

DIGITAL COMMAND CONTROL

GIVING
VITRAINS'37
SOME
'grrr'!

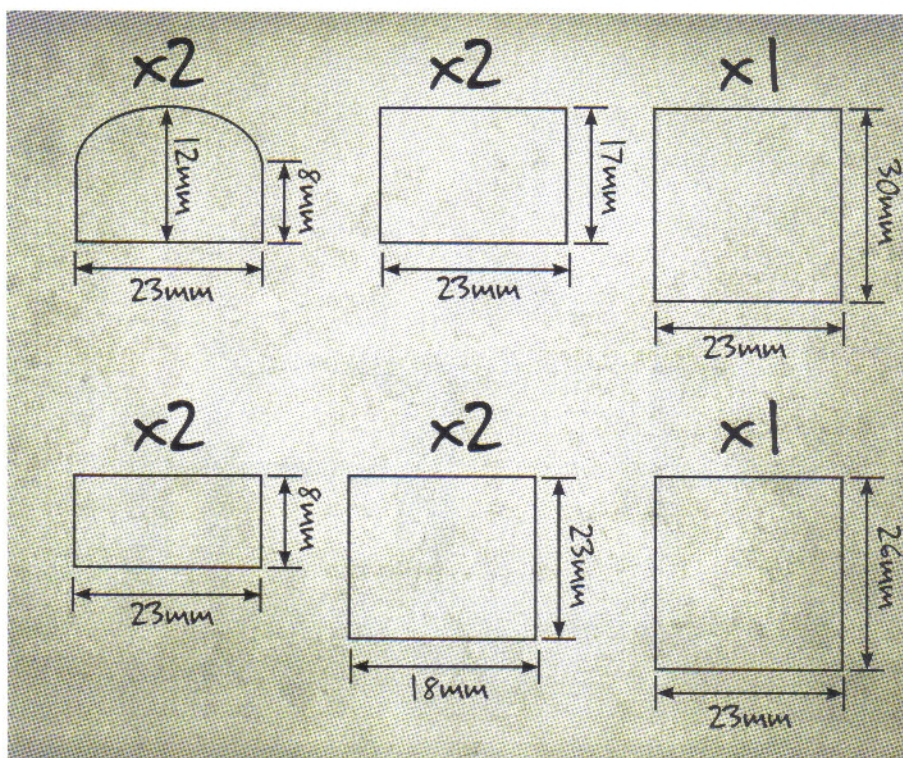


In a new series
PAUL CHETTER
 rumbles a ViTrains
 Class 37 diesel
 into life with digital
 sound - and looks
 at how to really
 bring out that
 classic 'growl'.

Ready for the road – the newly sound fitted ViTrains Class 37 poses for its portrait. It has been equipped with Zimo's latest MX644 sound decoder.

WHAT WE USED

Product	Cat No.	Manufacturer	Price
Class 37/4	V2033	ViTrains	£75.00
Sound decoder	MX644	www.zimo.at	£84.00
23mm mega bass speaker	810129	www.digitrains.co.uk	£6.50



Diagrams and measurements for the two speaker enclosures for the ViTrains Class 37 sound project.

IN MY LAST SERIES, I showed how to fit Digital Command Control (DCC) sound into a Hornby '4MT' steam locomotive.

This time I look at the '4MT's spiritual successor, the English Electric Class 37 diesel with the aim of giving it that characteristic EE growl.

There are two ways you can fit sound to these classic diesels and both will require you to build enclosures for the speaker(s) from 1.5mm styrene sheet to patterns included in this series. One method requires no modification to the model at all; the other requires minimal adjustment to the chassis.

I have used a ViTrains 'OO' gauge model as the basis for this project. This particular model was chosen for its excellent slow-speed performance, smooth and quiet mechanism, strong chassis and its overall weight. All of these aspects are key, but I have to admit that I only discovered this after I bought it. The fact is that I liked the look of the model and Keith at Mad About Trains in Gainsborough offered me a deal which was simply too good to miss.

Opening the model

Separating the body from the chassis is a simple but delicate operation. The instructions which came with the model were pretty basic, largely consisting of a diagram and arrows. The accompanying images illustrate the procedure, however. Prize the lower edges of each side of the body outwards to disengage the lugs which hold it to the chassis. The body can then be removed and set aside. During this manoeuvre it is possible to disturb the internal parts for the

lights. If you pull one end of the body away, the chassis may pivot and its other end strike the lamp assemblies. If you remove the bodyshell gently and evenly you should have no problem.

The motor is centrally located and powers both bogies via cardan shafts. As with all ViTrains locomotives, the model is DCC ready with an 8-pin socket fitted to a circuit board which also contains the lighting connections.

Having already tested the Class 37 on DC power, I removed the two metal shunts from the decoder socket and temporarily fitted a non-sound decoder to check the DCC performance. Remember that static electricity can kill decoders instantly so make sure you are electrically grounded before handling them - touching a radiator should do the job. It is disappointing that ViTrains does not clearly indicate the number 1 pin in some way, but the image in the step by step guide uses appropriately coloured spots to indicate where the red and orange wired pins should go.

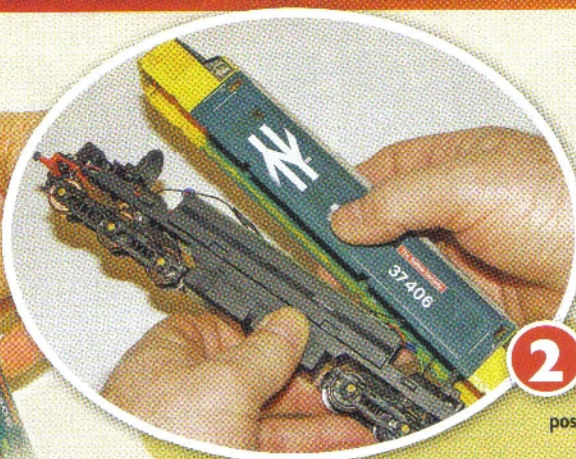
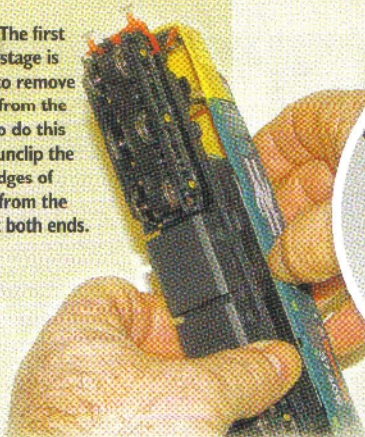
The decoder

I prefer Zimo decoders to all others and the latest MX644 series offers significant technical improvements over the MX640 used in the 'Standard Four' project - HM38-HM44. There is a greater tolerance of excessive voltage, electronic protection of the speaker connections and a smaller physical size.

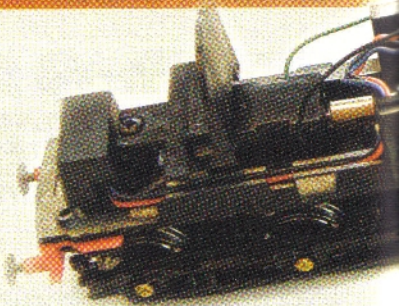
The design improvements most likely to become apparent in use are the massive (in model rail terms) 3W amplifier output and the two wires which have been provided for direct connection to capacitors. The use of capacitors »

STEP BY STEP INSTALLING DCC SOUND AND SPEAKERS IN A VITRAINS CLASS 37

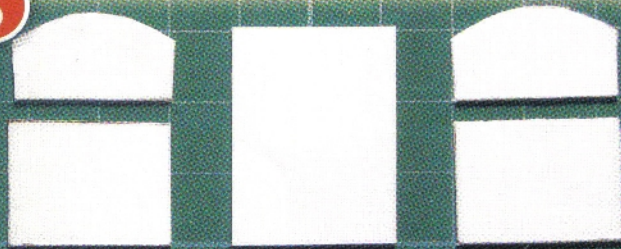
1 The first stage is to remove the body from the chassis. To do this carefully unclip the bottom edges of the body from the chassis at both ends.



2 Once the body is unclipped carefully lift it off the chassis – keep the body straight and level as you lift, as otherwise it is possible to damage the light connections.

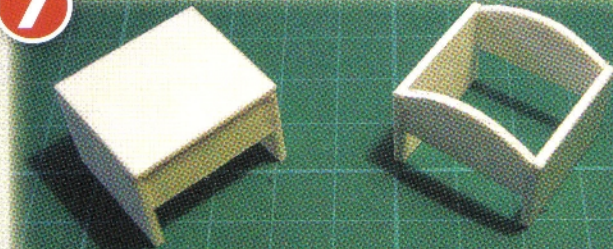


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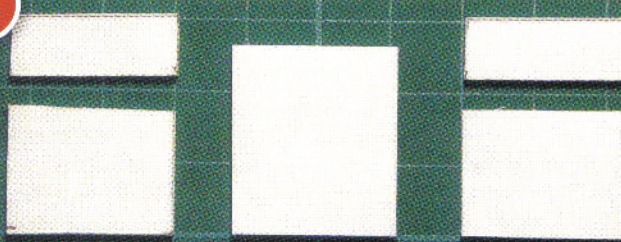
These are the component parts of the speaker enclosure for the non-fan end of the Class 37. The diagram with this feature shows the dimensions for these parts. All the parts are cut from 1.5mm styrene sheet.

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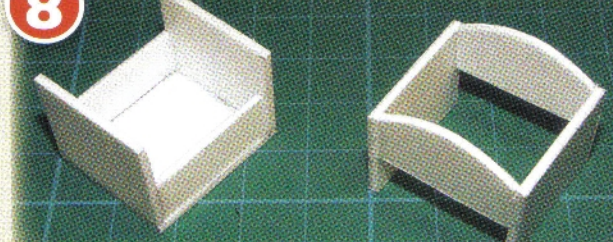
The two speaker enclosures are assembled with liquid plastic cement. Any rough edges can be cleaned up with sandpaper or a sharp craft knife.

6



The speaker enclosure for the fan end of the Class 37 needs a flat top to clear the fan moulding. The parts are cut from 1.5mm styrene sheet and the diagram includes all the dimensions to make these parts.

8



The underside view shows how the speakers will be supported so as not to foul the internal workings of the model's mechanism. The deeper sides sit on the chassis block while keeping the speaker up inside the lower sides.

improves running on dirty track or over dead frogs and is nothing new, but the surge of power on start-up can cause some DCC controllers to think there is a short-circuit and so shut down for protection.

This Zimo MX644 decoder has resistors and diodes incorporated onboard to remove this potential problem; fitting inexpensive capacitors has never been easier and the rewards of doing so are very real, especially if you like a lot of slow speed movements over pointwork and crossings.

Planning the project

Now that the chassis is exposed, it is possible to view the spaces available to accommodate the components of the sound system. There is clearly enough headroom for the MX644 to fit between the circuitboard and the inside of the roof. But where to fit a speaker, or maybe two?

It's common for modellers to fit downwards facing speakers in the battery boxes and water tanks located below the solebar. However, removing the plastic mouldings reveals that

these are filled with metal on this chassis. This is great news for traction - heavy weight low down gives a low centre of gravity - but does rather preclude fitting speakers there without a lot of metalworking!

There is some space between the cab rear bulkhead and the high shoulders of the chassis, so it was time to get measuring. There is not enough room for a 'bass reflex' speaker, but I have had much better results from a couple of Mega Bass or Hi Bass speakers - a 23mm square design from Soundtraxx and a 28mm one from QSI respectively. This project uses two 23mm Mega Bass speakers.

To my ears, using my own sound projects with Zimo decoders and with the speakers fully enclosed at the rear these two designs provide a richer, deeper tone than any others I have tested, but it is a subjective opinion.

The 23mm speaker will fit in the space available but the 28mm will not. The conundrum is that when it comes to speakers bigger is usually better. In order to provide a sensible comparison, however, I decided to use both and compare the results.

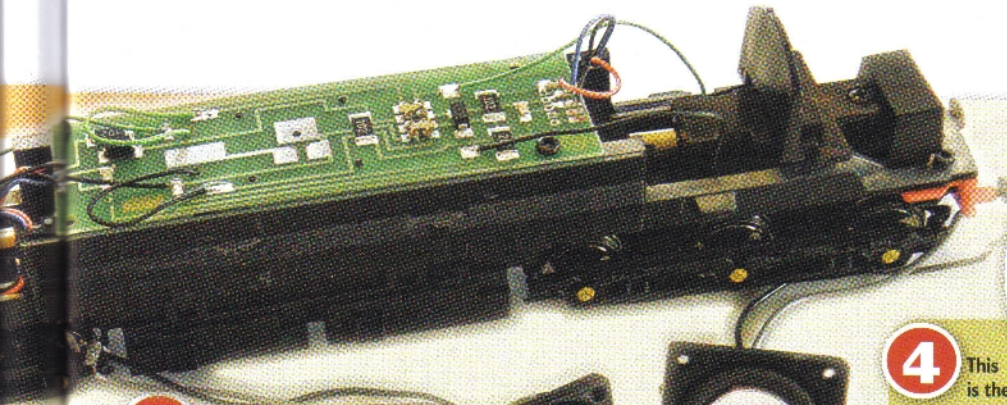
The enclosure

A normal speaker consists, in essence, of a stiff frame suspending a diaphragm which can be vibrated by the action of an electrically excited coil within a magnet. These vibrations are transferred to the atmosphere and the resulting waves create the sound in our ears.

There is a problem with this simple setup. The waves are created both at the front of the speaker and at the rear. There is a slight delay in hearing the rearward emitted waves and so front and rear become 'out of phase' which has the unfortunate effect of cancelling out parts of the sound we want to hear.

There are a number of ways that the rear vibrations can be kept from interfering with the desirable ones from the front. The simplest method given the size limitations with model locomotives is to fully enclose the rear of speaker. Any small gaps will reduce performance out of all proportion to their size so it does need to be a comprehensive job.

In theory, the effectiveness of an enclosure can be tuned to the specific speaker and location, but with such tight spaces there is

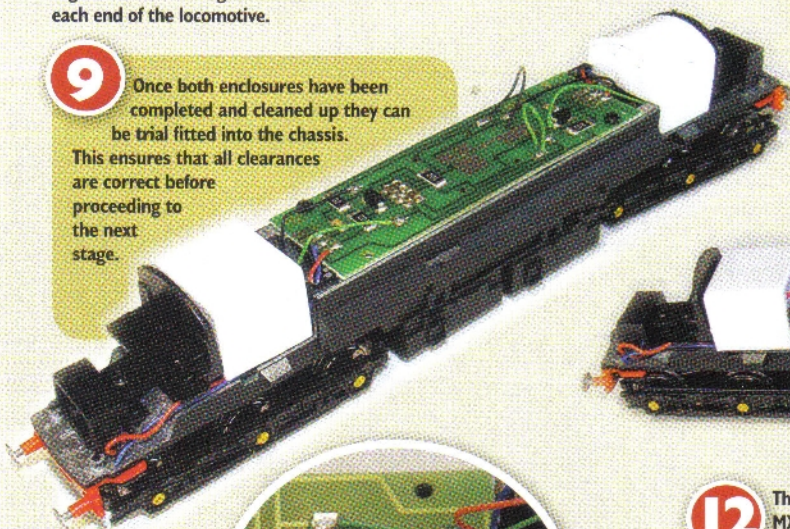


3 With the body removed the space available for speakers becomes clear. The two speakers shown here are 23mm and 28mm diameter Mega Bass speakers from Digitrains – one being suitable for each end of the locomotive.

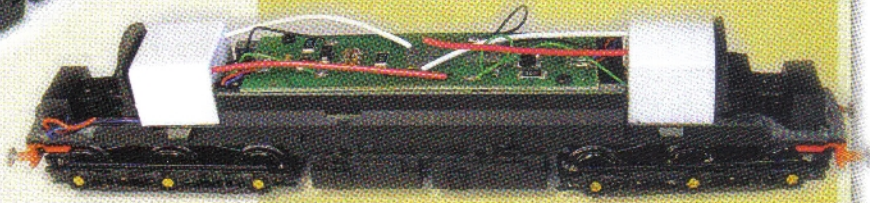


4 This is the smaller of the two speakers which neatly fits between the cab bulkhead and the chassis block above the bogie top. To mount this in place an enclosure is required and this will also aid the sound quality.

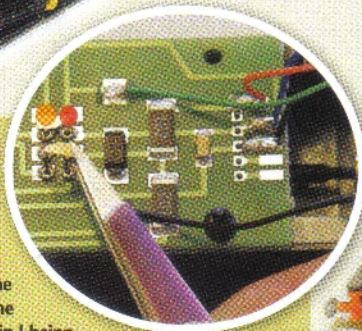
9 Once both enclosures have been completed and cleaned up they can be trial fitted into the chassis. This ensures that all clearances are correct before proceeding to the next stage.



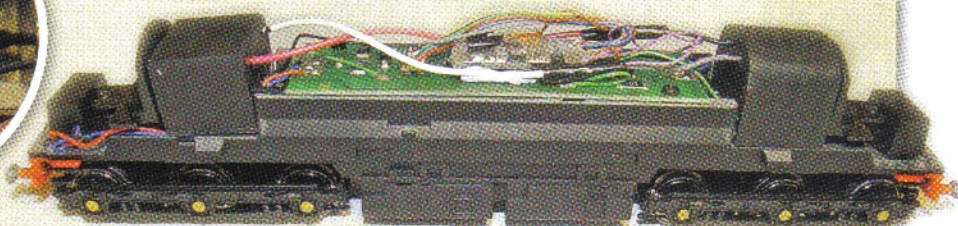
10 Each speaker enclosure has two 2mm holes to allow the speaker connections to exit drilled using a 2mm drill bit in a pin vice for control. The red and white wires are those which connect the speakers to the decoder.



11 Next the two three pin connectors need to be removed from the decoder socket. The two dots denote the position of pin 1, pin 1 being the orange wire on the plug.



12 The final installation features matt black painted enclosures and the MX644 sound decoder plugged into the chassis. Next issue we take this project on to the next stage.



usually little opportunity of achieving this level of perfection except by chance.

I have designed enclosures for the 23mm speakers based on the measurement of available space only. I do not claim that they are the best possible, but I can assure you they will fit if you adhere to the dimensions given - and the sound is very good too.

I used 1.5mm thick styrene sheet and liquid cement. Due to the fan modelled in the roof at one end of the locomotive, space is restricted. There are two designs of enclosure to cope with this if you choose to use two speakers. Cut out the panels shown in the diagram on page 85, taking all usual safety precautions, and make up the boxes. Leave them overnight to set properly, trim with a sharp knife and sandpaper any rough edges.

Drill two small holes which just allow the speaker wires to pass through in one of the arched sides. Take the other enclosure and drill through one of the narrower sides. I used a 2mm bit in a pin vice for this. Test fit the speakers - you may need to trim them or the enclosures to obtain a close fit.

Wiring the speakers

Solder enough wire to each speaker to reach the purple wires from the decoder, noting the colour connected to the speaker terminal with the red painted positive (+ve) indicator. Do not apply heat to the speaker terminals for more than a second or you may damage them.

Thread the wires through the holes and fit the speakers to the enclosures. You can glue them in place, or you can use blu tak or tape to hold them together. Black tape has the benefit of camouflaging them when viewed through the locomotive side windows - or you can paint them matt black.

Remember to block up the screw holes in the speaker and any gaps that become apparent and put in place on the chassis, behind each cab's rear bulkhead. Note that the flat topped enclosure fits at the end with the roof fan. You will need to trim off the fan base's plastic locators to clear the enclosures.

In both cases you will see from the photographs that they are designed to suspend the speaker pointing downwards.

The sound will escape through the gaps in and around the bogies. This pathway will help to diminish the high sound frequencies and accentuate the lower range - vital for a Class 37.

Test fit the locomotive body and make any minor adjustments needed. When you are sure everything will fit correctly, push the decoder plug into the circuitboard socket, and wire the speakers in parallel to the decoder. Make sure you connect the speakers in phase; the red terminal wire from each speaker together, although it does not matter which of the (purple) speaker wires from the decoder they are attached to. Before final reassembly of the locomotive, test run it and the sounds to ensure it all works as intended.

The advantage of using the smaller speakers is that your model is not damaged in any way, and all additions are reversible.

Next issue we'll show you how to fit the larger speakers, fit capacitors for improved running and how to get extreme slow running by adjusting the correct CVs - the difference the latter two make is quite stunning. 