



TATUNG LOOKS FAMILIAR

A micro in the old-fashioned way, tested by Brendin Lewis.

When even a multi-national corporation such as Tatung enters the business micro industry nowadays, it takes a risk by not producing an IBM compatible machine. And Tatung has done just that with the TPC-2000.

Tatung has also not taken the popular 16-bit trail. Instead it chose a system based on the well-proven combination of CP/M and the Z80 microprocessor. Add to this almost 2 Mb of floppy disk storage; the usual parallel and serial ports; plenty of expansion options for both control and business applications and both sales and purchase ledger business software packages and you have a sound business micro with attractive looks and an attractive price.

First impressions

The machine arrives in two boxes, monitor in one box, main unit and keyboard in the other, and looks deceptively small.

When assembled the unit is very easy on the eyes, built of plastic in a two tone grey finish. The monitor tilts and swivels to suit and fits snugly into a recess in the main

unit's top. The main unit's slimline design would not look out of place on an executive's desk. The keyboard connects via a curly cable to the front of the main unit and has two small swivel feet underneath to bring it to a comfortable typing angle. In fact it is uncomfortable to use without the feet, as it slopes away from the user in the normal position.

Keyboard

The keyboard has 95 keys including an 18-key numeric pad, and there are dedicated function keys such as line and character insert/delete; clear to end of line/page etc which have specific word processing functions. The four cursor keys are in the straight line format as opposed to the north, south, east, west format. Six user-defined function keys are available along the top of the keyboard. The remaining keys are caps lock, shift lock, reset and local. The space bar is acceptable despite its cheap feel.

Unfortunately, the reset switch is positioned next to the F1 key where problematic accidental striking could be all too

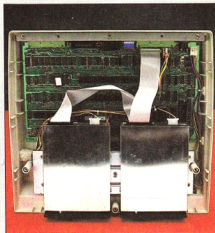
easy. Also slightly annoying was that the LEDs indicating caps and shift lock were not incorporated within the keys, but at the top right of the keyboard where they cannot be seen if a light is shining on them. They also appeared not to work from time to time, though only when a piece of software had hung — after a reset they resumed normal working.

The green screen monitor display is 24 lines by 80 columns. The character set is clear and can be programmed with up to four attribute bits which allows a mixture of normal, reverse, underlined, flashing and high-intensity text on the screen at any one time. These attributes are set by escape codes sent to the display driver.

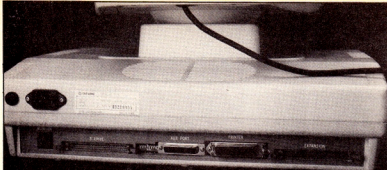
Documentation

Only three manuals arrived with the system. One each for the two software packages — sales and purchase ledgers from Fast software. Both manuals share similar design and high quality. How to run the packages is covered, with useful examples, including tables showing output from the printer for the different facets of the packages. A case study shows the first-time user how to adapt to a computer's method in a simple step-by-step approach which explains the screen display.

The other manual which arrived was the Tatung operators manual, or rather a bound photocopy of the draft operator's manual as there were quite a number of errors throughout the text. Tatung says this only went out with the review machine and production machines will be shipped with rewritten and better presented documentation. The manual contains standard system information and explanations of the CP/M built-in commands and disk utilities. This latter feature would be better presented as a separate manual or a separate section in a ring-bound volume. It should also contain the rest of the usual CP/M information, such as information on file definition blocks etc., for the user to use the system to the full. On the other hand the machine is not for the primary user. **34**



Looking inside the TPC-2000: the integral disk drives almost obscure the motherboard.



A plethora of interfaces at the back — some for future add-ons.

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Storage

The system contains only 64K of RAM as this is the addressing range of the Z80 without the use of a paging register, but Tatung has got round this limitation partially by including a large amount of floppy disk storage. The two slimline 5.25in drives each contain 1Mb of unformatted data storage, which translates into approximately 720 K when formatted (the manual gives it as 760 K).

For such high-capacity drives they are extremely quiet with only the faintest rumbling when the heads are stepping over the disk. Such a large amount of disk storage enables larger software packages to run on the system, using a process called overlay. This simply means reading small sections of the program from the disk when required instead of holding the whole program in memory. An example of this is the Help menus on Wordstar.

Interfaces

At the back of the main unit are the input/output ports. These include a standard Centronics parallel printer port; a port marked auxiliary, which is the RS232 serials port; a single DIN connector through which the monitor draws both its signal and power; an 8in disk drive connector—now semi redundant because the 8in disk option is no longer available from Tatung. Tatung says, though, that this is the same connector through which the hard disk options will be fitted. The hard disk options available are in the range 6.0Mb to 27Mb as 5.25in drives and ten to 40Mb 8in drives.

The only remaining connector, besides the power inlet, is a socket marked expansion where all the remaining expansion options would be fitted. These include the eight RAMdisks (see box) and a graphics board—at the time of review the resolution was not available. Tatung has yet to decide to market this as a colour graphics option. The two other options available will probably not concern the average first-time business user, though they may interest a company wishing to use a computer for both control and their normal accounts etc.

The first option is a board with 14 RS232 serial ports to control installations using multi-input serial devices eg 'point of sale' devices such as cash registers. The second option is a board containing 64 TTL (Transistor Transistor Logic) I/O points. A typical use might be to control robotic arms.

Lastly, I took off the top and peeked inside to get an overall idea of the general electronics construction. Tatung has used common off-the-shelf components.

The no-frills single-board Z80 system, and the low chip count—from using the Z80 custom chips—both promise welcome reliability.

The internal construction of the system is well-designed to leave the engineer the minimum number of replacement parts to carry around: the floppy disk assembly, the main circuit board and the power supply.

In use

The mains switch is mounted on the front of the unit, and it's a push-button at that. Potentially disastrous since an accidental power down could cause severe problems.

Booting the CP/M operating system is accomplished by inserting the system disk and pressing the F1 key. This key is preprogrammed for this purpose by the system monitor. This and all the other function keys are reprogrammed when the operating system loads, so frequently used commands such as DIR and STAT are immediately available.

Reprogramming the function keys is achieved by loading the Function utility from the system disk. This displays the current contents of the function keys and allows you to enter up to 16 character commands for each key. Since the commands all end in 'return', a command where something must be added onto the end of it is not possible.

Software

Little can be said about the availability of software for an eight-bit version of CP/M, except that almost all applications (which are too numerous to mention) are covered. So let's stick to software which arrived with the machine.

Five disks would normally be issued with the machine, four of which cover the sales and purchase ledgers given away free as a

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starter pack to first time users. The fifth disk is the CP/M system disk.

Though not a business man, I found the business software easy to use, even if I didn't always know what I was doing. However, when I loaded the package a menu offering both sales and purchase ledgers was displayed, but selecting the sales ledger if the purchase ledger disk is in drive B makes the system hang. At this point the caps and shift lock keys failed to operate. Other than this minor problem the packages worked well.

Two other disks included with the review system were Wordstar and Dbase II. Wordstar worked well, though I didn't test it with a printer. Dbase II also performed well and had a number of demo programs on disk, as well as a neat install program.

Last but not least is the facility which enables a user to emulate a terminal.

Verdict

As a machine which is solid and reliable, the TPC-2000 offers the first-time user a doorway into the world of computing with a system based on well-proven technology and an abundance of freely available software.

If you want a reliably-built machine with a competitive price, bear this system in mind.

PCN

Disks in the RAM

A number of RAMdisks (or virtual disks as they are sometimes known) can be fitted to the TPC-2000 system. The machine can accommodate eight such RAMdisks, each with a capacity of 256K. A RAMdisk is a printed circuit board containing, in this case, 256K of RAM. This RAM is not configured as part of the Z80's memory map but is configured from within the operating system to look like a disk drive with 256K of storage. The big advantage is the speed at which data can be read into main memory compared with a physical disk drive. Also, the current price of RAM chips means a RAMdisk can be cheaper than a floppy disk unit.

However, a major disadvantage is that like all RAM, they are volatile storage and lose any data in them when the power is removed. This leads to a more complicated power down procedure because precautions must be taken to ensure that any relevant data stored within the RAMdisk is first transferred to floppy disk before power down takes place.

Specifications

Price	£1,699
Processor	Z80A 4MHz
ROM	4K system, 2K display
RAM	64K plus 4K display
Screen	80 × 24 alpha
Keyboard	95 keys including cursor keys, numeric pad and six function keys
Interfaces	Eight RAMdisks, two serial boards, two parallel boards, hard disk and graphics
Operating system	8-bit CP/M
Software included	Sales and purchase ledgers by Fast software
Distributor	Tatung (UK) Bridgenorth, Shropshire, WV15 6BQ.