# DCC and Layout Wiring - Part 3: Control Panels & Levers

One of the more common questions is:

"how can I create a tidy control panel"

Well… it's not so difficult. If you can use common computer software, have a few tools and you are prepared to spend a little time to follow our guidelines and do it right, then a great looking control panel is something that any modeller can create.

The control panel in this first image is one we created for a test track that needed several DCC systems and other things connected - making it far more complex in style than most will need.. so we will concentrate on something a little more common for the rest of this article.
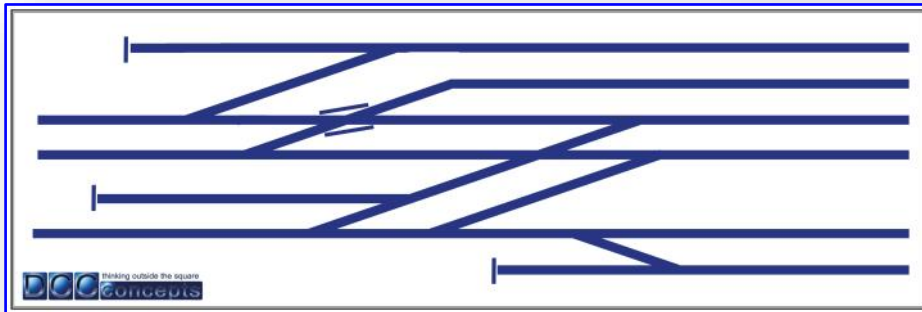
We will call our example "The Station throat". Here it is. We created it using a basic computer drawing program . Nothing special, just lines to represent the track. We drew it for A3 paper, but it'd work in A4.

While it represents the entry to a station area and has typical features, it's not the limit of these techniques…

Panels of ANY size can be done this way.

However, we recommend that you think like the prototype did… Make several panels, not one for everywhere!

Why? Because it is far more practical to make each panel a "Local" panel that represents an area that one signal box might have controlled… That way, wiring of each panel will be manageable, and the operation of the layout will also be far clearer to you - and to any visiting operators. Things change too, so if you make two or three or four separate panels, and then make a change to one area of the layout, you only need to rebuild one smaller panel!

Things to note: Make a heavy border. This gives you something to cut to, and after you laminate it and cut it to size, go around the edge with a dark colour marker pen. This hides the white paper-edge line for a professional look.

Next step, Decide how control will be done and what you will incorporate into it. We'll use "normally off" pushbutton switches on each turnout and we will use LEDs with chromed bezels because they are easy to install and look nice too.

Here's the panel with the position of each switch and LED added to it.

I used Red for LEDs, Green for switches. Because each of these items will need a 1/4" or 6.5mm hole, I've made the dots 6mm in diameter to help me locate the simple hole punch that we will use later.
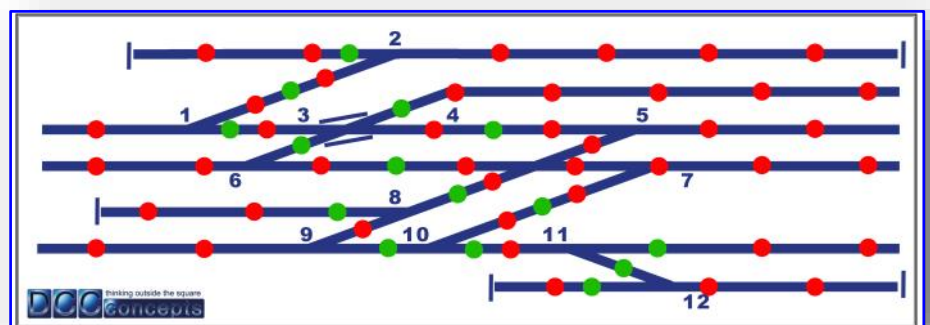
You will notice that there are lots of red LEDs and fewer switches than you might expect...

Fewer switches. There are only 15 switches whereas 12 turnouts would usually need 24. (we could have gone down to as few as 13 if we took this to the limit). This is because we used some logic in switch placement, so some switches make more than one turnout operate. That saves time and complication in wiring. There are only 15 switches where 12 turnouts would usually need 24! **Examples:** one switch operates both 1 and 2 when set to the crossover. Same with the switches on the main close to the double slip. One button sets both turnout 1 and the LHS of the slip to straight, same with the RHS side of the slip and turnout 5. Can you find the rest of the "multi-use" switches?.

Lots of LEDs. All DCCconcepts Accessory decoders and Cobalt motors can easily handle 6+ low-current 3mm LEDs on every output, so we can add enough to give a clear route. Its easy to do as they are all just wired in parallel.

Some LEDs will always be on. Two examples are the LEDs at the "Toe ends" of Turnout #9 and Turnout #12.
*By the way - Use ONE colour for route LEDS. Using red and green sounds good BUT it just ends up looking confusing.*

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Next step: Print and laminate it.

If you need a panel larger than your own printer can do, take the file to a stationery supplier. They'll be able to help with A3 or larger print/laminating services, and it is not an expensive thing to do.

Get a couple of copies so you have a spare "just in case". It will now be looking something like this picture. >>
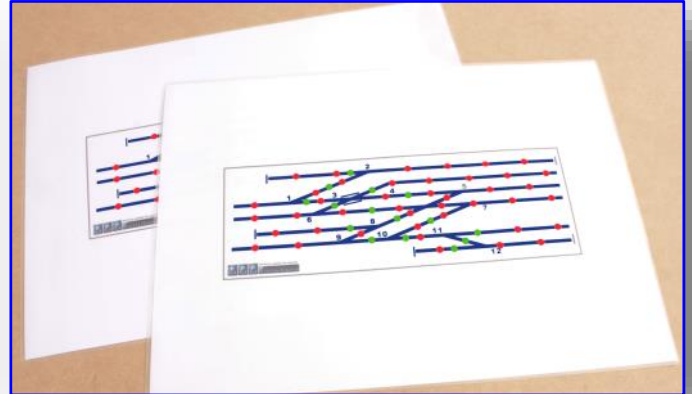
Next, using a very sharp blade, cut it out carefully leaving a nice, even border all round.

When the cutting is all done, use a marker pen with a large tip (one that is close to the border colour) and go round the edges carefully. If you slip don't worry… just put a <u>small amount of methylated spirits</u> on a cloth and wipe it away.
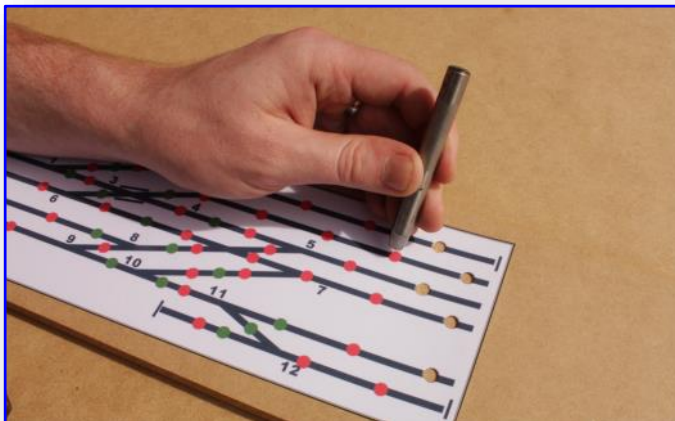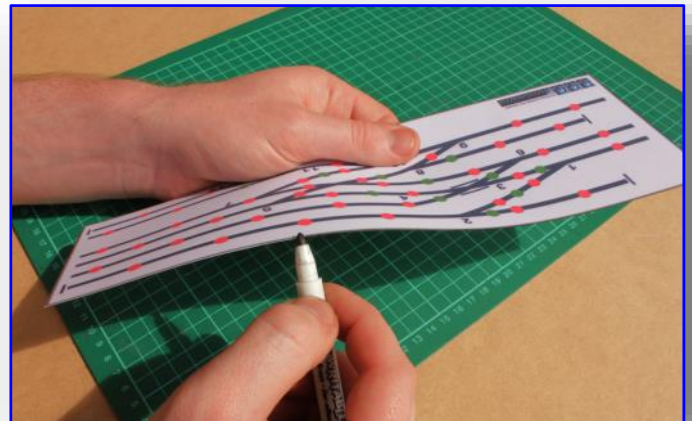
Now we have a professional looking, cleanable top surface with sharp, clear graphics, it is time to start the transformation from a laminated print to a professional looking control panel to be proud of!

From now on, really take your time, be fussy and you'll be amazed at how easy it is to create something good enough for a glossy magazine!

Tools needed: A clean flat surface - such as an offcut of MDF or ply. A hammer or mallet. A set of low cost hole punches (Less than $5 for a set from our equivalent of B&Q/Home Depot). We'll be using the 1/4" punch (6~7mm OK).

What you will do. Practice on a bit of the offcut laminated paper to get an idea of the hammer force you need to use.

Place the laminated panel artwork on the flat surface. Centre the punch on a red or green dot. Hit the punch firmly. There is no need to clear the punch each time, just move from dot to dot until they are all done.
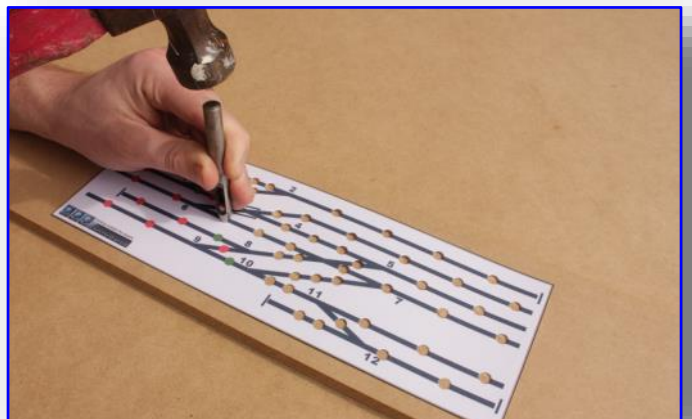
Here is what it will start to look like as you make some progress... Very professional indeed!

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Next step: Make the flat panel that will support the laminated diagram you have created.

We'll discuss only the panel itself here.. It's up to you how to make the panel frame that supports it but we recommend that you glue the panel to the frame, as screw heads on a control panel take away from its super-professional look.

Materials needed. Unless you want exposed wood grain don't use ply unless it it's fine grained. We like 3mm MDF but others we know like working in metal so use aluminium. We will discuss MDF here… tools for metal are up to you!

You will need some 3mm MDF and a <u>spray can of paint</u> in an appropriate colour for the exposed panel border area.

Tools for this step: Sharp pencil. A straight-edge. Sharp saw with medium-to-fine teeth. Fine sandpaper. You will also need a sharp 1/4" or 6.5mm drill bit. A sharp counter-sink. A battery drill (or other form of drill). Clips or clamps

Measure 10~15mm from the <u>straightest long edge of the MDF</u> and draw a line 15mm from the edge.

Place the panel on that line, hold firmly & draw round it. Draw the other borders the same distance from the panel edge.
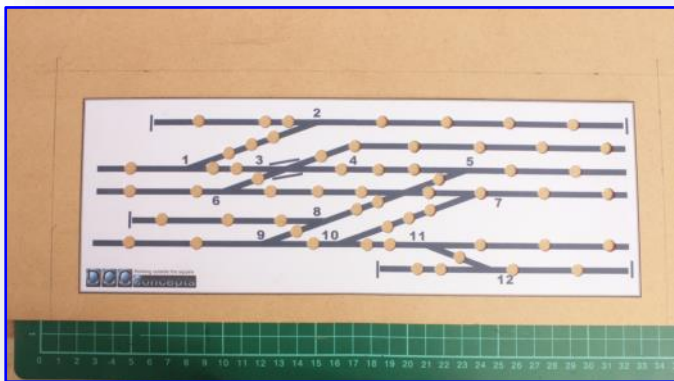
Cut the panel out & carefully sand the edges smooth.
Radius it a bit and take any sharp edges off with sandpaper.

Give the edges a coat of paint and let dry. Paint only the edges and make sure that no paint clumps anywhere. If it is needed, sand and spray-paint it again… and again!
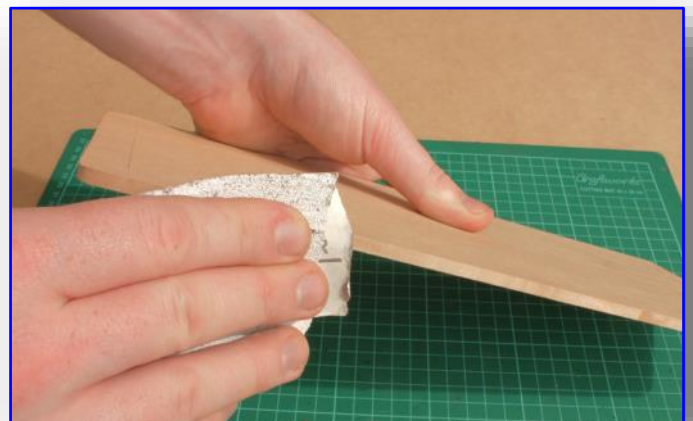

Make sure you do not lose the pencil line that indicates where the panel will go. Leave it for long enough to dry properly.

Now… Take the panel support surface & lay the laminated panel on it. Secure with clips (office "Bulldog clips" are good).

Using the sharp pencil, draw around all the holes. Make sure the artwork does not move when you are doing this.

**The support panel will look something like this when its ready for the next step….**
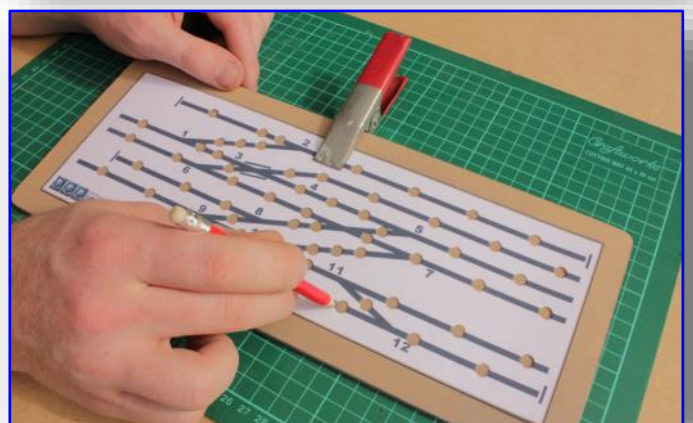
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Next step - Make some holes.

Place the support panel on a hard flat surface. This bit of wood will get damaged, so make it an off-cut.

Before you drill, create a centering dimple: You can see the Rings you drew in this image. Use a punch to pop a cen- tre-mark on each drawn ring. This will be a really big help in drilling accurately as it will guide the drill for you.
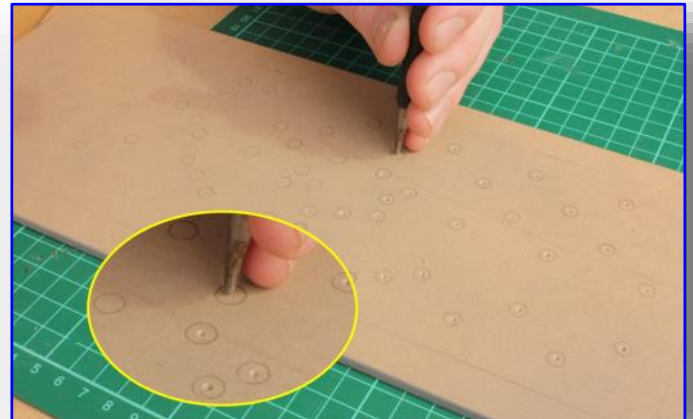
Drilling time: Using the new, sharp drill mentioned last page… carefully drill all of the holes. Use the dimples made by the punch to stay centered in the circles you drew…. this will help proper registration of the panel and diagram. Do not rush!

(You might find it easier to clamp the panel and sacrificial wood together - Clamped or not, do your best to keep them pressed hard together while drilling because having the wood under the panel plate will stop the drill bursting through and keep the holes you are drilling tidy)

Time to use the Countersink bit: Once all of the holes are drilled, take the countersink bit and slightly bevel the holes on both sides. This cleans up the holes and makes it much easier to add the LEDs and switches later.
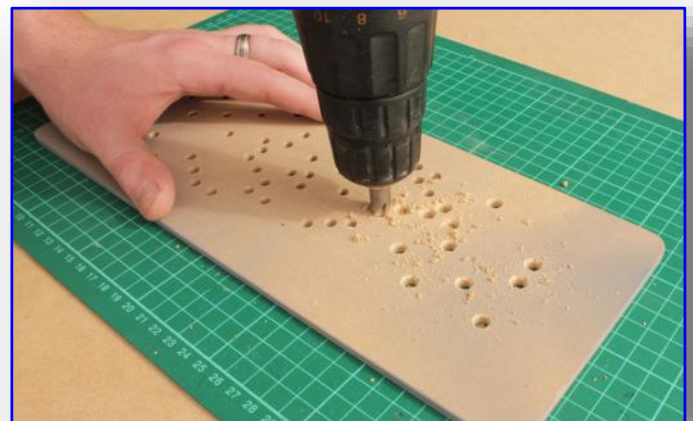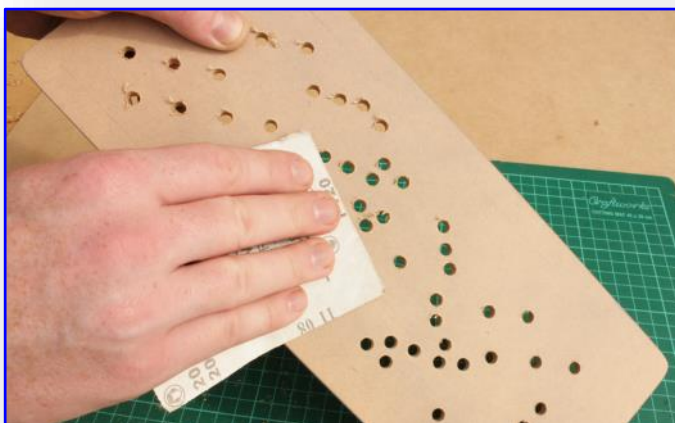

Sand any rough edges or dags left over from drilling and countersinking before you take the next step.

Paint the rest of the panel. Because we have the holes in it that match the diagram, we no longer need the positioning line we drew so we can finish off the painting. Take your time.

One good, even coat with solid coverage... let it dry properly.

Once again, sand it, then re-coat it evenly once more and you should have a smooth surface that no longer looks like MDF! It should look something like this!
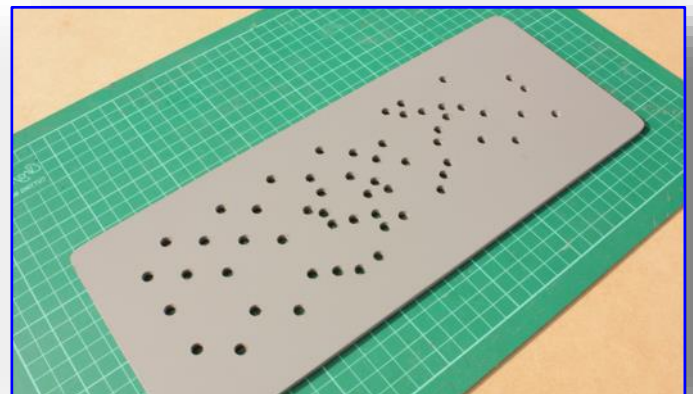
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Next step - Glue time… We prefer to use a 3M spray type contact glue…. It's by far the best spray glue we've found.

Spray glue is a contact glue and that means it will work best when applied to BOTH surfaces and left to go tacky before you bring them together (read the instructions on the glue).

Mask the face of the support panel so that excess glue will not be visible past the edge of the panel diagram when you join them together. (If you have made the border 15mm wide as we have, mask an added 2mm, or 17mm from the edge of the support panel) . Spray the centre area of the support panel.
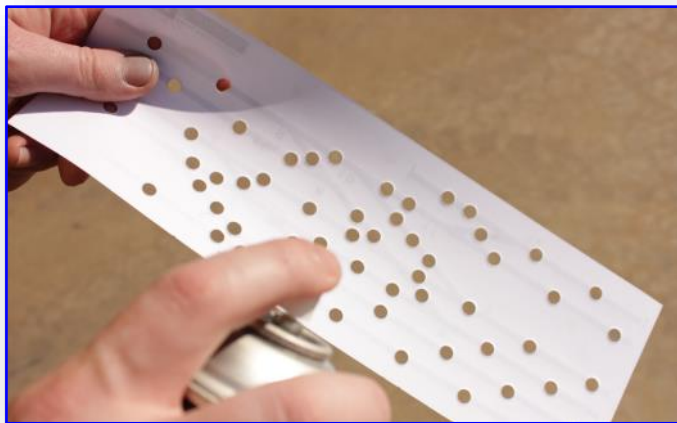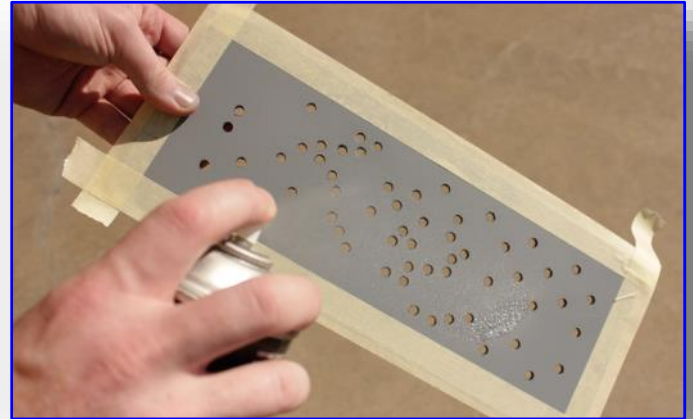
Adding Glue to the laminated panel:

Our image shows us holding the panel and spraying it… but to be honest its much better to place it face-down on newspaper when you spray it with the contact glue as then you will not get glue on your fingers!

As per the glue instructions, once it has an even coat (it does not need to be too heavy) ...wait until it is "tacky" before take the next step!

Remove the masking, carefully bring them together:

TIP: Good registration matters but the glue grips fast!

To get it right first time, use a couple of sharp pencils or similar things inserted into the laminated panel holes.

The taper of the pencil-ends will ensure accuracy!
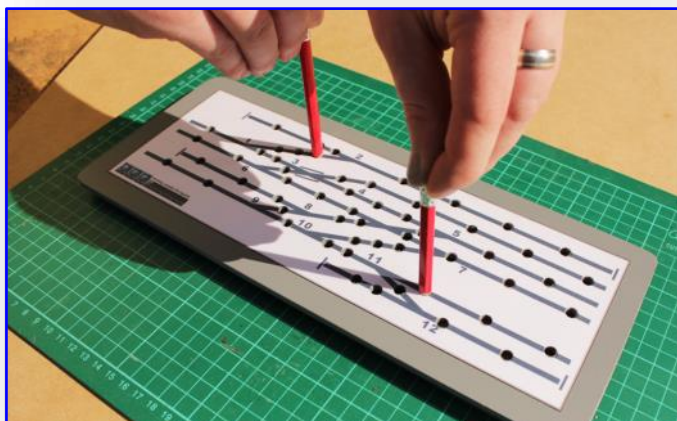
(Because the holes in the support panel and diagram match, the pencil end-tapers guide them together and this results in accurate registration between the panel parts.)

Take your time as once its on, its on!

When you are happy with the way that they are both positioned, use a cloth and working from centre outwards, press them evenly together.

Its nearly done… As a final touch before the next step, wipe the surface/laminated face with a damp cloth.

(If you got glue where it shouldn't be, it's OK - a soft cloth "just damp" with turps (damp, NOT wet with it) will remove it.)

Well done! with almost no cost and very little effort, you have just finished the hardest part… and you are well on the way to creating a really good looking control panel.

Take a break now and admire your work... From now on, its all just assembly and wiring!

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Now the fun bit… we can add the switches and LEDs.

Work steadily & neatly. There's NO need to over-tighten the nuts holding LEDs & switches..

Be careful not to damage the face of the panel as you do it.

The switches and LEDs shown are from our "Cobalt Digital switch kit" and this kit is very good value - actually cheaper than buying the parts from a high street parts store!

Additional switches and LEDs can also be bought from DCCconcepts. Both the switches and LEDs have 1/4" threaded mounts. The ideal tool to do them up is a small tube-type nut wrench or spanner - however if you are careful, pliers will do.

TIPS - LEDs. The long lead on each LED is the positive. Where multiple LEDs are used so that they relate to one track or turnout position, they should be wired in parallel, so it is better to install them all with the positive (long lead) at the top so any wiring you do can be a straight line. This will make it easier and keep the panel wiring nice and tidy too.

TIPS - Switches. We usually supply 3-terminal pushbutton switches in our switch packs - The terminals are marked C (common) NO (Normally Open and NC (Normally Closed).
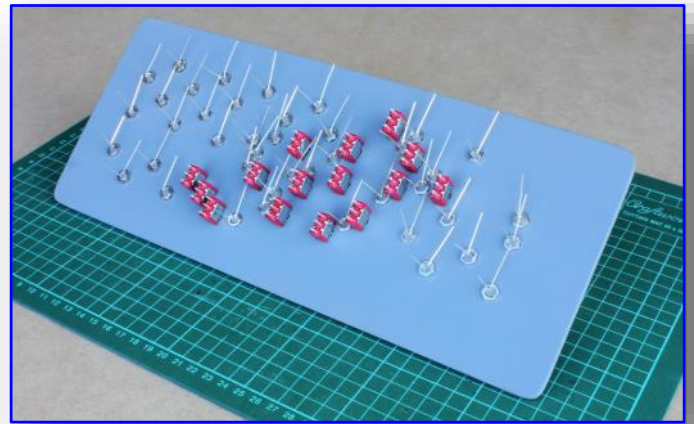
For pushbutton use, we use the C and NO terminals - To keep later wiring neater and easier, install all switches with the same orientation / same terminals at the top. This image shows **our** panel with everything in place, properly aligned. So far, so good!

Well… its nearly done. Here is another image, this time from the "business side" of the control panel.

There is no point taking this demo panel to the "fully wired stage" at this point, because its intended use may not be the same as your own choices. To add some perspective for you… We will be using this panel with Cobalt iP Digital motors so we can have the choice between DCC/Digital and Analog control… but it could also be used just as we have built it here as a panel for solenoid point motors using either our CDU-2 high-capacity CDU or solenoids plus our AD-S8fx solenoid decoders.

We WILL do other "Control Panel Tutorials" sometime.. One will demonstrate how to solder to panel components (it may be a video because of that) and another will show you how you can benefit from some new digital technology - but meanwhile, why not consider our Cobalt-S Levers? (next page or 2)

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Of course, there is more than one way to add point & accessory control to a model railway.

One way is with the versatile DCCconcepts Cobalt-S levers.

These very tactile, nice to use levers are suite large (140mm tall) reproductions of the signal-box levers used all over the world throughout the "Steam era" and beyond.

In fact, similar levers are still in use around the world today!

With a traditional lever design and solid brass levers, Cobalt-S Levers give a very prototypical feel to model railway operation.

They are very versatile too:

Each Cobalt-S lever has three SPDT switches built in (one is momentary and the others On-On). This allows each Cobalt-S to control almost ANY accessory device ever invented for use on model railways, so the sky is the limit!

Gang a Cobalt-S levers together, paint them prototypically and the operation of your model railway will quickly become far more realistic.

(each lever in a signal box is painted in a particular way… the style and colour that was chosen indicated its specific purpose).

Add a signal box diagram that looks like the real thing… and you are moving to a whole new way of operation!

Below: Some images of Cobalt-S as it comes - and "dressed & painted" ready to install on a layout.
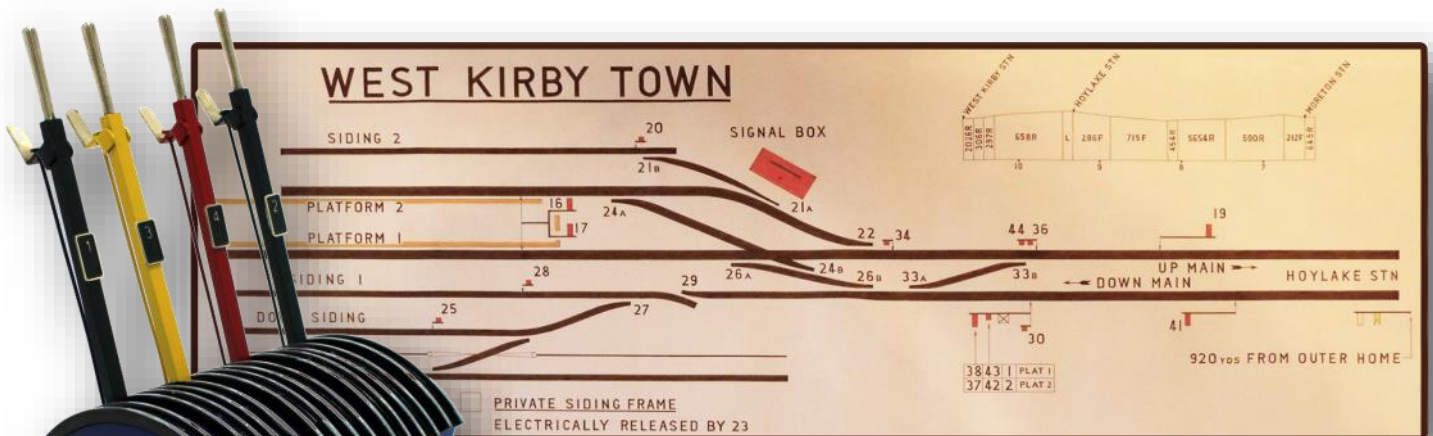
On the final page of this "Control panels and levers" section, we've included a chart showing the lever categories and uses, as well as the lever colours that were commonly used throughout UK.

Your own prototype may be different… so check first!

Dress them up!

Ribbed metal tops are supplied. You can also add the Etched Brass numbers that are available for Cobalt-S levers (1 to 99)

Summary of standard signal box lever colours (General UK railway practice)

Lever Colour	Main lever function	Notes
Yellow	Distant Signal	(also for temporary collars to indicate electrical isolations)
Red	Stop signal, Ground signal	Also route levers
Blue	Facing point lock	
Black	Points, scotch blocks, de-railers	Also quadrants and catch blocks
Blue Top/Black lower	Combined point/facing point lock	
Brown	Barriers, Gate, Bridge & TT locks	Also wicket gates
Green	Gongs & asking lever	Distant signal colour up to 1930 (appx)
White	Spare lever, Fixed lever	Lever white if related apparatus removed
Red top/Brown lower	Acceptance lever	
Stripes Brown + white	King Lever	
Chevron Black/White	Detonator placer apparatus	Warning detonators for fog apparatus
Red top with Chevron Black/White lower	Signals combined with detonator placer apparatus	
Red top/Yellow Lower	Combined home and Distant signal	
White top, other colour below (various)	Lever left to retain locking or out of use with locking still attached	Lever top also shortened
Addition of a white band	Remote release possible	Indicates the lever can be released from another signal box

Please Google "Signal lever colours" for specific information related to your prototype as details may vary a little