REX is a clever wee thing - compact, reasonable in cost and very versatile...

First. Let's explain what it is. REX means "Relay Extension Device".

REX is designed to work any and every way we could think of… although because we are aware of the endless creativity of modellers, we will not be at all surprised if one of you thinks of other interesting possibilities :-).

Simple to use, REX is extremely versatile, so we will cover it by sending you TWO separate newsletters.

In this, the first, we will:

- **Explain REX, what it is and what it can do.**
- **Use REX to solve a couple of common track-wiring issues—for both DC and DCC users.**

  Examples include:

  * **Reversing loops for DC and DCC modellers**
  * **Wiring and interlocking a symmetrical 3-way PECO turnout**

We hope you enjoy Part 1. Part 2 will follow in a week or so.

If you have ANY questions at all in relation to REX, please ask immediately—you never know, we may just answer your question in Part 2 of our REX newsletter!

Regards,

Richard Johnson

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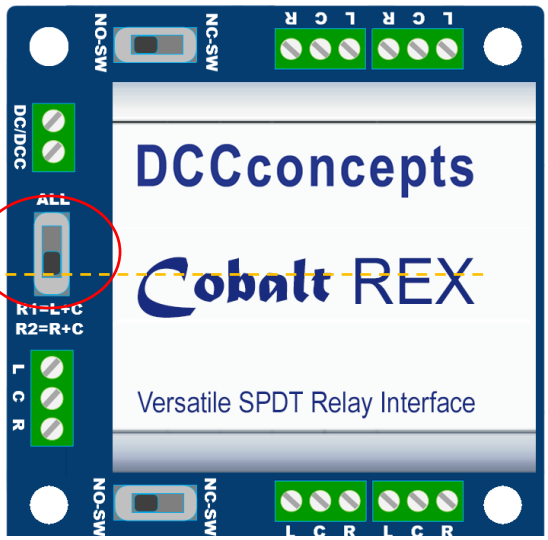
Note: For clarity, we have numbered terminal blocks 1 to 6, and switches A, B, C within any descriptions.

The INs and OUTs of REX.

Connections and their actions or purposes...

First, lets show you REX. We will explain what each of the connections and switches can do for you...

REX actually has TWO halves, each with two high quality high power S.P.D.T. changeover relays. Because these relay terminals are all totally independent of any power, they can be used for any purpose you might imagine.

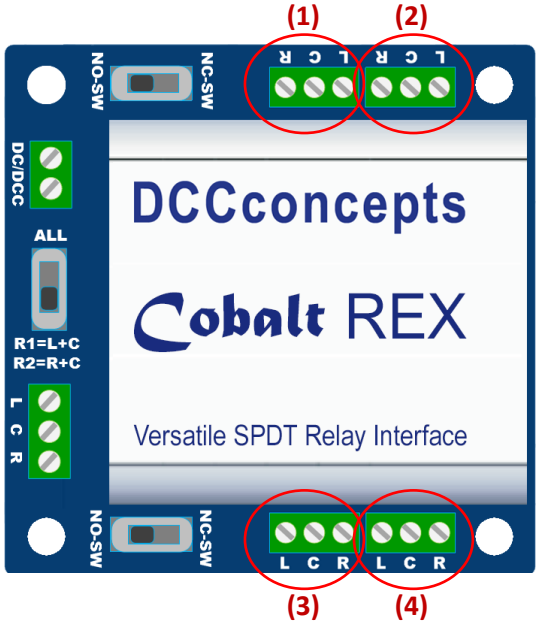


The dotted line indicates the split. The 2 relays at the top form 1 set of outputs, the two at the bottom the other.

The two halves of REX can work separately or together, depending on the choices that you make.

See the red circle for the switch (A) used to choose how they act. Switched to the right, the two halves are independent. To the left will make them all work together.

Connecting the devices that you want REX to control uses the 3-terminal blocks close to each relay. Each 3-terminal block is effectively an SPDT switch. Switch connections are all set up as Left - Common - Right.



Because the two contact sets on each half of REX are also totally independent you have the choice of using them as two separate switches for two different things OR you can also wire them together to act as a DPDT or double pole double throw switch (relay terminals can handle 5 Amps).

This really adds to REX's versatility as it means "reverse polarity switch wiring" is also possible, so REX could then become an auto-reversing device for a return loop on DC or DCC - or - control direction of a DC shuttle!

If we now think about linking outputs of the top (switch 1 and 2) or bottom switches (switch 3 and 4), we can think about neat stuff like interlocking as well.

We will look at these things later with an example or two because we have more to tell you first.

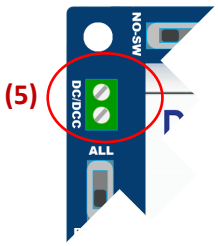
It is time to move on to the screw connections and control switches that provide power to REX, decide whether the switches or devices we use to trigger rex are momentary or on-off and, most importantly, we will take a look at the input switches that activate REX to make things happen around the layout.

These things are all on the left side of REX. There aren't many, but they combine to make REX a very versatile device. We've cut the images here down a bit to leave room to talk about them.

Power Input. REX can be powered by many things and is usable on AC, DC or DCC layouts. The red ring shows the position of the two power input, which can be:

- A regulated DC power supply between 9 and 18V
- DCC track power at all DCC standards levels
- AC Accessory power from 9 to 18V AC
- A battery pack or similar.

Please note: REX does not draw much current at all, even with both relays energised. The relays will handle 5 amps.



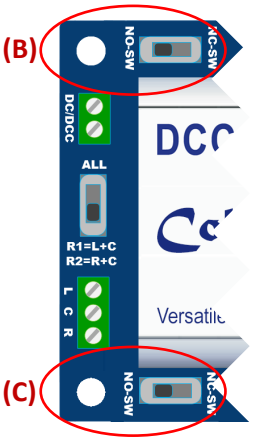
NO/NC selector switches. There are two of them (B, C). One switch is for the top two relays, the other is for the bottom pair. (The red rings show these switches)

- Used with NO switches (Normally OPEN or OFF such as push button switches, spring centre toggle switches, reed switches or perhaps Hall triggers).

  When the switch is at the NO position, any momentary switch or detector activity will change the relays it controls & they will latch into the position selected. A second pulse/connection to the same terminals releases them.

- Used with NC switches (Normally closed or ON-ON switches such as relays, standard toggle switches or the switches on COBALT turnout motors).

  When the switch is one way, then the relays will change. When the switch is released or changed, the relay will also change (the action is toggled).

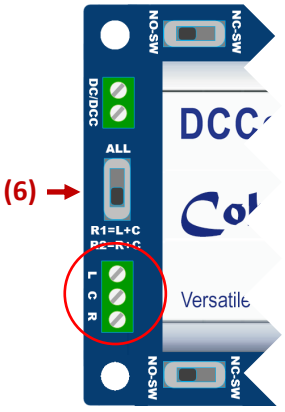


The switching contacts that you will use to control REX. There are only these three terminals, yet they will allow you to do almost anything. (See the red circle)

- Terminals L and C will control the upper pair or relays. (sw 6)
- Terminals L and R will control the lower pair or relays. (sw 6)

You can connect these terminals to almost any form of switch. It could for example be a momentary (NO) or on-off (NC) switch. It can be part of something else (ie a Cobalt motor switch), a reed switch or a detector.

With this flexibility in switches, REX outputs can be controlled by almost ANY kind of switch, relay or detection device. Note: If the device has an active output with live voltage, then it will be OK to use it providing that output does not exceed normal logic levels (this is usually 3~5v). If unsure of this, initially add a 1k resistor in series with one switch wire. Reduce in 100 ohm steps until the switching works.



That is REX and its connections. Now let's look at some simple examples of how REX could be used around your layout to improve operations and do things that might otherwise impossible without complex wiring and customised circuitry. It can also make it harder to for you make mistakes that result in short circuits and derailments at point-work AND even save you money.

Examples using REX.

#1 - The reversing loop.

EXAMPLE #1: An automatically controlled reversing loop for those who run trains with DC.

General concept: DC modellers tend to avoid reversing loops or anything similar because they really complicate life. However, it can be useful to have a wye, loop or diagonal within the trackwork. We will show you the loop here but both wye and diagonals share the same features.

- **REX will actually be "remotely controlled" by two detectors**. We recommend a simple IR detector (best as no additional track gaps are needed)
- **The TOP half of REX** will control the turnout motor controlling the loop.
- **The BOTTOM half of REX** will be configured as a reversing switch to change the polarity of the power on the main part of the layout ahead of the train (including of course the exit track from the loop or wye) so that you do not have to slow, stop or do anything at all. Because the entry and exit tracks of the loop, diagonal or wye will toggle each time it is used, the reversing section will always be ready to accept the next train.

REX switch positions:
See the red box placed over each switch like this [ ] or this [ ]

Connect this wire to Rail #1
Connect this wire to electro-frog FROG
Connect this wire to Rail #1

This wire to Solenoid coil #1
This wire to one CDU wire (Other CDU wire to Solenoid common)
This wire to Solenoid coil #2

Regulated DC Power Supply 12~18v DC 1~2.5 Amps

DCCconcepts
Cobalt REX
Versatile SPDT Relay Interface

LOOP turnout control - Using top half of REX for other brand turnout motors (For Cobalt Omega/iP Analog see notes below).

IMPORTANT
When a DC layout has a reversing loop, the loop is the place where the MAIN DC controller wires are connected. The rest of the layout is linked via REX.

Dt-a

Dt-b

The Detectors are infra-red types

"REST OF THE LAYOUT"
Note that the layout track ahead of the train is switched/reversed, so a train can continue without any interruption OR a need to stop.

LOOP turnout control using a Cobalt Omega / iP Analog (for other types of point motors see wiring notes above)

We use a Cobalt Omega or iP Analog turnout motor as it is a DC layout. If you run locos with DC but use a DCC Accessory bus then add an AD1 Accessory decoder for digital use if you wish.

12v DC (regulated DC power supply)

Cobalt Omega / iP Analog (They are wired the same)

DCCconcepts

Examples using REX.

#2 - The DCC reversing loop

EXAMPLE #2: An automatically controlled reversing loop for those who run trains with DCC.

General concept: DCC modellers have more flexibility with reversing loops because an auto-reverser can change the polarity of the track under a running train. However, all brands of auto reversers have two real drawbacks:

- They are triggered by generating a short circuit at the rail gaps, and actually create quite a high voltage spike when they do it. It is big enough to see happening in the dark and will both pit loco wheels AND progressively cause incremental damage to your loco decoders.
- They are relatively expensive.

Using REX allows the change to happen without that momentary short circuit so you get the best of both worlds - seamlessly traversing reversing sections without high cost or potentially creating damaging voltage spikes.

- **REX will actually be "remotely controlled" by two detectors.** We recommend a simple IR detector (as there are no additional gaps needed). However if you use an inductive detector such as the NCE BD20, added gaps will be needed to isolate the trigger sections - these are shown with ORANGE markers on the drawing.
- **The TOP half of REX...** will control the turnout motor controlling the loop. For best results, even for DCC users we recommend that you use a Cobalt iP Analog or Omega in this case. While the motor will be automatically managed by the REX, you can also add an AD type accessory decoder if you want to have separate / additional DCC control of the motor).
- **The BOTTOM half of REX…** will be configured as a reversing switch to change the polarity of the power in the loop and before the train reaches the end of the loop. You do not have to slow, stop or do anything at all. Because the entry and exit tracks of the loop, diagonal or wye will toggle each time it is used, the reversing section will always be ready to accept the next train.

REX switch positions:
See the red box placed over each switch like this [ ] or this [ ]

Connect this wire to Rail #1
Connect this wire to electro-frog FROG
Connect this wire to Rail #1

This wire to Solenoid coil #1
This wire to one CDU wire (Other CDU wire to Solenoid common)
This wire to Solenoid coil #2

Regulated DC Power Supply 12~18v DC 1~2.5 Amps

DCCconcepts
Cobalt REX
Versatile SPDT Relay Interface

LOOP turnout control - Using top half of REX for other brand turnout motors (For Cobalt Omega/iP Analog see notes below).

Dt-a

Dt-b

If infra red Detectors are used only the yellow gaps are needed. If you use any form of inductive detector such as NCE BD20 then also add the orange gaps.

DCC Layout Power Bus

LOOP turnout control using a Cobalt Omega / iP Analog (for other types of point motors see wiring notes above)

We still use a Cobalt Omega or iP Analog turnout motor as it gives simple connection. If you use a DCC Accessory bus then add an AD1 Accessory decoder for digital use if you wish.

Cobalt Omega / iP Analog (They are wired the same)

12v DC (regulated DC power supply)

DCCconcepts

Examples using REX.

#3 - The always problematic Peco symmetrical 3-way turnout.

EXAMPLE #3: Interlocking a Peco 3-way turnout to give ONLY correct turnout blade positions.

General concept: 3-way turnouts use two turnout motors, which of course gives 4 possible positions overall - but as there are actually only three routes, one position is not valid.

It is nice to be able to get this sorted with the asymmetric 3-way. However, it's actually very important to get it right with the symmetrical version as it creates a real problem if the "illegal" route is selected.

Why?

Because while with Peco *asymmetrical* 3-way turnout, there is no fouling of the blades because they are offset (although there is still a need for interlocking as the bottom tie-bar pointing the traffic to the right needs to point straight if the top tie-bar is to be of any use).

However - with the symmetrical 3-way, all of the point blades are directly adjacent to each other...so, if operated out of sequence, the blades will be in conflict and foul each other.

How to fix it?

While using motor-drive turnout motors with onboard switching such as DCCconcepts Cobalt Omega, Cobalt iP Analog or Cobalt iP Digital will take care of this for you… Most turnout motor types do not! (We can provide diagrams for 3-ways with Cobalt motors - Ii you email and ask, we will send you one).

Solenoid users… REX comes to the rescue again:

If, like many modellers you are using solenoids or other motors that do not have added switching, it can be difficult to set up… or you will need to add hard-to-wire microswitches or similar. However, REX makes it easier for you.

The next two diagrams will show you how. (we split it into two separate diagrams to keep it clear for you)

- Diagram 1 is for the turnout frog wiring only
- Diagram 2 is the use of REX to interlock the two turnout motors to only allow correct positioning. We do this by using REX to control power to each solenoid by interlocking the common wires of the solenoids.

NOTE:

Sometimes you pre-wire the solenoids before installing them. If that is the case one may end up installed 180 degrees differently as they are not left-right specific. If this happens, when you wire with these diagrams you may find that the motor works backwards. If this occurs do not worry, all you need to do is swap the left and right coil wires at the solenoids. If frog conflicts arise, just swap the two wires from the track over to correct it.

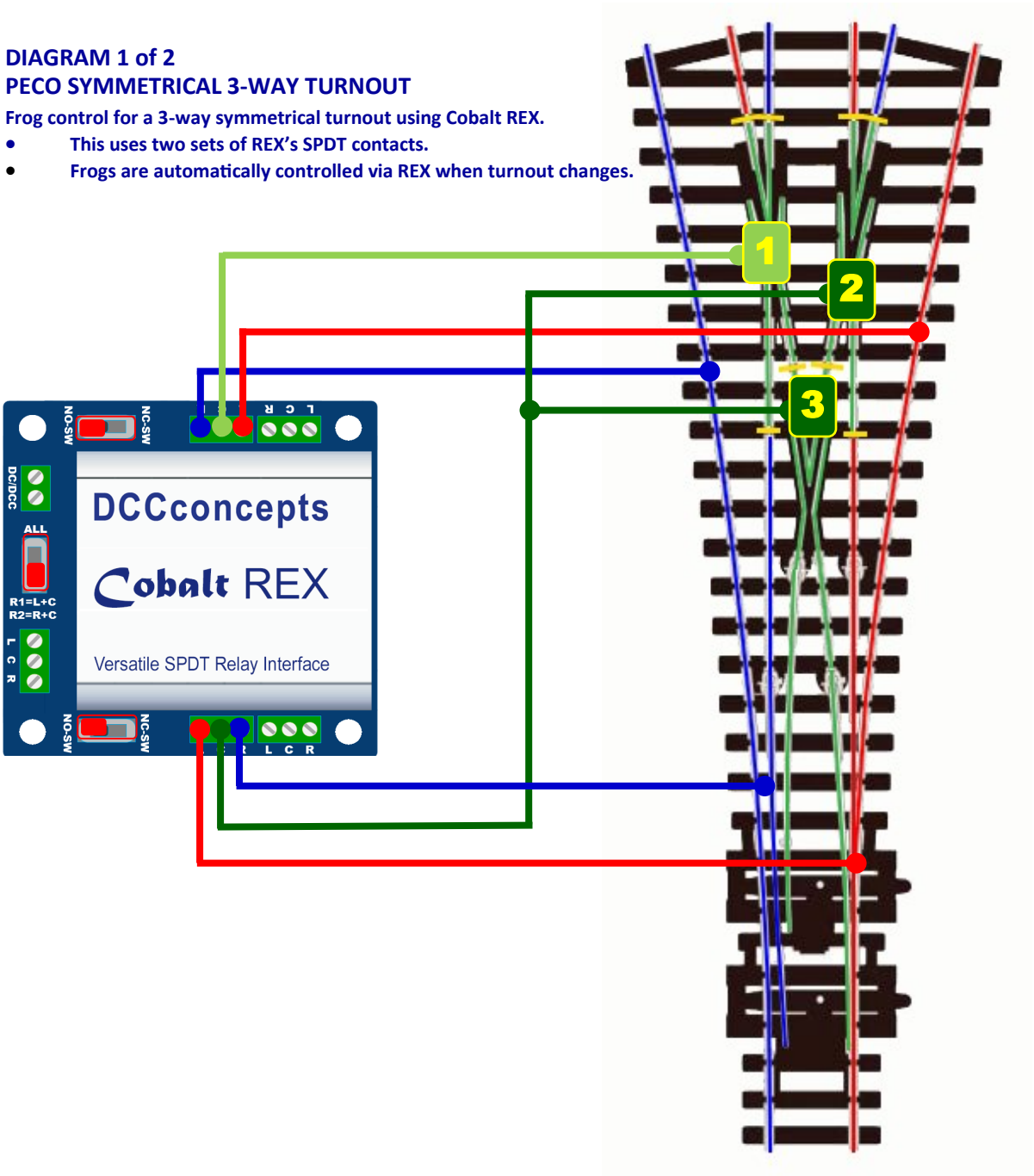
DCC concepts thinking outside the square

DCCconcepts REX. Tiny but Very Clever

DIAGRAM 1 of 2
PECO SYMMETRICAL 3-WAY TURNOUT

Frog control for a 3-way symmetrical turnout using Cobalt REX.

- **This uses two sets of REX's SPDT contacts.**
- **Frogs are automatically controlled via REX when turnout changes.**



DCCconcepts thinking outside the square

DCCconcepts REX. Tiny but Very Clever

DIAGRAM 2 of 2
PECO SYMMETRICAL 3-WAY TURNOUT

Interlocking of two solenoid type point / turnout motors via REX.

- **This uses two Double Pole double throw switches.**
- **They must be momentary "Spring to centre" type switches.**
- **Wire exactly as shown.**