



DECODING DCC

PART 1

Setting up a DCC decoder properly can be simple, as **Howard Smith** shows in the first of a series of DCC lessons for beginners.

I think DCC decoders are marvellous, but there appears an element of mystery surrounding their installation and how they work. If you're a newcomer to DCC, then you might have a few questions of your own.

When talking with modellers about Digital Command Control (DCC), I've noticed that they tend to fall into two categories. Some can't get enough of it, looking forward to their next acquisition, but others won't go near it, claiming it's too much hassle and plagued with problems. Few people seem undecided, even newcomers. Converting non-DCC users who have heard tales of puffs of smoke and expensive replacement bills isn't easy, but you have to ask if the equipment was being used correctly in those cases. Hopefully this short series can dispel such myths and encourage you to embrace the prevailing direction of the hobby - for a beginner; it's not as difficult as you might think. **BRM**

CHOOSE A DECODER WITH THE RIGHT CAPACITY

Fitting an underpowered decoder can result in premature failure. To find how much power a model consumes, place it on the rails against a solid object - such as a bufferstop - and force it to stall. Place an ammeter in series between one rail and a terminal on the DC transformer. This determines what the locomotive consumes in a 'worst case' scenario, should it stall or accidentally run into a bufferstop and its wheels spin. Turn up the power on the transformer slowly from a crawl to maximum speed, noting the maximum amount of current consumed. Add to this figure a 'safe margin' of around 20% and this is your locomotive current consumption.

Look for a decoder that can handle this amperage on a 'continuous' cycle, not 'peak'. The peak output of a decoder is the maximum current it can handle, but only for short periods of time before it overheats.

Most accessories connected to decoders consume little current, especially modern LEDs - the margin of 20% will more than handle them. Beware if fitting a smoke unit, as the resistor heater element and fan motor - if fitted - will consume far more current than an LED. In this case, refer to the manufacturers' manual for its amperage and add this to the sum total.

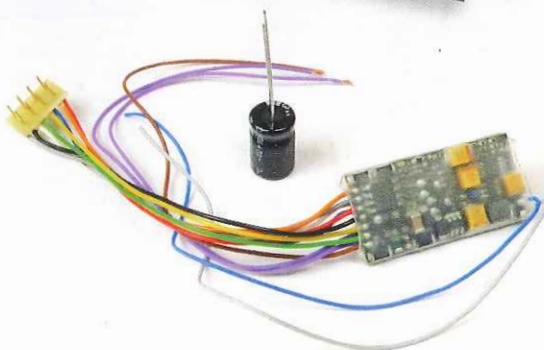


Jobs such as fitting a Zimo MX645 sound decoder from YouChoo into the tight confines of this Bachmann Class 08 and configuring it properly might deter non-DCC users, but it's actually quite simple.

MORE ADVICE?

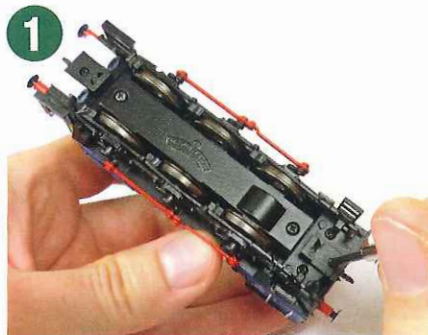
If you're still unsure and have more DCC-related questions, ask your local model shop or retailer who should be able to point you in the right direction. You can also ask on our forum **RMweb**.

W www.rmweb.co.uk

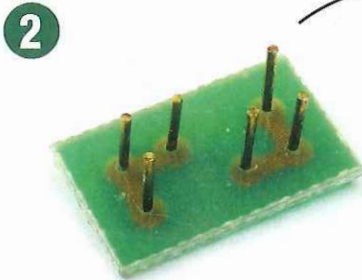


STEP-BY-STEP GUIDE

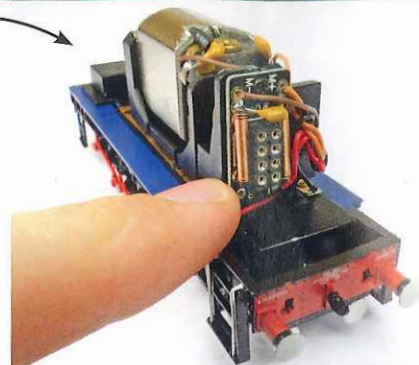
INSTALLING A DECODER



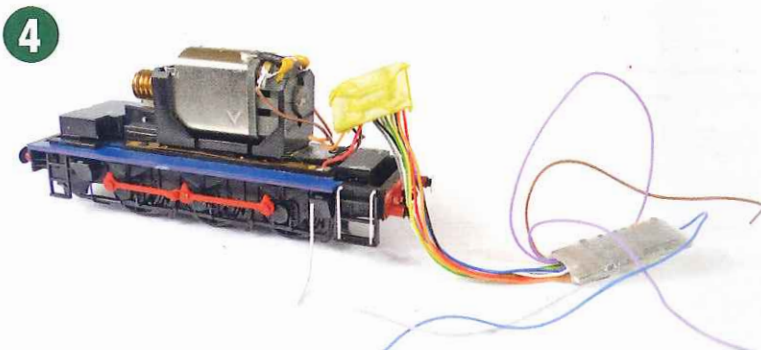
Installing a decoder into this Bachmann Class 08 and setting it up is a five-minute job. The chassis is parted from the top by removing a single screw under the cab.



At the front of the chassis is an eight-pin DCC socket. Before installing a decoder, remove the 'blanking plug' which links pins one, two and eight as a group and four, five and six as another. It connects each motor terminal to a rail and without it, the locomotive won't move on DC power.



Above The only way to install a Zimo MX645 sound decoder in this compact locomotive is to remove part of the chassis and flywheel with a small hacksaw. Many locomotives have room for such a decoder, but this one hasn't. It's a 'worst case' scenario, but at least you'll know what to do if you try the same.



Avoid using glues when installing decoders as they're messy around electronics. I prefer to use masking tape - it's much neater and doesn't leave the same sticky residue as insulation tape. Double check that everything fits before going any further. Look out for wires that might pinch, interference with moving parts and any non-insulated wires is likely to cause short circuits.

DID YOU KNOW?

You don't need a DCC socket to install a decoder, although it makes the process much easier. You can 'hard wire' it in place by soldering the correct wires together.

TEN RULES FOR INSTALLATION

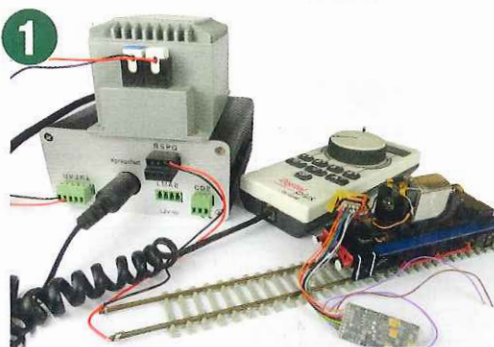
1. Because of inconsistencies and changes in standards six, eight or 21-pin socket might be fitted to your model. Check which you have before buying a decoder
2. Match the decoder power output to the amperage of your locomotive. What a locomotive consumes depends on its size, weight, age and the type of motor fitted
3. Make sure all decoder wires are kept away from moving parts such as gears and wheels
4. Exposed or unused wires must be isolated to avoid short circuits
5. Keep your decoder away from motors if possible. Decoders like to be kept cool and motors are a source of heat in a confined space
6. If possible, install a suitable 'Stay Alive' capacitor. These reduce stuttering of models over poorly laid or dirty track and improve performance, especially with sound
7. Decoder installation must be carried out as the final job when building a model. Paint it before installation
8. Beware of using steel wool around a model fitted with a decoder. Small fragments can create short circuits in a decoder. Keep your workbench clean and free from debris by regularly vacuuming
9. Make sure you have space for a decoder. If you fit a sound decoder, make sure you have room for the speaker and wires too
10. Some decoders are surrounded by heat-shrink wrapping. It prevents stray wires from coming into contact with the fragile circuits - don't remove it.

STEP-BY-STEP GUIDE

If you're new to, or considering DCC, you might wonder why you need to program each decoder. Put simply, it customises the running characteristics of each locomotive. Imagine a pigeon loft - this represents a decoder. Each hole changes a characteristic of the decoder, for example its top speed or time to reach its top speed. These holes are known in DCC language as 'CVs' or Configuration Variables.

Using the word 'programming' shouldn't provoke an instant fear of computer illiteracy. DCC simplifies many things, but having to program each decoder isn't one of them. Nevertheless, once you get the hang of it, you'll be surprised at the difference it makes.

BASIC DECODER PROGRAMMING



Many DCC systems are available and all perform differently when programming. In my case it's a Lenz Set 90. The programming track is connected to terminals 'P' and 'Q'. It should be an electrically separate section, such as a siding.



To access programming mode, the 'Om' button is pressed to get 'Pro' on screen. Continually pressing the button will cycle through the menu options.

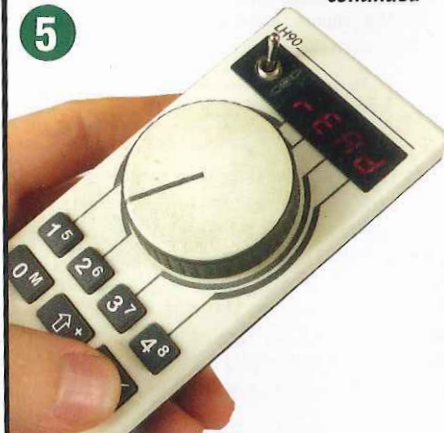
PRACTICAL BRM



STEP-BY-STEP GUIDE

BASIC DECODER PROGRAMMING

continued



The Lenz system is good at informing the user what it is doing. When the command 'read' on a CV is given, it clearly notifies us on screen.



If the 'A' button is pressed to validate our choice, the command station will ask us what we want to access - in this case CVs, noted 'C'.



The value of CV 1 is now returned, in this case its factory default value '3'. That means that this locomotive's address is 3 - a default industry standard with DCC. The decoder hasn't been touched, so all CVs contain their default settings. These are included in the instruction manual, no matter what your make of decoder.



Validating again with the 'A' button will ask us which CV we would like to read. Reading a CV is like seeing what is inside the pigeon holes referred to earlier. Here, we have selected CV1 which stores the model's address or 'ID' if you like. This will identify it from other decoders. The Zimo MX645 decoder has 428 CVs, most of which we don't need to touch.



We need to change this CV because if we run two locomotives with CV1 set to address '3', they'll both set off at the same time. This is done by putting a number - or value - different to 3 in the CV. I'm choosing 8, since it's an '08', but you can enter anything in this CV from 1-127. The values you can enter will be specified in your manual.

TABLE OF CVs TO CHANGE

This is the first step to programming DCC decoders, so I'm keeping it simple, but below are a list of CVs for the Zimo MX645 and the values to which I'm changing them. These are the most important aspects that should be changed. The result will see our Class 08 run at a realistic scale top speed no matter how enthusiastic the operator. It'll have its own address different from the default and will accelerate and decelerate better too.

CV Number	What does it do?	Default Value	Modified Value	
1	Locomotive Address	3	8	Changes the locomotive's default address
2	Start Voltage	2	1	Improves crawl ability of the locomotive
3	Acceleration Rate	2	4	Makes the locomotive slower to accelerate to its top speed
4	Deceleration Rate	1	2	Gives the locomotive more inertia
5	Top Speed	1 (=255)	130	Limits top speed to scale
6	Medium Speed	1 (=1/3 of CV5)	65	Resets to half of top speed

WHO SETS CV STANDARDS?

The standards for CVs and what they represent are set out by the NMRA (National Model Railroad Association) in the USA. It keeps standards between manufacturers consistent, so many of the basic CVs are responsible for the same functions, regardless of decoder brand. Beware though, not all decoders follow NMRA standards, so always refer to your manual and never assume a CV is responsible for a setting unless you're absolutely sure.

Left: This is the CV table in the Zimo decoder manual. It's usually found at the rear and gives a list of what each one does. Without it you might be stuck, so keep it in a safe place. I keep mine in the locomotive boxes, keeping note of changed CV values.



We'll fit some sugarcube speakers designed for small spaces.

NEXT TIME...

In the next episode, we'll look at more advanced decoders features - 'stay alive' capacitors, speakers and how you can get the most out of them. We'll also exploit the Zimo decoder to its fullest and explore some of its unique features it offers.

So, join us onboard the DCC train and discover the sound possibilities it can offer.

Whether you fit a standard or sound decoder to a locomotive, it'll offer numerous advantages, not just freedom of movement around your layout without isolation switches, but smoother motor control, fine tuning of speeds and more realistic operation.

Page 70 Non-Sound Decoder MX645 - MX645 and Sound Decoder MX645 - MX645

11 CV - Summary List

CV	Value	Description
1	3	Locomotive Address
2	2	Start Voltage
3	2	Acceleration Rate
4	1	Deceleration Rate
5	1 (=255)	Top Speed
6	1 (=1/3 of CV5)	Medium Speed

SEE THE DCC SOUND DECODER ARTICLE IN THIS ISSUE!

ZIMO decoders are designed and made in Vienna, home to Beethoven, Mozart, Schubert and Strauss. Would you risk trusting your sounds to anyone else?



Products for all scales

DCC decoders suitable for models ranging in size from 'N' to 'O' gauge, and larger, including garden railways.



Incredible specification

Functionality is paramount at ZIMO. Plenty of function outputs are always provided for greater play value.



Unrivalled motor control

Low-noise, high-frequency drive options with back-EMF sampling. Optimal performance from all motor types.



High current ratings

Plenty of capacity provides peace of mind, plus there are thermal cut-outs and overload protection on all outputs.



Superb sound quality

Powerful amplifiers, large memory and high sample rates means sounds need to be heard to be believed.



Stay alive technology

Many decoders incorporate energy storage circuitry that will improve running over poor or dirty trackwork.



Easy software updating

Our decoders can be easily updated with new software without the need to disconnect or disassemble locos.



Worldwide reputation

Chosen by premium brands like Roco & Fleischmann. Widely respected in continental Europe and the USA.



Great value for money

All decoders are made in our own hi-tech production facility in Austria and are surprisingly affordable.

ZIMO has been at the cutting edge of DCC for more than 30 years, offering a range of technologically advanced sound, motor and function decoders.

The pinnacle of digital sound technology...

MX644 & MX645 sound decoders

With 1.2 Amp motor rating, 3 Watt audio amplifier, eight function outputs, built-in 'stay alive' circuitry and the revolutionary 'smart stop' technology, these are the decoders of choice for 4mm scale modellers.

Miniature 'sugar cube' speakers

Matched to ZIMO's pre-wired loudspeaker outputs and designed for the tightest of spaces. Three sizes are available, complete with resonator boxes, right down to an amazingly small 8 x 12 mm footprint!

'Stay alive' supercapacitors

Improve running characteristics and avoid sound interruption and lighting flicker by using an energy storage module wired directly to your decoder. ZIMO's SC68 'Supercapacitor' is the ideal solution.

At the forefront of digital command control since 1979

Ask for **ZIMO** by name... ZIMO decoders, sugar cube speakers and accessories are available ONLY from these approved retailers:

RAIL EXCLUSIVE
01780 470086
DISTRIBUTOR

YOUCHOOS
0844 772 5052
GOLD

DIGITRAINS
01522 527731
GOLD

MR SOUNDGUY
01983 531443
SILVER

EDM MODELS
01904 331973
SILVER

COASTAL DCC
01473 403764
SILVER

DCC TRAIN AUTOMATION
0117 230 8078
BRONZE

WICKNESS MODELS
01387 738175
BRONZE

GARDEN RAIL SPECIALISTS
01844 345158
LARGE SCALE ONLY