Sundry Snippets 14 - Reliable Electrics

Mike Sharman

The Brief

The Editor suggests "something" on track layout and design of control panels with a view to reliable use at Exhibitions. Now that is rather far-reaching and will have to be split over two sets of *Snippets.*

I have been attending about 10 exhibitions a year for some years now, many with a 600-1000 mile round trip, often on Belgian motorways, so I have a *fair* idea of what can go wrong. I won't bother with the routine problems of locomotive servicing (dirty wheels, and so on), but will stay with the aspect of layout design and cover modifications which have evolved in the fight to reduce unreliability. You will note I said "reduce", not "eliminate"!

Problem areas

Problems are for the most part based around electrical faults resulting in 'open' circuits (*not* 'short' circuits. We will see later how panel design can minimise the 'shorts'). Here are a few preliminary comments on the main areas of difficulty:
1 – 'Open' circuits: these all centre around fatigue in soldered joints, mainly on point blades and on multi-pin plugs between baseboards and between panel and baseboard.
2 – H & M Point Motors: mine have been swapped between 8 layouts to date, and they are still superb. As long as you remove the built-in change-over switch and mount instead a micro-switch round the slide bar for the polarity of the frog (sorry, I should say "crossing").
3 - Turntables: These have driven me mad over the years. Now I build the turntable as a removable and adjustable item *before* I start trackwork – more on that later, too.
4 - Baseboards: These are often too big and/or heavy. I now have 4ft. x 2ft. as a maximum, with a framework of 9mm ply drilled full of 1in. lightening holes. My tops are covered with 10mm balsa, glued with Resin W – after all, you don't *need* to be able to walk on the baseboard.

Power Units and Panels

If at all possible, I no longer have a 'main' detachable control panel, but install mini-panels as a permanent part of each baseboard. They can be hidden behind hillsides or half-relief buildings, or indeed kept in full view: on the continent, visitors are fascinated to follow what you are doing from panel to track.

My power unit and controllers have now been built to a 'standard' pattern, which can be plugged into any station I build, be it simple or complex. I have three sets, two of them in use and one as a spare, and all are fully interchangeable. They are not plugged into the panels, but are built into the rear of the baseboard, near the

centre of the 'operating' area and can be clipped to the baseboard or hand-held, depending upon the choice of length of cable loom. The transformer sits on the floor, under the layout, and plugs into a socket next to that of the power unit. They both have nine-pin plugs and are colour-coded, Blue for the transformer and Orange for the controller.

Figure 1 shows the layout of the controller, and *Figure 2* the wiring and plugs to the baseboard. The rear of each socket is wired to 'busbars' near the panels. But what are busbars? In my case, they are 1in x ½in strips of thin brass tacked to strategic parts of the baseboard, which act as wire collectors for the different circuits – AC Positive, AC Negative, AC for points, for turntable, and so on. I know you can use 'choc blocks' to collect your wires together, but they take up a *lot* more room. The drawings will, I hope, show the system.

Where there are spare pins in the plug, I wire some of them into the loom and then coil them away underneath. Should a system fail at a show, it is a lot quicker to duplicate a feed *then*, and to sort it out later. Another hand 'tool' is a long length of wire with small crocodile clips at each end. Recently I 'lost' my AC return from some pointwork and could find nothing obviously wrong (it turned out to be a poorly soldered joint in the back of a plug – my fault). Anyway, I clipped my 'croc' to the busbar for the AC return and along to the offending point motor – and away we went!

Design

Having established a few basics, let us start at the simple end of the range with the much-loved Scalefour small layout: an immaculate, accurate and aesthetically lovely end-of-branch line to fiddle yard, with half a dozen points, a turntable, and one controller which feeds across two baseboards. Now, using *Figure 2* as a guide, let us see what we can discard.

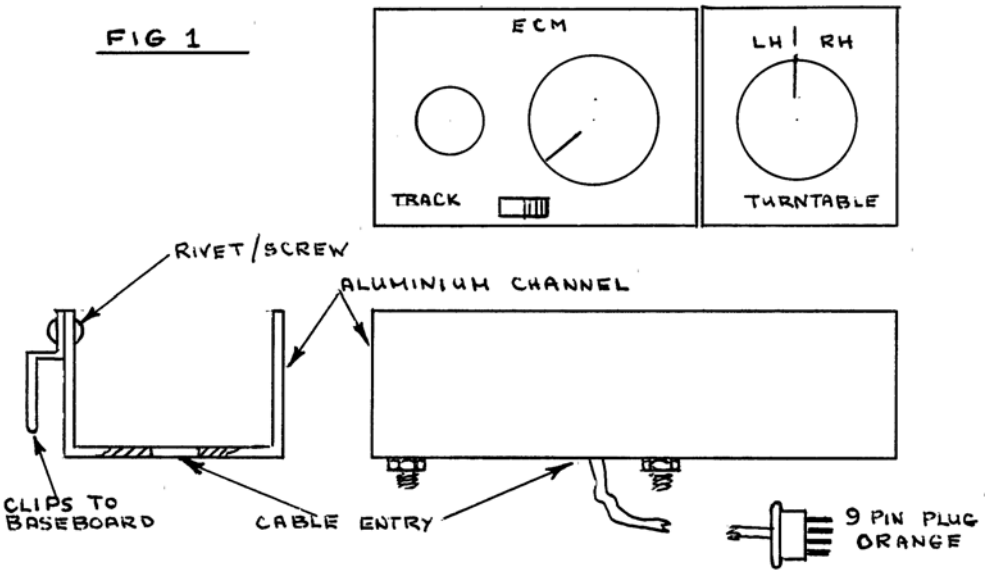
I would start by using the standard power system in *Figure 1,* but I would have a few more unused spare pins on the plugs. We could do away with the AC power for the points and use instead simple control by push/pull wire-and-tube, with the levers positioned as near as possible to the operating position and hidden from view behind a half-relief building or hillside. The track section switches could be on two hidden mini-panels or spread along the board with the turntable on the main input board. As you can see from *Figure 2,* there are only four wires between the baseboards – and there need not be any more on a complicated layout.

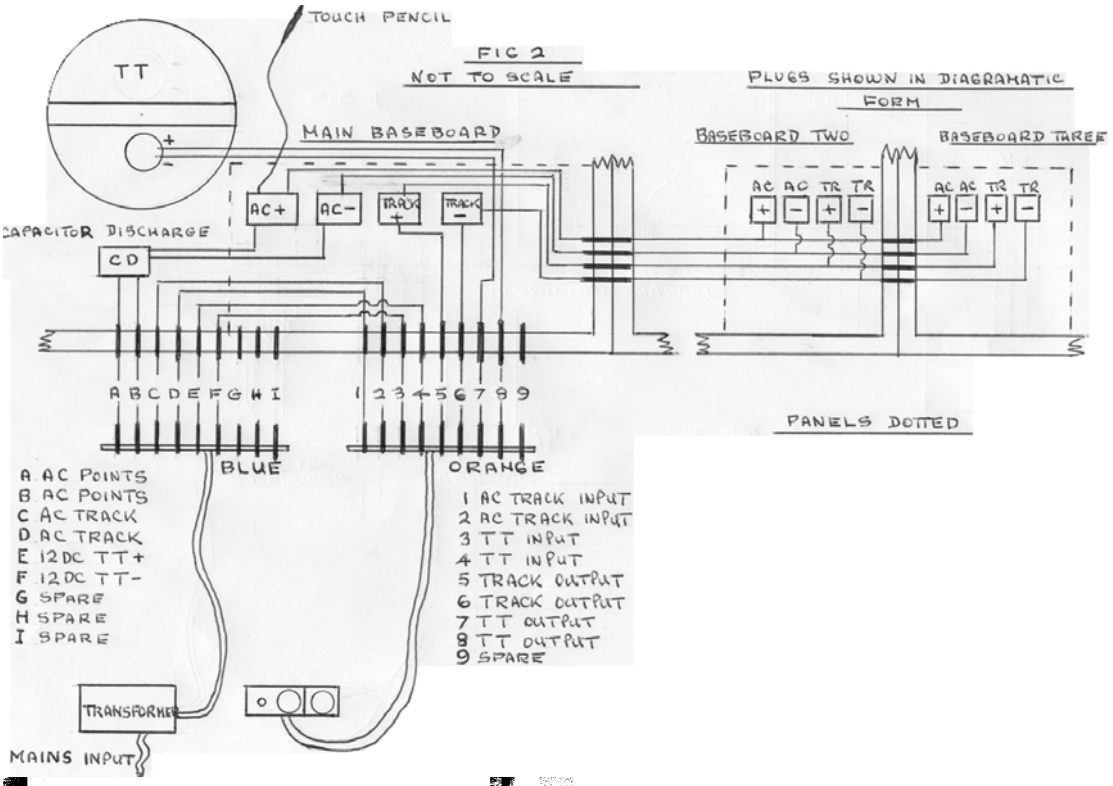
Now, having enjoyed – and got bored with – our first attempt, let's go for some 'fun'. We could use exactly the same panel system on a larger and more ambitious layout, but because of the distance and complexity we could introduce point motors, with touch-pencil control to small brass pins on our panel diagrams; and

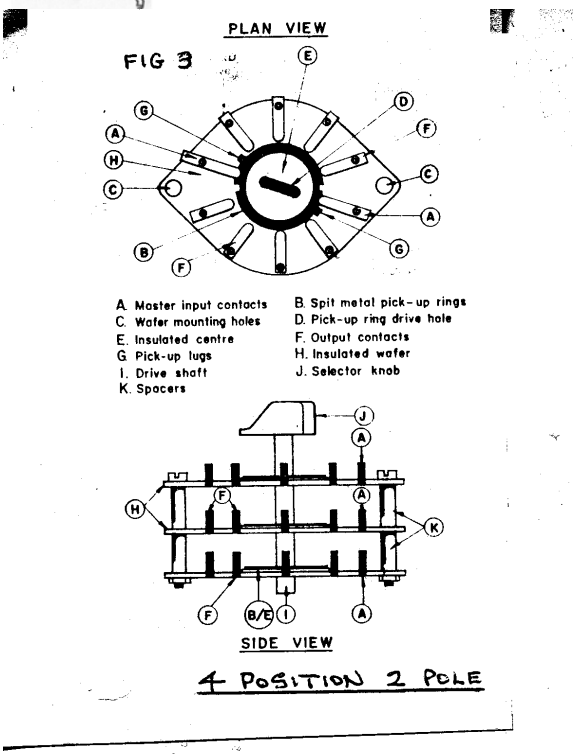
rotary switches (see *Figure 3*) for the more complex track circuits. So, what are rotary wafer switches?
They consist of a flat insulated disc, a wafer *H* surrounded by 12 or more contacts which can be positioned in any permutation you require, e.g. 6-position, 2-pole; 4-position, 3-pole; 3-position 4-pole; and so on. The centre is a rotating plate *E*, with two split metal rings bonded to it *B*. The two metal rings are in permanent contact with the (in this case) two master input contacts *A*. The centre pick-up rings are made to rotate by means of an oblong bar *I,* passing through an oblong hole in the centre of the assembly. As these rings are rotated, pick-up lugs (shown in the mid-way position, for clarity) make contact with the output contacts selected. So, with one wafer, as illustrated, we could use half the contacts for positive current and the other half for negative.

The wafers can be bought from Radio Spares and cost me about £1 a couple of years ago. They can be built up into packs of about 12. They are simply bolted together, using spacers *K* and a centre drive rod that is long enough to engage all the wafers. Current can be fed to any of the master input contacts and away through the outputs. As long as only one feed from a section of track is fed to an output contact, there is no danger of mixing positive with negative. This is because, once the required route has been selected, *all* the other rails not in use in the track formation will end up at 'open' circuit.

Now, using the self-explanatory 'tool' in *Figure 4*, let us wire a crossing formation to our wafer switch. *Figure 5* represents a typical crossing from the days when tracks were laid 'as required'.




TOUCH PENCIL
TT
+
-
MAIN BASEBOARD
AC+
AC-
TRACK +
TRACK -
CAPACITOR DISCHARGE
CD
A B C D E F G H I
1 2 3 4 5 6 7 8 9
BLUE
ORANGE
A AC POINTS
B AC POINTS
C AC TRACK
D AC TRACK
E 12DC TT+
F 12DC TT-
G SPARE
H SPARE
I SPARE
1 AC TRACK INPUT
2 AC TRACK INPUT
3 TT INPUT
4 TT INPUT
5 TRACK OUTPUT
6 TRACK OUTPUT
7 TT OUTPUT
8 TT OUTPUT
9 SPARE
TRANSFORMER
MAINS INPUT
FIG 2
NOT TO SCALE
PLUGS SHOWN IN DIAGRAMATIC FORM
BASEBOARD TWO
BASEBOARD THREE
AC AC TR TR
PANELS DOTTED


PLAN VIEW
FIG 3
A Master input contacts
B Spit metal pick-up rings
C Wafer mounting holes
D Pick-up ring drive hole
E Insulated centre
F Output contacts
G Pick-up lugs
H Insulated wafer
I Drive shaft
J Selector knob
K Spacers
SIDE VIEW
4 POSITION 2 POLE