

# Point motors

Fitting point motors can make a real difference to a model railway by offering hands free operation of turnout direction – but which are the best? **MARK CHIVERS** assesses the options covering both solenoid and stall motor designs.

**R**EMOTE OPERATION OF POINTS (or turnouts – the terms can be used interchangeably) is an essential ingredient for reliable operating sessions.

This issue we focus on electrically-operated point motors encompassing solenoid and slow-action types. Solenoid motors incorporate two electromagnetic coils which fire a metal drive pin from one side of the mechanism to the other as a pulse of power is applied, while slow-action types employ a geared motor which slowly eases the drive pin across. Sometimes referred to as stall motors, they are usually continuously powered but stall out as they detect the turnout throw bar has reached the extent of its travel.

Solenoid quick-action motors can be mounted either above or below the baseboard, depending on the product, and even direct to the turnout. They are suited to points that have a spring within the switch mechanism as they are non-latching motors, so the spring helps keep the turnout in place once thrown. Slow-action

motors can also be used with sprung points, but the slow-motion movement is best appreciated if the spring has been removed. The gearing and forces associated with these motors are sufficient to hold the point blades in place.

For solenoid point motors to operate effectively, a Capacitor Discharge Unit (CDU) is recommended to provide sufficient 'kick' to fire the motor. For analogue DC use this can be wired into the layout separately while for Digital Command Control (DCC) use, some digital accessory decoders feature a built-in CDU for solenoid motors. Stall motors don't require a CDU to operate.

When installing turnout motors, it is important to check the fit and orientation is correct and that the drive pin is true to the throw bar. If fixing a motor from below the baseboard, the drive pin is usually eased through a corresponding hole in the turnout throw bar above.

Options include drilling a hole for the drive pin travel in the baseboard and mounting from below (8-10mm will suffice in all cases),

creating a larger hole the size of the motor and mounting it directly to the point or fixing the motor above the baseboard and utilising an adaptor to fire the point. A selection of surface mounted solenoid point motors is also available which can be mounted parallel to the turnout, which fire a drawbar rather than a metal pin to switch the throw bar.

Some point motors, such as slow-action examples, allow you to centre the drive pin before installation. Placing the turnout throw bar to a central position can be a little more difficult if it has an integral spring, but as previously mentioned this can be removed if necessary for operation with stall motors.

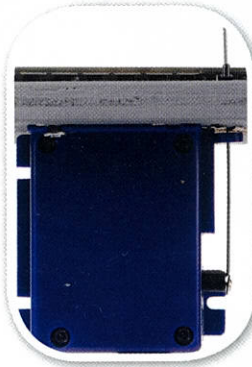
Each of the point motors below was connected to the same Peco 'OO' gauge Code 75 point initially and rated according to installation time and ease of setup using Digital Command Control (DCC) operation. The following selection represents a snapshot of ten of the more popular examples of solenoid and slow-action point motors, currently available.



There is plenty of choice when it comes to point motors, but for *Hornby Magazine* there is a clear winner for quality, simplicity of installation and versatility and that is DCC Concepts Cobalt IP digital motor. We have used them on five of *Hornby Magazine's* layouts with great success including *Axe Regis* – the branch line extension for *Topley Dale*. A Class 205 'Thumper' departs crossing a point controlled by a DCC Concepts Cobalt motor.



## DCC CONCEPTS COBALT



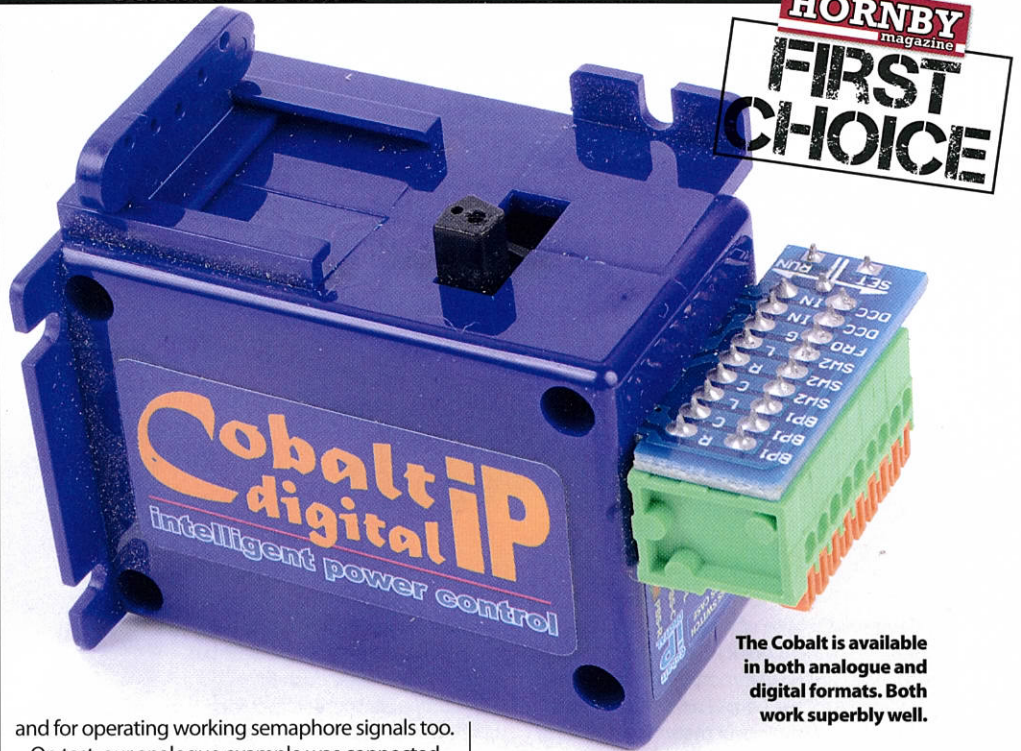
The DCC Concepts Cobalt was the quickest and simplest to install from the motors we tested for this guide. The adjustable fulcrum makes set up simple.

DCC Concepts' range of Cobalt slow-action point motors first appeared

in 2010 and most recently consists of the Cobalt iP Analogue (Cat No. DCP-CB1IP) and Cobalt iP Digital (DCP-CB1DIP) brands.

The latest Cobalt iP models were issued in 2014 and incorporate low current draw between uses, three integrated single-pole, double throw (SPDT) switches for use with frog switching and panel indicators, come pre-centred for quick installation and can be programmed to self-centre and reverse the direction using digital commands within the DCC decoder-fitted example or a DCC accessory decoder for the analogue version. In addition, the Cobalt iP Digital model also includes a useful 'learn' mode for quick addressing.

Suitable for use from 'Z' to 'G' scales, each is supplied with a 0.8mm spring steel wire drive pin, fittings and an adhesive mounting pad to help during the installation process. All wiring connections are made to solder-free connections on the base of the unit. Measuring 55mm x 40mm x 68mm when fully assembled, it has a robust blue plastic outer casing which can be mounted below or above the baseboard in a choice of orientations, enabling it to be used for turnouts



The Cobalt is available in both analogue and digital formats. Both work superbly well.

and for operating working semaphore signals too.

On test, our analogue example was connected to a DCC Concepts accessory decoder (Cat No. AD-2fx) and addressed within a matter of seconds – digital versions, which we also tested, can be addressed straight from the decoder and are compatible with analogue control. Setting up proved straightforward, working on the first attempt without issue, the slow-action stall motor offering remarkable performance with quiet, slow positive throw in both directions. An adjustable fulcrum allows the drive pin

to be fine-tuned, if necessary. Our sample was up and running in just nine minutes.

Simplicity of installation, setup and reliable operation are just some of the reasons the Cobalt iP point motor has been adopted as the product of choice for *Hornby Magazine's* exhibition layout fleet incorporating Twelve Trees Junction, Grosvenor Square and Shortley Bridge and Felton Cement Works in 'OO' and West Riding Power and Barrenthorpe in 'N'.

## GAUGEMASTER SEEP PM10

Introduced in 2015, Gaugemaster's SEEP GMC-PM-10 solenoid point motor certainly packs a lot into its 37mm x 32mm x 23mm footprint.

Whilst initially appearing similar to other brands, the PM-10 offers both direct fitting to turnouts and beneath baseboard mounting without the need for a separate mounting plate, thanks to its six-prong metal fitting at one end and metal baseplate mounting at the other. The latter also features one hole and one slot each side to enable finer adjustment when installing the motor from beneath the baseboard. Between the mountings, two solenoid electromagnetic coils sit within the metal chassis, together with a 1.2mm diameter metal drive pin. A 30mm extension pin and sleeve are also supplied together with mounting screws.

Designed for use on 'N' to 'O' scale turnouts, its low power consumption and screw terminal connections for easy wiring offer additional benefits, while on test it demonstrated a powerful kick in each direction. Installation proved uncomplicated and there is no soldering required. This model could also be installed above a baseboard with a suitable adaptor base.

In addition to the standard analogue DC model, a digital version is also available (Cat No. GMC-PM10D), and comes with a removable DCC accessory decoder, built-in Capacitor Discharge Unit (CDU) and connections for switches and Light Emitting Diodes (LEDs). This model also offers two-wire connection and is DC compatible.

*"The PM-10 offers both direct fitting and beneath baseboard mounting."*



Above: Gaugemaster's new solenoid point motor is a reliable and simple to install device. It is available DCC fitted too.

Left: The point motor is supplied with a short pin and an extension bar for use in underboard installations.



## GAUGEMASTER GMC-PM20

*“The GM-20 fired each way with a strong positive force.”*



The Gaugemaster surface mount motor is designed to use screws to hold it firmly in place.

Gaugemaster also offers a side-mounted surface solenoid point motor (Cat No. GMC-PM20) in its portfolio.

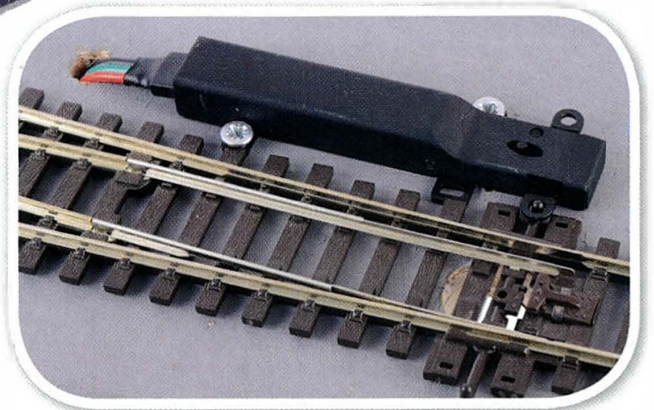
Suitable for use with 'N' and 'OO' turnouts, at 68mm x 21mm (over mountings) x 9mm, its shape roughly resembles a full-size point machine with a blackened metal body housing the motor's magnetic coils and comes with a three-wire plug-in socket and mounting screws.

Four holes are moulded into the base of the unit for fixing parallel to a turnout, with the drive bar

hooking over the tab of the corresponding turnout tie bar.

A pre-wired push-fit three-pin socket is provided with each of the 1.7mm diameter sleeved red, green and black wires measuring 140mm in length. The green wire is the common return.

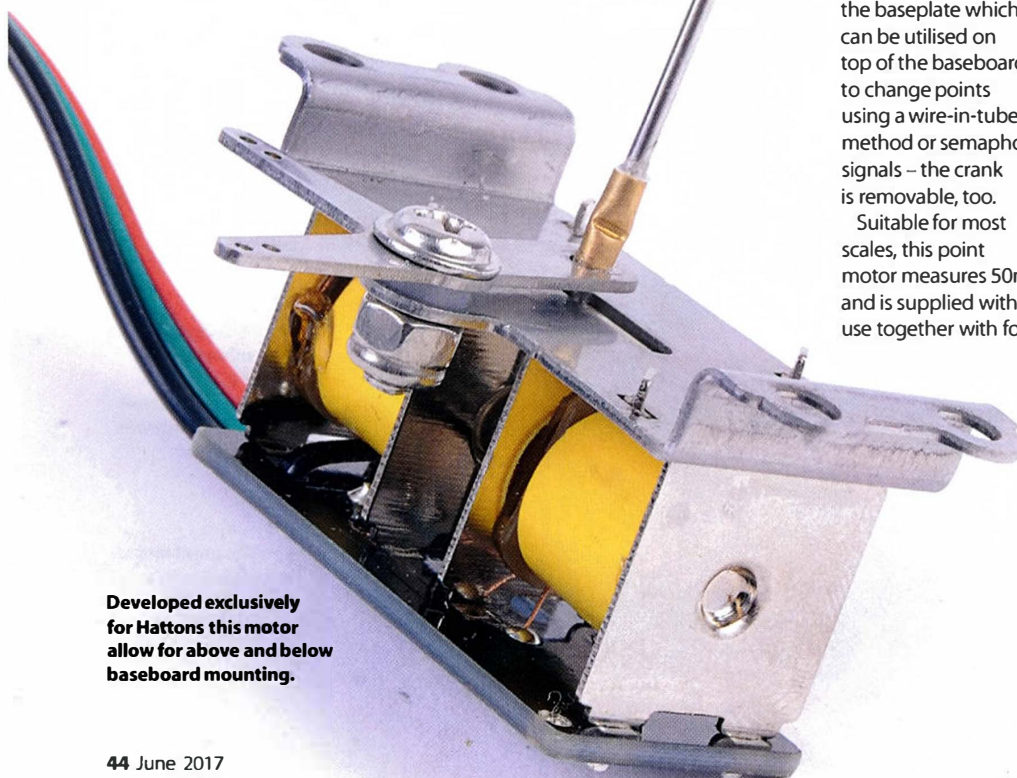
In use, the GM-20 fired each way with strong positive force, although on our sample we noticed that the holes on the drive bar are



quite large in relation to the throw bar tabs on some points which resulted in a little sideplay, particularly when married up to a recent Hornby turnout. However, the unit worked reliably with each throw and can be used in conjunction with DC and DCC systems.

## HATTON'S HAT-PM-01

**HORNBY**  
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**BEST**  
**SOLENOID**



Developed exclusively for Hattons this motor allow for above and below baseboard mounting.

A recent addition to the Hatton's range of model railway accessories is its exclusive HAT-PM-01 solenoid point motor.

This model differs in appearance to similar point motors as it also features a crank mechanism fitted to the baseplate which can be utilised on top of the baseboard to change points using a wire-in-tube method or semaphore signals – the crank is removable, too.

Suitable for most scales, this point motor measures 50mm x 39mm (over crank) x 22mm, comes pre-wired and is supplied with an extension pin and sleeve for below baseboard use together with four motor fixing screws. It can be secured in place to the underside of the baseboard using the four holes in the metal baseplate.



The Hatton's motor installs neatly under a baseboard.

Of all the solenoid motors tested, this turned out to be the simplest to install and delivered a powerful snap when throwing direction, plus its neat wiring provides for a tidy appearance. In common with most solenoid motors, the common return wire is green on this model, with each of the 1.7mm diameter sleeved wires measuring 144mm in length. Also suitable for DC and DCC use. We have been highly impressed by this solenoid motor throughout our tests.



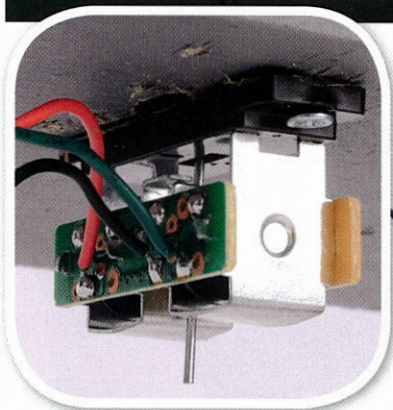
## HORNBY R8014

Hornby's R8014 solenoid point motor has been developed to work with its current style of 'OO' gauge turnouts with fine tie bar tabs.

Primarily designed to fit direct from below, the metal base plate comes with four prongs which correspond with moulded holes in the turnout's plastic sleepers

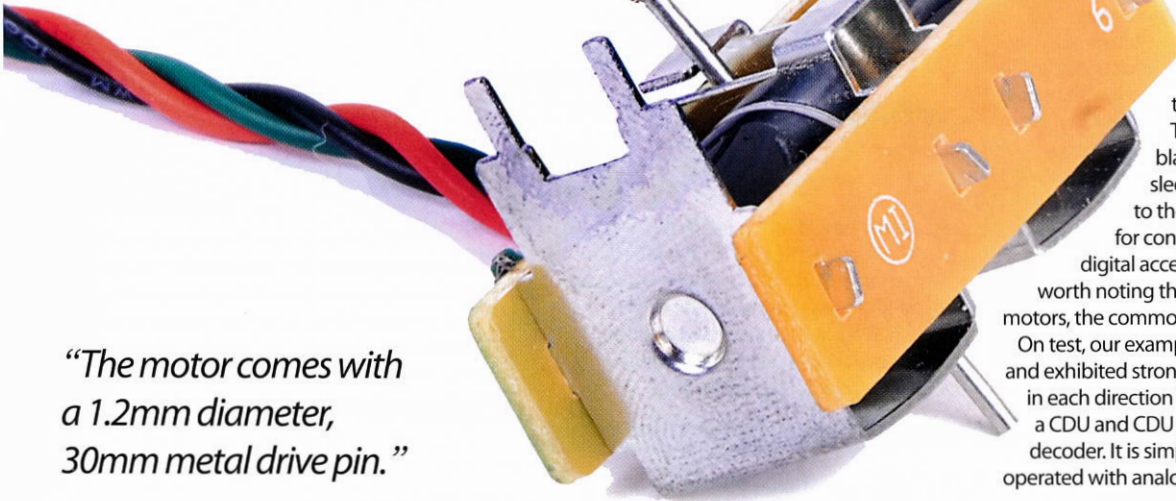
simply clipping in place, ready to go. An adaptor base and housing (Cat No. R8015) is also available to enable the point motor to be housed on top of the baseboard. It will also fit Peco's point motor mounting plate (PL-9) to enable it to be fitted below the baseboard. The point motor comes with a 1.2mm diameter 30mm metal drive pin, while an additional extension pin and sleeve are also supplied.

Measuring 37mm x 21mm x 23mm, construction is fairly simple, consisting of an elongated 'M' shaped metal shell housing two electromagnetic coils fixed between two strips of Printed Circuit Board (PCB) material. All wiring connections are made to one side of the PCB, while the other side of the housing is purely to provide rigidity. Three 145mm lengths of black, green and red 1.4mm sleeved wire are pre-soldered to the point motor PCB ready for connecting to switches or digital accessory decoders. It is worth noting that on Hornby's point motors, the common return wire is black. On test, our example was quick to set up and exhibited strong throw characteristics in each direction when operated with a CDU and CDU powered accessory decoder. It is simple and solid and it can be operated with analogue or digital systems.



Hornby's solenoid will fit into a Peco mounting plate for underboard installation.

*"The motor comes with a 1.2mm diameter, 30mm metal drive pin."*



## HORNBY R8243

Hornby's surface mounted is best suited to its own range of track components and comes pre-wired with the three-colour harness.

Hornby's range of model railway accessories also includes the R8243 surface mounted solenoid point motor.

Offering a compact design, the unit comprises a vented plastic shell and metal baseplate which houses two small solenoid motor coils, Printed Circuit Board (PCB) and a small plastic crank which houses the internal drive pin and provides a discreet swivelling throw arm which hooks over the tab on Hornby 'OO' gauge turnout throw bars. This provides just enough movement to throw the point in each direction. Each unit measures 48mm x 18mm x 8mm and is pre-wired with three fine 150mm black, green and red 0.7mm diameter sleeved wires, ready for use. Again, the common return wire is coloured black.

On test, as expected, this surface mounted motor worked well with a Hornby point but it did struggle a little when trialled with a Peco product – possibly a combination of spring resistance and throw bar clearance. Accessing the small throw bar arm on our example was quite fiddly and it had a habit of disappearing within the housing.

Setup was quick on DCC, with the motor connected, wired and programmed in less than six minutes. A pair of small crosshead screws is supplied to mount the motor alongside the turnout.

The size of the hole in the crank is designed around Hornby's point range making it a difficult fit on Peco points which have a larger diameter pin on the tie bar ends.





## PECO PL-10

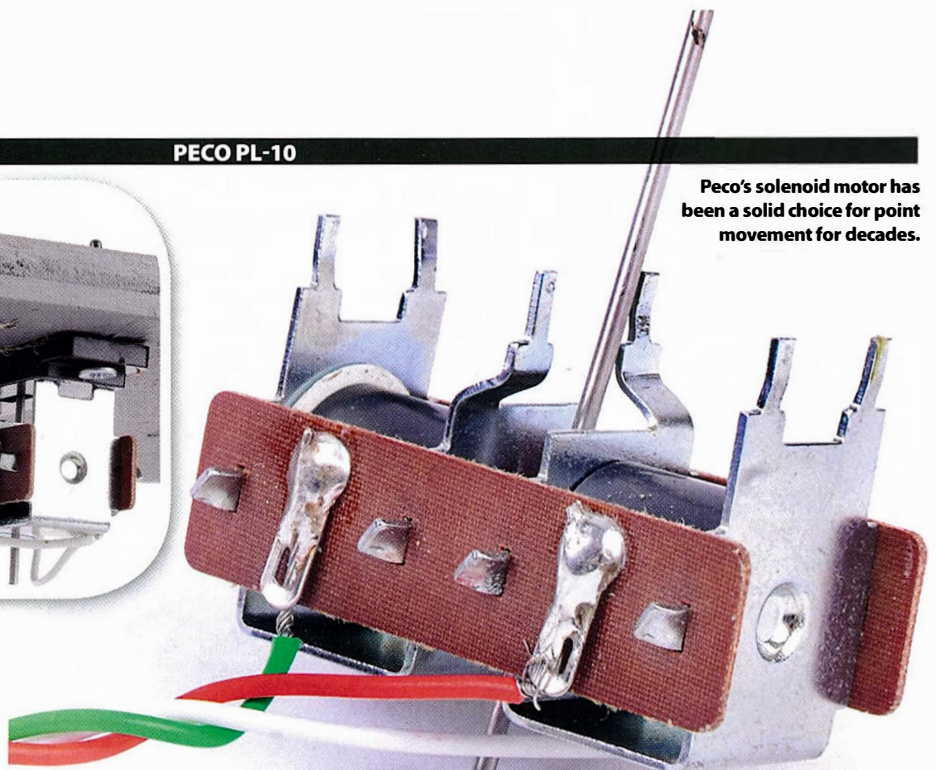
Peco's solenoid motor has been a solid choice for point movement for decades.

Peco's PL-10 solenoid point motor has long been a part of the manufacturer's Peco Lectrics range of model railway accessories and remains a popular choice for modellers.

As standard, the PL-10's tried and tested design comes with a 47mm long, 1.2mm diameter metal drive pin, but is also available in other guises with an extended pin and sleeve (Cat No. PL-10E), low circuit coils for limited output transformers (PL-10W) and with low circuit coils and extended pin (PL-10WE).

Each point motor measures 37mm x 21mm x 24mm and features two separate electromagnetic coils within metal housings secured with Printed Circuit Board (PCB) material either side. Metal solder connections are included on each PCB ready for attaching wires from switches or digital accessory decoders - the PL-10 is supplied without wires and ideally requires these connections to be made before fixing in place. A useful point motor wiring loom (PL-34) with connectors is available separately.

Six pre-formed metal securing prongs are provided - one at each corner for connecting directly to the manufacturer's turnouts, and two central prongs which can be used with its point motor mounting plates (PL-9) for use



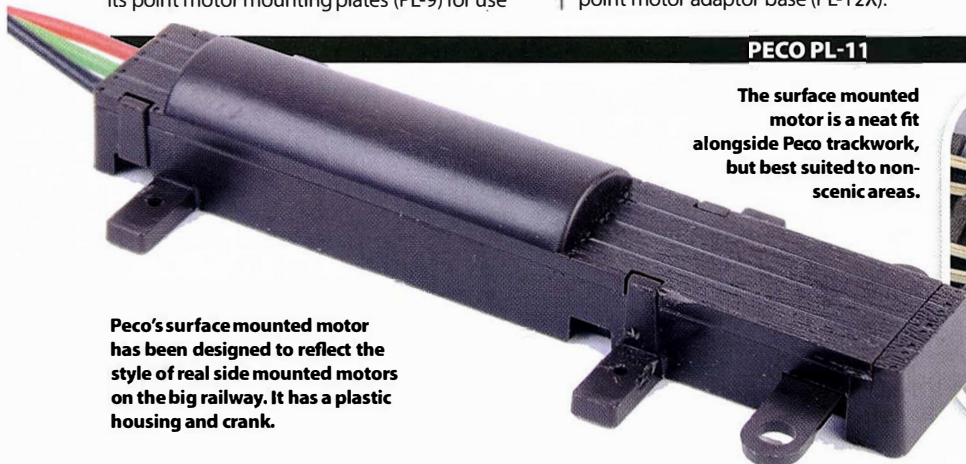
beneath the baseboard. These latter two fixings can be bent out of the way if not needed.

Fitting the motor underneath the baseboard was straightforward using a mounting plate, while it is also possible to mount the motor above the baseboard with Peco's point motor adaptor base (PL-12X).

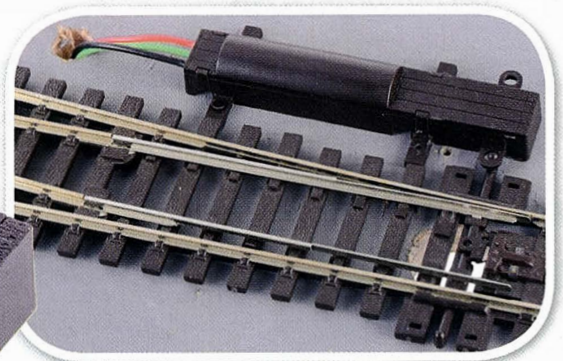
Suitable for analogue and digital use with 'N' to 'O' gauge turnouts, the PL-10 is showing its age when compared with recent additions to the market with their pre-wired connections and additional features, yet it still operated as anticipated with a decisive kick and click in both directions proving robust and reliable.

## PECO PL-11

The surface mounted motor is a neat fit alongside Peco trackwork, but best suited to non-scenic areas.



Peco's surface mounted motor has been designed to reflect the style of real side mounted motors on the big railway. It has a plastic housing and crank.



Peco's side-mounted solenoid point motor (Cat No. PL-11) offers an alternative take from the manufacturer for remotely operating turnouts and has been designed to loosely resemble the prototype point machines from the full-size railway.

Measuring 61mm x 23mm (over fixings) x 9mm, it is designed for use with many of the manufacturer's turnouts including its 'N' and 'OO'

gauge ranges. It can be fitted directly alongside most 'OO' Setrack and Code 100 Streamline turnouts which have locating gaps, while Code 75 Streamline and some other turnouts may need to use the supplied locating arms before fitting.

Installation is straightforward - the plastic drive link from the unit hooking over the turnout throw bar tab.

On test, our sample performed very

well. Results may differ if using with other manufacturers' turnouts. For example, a little play was noticeable between the drive bar hoop and the smaller tabs on a Hornby point.

Each unit is supplied pre-wired with three 300mm lengths of black, green and red 1.2mm sleeved wire and can be used with analogue DC and digital DCC systems. Green is the common return wire on this motor.

### POINT MOTOR COMPARISON TABLE

	OUR PICK		BEST SOLENOID							
Point motor	DCP-CB11P	GMC-PM10	GMC-PM20	HAT-PM-01	R8014	R8243	PL-10	PL-11	800-6000	TT300
Power input	7v-23v	16v-24v	16v-24v	15v-24v	12v-16v	12-16v	16v	16v	12v	9v-18v
Power type	DC/DCC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC	AC	DC	DC
Solenoid	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
Slow-action	✓	✗	✗	✗	✗	✗	✗	✗	✓	✓
Surface mount	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
Below baseboard mount	✓	✓	✗	✓	✓	✗	✓	✗	✓	✓
DCC compatible	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
DCC fitted	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
Size (mm)	55 x 40 x 68	37 x 32 x 23	68 x 21 x 8	50 x 38 x 22	37 x 21 x 23	48 x 18 x 8	37 x 21 x 24	61 x 23 x 8	57 x 50 x 82	82 x 32 x 40
Frog switching	✓	✗	✗	✗	✗	✗	✗	✗	✓	✓
Installation rating	10/10	8/10	8/10	9/10	8/10	6/10	8/10	7/10	7/10	8/10
Price	£17.95	£6.95	£9.95	£6.50	£8.99	£8.99	£7.45	£9.25	£17.50	£22.50

DCCconcepts added note: Cobalt power requirements and DCC onboard status are dependent on the model selected. More details at [www.dccconcepts.com](http://www.dccconcepts.com)



## TORTOISE 800-6000

Developed in the mid-1980s by US manufacturer Circuitron, the Tortoise 800-6000 is another popular slow-action stall motor design.

Low current draw is a key element of the Tortoise point motor, together with two internal single-pole, double throw switches. Supplied with a 0.6mm diameter spring wire drive pin, adjustable fulcrum and small fittings, assembly is straightforward although it requires the drive pin to be bent to shape prior to assembly. A full-size template is included with the instructions to ensure you bend the wire to the correct shape, but it can be tricky to get this perfect initially as the wire has a high degree of spring to it. Suitable for most gauges, heavier duty wire is recommended for 'O' gauge and above.

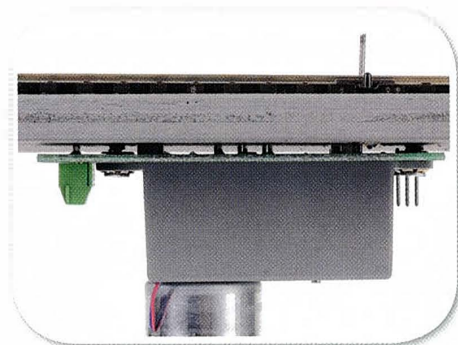
All electrical connections are made to solder tabs extending from the base of the unit and for our DCC installation two wires from the accessory decoder were soldered to terminals 1 and 8. Encased in durable green plastic and measuring 57mm x 50mm x 82mm, it is designed to be installed below the baseboard, but you will need to consider clearances in this area due to its overall depth – it is the deepest of all the motors tested here.

On test, our sample took a few attempts to align the drawbar and fire the turnout throw bar reliably in each direction with sufficient force, which resulted in a longer than anticipated installation process. However, once the drive pin position had been adjusted and fine tuned, the Tortoise motor settled down and worked smoothly and quietly, typically taking a couple of seconds to throw from one side to the other.



The Tortoise is a reliable design, but it isn't as simple to install as the DCC Concepts Cobalt motor. It also requires soldering or the power connections for installation.

## TRAINTRONICS TT300

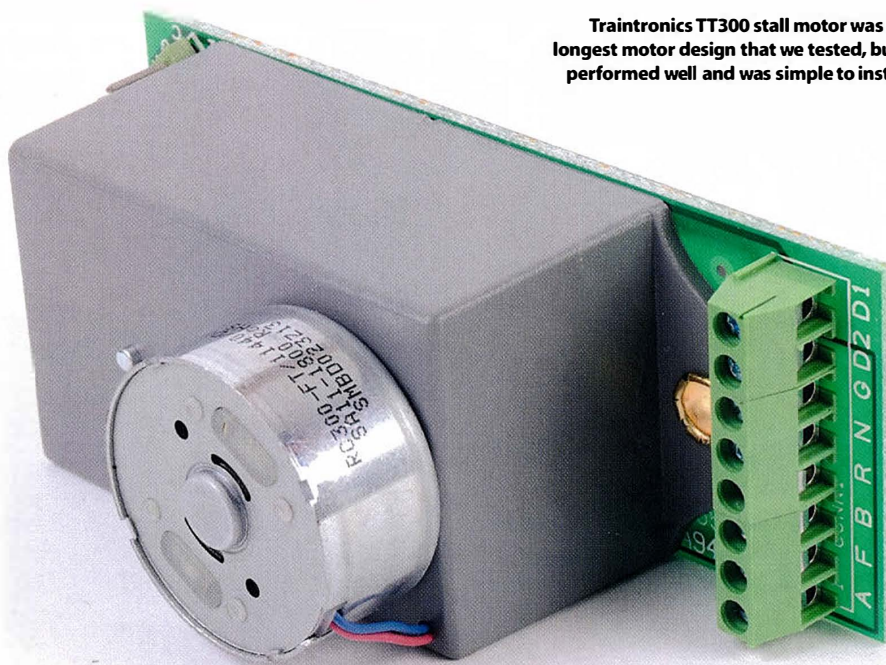


Traintronics' range of electronic accessories includes its own-brand TT300 DCC-fitted slow-action point motor which is intended for below baseboard installation.

Suitable for use up to Gauge 1 and measuring 82mm x 32mm x 40mm, the unit is formed of a Printed Circuit Board (PCB) with screw terminal connections, gearbox and motor and also comes with a pre-fitted strong 1.2mm drive pin. A pair of small plastic spacers are also included which are intended to be placed between the baseboard and the unit during installation to prevent damage to the PCB. Live frog switching and outputs for Light Emitting Diode (LED) indicators are also supported and the unit offers low current draw when idle and in operation.

Fitting the motor was fairly straightforward – in fact, the most complicated part was keeping the spacers in place while securing the motor below the baseboard. It is important not to overtighten the screws.

With the drive pin centred and checked for clearance, our example was up and running in just 12 minutes, displaying a satisfying gentle slow-action motion. Whilst the motor is designed to detect when to stop as the turnout throw bar



Traintronics TT300 stall motor was the longest motor design that we tested, but it performed well and was simple to install.

reaches the end of its travel, it is also important to check that turnouts are secured properly, as the pressure exerted on our sample was enough to visibly shift the track formation.

With a built-in DCC accessory decoder, the TT300's Configuration Variables (CVs) can be programmed and the unit's operating sense can be reversed with a change to CV2. It can also be operated on analogue DC control, provided this CV has not been changed under DCC programming. Details are included with the supplied instructions.

A robust and impressive package, although

this was the longest motor design in our tests which will require consideration for multiple motor installations on complex track formations.

## LINKS

Circuitron	<a href="http://www.circuitron.com">www.circuitron.com</a>
DCC Concepts	<a href="http://www.dccconcepts.com">www.dccconcepts.com</a>
Gaugemaster	<a href="http://www.gaugemaster.com">www.gaugemaster.com</a>
Hatton's	<a href="http://www.hattons.co.uk">www.hattons.co.uk</a>
Hornby	<a href="http://www.hornby.com">www.hornby.com</a>
Peco	<a href="http://www.peco-uk.com">www.peco-uk.com</a>
Traintronics	<a href="http://www.traintronics.co.uk">www.traintronics.co.uk</a>