EIGHT-PIN DECODERS

The range of Digital Command Control motor control decoders continues to grow. **MARK CHIVERS** casts his eyes over a selection of 8-pin NEM652 examples from the popular brands.

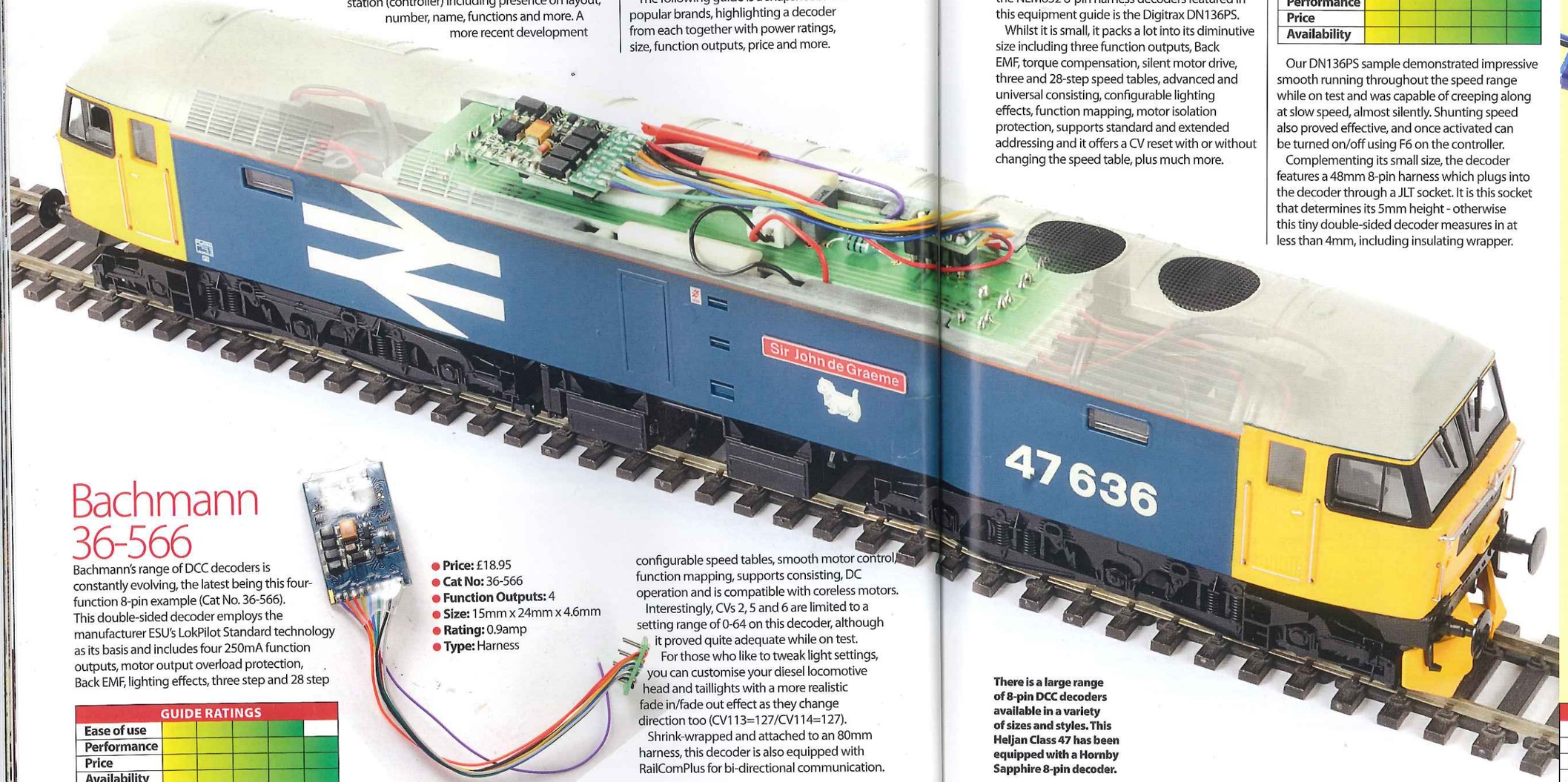
TAKE A QUICK BROWSE ONLINE OR a visit to your local model shop and you will discover an amazing array of 8-pin Digital Command Control (DCC) locomotive decoders. They come in different shapes and sizes – direct plug or wired harness – and cater for all pockets – budget, mid-range and premium. But which do you choose?

It can be somewhat bewildering as they all appear to do the same thing. Budget decoders are attractively priced but usually feature a limited range of Configuration Variables (CVs) compared to full-specification decoders. While this should be more than adequate for most users, it could lead to frustration in the future as you become more competent at fine-tuning your model's performance and functionality. That said, they still deliver good running characteristics and functionality, a selection of lighting effects and a cost-effective means of populating your locomotive fleet.

As you might expect, mid-range and premium decoders offer increased levels of refinement and motor control as well as 'stay alive' capability. A growing number are now RailCom or RailComPlus equipped, which means they can feed back information from the locomotive to a compatible DCC command station (controller) including presence on layout, number, name, functions and more. A more recent development is ABC braking, developed by Lenz, which offers a form of layout automation with signal and distance controlled stopping.

As operators of DCC layouts ourselves, we know how difficult it can be to decide which decoder is right. Consider what you want the locomotive to do, what space is available for the installation and how many functions you require it to operate. For diesel locomotives, you may just wish to operate the directional lighting and interior lights but for steam locomotives you might want to add head and tail lamps, firebox glow and a steam generator. It is also worth considering the future as well as the present.

The following guide is a snapshot of ten popular brands, highlighting a decoder from each together with power ratings, size, function outputs, price and more.



Digitrax DN136PS

- **Price:** £18.99
- **Cat No:** DN136PS
- **Function Outputs:** 3
- **Size:** 14mm x 10mm x 5mm
- **Rating:** 1amp (1.5amp peak)
- **Type:** Harness

Offering perhaps the smallest footprint amongst the NEM652 8-pin harness decoders featured in this equipment guide is the Digitrax DN136PS.

Whilst it is small, it packs a lot into its diminutive size including three function outputs, Back EMF, torque compensation, silent motor drive, three and 28-step speed tables, advanced and universal consisting, configurable lighting effects, function mapping, motor isolation protection, supports standard and extended addressing and it offers a CV reset with or without changing the speed table, plus much more.

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Our DN136PS sample demonstrated impressive smooth running throughout the speed range while on test and was capable of creeping along at slow speed, almost silently. Shunting speed also proved effective, and once activated can be turned on/off using F6 on the controller.

Complementing its small size, the decoder features a 48mm 8-pin harness which plugs into the decoder through a JLT socket. It is this socket that determines its 5mm height - otherwise this tiny double-sided decoder measures in at less than 4mm, including insulating wrapper.

DCC Concepts ZEN DCD-Z360

- **Price:** £19.96
- **Cat No:** DCD-Z360
- **Function Outputs:** 4
- **Size:** 12.9mm x 14.5mm x 5mm
- **Rating:** 0.75amp (1amp peak)
- **Type:** Direct

This tiny ZEN 360 direct plug decoder forms part of DCC Concepts' range of 8-pin DCC motor control decoders, designed to suit models where available space is at a premium.

Just slightly larger than the 8-pin socket it is designed to plug into, the ZEN360 is effectively two small printed circuit boards (PCB) - one on top of the other - with an NEM652 plug directly beneath. However, appearances can be deceptive as this miniature marvel has four 100mA function outputs, self-adjusting Back EMF, lighting effects, function mapping, three and 28-step speed tables, supports short and long addresses and more.

Motor control can be fine-tuned through the supported CVs while a raft of lighting effects is also included such as random flicker which would suit use for firebox glow or even locomotive oil lamps and each ZEN360 comes with 'stay alive' capability too.

Whilst suited to most installations where space is an issue, it is worth noting that the double-thickness PCB on the ZEN 360 adds a little extra height to this small decoder and therefore requires 5mm or so clearance between the decoder socket and inside edge of a bodyshell.

Other ZEN decoders in the range include the NANO 8-pin direct plug, which is even smaller than the 360, and the versatile 8-pin/21-pin ZEN 218 which features a 21-pin socket and separate 8-pin harness.

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Bachmann 36-566

- **Price:** £18.95
- **Cat No:** 36-566
- **Function Outputs:** 4
- **Size:** 15mm x 24mm x 4.6mm
- **Rating:** 0.9amp
- **Type:** Harness

Bachmann's range of DCC decoders is constantly evolving, the latest being this four-function 8-pin example (Cat No. 36-566). This double-sided decoder employs the manufacturer ESU's LokPilot Standard technology as its basis and includes four 250mA function outputs, motor output overload protection, Back EMF, lighting effects, three step and 28 step configurable speed tables, smooth motor control, function mapping, supports consisting, DC operation and is compatible with coreless motors.

Interestingly, CVs 2, 5 and 6 are limited to a setting range of 0-64 on this decoder, although it proved quite adequate while on test.

For those who like to tweak light settings, you can customise your diesel locomotive head and taillights with a more realistic fade in/fade out effect as they change direction too (CV113=127/CV114=127).

Shrink-wrapped and attached to an 80mm harness, this decoder is also equipped with RailComPlus for bi-directional communication.

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

There is a large range of 8-pin DCC decoders available in a variety of sizes and styles. This Heljan Class 47 has been equipped with a Hornby Sapphire 8-pin decoder.

ESU 54611 LokPilot V4.0 DCC

- **Price:** £29
- **Cat No:** 54611
- **Function Outputs:** 4
- **Size:** 15mm x 21mm x 5mm
- **Rating:** 1.1amp
- **Type:** Harness

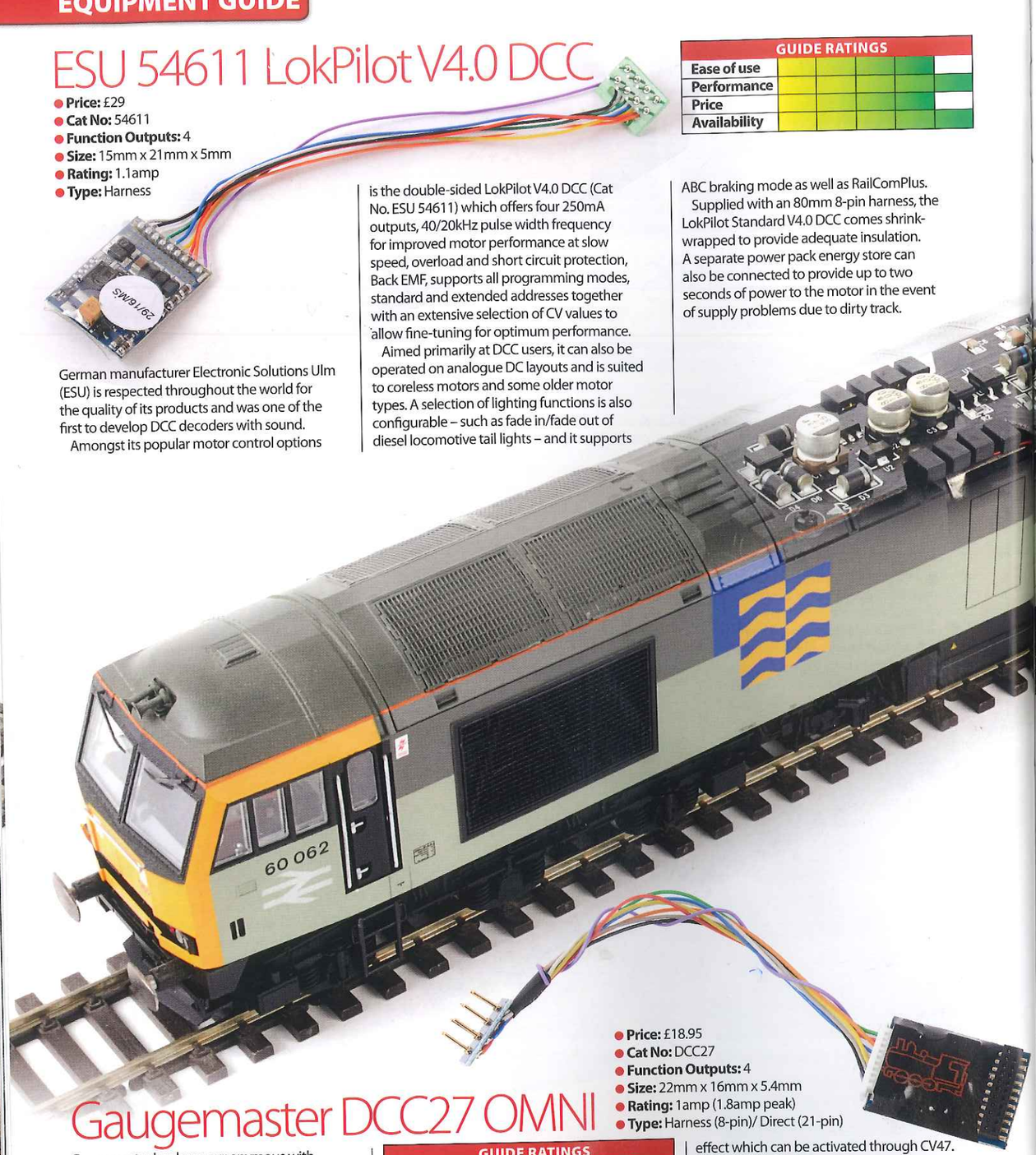
GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

German manufacturer Electronic Solutions Ulm (ESU) is respected throughout the world for the quality of its products and was one of the first to develop DCC decoders with sound.

Amongst its popular motor control options is the double-sided LokPilot V4.0 DCC (Cat No. ESU 54611) which offers four 250mA outputs, 40/20kHz pulse width frequency for improved motor performance at slow speed, overload and short circuit protection, Back EMF, supports all programming modes, standard and extended addresses together with an extensive selection of CV values to allow fine-tuning for optimum performance.

Aimed primarily at DCC users, it can also be operated on analogue DC layouts and is suited to coreless motors and some older motor types. A selection of lighting functions is also configurable – such as fade in/fade out of diesel locomotive tail lights – and it supports ABC braking mode as well as RailComPlus.

Supplied with an 80mm 8-pin harness, the LokPilot Standard V4.0 DCC comes shrink-wrapped to provide adequate insulation. A separate power pack energy store can also be connected to provide up to two seconds of power to the motor in the event of supply problems due to dirty track.



Gaugemaster DCC27 OMNI

- **Price:** £18.95
- **Cat No:** DCC27
- **Function Outputs:** 4
- **Size:** 22mm x 16mm x 5.4mm
- **Rating:** 1amp (1.8amp peak)
- **Type:** Harness (8-pin)/ Direct (21-pin)

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

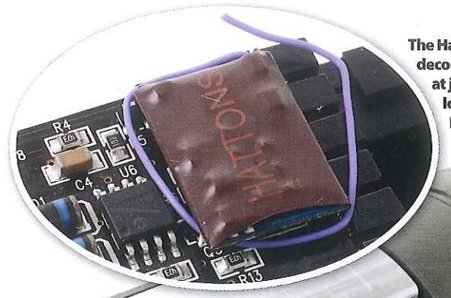
Gaugemaster has been synonymous with model railways since the 1970s, producing its first analogue controller in 1977 and subsequently developing an extensive range of model railway transformers, controllers and accessories which now includes its highly regarded Prodigy Advance DCC system.

Amongst the company's own-brand range of electronics and accessories is this versatile DCC27 OMNI double-sided DCC decoder, suited to both 8-pin and 21-pin installations.

Supplied with a separate 75mm 8-pin harness which connects to the 21-pin direct plug decoder via a JST socket, the OMNI 1amp decoder boasts four function outputs, Back EMF, silent drive, function mapping, special lighting effects, decoder lock and supports DC operation and consisting amongst its specification.

For modern era modellers, the OMNI decoder also features a fluorescent flickering light effect which can be activated through CV47. Whilst supported CVs are limited in number, instructions to help you get the best from the decoder are available on Gaugemaster's website.

Complementing the range is a 1amp (1.5amp peak) 8-pin direct decoder (Cat No. DCC29 OMNI) which has a footprint slightly larger than an NEM652 socket, measuring 15mm x 12mm x 5.5mm. Also, a 1.1amp (1.8amp peak) 8-pin decoder (Cat No. DCC26 OPTI) is available measuring 19mm x 11mm x 5mm and includes a plug-in 7-pin JST harness. Each is shrink-wrapped and double-sided.



The Hatton's direct 8-pin decoder is the best value decoder amongst those tested here coming in at just £13. It is ideal for diesel and tender locomotives in 'OO'. Here it is shown inside a Hornby Class 60.

HORNBY magazine *Best value!*

Hatton's DCR-8PIN-Direct

- **Price:** £13
- **Cat No:** DCR-8PIN-Direct
- **Function Outputs:** 4
- **Size:** 13mm x 18mm x 3.6mm
- **Rating:** 1.1amp (1.6amp peak)
- **Type:** Direct

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Offering a budget own-brand motor control decoder, Hatton's of Liverpool's 8-pin direct plug DCR-8PIN-Direct delivers four-function outputs, three and 28 step speed tables, Back EMF, silent drive, supports consisting, standard and extended addressing and CV programming in its specification.

What makes this double-sided decoder stand out is its size. Measuring just 3.6mm high, it is one of the finer direct plug decoder types available and suitable for fitting within locomotives that have limited space for a DCC installation. We tested this ability in Hornby's recently released 'OO' gauge Class 71 Bo-Bo electric.

Understandably, the list of accessible CV values is limited in comparison to a fully specified decoder, but those which are configurable enable you to achieve smooth and quiet running qualities. Other useful elements include the ability to switch off Back EMF when double-heading, a decoder locking feature, which is useful for multiple decoder installations, while pin No. 1 is identified on the shrink-wrapped sleeve to aid installing the decoder correctly. It will also happily operate on analogue DC layouts.

Also available is a 75mm harness version (Cat No. DCR-8PIN-Harness), measuring 13mm x 20mm.

Hornby R8245 Sapphire

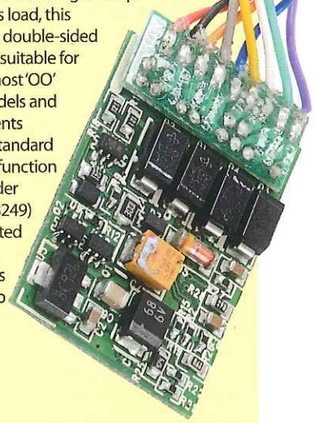
- **Price:** £39.99
- **Cat No:** R8245
- **Function Outputs:** 4
- **Size:** 23mm x 17mm x 6.5mm
- **Rating:** 1amp (1.5amp peak)
- **Type:** Harness (8-pin)/Direct (21-pin)

Hornby's Sapphire DCC decoder (Cat No. R8245) first appeared in late 2009 and continues to offer a good quality specification including high frequency Back EMF for smooth motor control, four 200mA function outputs, lighting options such as flicker effect for firebox glow within steam locomotives, advanced consisting for multiple locomotive operation, standard and extended addressing, shunting speed and RailCom support.

Cleverly, this versatile decoder is suited to both 21-pin and 8-pin applications as it features an 8-pin harness which simply plugs into the 21-pin connector on the decoder, converting it accordingly.

Delve a little deeper into the programming and you'll find an automatic control function, which enables the locomotive to operate remotely with change of direction, speed, and duration - all programmable, which would suit a branch shuttle, for example. You can also set virtual coal/fuel and water level settings for your locomotive, which ultimately results in it coming to a stand until the levels are replenished! Fuel and water can be programmed direct or through embedded routines in Hornby's Elite DCC system.

Capable of handling a 1amp continuous load, this impressive double-sided decoder is suitable for use with most 'OO' gauge models and complements Hornby's standard 8-pin four function DCC decoder (Cat No. R8249) which is rated at 0.5amp continuous load (1amp peak).



GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Lenz Standard+ V2

● **Price:** £20.75 ● **Cat No:** 10231-02 ● **Function Outputs:** 4
● **Size:** 15mm x25mm x 3.6mm
● **Rating:** 1amp (1.8amp peak) ● **Type:** Harness

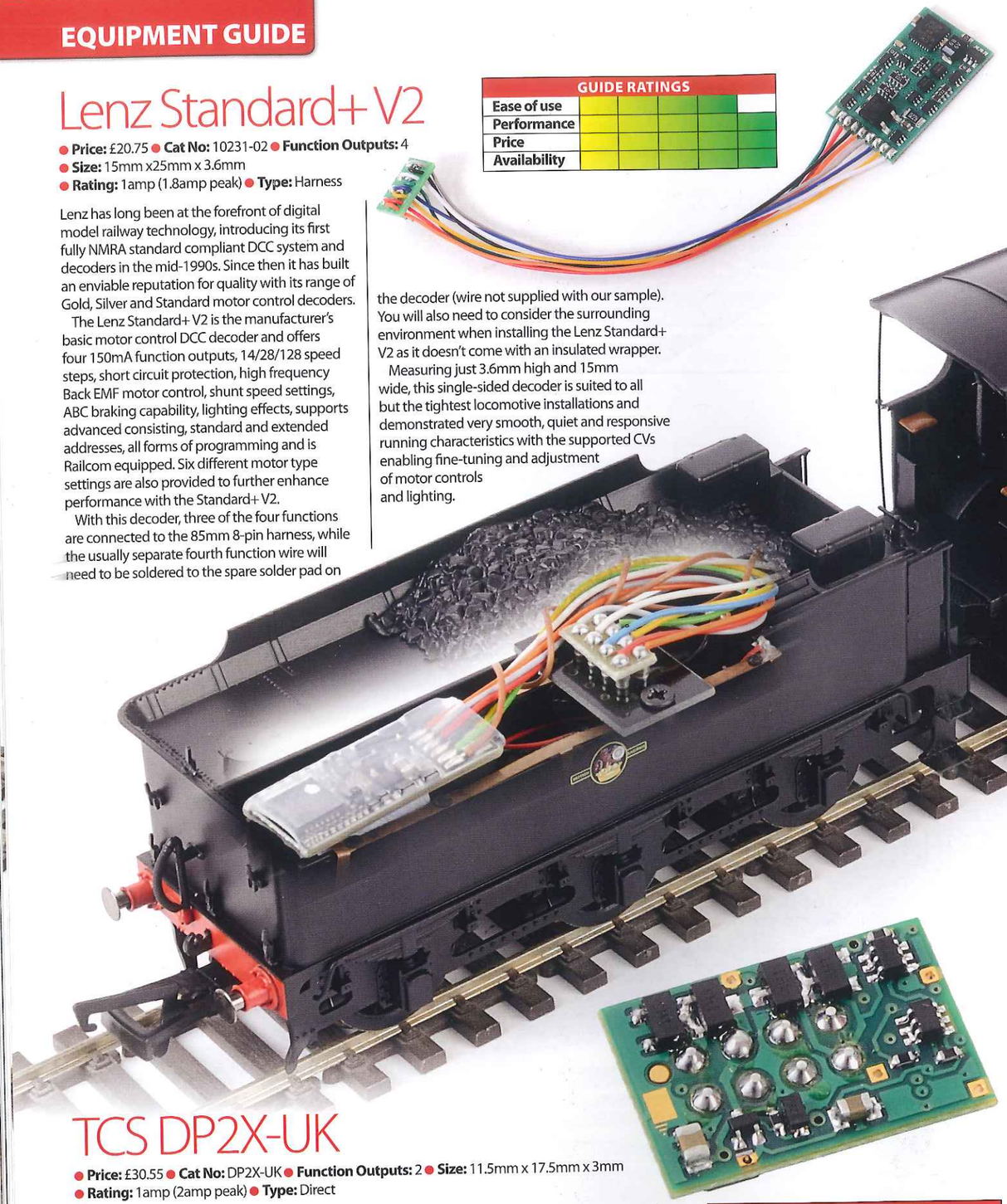
GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Lenz has long been at the forefront of digital model railway technology, introducing its first fully NMRA standard compliant DCC system and decoders in the mid-1990s. Since then it has built an enviable reputation for quality with its range of Gold, Silver and Standard motor control decoders.

The Lenz Standard+ V2 is the manufacturer's basic motor control DCC decoder and offers four 150mA function outputs, 14/28/128 speed steps, short circuit protection, high frequency Back EMF motor control, shunt speed settings, ABC braking capability, lighting effects, supports advanced consisting, standard and extended addresses, all forms of programming and is Railcom equipped. Six different motor type settings are also provided to further enhance performance with the Standard+ V2.

With this decoder, three of the four functions are connected to the 85mm 8-pin harness, while the usually separate fourth function wire will need to be soldered to the spare solder pad on the decoder (wire not supplied with our sample). You will also need to consider the surrounding environment when installing the Lenz Standard+ V2 as it doesn't come with an insulated wrapper.

Measuring just 3.6mm high and 15mm wide, this single-sided decoder is suited to all but the tightest locomotive installations and demonstrated very smooth, quiet and responsive running characteristics with the supported CVs enabling fine-tuning and adjustment of motor controls and lighting.



TCS DP2X-UK

● **Price:** £30.55 ● **Cat No:** DP2X-UK ● **Function Outputs:** 2 ● **Size:** 11.5mm x 17.5mm x 3mm
● **Rating:** 1amp (2amp peak) ● **Type:** Direct

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

America's Train Control Systems (TCS) manufactures an astounding variety of DCC decoders ranging from two-function motor decoders to eight-function sound decoders which can play up to seven sounds simultaneously.

One decoder produced specifically for the UK market is its DP2X-UK. Available for some time now, it is a direct-plug 8-pin decoder which had the pins re-orientated for UK installations. It has proved particularly useful for models with limited space for an installation such as Hornby's 'OO' gauge Drummond 'M7' 0-4-4T, where removal of the ballast weight might otherwise be required. It also fitted (just) within Hornby's recent 'OO' gauge Class 71 Bo-Bo electric, but would benefit from insulation and was also a comfortable fit in Hornby's Adams 'Radial' 4-4-2T.

The double-sided DP2X-UK features just two 100mA function outputs which perhaps shows its age now, but also boasts Quiet Drive for smooth motor performance, Back EMF, slow speed dither control, three and 28-step speed tables, adjustable lighting, function mapping and is equipped with RailCom.

To identify the location of pin 1 on this decoder you need to refer to the instruction leaflet, as there appears to be no indication on the decoder itself. Once orientated correctly, the decoder operated smoothly and quietly using default settings although we noticed a tendency for slight speed surges on deceleration once we altered CVs 2, 3, 4, 5 and 6 to match those used to test the other decoders within this equipment guide.

Zimo's new MX600R is *Hornby Magazine's* choice from the selection tested. Following our extensive experience with Zimo sound decoders it ticked all the right boxes and offers a wide range of functions at a good price.

Zimo MX600R

HORNBY magazine Choice!

● **Price:** £19 ● **Cat No:** MX600R ● **Function Outputs:** 4
● **Size:** 25mm x 11mm x 3mm ● **Rating:** 0.8amp (1.5amp peak) ● **Type:** Harness

GUIDE RATINGS	
Ease of use	
Performance	
Price	
Availability	

Austrian manufacturer Zimo has been developing digital model railway control systems since the late 1970s and currently produces a prolific range of Digital Command Control (DCC) motor, function, accessory and sound decoders.

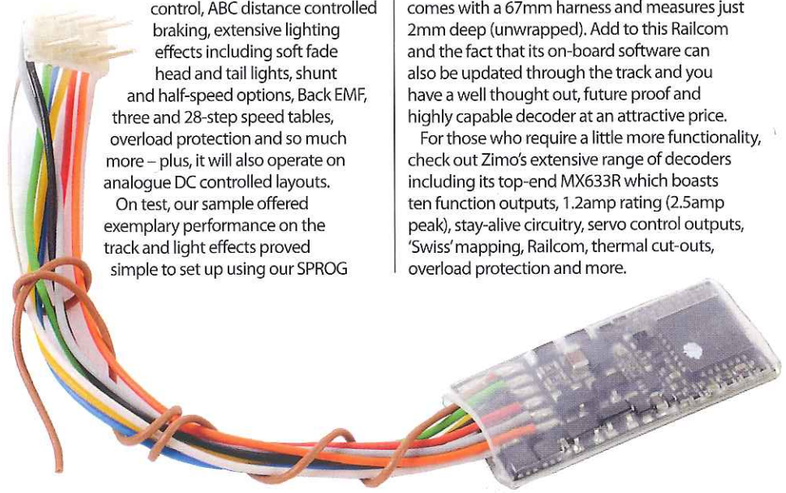
A recent introduction has seen the MX600 series of DCC decoders aimed at entry-level applications.

This impressive single-sided decoder has four function outputs, smooth motor control, ABC distance controlled braking, extensive lighting effects including soft fade head and tail lights, shunt and half-speed options, Back EMF, three and 28-step speed tables, overload protection and so much more – plus, it will also operate on analogue DC controlled layouts.

On test, our sample offered exemplary performance on the track and light effects proved simple to set up using our SPROG II USB programmer and DecoderPro software as well as more conventional handset programming with a Gaugemaster Prodigy.

In addition to its high specification, the MX600R comes with a 67mm harness and measures just 2mm deep (unwrapped). Add to this Railcom and the fact that its on-board software can also be updated through the track and you have a well thought out, future proof and highly capable decoder at an attractive price.

For those who require a little more functionality, check out Zimo's extensive range of decoders including its top-end MX633R which boasts ten function outputs, 1.2amp rating (2.5amp peak), stay-alive circuitry, servo control outputs, 'Swiss' mapping, Railcom, thermal cut-outs, overload protection and more.



TERMINOLOGY	
Back EMF	This feedback is used as a means of preventing a train slowing down or speeding up on gradients and regulates motor speed.
Command station	Control hub of a DCC operated layout.
Consisting	Two or more locomotives operating together using the same DCC address.
DCC	Digital Command Control. Model railway digital control system.
DCC fitted	Model supplied with factory fitted DCC decoder.
DCC onboard	Model supplied with factory fitted DCC decoder.
DCC ready	Model supplied with DCC decoder socket only.
DCC sound fitted	Model supplied with factory or supplier fitted DCC sound decoder and speaker.
Decoder	Printed circuit board for operating model railway locomotives and accessories.
Function output	Used to control functions on DCC locomotives or coaches such as lights or sound files.
NEM	This acronym relates to a product which conforms to European Standards for Model Railways established by the MOROP (Modellbahnen Europe) association in Europe.
Programming track	DCC term for track which is separate from the rest of a layout, used for programming locomotive CVs.
Speed steps	DCC power control increments. The more steps you have, the smoother the speed transition. Equally divided into 14, 28 and 128 steps, depending on controller setting.

USEFUL LINKS	
Bachmann	*www.bachmann.co.uk*
DCC Concepts	*www.dccconcepts.com*
DecoderPro	*www.decoderpro.com*
Digitrax	*www.digitrax.com*
ESU	*www.esu.eu*
Gaugemaster	*www.gaugemaster.com*
Hatton's	*www.hattons.com*
Hornby	*www.hornby.com*
Lenz	*www.digital-plus.de*
Sprog DCC	*www.sprog-dcc.co.uk*
TCS	*www.tcsdcc.com*
ZIMO	*www.zimo-digital.co.uk*