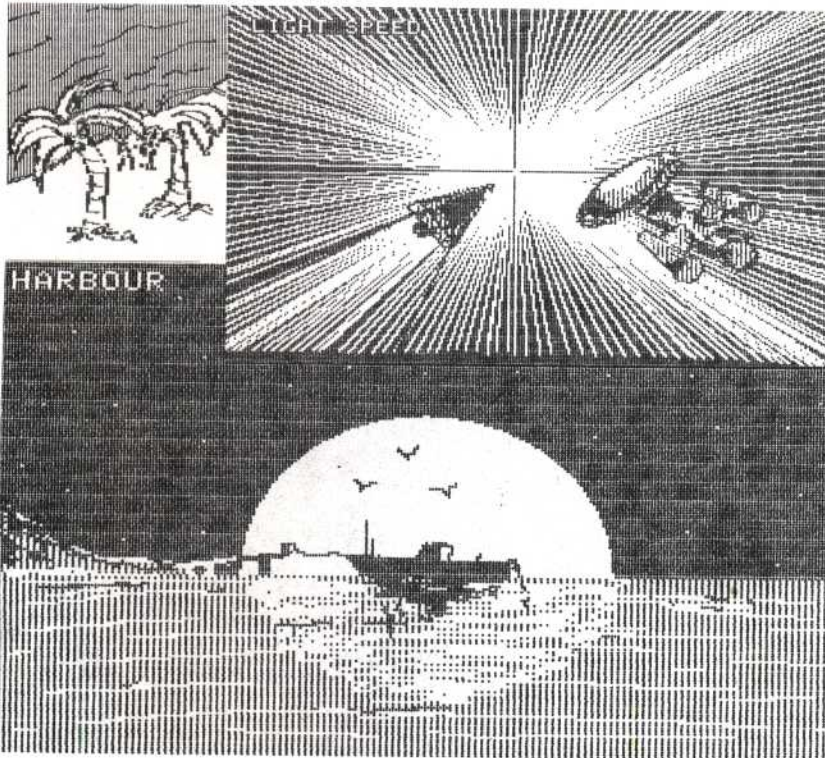




FIRST IMPRESSIONS



Screen Print

These designs were drawn on-screen using a graphics tablet. The screen contents were then dumped to an Epson FX-80 printer, showing the graphic possibilities of the dot matrix printer

The graphics capabilities of dot matrix printers often tend to be overlooked, simply because users don't know they exist. In this article we show how to set up a printer to produce attractive graphics, and how to construct a screen dump program that will do the work for you.

Most home computers have a low resolution graphics mode in which pictures are built up from graphics characters, each the same size as a conventional text character. These 'block' characters have character codes greater than 127, as the numbers 0 to 127 are reserved for the ASCII character set. So PRINT CHR\$(90) would print an ASCII character on the screen — 'Z' in this case — whereas PRINT CHR\$(128) displays a graphic character — a black rectangle if you are using a Dragon micro.

To print the letter 'Z' on a printer, we would type LPRINT CHR\$(90), so you might think that LPRINT CHR\$(128) would similarly print a black rectangle on paper. Unfortunately this is not the case. This is because the characters above code 127 vary enormously between different makes of micro, and obviously printer manufacturers cannot produce a special printer for each computer on the market. What they tend to do is either copy the standard ASCII set into the codes

128 to 255, or alternatively program in their own graphics characters.

The Epson range of printers does not come with any graphics characters. Instead you can change any of the standard ASCII characters to produce your own graphics characters. This is achieved by sending suitable 'escape codes' to the printer (see pages 324 and 325).

High resolution computer graphics are constructed from small dots, or pixels, rather than from whole characters. In a similar way, high resolution printing uses small dots of ink. The print head in a dot matrix printer has a number of pins arranged in a vertical line that moves across the paper as it prints. Usually, characters are made up from a grid of dots (perhaps eight by eight dots). It is possible, however, to produce graphics by controlling the pins individually.

The first step is to switch your printer into its graphics mode. As with any other printing exercise, this is done by sending an escape code that is specific to the type of printer being used. On the Epson FX-80 for example, the necessary instructions are:

```
LPRINT CHR$(27);"K";CHR$(N1);(N2);
```

The letter "K" indicates graphics mode and the numbers (N1) and (N2) set the width of each line of graphics — in other words the number of dots that will fit across the page.

When in standard graphics mode, the FX-80 can print a maximum of 480 dots in one line. Other modes allow resolutions in the range of 576 to 1920 dots per line. If we wish to use the full width, therefore, 480 will be the required line length. Two numbers are required in our code to set the width, because the maximum size of each number is 255. The second number (N2) is therefore multiplied by 256 and added to the first, (N1). So for 480, the numbers are 1 and 224 ($480 = 256 \times 1 + 224$). Therefore, on the Epson FX-80 printer we need the following instruction:

```
LPRINT CHR$(27);"K";CHR$(224);CHR$(1);
```

Having programmed the printer with the graphics line length we need to send the graphics data. Even though there are nine pins in the print head of an Epson FX-80, only the top eight can be used in most graphics modes. Starting from the bottom pin we number them 1,2,4,8,16,32,64 and 128. The data for all eight pins can then be represented by a single number, between 0 and 255, and this is sent to the printer using LPRINT CHR\$(X), where X is the number. So if we wanted only the bottom pin to 'fire' we would send CHR\$(1) to the printer; to trigger the top pin alone we would send CHR\$(128). For a combination of pins we simply add up the