no way of loading programs, other than keying them in each time they are needed. Furthermore, the computer has only four Kbytes of memory, so there is little room for more than a few modest BASIC programs. This means that for almost any serious use the optional printer and cassette add-on is essential.

SHARP PC-1500A

Sharp's other portable computer, the PC-1500A, is a development of an earlier model (the PC-1500) and is designed with the more serious user in mind. It costs £170, although with all of the main accessories included the price leaps to £735. The PC-1500A measures 195 by 85 by 25 mm (8 by 3½ by 1 in) and weighs 375 gm (13 oz), which is over three times heavier than the PC-1251.

The PC-1500A has a better keyboard and a slightly larger display than its sibling. The width of the LCD is minimally expanded — 26 characters instead of 24 — and the PC-1251's handy screen adjustment facility has disappeared from the larger machine.

The version of BASIC, however, is a great improvement over the other. Variables can have two-letter names, and the same name can be used for string and numeric variables without causing confusion. The BASIC also supports some useful sound and graphics facilities. Patterns with a resolution of seven rows by 156 columns can be drawn on the LCD, using the GPRINT command to define each seven-dot column. The machine's BEEP command allows control over the pitch and duration of notes, which are reasonably loud.

The computer has a built-in calendar and clock, which can be accessed using the variable TIME. The computer keeps the time even when it is turned off, so once set it keeps ticking over. This facility would be a useful addition to any home micro. The PC-1500A has several other commands in its BASIC that give it an advantage over many home micros. These include an ON ERROR GOTO command and trace facilities — TRON and TROFF. It has a generous 39 error messages for the standard computer; another 16 are available for commands used only with add-on units. However, like the PC-1251, these error messages are given as numbers, and could be more helpful.

The top row of alphabetic keys have BASIC keywords programmed into them, and a plastic template can be fitted over them to identify the 10 commands. Why Sharp chose not to print these commands directly on the casing above the keys is a mystery — the template is easily lost. The six keys above the main keyboard can have up to 18 functions programmed into them.

PC-1500A users will have to write most of their own software: only a few companies produce programs for the machine and Sharp itself sells only one tape of assorted programs for £15. A book supplied with the machine lists 53 programs, with a variety of applications in five main areas — mathematics, statistics, electrical, office work and games. These programs were originally written for the PC-1500, but they all work perfectly well on the PC-1500A because the only difference between the two models is the amount of RAM memory available. The earlier model had 3½ Kbytes of memory, while the PC-1500A has 8½ Kbytes.

Using a cartridge slot on the underside of the machine, it is possible to increase the amount of memory available. Four memory cartridges are offered, and all of them are rather expensive. The standard four Kbyte and eight Kbyte memory packs (priced at £50 and £80 respectively) hold their contents only while they are in the machine. Two other cartridges have batteries in them so that their contents can be saved even when they are removed from the computer. These have capacities of eight Kbytes (£90) and 16 Kbytes (£110).

Priced at £150, the printer/plotter and cassette interface unit is much better value for money. The cassette interface allows an ordinary cassette recorder to save and load programs — and Sharp offers a compatible cassette recorder of its own for £40. The printer/plotter part of the unit uses four ball pens to draw good quality letters and graphics in four colours. It is almost identical to a number of other printer/plotters on the home computer market (see page 289), but it uses paper only 57 mm (2¼in) wide, which is a great limitation.

The BASIC includes a full set of commands to use the printer/plotter. These are: CSIZE to produce different-sized letters, ROTATE to print characters on their sides or upside down, COLOR to select the pen colour, LF to move the paper up and down, LPRINT to print text, LCURSOR and GLCURSOR to move the pen in text and graphics mode, SORGN to set the origin, and LINE and RLINE to draw a line between two points using absolute and relative co-ordinates respectively. The printer/plotter and cassette unit is supplied in its own case, along with accessories such as a mains transformer (with a lead for an ordinary mains plug) to power its rechargeable batteries.

Two other major add-ons are produced for the PC-1500A. One is a Centronics and RS232 interface, which allows the machine to communicate with full-size printers and computers. The other peripheral is called a 'software board'. This device is a large touch-sensitive pad, which has 140 definable keys that can be programmed to perform commonly-used tasks (such as automatically calculating totals in spreadsheet applications). As the software board costs £80, and requires the interface (£150) for its operation, the price of this expansion facility is rather prohibitive.

Although the PC-1500A can be expanded into a powerful system with many impressive facilities, many similarly-priced micro systems are more versatile and — most important of all — supported by a wider range of software. By attempting to top the lightweight computer league, the PC-1500A is in danger of being heavily outclassed by a lot of more powerful middleweights.