The RAILWAY Magazine GUIDE TO

OCTOBER 2018

Modelling

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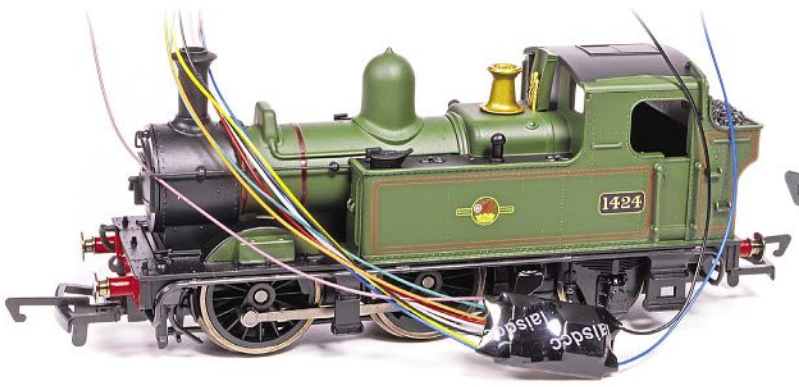
Tech talk

No NEM-652 interface socket? Hard wiring is the answer!

Nigel Burkin shows how to use 'wired' decoders in older 00-gauge tank locomotives, particularly those with little space for a decoder.



Tinkering around revealed there is no space for a micro-decoder, apart from the cab or coal bunker, into which an LAISDCC four-function decoder will fit comfortably.

Hornby reissued its GWR 14XX 0-4-2T locomotive in 2018 under its 'Railroad' brand. Here the model remains to be equipped with a NEM-652 decoder socket.

Useful tools and materials

- Soldering iron (15W is ideal) and electrical solder.
- Fine soldering bit (1mm).
- Solder sponge dampened with water for tip cleaning.
- Non-acidic flux for electrical soldering.
- 2:1 heat shrink sleeve.
- Electrical insulation tape such as Kapton tape.
- Double-sided foam tape.
- Bath seal adhesive.
- Jeweller's cross head screwdriver set.
- Modelling knife or scalpel.
- Tweezers.
- Soft mat to place the model on the work bench.

Older locomotive models with no provision for conversion to DCC present the modeller with a number of challenges. In tank locomotives particularly, space is often the main issue regardless of the physical size of the model, and another is having to solder the harness wires of a 'wired' decoder to the correct terminals – ie, hard wiring.

Model designers saw no need to provide space for decoders and wires at a time when DCC was far from mainstream, so many designs were filled with die-cast metal for traction with minimal electronics and little space for anything else.

Tank locomotive models might have space for a wired decoder in the cab, coal bunker, smokebox and inside the water tank area of the body shell. The problem with using the cab and bunker space is that the decoder and harness wires would be clearly visible and hard to disguise, and weight is often added to other places that would ideally suit a decoder, such as the smokebox and front part of the boiler.

With performance such an important consideration, the largest motor possible is fitted, and invariably this fills most of the body shell. So with space the biggest challenge when converting small tank engines without an interface socket, this two-part article uses two popular but older model designs from the Hornby range to offer some solutions, alongside the techniques used to safely fit a decoder to any model. This month we look at Hornby's 14xx 0-4-2T, followed next month by the 'Terrier' 0-6-0T.

Choosing a decoder

The key to choosing a decoder for a small space 00-gauge conversion is a balance between decoder size, its current rating and having sufficient room for heat dissipation and ventilation. The reason why micro-decoders make good choices for such models is because they are designed to work with N and Z-gauge models, where space is tight and ventilation likely to be restricted. Fortunately, manufacturers have become aware of the use of micro-decoders in 00 and HO-scale models and are offering high current capacity decoders together with efficient thermal overload protection in some very small packages. An excellent example is the wired Nano decoder produced by ESU, which will fit small models very well but packs quite a punch in the power rating stakes.

Good examples of wired micro-decoders that suit smaller 00-gauge models are the Digitrax DZ125 and the more up-to-date DZ126. Other suitable decoders include Hornby's basic V1.3 (R8249) which has sufficient current capacity for the Terrier and 14xx models (which share the same basic chassis configuration and motor). LAISDCC offers a high-capacity decoder that will fit neatly in small tank engines, and a little research into smaller decoders will soon reveal that TCS, Zimo and others also have suitably-sized decoders, so it's a matter of personal choice as to which one you prefer.

Price is also a factor, because generally, as decoders become smaller the price goes up! When making a choice, it is important that the decoder will fit the model comfortably. Avoid the temptation to squeeze a slightly oversized decoder into the space because they are easily damaged through compression. One way to check the fit of any given decoder is to make up a simple styrene card gauge to the exact width, length and depth of the decoder you are considering, to see if it will fit the available space.

Before starting

Make sure that the model is operating smoothly with a DC power pack before starting work on a DCC conversion. Fitting a decoder will not improve a poor model, nor will it overcome dirty wheels or pick-ups. A clean of the wheels and a light service according to the manufacturer's instructions is advised if the model has seen service in the past or has been stored for a while. New models should be examined for damage and run in for a while (follow the manufacturer's instructions) to establish how well they run before installing a decoder.

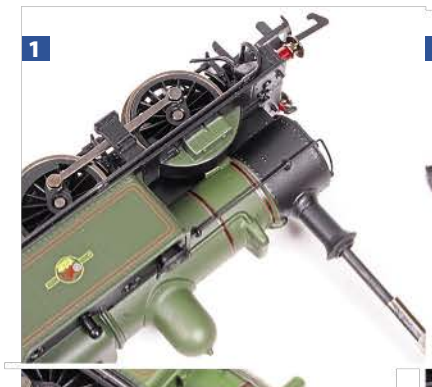
Ensure that the work bench is clear of debris from previous modelling projects before laying out your tools. Have a clean soft pad or mat on which to lay the model, and consider using a loco cradle such as those offered in the Proses range to make handling the model easier. Place a small tray or box nearby to hold screws and other small parts removed from the model as it is dismantled for decoder fitting.

Conversion basics

In common with all DCC conversions, it is vital that you securely isolate the motor from current collection pick-ups. The Hornby Terrier and GWR 14xx class are easy to work on in this respect, because they both have a plastic chassis and independent pick-ups for each wheel (split frame chassis conversion is a subject for a future article). The leads are unsoldered from the motor terminals and the TV suppression capacitor discarded. In the case of the Digitrax and LAISDCC decoders, a sleeve protects the components. Do not rely on the sleeve for total protection from metal components – use double-sided adhesive foam tape to secure decoders regardless of whether they have a sleeve or not. Kapton tape should be applied to any and all adjacent metal surfaces before installation.

No lights are fitted to either locomotive model, so the blue, white, green, mauve and yellow function wires are not required. Not all decoders have all of the function wires fitted – it depends on whether they are two or four-function decoders. This leaves four important harness wires: red and black, which are connected to the track pick-up wires, and orange and grey, which are connected to the motor terminals. There must be no direct electrical path between the track and motor after the conversion has been completed, otherwise the decoder will be destroyed.

The problem with decoder fitting to the cab space is the chance that wires might be visible through the side openings. However the motor can already be seen in the cab of this model, so the compromise is one that many will consider acceptable.



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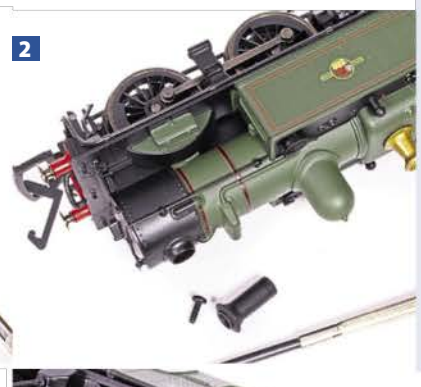

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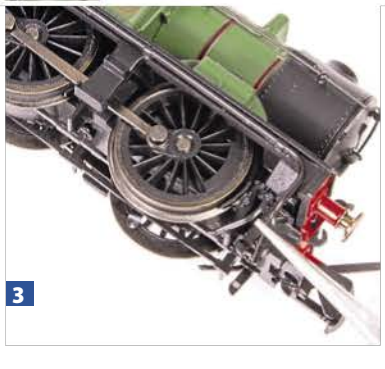

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1. One screw holds the chassis and body together – and that is to be found in the chimney!

2. Once the screw is released, the chimney comes off too.

3. Before attempting to remove the body, release the pipework at the front of the chassis.

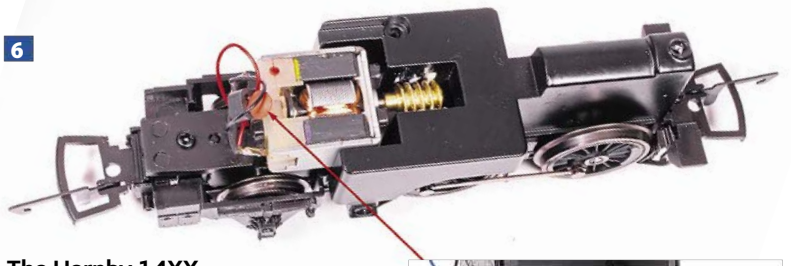
4. The same body pipework can be found to the rear of the chassis which is plugged into the frame on each side of the model.

5. Lift the front of the body off the chassis until the clip at the rear disengages.

Soldering is the only way of making secure connections between the decoder wires, the motor terminals and those fitted to the current pick-ups. As the pictures show, the wires from the pick-ups are grouped for either side of the chassis and soldered in one place to the red and black harness wires.

Thread about 6mm of 1.4mm diameter, 2:1 ratio heat-shrink sleeve on to the wires before completing the soldered connection. Once cooled, the sleeve can be pushed over the exposed wire and gently heated with the soldering iron to shrink it into place. Do not apply too much heat or the soldered connection will come adrift inside the sleeve! When soldering to motor terminals, use a small soldering iron tip and be quick: 'in – wet – out' is the process before too much heat affects the plastic end of the motor casing. Flux will help the solder to flow quickly without having to apply too much heat. Keep the solder tip shiny with the use of a damp soldering sponge.

Test the conversion on the layout service or 'programming' track first before running the model on full DCC track power. It is advisable not to secure the body before making the initial test just in case you have to make a change to the wiring (ie, you have made a mistake or there is a cold joint in the wiring). Test again after refitting the body just in case some wires have become pinched between chassis and body, resulting in breakage or contact with metal. Once satisfied with the conversion, allocate a unique address to the decoder before operating it on the layout.



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The Hornby 14XX

Hornby has released its GWR 14XX Class 0-4-2T locomotive as BR No. 1424 in 2018 as part of its Railroad range. It is not equipped with a DCC interface socket, which means the only way of converting it for use on a DCC layout is to fit a wired decoder to the model. Close examination of the model reveals little space for a decoder within the body because the internal ballast weight fills the body and smokebox area including the side water tanks, leaving not enough room on top of the motor or on the sides to fit even a Nano decoder.

Fortunately one decoder small enough to fit into the bunker of the model, with sufficient capacity for the current draw of the motor, is the LAISDCC four-function decoder with 'Keep Alive', a reliable low-cost decoder packed with features. The un-needed function wires are cut short and coiled, while the 'Keep Alive' wires are retained but shortened just in case a 'Keep Alive' unit is required.

There's always a chance that the harness wires will be visible in the cab unless particular care is put into disguising them, but in any case part of the motor casing is visible through the cab side openings, making the installation a compromise that one may have to accept with this otherwise very useful and popular model.

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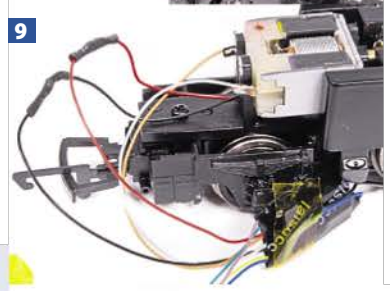

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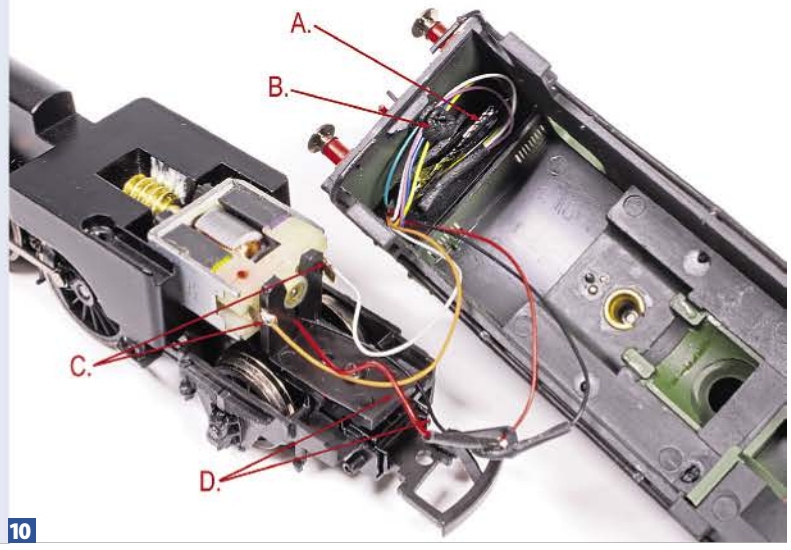
9. The completed conversion with red and black decoder wires connected to the track current wires whilst the orange and grey wires are connected to the motor terminals.

10. Another view of the conversion with the decoder fitted to the body. Points to note:
A: A medium sized four function decoder fits the bunker neatly. Always use the largest decoder that will fit the model whenever possible.
B: Unused harness wires are shortened and coiled.
C: Orange and grey are connected to the motor terminals. Check that the model runs boiler first when forward is selected on the controller.
If not, swap the motor leads around.
D: Red and black to the track power leads, with heat shrink sleeve used to insulate the soldered connections.



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6. In common with most tank locomotives, the body is filled with motor and ballast weight which is shaped to fit the body shell as closely as possible. Note the existence of a TV interference suppression capacitor.

7. The track current wires are unsoldered from the motor terminals and the suppression capacitor is discarded. Heat shrink sleeve is threaded on to the wires ready for soldering the decoder leads to them.

8. The chosen decoder fits neatly in the bunker, where it will be secured with double-sided adhesive foam tape when the various leads are soldered.