



# Cobalt-S

the switch that  
switches everything

## controls it all

## SOLENOIDS

Please also see  
MANUAL #1  
For full details  
on how best to  
dress & set-up  
your Cobalt-S

## Cobalt-S: what can it do.... the basics

Cobalt-S is a high quality "control lever" which has been created to allow a modeller to use ONE kind of switch to control ALL of the devices on his layout. It is equally usable for any scale, for any accessory whether AC, DC or DCC powered and any form of train control whether it be AC, DC DCC or proprietary systems such as Marklin.

There are a myriad of uses... either for dissimilar or linked operations: For example, one Cobalt-S could do all the following: change a solenoid point motor, switch the polarity of the frog, control associated panel lights and signals AND operate a "safety section" ahead of each frog rail to prevent a point being crossed without being correctly set.

Cobalt-S really CAN control anything that has ever been invented for use on a model railway.

### Operation:

Cobalt-S uses a typical form of traditional signal box lever interface: The catch must be gripped in order to release the lever, and released at end of throw to lock it In position. The pull is smooth and firm and locking is positive.

### ONBOARD SWITCHING FOR SOLENOIDS:

**Momentary:** Cobalt S includes a high-power handling SPDT momentary switch, suitable for any device needing only a pulse of power such as DCC accessory decoders, high or low power AC/DC solenoids or signals. Cobalt-S is therefore the perfect way to add traditional manual control of electrical devices - and a great way to provide an optional control method for DCC decoders that offer that choice. The Momentary switch makes contact at the end of throw.

**Latching or On-On switches:** Cobalt S includes TWO high-power handling "Break before make" SPDT On-On changeover switches that can be configured as either on-on or on-off switches, as well as being able to be used together to create a DPDT switch to control devices that need reverse polarity... or even select between program and main line power for a DCC layout. All Cobalt-S switching is able to handle high or low power switching at any common Model railway voltage.

### Connection:

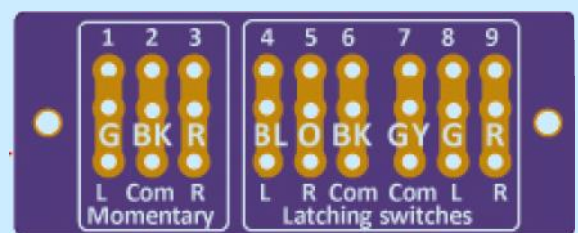
Cobalt-S has a simple to use plug-in 9 wire harness & is also supplied with a clearly marked printed circuit board that tells you which wire goes where - so even for a novice, wiring is simplified.

### Instructions:

The basics are covered by the instructions on the back of the product, and those with simpler applications or needs and modellers with a little experience will need no more than the basic data to be able to use Cobalt-S to do it all...

However... the potential is SO big that we do need to show off what it can do... Without making the use of Cobalt-S look too intimidating! Therefore, we will break down "Working and wiring with Cobalt-S" into several simpler manuals and we are now preparing the first of them, each covering a single subject, as follows: **THIS is MANUAL 2**

- (1) **Manual 1 - Cobalt-S basics: All about Cobalt-s, how to dress it for realism and basic wiring instructions.**
- (2) **Wiring Solenoids & Momentary devices with Cobalt-S, including panel lights & switched frog power.**
- (3) **Wiring Cobalt and similar devices, including panel lights, safety interlocking & switched frog power.**
- (4) **Conditional operation: Interlocking signals and pointwork or pointwork and control options.**
- (5) **Interfacing with digital devices, thinking laterally and problem solving.**
- (6) **The importance of proper power supplies in pointwork switching and overall layout control.**



## SOLENOIDS



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## Cobalt-S: the wiring basics....

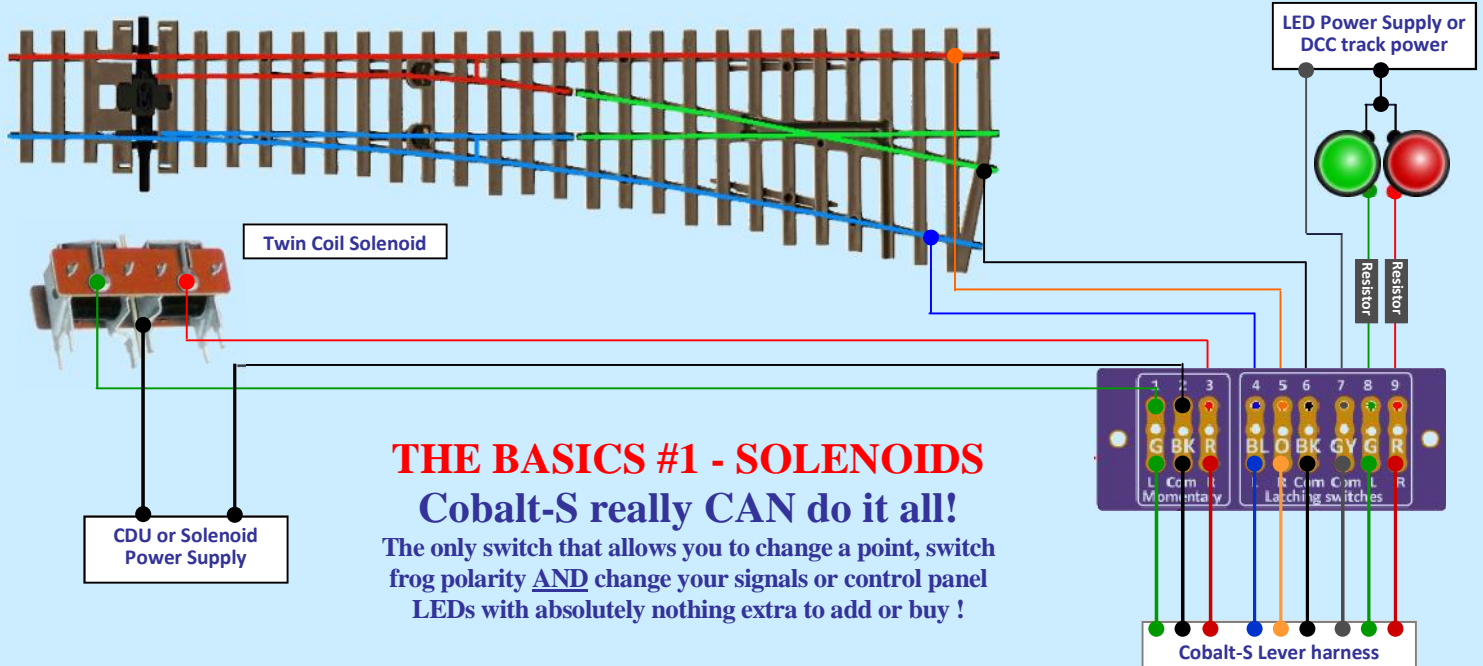
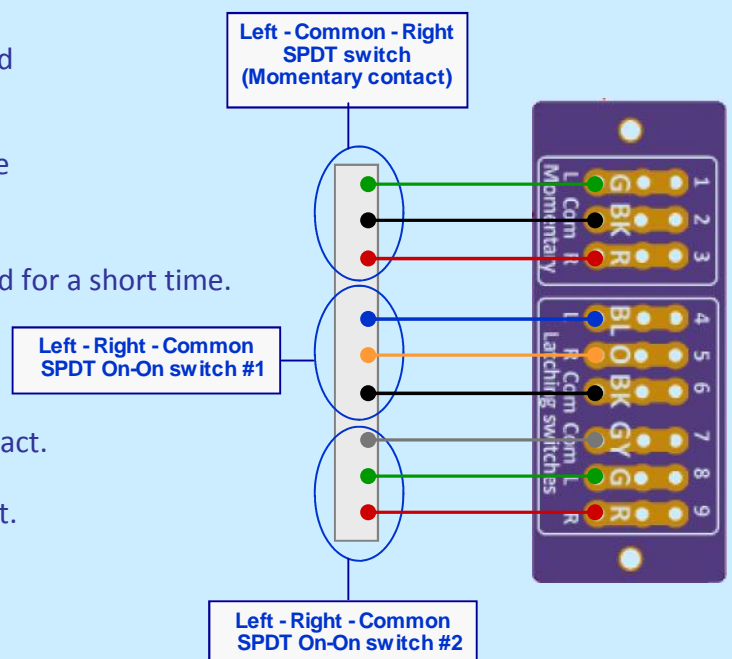
The image to the right shows the wiring basics. The harness is shown in the same orientation as it will look when plugged into Cobalt-S, with the three "momentary contact switch" wires at the top. The PCB you will receive with Cobalt-S will be printed just like this illustration, so you will be able to use the PCB itself as a permanent on-layout "reminder"

### Re Switch types and name abbreviations:

- \* "Momentary contact" means that the wire is only powered for a short time.
- \* "SPDT" means "single pole double throw"
- \* "On-On" means the power stays on in each direction

### Description and purpose of each wire on Cobalt-S:

- (1) Green wire. Left coil of solenoid or left momentary contact.
- (2) Black wire. Common wire for momentary contacts.
- (3) Red wire. Left coil of solenoid or left momentary contact.
- (4) Blue Wire. Left contact for SPDT On-On switch #1
- (5) Orange Wire. Right contact for SPDT On-On switch #1
- (6) Black Wire. Common contact for SPDT On-On switch #1
- (7) Gray Wire. Common contact for SPDT On-On switch #2
- (8) Green Wire. Left contact for SPDT On-On switch #2
- (9) Red Wire. Right contact for SPDT On-On switch #2



## THE BASICS #1 - SOLENOIDS

### Cobalt-S really CAN do it all!

The only switch that allows you to change a point, switch frog polarity AND change your signals or control panel LEDs with absolutely nothing extra to add or buy !





# Cobalt-S

the switch that switches everything controls it all

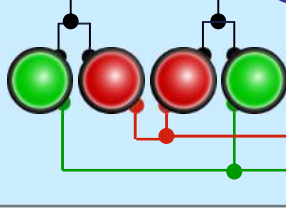
## SOLENOIDS

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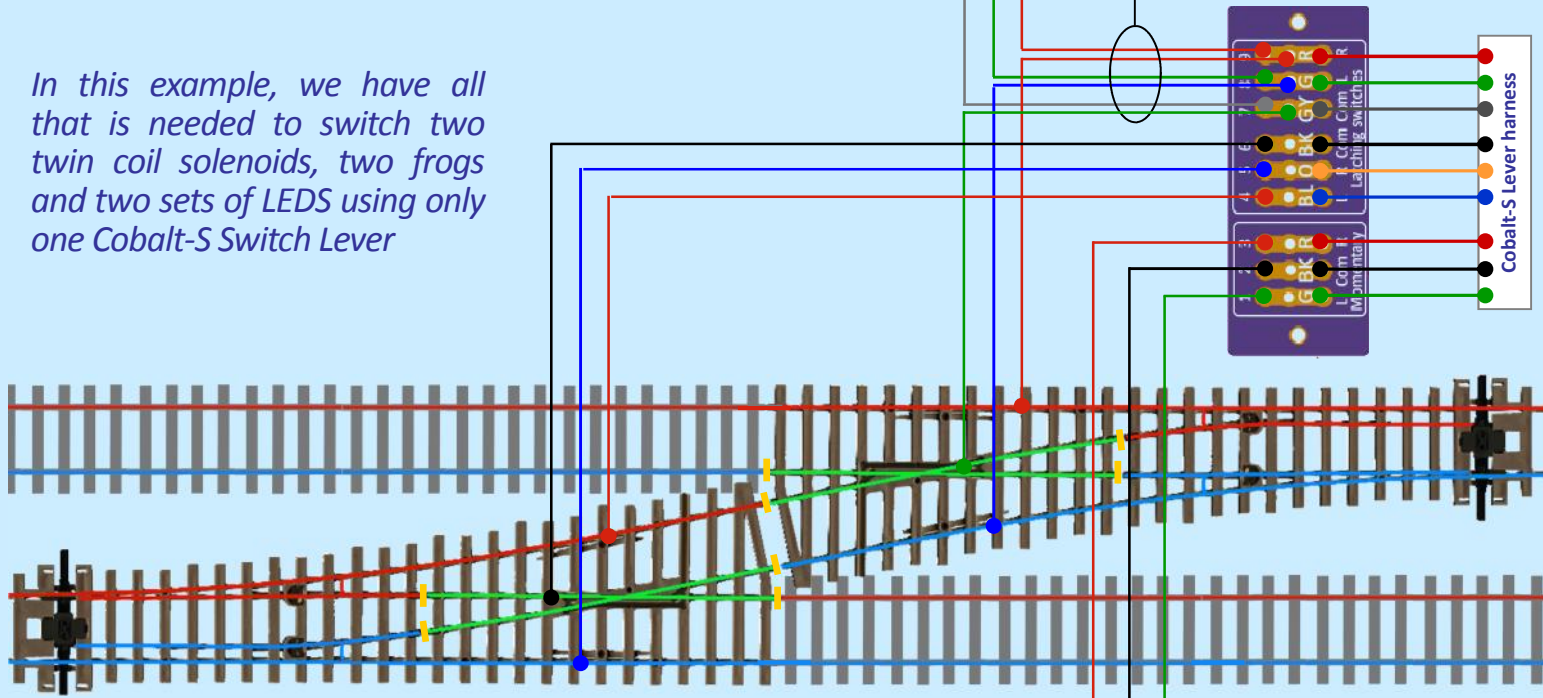
### Cobalt-S: one switch works a full crossover

Because we are only sharing ONE side of the LED and frog power circuit, we can safely use the same terminals for both purposes. To make this easy the supplied PCBs have space for extra wires.

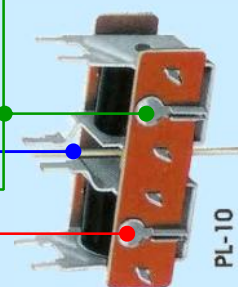
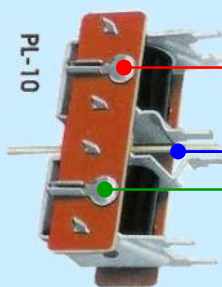
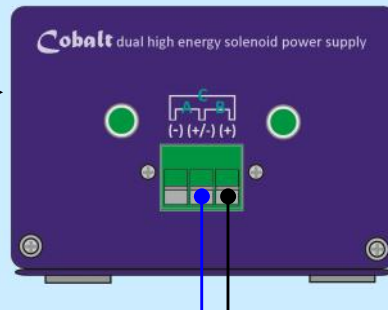
Separate LED Power Supply (NOT track power)



In this example, we have all that is needed to switch two twin coil solenoids, two frogs and two sets of LEDs using only one Cobalt-S Switch Lever



We show our Cobalt DCU 2+ high power solenoid power supply in this example, because a high quality CDU like this will give greater reliability. You can of course use any appropriate power supply with enough power for reliable changing



CDU 2+ and Cobalt-S levers work equally well with Seep, Peco, Hornby and other brands of twin coil solenoids.



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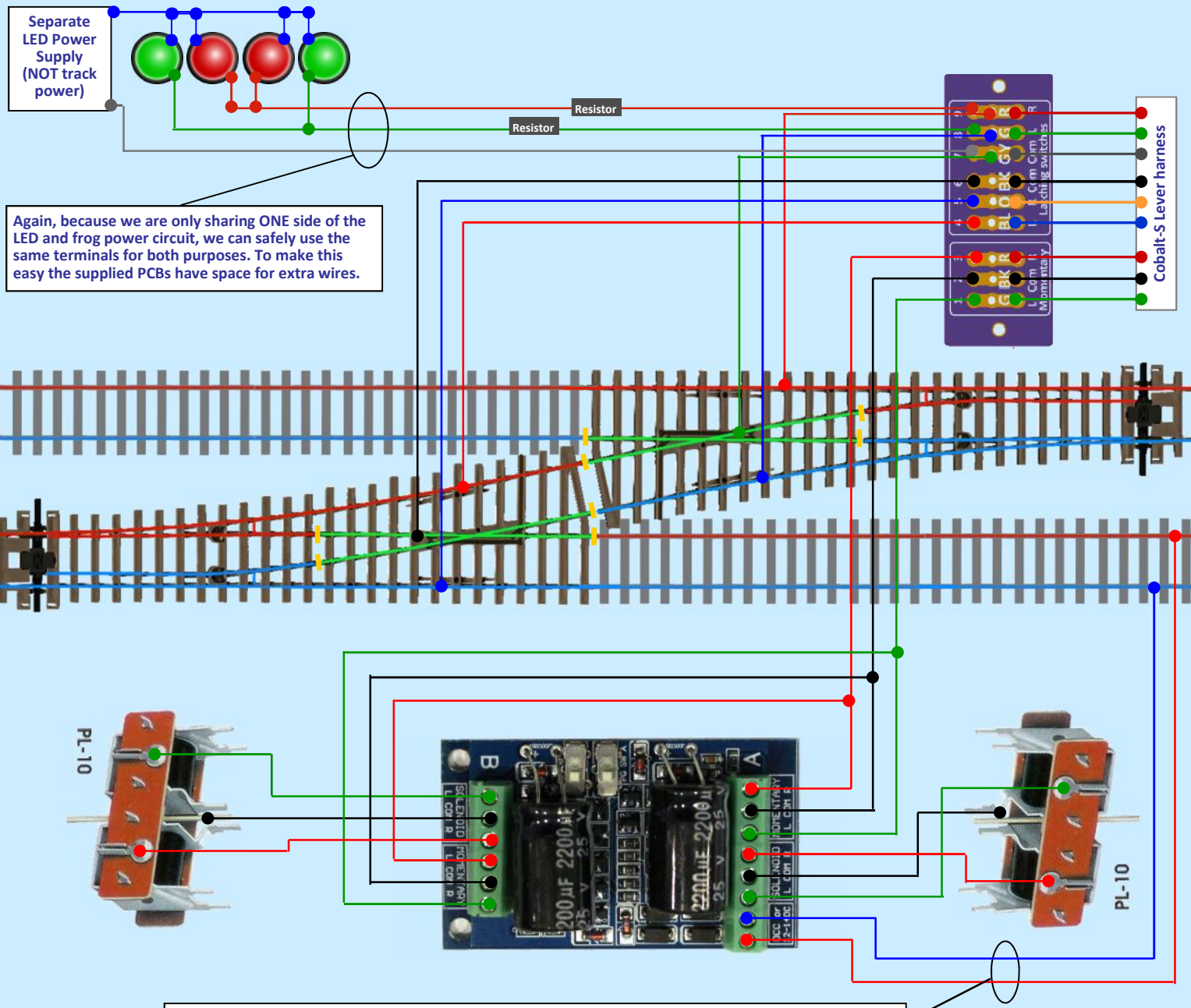
## controls it all

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**Cobalt-S:** this time, plus the Cobalt **AD-S2** twin solenoid decoder

Here is a way to use Cobalt-S to power point-work via the built in CDU of our AD-S2 (or AD-S8) Solenoid decoders, which can be controlled digitally OR be changed by a momentary pulse. As well as being the ideal Solenoid decoder for DCC because of its built-in CDU, AD-S2 also works well 12~15v DC power so you don't have to go DCC to use it!



Again, because we are only sharing ONE side of the LED and frog power circuit, we can safely use the same terminals for both purposes. To make this easy the supplied PCBs have space for extra wires.

Our AD-S2 accessory decoder will also work with DC power (12~15v DC from a regulated power supply is best) so if you are a DC modeller that wants reliable changing and simple wiring, connect DC power here.





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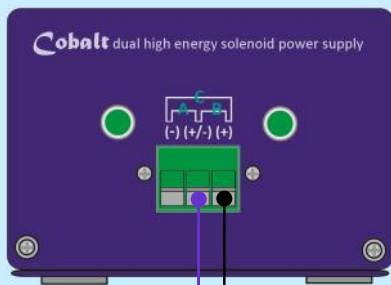
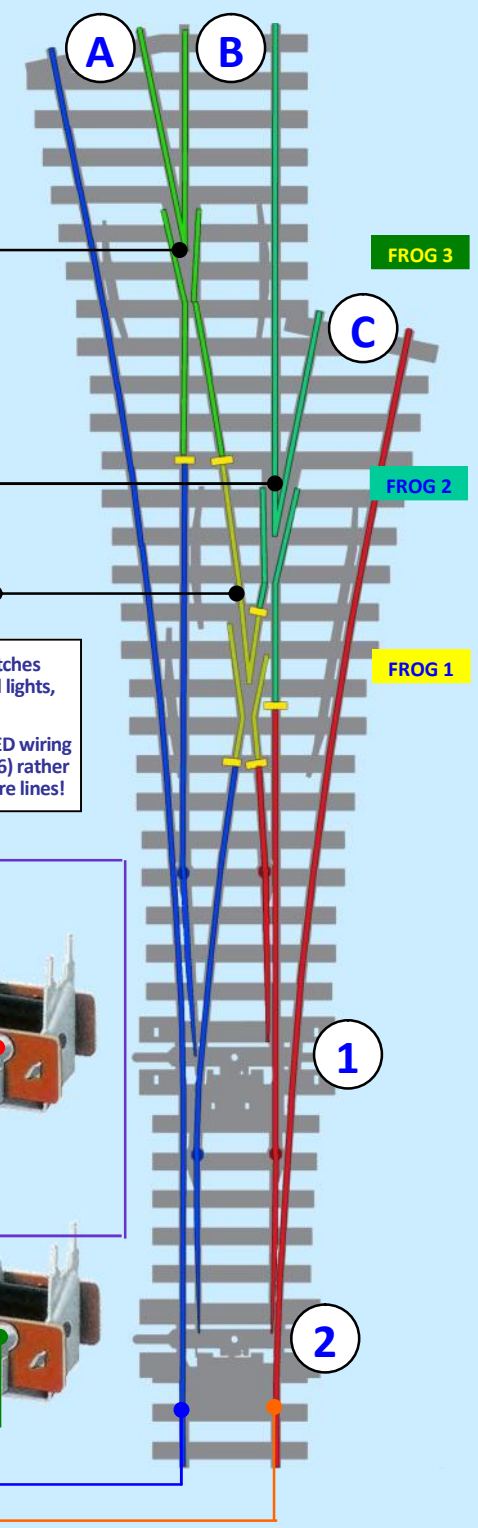
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### Switching a live frog 3-way point needs 3 frogs to be changed and requires two Cobalt-S levers.

You will find it helpful to make a "truth table" when options are more complex. This one shows the lever positions and relative frog rail orientation if B is the main route and A & C are the diverging routes. (Normal = to main, Set = diverge)

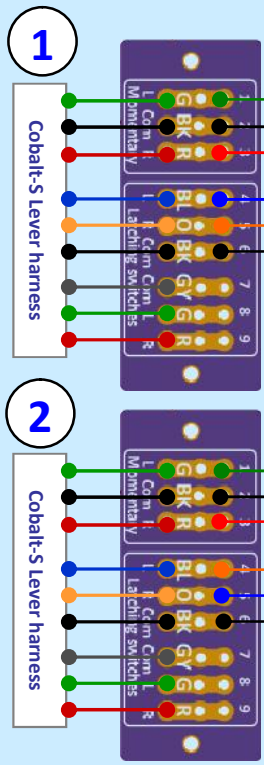
<b>Lever 1 Normal/L (route B)</b>	<b>Lever 1 Set/R (route A)</b> <lever 2 stays normal>
Frog# 1=any 2=red 3=blue	Frog# 1=red 2=any 3=red
<b>Lever 2 Normal/R (route B)</b>	<b>Lever 2 set/L (route C)</b> <Lever 1 stays normal>
Frog# 1=any 2=red 3=blue	Frog# 1=blue 2=blue 3=any

We can see from this that to keep both levers aligned at rest for the main line (route B) then the motors and frogs need their respective wiring reversed

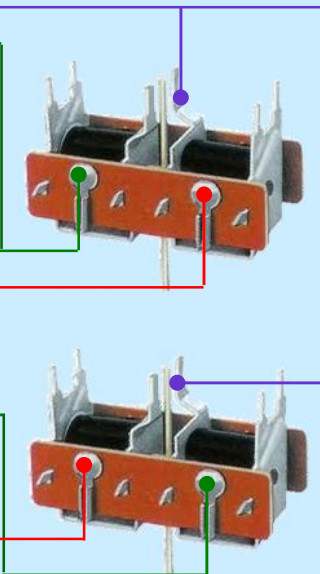


We have TWO full changeover switches spare & available for control panel lights, interlocking or signal control.

We will show you how to do the LED wiring for all 3 routes on the next page (P6) rather than complicate this page with more lines!



Wiring reversed at SW #2 to keep lever position correctly at rest for the main line





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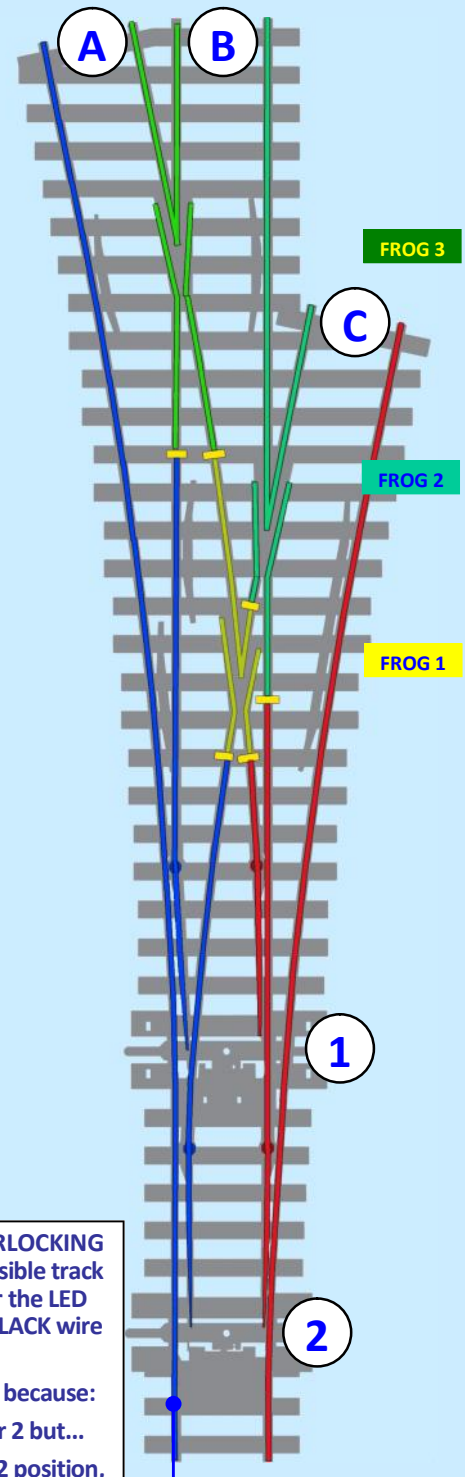
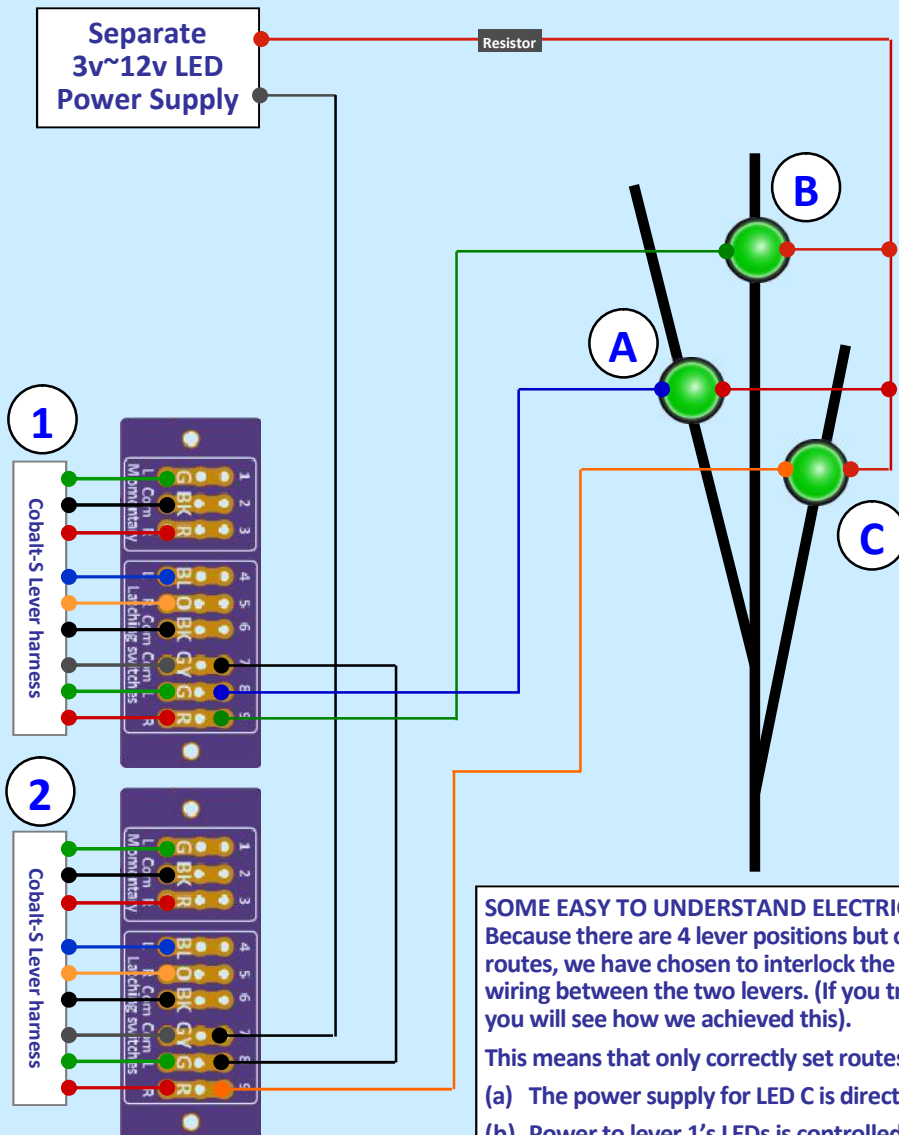
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### Switching a live frog 3-way point continued (Adding the control panel led lighting)

To keep it simpler, we have shown ONLY the LED lighting on this page. For DC users, we are using a separate power supply for LEDs, but of course DCC modellers can if they wish use track power for the LED's (but please don't forget to add a resistor!)



**SOME EASY TO UNDERSTAND ELECTRICAL INTERLOCKING**  
 Because there are 4 lever positions but only 3 possible track routes, we have chosen to interlock the power for the LED wiring between the two levers. (If you trace the BLACK wire you will see how we achieved this).

This means that only correctly set routes will light because:

- (a) The power supply for LED C is directly to Lever 2 but...
- (b) Power to lever 1's LEDs is controlled by lever 2 position, so LED A and LED B can only illuminate and be changed by Lever 1 if Lever 2 is put into the correct position.





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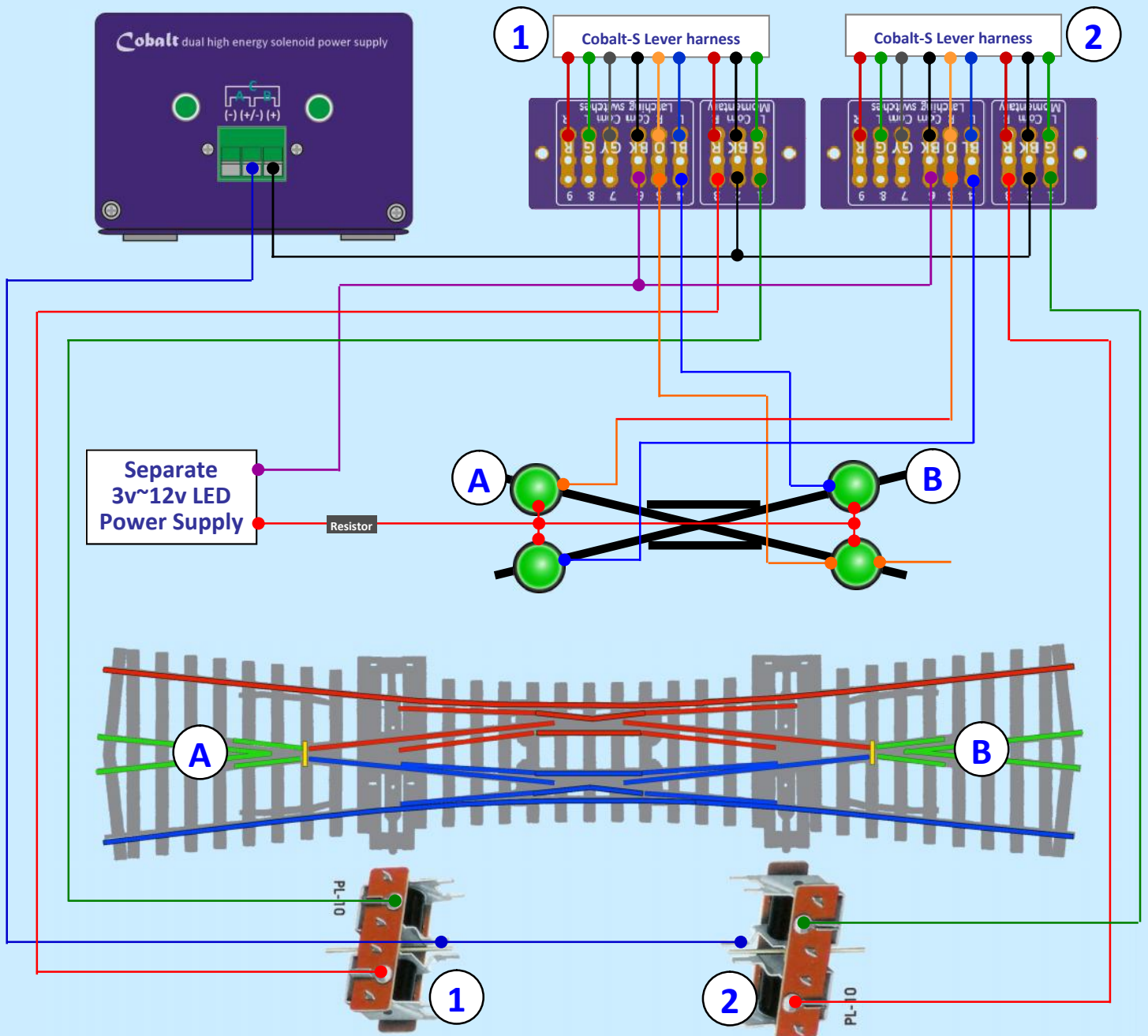
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**Cobalt-S:** A Double slip is MUCH easier to wire properly than it looks (part 1)

In this example, we use 2 Cobalt-S to control solenoids, frog polarity and add control panel LED's too



Solenoid 1 and the polarity of frog B change at the same time. Additionally, Cobalt-S lever 1 controls the LEDs at the B end Solenoid 2 and the polarity of frog A change at the same time. Additionally, Cobalt-S lever 2 controls the LEDs at the A end



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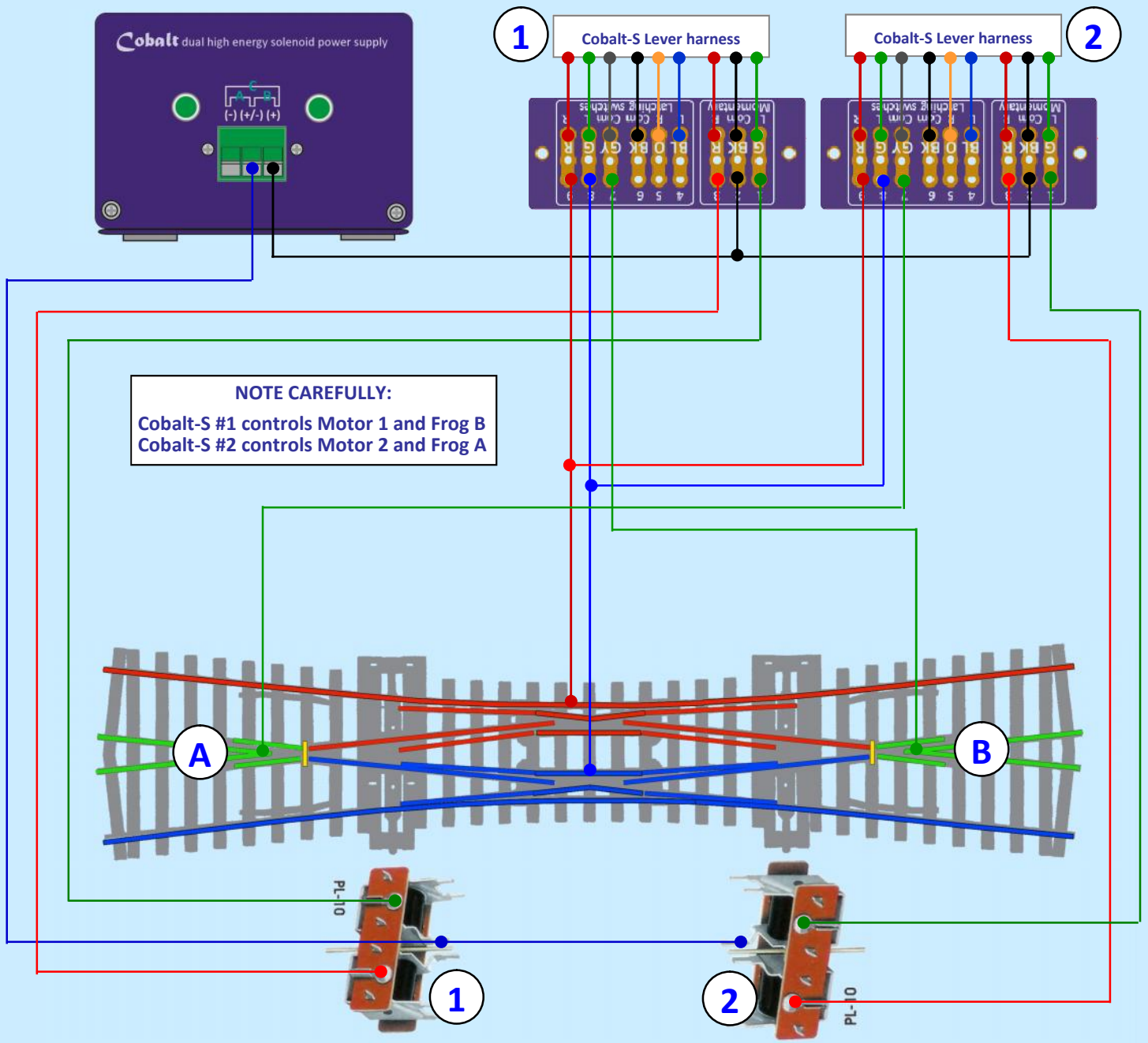
## controls it all

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**Cobalt-S:** A Double slip is MUCH easier to wire properly than it looks (part 2)

We've deleted the LED wiring here to show you the frog wiring - As you can see, it's quite easy to do.



**NOTE CAREFULLY:**  
Cobalt-S #1 controls Motor 1 and Frog B  
Cobalt-S #2 controls Motor 2 and Frog A

Solenoid 1 and the polarity of frog B change at the same time.  
Solenoid 2 and the polarity of frog A change at the same time.



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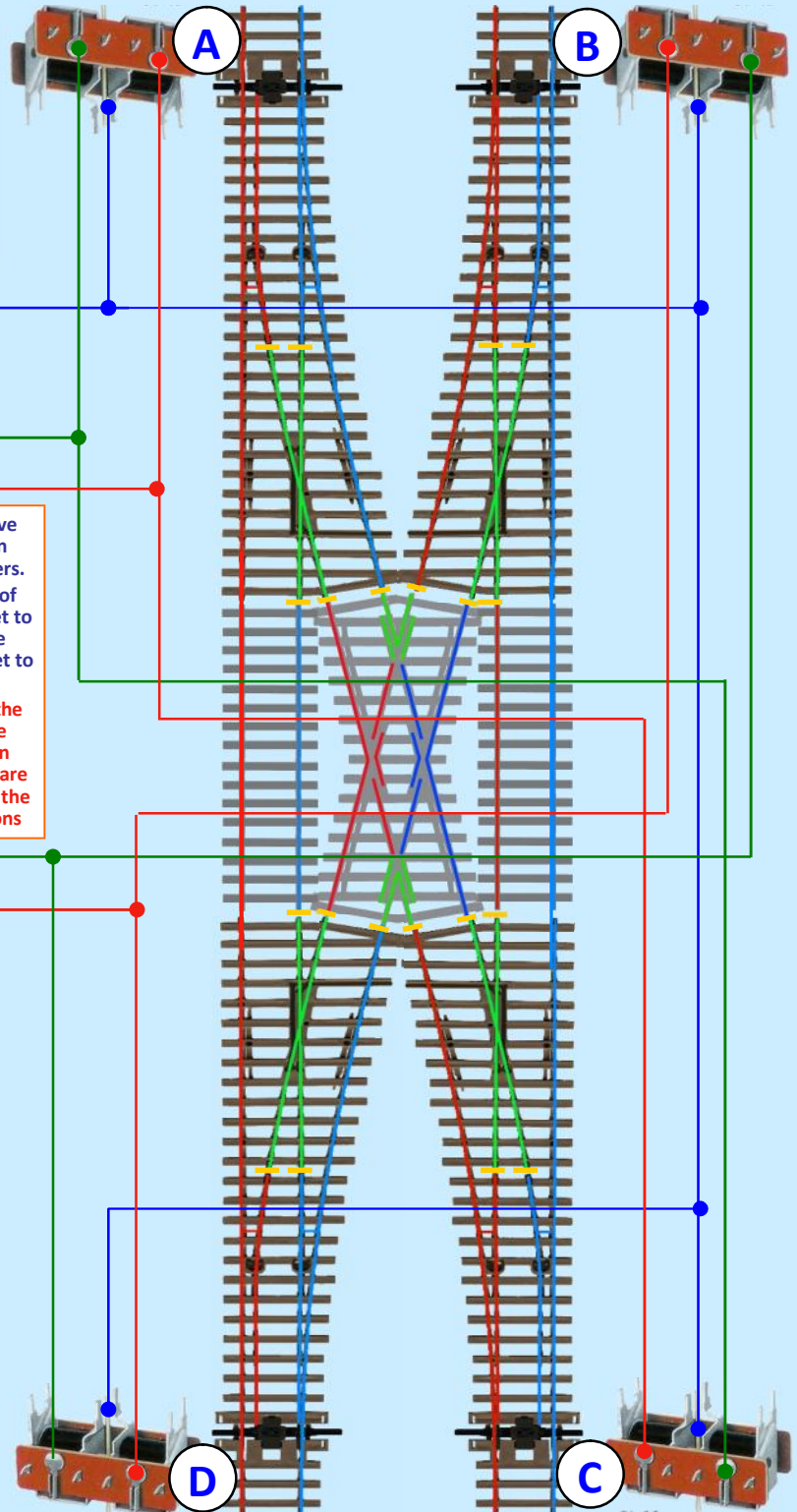
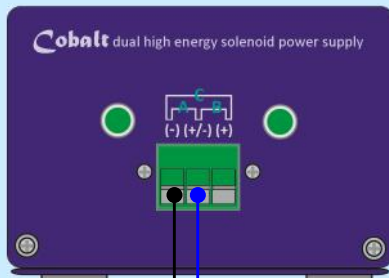
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We show our Cobalt DCU 2+ high power solenoid CDU power supply in this example, because a top quality CDU like this will give greater reliability.

You can of course use any appropriate power supply with enough power for reliable point changing.



These wires give active Interlocking between the two Cobalt-S levers. Because of this both of the levers must be set to the main track before either lever can be set to use the crossover.

NOTE that we show the connections using the middle solder pads on the PCB as we will share these terminals with the frog wiring connections

### SCISSORS CROSSING PART 1 - SOLENOIDS

(On this page, we show only solenoid wiring)

A full scissoring crossing is easier than it looks but it can be daunting to a novice - we want to keep it simple so we will show wiring of a scissoring crossing spread over three pages.

- Cobalt-S lever #1 controls A + C, #2 controls B + D
- Left = straight, Right = crossover for both levers

In this example, we also use the Cobalt-S switches to interlock the levers, so unless lever 1 is set straight, lever 2 can't be set to the crossover and vice versa.





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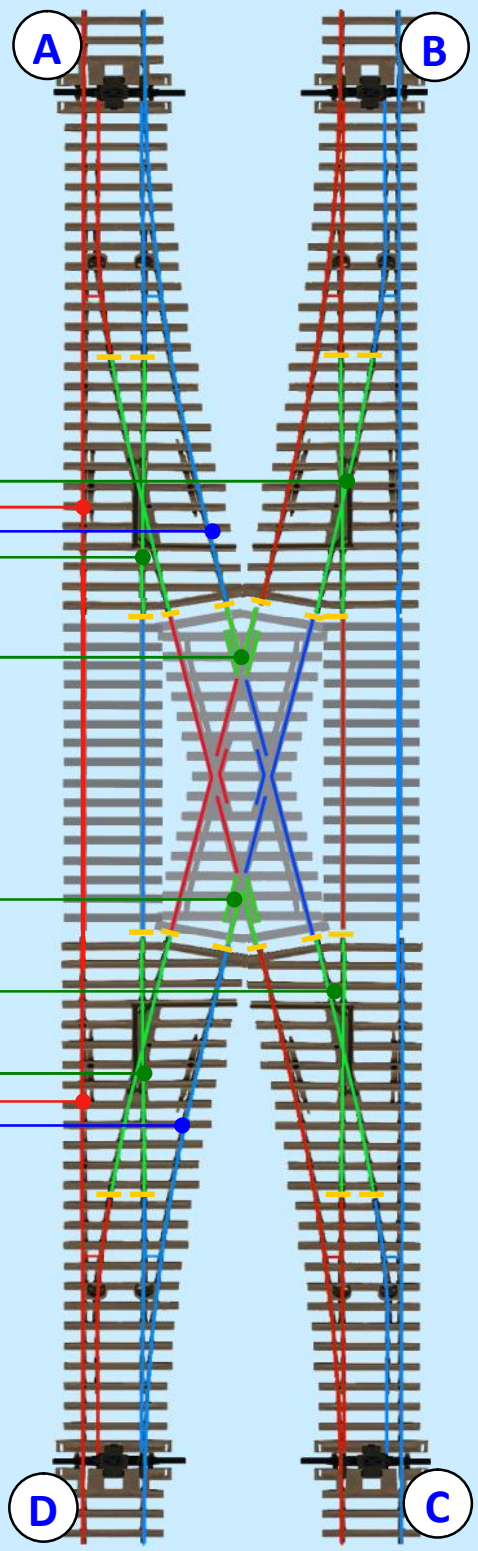
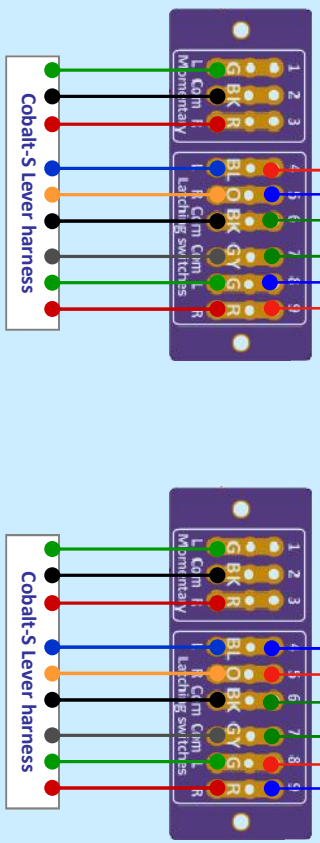
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### Cobalt-S: Four switches can handle six frogs!

The trick to making a fully live scissors crossing work is to wire some of the switch contacts as a "reversing switch" so that they can swap diamond frog polarity independently to the main point frogs, preventing possible short circuits.



#### SCISSORS CROSSING PART 2 - FROG WIRES

(In this drawing, we show only Live Frog wiring)

The main point frogs are not difficult to handle as they are quite simple to switch, however the two frogs within the diamond crossing can be a bit harder to get right as their polarity depends on which way each of the two crossovers is switched.

Instead of needing more switch connections to get it right, we have locked out any potential conflicts by "interlocking" both of the levers (shown in the diagram on page 9 of this manual).





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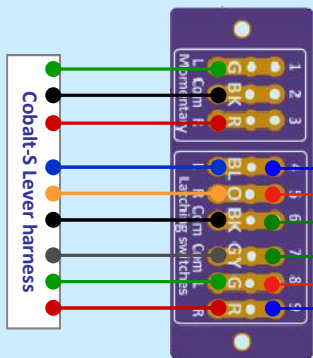
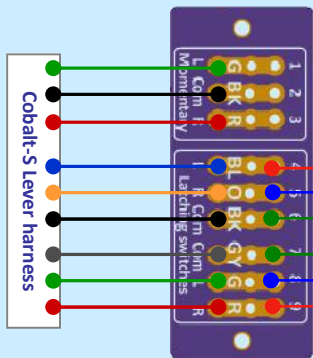
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**Cobalt-S: now with all of the frogs switched, we can easily use them to power the panel lamps!**

The ability of Cobalt-S to do far more than any other switching device can, also makes it a very economical way for you to gain total control of your layout.



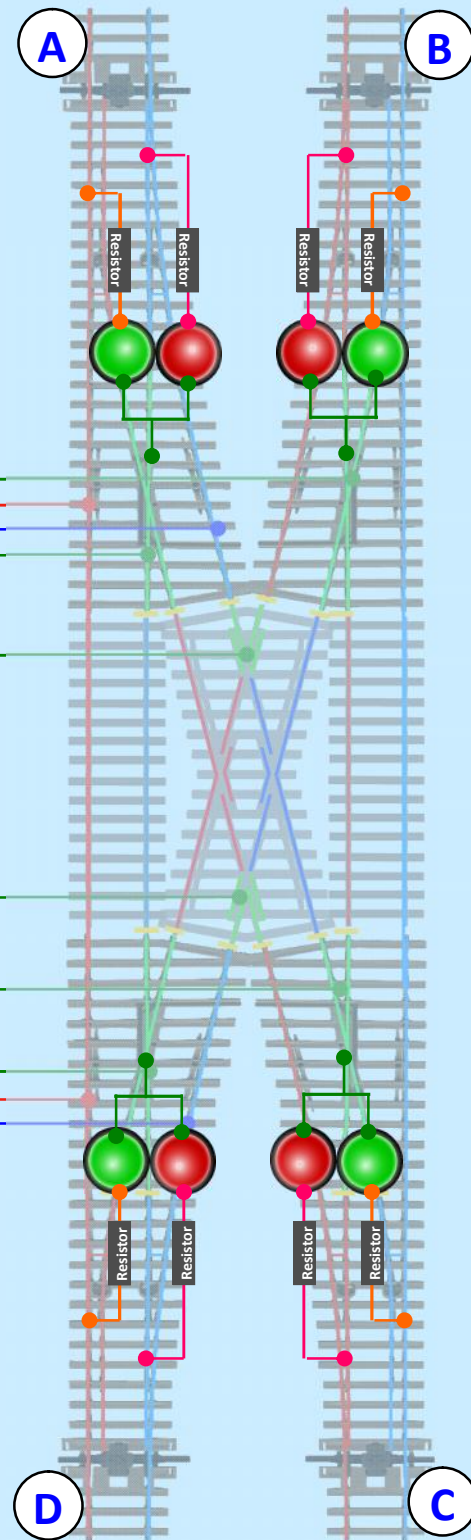
We've "greyed out" most of the other track wiring to let you see the LED connections more clearly.  
 Resistors for LEDs: We suggest 2000 ohms for Red and 1000 ohms for Green.

**SCISSORS CROSSING PART 3 - PANEL LIGHTS**  
 (In this drawing, we add some control panel LED's)

So we can achieve a huge amount of control using just 2 switches, we are again "sharing" a few connections for part of the LED circuits.

This time we do not need a separate power supply as we can use the DCC track power to give us all that we need.

LEDs are simply connected in pairs to the frog wires, and when the frog polarity is changed by Cobalt-S, the LEDs will also change.







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## The Cobalt-S ...Pack contents and Accessory kits

### Cobalt-S Switch - Part number DCP-CBS

Cobalt S can be used as is but the pack contains some really nice dress-up parts too, so you can make it something very special and uniquely yours if you wish!

The single pack contains the following:  
(6 & 12 packs contain correct multiples)

- Lever x 1
- Spacer x 1
- Mounting screws x 2
- Harness x 1
- Wiring PCB x 1
- Etched Brass Numbers x 6
- Ribbed top castings x 2



### 99 etched brass numbers - Part number DCP-CS99

Able to cope with even the largest Lever frame, these quality etched brass numbers will also find a home on many control panels as ID numbers for points and signals.  
*We've painted a few to show you how good they can look!*

### SIX AND TWELVE PACKS ARE ALSO AVAILABLE

Six and Twelve packs contain an appropriate "Signal lever" quantity plus a pro-rata quantity of all accessory items.

Of course, these packs also save you some hard earned hobby money by offering a lower per-lever cost too.

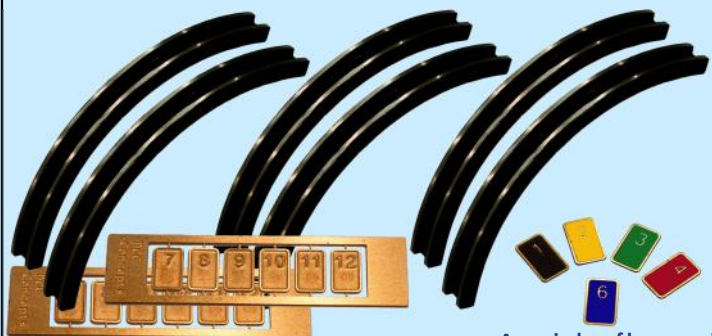
**Part numbers: 6-pack DCP-CBS6, 12-Pack DCP-CBS12**



### Cobalt-S cosmetic parts. Part number DCP-CSP

If you need only a few more etched brass numbers, this pack contains lever number plates 1~12.

Additionally, in case you lose or even damage the cast metal lever "Ribs", we have added 3 pairs to this pack.



A reminder of how good  
these look when painted

### Three Spare Harnesses, Three Spare PCB's and Nine mounting screws.

**Part number DCP-CSA**

With Cobalt-S designed to last for a very long time, most modellers will change the layout several times in the time they own them.

This "connection pack" makes sure that all of the parts that might be needed will be to hand if and when they are needed.

