AutoStereograms

Convert simple screen pictures into stunning 3D images with this clever

By now, there can t be many people who haven t seen the pictures and posters for sale consisting of seemingly random coloured dots (autostereograms), which when viewed in a particular way produce startling 3D images. The short program listed here enables you to produce your own multicoloured autostereograms for viewing either on the computer screen or as a printout.

Unlike our previous article on the subject, Dots before your eyes (RISC User 7:4) you don t need a special art package to make this work. You can easily create a simple picture for translation using either Paint or Draw, and then pass it through 3dConvert, listed here, to generate the final image.

CREATING YOUR OWN STEREOGRAMS

To produce your own autostereograms with 3Dconvert you must first create a suitable Mode 12 sprite containing your original design. The conversion program will eventually use this to create a 3D image. When it does so, it will place all objects of the same colour at the same depth. If you are using the Desktop palette (as you would be if you were using Paint or Draw in Mode 12), all parts of your picture in white will end up furthest from the eye in the 3D representation. By contrast, those in light blue will end up nearest to you, while colours in between will appear at intermediate distances which depend on their relative position in the palette (as seen for example on the palette icon on the icon bar).

The most obvious approach is to work directly in Paint, or any other art package that lets you create mode 12 sprites. In each case you must remember to be in mode 12 when producing the sprite, and do not use other than the default Desktop palette. Create a new sprite window of 640 by 256 pixels. The largest horizontal size allowed by 3Dconvert is 1000 pixels. Click on the toggle-size icon to open up the window to its fullest extent. From the Paint menu click on Show colours and Show tools. Use a background colour of white, and produce a few bold shapes in different colours using the filled shapes from the toolbox. Try different colours and shades of grey, but don t use the strip about ninety pixels from the right-hand edge of the window. Finally, save your picture to disc.

HOW IT WORKS

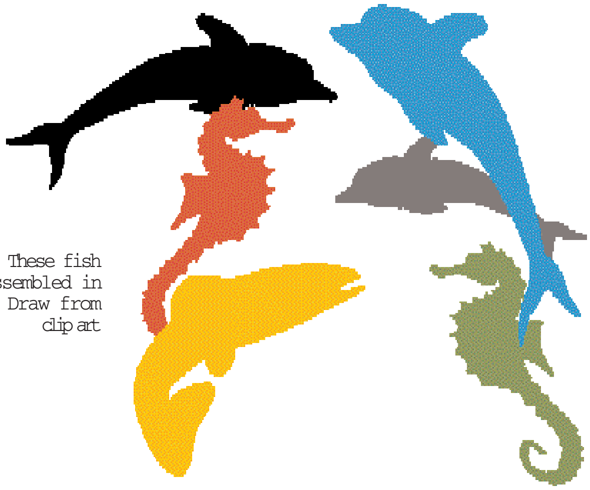
Here is a brief description of the theory behind autostereograms. Figure 1 represents a viewer looking at two points on Objects A and B. The projection of these points as seen from each eye is seen on the paper. The two points produced on the paper as projections of the furthest Object A are more widely separated than two points projected from the nearer Object B.

The paper is filled with randomly coloured dots, but an algorithm is used to ensure that the two dots representing each eye s perceived position of A are separated by a fixed distance and are the same colour, and similarly for B except that the separation distance will be proportionally smaller. Provided the viewer can focus behind the paper, then slightly different images will be presented to each eye. The brain then fuses these images to give the three-dimensional impression.

Note that practice is required to see these images. If you have a dominant eye or suffer from astigmatism you may not be successful. If you are near-sighted, remove your glasses;

Figure 1

An alternative approach is to use Draw to create the starting image. Proceed as with Paint, drawing fairly chunky objects in a variety of colours. When you have finished, you will need to take a snapshot of your drawing on the



These fish were assembled in Draw from clip art

Desktop in order to convert it to a sprite file (since Draw s save option would generate a Draw file, which 3DConvert cannot handle). But taking a snapshot is easy: just use Paint s screen grab facility by selecting Snapshot from its icon bar menu.

As a third alternative you might like to use a clip art sprite, but most clip art Sprites which appear suitable for conversion have not been produced in Mode 12, or if they have, the palette has been altered. To check on this, double-click on the sprite file to load it into Paint. Double-click

PROGRAM NOTES

These notes apply to the accompanying listing.

The program first loads the sprite into memory at start%. This memory will be altered during the course of the program and re-saved as the output file, since it already contains the sprite file header information.

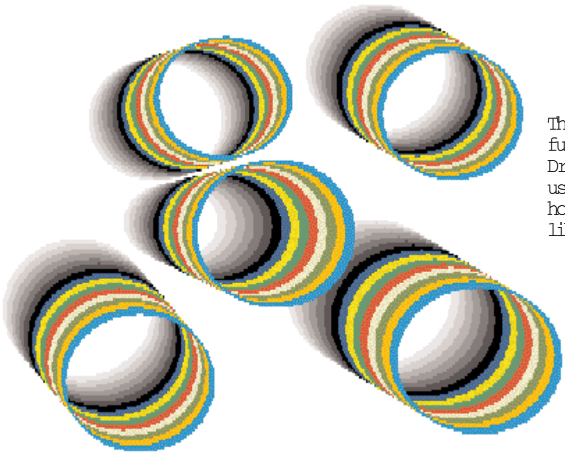
Line 160 reads some of this information which is required by the program, such as the horizontal and vertical dimensions in pixels (horiz and lines) along with the start position of the pixel data (data). Line 170 alters the sprite s name.

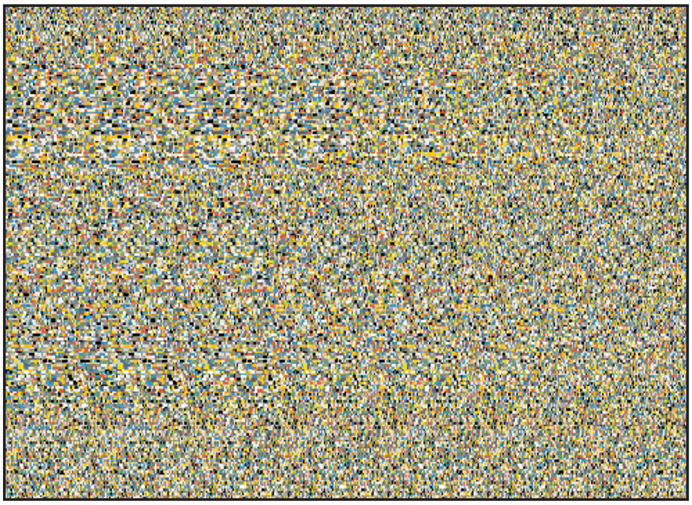
Each horizontal row of pixels is read one at a time by the loop in lines 190 to 270. The like array is first initialised to zeros. The next loop (lines 210 - 220) reads each pixel at a time as though this was seen by the left eye, and determines from its colour what distance in pixels the right eye will see the same spot on the image. If the pixel is white (colour 0) the base distance of 90 is returned, if the pixel is colour n the distance returned is 90-n. The like array for this pixel is then set to this distance (provided that the like pixel is not past the right-hand edge), this will be used later to ensure these two pixels are the same colour. Note the complication in lines 340 - 350 due to the fact that 16 colour pixels are stored in 4 bits or two pixels in one byte - a flag is used to choose which pixel information to use.

The next loop (lines 230-250) works from the right-hand edge, first setting all the pixels that were too close to the edge for a right eye image like(x)=0 to random colours, but as the loop works further left the like array shows all the pixels will be like pixels to the right, and the program ensures that the colour array is set to be the same (colour(x)=colour(like(x))).

```
 10 REM Program   3DConvert
 20 REM Program   3D sprite creator
 30 REM Version   A2.0
 40 REM Author    D.N.Baron
 50 REM RISC User June 1994
 60 REM Program   Subject to Copyright
 70 REM           Not Public Domain
 80
 90 DIM start% &30000,like(1000),colour (1000)
 100 base=90
 110 REPEAT:INPUT"Full pathname for Spr ite
file to convert "infile$
 120 in%=OPENINinfile$:UNTILin%<>0
 130 len=EXT#in%:CLOSE#in%:IFlen>&30000
 PRINT"File too large":END
 140 OSCLI ("LOAD "+infile$+" "+STR$~st art%)
 150 INPUT"Full pathname for Sprite fil e to
output "outfile$
 160 hor=(start%!28+1):horiz=8*hor:line
s=start%!32+1:data=&0C+start%!44+start%:
ptr%=data-1
 170 start%!16=&70736433:start%!20=&657
46972:start%!24=0
 180 SYS "Hourglass_On"
 190 FORy=0TOlines-1:flag%=0:SYS "Hourg
lass_Percentage",y*100/lines
 200 like()=0
 210 FORx=0TOhoriz-1:dist=FN3D:IFx+dist
<horiz like(x)=x+dist
 220 NEXT
 230 FORx=horiz-1TO0 STEP-1
 240 IFlike(x)=0 colour(x)=RND(16)-1 EL SE
colour(x)=colour(like(x))
 250 NEXT
 260 FORx=0TOhoriz-2STEP2:?(data+y*4*ho
r+x/2)=colour(x)+16*colour(x+1):NEXT
 270 NEXT
 280 SYS "Hourglass_Off"
 290 OSCLI("SAVE "+outfile$+" "+STR$~st
art%+"+"+STR$~len)
 300 OSCLI("SETTYPE "+outfile$+" FF9")
 310 END
 320 DEFFNget:ptr%+=1:=?ptr%
 330 DEFFN3D
```

on the sprite and use the Edit submenu of the sprite window menu to ensure that neither the Palette nor Mask options are ticked. Now choose Show colours from the Paint submenu. If the palette that appears does not have exactly 16 colours, then the file is not suitable for conversion. Otherwise, save the file and you are ready to begin.


The interpolate function of Draw can be used to create hollow pipes like these


This dotscape, and the one on the previous page, can be used to demonstrate the principle. You should be able to see the shapes without too much difficulty (see RISC User 7:4)

CONVERSION

Once you have a sprite file ready to convert, you can use either the listing given in this article or the program on the magazine disc to do the transformation. If you do not have the disc, type in and run the listing. You will be prompted for full pathnames for the source sprite and the 3D sprite to be created. The program will then convert your sprite and save it automatically.

Otherwise, load the 3Dconvert program from the magazine disc and drag the file onto its icon on the icon bar. A save window will appear, allowing you to save the file