

Cobalt

Turnout control redefined

About these pages...

We've done our best to make this far more than just an owners manual

We thought we would start by telling you a bit more about what is included in these pages... as while they do of course include instructions and installation guidance for our Cobalt turnout motor, they are far more than just that!

So what's inside?

We know that our Cobalt turnout motor will be bought and used by experienced and newer modellers alike, so we thought we would not only tell you how to get the best out of Cobalt, but also share some tips and ideas that may make the whole process of layout creation, turnout selection, installation & automation a bit easier.

Throughout, the manual we will also do our very best to anticipate those questions that never actually arise until its time to lay the track and install the turnouts!

We hope that you will find it useful.

Still need more help?

Try as we will we know that there will always be more questions than we thought of here and that sometimes, we will describe something in a way that is still not 100% clear to you..or perhaps still needs some more detail or qualification in relation to your specific layout.

If that happens, please feel free to email us at: sales@dccconcepts.com and we will do our very best provide the help that you need

Terminology:

Across the world there are several ways to describe the parts of a turnout or details of an installation, so we have done our best to use terms with a reasonable level of universal understanding.

Therefore we have chosen to use the following terms.

We have selected the word "Turnout" to describe the whole device... Of course its often also called a "Point" in UK or a "switch" in USA....

We use also "Frog" to describe the area that is more correctly called the "Common crossing" (the combination of Vee , check rails and associated closure rails) and "Tie bar" to describe the moving bar that joints the two "Point blades".

As to Cobalt... the wire that moves the tie bar is called the "actuator wire", the device that moves the wire the "actuator bar" and the sliding bracket that guides the actuator wire and adjusts its range is the "fulcrum bar".

There are more... But hopefully all will be clear to you.

Cobalt is fully CE approved



COBALT MANUAL CONTENTS

1	Introduction to the Cobalt Manual
2	Cobalt overview: information and features
3	Cobalt general specifications
4	The Cobalt accessory range
5,6	detailed Cobalt installation information
7	Offset mounting for difficult places
8, 9, 10	Wiring Cobalt for standard control panel use
11	Wiring Cobalt for DCC operation
12	Wiring Cobalt for both panel & DCC operation
13	"thinking outside the square" with Cobalt
14	Using the Cobalt installation template
15	Using Cobalt accessory items
16	Improving turnout performance + reliability
17, 18,	Improving turnout realism in a few easy steps
19	Laying track & turnouts/pre-ballast preparation
20, 21	Ballasting around your Turnouts without worry
22	The unique Cobalt lifetime Warranty

Modellers and model railway clubs are welcome to use this information for "own use" in any way they wish however no re-publication or web use of any kind is permitted without prior permission. Any appropriate commercial client use will always be acceptable with prior authorisation.

A few good reasons why Cobalt is the best of all possible choices...

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Turnout control redefined

The DCCconcepts Cobalt Turnout motor has been designed without compromise to be the very best, most versatile and easiest to use motor drive turnout/point motor for railway modellers in all scales from Z to Gauge 1.

* Cobalt is smaller yet much stronger:

While it is only 46% of the physical volume of its nearest competitor, it has a much higher gear ratio, superior throw strength and far greater stability than any other similar product at the end of throw.

* Cobalt is quieter and more robust:

The design has been made much stronger than all of its competitors yet it is quiet in operation. We did this by choosing higher quality plastics and specifying a heavy walled internal design that adds to stability while lowering mechanism resonances. Gears are specifically tooled for Cobalt and are made with the best available material which is fibre reinforced nylon for quiet operation, incredible reliability and long life.

* Cobalt is voltage tolerant & low current:

Even at higher voltages, it rarely draws more than 25mA (that is a tiny 25 thousandths of an amp) yet it works very well below 9 volts... or at 12. Cobalt always moves reliably, powerfully and is rock solid. We find 9~12v ideal. (we use 9v on our own layouts).

This power supply versatility, combined with very high gearing and variable fulcrum make it as tough or as gentle as it needs to be yet allows it to remain far more stable than any other turnout motor at the "end of throw"... whether the power is left on constantly or turned off once the work is done.

* Cobalt is very, very versatile

Because it will not relax even a bit at the end of throw Cobalt can be powered by almost ANY method that can deliver DC power and is compatible with almost every DCC accessory decoder ever made.

It is equally at home as a DC or DCC controlled device, with stall drive using a standard switch or if you prefer, with pushbuttons or short-term power drive... making it very easy to wire Cobalt for BOTH direct control panel and DCC control at the same time.

Because of its high very gearing it is even easy to stop Cobalt mid-throw for control of 3 position semaphore signals and 3 way stub turnout operation!

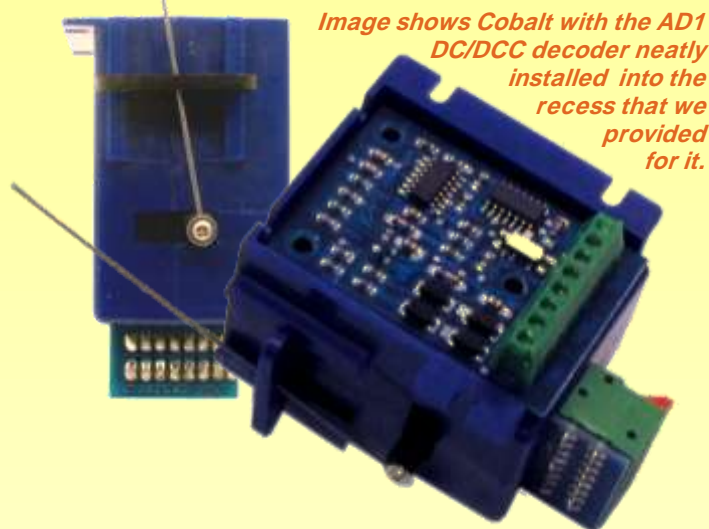


Image shows Cobalt with the AD1 DC/DCC decoder neatly installed into the recess that we provided for it.

Of course, Cobalt is also fully CE approved

Cobalt has also been designed from the ground up for either horizontal or vertical mounting which Makes it the perfect device for railway crossing barriers and proper control of delicate semaphore signals too.

* Cobalt is easy to install.

Each Cobalt turnout motor comes complete with all the parts needed including the screws needed to fix it to the baseboard....and we have also created a wide accessory range including pre-prepared switching.

We've even designed a template that makes it dead easy to get it right the very first time in any scale... Used from above, with the drill kept vertical, it will result in the creation of ready-made accurate pilot holes for you to use when mounting Cobalt.

We even supply the pilot drill bit you will need!

* Cobalt needs NO soldering.

Its no fun soldering under the baseboard... and edge connectors are hard to find and always expensive.

Cobalt has a very high quality 8 way solder-less connector that doesn't even need a screwdriver to give you a perfect connection in moments.

* Cobalt is incredibly reliable.

High quality engineering plastic, top quality gold plated 1.6mm fibreglass PCBs and very careful design make it bulletproof... So we can very confidently give Cobalt the best warranty ever!

(see rear page for comprehensive details)

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Basic specifications and product details

Cobalt...

Is a high quality DC motor driven actuator created specifically to be the best product available for turnout or signal control in any modelling scale from N to O.

Flexibility of Control:

Cobalt is a low current device with great flexibility. It can be powered via a small "wall wart" type power supply and it can be switched by standard latching type switches, short term power such as pushbuttons or it can even be automated simply via use of DPDT relays.

Cobalt is totally comfortable with DCC decoders and any of the low power "stall type" accessory decoder with reversing power ability can be used. Additionally, by adding diodes, even AC output DCC decoders with appropriate voltage and adjustable pulse length can be used.

Positive but gentle Action:

Because of its extremely powerful high ratio gearing it is equally effective when used as a stall type or short term power device and does not relax at all at the end of throw. Incredibly powerful as it is, it's also designed to be gentle when needed and so the degree of pressure and range of its throw has been made easy to adjust over a wide range. Therefore extremely positive action is there when it is needed and gentle treatment of your turnouts, signals or other items is guaranteed by design.

No connectors or soldering needed:

Cobalt requires no soldering and no added connectors or other parts for wiring or installation. Wiring is quick & easy!

Cobalt Installation:

Cobalt has been designed to be installed vertically for turnout operation or horizontally for semaphore signal or for things like vertical crossing boom actuation.

We supply the correct screws for mounting. (We even supply 5 just in case you lose one). Additional mounting parts such as double sided foam pads shaped exactly to Cobalt's top surface are also available.

The actuator wire is of the correct stiffness for reliable turnout throw and has been pre-formed for easy mounting.

Where a turnout or signal is close to a layout brace or if a standard direct linkage is not possible, it is simple to arrange Cobalt so that it provides an offset drive via a simple cranked wire arrangement (shown in our "tips" pages).

Installation template available

A metal template is available for precise installation for turnout control in all scales. The template allows you to establish perfect position & create pilot holes for mounting screws from ABOVE the baseboard with zero stress.

Dimensions and other key specifications:

Cobalt is only 46% of the volume of its nearest competitor and leads in flexibility, noise level and flexibility of control

Cobalt facts & specifications			
W x H x D	28.5mm (34mm over the mounting wings)	44mm (67 mm over the connector)	40mm (48mm over the mounting wings)
Approvals	Cobalt meets all applicable European CE standards		
Current draw	Stabilised to maximum 30mA at any supply voltage		
Voltage range	Requires DC power. Happy from 6v to 12v		
Connection	Totally solder-free. 2 x terminals for drive power plus two built-in DPST switches for frog, signal, panel lighting or any other use. Gold plated switch contacts		
Mount ability	Vertical for turnout operation, horizontal for semaphore signal or vertical lift grade crossing gates etc		
Noise level	Quietest of all motor drive types at all supply voltages		
Control type	High gear ratio and low current draw allows either stall or short term power without "relaxation" at end of throw. Wide adjustment of throw for positive but gentle action		

Cobalt's Warranty:

Very careful design and selecting only the best quality materials allows us to provide you with the best possible warranty. Full details are on the last page of the manual.

Cobalt basic parts list:

All Cobalt turnout motors are supplied individually boxed whether supplied singly or in economical 6 and 12 packs. Every Cobalt turnout motor is supplied with:

* 5x #4 wood screws for installation * 1x Washer head screw for fixing actuator wire to the actuation bar * 1 Pre-formed 0.8mm Spring wire actuation wire * 1x Fulcrum bar

Cobalt added value accessory packs:

We have done our best to provide a complete accessory range to make installation as easy as it can possibly be.

* **Switch pack:** Contains 3x 1/4" mount DPDT switches on compact PCBs ready for simple "2 in-2 out" connection. LEDs included and LED connections are already in place.

* **Template pack:** Includes a clever multi-gauge metal template for easy & precise installation in any gauge from N to O Plus the drill you will need to use with it!

* **Accessory pack:** A whole host of items to make your task easy when installing Cobalt, plus spare screws and actuator wires... even the drill for the actuator wire hole!

* **Label pack:** Ballast printed labels for under the Tie bar.

(Full accessory pack details are provided on page 4)

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The Cobalt range... & Cobalt Accessories

The DCCconcepts Cobalt Accessory pack range has been created to cover all possible needs.. Items to make installation easy to get right first time, switches to make wiring easier than its ever been and even covering the parts you may need to manage future re-installation

Accessory, installation and Accessory packs

The TEMPLATE Pack: DCP-TMB

Includes the all metal Cobalt template suitable for use with all popular gauges from (N to O) & we also include the drill you will need to make the pilot holes for easy mounting or drill the tie bar for the actuator wire!



Note: The final Cobalt template will be shaped the same but may be differently coloured to this pre-production drawing



The ADDED VALUE Pack: DCP-CMC

This is a really useful pack that is excellent value. It is packed full of items that help to make installations easier

- 12x pre-printed "ballast look" labels to cover the actuator hole
- 6x double sided foam pads for Cobalt mounting
- 1x 7mm HSS drill bit for drilling the actuator wire hole
- 1x 0.8mm HSS drill bit for drilling pilot holes
- 3x spare actuator wires for Cobalt turnout motor
- 3x spare washer head screws for Cobalt turnout motor
- 12x 12mm #4 screws for Cobalt turnout motor mounting

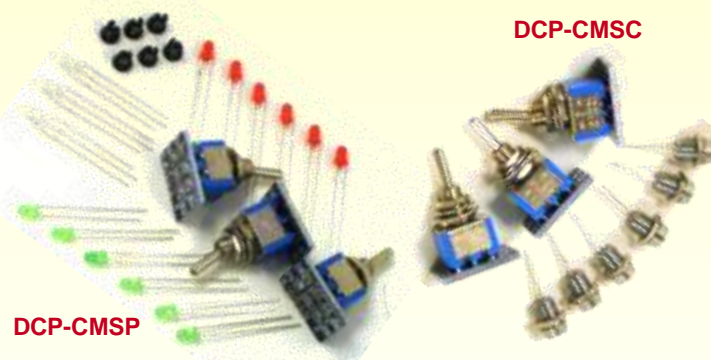
The SWITCH Pack: DCP- CMS (2 options)

Makes wiring a breeze with the hard stuff already done for you... simple 2 wires in, 2 wires out connection!. The packs contain:

DCP-CMSP: 3 x DPDT switches pre-fitted to a small PCB ready- For 2 wire in, 2 wire out connection, 3 x red/green Bicolour LED, 6 x red and 6 x green LED and 6 x plastic panel mounting bezels.

DCP-CMSC: 3x DPDT switches pre-fitted to a small PCB ready For 2 wire in, 2 wire out connection, 6 x 3mm LEDs in chromed brass mounting bezels (**Specify Red or Green when ordering**)

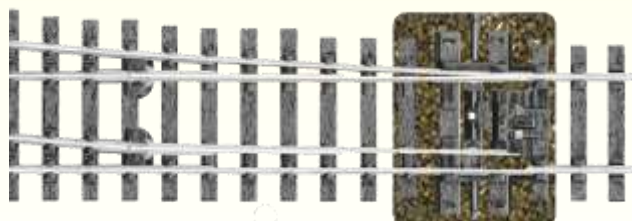
(See page 12 for just how simple these are to wire & use)



The "Ballast Label" pack: DCP-CML

No more ugly baseboard holes to be covered before ballasting! this excellent value low cost pack includes 50 of our tough pre-printed "older ballast look" Mylar coated stickers.

They are sized perfectly for OO/HO and already have the slot in them for the actuator wire... They are pre-glued on the face except where the tie bar goes so are very easy to apply to your turnouts



The Basics - Cobalt unique spare parts

Cobalt "Key Parts" pack: DCP-CMK

There's no point in making a turnout motor that will last a lifetime if the unique parts that attach to it are not available...Contains a spare fulcrum bar, 0.8mm actuator wire, washer head screw plus 5x mounting screws.

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Installation instructions: Physical installation Part 1

The DCCconcepts Cobalt Turnout motor is designed for use in all popular modelling scales and gauges. Cobalt is designed for under-baseboard installation and can be mounted either vertically for turnout operation or on its side for operation of semaphore signals or vertical road crossing barriers.

Basic Preparation:

Its always much easier if you think ahead here...

Note: There are also things that you can do to improve ready-to-go turnouts in both their reliability and appearance... So before you run ahead, perhaps it may be worth reading how (it is clearly explained with diagrams from page 14 of this manual onwards.)

Most tips focus on Peco brand turnouts (all scales) as they are the most commonly used brand within our sales regions, however much of it applies to other brands too... So why not take a look now.

Prepare the baseboard:

If you intend to use the self adhesive pads provided in our accessory kits, it is worth spending 5 minutes sealing the underside of the baseboard with gloss varnish or paint. It may be easier to drill mount holes prior to doing this as it will highlight exact positioning so only the minimum painting needs to be done! (leave for 24 hours to dry before installation).

Method 1: Using the metal template

If you have already laid the turnouts then that is fine for this first step.

Remove turnout springs so you can take best advantage of the slow motion action of Cobalt. (easy to follow instructions for how to do this are on page 13).

Examine the Template and identify the tabs which are appropriate for your track gauge. Bend down the tabs so their outside faces are a smooth sliding fit between the rails.

Centre the turnout Tie bar. Place the template onto the rails with the tabs between the stock rails and the pint blades and in line with the Tie bar.

Place the 0.8mm drill temporarily through the template hole between the bent down tabs and also through the hole in the Tie bar.

Method 1 continued...

Align the template along the turnout length. Try to keep it parallel with the straightest of the stock rails.

Remove the 0.8mm drill bit & place in a power drill.

Hold the Template steady - and holding the drill as close to an exact right angle / 90 degrees to the baseboard as possible, drill all 5 pilot holes right through the baseboard.

We prefer to do the most important "central pilot hole" between the tabs first (being careful of the Tie bar) and then drill the 4 matching colour holes.

Remove the template. You can now temporarily remove the Turnout to complete the larger hole for the actuation wire.

Drill the hole for the Tie-bar using the 7mm drill bit provided in the "added value accessory kit" (or use the nearest equivalent drill you already have at home - the imperial equivalent is 9/32~5/16)

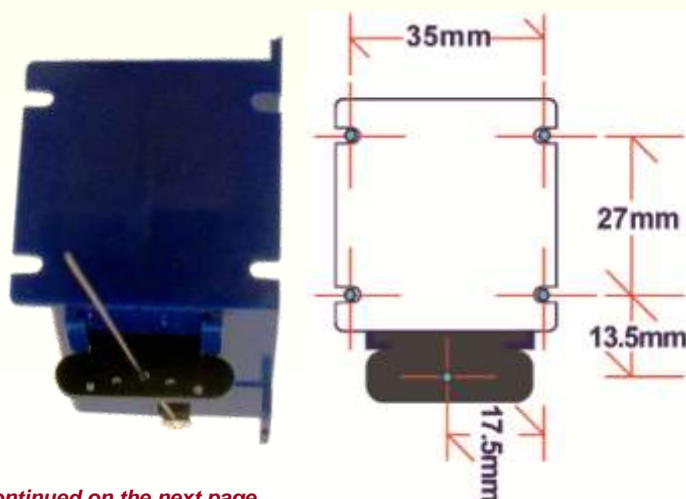
TIP: very slightly countersink this hole both sides to remove rough edges and give best possible tolerance in mounting and maximise throw potential.

You can now install Cobalt.. And the turnout!

Method 2: Using simple measurements

This is best without the turnout in place and with a clean top surface on the baseboard. This will let you mark out accurately to get the best results.

Here are the key dimensions. Draw the turnout centreline, mark exactly where the Tie bar hole pilot hole will go and use that as a reference for all other holes. **Take your time and be accurate!**



continued on the next page....

Installation instructions: Physical installation Part 2.



Method 3: Drill only the actuator wire hole & use sticky foam pads to hold Cobalt ready for screws.

Proceed as per the previous page, but:

Drill only the central pilot hole for the actuator wire with the 0.8mm drill and then complete the hole with the 7mm or equivalent drill (TIP: countersinking both sides of the hole slightly is a very good idea with this quicker but slightly less precise method)

Centralise the actuator wire/throw arm by using your DC power supply or the simple 9v battery as per the "expert tip" below.

Remove the protective film from one side of the double sided foam tape pads provided in our added value accessory kit and apply it accurately to the top of your Cobalt turnout motor.

If the turnout is already installed, use cardboard strips to centralise the Tie-bar between the turnouts stock rails.

Position yourself under the baseboard so that you can clearly see up through the actuator wire hole.

Remove the remaining film from the top of the self adhesive foam pad and very carefully place Cobalt in position as follows:

If the turnout is in position: make sure that the wire is through the Tie-bar hole and central in the hole, then press Cobalt onto the baseboard, temporarily fixing it with the tape.

If the turnout is not yet in position: carefully position Cobalt so that the wire is vertical, at the centre of the Tie bar hole & so it is aligned properly for turnout operation and press into place, fixing it with the tape.

Method 3 continued...

If you have previously painted the underside of the baseboard and sealed it, you will now be able to test your installation without screws in place.

Once you are happy with the operation, fix Cobalt permanently in place with 4 of the screws provided.

NOTE: These do not need to be overly tight... just screw them in far enough to hold Cobalt snugly against the double sided self adhesive foam pad.

EXPERT TIP: Foam tape can be very strong. Consider removing the screws totally!

If you have sealed the baseboard well & used either our foam pads or a good quality (3M) foam tape, after 48 hrs the foam tape will have bonded properly & you can slacken off or remove the screws totally .

Securing only with the tape, the already quiet Cobalt turnout motor will become even quieter!

(If you do want to remove the screws but still want more secure mounting... a generous bead of silicone placed around the top edges will provide it!

Fitting the pre-formed 0.8mm actuator wire

This has been pre-bent for a precise fit in the actuator bar. It is the ideal size for turnout control.

This wire is passed through the central hole in the fulcrum bar and the short right angle end is placed into the upper hole on the moving actuator bar.

Secure the Actuator wire using the washer head screw provided. Its sole purpose is to hold the wire in place, leaving it able to move freely, so please take care to tighten it only enough to lightly touch the wire.

Why are there other holes in the movable fulcrum?

There are 2 main reasons for these extra holes.

- (1) When you need to offset the mounting of Cobalt due to under baseboard obstructions these offset holes will allow you to easily adjust the throw range horizontally relative to Cobalt's position.
- (2) When Cobalt is mounted horizontally for signal or crossing barrier use etc it is not always that easy to make your operating linkages a perfect length.
- (3) The added holes are an easy way to change operating range - much easier than either modifying the signal linkages or bending the actuator wire!

EXPERT TIP: Moving the Cobalt Actuator arm and actuator bar to the central position

Because of its high gear ratio it is impossible to move the Cobalt Actuator throw arm manually.

However it is helpful to have it in the centre of its throw when installing using the above method.

Simply buy a 9 volt battery and solder two 300mm wires to it. Strip and tin the other ends.

Now, its a matter of moments to touch the wires to the two outside terminals, removing them when the actuator wire or throw arm reaches the right place!

Installation instructions: Easy offset mounting for awkward places.

Cobalt

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If there is a need to offset the mounting of your Cobalt turnout motor due to baseboard beams etc in the way, then try this... this method will work even if there is a beam directly under the tie bar of the turnout.

You will need the following materials in addition to the Cobalt Turnout motor.

- (1) Brass tube with an internal diameter of approximately 0.8~0.9mm
- (2) Spring steel wire . We use 0.8mm but a little either way is fine. Spring steel wire is low cost and usually available at hobby shops, (especially those who sell flying models as it is also used for undercarriages)

You will need the following common hobby tools.

- (1) A razor saw or heavy disposable knife blade to cut the tube (cut with a knife by pressing down firmly and rolling back and forth)
- (2) A drill the same size as the outer diameter of the tube - probably 1.0 to 1.1mm.
- (3) A cut off wheel or hardened cutters for the spring steel wire (Or you can file a nick either side of the wire at the cut point and break)
- (4) Solder, flux & soldering Iron OR a good strong easy to control glue. (Loctite also works as it is steel wire)

Parts reparation:

Cut the following from the brass tube.

- (1) Two short lengths, each about 3~4mm (not critical). Clean them up after cutting to remove any ragged edges.
- (2) One length about 15mm. Mark 5mm from its end and squash the 5mm end flat. Mark the centre of the flat section and drill a 0.8~0.9mm hole close to the end.
- (3) One piece that is the total of the length needed to be flush with the top of the sleepers (ties) and also extend 8~10mm below the baseboard.

Cut a length of the spring wire.

Its total length should be 55~65mm PLUS the length of the brass tube in 3 above.

Prepare the turnout area.

Look for the hole in the tie bar and measure 10mm from that hole parallel to the track... Orientation towards the toe OR heel of the turnout is OK, but make sure that the hole misses the baseboard beam that is in the way. It's OK to adjust length in order to allow for sleepers (ties). Use a drill bit that is the same diameter as the brass tube so that it will be a smooth sliding fit.

Check that the hole clears the beam then insert the tube and glue it in place flush with the sleeper (Tie) tops.

Prepare the spring wire.

Mark 3mm from the end, bend sharply to 90 degrees.

Place this 3mm end into the tie bar hole and mark the point where it passes over the brass tube you glued into the hole. Be sure this is right then bend at a sharp 90 degrees.

Insert the spring wire:

You should now be able to insert the long end of the spring steel wire into the brass tube with the 3mm end dropping into the hole in the tie-bar. If not, take the time to remake it until it does (spring steel wire is low cost so its worth persisting to get it right).

With the 3mm end in the tie bar and the rest inserted into the

Hold the wire down firmly on the tube top, grip the free end of the spring steel wire under the baseboard close to the brass tube and bend at 90 degrees so it points directly away from the beam that caused the problem.

You now have a crank that, when moved left & right from below the baseboard, will move the turnout tie bar for you.

Add the flattened brass tube to complete the crank:

Take the tube with the flat section and slip it onto the end of the crank. Solder/glue in place with the flat part horizontal.

Preparing Cobalt for installation:

Using a 9v battery or power supply, centre the Cobalt actuator wire. Temporarily put the wire in its mount hole in the actuator bar and mark it at a point about 2mm below the top mounting surface . Cut the actuator wire at the mark

Take ONE of the two short lengths and solder or glue it 6mm from the top of the actuator wire, then re-insert into its hole and add the retaining screw.

Orient the Cobalt fulcrum bar so that the holes are at the bottom and with the actuator wire inserted into the centre hole, slip it into its guides. Add a Cobalt foam pad or double sided tape to the top of Cobalt.

Final installation:

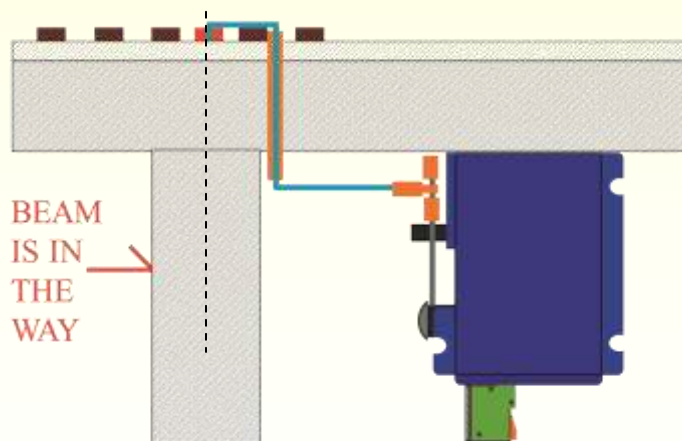
Centre the tie bar and hold in position with tape or thin packers.

The actuator wire of Cobalt should be centred, with the fulcrum bar placed about half way between top and bottom in its guides.

Place Cobalt with it facing the end of the crank wire, and thread the Cobalt actuator wire through the hole in the flattened brass tube that is on the crank wire. Secure Cobalt temporarily with the foam tape only and then add the other short length of brass tube at the tip of the actuator wire to secure the crank properly.

Test, moving Cobalt's fulcrum bar up or down until the turnout works reliably. When all is well, screw Cobalt in place.

This diagram should explain it all clearly:



Legend for drawing:

Red : Tie Bar
Orange: Brass tube parts
Cyan: Spring steel wire

Wiring Cobalt for DC or panel control - the basics

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The DCCconcepts Cobalt Turnout motor is easy to wire and there are several ways to wire it. Cobalt works only with DC power (Ideally 9~12 volts) and is controlled by reversing the voltage.

Cobalt cannot be powered by an AC supply such as the accessory output of a train set transformer.

(We do show a method in our DCC wiring pages for using AC output accessory decoders with the simple addition of steering diodes for Cobalt operation, however we discourage this use for standard switch control as it is a little harder on the drive motor and the resulting half-wave DC is also noisier than proper rectified and smoothed DC operation. Voltage will also be marginal with some decoders)

How you finally choose to do it is up to you, however we have laid out below several methods that we find easy and trouble free. Cobalt operates very strongly at all recommended voltages and draws very little current so there is absolutely no need for a large power supply.

If you are using shorter term power such as pushbuttons, then all Cobalt turnout motors could easily be powered by a single wall-plug or "wall-wart" type supply. If you are using "stall motor operation" with power remaining on to each Cobalt at all times, then you can (conservatively) power 30 Cobalt Turnout motors for each amp of power supply capacity.

Rather than an old train-set transformers DC output which is generally not well rectified, we strongly recommend that you use a better quality regulated DC "wall wart" type plug pack.

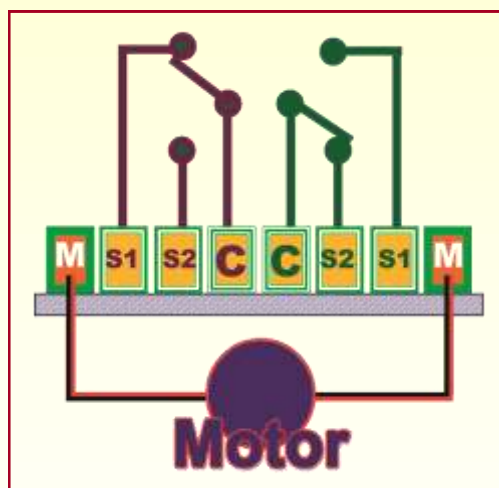
These are low cost and available everywhere - You may even have the one you need lying around in that bottom drawer...we use a 9v supply that once powered a portable phone for our own test layout!

The fundamentals of wiring your Cobalt Turnout motor.

There are 8 spring loaded terminals on each Cobalt Turnout motor. No soldering is needed... however if you do prefer to solder your wiring you can still do so as we have chosen a connector with two solder points per pole, so you can solder wires to the easily accessible outer solder point on each connection point without risk to your warranty.

Connection is simple. Strip about 12mm of wire, twist and insert!

- (1) Outside terminals are the motor drive and should be connected via whatever switching method you prefer. (examples next few pages)
- (2) Left inner terminals form a "break before make" single pole double throw (SPDT) switch. The centremost terminal **C** is common.
- (3) Right inner terminals form a "break before make" single pole double throw (SPDT) switch. The centremost terminal **C** is common.



EXPERT WIRE STRIPPING TIP:
When stripping wires for insertion into any form of terminal, don't just strip and pull the insulation off!

Use the strippers or knife to ring-cut the insulation then twist the free end between your fingers as you pull.

This gives a super tight twist to the strands and totally guarantees that there will be NO loose strands!

These switches have gold plated contacts for super reliable performance and adequate power handling for use as frog switching, interlocking, automation logic or control of any form of commonly used model railway accessories such as signal or panel lighting etc...

If the turnout controls entry and exit to a reversing loop... they can also be used to control a DPDT relay for auto reversing of track power OR combined in their own right to achieve the same result. (The most common uses are signal, frog power or panel lights control)

WIRE TYPES: There is no need for heavy wire with Cobalt but The terminals will accept up to 16x0.2 (or about 20 AWG) easily.

Cobalt

Turnout control redefined

Wiring Cobalt for DC or panel control - Part 2

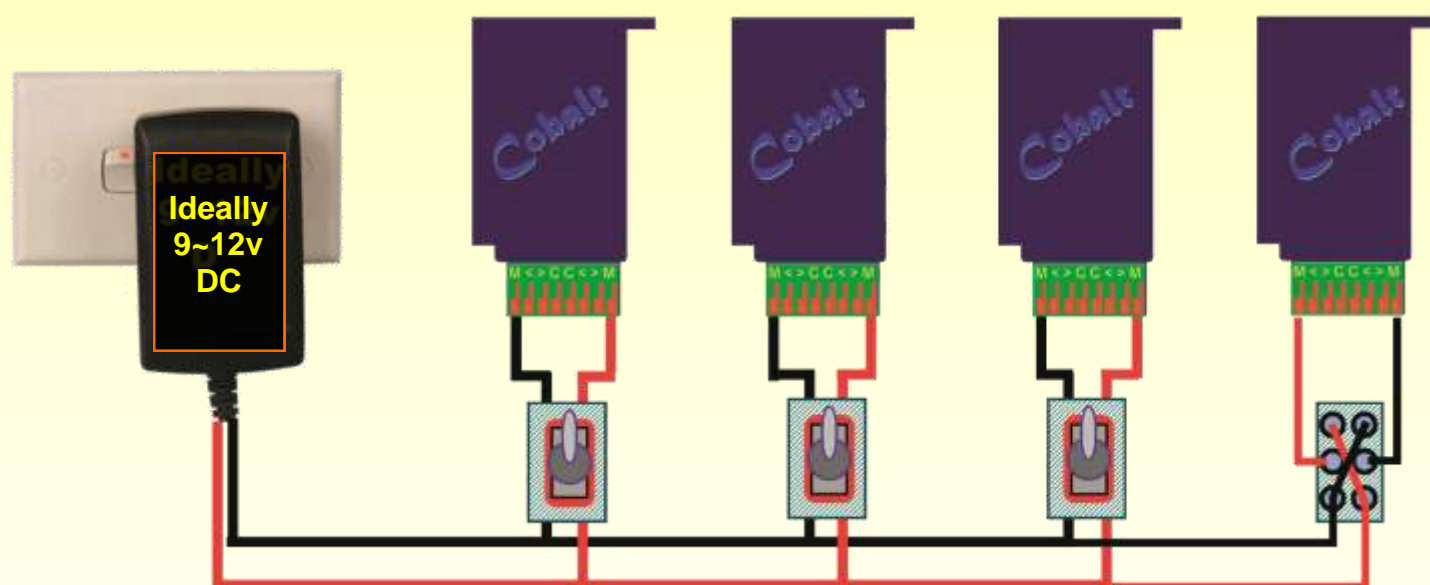
“Two wires in, two wires out”

It really can be that easy if you choose to use the pre-configured switches that we have made available in our “cobalt switch pack”... however we know that many modellers prefer to do it their own way, so we have laid out below several wiring methods that are recommended for use with Cobalt.

In each case we show a standard “DC plug pack” power supply which we strongly recommend as the best choice for smooth and well regulated DC power with minimum cost.

The first diagram shows the use of our pre-prepared DPDT switches: These are included in our Cobalt switch pack (DCP-CMS). This is a simple, direct method that can easily also have control panel LEDs added, either by connection to the PCB pre-fitted to the switch or via the Cobalt SPDT contacts.

For those who already have switches or prefer to wire them themselves, we have shown the correct way to wire a DPDT toggle switch for reversing polarity as required by Cobalt.



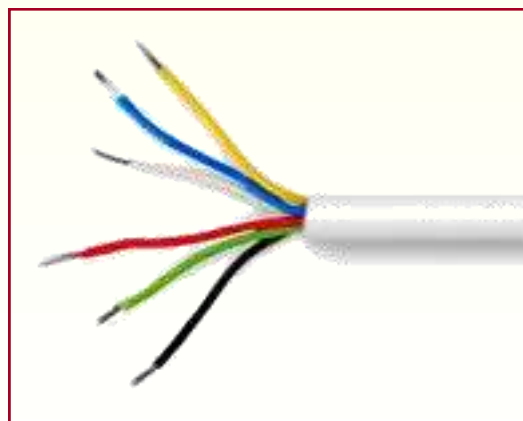
For those who want to wire their own, the right hand switch shows you how.

Which wire to use with Cobalt?

Because Cobalt is a low power device heavier wire really isn't needed. You can therefore use finer easy to handle wire as small as 7 x 0.2mm (22~24 gauge) if you wish.

Most often when we wire Cobalt we will be taking either 2 (if using switch contacts for panel LEDs) or 5 (if we are using one of Cobalt's in-built switches for panel lights) to the control panel .

Our favourite wire for this is either 2 or 6 wire Alarm installation wire... We like this wire as it is the ideal gauge of copper, is already consistently colour coded and has a nice white cover that we can write on to designate where its from. its low cost too!



Cobalt

Turnout control redefined

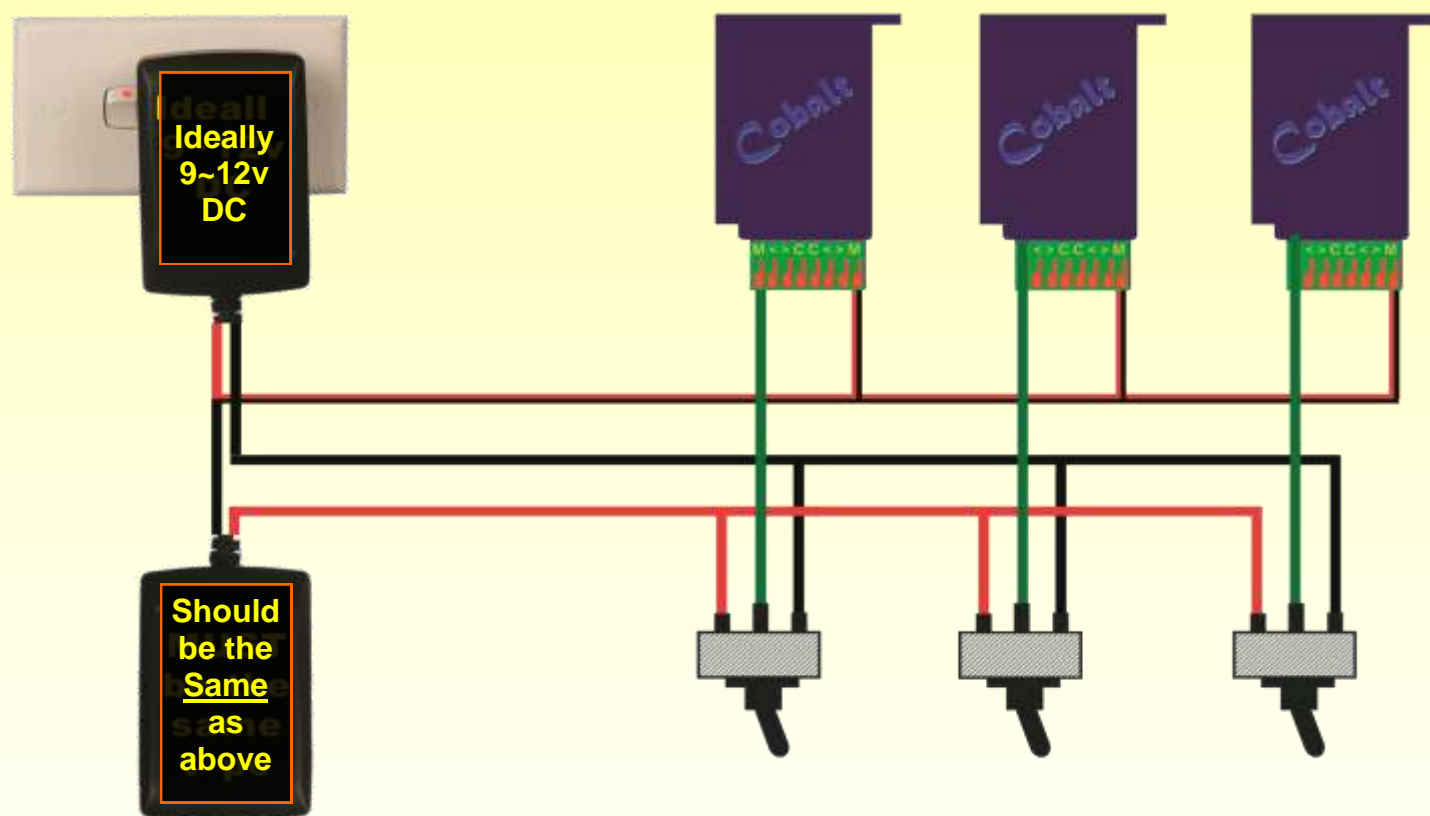
Wiring Cobalt for DC or panel control - Part 3

“Twinned power packs, usable for SPDT toggles or 2 pushbuttons”

For those who like to do it differently or revel in saving wire, this simple method is effective and safe. It can be used with toggles or pushbutton switches with equal success.

You will need two identical wall mount/plug pack type regulated DC power supplies to use this configuration which is effectively a bi-polar power supply.

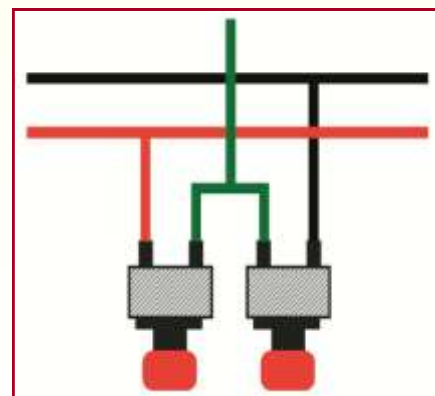
Take the negative wire of one plug pack and connect it to the positive wire of the other. The remaining wires then become (1) the common which is hard wired to all Cobalt Turnout motors and (2) the wire which feeds each switch to complete the circuit.



Nearly the same as above... but this time using some standard SPST “normally off” pushbutton switches...

As you can see from the diagram inset to the right, you can achieve the same results by using two “normally off” pushbutton switches instead of a single SPDT toggle switch.

You will of course have to hold the switch down for a couple of seconds to achieve full throw, however if you are a US Steam era or a narrow gauge or logging railroad modeller it will also give you a BIG benefit.. the ability to precisely stop the movement mid-throw for full control of 3 way stub switches or 3 position semaphore signalling!



Cobalt

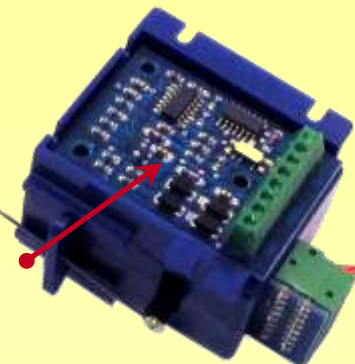
Turnout control redefined

Wiring Cobalt for DCC operation

The possibilities really are almost endless.... and problem free!

Because of its consistent low current draw & wide supply voltage tolerance, Cobalt will work equally well with "stall type" turnout decoders, decoders with two reversible DC outputs, two DC output channels that can be wired together or even some 3 wire AC-out decoders if they have adequate voltage (AC needs added diodes for 1/2 wave DC).

Even better, because Cobalt is also totally stable when powered only for the time needed to change the turnout, you can also have the best of both worlds... with DCC or computer control when you want to use it, and manual control panel operation wired in parallel for direct hands-on control via conventional control panels when you want it.

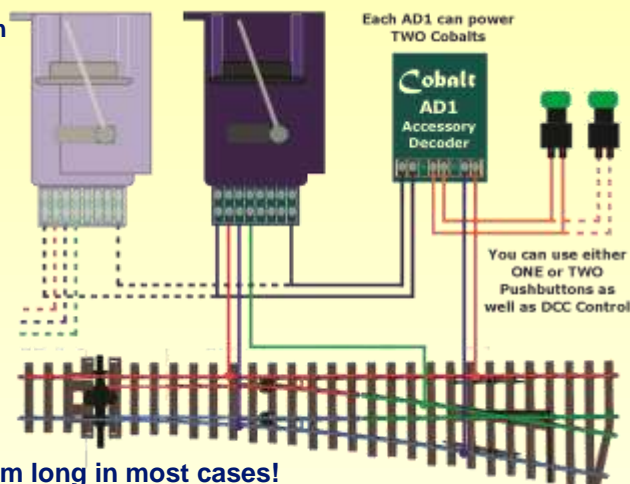


DCCconcepts own AD-1 and AD-4 Cobalt Accessory Decoder

(Full detail of both models, as well as instructions, are available on our website)

Did you notice the recess on the side of Cobalt? That space has been put there for a specific purpose.... It makes the mounting of our own DCCconcepts AD-1 Cobalt DCC accessory decoder a simple task, keeping it in the perfect position - right at the motor drive it controls.

It will also make wiring a dream, as connection needs only 2 drop-pers from the track or accessory bus to the DCCconcepts Cobalt accessory decoder, and two very short wires from Cobalt accessory decoder to the Cobalt Turnout motor.



Legend for the wiring diagram on the right:

Black	Cobalt motor operational control
Blue and red	Track power / DCC decoder connections
Green	Frog Polarity control
Brown	Optional pushbutton Panel Switches

Simple, direct and easy to do.... With the wires less than 300mm long in most cases!

Note: The DCCconcepts Cobalt Accessory Decoder works with all DCC systems and has a target release date of November 2010

Controlling Cobalt with other brands of reversible output "Stall motor" accessory decoders.

Cobalt's low current draw makes it compatible with most accessory decoders designed for stall motor devices.

In all cases the wiring will be similar to that needed for the Cobalt accessory decoder. However as small differences in actual wiring positions will exist, please be sure to refer to the documentation provided with the brand chosen.

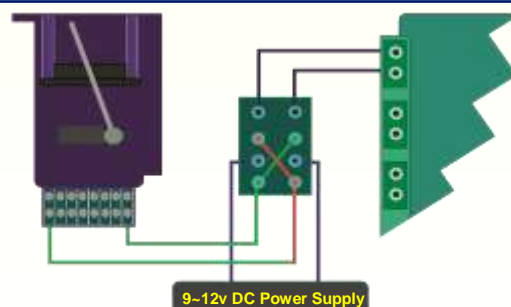
Compatible Stall motor drive DCC decoders include the NCE Switch-it and Switch-8, Digitrax DS64 and DS44, Team digital SMD8 & SRC16 - There are many we haven't listed but as long as they deliver a reversible DC output, they should be just fine with Cobalt!

We know we will be asked often.. So for those who want to know, **apart from our own AD1 and AD4 that are truly designed for Cobalt**, we also like the NCE "Switch-it" and "Switch 8". We like them as like our own AD1 and AD4 they are economical and most importantly, easy to understand and program as well as being very reliable and universally compatible with all DCC brands.

(Please note that the "Switch 8" (which will operate 8 Cobalt motors) does not directly support pushbutton switches. However these can still be added by also utilising the very clever "NCE Mini-panel" which is a compact device which plugs into your control bus to provide a huge range of layout and train control automation.. Including automated shuttle, signal interlocking and route control).

Controlling Cobalt with DCC really economically using a single 2 wire DCC signal decoder output, plus a separate 9~12 volt DC power supply ...and a low cost DPDT relay.

- (1) Choose your relay to match the DC output voltage of the accessory decoder.
- (2) Connect the 2 wire output of one decoder channel to the relay coil
- (3) Wire the relay as a DPDT changeover switch (Check carefully as the positions of common, normally on and normally off terminals will vary)
- (4) Connect the relay to your Cobalt turnout motor as per this simple diagram.



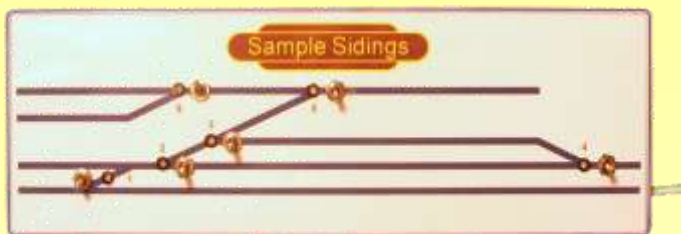
Special applications: 2 wires in/out with LEDs & 3-wire DCC decoders

Cobalt

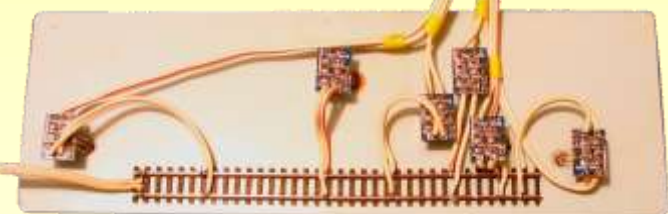
Turnout control redefined

Using Cobalt with our special DPDT switches for a complete but easy to make control panel.

Using our specially prepared DPDT switches to create an easy to make control panel with the minimum of wires.



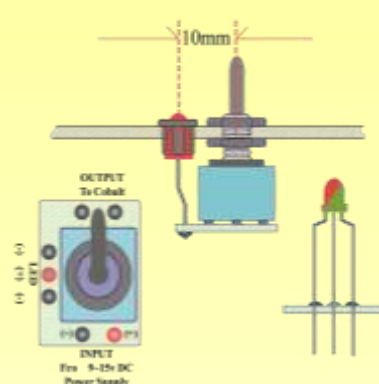
This control panel has SIX turnouts. It is totally ready to go yet its wired with a total of only 7 pairs of wires. The wires are 1 pair for power in & 1 pair connected to each of the 6 Cobalt turnout motors. Each switch has a 2-colour LED associated with it and that is directly connected to the PCB we have pre-fitted to each switch. It just cannot get any easier!



This is how the switch is wired, and how it relates to the control panel. As you can see a 3 wire bi-colour LED can be directly wired to the PCB.

Of course, 2 separate red, green or other colour LEDs can also be used, with their (+) leads connected to the centre pad of the LED contacts.

NOTE: The LED solder pads already have resistors in place so there is no need to add them.



EXPERT TIP - A simple power Distribution Bus for your panel.

You will notice the length of N gauge track in the image to the left. Tidy power distribution on a control panel is important and a track off-cut makes a convenient & easy to solder connection point for as many connections as you need!. If you need more than 1, colour code the sleepers

EXPERT TIP - having the best of both worlds without problems.

You can have both a local control panel and direct DCC control if you use our specially prepared centre-off DPDT switches, moving them to the centre off position when computer or DCC control is wanted. (Some DCC decoders will also allow standard pushbuttons to be utilised)

Using Cobalt with DC output 3 wire DC-out Accessory decoders such as the Lenz LS100.

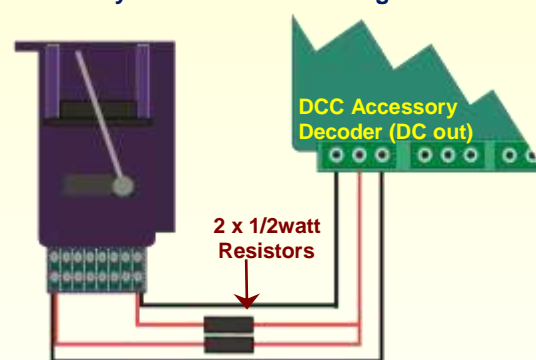
Cobalt needs reversible DC control but we can still control it with this type of accessory decoder. The drawings show how.

Lenz sell the LA010 however to do this however while it does work well, it is designed for higher current turnout motors so it is also very expensive!

Because Cobalt draws very little current, it is possible to use a much simpler approach to achieve exactly the same result, and doing it this way will reduce the cost to almost nothing!

All you need to do to use LS100 to control your Cobalt turnout motor are a couple of (180~200) ohm 1/2 or 1 watt resistors... It couldn't be easier in fact!

- (1) Connect centre common of the LH100 to both Cobalt motor terminals with a 180 ohm 1/2 watt resistor inserted into each wire.
- (2) Connect Left decoder output to one motor terminal, right to the other.
- (3) Set LH 100 operation time to 4 ~ 5 seconds only (see the LS100 manual)



Being Creative! Controlling a full Scissors with ONE channel of a 3-wire DC-out DCC Accessory decoder.

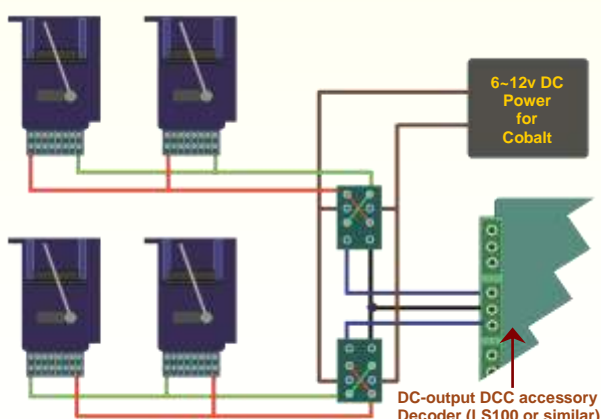
Being a little creative, for the cost of two low power DPDT relays & a DC power source, we can control many Cobalt motors independently

Here, we have taken the simple and economical "use a relay" idea from the previous page and applied it to a 3-wire DC output decoder. This lets each side of the Accessory Decoder output control BOTH directions of a Cobalt turnout motor and so is a very useful thing to be able to do....

Example: Controlling the two crossovers of a scissors crossover or perhaps controlling both ends of 2 storage loops... All with ONE decoder output set!

The relays can be lower power types and the power supply anything 9~12v.

There will be 8 SPDT switches between the 4 Cobalt motors so there will be enough for all 6 frogs of a scissors plus 2 spare sets for panel and signals!



Installation Instructions: "Thinking outside the square"

Cobalt

Turnout control redefined

Controlling Cobalt with a "Diode Matrix system" driven by simple 556 IC circuits for easy route control

Many modellers are used to using a diode matrix system for control of solenoid type turnouts...

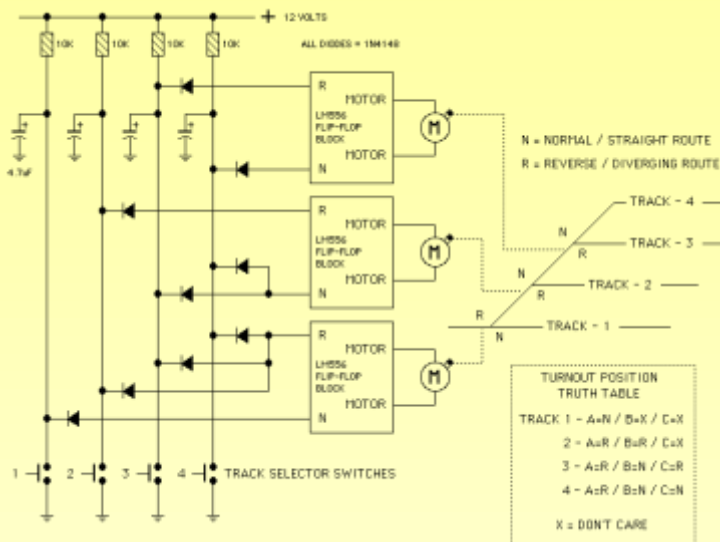
But did you know that you can also use a diode matrix to control "stall type" turnout motors like Cobalt?

We are not going to describe how here, as full details and a clear explanation for this circuit and others that we have featured on this page are already available to you "On the web" at Rob Paisleys excellent Website.

We really do recommend that you visit Rob's site to learn more about electronics in model railways...

Here is a link:

[Diode matrix control of the Cobalt turnout motor](#)



Be creative... It's one of the joys of the hobby!

Providing that you stay within voltage limits that we have indicated in this manual and think things through clearly first, there is almost no limit to the things you can do or achieve in control of Cobalt turnout motors.

So... Have a go: you just may surprise yourself!

If you do have a bright idea that you are proud of, tell us & we will use the free space below to show your idea to the world with full accreditation!

This space is for YOUR idea... Meanwhile, here is a close up of a modified Peco turnout to show off how much better they can look with just a small change.

Can YOU tell which ties are now copper-clad PCB?



If you like to do it yourself there are many clever options out there!

Here's a nicely designed control circuit with memory for Cobalt using 556 type IC's (for use with push-button switches etc.)

For a long time we have enjoyed using and building the circuits we find on Rob Paisleys excellent website, which is full of clever, useful electronic ideas for anyone who enjoys model railways.

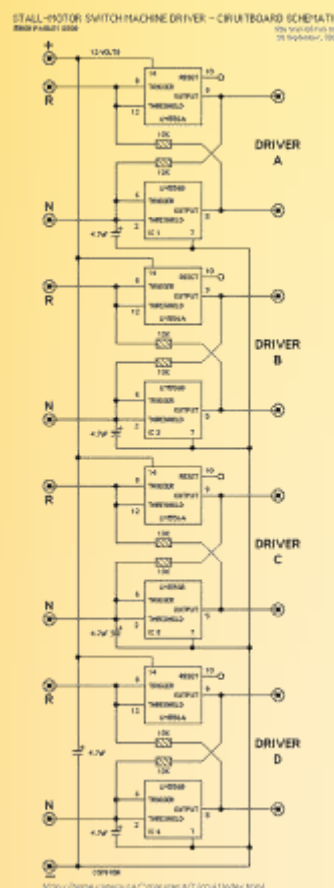
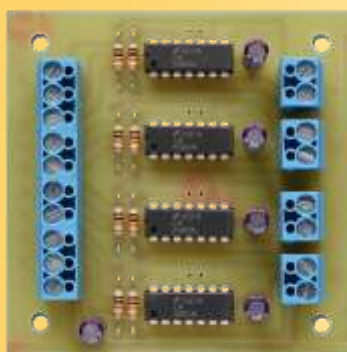
Parts are easily available/low cost and Rob will even provide you with PCBs if you wish. (his email address can be found on the Web page links below)

For full information and access to a wide range of really interesting stuff...

Here are the links:

[Link to circuit information](#)

[Link to other good stuff](#)



Link in plain text: <http://home.cogeco.ca/~rpaisley4/556Stall08.html#PCB>

Installation examples: (a) Using the Cobalt Installation Template

Cobalt

Turnout control redefined

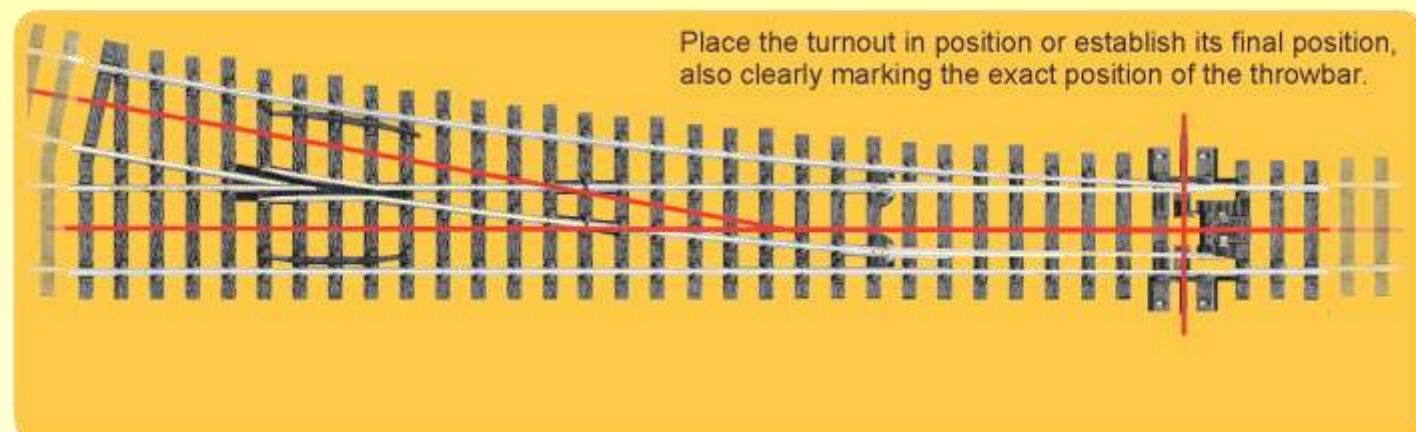
The Cobalt template is made in metal to last forever and is designed to give perfect installation first time for all popular modelling scales including N, HOe, 009, TT, HOm, HO $3\frac{1}{2}$, HO, OO, On30, EM, P4, S and O scales

The template kit is supplied as one of our added value accessories and is sold complete with the 0.8mm drill you will need to create the pilot holes. The part number is DCP-CMB.

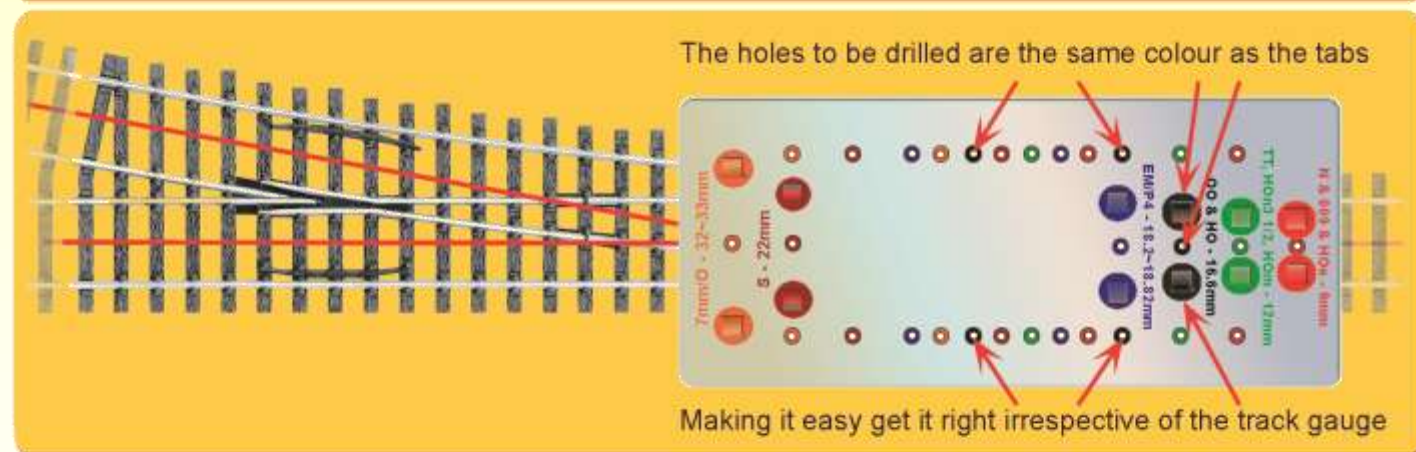
The process is clearly explained below, so we'll just add a few comments here... we find it best to carefully drill the pilot hole for the actuator wire first, followed by the other 4 pilot holes for mounting your Cobalt Turnout motor. We also like to slightly countersink the actuator wire hole once its been drilled with the 7mm drill—it removes any ragged edges from the hole and allows a slightly wider movement of the actuator arm just in case its needed.

Just in case you need them, there are also simple instructions printed on the rear of the template.

Place the turnout in position or establish its final position, also clearly marking the exact position of the throwbar.

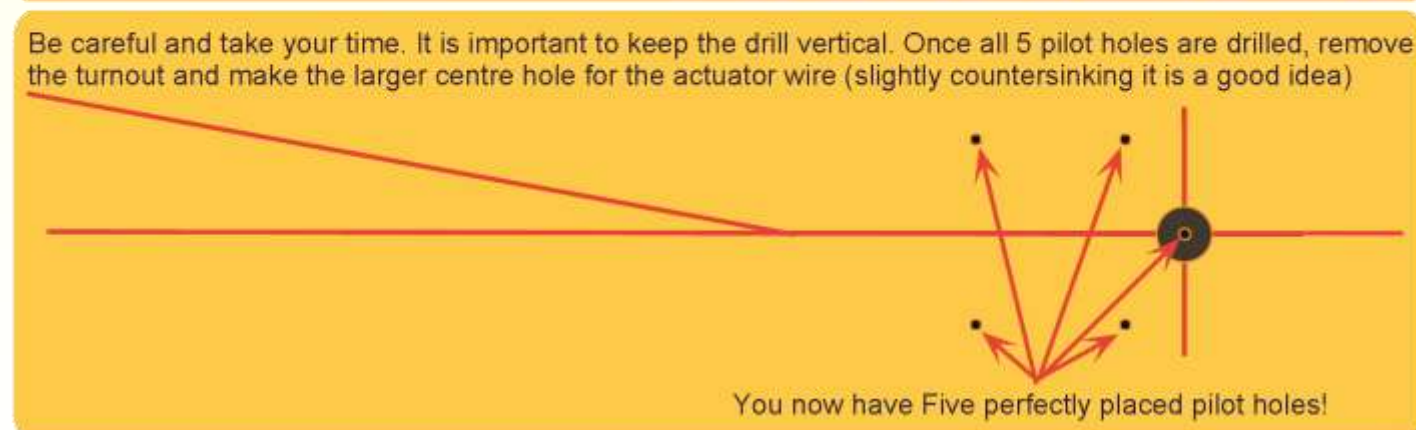


The holes to be drilled are the same colour as the tabs



Making it easy get it right irrespective of the track gauge

Be careful and take your time. It is important to keep the drill vertical. Once all 5 pilot holes are drilled, remove the turnout and make the larger centre hole for the actuator wire (slightly countersinking it is a good idea)



You now have Five perfectly placed pilot holes!

Cobalt

Turnout control redefined

Installation examples: (b) Using other Cobalt added accessory items

The easily to use and very helpful

"Tie bar ballast label"

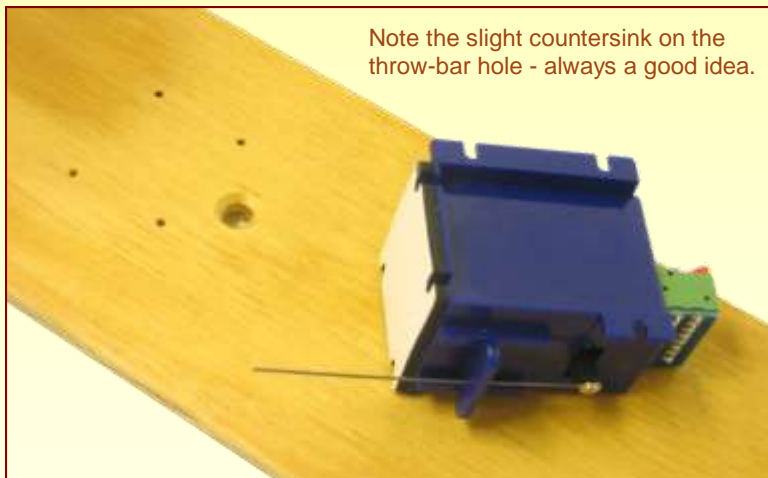
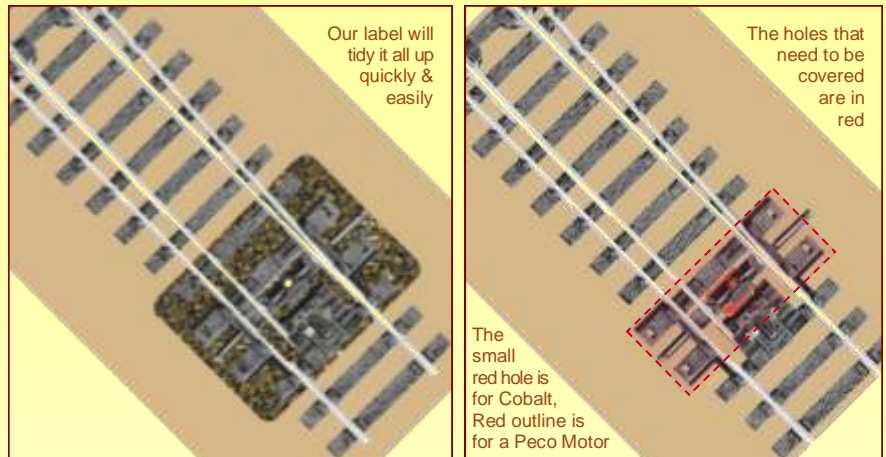
Some things are so simple that you wonder why they haven't been made before:

When you drill to mount any turnout motor, you always end up with an unsightly hole in the base-board that also makes ballasting later a problem.

Our "ballast label" is self adhesive EXCEPT where the tie bar goes and has a slot pre-cut for the actuator wire. It is pre-printed with fine HO scale "Weathered ballast" but cut to size works in N too!

Using the label reduces the need to glue around the tie-bar, making installations tidy & trouble free.

A low cost accessory that you shouldn't be without!



The achievement of total silence

Using the pre-formed double sided foam pad:

Cobalt is already very quiet in comparison to all other turnout motors but by utilising these foam pads, they will instantly become even quieter...

- (1) Pre-drill the throw bar hole and 4 x screw pilot holes
- (2) Paint /varnish the area where Cobalt will be mounted.
- (3) Apply the pad to the top of Cobalt and fix in position with the throw-bar centred and with the four screw mounting slots in line with the pilot holes.
- (4) Add the screws. Tighten evenly but not overly tight.
- (5) After 24 hours, the adhesive will have had time to settle and you can safely remove all 4 of the screws... Resulting in the quietest possible turnout operation.

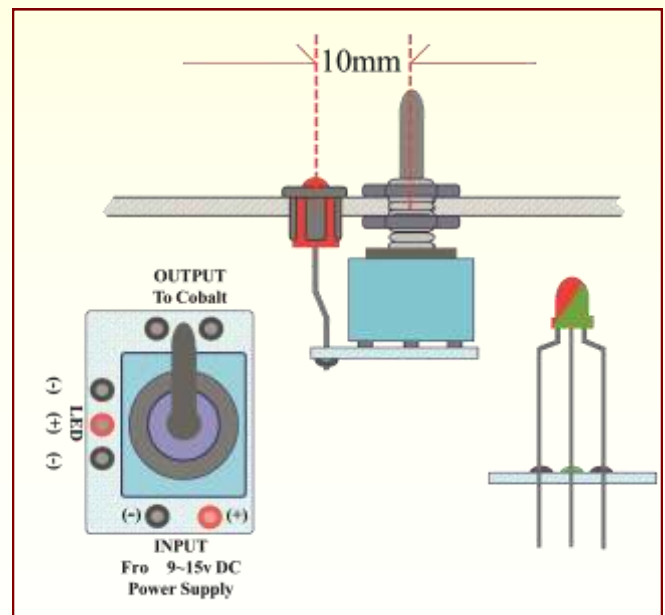
The "ready to go" DPDT switches with LEDs

Wiring a DPDT switch as a reversing switch is not hard but its a time consuming thing to have to do.

Our ready-to-go switches have all the hard work already taken care of and also have pre-ballasted LED outputs so you can easily add LED panel lights without the need for either resistors, another added power source or a maze of complex wires.

They really do make it easy: All that's needed are 2 wires from the DC power supply, and two wires to each Cobalt Turnout motor!

Supplied in packs of three, they come with either a selection of LED colours and plastic LED mounts or with a choice of either red or Green LEDs already fitted to smart Chromed brass bezels for a smart panel and very easy installation.



An easy to make control panel "How to" coming soon!

Improve turnout action reliability and layout “running performance”

Cobalt

Turnout control redefined

GET RID OF SNAP ACTION SPRINGS!

Cobalt has a smooth, positive action and there is no need whatsoever for any over-centre springs or snap action devices in the turnouts that it powers.

Besides - why would you want them to “snap” as they change when the steady movement of Cobalt is far more reliable and much more prototypical!

So... for best results and greater realism...REMOVE the snap-springs from Peco or similar points and turnouts.

Here is how its done. It really is very easy to do. the inset pictures opposite show how to go about it.

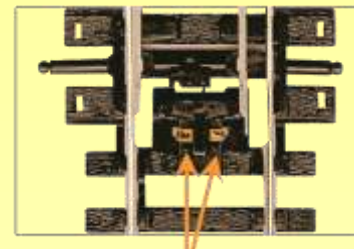
Turnout with a plastic pin.



Lever up
the cover

Remove
The Spring

Turnout with metal tabs



Bend up these
tabs if fitted

- (1) Depending on the turnout, the spring cover will be held either by a friction-fit plastic pin or two metal tabs. Either prise up the cover (if you can see no metal tabs it will be held by a plastic pin) or bend up the metal tabs as shown above and raise the cover to see the fine phosphor bronze spring.
- (2) Gently grasp the spring with tweezers or fine pliers, then remove it completely... Now replace the spring cover and if it was held with metal tags, bend them back into closed position. Its that easy to do and takes only a moment.

USE ONLY LIVE FROG TURNOUTS.... And prepare them for best performance and reliability!

There is no greater frustration than building a layout using insulated or insul-frog turnouts “because it looked easier to wire them” and then finding that there are intermittent shorts at the frog, that those point blades that use tabs to collect power stop working reliably as soon as they are ballasted and weathered to look good... or that shorter wheelbase locomotives stall on them when running slowly... as they WILL do as small loco's always run slowly in yards and sidings - and that's where the all of the turnout are!

So... You really should use Live frog turnouts exclusively. There is no doubt at all that live or “electro-frog” type turnouts are the very best choice for reliability on any permanent layout and as they also usually cost no more - its simply a sensible decision!

Even then we can make things better... And this has been made easier recently by Peco, as they now pre-prepare much of what needs doing, making it a ten minute job the make their electro frog turnouts about as good as they can be.

Its a simple process, as the diagrams below show. (Peco turnout used as an example)



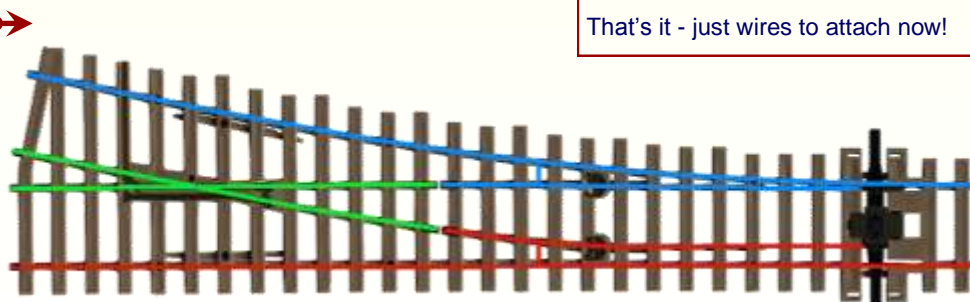
Step 1 - improve the power flow

- (1) turn it over. You should see a wire attached to the frog area. Pull it from its slot ready to attach a dropper (it will be connected to the common wire of one of Cobalt's switches)
 - (2) There are two orange bars on the drawing to the left. These are wire links you should add (solder them between stock and closure rails).
 - (3) There are two red lines. Older turnouts will need the rails cut here. Newer turnouts already have the rails gapped., but there will be wire links here... Please remove or cut them.
- That's it - just wires to attach now!

Step 2 - attach the droppers

- (1) attach a green wire to the frog. This should be wired to the common terminal of one of Cobalt's built in SPDT switches.
- (2) Attach whatever colours you have chosen for your own track power to the blue and red rails. These wires go to the other two terminals on Cobalt SPDT switch. Now, when you change the turnout, the polarity of the frog will change to match the route and you will have perfect running!

**These quick & simple improvements
will give better overall reliability to
both DC and DCC powered layouts.**



Improving the realism of RTR turnouts in a few “easy to do” steps 1

Cobalt

Turnout control redefined

The Transformation: from just another turnout.... to something a bit more like the “real thing”

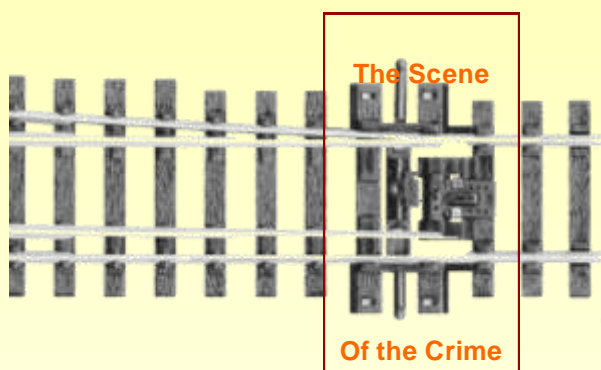
Ready to run out of the box turnouts have to be made easy to use for anyone, so there are lots of compromises made in the overall design. Most are also quite inaccurate in their overall general geometry but we aren't worrying about that, as there is one area that above all makes a RTR turnout look like a toy and that is the area around the Tie bar .

This has to be made heavily as unless the layout is permanent it gets a lot of stress... and it often has to cope with the action of some pretty violent solenoid type turnout motors AND act as their mounting point, as well as contain an over centre spring to compensate for the fact that most solenoids have no “latching ability”.

None of this heavy, clunky stuff is needed any more when you use Cobalt, so we can spend about twenty minutes removing the parts that offend the eye and make a good turnout very much better... And make it far more realistic at the same time!

You may be very happy with your turnouts as they are and that is just fine. Do take the springs out though... Please. If you are one of those who don't need to make changes, then skip ahead a couple of pages and we'll talk about ballasting and painting turnouts.

For those who want a little more but don't feel confident enough to build their own turnouts, read on: We will do our best to show you how to make the whole turnout look so much more realistic in a few easy steps that really aren't too hard to achieve!



The start: Plan and prepare for the process properly

- * **prepare the turnout** - Do the electrical mods from the previous page.
- * **Look carefully at the turnout** - The area of interest for this project is around the Tie-bar, and for the more adventurous, refining the tie bar a bit.
Look closely at the area...there's pretty well nothing about it that could be called realistic no matter how generous we were, especially those heavy and incomplete sleepers with the holes in them!
- * **Get ready...** Because we are going to show you how to replace them with something far better looking, for very little cost and with little effort!

First remove the offending parts:

Step 1: Remove the spring now if you didn't do it before...

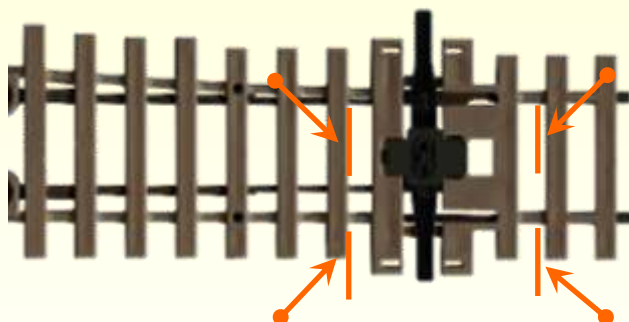
No need to replace the spring cover, we are going to get rid of all that!

Step 2: Turn it over, cut through the plastic web between the offending parts and the rest of the turnout. (the lines / arrows show where to cut)

Step 3: Look at the side of the turnout. You will see on each side a thin web of plastic that holds the sleepers either side of the Tie-bar.

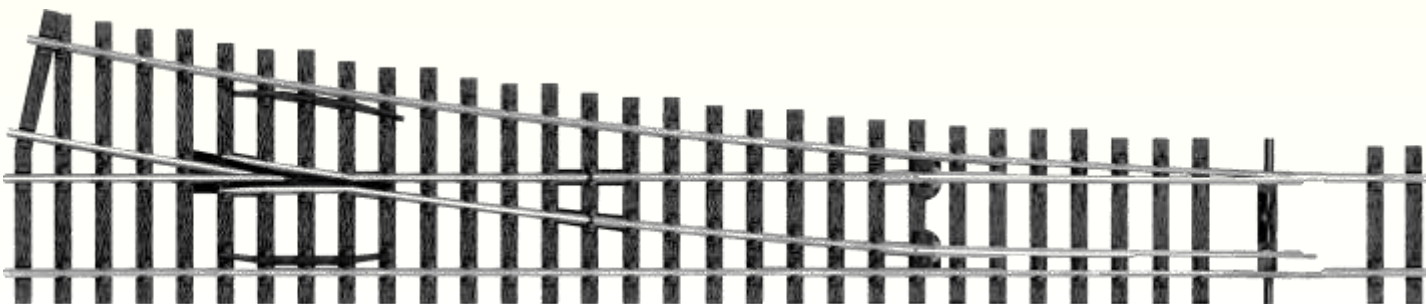
Cut it either side of the tie-bar and then you can tweak the heavy-look sleepers away from the main part of the turnout and drop them in the bin!

You CAN leave the tie bar as is... but it's better not to. Cut the ends and small square spring housing off and file it to a slightly better shape.



Take a minute to admire your handiwork:

Your turnout will now look like this... On the next page, you will see how easy it will be to make it look much nicer than it did before!



Continued next page

Improving the realism of RTR turnouts in a few “easy to do” steps 2

Cobalt

Turnout control redefined

Next step: Replace those ugly parts that we removed:

This is easily done with sleepers (ties) pre-cut copper-clad material—the same stuff that Circuit boards are made from. (These are available from C&L fine-scale in UK or DCCconcepts in AU in the right width, which is 3mm (order 1.6mm fibreglass 3mm sleepers) .

If you can't find the correct width, then a few strokes of a file will correct wider ones, or if you want to cut your own that is fine... you can easily cut them from sheets of PCB material that is available from most electronic parts suppliers.

Look closely at the drawings below and you will see there are a couple of lengths of sleeper (tie) needed. Cut them with saw or track cutters and then if needed, file the ends square. Once that is done, gap by removing a small amount of copper from the centre of each with a round backed needle file (This removes it more subtly than a slot with a file edge or saw).

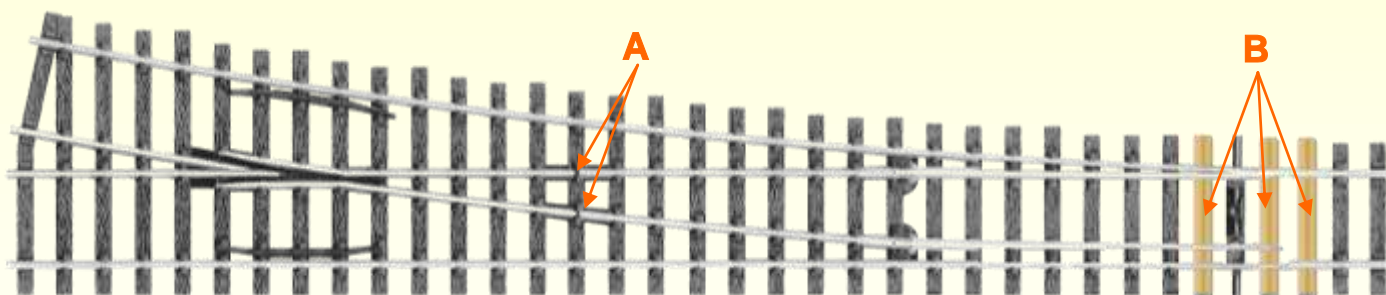
Soldering the copper-clad sleepers in place.

- (1) Clean the PCB sleeper (tie) surface with a fibreglass brush or fine wet and dry. Apply a little liquid flux to the area where the rail will sit. Tin the area as follows: Less is more when it comes to soldering flat-bottom rail to copper clad sleepers!
- (2) Wipe all the solder OFF the tip of your Iron with a damp sponge. Then re-apply only a very small amount - just 1mm or so of solder wire at most. Put a light coat of solder on the sleeper (tie) where the rails will go - it should be thin, NOT a lump.
- (3) Turn the turnout over and clean the bottom of the rails where these sleepers will go. Use a fine file if you like, or the methods above. Paint the bottom of the rails with some liquid flux.
- (4) Place the turnout on a flat surface that you can solder on. Place the sleepers (ties) in the correct position. Be accurate and keep them parallel with the existing plastic ones. (You MAY need to raise them very slightly if they are thinner than the originals - cut a strip of 1mm thick cardboard and it as a packer underneath to hold securely against the rail so you can do this easily)
- (5) If you like, add a wee bit more flux - it can't hurt and is better than not enough! Apply the Iron so that the tip meets both sleeper and rail and move back and forth a couple of times with light pressure. Leave it in contact no more than about 3 seconds. In this time the flux should hiss and you will see the tinning soften and flow under the rail. Count to 5 then you can take the finger pressure off the rail and the joint will be solid—and nice and subtle if you didn't use too much solder! Repeat on all other joints.

(6)

TIP: Space the new copper-clad sleepers/ties well so that they are even. Keep the ends of all of them on the straighter side even and it will look much better. Cut off those extensions on the tie bar too... We want it subtle!

Your turnout will now look like this: It looks so much better when the toy-like “Heavy look” around the tie bar area has been removed, doesn't it!



Next page we are going to prepare the turnout before laying it... Time for a quick checklist:

- (1) Green “Frog dropper wire” soldered to the frog, bus wires in correct colours for the Power Bus soldered to each stock rail.
- (2) Gaps cut OR links removed at A.. Gaps properly filed in copper-clad at B
- (3) Turnout given a quick wash to remove any flux residue or swarf from filing (use a bathroom spray cleaner and rinse well.

All done? OK, we can move onto the next page and get our turnout ready to lay...

EXPERT TIP: soldering droppers to rail and turnouts:

- (1) You need a soldering Iron with a clean shiny well tinned tip, some non-acid flux & some sapphire 179 solder (DCCconcepts).
- (2) Strip 6~8mm of insulation from the dropper wire and twist it well. Add a bit of flux. Tin it, bend 90 degrees at mid point of the tinned section and then cut the end off the “L” so it is about 2mm long.
- (3) Cut plastic web from between the sleepers where you will attach the dropper. File the rail bottom so its a clean metal surface.
- (4) Add a bit of flux to the clean metal of the rail and tin the rail bottom with a little solder.
- (5) Add flux to the tinned rail. Hold the “L” of the wire to the rail. Apply the soldering Iron and the solder on the rail and dropper will flow together immediately. Remove the Iron/hold the wire steady. Count to three/let go. **That's it... a perfect join in seconds!**

Laying track and Turnouts - Preparation before you add ballast.

Cobalt

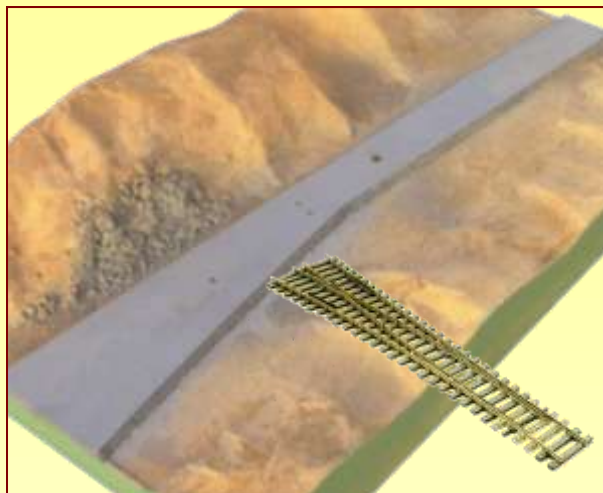
Turnout control redefined

Realistic track ready for tidy ballasting to be proud of with zero stress in just a few easy to do steps.!

Now that you have modified the turnouts/point-work to look good it takes just a few easy steps to go from bare track to a realistic layout. We've created a small demo module & will photograph each step.

(Our scenery is just card formers & brown paper dipped in diluted glue, colour is paint mixed with some plaster and all initial texturing is dry stone powder from the roadside sieved on with a kitchen sieve onto the wet paint. Rocks are from the roadside too).

- (1) Create the basic scenery and lay the track bed. We have used our own DCCconcepts closed cell foam track-bed here, but any way you want to do it is fine.
- (2) Once this is done it is time to spray the track-bed area with standard gray primer, masking the scenery roughly with paper or fabric.
- (3) Place/cut the track to fit and drill holes for the droppers and throw-bar (or use the template and drill pilot holes for fixing Cobalt at the same time)



- (4) Lay the track: We prefer to pre-fix droppers under the rails so they can be fed through the holes at the same time as track is laid. We prefer to secure our track with PVA glue run along every 3rd/4th sleeper/tie.
- (5) Mask the scenery again and re-spray the track area with another light coat of the gray undercoat and let it dry thoroughly (overnight is best).
- (6) Buy some dark brown wood stain and add a little black and terracotta or red-brown paint - the predominant colour we want is "aged sleepers and track" not a rusty look, so be heavier on black than red-brown.
- (7) When the gray undercoat is totally dry, give the stain/paint mix a good shake and with reasonably soft 1~2" paintbrush paint the whole of the track and underlay. Brush gently and be generous, be quick and don't be fussy. This whole Module took only about 1 minute. When the paint coat is done go all over it again with a stippling motion to remove any brush marks. Because its mostly stain it will be a "See through brownish colour" now with the gray still semi visible. That is exactly what we want! (In scenery, less is often more when it comes to colour!)

- (8) When the first stain is dry...Take a little of the stain and add more of the terracotta/red brown paint to it. NOT too much! This will be our colour for rusty rails & we want it to "wash" easily over the rails.
- (9) Take a cheap kids paint brush (3~4mm max width) with stiffish bristles. Shake up this redder stain and quickly paint along the rail sides. We do NOT want to be over careful as it will not matter if a small amount gets on the sleepers... So be careful but not too careful. Shake or stir the "stain-paint mix" often - the paint settles out quickly.
- (10) Wait a while & admire your handiwork. If there is too much on a sleeper spread it. If you want more rust colour let it "tack" properly first then re-coat ...but not too much. We want the stain to settle and blend naturally. You will notice that the stain has partially separated and the paint part has gathered around fixings and bolts... That's just what you want!
- (11) Leave overnight... Touch up again if you want but do keep it subtle as there's nothing worse than rails that look like they were painted - nature is more subtle than that and there are few hard edges, even to colour!



EXPERT TIP: Making later clean-up easier and keeping things moving properly:

* **When you paint around rails the tops are going to get covered...** But its easy to clean them. Before you paint take an off-cut of soft timber like pine and put it end-wise into a saucer of thinners. As soon as you finish painting, shake it off and rub over the rail tops... paint will come off immediately leaving a nearly perfectly clean rail-head... needing only a quick pass of the rail cleaner later!

* **While the paint is drying, move the blades occasionally so they don't get stuck hard.** If they do stiffen up a bit don't worry... When all the ballasting and detailing is done, just get a couple of tiny drops of thin oil and place it on and around the tie bar... work the turnout a little and it will free up - and the oil will spread into the ballast a little... Just as it always does on the real thing!

Ballasting around your Turnouts... and a few general ballasting tips.

Cobalt

Turnout control redefined



Ballasting is a job that modellers dislike and I've lost count of layouts ruined by those who speed through ballasting just to get it over and done with... but it can be a relaxed, easy process.

Now that we have the track in place and ready, we will start with the "cess". (The area between the ballast and the rest of the world). We start there as its always best to use the same sequence as the real thing does.

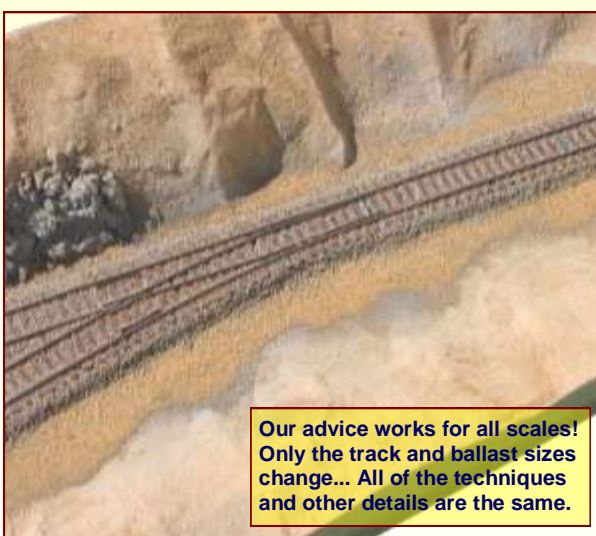
When the track is laid, the cess is a part of the track engineering that is completed before ballasting so ballast should be on top of it... It's also the part that nature encroaches on so it should be under greenery at the outer edge.

- (1) Get hold of some very fine "stone powder" from the side of the road.
- (2) Mix PVA & water about 3:1 and paint it from the edge of the track-bed to the edge of the other scenery - Make the edge soft, wavy and natural.
- (3) Put the "stone powder" in a fine sieve and tap so the glued area is well covered with fine stone grains. Mist the area with alcohol based window cleaner. Leave until it's totally dry. When dry, Vacuum up the excess

Tidy ballasting is important. This is how to keep it that way with no stress and also reduce the amount of ballast you will need!

With the "Cess" tidied up we will tackle just the angled shoulders of the track-bed as a first step. This is where you will really appreciate having the correct 60 degree shoulders on that pre-cut closed cell foam underlay!

- (4) Using a brush of about 5mm ~1/4", paint neat PVA or latex glue ONLY on the ballast shoulders. Try to be neat and do only about a metre (3 feet) at a time.
- (5) Put ballast (We prefer 75% N, 25% HO mixed) into a bag & cut a small hole in one corner. Sprinkle a good coat onto the glue, When well covered, pat it all down gently with taps of a finger then leave it alone totally until dry.
- (6) Without touching the ballast and cess areas, vacuum off the excess (We keep a small vacuum cleaner especially for ballast - so we get 100% recovery)
You'll now have a tidy edge to the ballast area that looks like it should!



**Our advice works for all scales!
Only the track and ballast sizes change... All of the techniques and other details are the same.**

Now the all important step... Ballasting around the track!

We have tidy edges already, These edges will hold the rest of the ballast as you spread it... Keeping the job tidy and making it much easier.

- (7) Put the ballast into a wide mouth jar or dish. borrow a soup spoon
- (8) Place ballast ONE spoon at a time and spread it with your finger tips.
- (9) When an area has been well spread, very gently tap the rail with the spoon. This will vibrate the rail a little and any bits that are alongside the rail will bounce away... So there will be less to clean from rails later.
- (10) STOP adding ballast one "sleeper gap" away from the tie-bar. We will do this area in a different way on the next page!
- (11) Be fussy. If there are any grains on the sleepers or there they should not be such as between guard rail and rail, remove them with the wet tip of a fine modelling paint brush. When you've done enough for the day - Stop! Its best to fix what you start and do more another day!
- (12) Make up a mix of one part glue to 3 parts warm water. When that is well mixed, add 2 parts Isopropyl alcohol or methylated spirits & shake well. Get a spray bottle with a fine mist. Fill with methylated spirits or alcohol.

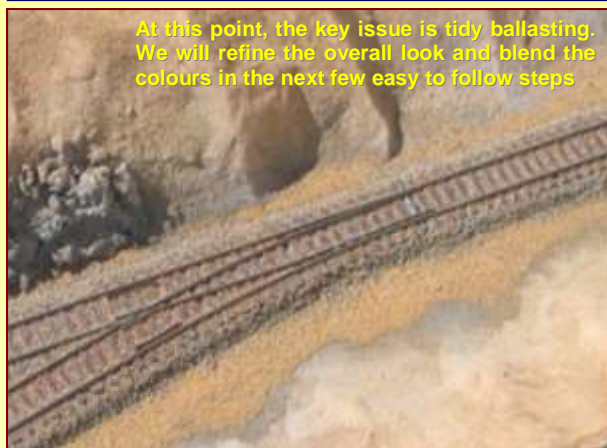
- (13) From far enough away to not disturb the ballast, mist the area to be glued with methylated spirits or alcohol until it is quite damp.
- (14) Shake the Glue mix again and drip it onto the ballast with a dispenser bottle - do it from close up so you don't disturb the ballast. You do not need to use too much glue - it will soak in really well and spread easily. Do NOT touch the ballast now for any reason.
- (15) When you have added glue to the entire area of ballast to be fixed during the session, re-mist again with a generous amount of Meths/alcohol. Now... Walk away and don't touch anything until it is totally dry - that will be 6 to 24 hours depending on weather.
- (16) When it is totally dry rub a finger alongside each rail and put a toothpick between all check or guard rails etc. Rub any grains off sleepers and generally tidy up. Because you did not use a too strong glue mix, this will all be easy. Vacuum up any loose grains.

That's the worst of it done! On the next page, we'll do the area around the tie-bar and add a little more "easy weathering".

Ballasting around your Turnouts... and a few general ballasting tips.

Cobalt

Turnout control redefined



At this point, the key issue is tidy ballasting. We will refine the overall look and blend the colours in the next few easy to follow steps

Your track will now look something like this...

It will be natural and well ballasted, with no lumps of ballast where they shouldn't be and no need to spend hours picking excess off the rail sides and sleepers... All because you were relaxed about it, took it one step at a time and used the right tools and glue mix!

If you want to do more than a short length at a single session, go for it, but still do only a metre at a time and leave a gap, doing another metre... Don't jump ahead though - do all of one step/process at a time - in other words, do several lots of ballast edges at a time, then go back and fill the gaps.

When all the edging is done, do several 1 metre lots of ballasting with gaps between them then go back and fill those gaps.

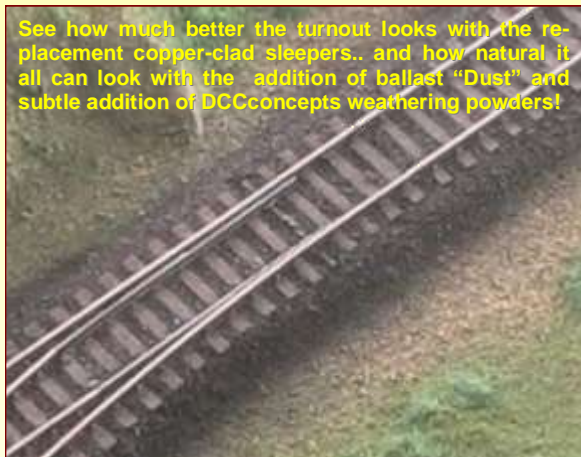
Because we are being careful, deliberate and using a step by step process it will all seem much less of a chore... and because each step uses the same process, the gaps you fill later will be totally seamless, blending the separate tasks together as it you did it all at once!

Ballasting around the tie-bar.

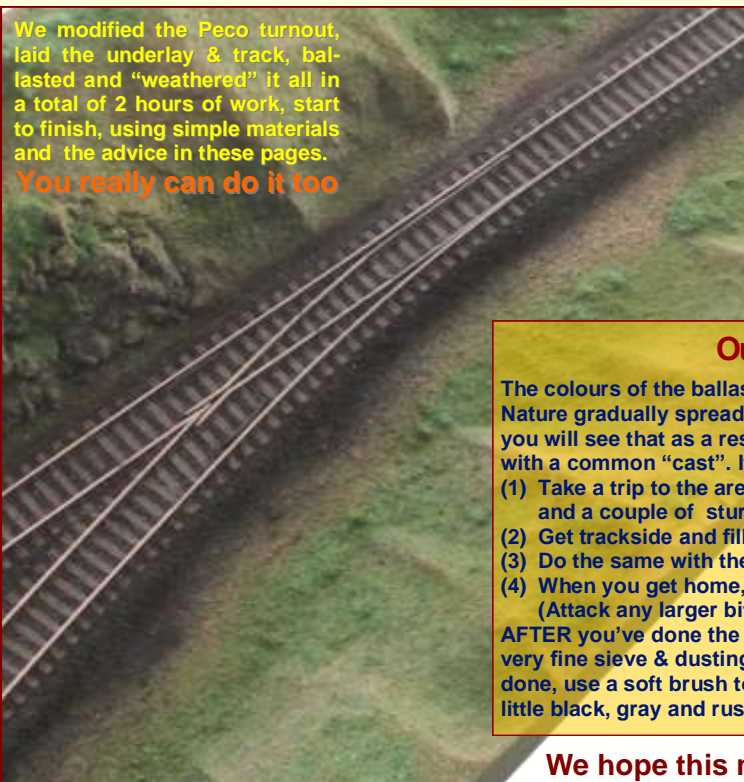
This area needs care so take your time. Even if you take your time and are very cautious, 5 minutes per point/turnout is all this step will take!

- (1) Take a reasonably fine modelling paintbrush and paint neat glue between the sleepers (onto the track-bed) alongside the tie-bar.
- (2) Use another similar brush and paint a little oil onto both sides of the tie-bar itself. This will stop any glue or ballast sticking to it.
- (3) Now, paint glue into the gap either side of the tie-bar itself. You do NOT need a lot of glue, but the roadbed should be well covered. If you do get a little too much on, pick it up with the brush and remove it. Be fussy!
- (4) Pick up a little ballast and sprinkle onto the glue - a teaspoon is the perfect tool! When its all in place, pat down with a finger, mist it with the Methylated spirits or alcohol and then just leave for several hours.
- (5) When its dry vacuum off, tidy up and that's it - all done. Congratulations!

See how much better the turnout looks with the replacement copper-clad sleepers.. and how natural it all can look with the addition of ballast "Dust" and subtle addition of DCCconcepts weathering powders!



We modified the Peco turnout, laid the underlay & track, ballasted and "weathered" it all in a total of 2 hours of work, start to finish, using simple materials and the advice in these pages. You really can do it too



Refining the ballast look to integrate it into scenery:

- (1) Take some of the ballast and sieve it so you end up with only the finest particles. Spread these all over the ballast area and work it in with a finger or fine brush as needed.
- (2) Mist-spray with meths then spray using a window cleaner bottle containing a really weak glue spray (1 part glue to say 4 parts water and 4 of methylated spirits or Alcohol)
- (3) When its all dry, tidy up then follow the Expert tip below as the final detail work makes all the difference!

Our final "Expert Tip" for this manual

The colours of the ballast and cess are those of the railway and the area that is close to it. Nature gradually spreads that colour as a fine "dusting" over everything. Look closely & you will see that as a result there are no quick colour changes and that areas blend in tone, with a common "cast". It is quite easy to recreate it too... Using natures own materials!

- (1) Take a trip to the area you are representing in your model. Also take with you a trowel and a couple of sturdy bags to hold your materials when you gather them.
- (2) Get trackside and fill one bag with the "Fines"-The dust and tiny rocks.
- (3) Do the same with the local non-railway soil and perhaps get some "roadside dust" too
- (4) When you get home, use several sieves to sort the dust from heavy/sandy stuff. (Attack any larger bits with a mortar & pestle to grind them smaller)

AFTER you've done the initial weathering,... It is time to unify the overall area by using a very fine sieve & dusting it with the "dust" grades that you have created... When its all done, use a soft brush to work it in as needed, unifying the scene. Finish it all off with a little black, gray and rust coloured DCCconcepts weathering powder.

We hope this manual has been of help to you. Enjoy the hobby!

The Cobalt turnout motor is warranted for life

We have chosen the very best materials and taken great care with the design of our Cobalt turnout motor, using only the highest quality materials and incorporating such refinements as gold plated PCB switch contacts and a super strong and reliable drive system that can cope with a wide range of applications and DC power supply voltages under any reasonable model railway conditions.

The Warranty... Simple, fair and clearly stated in plain English.

(This Lifetime Warranty is not transferrable and applies only to original owners who purchase their Cobalt turnout motors from an authorised Cobalt stockist.)

Having designed Cobalt to last, we are pleased to offer Cobalt owners a lifetime warranty when Cobalt is used and installed in accordance with the instructions on an indoor model railway in any scale.

The warranty applies when Cobalt is used in any reasonable application as an actuator for point/turnout control, signal control or any similar or related model railway purposes, providing that it is installed with respect and has not been subjected to water or corrosive liquids, has been properly wired in accordance with these instructions, operated within recommended supply voltages and power has been supplied to it by a properly rectified DC power supply or any NMRA compatible DCC decoder with a voltage and power output which meets our specifications.

The first year after purchase....

If your Cobalt turnout motor or any part of it fails under any fair and reasonable operating conditions within 12 months of purchase please return it to your retailer along with a copy of purchase receipt.

If returning by mail or (enquiring by E-mail) include a description of the installation and how it failed.

Providing that examination proves that the failure was not due to physical abuse, water or similar damage, over-voltage or excessive current loading on switch contacts, your retailer is authorised to make this decision locally without further reference to DCCconcepts and so once warranty cover is agreed you will promptly receive a new Cobalt turnout motor from your retailer free of charge.

In case of uncertainty: *If your retailer is unsure of any issue relating to the failure he may choose to refer the claim to us at DCCconcepts Pty Ltd along with your contact information and in that case we will promptly assess the failure and if warranted, supply your replacement directly from our offices.*

For the rest of the time you continue to own Cobalt....

If your Cobalt turnout motor or any part of your Cobalt turnout motor fails under what are reasonable operating conditions at any time after the initial 12 months of purchase, please contact DCCconcepts Pty Ltd directly, advising of us how Cobalt or any of its components has failed.

Once the required description of the failure and other information has been received (including proof of purchase) we will then decide whether to ask you to return it for evaluation, repair or replacement, or... if it is a simple issue and if it will save you post cost and time, with your prior agreement we may simply offer to supply you with the parts needed to carry out the repair yourself.

DCCconcepts “absolutely always” spares & accessory part guarantee

We feel very strongly that when we create something that others will buy and use on their layouts, we should be very sure that if the worst happens and something goes wrong, spare parts MUST be available as and when needed... and when a lifetime Guarantee is offered, it must be properly backed up.

Therefore, if we cannot supply the service parts needed at any time, we will replace the whole product and if we ever have to back-order replacements for lost Cobalt parts such as special screws, actuator wires or anything needed for installation or actuation, they will be supplied to you free of charge.

Cobalt *Built to be the very best... with the best warranty ever!*