Cobalt-S
the switch that switches everything
controls it all

Using Cobalt-S &
Cobalt motors

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 Cobalt or motor drive point motor, switch frog polarity, control all your 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

Momentary: Cobalt S includes a versatile SPDT momentary switch, suitable devices needing 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 many 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 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 handles high or low power switching at any common model railway voltage and current. Add Cobalt-S to a Cobalt motor & you have 5 changeover switches available, 1 momentary and 4x SPDT, making almost anything you may imagine possible.

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.
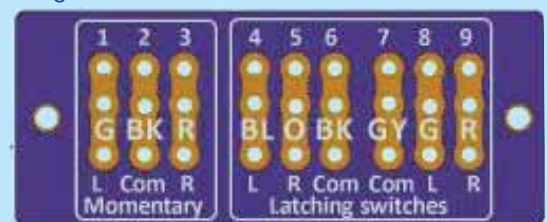
Instructions:

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 3**

(Wiring with Cobalt-S + Cobalt motors & similar devices, including panel lights, interlocking & switched frog power)

Please note: When we draw diagrams, We assume that a Cobalt motor or Cobalt-S switch will be placed with a specific orientation. (example, facing the toe or heel of a point). It is however possible that on your layout, you may arrange the orientation differently. If that is the case, and things work backwards as a result, then please do not worry - all you will have to do is swap the associated wires from "L" to "R" to get correct operation. DO Have fun with our products - and don't hesitate to email us and ask for help if you need it. We can be contacted on Questions@DCCconcepts.com (please allow up to 72 hours for us to reply as we do get very busy)

Using Cobalt-S & Cobalt motors

Cobalt-S
the switch that switches everything
controls it all

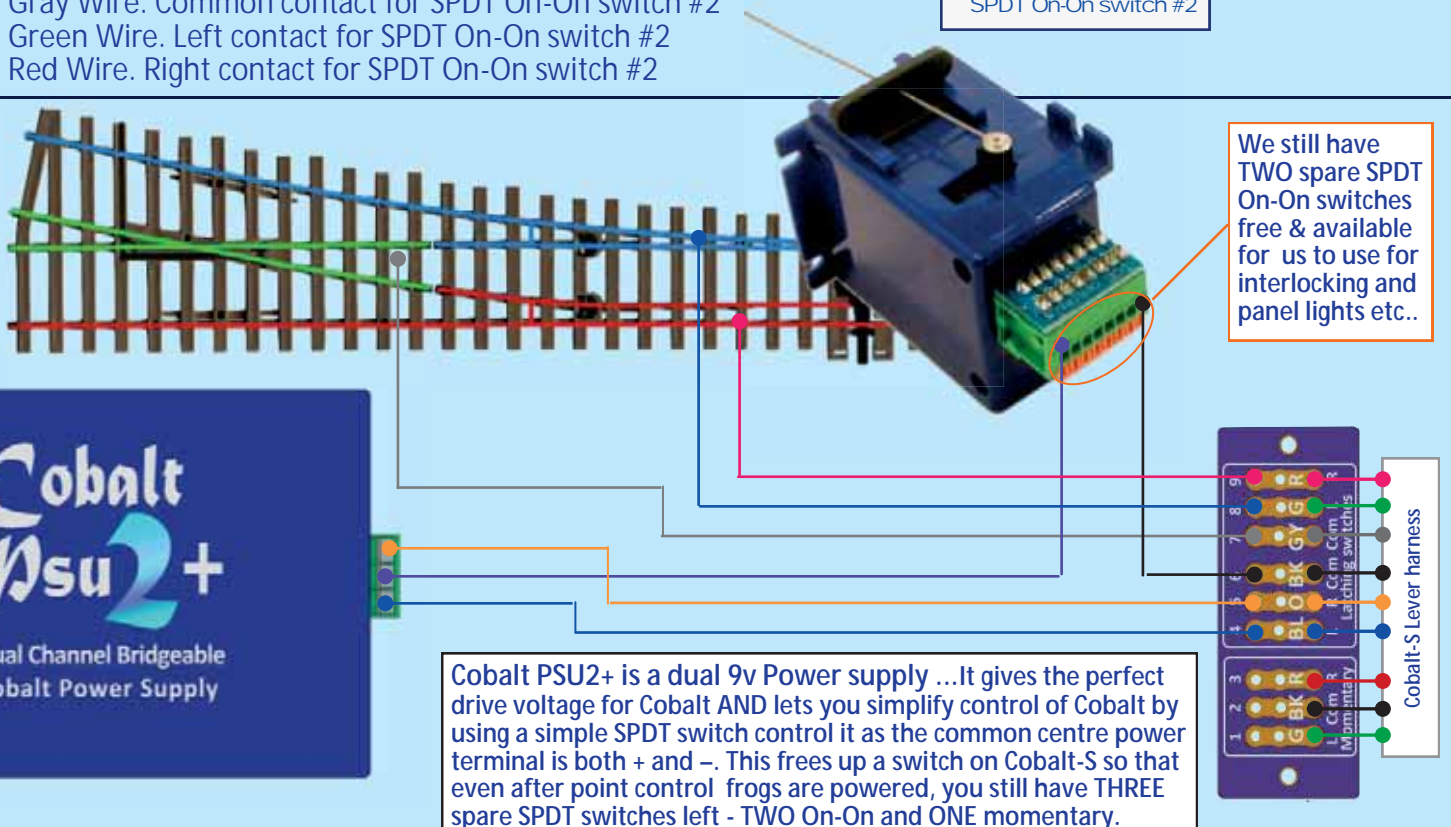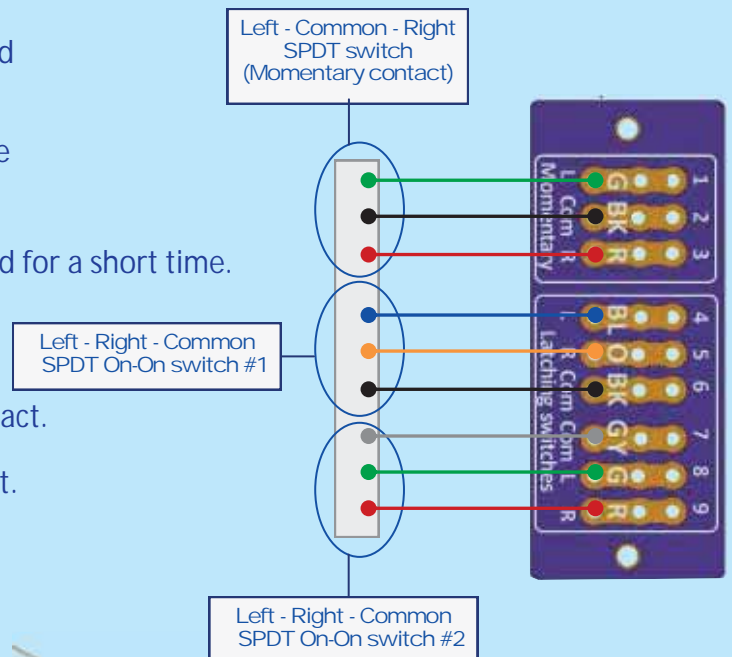# Cobalt-S: the wiring basics.... (common page all manuals)

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 PC board 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

Left - Common - Right
SPDT switch
(Momentary contact)

Left - Right - Common
SPDT On-On switch #1

Left - Right - Common
SPDT On-On switch #2

We still have TWO spare SPDT On-On switches free & available for us to use for interlocking and panel lights etc..

Cobalt PSU2+
Dual Channel Bridgeable Cobalt Power Supply

Cobalt-S Lever harness

Cobalt PSU2+ is a dual 9v Power supply ...It gives the perfect drive voltage for Cobalt AND lets you simplify control of Cobalt by using a simple SPDT switch control it as the common centre power terminal is both + and –. This frees up a switch on Cobalt-S so that even after point control frogs are powered, you still have THREE spare SPDT switches left - TWO On-On and ONE momentary.

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the best of everything
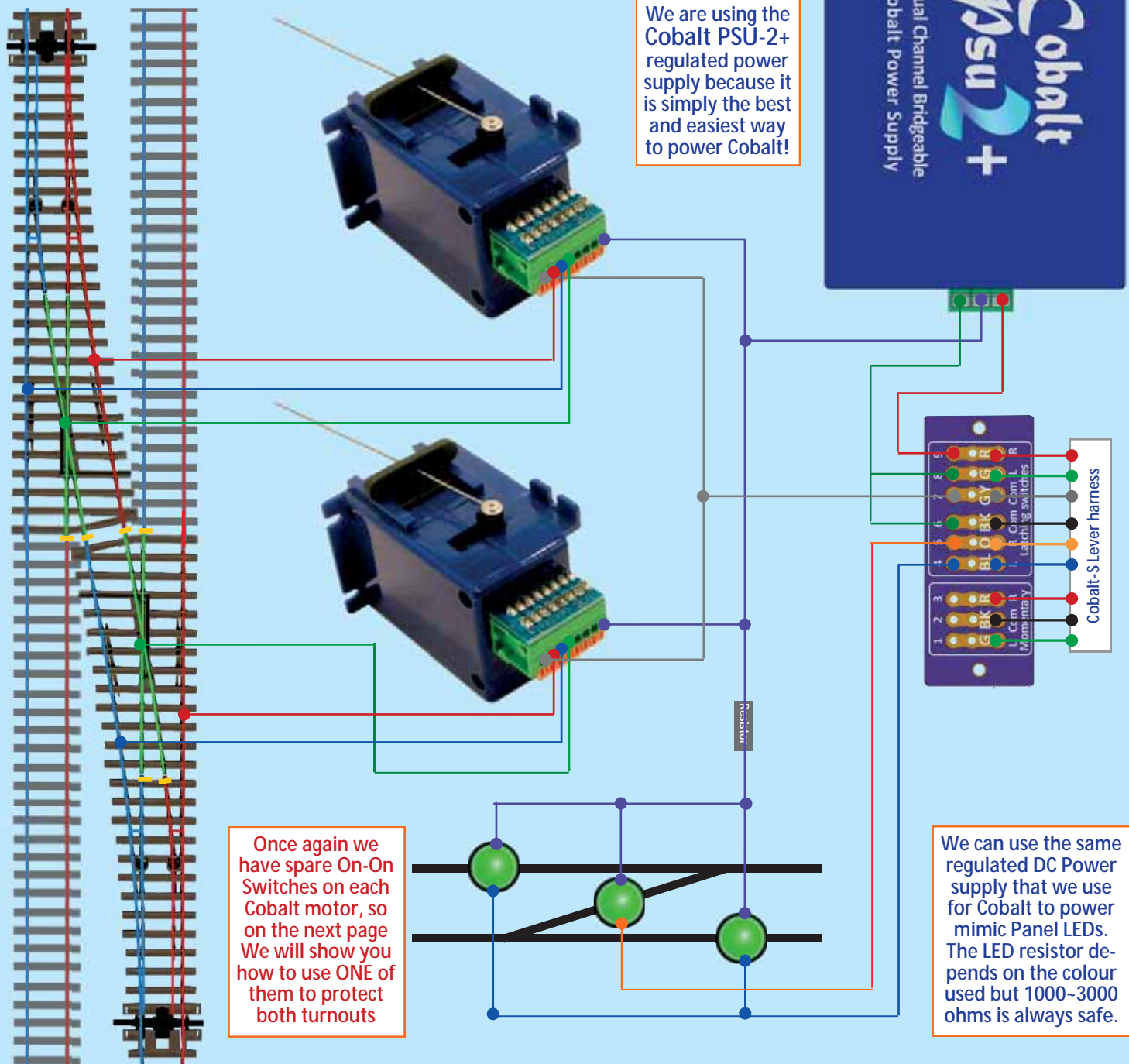
Cobalt-S
the switch that switches everything
controls it all

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

Cobalt-S: <u>one</u> switch works a full crossover and in combination with Cobalt or Cobalt digital, there will still always be plenty of spare switching left available for any other possible accessory, special control or device you may need.

We are using the **Cobalt PSU-2+** regulated power supply because it is simply the best and easiest way to power Cobalt!

Cobalt **Psu 2+**
Dual Channel Bridgeable
Cobalt Power Supply

Cobalt-S Lever harness

Once again we have spare On-On Switches on each Cobalt motor, so on the next page We will show you how to use ONE of them to protect both turnouts

We can use the same regulated DC Power supply that we use for Cobalt to power mimic Panel LEDs. The LED resistor depends on the colour used but 1000~3000 ohms is always safe.

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Cobalt-S
the switch that switches everything
controls it all

Using Cobalt-S & Cobalt motors

Cobalt-S : <u>one</u> switch works a full crossover and so we can use one of the spare switches on either of the Cobalt Motors to create 'Safety Interlocks" so that a train can't accidentally be sent cross a point that is set against it.

We are using the **Cobalt PSU-2+** regulated power supply because it is simply the best and easiest way to power Cobalt!

Dual Channel Bridgeable Cobalt Power Supply

Cobalt PSU2+

GAP

GAP
GAP
GAP

GAP

We have deleted one motor to keep the "safety interlock" diagram clear for you.

This is a very simple thing for you to do.

(1) We make isolation gaps in one rail ahead of each turnout (appx one loco length from the turnout) using the SAME rail for each gap (We chose the blue rail - You can see the heavier yellow markers on the diagram)

(2) We then collect power from the power bus feed to the blue rail and feed it to the common terminal on an On-On switch.

(3) We then link a wire from these two isolated lengths of rail to one of the two spare terminals on that On-On switch, so that power will only get to those two sections when the point is safe for a loco to cross.

Resistor

Cobalt-S Lever harness

R Com Com L
Latching switches
BL O BK R

Cc m
Momentary

We can use the same regulated DC Power supply that we use for Cobalt to power mimic Panel LEDs. The LED resistor depends on the colour used but 1000~3000 ohms is always safe.

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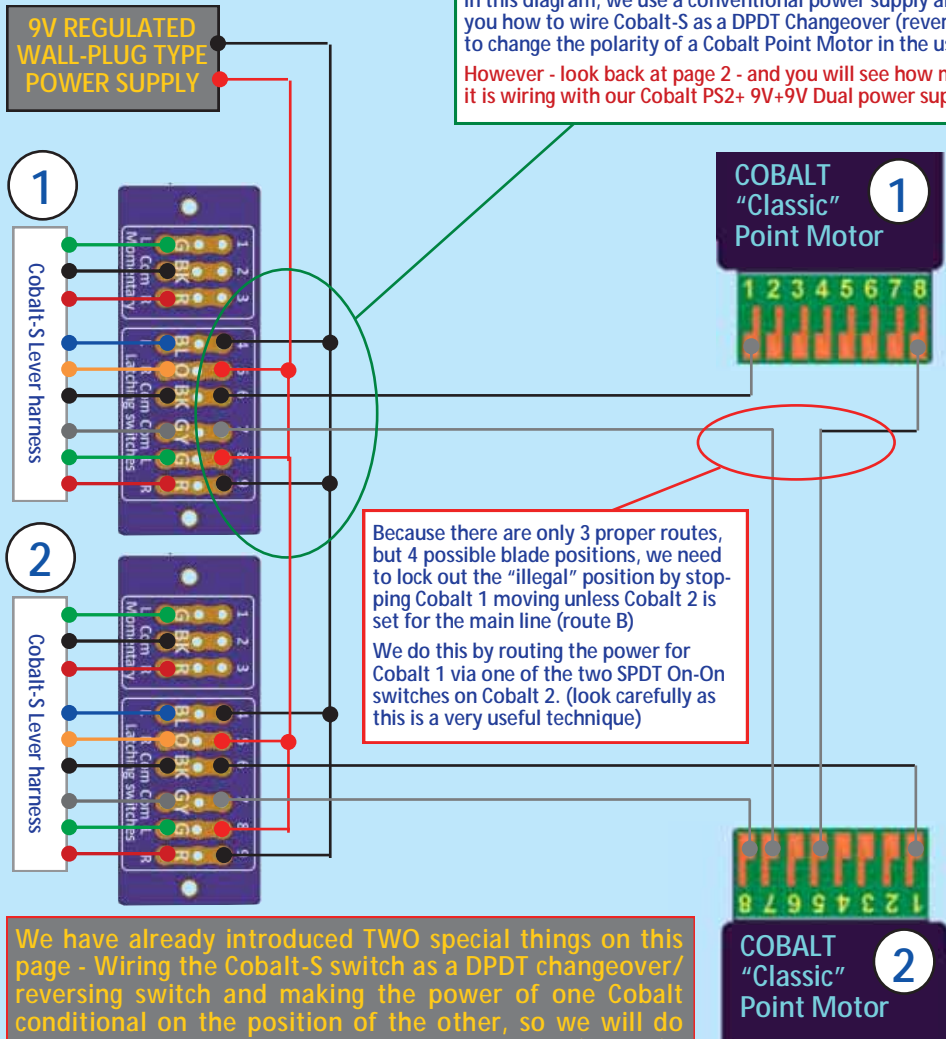For full details on how best to dress & set-up Cobalt-S

Switching a live frog 3-way point needs 3 frogs to be changed & requires two Cobalt-S levers. with 2 Cobalt Classic also used to change the 3-way, we'll have a total of 8 On-On changeover switches available so there is nothing in the area of turnout / point wiring we cannot achieve easily!

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)

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

Lever 2 Normal/R (route B)   **Lever 2 set/L (route C)** <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

A   B

FROG 3

C

in this diagram, we use a conventional power supply and also show you how to wire Cobalt-S as a DPDT Changeover (reversing) switch to change the polarity of a Cobalt Point Motor in the usual way.
However - look back at page 2 - and you will see how much easier it is wiring with our Cobalt PS2+ 9V+9V Dual power supply!

FROG 2

9V REGULATED WALL-PLUG TYPE POWER SUPPLY

COBALT "Classic" Point Motor 1

FROG 1

1

Cobalt-S Lever harness

1 2 3 4 5 6 7 8

Because there are only 3 proper routes, but 4 possible blade positions, we need to lock out the "illegal" position by stopping Cobalt 1 moving unless Cobalt 2 is set for the main line (route B)

We do this by routing the power for Cobalt 1 via one of the two SPDT On-On switches on Cobalt 2. (look carefully as this is a very useful technique)

1

2

Cobalt-S Lever harness

2

COBALT "Classic" Point Motor 2

We have already introduced TWO special things on this page - Wiring the Cobalt-S switch as a DPDT changeover/ reversing switch and making the power of one Cobalt conditional on the position of the other, so we will do the rest of the 3-way turnout wiring separately (Pg 6+7)
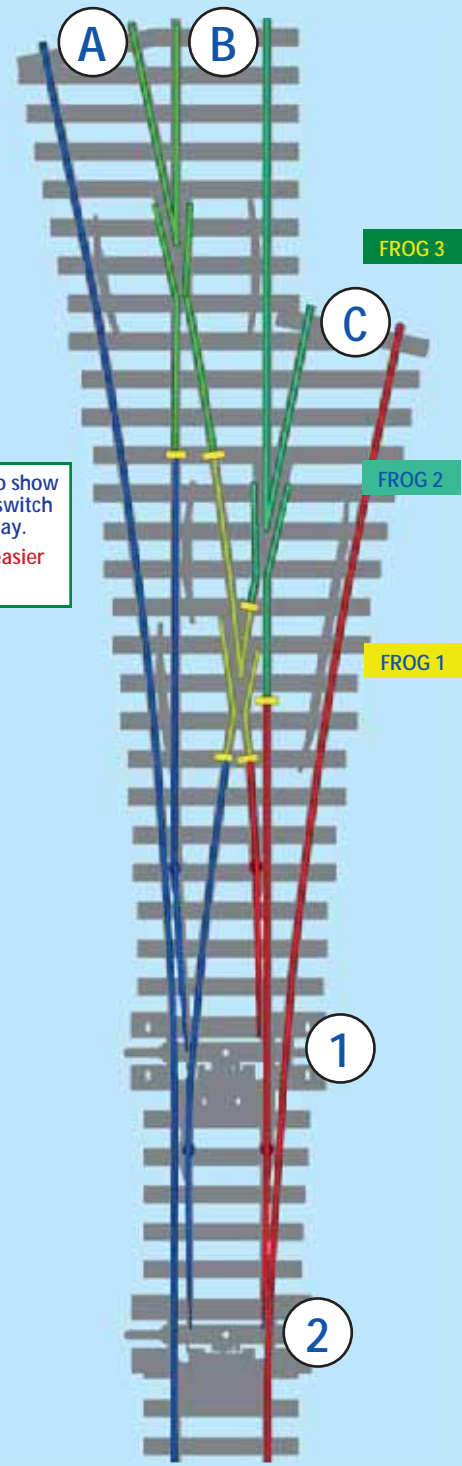
Cobalt-S
the switch that switches everything
controls it all

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

With so many spare switches we have lots of flexibility, and even though we have used several switches to use a conventional DPDT type motor control, we still have plenty of contacts left for the last two things most modellers want - proper frog polarity control & accurate LED panel lighting. Frog power is shown here and panel LED's are shown on the next page.
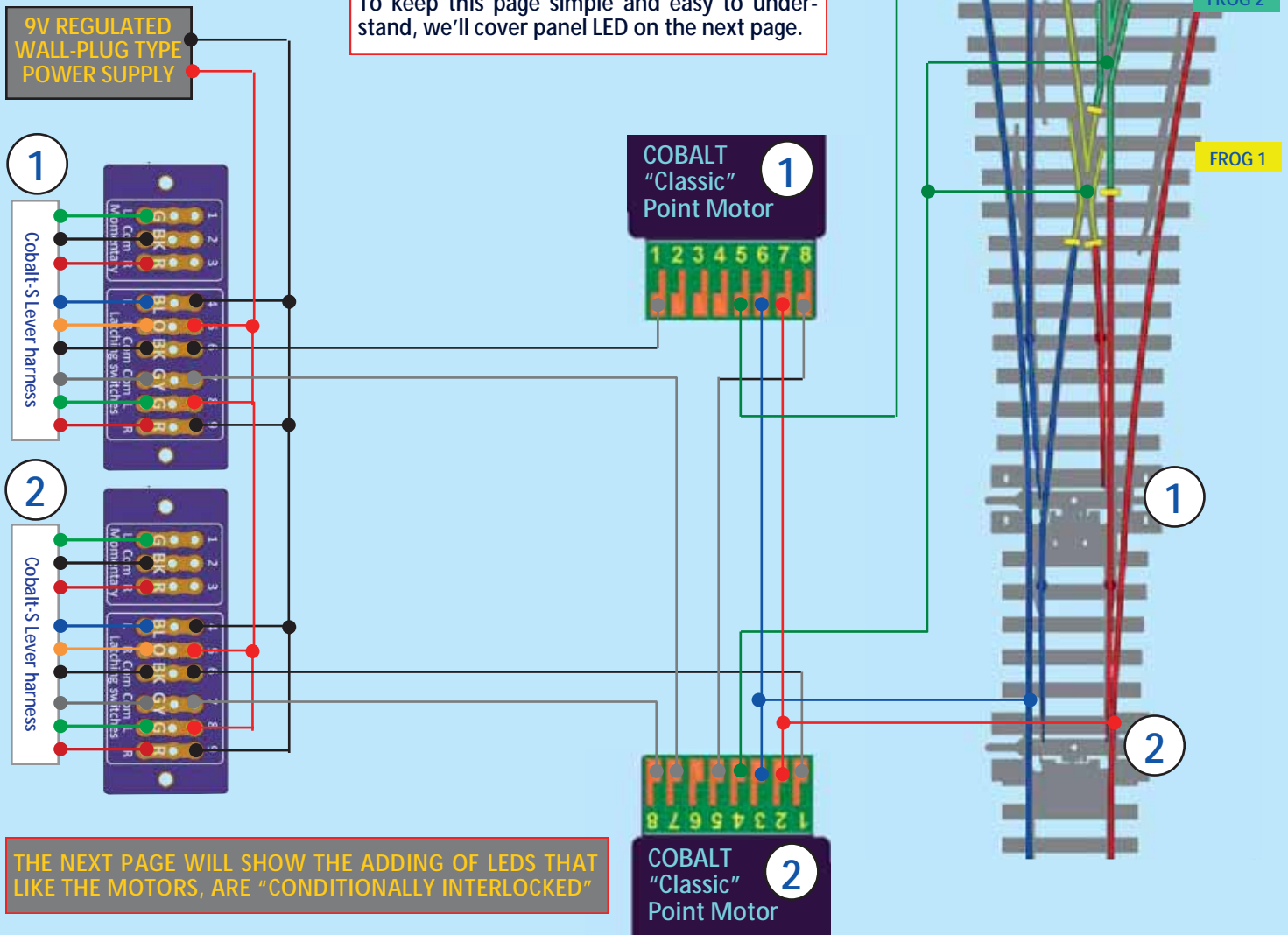
FROG POWER WIRING

As you can see from this page, it is quite straightforward.

(1) As the position of Motor 2 will dictate the access to Routes A and B it can control BOTH frog 1 and frog 2.

(2) Motor 1 only needs to control Frog 3

To keep this page simple and easy to understand, we'll cover panel LED on the next page.

A   B

FROG 3

C

FROG 2

FROG 1

9V REGULATED WALL-PLUG TYPE POWER SUPPLY

1

Cobalt-S Lever harness

COBALT "Classic" Point Motor
1
1 2 3 4 5 6 7 8

2

Cobalt-S Lever harness

COBALT "Classic" Point Motor
2
1 2 3 4 5 6 7 8

1

2

THE NEXT PAGE WILL SHOW THE ADDING OF LEDS THAT LIKE THE MOTORS, ARE "CONDITIONALLY INTERLOCKED"

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Cobalt-S

the switch that switches everything

controls it all

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

Cobalt motors use a reversing DC for power and changing. We can take advantage of this to also control LEDs which will light only when polarity is correct.
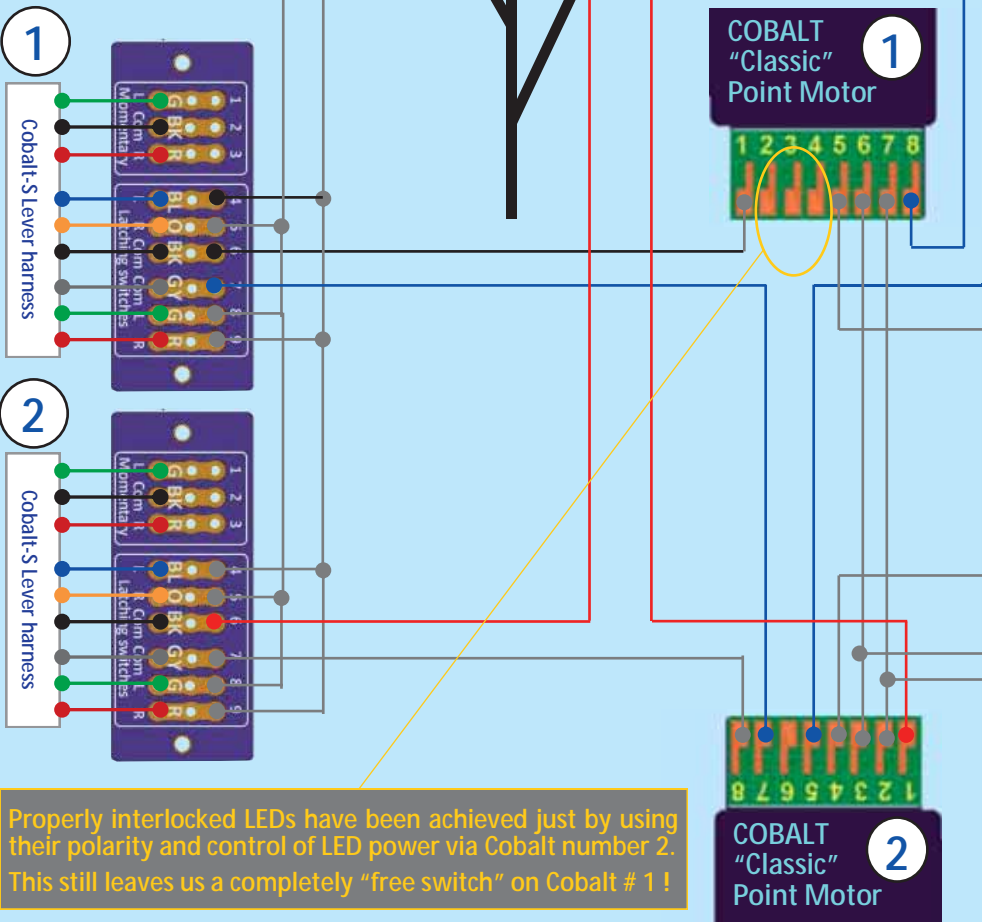
To do this we add the LEDs directly into the leads that power Cobalt. In this case there is NO need for Resistors as the Cobalt circuit will provide current limiting for the LEDs.

In this drawing, we "Re-Route" the motor power wires to include the LEDs.
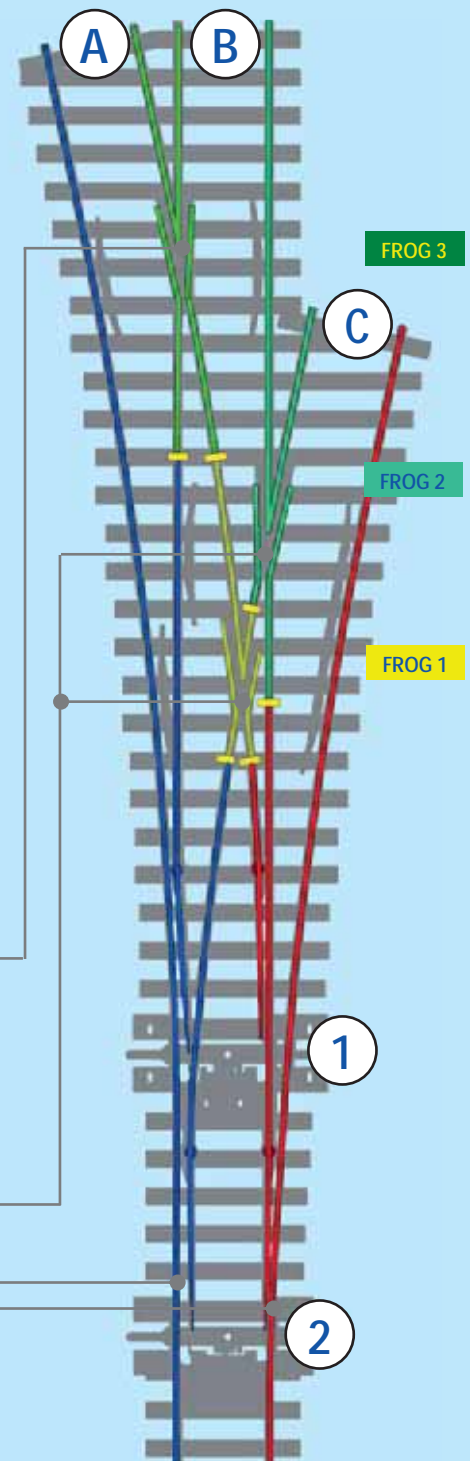
(1) LEDs A and B are wired back-to back with (+to-) and (-to+) so that only one will light depending on the power supply polarity.

(2) The power to LEDs A and B is, like Motor 1, controlled via motor 2, so they will not light unless M2 is set to allow route B or C. Follow the BLUE line to see this.

(3) LED C is wired in series with one power wire to Cobalt 2 so that it lights only when Cobalt 2 is set for Route C. Follow the ORANGE line to see this.

Only LED wiring is shown in colour so the diagram remains clear for you

A   B

FROG 3

FROG 2

FROG 1

9V REGULATED WALL-PLUG TYPE POWER SUPPLY

A   B   C

Cobalt-S Lever harness

G Com R Momentary
BK
R
BL
O BK
Latching switches
GY R Com L
G
R

1

2

Cobalt-S Lever harness

G Com R Momentary
BK
R
BL
O BK
Latching switches
GY R Com L
G
R

COBALT "Classic" Point Motor
1   1 2 3 4 5 6 7 8

COBALT "Classic" Point Motor
1 2 3 4 5 6 7 8   2

1

2

Properly interlocked LEDs have been achieved just by using their polarity and control of LED power via Cobalt number 2.

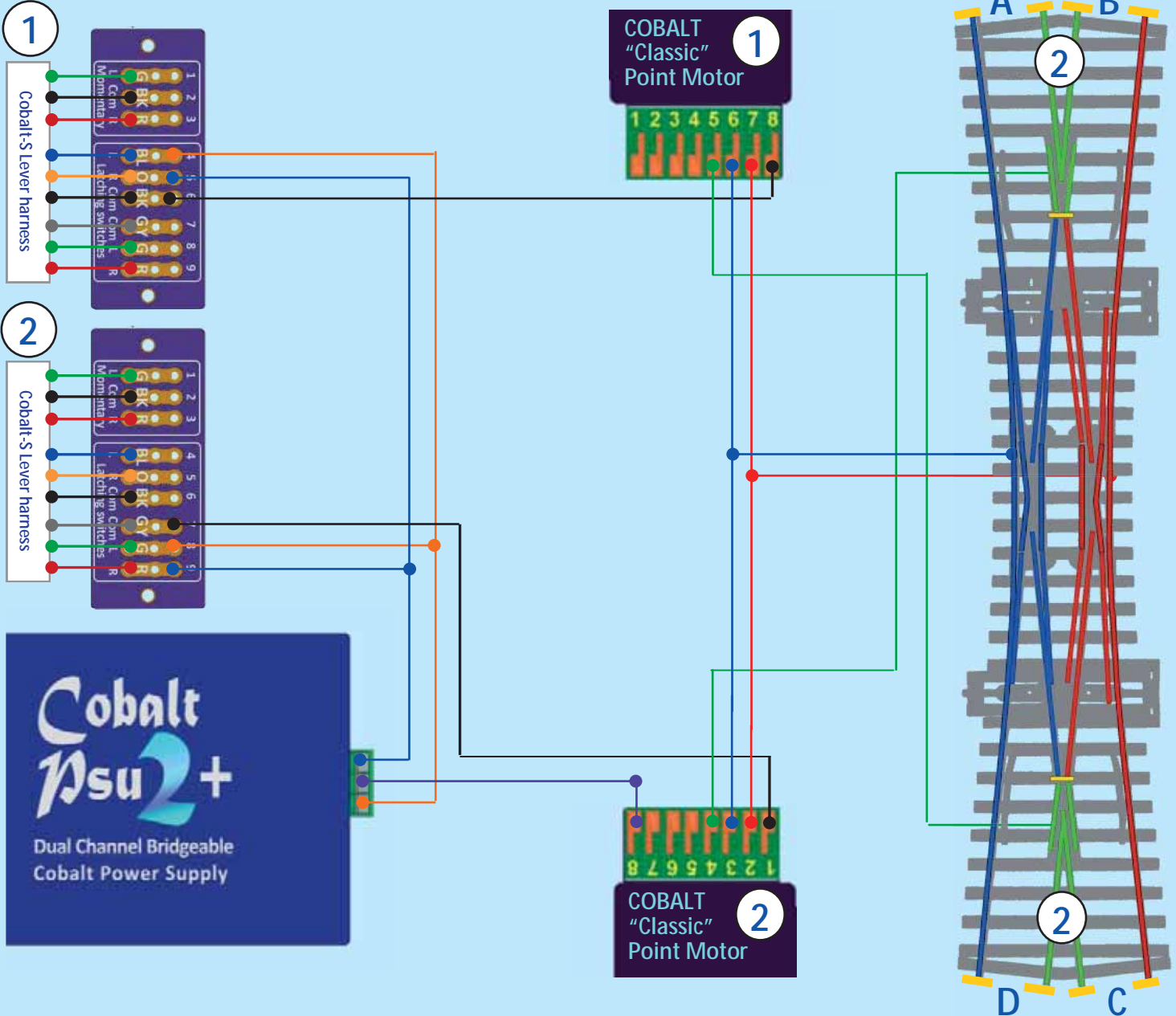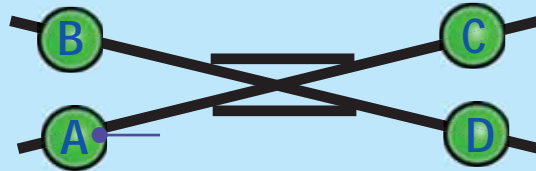This still leaves us a completely "free switch" on Cobalt # 1 !

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Cobalt-S

the switch that
switches everything

controls it all

Using Cobalt-S &
Cobalt motors

Switching a Double or Single slip is actually quite simple. The things to remember are :
(1) To isolate all of the rails and ...

(2) That Cobalt 1 controls frog 2 and vice-versa. Our wiring task is made especially easy here as we have so much switching available with Cobalt and Cobalt-S

1

Cobalt-S Lever harness

L Com Momentary — G BK R
L BL O BK Com Com L Latching switches GY G R

2

Cobalt-S Lever harness

L Com Momentary — G BK R
L BL O BK Com Com L Latching switches GY G R

COBALT
"Classic"
Point Motor **1**

1 2 3 4 5 6 7 8

Cobalt Psu2+

Dual Channel Bridgeable
Cobalt Power Supply

COBALT
"Classic"
Point Motor **2**

1 2 3 4 5 6 7 8

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DCCconcepts
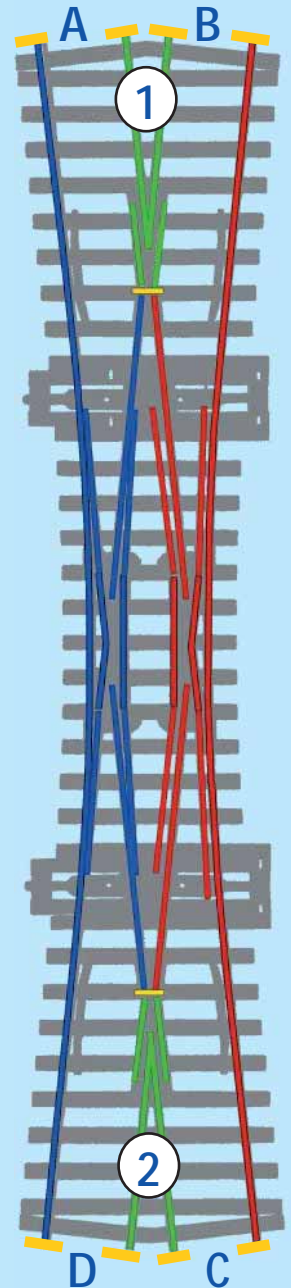
Cobalt-S
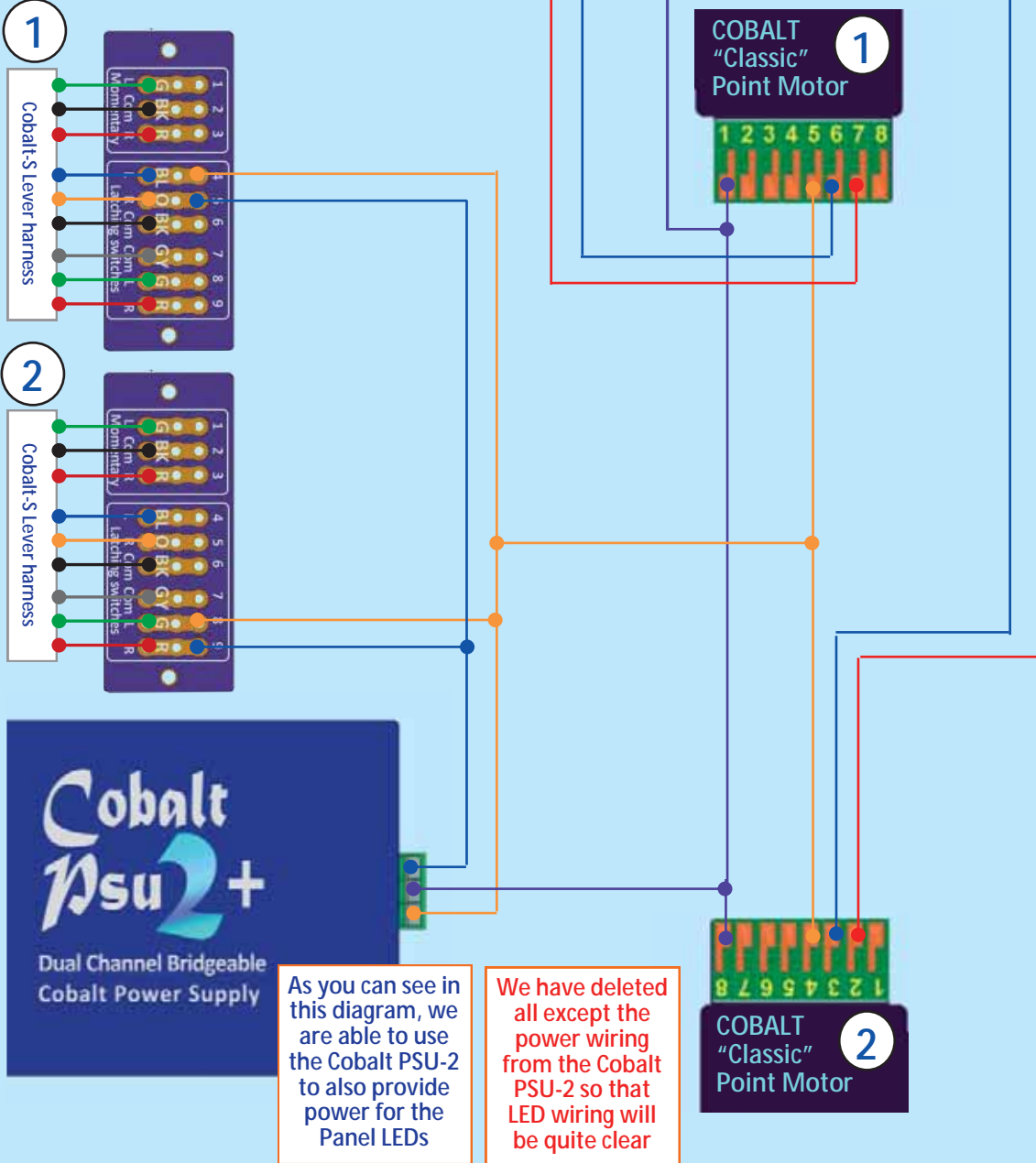### the switch that switches everything
controls it all

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

Switching a Double or Single slip is actually quite simple. The things to remember are :

(1) To isolate all of the rails and ...

(2) That Cobalt 1 controls frog 2 and vice-versa. Our wiring task is made especially easy here as we have so much switching available with Cobalt and Cobalt-S

(3) That the motor controls the LEDs at the opposite end of the slip. Ie: Cobalt 1 controls LEDS C and D and so Cobalt 2 controls LEDs A and B
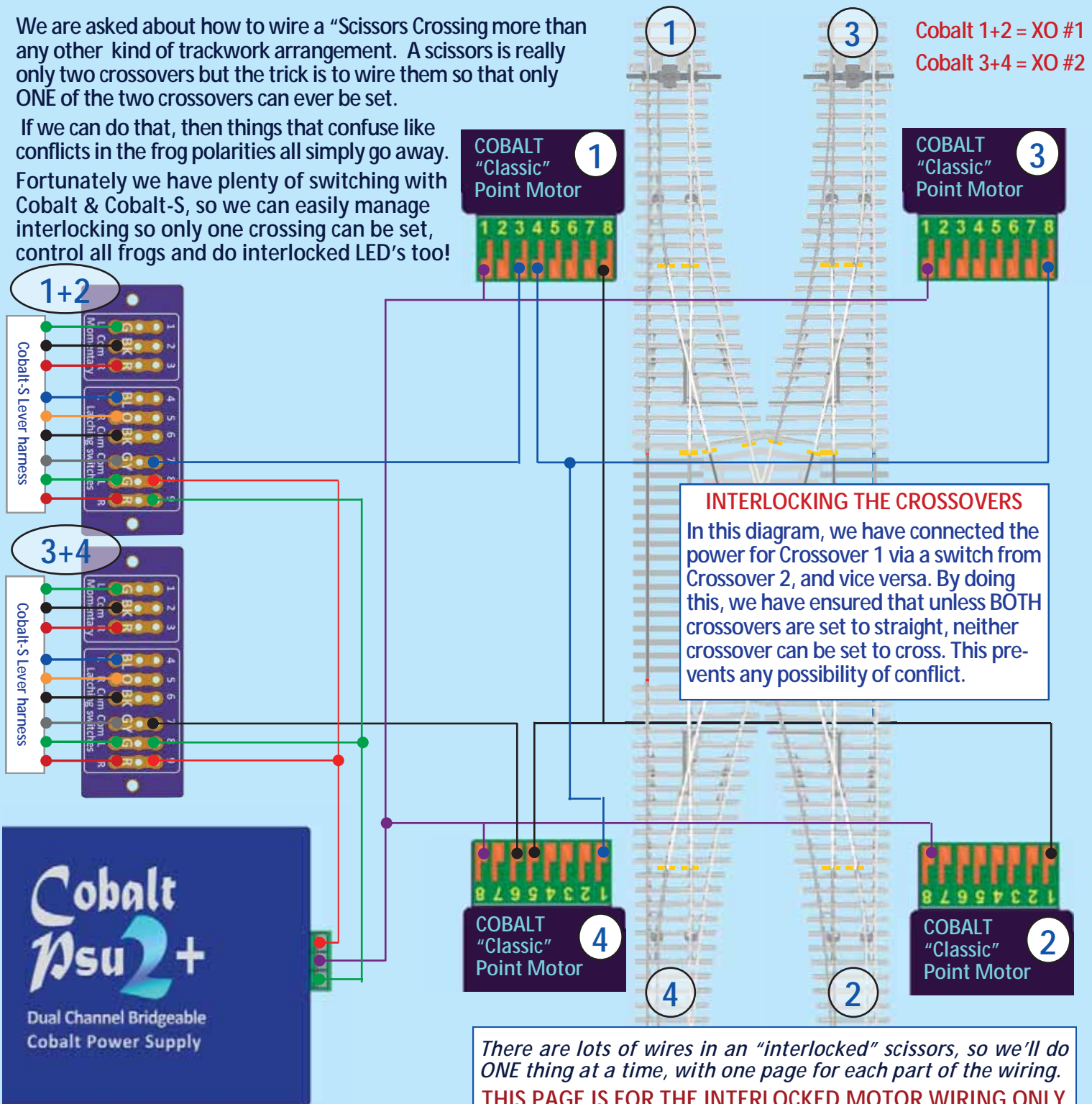
1

Cobalt-S Lever harness

2

Cobalt-S Lever harness

D **A**
C **B**

COBALT "Classic" Point Motor **1**

A **B**
1

Cobalt Psu2+
Dual Channel Bridgeable Cobalt Power Supply

As you can see in this diagram, we are able to use the Cobalt PSU-2 to also provide power for the Panel LEDs

We have deleted all except the power wiring from the Cobalt PSU-2 so that LED wiring will be quite clear

COBALT "Classic" Point Motor **2**

2

D **C**

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DCC concepts

Cobalt-S

the switch that switches everything

controls it all

Using Cobalt-S & Cobalt motors

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

We are asked about how to wire a "Scissors Crossing more than any other kind of trackwork arrangement. A scissors is really only two crossovers but the trick is to wire them so that only ONE of the two crossovers can ever be set.

If we can do that, then things that confuse like conflicts in the frog polarities all simply go away.

Fortunately we have plenty of switching with Cobalt & Cobalt-S, so we can easily manage interlocking so only one crossing can be set, control all frogs and do interlocked LED's too!

Cobalt 1+2 = XO #1
Cobalt 3+4 = XO #2

1

3

COBALT "Classic" Point Motor **1**
1 2 3 4 5 6 7 8

COBALT "Classic" Point Motor **3**
1 2 3 4 5 6 7 8

1+2

Cobalt-S Lever harness

L Cim / Momentary
G BK R
1 2 3

BL O BK / Latching switches
L Cim Com GY
4 5 6 7 8
GY
R

3+4

Cobalt-S Lever harness

L Cim / Momentary
G BK R
1 2 3

BL O BK / Latching switches
L Cim Com GY
4 5 6 7 8
GY
R

INTERLOCKING THE CROSSOVERS

In this diagram, we have connected the power for Crossover 1 via a switch from Crossover 2, and vice versa. By doing this, we have ensured that unless BOTH crossovers are set to straight, neither crossover can be set to cross. This prevents any possibility of conflict.

Cobalt Psu2+

Dual Channel Bridgeable Cobalt Power Supply

COBALT "Classic" Point Motor **4**
1 2 3 4 5 6 7 8

4

COBALT "Classic" Point Motor **2**
1 2 3 4 5 6 7 8

2

There are lots of wires in an "interlocked" scissors, so we'll do ONE thing at a time, with one page for each part of the wiring.
THIS PAGE IS FOR THE INTERLOCKED MOTOR WIRING ONLY

Cobalt-S
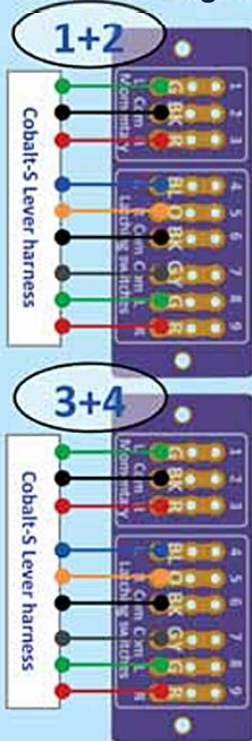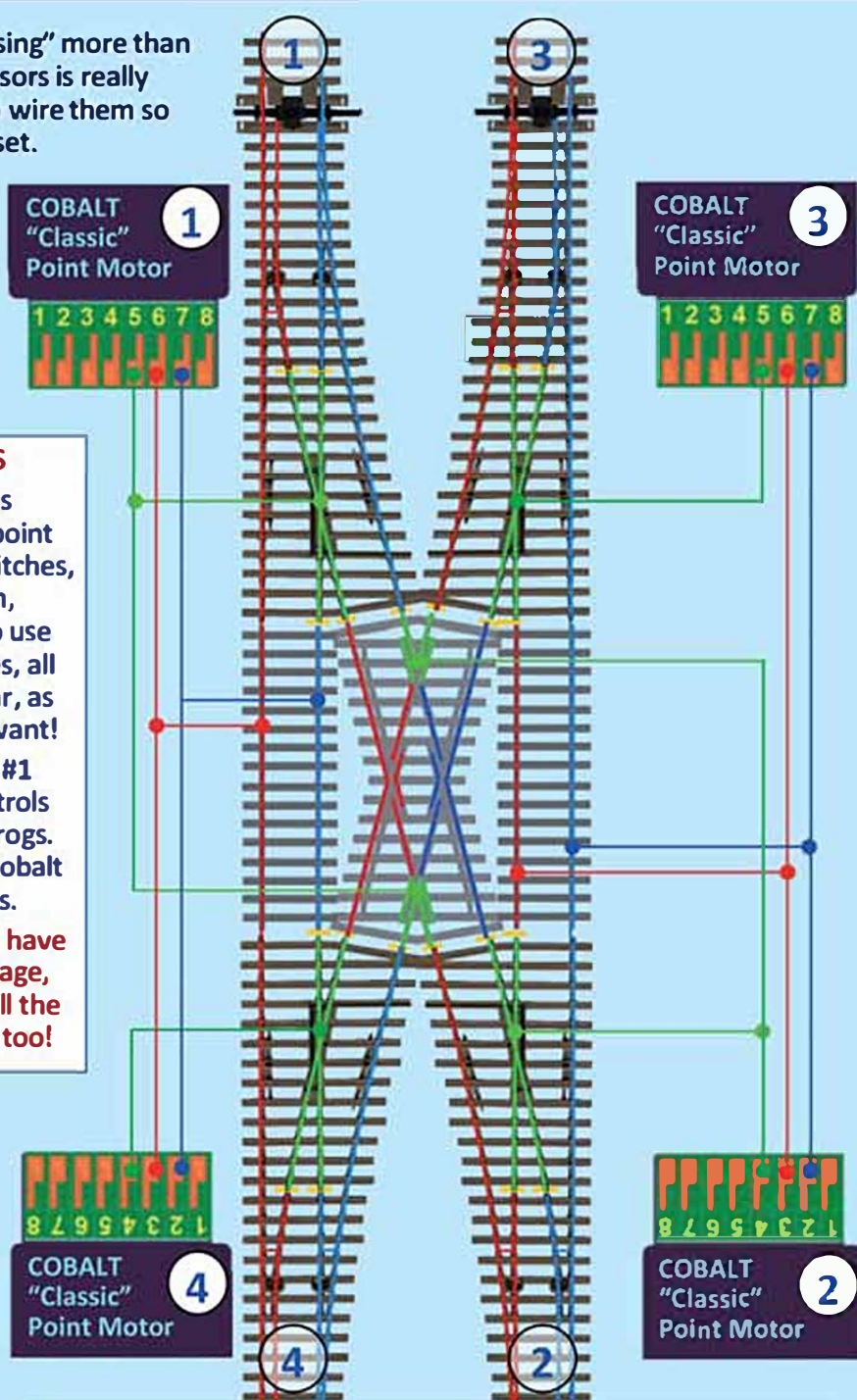*the switch that switches everything*

Using Cobalt-S & Cobalt motors

controls it all

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Fortunately we have plenty of switching with Cobalt & Cobalt-S, so we can easily manage interlocking so only one crossing can be set, control all frogs and do interlocked LED's too!

1+2

Cobalt-S Lever harness

3+4

Cobalt-S Lever harness

COBALT "Classic" Point Motor ①
1 2 3 4 5 6 7 8

COBALT "Classic" Point Motor ③
1 2 3 4 5 6 7 8

WIRING THE FROGS

This is the bit that confuses many, and with solenoid point motors or less capable switches, it can indeed be a problem, however once you start to use Cobalt or Cobalt-S switches, all of the difficulties disappear, as you can do anything you want!

In this diagram, Crossover #1 (Cobalt 1+2+) actually controls both point and diamond frogs. We've left Crossover #2 (Cobalt 3+4) just with its own frogs.

When this is done, we still have 4 spare switches so next page, we can properly arrange all the LEDs for the control panel too!

Cobalt Psu2+

Dual Channel Bridgeable Cobalt Power Supply

COBALT "Classic" Point Motor ④
1 2 3 4 5 6 7 8

COBALT "Classic" Point Motor ②
1 2 3 4 5 6 7 8

There are lots of wires in an "interlocked" scissors, so we'll do ONE thing at a time, with one page for each part of the wiring.
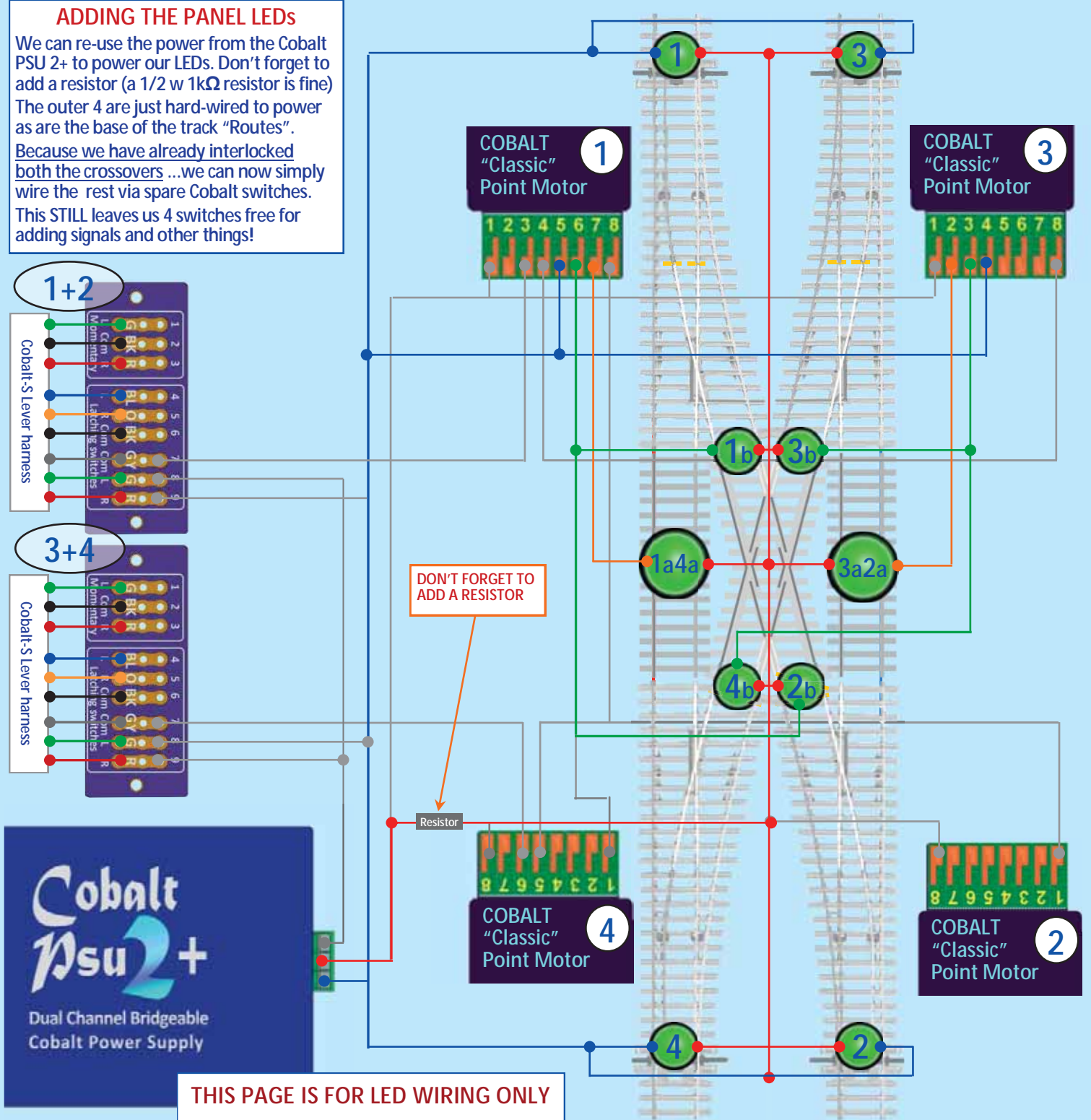**THIS PAGE IS FOR THE FROG WIRING ONLY**

Cobalt-S
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ADDING THE PANEL LEDs

We can re-use the power from the Cobalt PSU 2+ to power our LEDs. Don't forget to add a resistor (a 1/2 w 1kΩ resistor is fine)

The outer 4 are just hard-wired to power as are the base of the track "Routes".

Because we have already interlocked both the crossovers ...we can now simply wire the rest via spare Cobalt switches.

This STILL leaves us 4 switches free for adding signals and other things!

1+2

Cobalt-S Lever harness

3+4

Cobalt-S Lever harness

DON'T FORGET TO ADD A RESISTOR

Resistor

1

COBALT "Classic" Point Motor

1 2 3 4 5 6 7 8

3

COBALT "Classic" Point Motor

1 2 3 4 5 6 7 8

1b 3b

1a4a 3a2a

4b 2b

COBALT "Classic" Point Motor 4

COBALT "Classic" Point Motor 2

4 2

Cobalt Psu 2+
Dual Channel Bridgeable
Cobalt Power Supply

THIS PAGE IS FOR LED WIRING ONLY

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

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

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

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!

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.
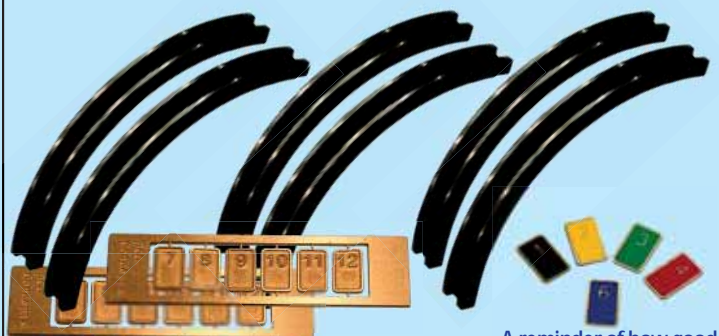
A reminder of how good these look when painted

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 need will be to hand if and when they are needed.