

# Narrow gauge **SOUND**

**PAUL CHETTER** explains how he fitted sound to 'OO9' narrow gauge model locomotives from Bachmann and Heljan revealing how a model's basic design can greatly influence the ease with which this can be achieved.





**U**NTIL RECENTLY SOUND and narrow gauge locomotives weren't generally associated with one another. However, changes to the 'OO9' scene and the arrival of new ready-to-run models from Bachmann and Heljan mean that it is just as possible to take advantage of sound in this scale as it is in 'N' gauge.

For this feature we are looking at two distinctive different models – the Bachmann Baldwin 4-6-0T which has been designed with sound in mind and the Heljan Manning Wardle 2-6-2T which features a decoder socket but no specific space for a speaker. These two approaches give rise to some surprising results, as the Bachmann 4-6-0T has a compact speaker which can be upgraded while the 'big' Heljan tank engine has a number of spaces that can be conveniently used for stay alive capacitors.

Starting with the Heljan Lynton and Barnstaple Railway Manning Wardle 2-6-2T, there have been

several modifications to the design since it was first introduced including the chassis weight design and the types of screws used to fit the bogies. In order to fit the required components, basic soldering skills will be required. Please note that removal of some Heljan fitted parts and modification to the internal body surfaces to complete this installation will probably adversely affect any warranty on the model.

The 6-pin DCC connector used in the 2-6-2T restricts the size of decoder which can be fitted. In each variation of this model there is insufficient space to fit a 6-pin sound decoder, but there are ways around this by deploying more suitable technology. The Zimo MX659N18 decoder has a compact Next18 connector and is the smallest mainstream DCC sound decoder available. It was, literally, made for these restricted space installations.

Knowing this, I was able to see a clear pathway to sound installation. A replacement Next18

adaptor has been fitted to the model to allow a Zimo MX659N18 decoder to be clipped into place. Superficially, the adaptor looks symmetrical, but there is a correct orientation to be followed so the connections are assigned in the proper order. These are provided with the board and, in the case of the Heljan tank engine, only require connection of the motor and pick up wires from the locomotive. There are also spaces to connect speaker and stay alive wires.

With the later modified chassis I also found that the Next18 decoder would fit across the model instead of the more usual central longitudinal orientation and that there was also room for on-board standby power in the form of stay alive capacitors. These operate by building up a charge when on track power then releasing this power when required by the decoder until track power is restored when the capacitors recharge in preparation for the next power loss event.

Zimo's larger decoders have onboard circuitry to manage this charge and discharge cycle, but the miniature and sub-miniature types do not have this. In this case, some external circuitry is required to act as an interface between decoder and capacitor. The requirements are modest enough for DIY assembly – a diode, a resistor and a voltage regulator in a circuit illustrated in the Zimo decoder manual.


To simplify this task, Zimo has produced a small ready-made device, the SACC16, which has all the necessary components in a compact format for this purpose. Virtually any type of capacitor which can physically fit inside the model may be attached to this interface, either directly to its solder pads or remotely located and linked by wires. It's a very flexible way of using all available spaces within a model for maximum energy storage. I've illustrated the use of this in the Heljan Manning Wardle.

I connected six individual 220uF tantalum capacitors to the SACC16, two directly to the board and a further two pairs, one pair located under each of the coal bunkers. They were all wired in parallel to add their capacitance values together, giving a total of 1,320uF, fairly modest but enough to produce a visible turn of the driving wheels. All were insulated before being fixed in place with soft glue.

I located the cube speaker in the cab. Not ideal, perhaps, but in such a small model, almost inevitable. A crew added on reassembly goes a long way to help to hide the speaker.

I noted during the conversion dry-run that some material would need to be removed from inside the top of the boiler to provide clearance for the side fitted tantalums and the decoder. I did this with a mini grinding wheel, testing the fit regularly. The model was then ready to be reassembled in the reverse order to that which I used during disassembly.

By comparison the process of installing sound in the Bachmann 4-6-0T is very straightforward. At its simplest the front portion of the body needs to be removed to allow a Zimo MX659N18 decoder to be clipped into the Next18 socket and the model will operate straightaway using the factory fitted speaker. For greater depth of sound the speaker can be replaced with the same type but featuring a larger enclosure, though this does then protrude into the cab area. The compromise is well worth it in our view though.

The following step by step guide explains the process of sound installation for both locomotives in more detail. 

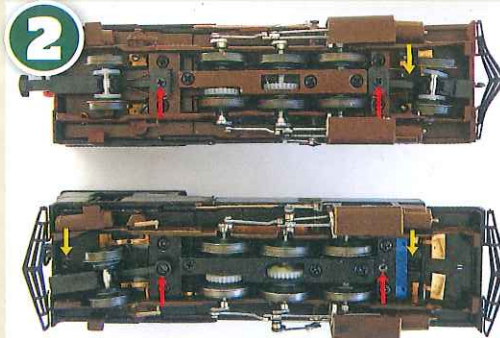
**The Heljan Manning Wardle 2-6-2T and Bachmann Baldwin 4-6-0T sound superb with their new sound decoders installed. The Heljan model is more complex by virtue of the fact that it has more space to work with. This allows stay alive capacitors to be built into the latest version as well as a new decoder socket and speaker.**



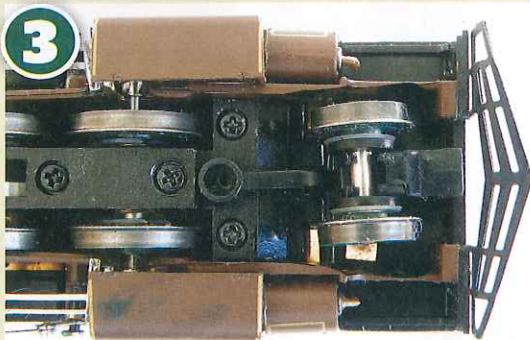
## STEP BY STEP INSTALLING DCC SOUND AND STAY ALIVE IN A HELJAN L&B 2-6-2T



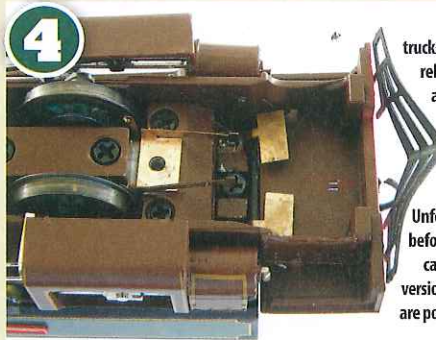
**1** The Heljan Manning Wardle 2-6-2T has a limited amount of space for a decoder and speaker, but it is possible. This cutaway shows the latest version of the chassis which has an exposed worm gear and no separate weight casting inside the boiler.



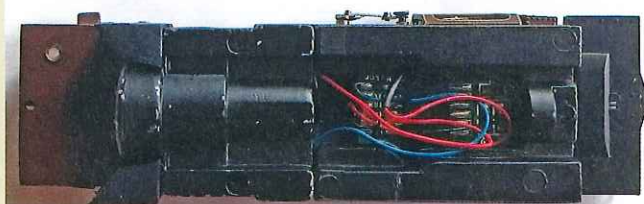
The general underside view of version 1 (lower) and version 2 (upper) models. Red arrows indicate the bogie retaining screws and yellow arrows the body retaining screws. The rear body retaining screw can be accessed by moving the bogie assembly aside.



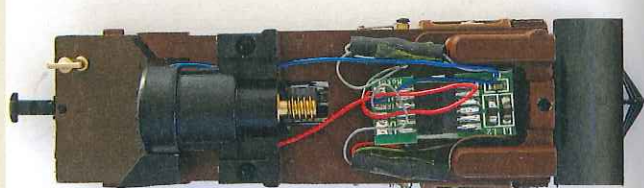
This picture shows the front pony truck of the first release. You must remove the bogie retaining screw (as shown). When the pony truck is removed, the front body retaining screw will be revealed which should also be released.



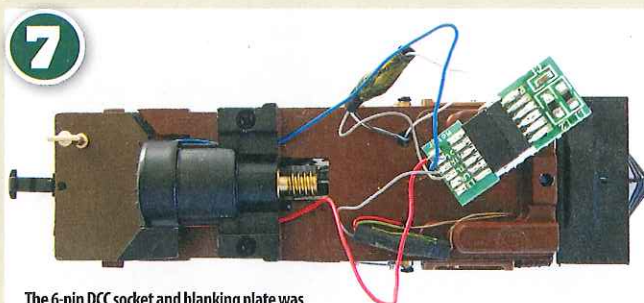
Sideways springing for the pony trucks was introduced with the second release. The fitting is more complex as the retaining screw now passes through the bogie, a spreader plate (note its orientation during disassembly) and a twin copper coloured spring device. Unfortunately, this must be removed before the front body retaining screw can be accessed and removed. In both versions, separate sprung pick-up pads are positioned to rub against the bogie wheels for electrical supply.



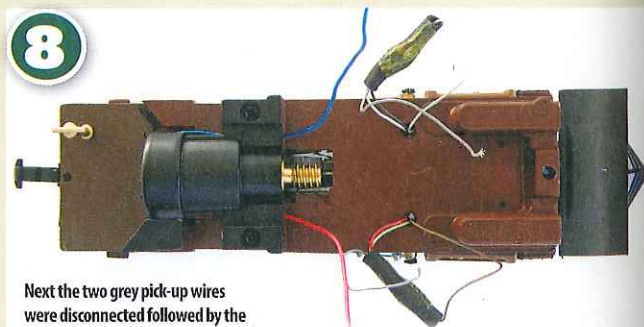
**5** With the complete body removed, the general layout of the first version of the 2-6-2T can be seen. The DCC socket is placed longitudinally and held in place with double-sided tape. To continue with an original version chassis, please move forward to Step 25.



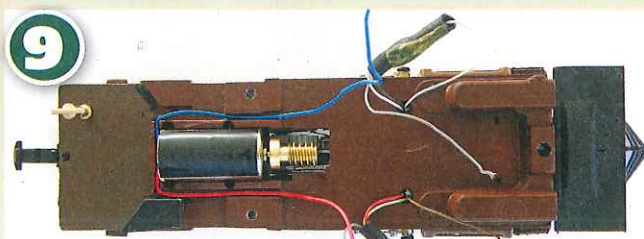
**6** In contrast, a similar view of the second iteration shows how much additional space has been created. The backhead/motor housing metal casting is now smaller. It no longer covers the worm drive and the side extensions have been modified, creating a space below each coal bunker which can be used during the installation.



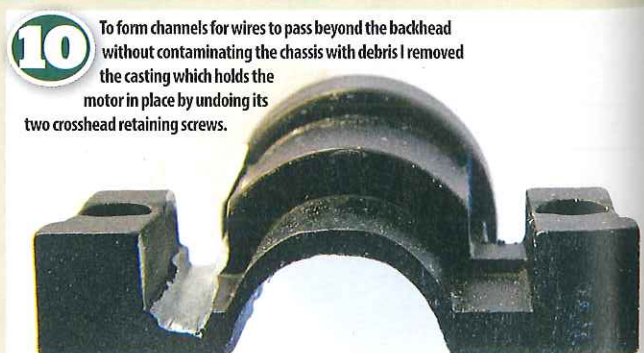
The 6-pin DCC socket and blanking plate was gently prised away from the chassis.



Next the two grey pick-up wires were disconnected followed by the blue and red motor connections.

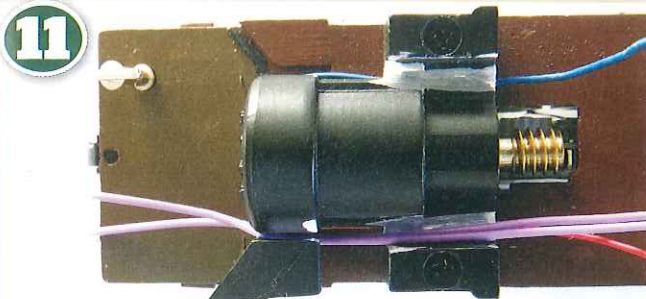


The close-fitting nature of the body to chassis in this area means that in order to allow wires to pass a channel must be made. I used a flat circular grinding disc in a minidrill to form a channel along the side of the backhead casting as shown. To retain as much structural integrity as possible, be careful not to remove too much material.

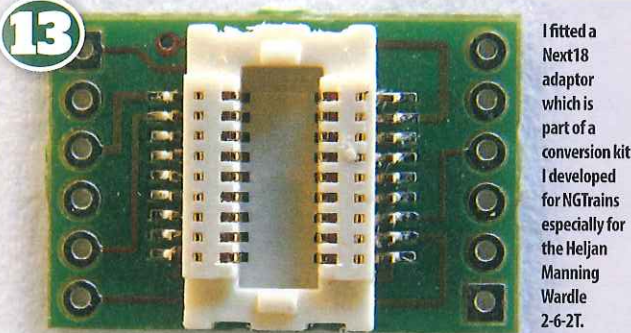


**10** To form channels for wires to pass beyond the backhead without contaminating the chassis with debris I removed the casting which holds the motor in place by undoing its two crosshead retaining screws.



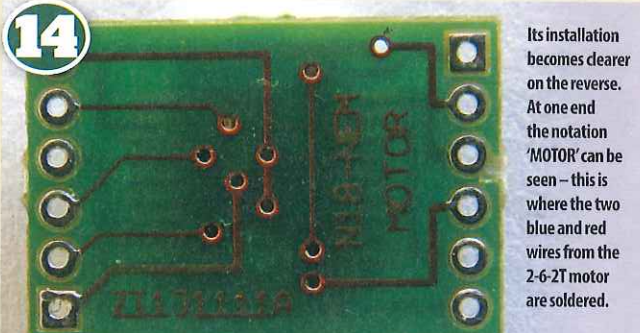
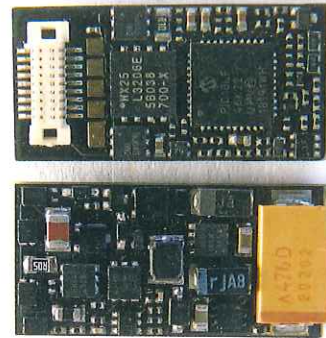


A channel was made on each side of the casting – one to accommodate the purple speaker wires and the second to allow stay alive wires to reach through.

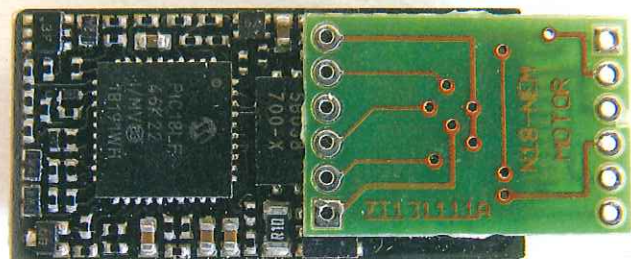


I fitted a Next18 adaptor which is part of a conversion kit I developed for NGTrains especially for the Heljan Manning Wardle 2-6-2T.

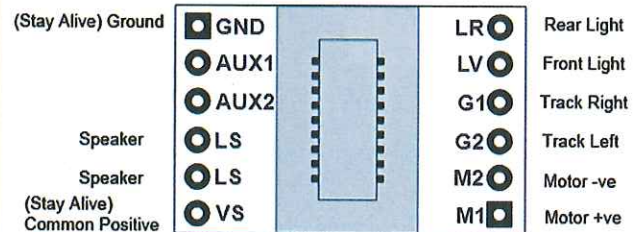
**12** With preparatory work completed, installing the decoder is next. This picture shows each face of the Zimo MX659N18 decoder, top side below right and reverse side with the Next18 plug (white) to the upper right. It's very compact, measuring just 9.5mm wide and 20mm long. In the older chassis design it can run along the length of the model while in the newer style it can fit across the width of the chassis owing to the extra space available.



Its installation becomes clearer on the reverse. At one end the notation 'MOTOR' can be seen – this is where the two blue and red wires from the 2-6-2T motor are soldered.

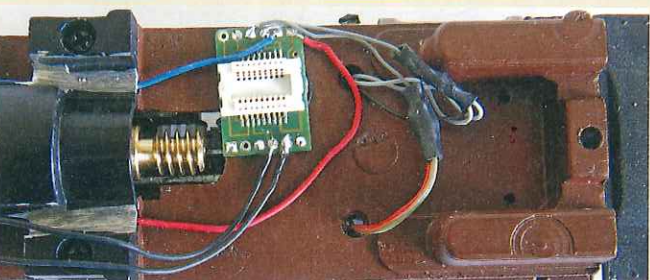
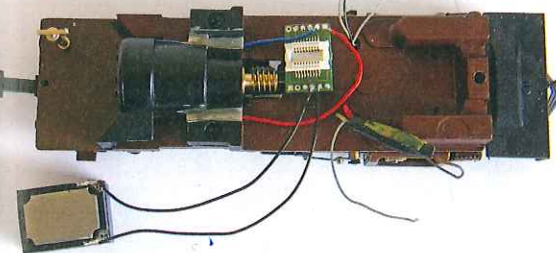


**15** The motor end protrudes beyond the decoder when it is dipped against the Next18 plug on the Zimo chip.

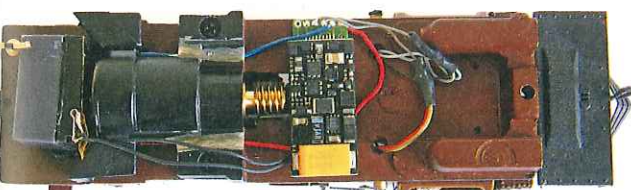


**16** This diagram shows the correct wiring. For this installation we will be using all but the front and rear lights and Aux 1 and 2 connections.

**17** The black wires from the speaker are connected first followed by the blue and red motor connections, as per the diagram in Step 16. The track wiring 'knots' have been stripped down to reduce their bulk.

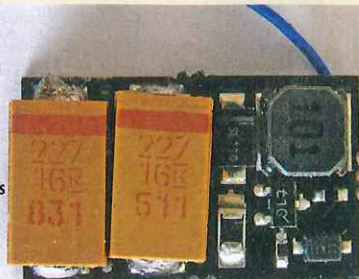


**18** Pick-up wiring has been re-connected in a more compact way and insulated with shrink wrap tubing before single track wires were soldered to the Next18 adaptor.



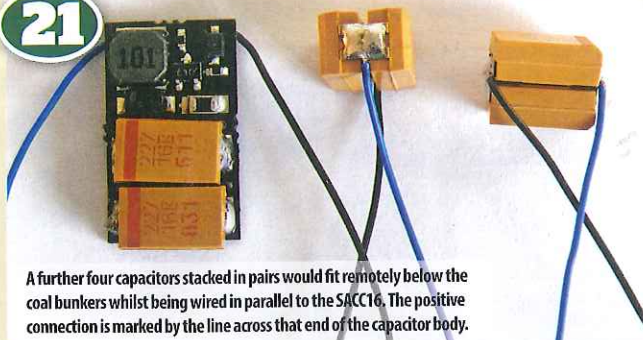
**19** Before progressing any further the decoder and speaker were positioned loosely so that the stay alive system can be planned into the remaining spaces.

**20** A detailed diagram of the Zimo SACC16 capacitor charging device is included with it explaining where the components go. It allows the safe connection of external capacitors from simple electrolytic to high capacitance supercapacitors of 16v or higher and allows for connection of multiple capacitors in a variety of ways. For this project two 220uF tantalum capacitors were soldered so the device will fit snugly in the space originally provided for the decoder without fouling on the inside of the boiler.



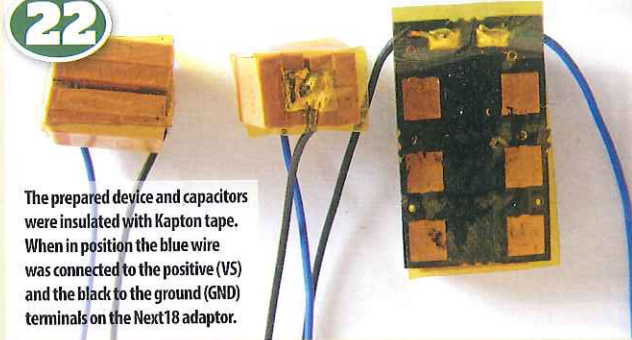


21

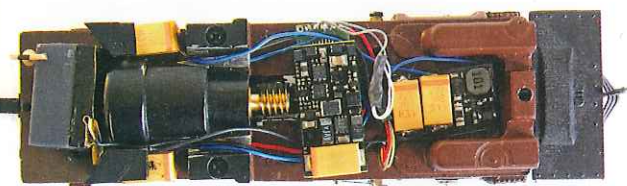


A further four capacitors stacked in pairs would fit remotely below the coal bunkers whilst being wired in parallel to the SACC16. The positive connection is marked by the line across that end of the capacitor body.

22

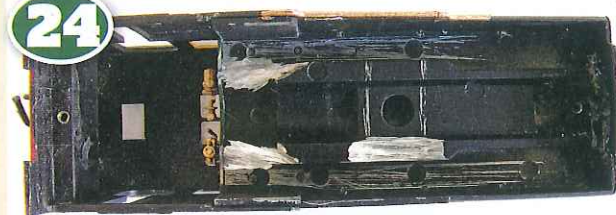


The prepared device and capacitors were insulated with Kapton tape. When in position the blue wire was connected to the positive (VS) and the black to the ground (GND) terminals on the Next18 adaptor.



23 The components are all now electrically connected, tested and fixed in place, ready for reassembly. The channels in the motor housing now contain the wires from the capacitors while the Zimo circuit board to operate them sits at the front of the chassis.

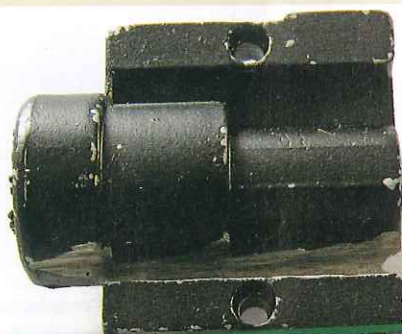
24



During the test fitting I noted that a small amount of material would need to be removed from the inside top of the boiler in places to give clearance for the side fitted capacitors and the decoder. This was achieved with a miniature grinding wheel and drill. Work slowly and carefully removing a small amount of material at a time. This completes the installation for the latest Heljan chassis design.

25

Moving back to the first chassis design for the Heljan 2-6-2T, a channel was created along one side side of the motor housing to facilitate passage of the speaker wires.



26



There isn't as much space inside the original design which means only a decoder and speaker can be fitted. The same Next18 adaptor board was used, wired up as per the diagram in Step 16. Kapton tape has been used to insulate the chassis area due to the tight confines of the space.

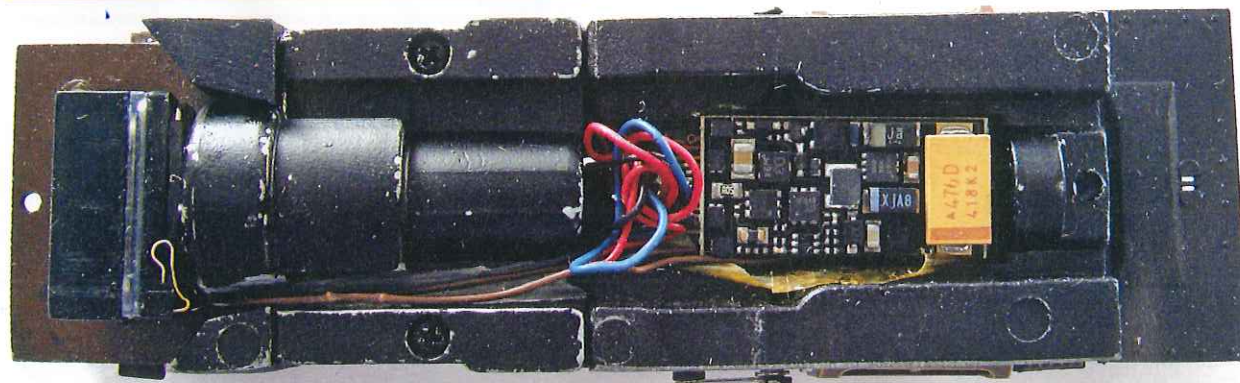
**GO ONLINE!**  
VISIT [WWW.HORNBYMAGAZINE.COM](http://WWW.HORNBYMAGAZINE.COM)  
TO SEE THIS IN ACTION

27

The original chassis design has only a very small space available which will be fully occupied with the Next18 adaptor and sound decoder as seen here. This simplifies installation as there is no need to cater for stay alive capacitors. The speaker was positioned on the footplate, as per the later design, and the model reassembled in the reverse procedure to disassembly.

## WHAT WE USED

PRODUCT	SUPPLIER	CAT NO.
Zimo MX659N18 sound decoders	<a href="http://www.digitrains.co.uk">www.digitrains.co.uk</a>	MX659N18
Rail Exclusive 15mm x 11mm x 9mm speakers	<a href="http://www.digitrains.co.uk">www.digitrains.co.uk</a>	SP15x11x09
Zimo SACC16 stay alive pack	<a href="http://www.digitrains.co.uk">www.digitrains.co.uk</a>	SACC16
Zimo 4-pack tantalum capacitors	<a href="http://www.digitrains.co.uk">www.digitrains.co.uk</a>	TANTX4
Next18 adaptor	<a href="http://www.ngtrains.com">www.ngtrains.com</a>	



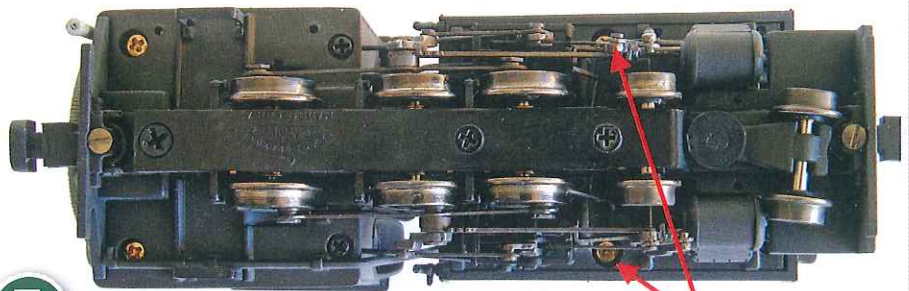


# Bachmann Baldwin 10-12D

**S**IMPLE DCC AND SOUND INSTALLATION was part of the design for the Bachmann model from the outset and shows what can be achieved with an integrated approach. Bachmann even worked with Zimo to produce a specially sized sound decoder to realise its vision.

Despite its diminutive size, the Baldwin is as close to 'plug and play' sound installation as is possible – it takes less than five minutes to install a Zimo MX659N18 decoder in the locomotive to make use of the factory fitted speaker. The provision of a fully wired and installed speaker in all versions removes almost all of the effort.

Whilst this gives a perfectly acceptable performance in a home environment, this conversion was scheduled to run on the



**A**

Release these two crosshead screws (arrowed). Follow the included instructions to release some plastic fittings before lifting the boiler and side tanks clear.

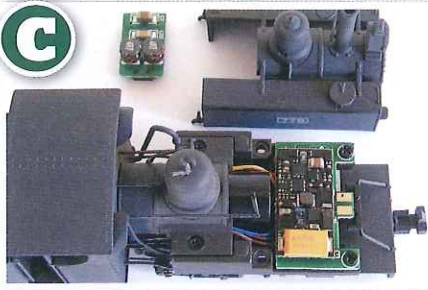
Hornby Magazine 'OO9' gauge layout at Warley.

For this demanding environment, the speaker was replaced with a standard mini sugar cube. The increased size gives a higher sound level but also means that it

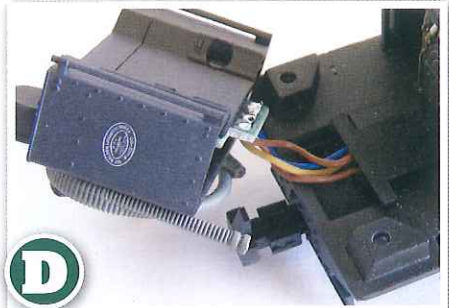
protrudes into the footplate area, so this is a compromise to achieve a particular task. I was able to disguise the intrusion with a couple of strategically placed crew members from a Bachmann 'OO' gauge figures set.



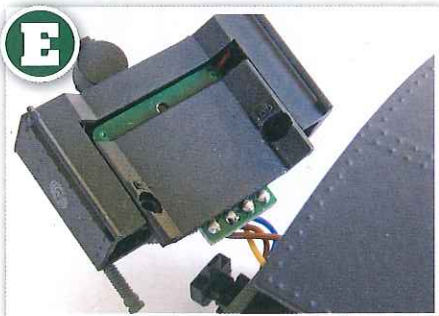
The DC blanking plate is revealed fitted to the side to side orientated circuit board.



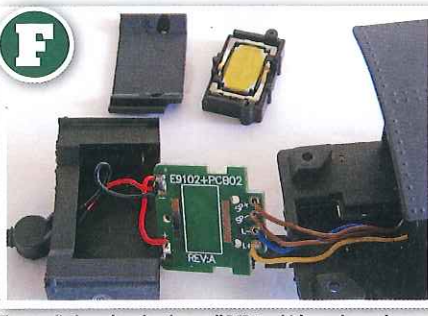
A push fit of the specially produced Zimo MX659N18 sound decoder is all the installation required. At this point the model can be reassembled and put into service using the factory fitted speaker. The following steps show how to fit an optional larger speaker.



After removing the two retaining screws from below the rear of the footplate (see step A above) the coal bunker and footplate wiring cover plate can be lifted away.



Remove the two screws which hold the front panel of the bunker in place, and slide the panel out carefully.



The supplied speaker plus the small PCB to which speaker and rear headlamp wires are attached can be seen. I made a note of the colour coding prior to the removal of all wires from the PCB.

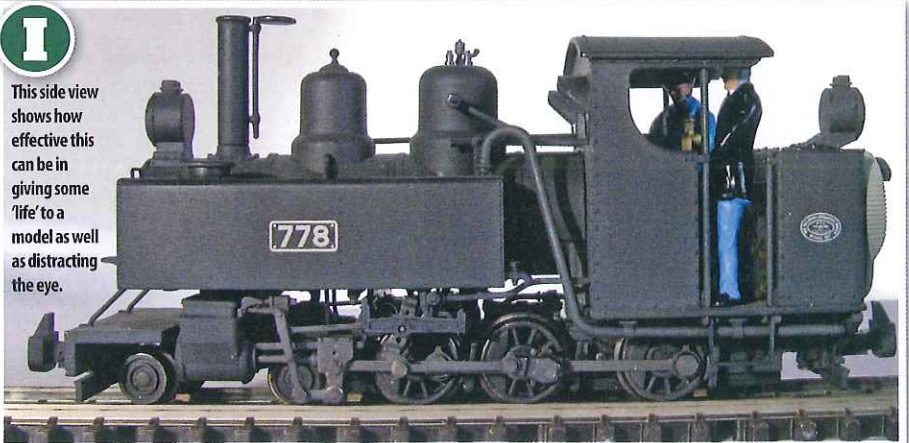


I soldered the speaker wires (brown) to the new larger speaker and joined the wires for the rear headlamp (red and black), insulating them with shrink wrap tubing. The speaker was insulated at the rear with Kapton tape. The bunker was refitted to the footplate with the speaker part way into the space created with a portion onto the centre of the footplate.



**H**

With some judicious surgery (removing part of their legs), two Bachmann figures were persuaded to join the speaker on the footplate where they represent the crew - especially important with an open backed cab - and to disguise the speaker's presence.



**I**

This side view shows how effective this can be in giving some 'life' to a model as well as distracting the eye.