Intricate Plot

A plotter is the best means of producing high quality graphic output from your computer. Working with fibre-tip pens, some can change colour automatically

The ability to create printed copies of diagrams that appear on a computer screen is an essential requirement for many serious computer users. Engineers, scientists, technical artists and businessmen all need accurate diagrams and charts that conventional printers are not capable of producing. The only device that can create these images is a plotter and, until recently, these have been too expensive for the home computer user.

However, with the introduction of devices like the four-pen printer/plotter mechanism used in the Tandy/CGP-115 and Oric MCP-40 printer, graphical output is at last within reach of the emptiest wallets. A whole range of plotters has recently appeared on the market that offer features previously only found in machines costing thousands of pounds.

The need for a plotter is generally governed by the type of output being generated by the computer. An engineer or draughtsman will need accurate drawings of equipment and installations, a businessman might want charts and graphs showing sales figures. Producing these on conventional printers is a very laborious process and the results will appear only in black and white. The only other low cost option is to take a colour photograph of the screen and while this might suffice for business charts, it certainly won't be accurate enough for a designer or architect.

Plotters work in an entirely different way from printers: they draw lines between two points rather than creating their output from preformed characters or patterns of dots. The basic principle behind all the various systems is that of the X, Y coordinate. Just as a graph can be plotted by defining the coordinates through which the line must pass, so any shape can be broken down into a series of coordinates. To be able to join these coordinates together in order to recreate the shape, there must be some form of movement. So the pen is fixed to a travelling gantry that can move in the X direction (left and right) while the pen moves along the gantry in the Y direction (up and down).

The traditional type of plotter is known as a 'flat bed' plotter because the paper is fixed to a flat plate with the gantry travelling over the top — this is shown in the illustration. Its disadvantage is that the plotter must be at least as big as the piece of paper.
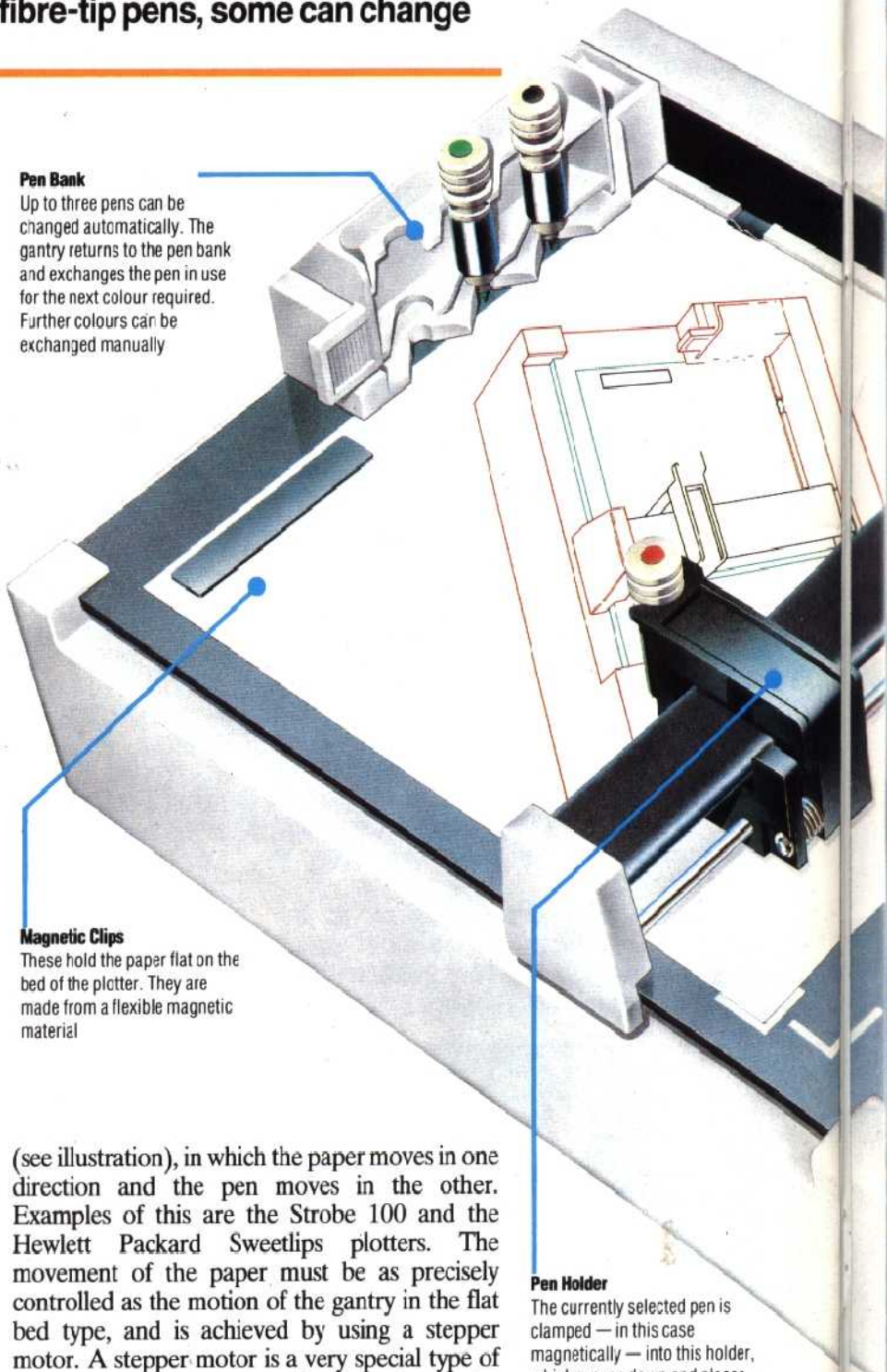
One method of reducing the size is to adopt a large-scale version of the four-pen plotter idea

(see illustration), in which the paper moves in one direction and the pen moves in the other. Examples of this are the Strobe 100 and the Hewlett Packard Sweetlips plotters. The movement of the paper must be as precisely controlled as the motion of the gantry in the flat bed type, and is achieved by using a stepper motor. A stepper motor is a very special type of motor that only rotates by a fraction of a turn for each pulse of power that is applied. It is mainly found in disk drives, where it controls the positioning of the head on the surface of the disk, and in robot devices (see page 176).

Connecting a plotter to a computer is generally the same as connecting a printer, at least in terms of the interface. Plotters are usually available with either serial (RS232) or parallel (Centronics or IEEE488) interfaces, which can be connected to the port normally used by a printer. The

Pen Bank
Up to three pens can be changed automatically. The gantry returns to the pen bank and exchanges the pen in use for the next colour required. Further colours can be exchanged manually

Magnetic Clips
These hold the paper flat on the bed of the plotter. They are made from a flexible magnetic material

Pen Holder
The currently selected pen is clamped — in this case magnetically — into this holder, which moves down and places the pen in contact with the paper