



there are 15 colours available, although no more than two of these may be used in each row of eight pixels. This limitation is imposed by the graphics chip used. Up to 32 sprite characters may be defined by the user; the commands to control these are included in the BASIC, which makes it possible to write impressive games programs with fast-moving action. A monitor program is provided in ROM to make machine code programming easier.

The graphics chip also limits the display to a maximum of 40 characters in width. A £50 add-on is planned to allow the 80-character display required by many CP/M programs to be duplicated on the Einstein; the 80-column screen will be monochrome only, but a colour version is planned for 1985.

The Einstein's sound quality is good, with output directed to a large loudspeaker located above the keyboard. A volume control is provided, and the BASIC commands to generate sound are comprehensive and easy to use.

Eight function keys are provided; these may be programmed to produce commonly used words and commands and a clear plastic strip allows labels to be fixed above each key, BBC fashion. The keyboard is well constructed and touch-typing should be no problem, but Tatung has provided only two cursor keys instead of the more usual four. This means that cursor keys must be used in conjunction with the shift key to produce movement in two of the four directions, which is extremely irritating on a machine of this price. A set of graphics characters can be produced from the keyboard if the graphics key is held down, but these are of limited use.

The Einstein is rivalled only by the BBC Micro in the number of interfaces offered. These include a standard Centronics interface for printer connection; an RS232 socket for use with printers, modems and other accessories; a socket for an RGB colour monitor (Tatung supplies one for £240); an output for a television display; and a pair of joystick sockets. The joystick sockets may also be put to more serious use as they are of the analogue-to-digital converter type that allows electrical voltages to be measured. The two sockets provide four A-to-D channels; these are complemented by an eight-bit user port that can input and output digital signals to and from other items of electrical equipment. This combination of user and A-to-D ports makes the Einstein ideal for control uses in robotics and scientific applications.

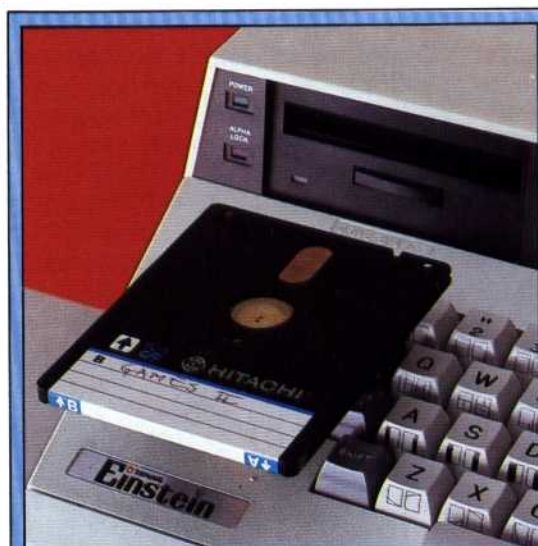
Future expansion is made possible by the 'Pipe' (similar in concept to the 'Tube' of the BBC Micro), which will allow various add-ons to be fitted. A ROM socket inside the machine allows the eight Kbytes of ROM fitted as standard to be expanded to 32 Kbytes.

The British-made Einstein is undoubtedly good value for money, but the fact remains that few users can afford to spend £500 on a home computer. Little software is as yet available, and this situation is unlikely to be rectified unless the machine sells in large numbers.



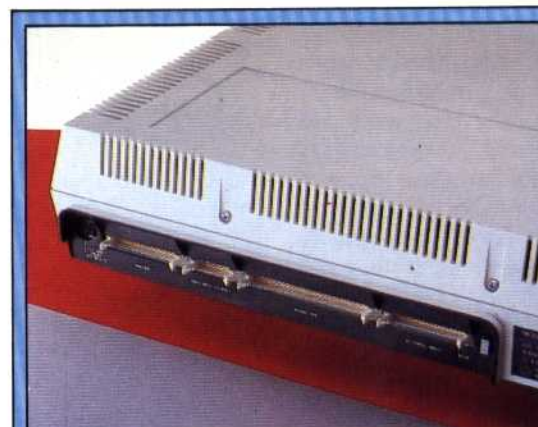
Monitor Options

The Tatung monitor accepts RGB or YUV input; the latter is Tatung's own, supposedly superior, system. Since YUV output includes a composite video line, any monitor can be used with it



Hitachi Drive

The disk drive is the Hitachi 3in system, which is becoming increasingly popular on microcomputers. The disks can store up to 190 Kbytes, and although the drive reads only one side, the disks can be manually turned over so that both sides can be used



Einstein Interface

The Einstein is well equipped with interfaces including the Tatung 'Pipe', a general-purpose port similar to the BBC Micro's 'Tube'. There is also an interface for additional disk drives

Z80 Microprocessor

8K ROM

This chip holds the machine code monitor program. The adjacent empty socket is for expansion

Switch Mode Power Supply

This does not use a conventional power transformer, and so is smaller in size and cooler in operation

Disk Drive

3 inch Hitachi format, single-sided; capacity 190K

Function Keys

User-definable in direct mode