How to edit a vector graphic

Background

I often get sent a diagram in the form of a PDF which I want to edit, without resorting to bit map additions. The first step is to import the PDF into ArtWorks and then export it as a Draw file. This preserves the precise detail.

It is perfectly possible to load the Draw file into the application !Draw and add some stuff and resave it but making more global changes is much more tricky. For example altering the thickness of lines that are 1.2 points wide to be 1.6 points.

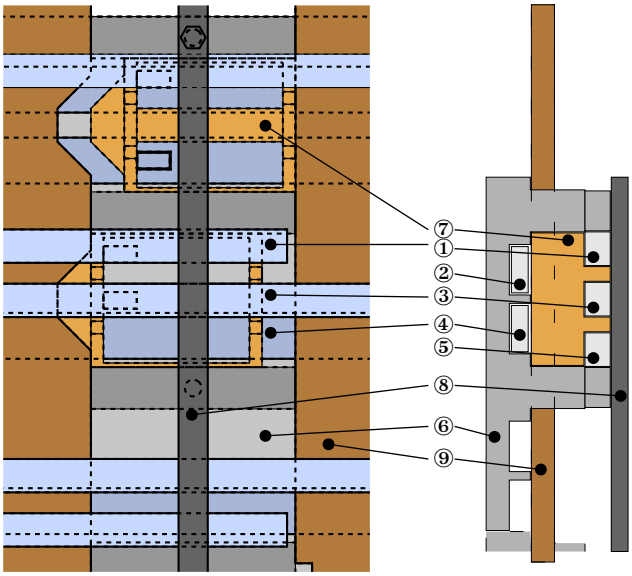
Adding bits

The diagram below is a good example: the left hand view is a portion of a large Draw file. I used MakeDraw to 'Include' this draw file before drawing the right hand half which adds some white rectangles to obscure parts of the larger file which are not wanted and then draws the sectional view and adds the numbered legends which overlay onto the left hand view.

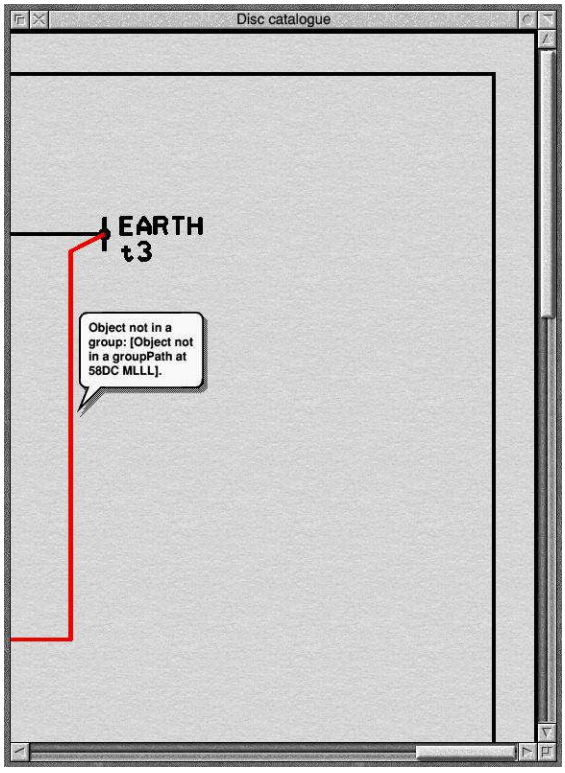
I have described this process before, using MakeDraw to take an existing Draw file and then add to it.

Altering bits

It is bit more tricky to make small but precise changes to an existing Draw file - for example to tinker with detail. The approach I find best is to take the exported Draw file and disassemble it using !MultiTask. This produces the complete instructions for recreating the original Draw file exactly. I now display the original Draw file in !DrawDis and identify the path I want to change.



Above: *A section through a 5-bar locking tray has been marked up to show the bars, locking nibs and tappet. A lock of solid construction is fixed to a single bar whereas a hollow lock can be driven by several bars. On the left hand view, 'V'-shaped notches may be seen, cut into the tappets. A plate or a condition piece may be mounted on a tappet to engage with the upper half of a lock (or with a 'top thin' lock). Locking bars ① to ⑤, the tray (⑥), a sliding lock (⑦), strap (⑧) and tappet (⑨) are labelled.*

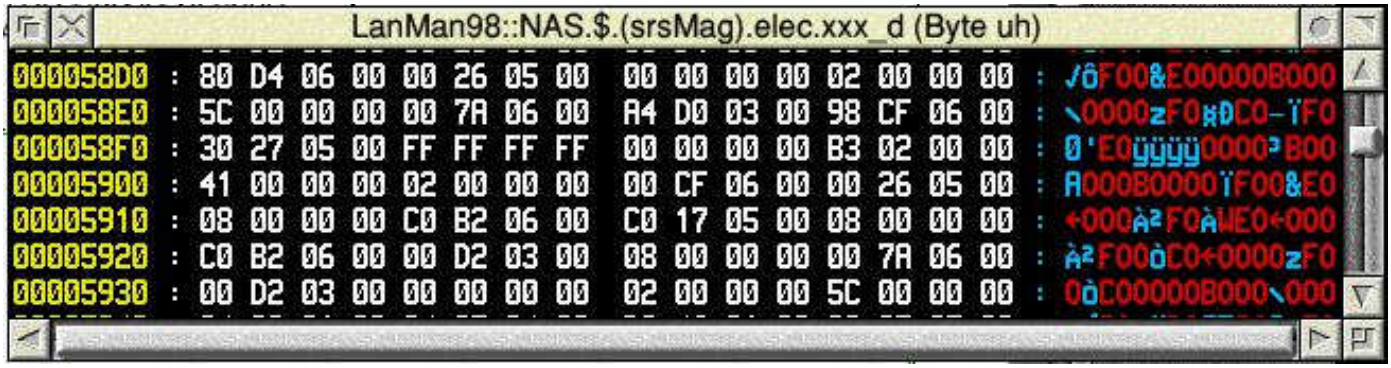


This is a screenshot from DrawDis where I have clicked on a particular path (which highlights it in red) and the interactive help shows its offset from the start of the Draw file.

```
0 : item%=240:mem%=&58DC:REM Path
0 : PROCmdSetFillStyle(FALSE,0)
0 : PROCmdSetLineColour(0,0,0)
0 : PROCmdSetLineWidth(0.38092613011)
0 : PROCmdStartPath(245.98015434,186.00220507)
0 : PROCmdLineTo(241.99338478,183.9911797)
0 : PROCmdLineTo(241.99338478,138.01984566)
0 : PROCmdLineTo(233.98456448,138.01984566)
0 : PROCmdEndPath
0 : REM mem%=&5935
```

Left: *an extract from the disassembly of the Draw file. The path element concerned extends from &58DC to &5935 (padded with zeroes to a word boundary) comprising a move (2), lineto (8), lineto, lineto and end (0).*

Below: *an extract from the original Draw file of the same area.*



So if I wanted to add a little wiggle in the line I could do so precisely and then recreate the Draw file with just that change made. You will see that the disassembled Draw file is in the form of a BASIC programme which looks curious as every line is numbered zero. This allows for the fact that there may be more than 65000 lines of disassembly. If so, adding intermediate lines is not feasible, in fact StrongEd and Edit can't handle it at all.

More refinements

The sequence of the various objects within the Draw file usually shows some order especially if the drawing was created by a CAD product. So there is advantage to be obtained if the first disassembly has `'PROCmdStartNamedGroup("partX")'` commands added in suitable places to separate bits that are obviously linked. (Items may be laid out left to right or top to bottom.) The Draw file can then be recreated and re-disassembled. It should still look identical to the original.

!DrawDis will show the group name of any items and will hide and restore the whole group at a single click. Any parts of the drawing that are not wanted can be easily identified and removed. A by product of disassembling the Draw file is that any bit map content will be identified - this would have to be edited separately.

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Chris Hall is a chartered mechanical engineer with a 29 year full time career in power stations and nuclear safety. This work included safety case preparation and oversight, moving to Oldbury power station in 1995 and to HQ in 2001. He retired in 2005 and has since indulged his hobbies including web design and computer programming and has worked for the last 30 years on a heritage railway as volunteer S&T technician and signalman. He is now 69 years old and has written a 60,000 word autobiography.