Making the most of 'O' GAUGE sound

Many 'O' gauge models are designed with sound fitment in mind. **PAUL CHETTER** lifts the lid on a Heljan Class 25 to install Digital Command Control sound and to highlight design features intended to make this as simple as possible.

WHAT WE USED		
PRODUCT	**SUPPLIER**	**PRICE**
Zimo MX699KV Sound Decoder	*www.digitrains.co.uk*	£185.00
80mm x 32mm DSS 236 speaker	*www.digitrains.co.uk*	£7.20

Heljan's 'O' gauge Class 25 was released in August 2016. This is the Tower Models limited edition in plain BR green. See HM112 for the full review of the '25'.

HELJAN'S Class 25 made its debut in August 2016 (HM112) for 'O' gauge and it offers an attractive proposition for newcomers to the scale for its all-purpose, go anywhere nature.

Today we are expecting more compatibility with digital for new locomotives in the scale, especially with the arrival of plug and play models like the Little Loco Company's PLux22 equipped Class 15 (HM117). However, not everything is quite so simple in 'O' gauge, but there are also products on the market which can – at least – begin to make it an achievable step to add sound yourself to an 'O' gauge twin motor locomotive.

The Class 25 follows Heljan's time honoured format of twin motors driving each bogie, but with the more recent arrangement of horizontally positioned motors providing drive to the bogies via cardan shafts and gear towers. This arrangement of the motors means that there is no shortage of space inside this large model as shown in the cutaway picture. Choice of decoder and speaker are not, therefore, tightly limited by the physical size which can be accommodated.

However, the dual high-powered motor design of this model requires the decoder to be capable of supplying 2-3Amps of continuous current, way beyond what is possible from decoders for smaller scales. The LokSound XL (4A) and Zimo MX699KV (6A) are more than a match for the Heljan model requirements in 'O' gauge, though both companies also offer decoders with lower power outputs (3A and 4A respectively) which would be sufficient for most users. There is also ample space to accommodate a wide range of suitable speakers, either singly or in an array of two or more subject to meeting the minimum impedance required by the decoder. I decided upon a single bass reflex type speaker mounted to the body above one of the bogie towers and a Zimo MX699KV decoder so that I could install my own custom Class 25 sound project.

The Printed Circuit Board (PCB) is designed primarily for analogue operations, allowing the main wiring to be operated correctly on DC. There are no obvious concessions to Digital Command Control (DCC) fitting or sound installation. The most straightforward way to install a decoder is to remove the locomotive PCB entirely and wire direct to the decoder in a process called hard wiring.

Many of the decoder types suitable for this model are available with screw terminal blocks which avoid the need for soldering, though all wiring will need to be disturbed if the decoder needs removal for any reason.

Removing the PCB will not adversely affect the locomotive lighting LEDs in this model as the lighting PCBs are equipped with resistors to protect the LEDs from excessive current. You may wish to add resistors in series to reduce the brightness of the LEDs.

FACTORY WIRING

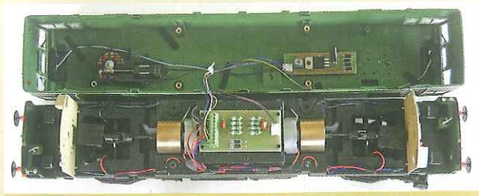
The track pick-up wires have been fitted so that the black from one bogie is on the same side of the model as the black from the other bogie. The same applies to the corresponding red pick-up wires. This is an improvement on earlier Heljan 'O' gauge models where, counter-intuitively, red and black wires had to be connected together.

The NMRA standards state that black should be on the left and red on the right as seen with the front of the locomotive pointing away from the viewer. This was reversed in our sample. For DC running this is not a significant problem, as the Heljan PCB wiring corrects this error.

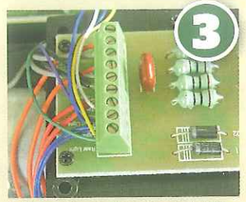
Whilst DCC operations would enable this to be corrected with CV changes, it is more »

STEP BY STEP INSTALLING DCC SOUND IN A HELJAN 'O' GAUGE CLASS 25

Removing the body is quite straightforward but their heavy weight makes these models tricky to handle. Remove four screws located near the inner ends of both bogies (one is arrowed here) and the body will lift off vertically.

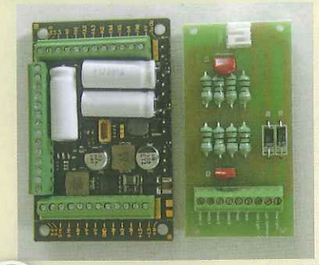


There are wire connections between the PCB and roof fan and headcode lighting which are just long enough to allow this shot of the general deployment of components. Note the JSP plug and socket arrangement for the radiator fan connection.

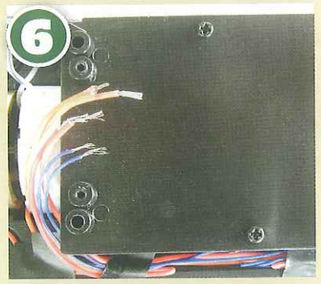


In close up, the wires to the headcode LEDs can be identified as yellow, white and blue. These and the JSP plug should be released to allow the body to be put aside for safety.

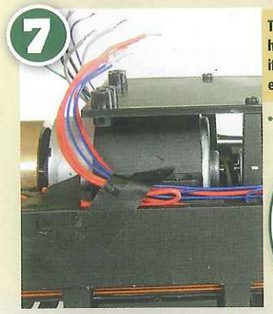
With the body mounted component connections removed, the track and motor connections can be seen more clearly.



Zimo's flagship MX699KV large scale sound decoder (left of picture) is compared with the locomotive PCB which has now been removed from the model.



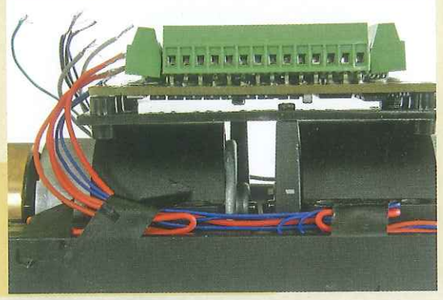
The plastic support provided for the PCB can be utilised in a similar role for the decoder.



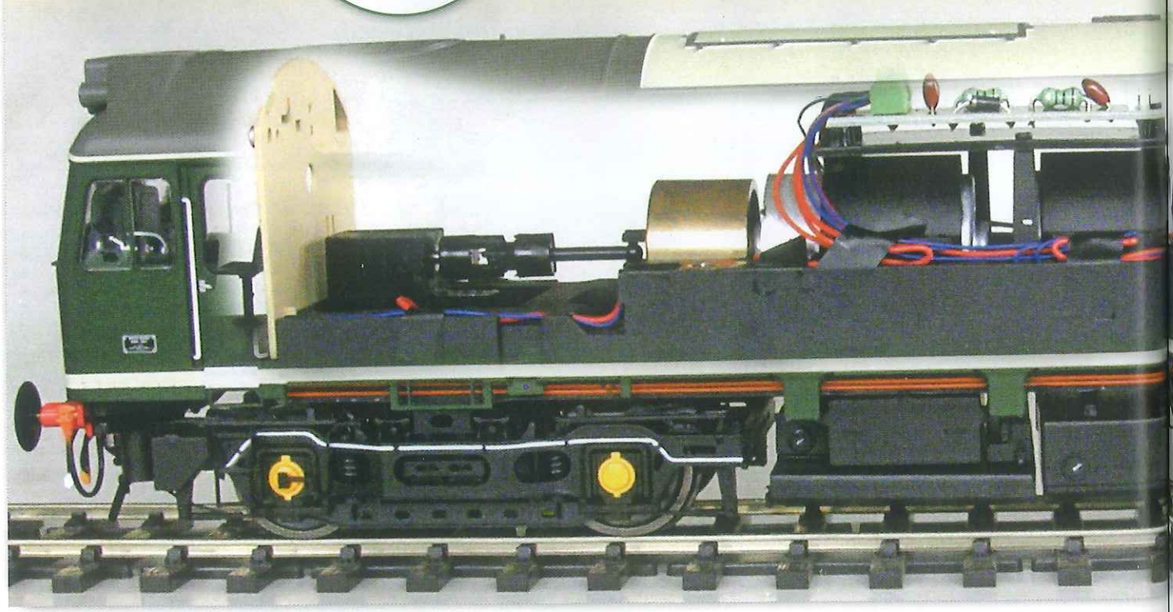
This support can be seen in its central position above the twin horizontally mounted motors. There is no need to lengthen any wires if the decoder is located here, though some may need uncoiling to ensure a stress-free connection.

TIP

Follow factory wiring carefully and test the model stage by stage to ensure the project is going as planned - its much harder to fault find at the end.

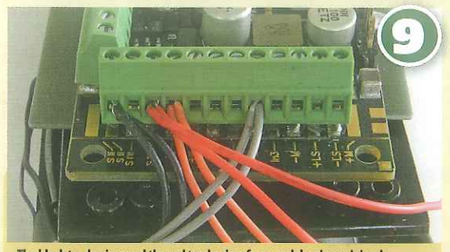


This shows the general location of the decoder and the loosely coiled wires under the black tape.



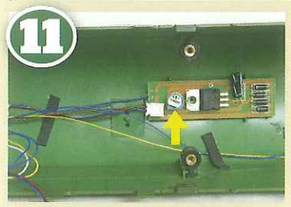
Intermediate

Beginner — SKILL LEVEL — Advanced

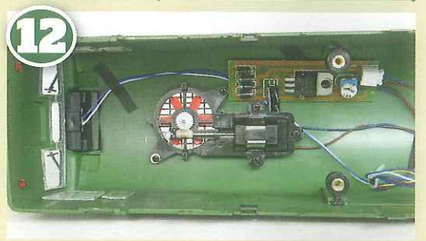


The black track wires and the red track wires from each bogie are joined together and connected to the appropriate screw terminals on the decoder. Similarly, the grey pair and the orange pair were connected together at the decoder. Unfortunately, this caused the wheels of one bogie to run in the opposite direct to those on the other on this example.

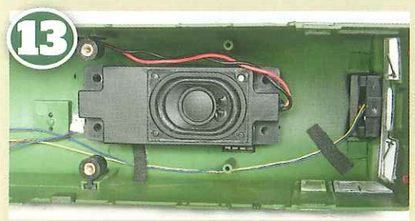
The reconfigured wiring shows how the grey from one end must be joined to the orange from the other in order to get all wheels turning in the same direction. The actual direction depends on which motor output each pair is connected to. Incorrect direction can be reversed by using a CV29 value change, but it is easy to rectify in the wiring at this stage.



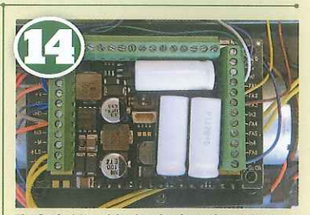
The operating radiator fan is controlled by this PCB. The potentiometer (arrowed) is a convenient way to adjust the speed of the fan so this board was retained for its functionality.



It was, however, relocated to a position close to the fan assembly to leave space for the speaker to be fitted above the other bogie tower.



This 80mm x 32mm bass reflex speaker encloses the same type of 28mm x 40mm speaker I've used in other HM projects in a 'ported endosure' designed to enhance the volume of the lower frequencies.



The final wiring of the decoder shows that each pair of LEDs and the roof fan each have their own connection to the decoder. This allows more prototypical use of lighting possible with DCC operations.

satisfactory to wire the track pick-up to the decoder correctly at this stage to avoid incorrect directional control when running on DC with a decoder fitted. Heljan has now moved away from using red and black for the motor wires to those specified in DCC standards, grey for negative and orange for positive.

However, if orange from both bogies and grey from both bogies are connected together, the motors drive the wheels in opposite directions, so we are still in the position of making counter-intuitive connections between different coloured wires! I found that I was required to connect orange from one bogie with the grey from the first and connect to the same motor output from the decoder: likewise, connect grey from first bogie to orange from the other and then connect to the decoder's second motor output.

None of these wiring issues are insurmountable, especially for those experienced in Heljan's 'O' gauge model foibles, but they are unnecessary obstacles to straightforward conversion. They could be easily avoided during the design phase. My recommendation before undertaking any DCC conversion to Heljan 'O' gauge diesel models is for wiring to be tested for polarity before connecting to any decoder.

INSTALLATION

Once the pick-up and motor wiring has been investigated and understood, the physical installation is straightforward. The decoder sits on the plastic platform to which the locomotive PCB was fitted. There is a subsidiary board which controls the operation of the working roof fan. This board is fixed to the roof in the position I intended to fit the speaker. It would be possible to remove this board altogether and wire the fan directly to one of the decoder's Function Outputs (or FAs as printed on the decoder). As there is a variable resistor on the board and this is a convenient way of adjusting the fan's operating speed I decided to retain it.

I released the screws holding this board and relocated it to a position next to the roof fan, fixing it with double-sided tape. The input wires from the board were connected to the common positive and FA3. The sound project is programmed to operate the fan whenever the fan sound plays if connected to FA3, so no separate or manual control is necessary.

I modified the lighting control by connecting each pair of white markers and each pair of tail lamps to separate Function Outputs. This allows the tail lamps to be illuminated when running light engine or the last vehicle in a train, and not illuminated at all other times. Finally, the speaker was fixed to the inside roof above the bogie tower and connected to the speaker outputs on the decoder.

The popularity of 'O' gauge both for customers and manufacturers is raising its position in the ready-to-run market and they offer very tempting prospects too. With sound on board these giants are taken forward in a giant leap with enhanced 'play value' and a much more enthralling operating experience.

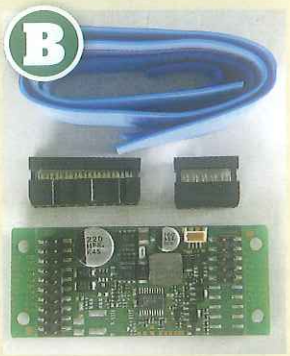
A cutaway view of the Class 25's interior showing the arrangement of the motors and the cavernous space available for a speaker and sound decoder.

STEP BY STEP **ALTERNATIVE SOLUTIONS**

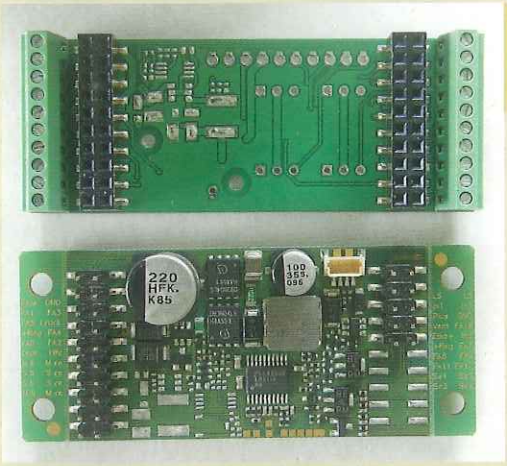
Intermediate
Beginner SKILL LEVEL Advanced

In recent years some decoder manufacturers have created types with continuously rated power outputs greater than those typically employed on 'OO' gauge models, but lower than their high performance decoders. These generally give sufficient power for 'O' gauge models, but can cost significantly less than the 'fully loaded' types. Here are some examples of Zimo's alternatives. Each will provide at least 4A continuous motor power and a further 2A for ancillaries. The number of Function Outputs varies from 8 to 14 depending upon the precise decoder type within each 'family'.

A From the left, the most economical MX696S with ribbon wiring and pin connectors, MX696KS which is a combination of MX696S decoder and LOKPL96KS adapter in a cost effective package and on the right MX699KS which provides all the power of the MX699KV but with fewer features.



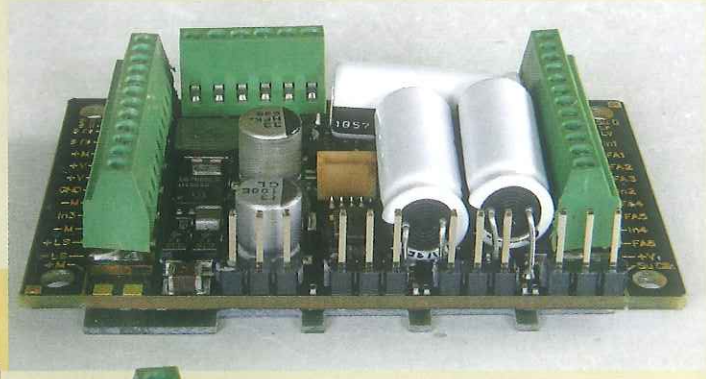
B The MX696S with cable has the advantage of being self-contained, but the wires will need to be joined to the model's wiring by soldering or screw terminal blocks.



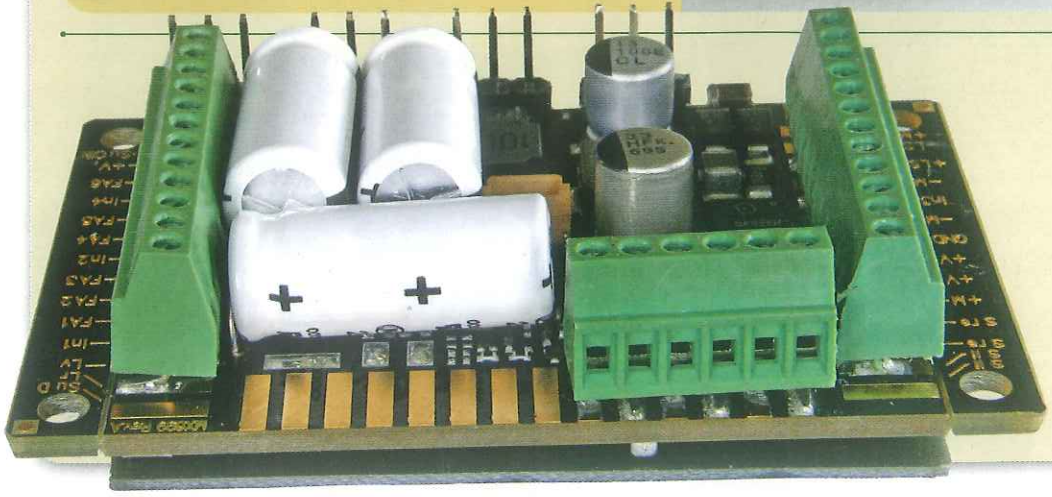
C The MX696S can be mated to a push-fit adapter (top of picture) which in turn has a full complement of screw terminals. This adapter is available separately or in a specially priced combination pack with a decoder. The designation of this is MX696KS.

D This shows the MX696S decoder in the process of fitting to the adapter.

E This shows the MX696S decoder pressed fully home into the adapter.



F The MX699KS has many similarities with the MX699KV, including the three on-board 'stay alive' supercapacitors for exemplary running even on poor or dirty track.



TIP

Sourcing the right sound decoder means finding a brand you like and also a sound producer too. Each has slightly different characteristics.

G The MX699KS lacks some features of the MX699KV so there are fewer screw terminals required.