brief and unhappy stay at the still-borne Weymouth Miniature Railway project. While at Cricket it was rebuilt in narrow gauge form - generally successfully - with one of the former cabs becoming the bonnet, and the other incorporated into a much taller single cab.

***“...a disc jockey turned theme park entrepreneur... sufficiently appalling to make Diddly-Dum look almost tasteful...”***

Not a disaster... what could possibly go wrong in rural Somerset? The villain of the piece was one Noel Edmonds, a disc jockey turned theme park entrepreneur who took on the franchise and turned the peaceful wildlife park into one of several Crinkley Bottom theme parks, inhabited by a range of characters sufficiently appalling to make Diddly-Dum look almost tasteful. For some reason never fully explained, Crinkley Bottom needed to have a train hauled by a half-timbered thatched cottage.

This dread deed took place in the early '90s - not an era best remembered for taste and decency in general. Luckily, the vulgar masses rejected the whole Crinkley Bottom concept and the venture collapsed, leaving the little diesel to be restored. It went on to run quietly at Cricket St Thomas until 2008 when it was sold, followed by the whole railway in 2013. We don't know where it is today, but if it's in your shed, let us know.

*We must end this brief exploration of the weird and wonderful world of strange miniature trains for the time being. But there are - or have been - many more, so if you've got a special favourite, do let us know. The subject might yet return!*



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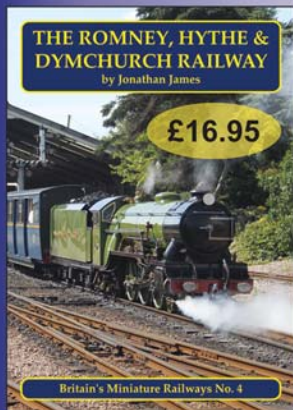


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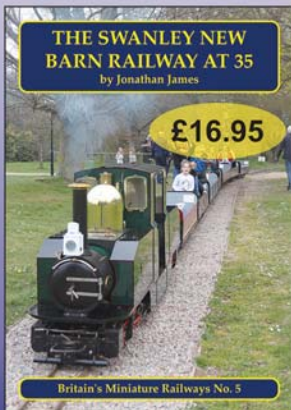


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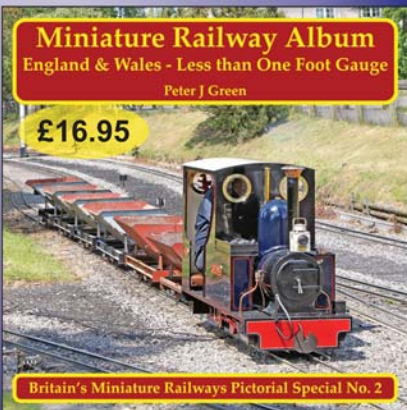
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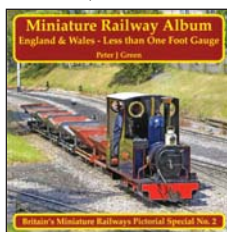
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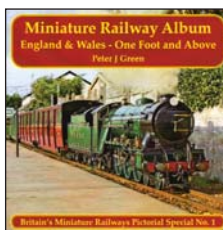
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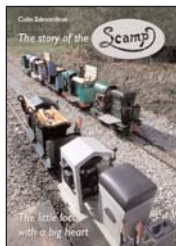
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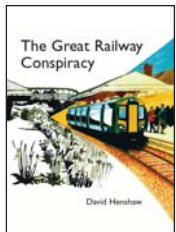


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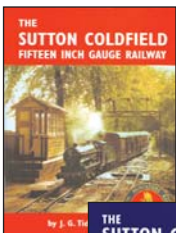


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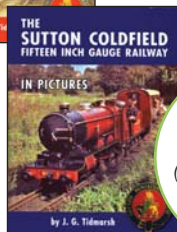


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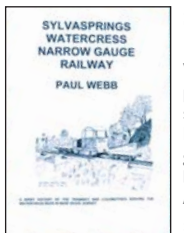
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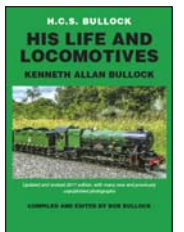


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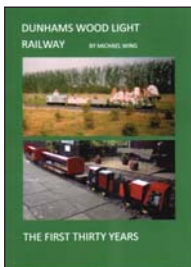


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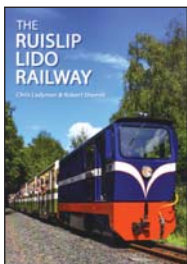


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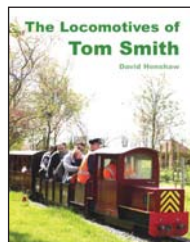
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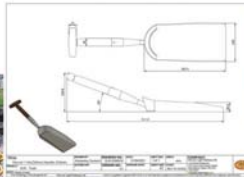
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