

## STEP BY STEP INSTALLING DIGITAL SOUND IN HORNBY'S TORNADO

**1** Our project locomotive is one of Hornby's numerous versions of 60163 Tornado – this specific example being from 2014 and fitted with Twin Track Sound. We will be replacing the decoder with a Doepler & Haass chip featuring Locoman Sounds' new project for the Peppercorn 'Pacific' together with stay alive and firebox flicker.



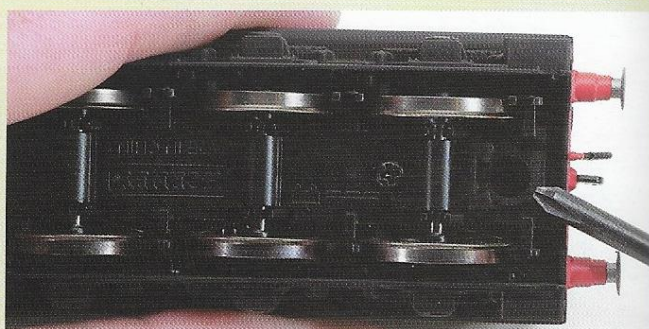
**2** To begin, the locomotive and tender need to be separated to ensure we don't damage any of the model's details during handling. The tender drawbar simply unhooks, but we also need to disconnect the four-wire plug from the tender chassis. We use Hornby's X6468 plug extractor tool to ensure we don't put any strain on the wires.



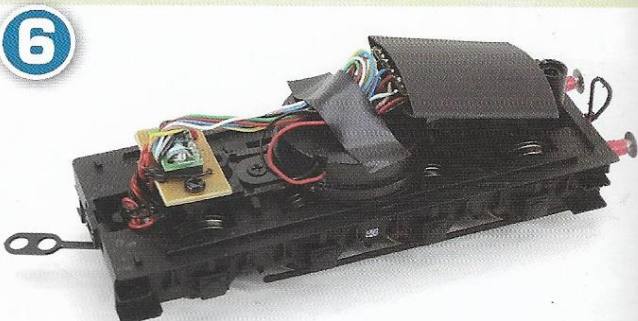
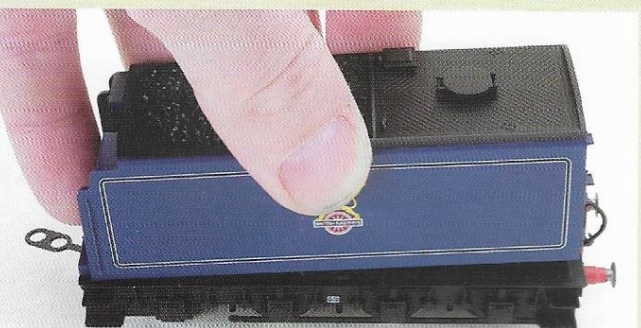
**3** To access the tender body securing screw, the rear coupling and its fishtail mount need to be removed. Use a pair of tweezers or a small flat blade screwdriver to gently lever it up from the slot to remove it.



**4** A single crosshead screw at the bottom of this well holds the tender body in place. Once you have removed it, keep it safe for refitting at the end of the project.

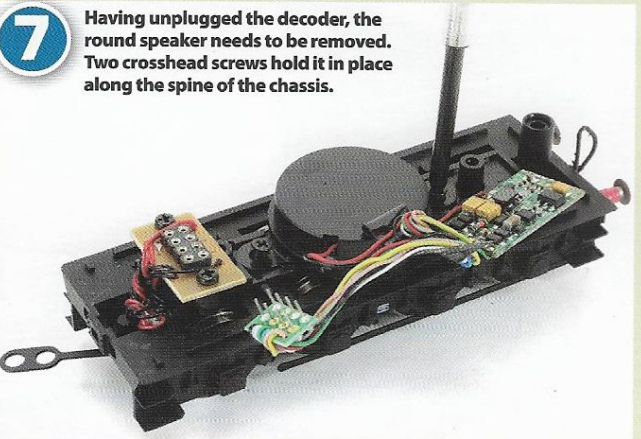


**5** The tender body lifts up from the rear until the front securing lug disengages from the chassis. Once the lug is out, the body can be lifted off and put to one side.

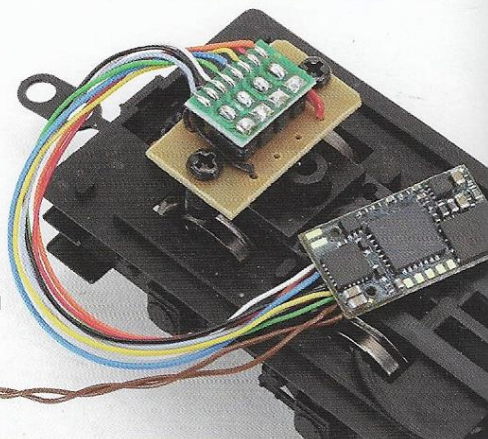


Our project locomotive was factory fitted with a Hornby Twin Track Sound decoder and 28mm round speaker. All of these components will be removed. One advantage of the tender body design is that it is entirely empty and allows plenty of space for speaker installation.

**7** Having unplugged the decoder, the round speaker needs to be removed. Two crosshead screws hold it in place along the spine of the chassis.



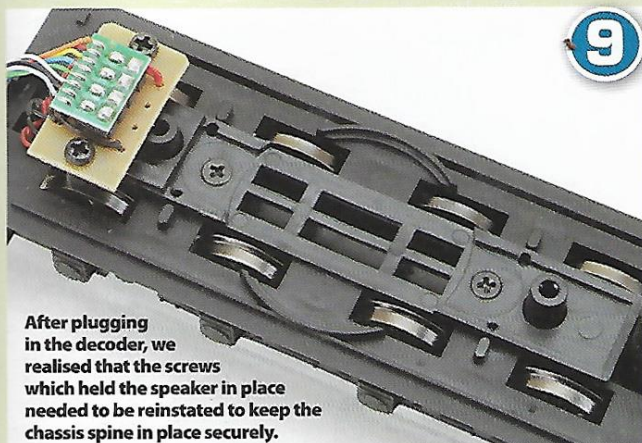
**8** Pin 1 is marked on the decoder socket and the orange wire on the D&H 8-pin plug marks pin 1 on the decoder making it straightforward to connect the decoder the right way around.





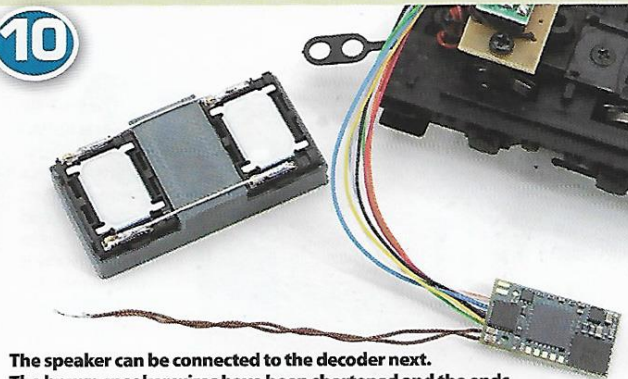
Beginner **SKILL LEVEL** Intermediate Advanced

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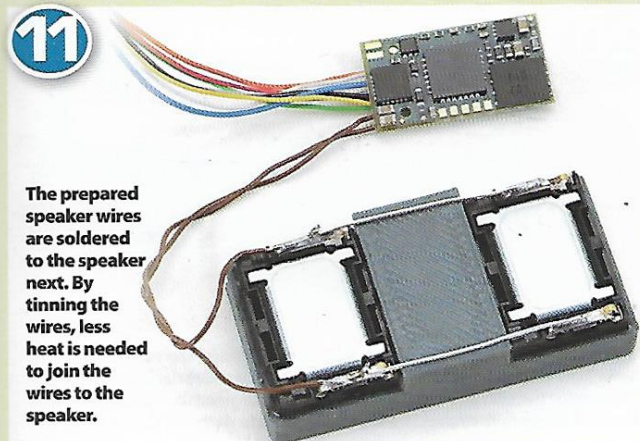
After plugging in the decoder, we realised that the screws which held the speaker in place needed to be reinstated to keep the chassis spine in place securely.

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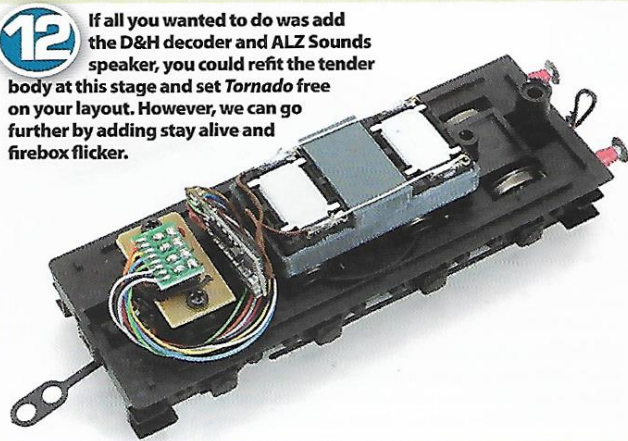
The speaker can be connected to the decoder next. The brown speaker wires have been shortened and the ends have had their insulation removed. The bare multi-core wire has been twisted together and then tinned with solder.

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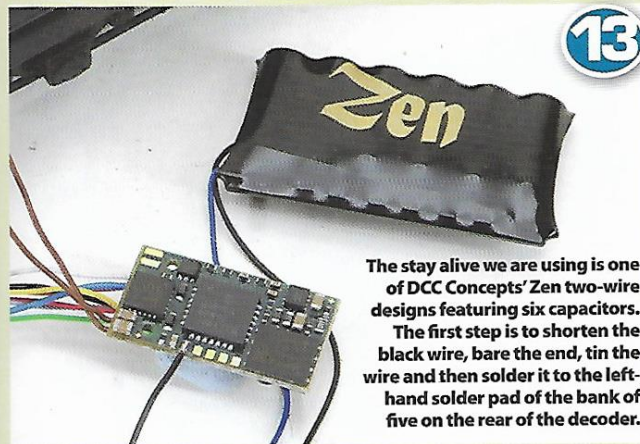
The prepared speaker wires are soldered to the speaker next. By tinning the wires, less heat is needed to join the wires to the speaker.

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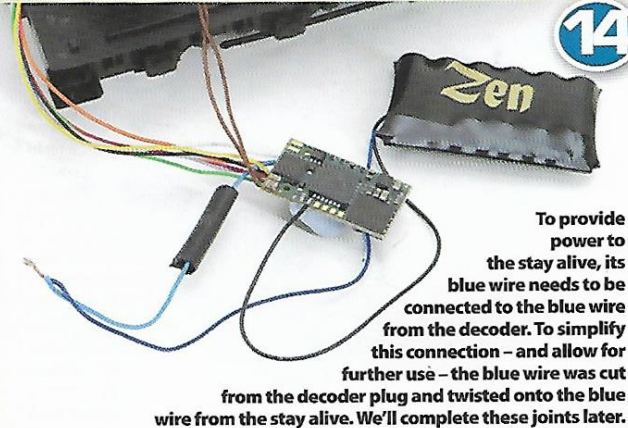
If all you wanted to do was add the D&H decoder and ALZ Sounds speaker, you could refit the tender body at this stage and set *Tornado* free on your layout. However, we can go further by adding stay alive and firebox flicker.

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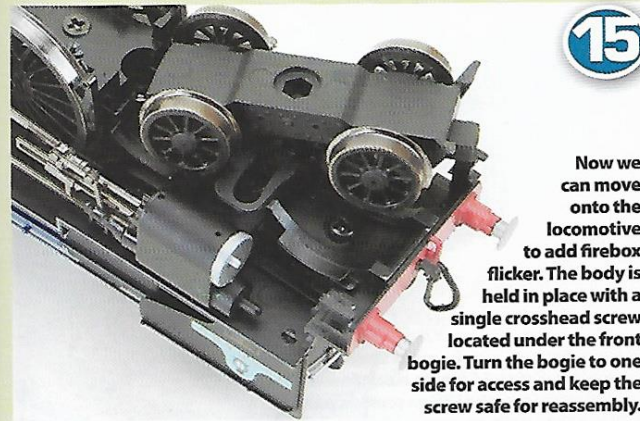
The stay alive we are using is one of DCC Concepts' Zen two-wire designs featuring six capacitors. The first step is to shorten the black wire, bare the end, tin the wire and then solder it to the left-hand solder pad of the bank of five on the rear of the decoder.

14



To provide power to the stay alive, its blue wire needs to be connected to the blue wire from the decoder. To simplify this connection – and allow for further use – the blue wire was cut from the decoder plug and twisted onto the blue wire from the stay alive. We'll complete these joints later.

15



Now we can move onto the locomotive to add firebox flicker. The body is held in place with a single crosshead screw located under the front bogie. Turn the bogie to one side for access and keep the screw safe for reassembly.

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Inside the locomotive there is ample space in the firebox area for the firebox flicker, but we will need to keep the wiring neat to prevent it catching on the flywheel on the rear of the motor.

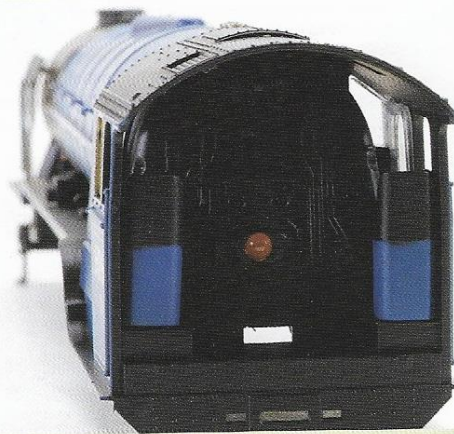


## STEP BY STEP INSTALLING DIGITAL SOUND IN HORNBY'S TORNADO



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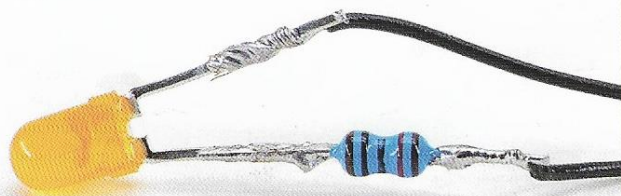
The firehole door is drilled out in stages starting with a 1mm drill then a 2mm and finally a 3mm drill to make it the correct size for the 3mm orange LED we are installing.



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The hole in the firehole door is a perfect fit for the orange LED which peeks through into the cab area. Once a crew has been installed, the LED won't be visible, but its lighting effect will be.

19



The LED has a longer leg to mark its positive side. The leg has been shortened and a 10k ohm resistor has been soldered to it. In addition, black leads have been soldered to the two legs. To distinguish between them the negative wire has been cut 40mm shorter.

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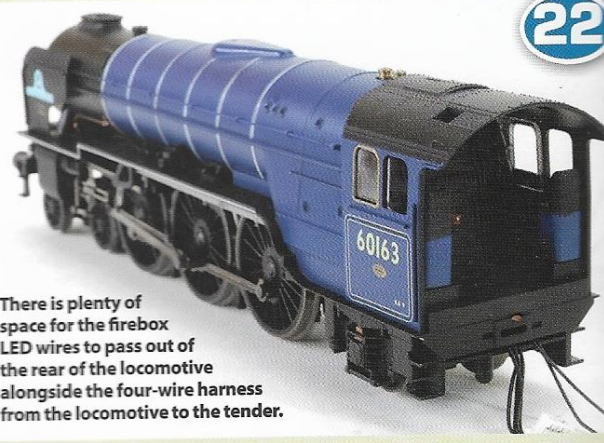
Using heatshrink insulation, both legs of the LED and the resistor have been fully covered to prevent any possibility of a short circuit occurring. The legs of the LED have also been bent at 90 degrees to reduce the amount of space they need inside the firebox.

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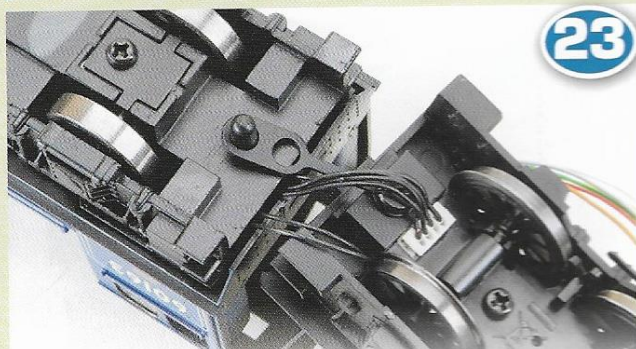
The firebox LED has now been fitted using black insulation tape to hold it neatly in place. The wires have been folded over carefully and then taped in place to prevent them from contacting the flywheel.

22



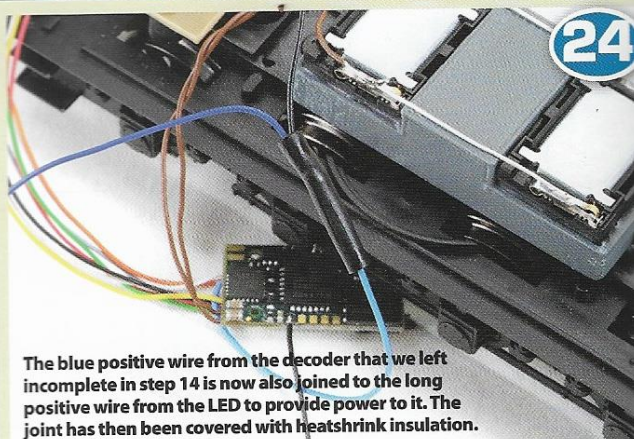
There is plenty of space for the firebox LED wires to pass out of the rear of the locomotive alongside the four-wire harness from the locomotive to the tender.

23



To take the LED wires into the tender, an additional 2mm hole has been drilled in front of the first tender axle. The hole is as close to the wheel as possible to ensure the wires don't get trapped by the tender body.

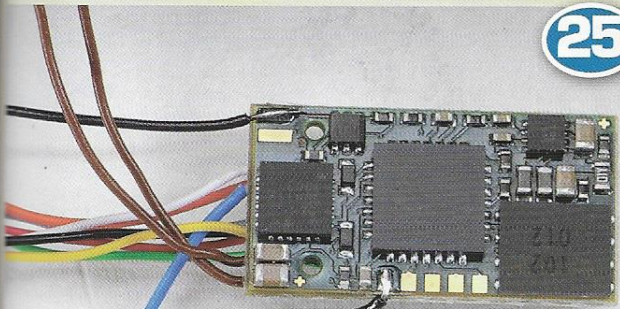
24



The blue positive wire from the decoder that we left incomplete in step 14 is now also joined to the long positive wire from the LED to provide power to it. The joint has then been covered with heatshrink insulation.

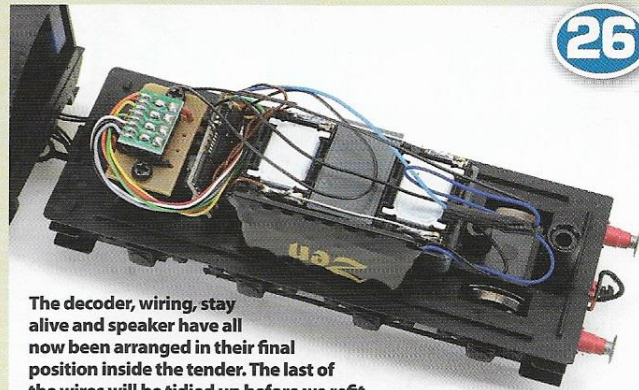


Beginner Intermediate Advanced  
SKILL LEVEL



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To complete the wiring, the short wire from the LED is soldered to the AUX3 connection on the rear of the decoder to switch the firebox LED on and off using Function 10 on a DCC handset.



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The decoder, wiring, stay alive and speaker have all now been arranged in their final position inside the tender. The last of the wires will be tidied up before we refit the body to complete the installation.

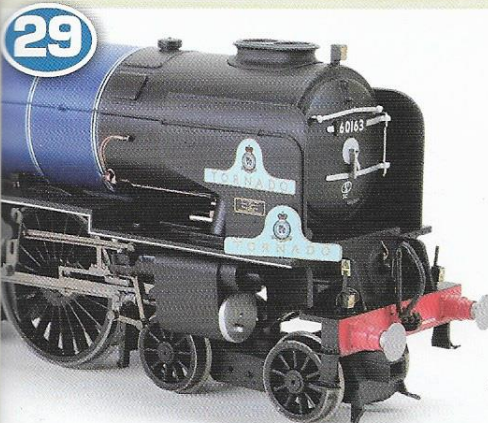


A Modelu 3D printed LNER crew has been painted for the cab using a combination of Humbrol Blue (25), Tamiya Matt Black (XF-1), Humbrol Matt Flesh (61), Lifecolor Wood Cold Light Shade - white (UA718) followed by a light wash of Lifecolor Soot liquid pigment (LPW15).



28

The crew poses are perfectly suited to *Tornado*. The driver (left) is seated with his hand to the regulator while the fireman (right) is leaning and can be positioned against the cab window frame.



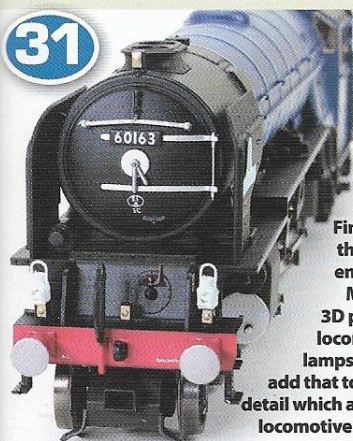
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Etched metal nameplate are included in the box with Hornby's main range versions of *Tornado*. To ensure they bond fully with the smoke deflectors the backs are lightly sanded to help the metal grip the Roket Rapid superglue used to hold them in place.



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The crew have now been fitted into the cab using the same glue. Looking into this area from the back the firebox flicker LED is quite prominent, but it isn't from the outside.



31

Finishing the front end are a Modelu 3D printed locomotive lamps. These add that touch of detail which a steam locomotive needs.



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*Tornado* has now been reassembled and is ready to return to traffic with its brand new and realistic sound profile from Locoman Sounds.