Fig. 1. I/O sockets on rear (top).
Fig. 2. Inside is room for memory expansion and communications board.

MEMOTECH MTX512

A Z80 computer runs CP/M and color graphics

BY CHARLES P. RUBENSTEIN

ALTHOUGH most manufacturers of new personal computer products boast of compatibility with the industry standard, some choose to go their own way. The latest independent is the Memotech Corporation, which recently introduced the MTX-FDX computer. You may recall thàt Memotech is the British company that probably extended the lives and popularities of the Sinclair ZX80/ZX81 and Timex TS1000 by designing a series of add-on memory, graphics, and interface "MemoPAKs" for the machines.

The MTX-FDX system, which sells for $1690 and is upward-expandable, is positioned with the small business in mind. Perhaps the first true Z80 system with CP/M and full color graphics, the FDX has also been aimed at small software houses needing to configure their offerings in a variety of 5¼" and 8" formats.

The MTX-512 Keyboard Console

The heart of the MTX-FDX is the MTX-512 cassette/TV system, which was designed as a modular, second computer for the Z80 enthusiast. The 512 can, in fact, be purchased (for $595) as a stand-alone cassette-based 40-column computer. The X in the designation MTX stands for the modular expandability built into the system console and the capability it has of accessing up to 512K bytes of bank-switched memory.

The MTX 79-key keyboard is superbly designed. It has a 12-key number pad/cursor pad, eight dual-function keys, and 57 full-travel keys in a layout that is nearly identical to the IBM Selectric's. Unfortunately, Memotech repositioned several of the shifted number keys—for example, double quotes over the 2, parentheses over the 8 and 9, and apostrophe over the 7—and made the LINEFEED key 20% larger than the RET key and thus much more likely to be hit. Finding and using the CTRL key—above the ALPHA LOCK key on the right side—is also problematic.

At the rear (Fig. 1) of the MTX-512 are two RS-232 (DB-25) connectors, a BNC connector and phono plug for color or monitor video and audio outputs, a

The MTX/FDX computer can display up to eight windows on the screen.
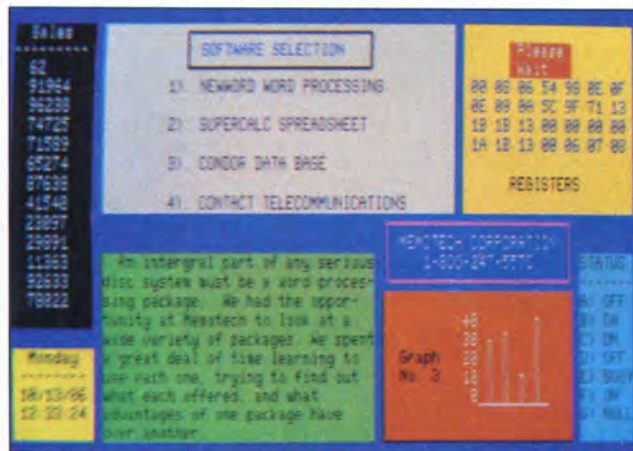
A split screen allows debugging a program while watching the contents of the Z80 registers.
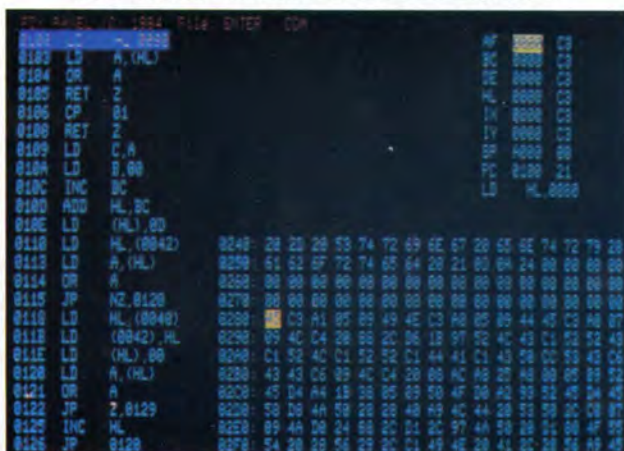
six-pin DIN power input socket, a TV (r-f) output phono socket, a 34-pin header Centronics parallel printer port (a second uncommitted port is available internally), MIC/EAR sockets for a 2400-baud tape cassette, and a pair of Atari-compatible (DB-9) joystick sockets. (It's nice to see standard connectors rather than the hodge-podge of connectors used on the Apple IIc, IBM PC*jr*, etc.) On the left-hand side of the unit is a slot for external ROM cartridges.

Inside the MTX

Inside the console (Fig. 2) is room for a computer, RAM/ROM expansion, and RS-232/disk bus communications board. The Z80A (4-MHz) CPU board possesses 104K of memory: 64K RAM, MTX BASIC and a cassette operating system in a 24K ROM, and 16K of dedicated video RAM for the Texas Instruments TMS 9928 40-column color video graphics processor. On each of the circuit boards is a PAL programmed logic array circuit (personality module), which lets the processor know which board is which and which version of the system is in the ROM, etc.

Mindful that business users might want customized ROM cartridge programs inside the console, where they could not be removed, or additional RAM memory banks to expand upward to the 512K maximum, Memotech has made available RAM/ROM upgrade boards. These boards can be configured to add-on 32K, 64K ($150), 128K ($275), or even 256K of RAM or ROM. The maximum possible expansion is to 512K of bank-selected online memory.

Only 18 of the 74 integrated circuits that make up the MTX-512 (Z80A, TMS 9928 video processor, ROMs, PALs, and VLSI integrated circuits) are in sockets, with all RAM and support chips soldered in place. Normally this design is encouraged. However, Texas Instruments has just released an 80-column color video graphics processor that is pin-compatible with the 40-column TMS 9928. But swapping chips isn't sufficient: The present 16K video RAM needs to be increased to 32K. Since RAMs are soldered in, you will need a $75 Memotech (dealer) board swap/upgrade.

Memotech's Disk Drive System—the MTX-FDX

For serious machine language or BASIC program development, true word processing and the myriad of spreadsheet, database, and business application programs, you would undoubtedly need the FDX 1000 CP/M color business

computer with dual 5¼" disk drives. There are two quiet, half-height drives labeled B and C in front. A 60-conductor ribbon cable is used to connect the MTX-512 console to the FDX. Ac power for both the FDX and the MTX-512 plugs into a very well identified rear panel on the FDX, which includes sockets for MTX power, an 80-column monitor, and an RGB color monitor, as well as three cutouts for chaining additional floppy and and hard disk units to the system. Also mounted on this panel is a rather noisy cooling fan, without which you probably wouldn't know the machine was on unless you looked at the lighted power switch in the front.

Inside, the layout of the FDX is rather good. Disk drives are on one side, power supplies underneath, and a card cage of

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Specifications

Product: Memotech MTX-FDX
Mfr: Memotech Corp.
99 Cabot St.
Needham, MA 02914
Price: $1690
Dimensions: MTX-512: 19¼"W ×
8"D × 1¼"H;
FDX-1000: 19¼"W ×
11½"D × 6"H
Weight: MTX-512: 7 lb
FDX-1000: 21 lb
Operating System: CP/M
Hardware: Z80 CPU, two 5¼" floppy
disk drives, 64K RAM, 24K
ROM, 16K video RAM, two
RS-232 ports, Centronics
parallel port, parallel port
Software: NewWord, SuperCalc I,
Condor Database

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electronics on the other side. (There would probably be enough room for a hard disk if the supplies were repositioned.) The card cage has room for up to seven boards although only four connectors are installed. Since it is a Z80-based machine, it would have been nice if Memotech had accommodated the S-100/IEEE 696 bus in the FDX design to allow for even greater flexibility in user hardware upgrades.

The standard system includes a bus interface/bootstrap ROM board, a Motorola MC6845-controlled 80-column color video board with 4K video RAM, and a Western Digital FD1791B disk controller board. A fourth connector is provided for an optional 256K-byte Silicon Disc Board ($695) that emulates a floppy at 50 times the access speed (often called a RAM disk). Using supplied programs (Sidisc and Sispool), the Silicon Disc can be configured either into a drive or into a full memory spool-

er. The MTX-512 console can handle four physical and four Silicon Disc (can be piggybacked into an 8M-byte single drive) drives. Thus you can assemble an impressive array of FDX-series single- and dual-drive 5¼" single/double/quad-density and 8" single/double-density floppy disk systems, as well as HDX-series 13M-, 24M-, or 32M-byte hard disk systems.

FDX BASIC

Memotech has achieved a high level of integration in its MTX BASIC software offering. Included, not only on disk, but in ROM as well, is their II-5 (interacting intelligence to the the fifth power) package, which includes BASIC, color graphics, the NODDY language, Z80 assembly language with PANEL, and local area networking through their Oxford Ring configuration.

FDX BASIC (and ROM-based MTX BASIC) contains a standard array of BASIC commands that can be abbreviated by one or two letters and a period (such as P. for print) and accepts both upper- and lower-case input. In addition to PLOT, LINE, CIRCLE, and DRAW commands, are INK and PAPER for coloring your graphics, GENPAT for creating your own character sets, CSR for cursor positioning, and ANGLE and ARC manipulations. There are also ASSEMBLER and DISASSEMBLER for generation and debugging of machine language programs.

These programs are immediately integrable into FDX/MTX BASIC without the usual hassles of defining USR but rather by declaring CODE from within the program. After the code is complete, the BASIC program recovers control of the action. Even better would have been a method of on-screen debugging. Memotech thought so too, and gives you VDEB (PANEL or ROM 1 in the MTX ROM), displaying a split screen wherein you can dynamically debug your program while watching the contents of each of the Z80's registers. You can poke around in the user memory area and even assemble a routine as you go.

Included within FDX BASIC is the NODDY language, which allows for user interaction with the display. Through NODDY you can ask a question, process it and move on to another display, create one of the eight virtual screens and have a layered look to your display.

Now add to all this Sprite graphics (up to 32 user-definable character sprites possible) for animation, and you get the ability to do, finally, real color graphics on a standard Z80-based microcomput-

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er. (I must admit that I spent 10-15 minutes trying to see where they hid an extra 64K ROM to do all this. I couldn't find it—amazing power in only 24K of ROM, or even 34K of disk!)

To assist you in learning about all these wonderful commands and possibilities is an MTX BASIC Tutorial and Reference Guide. I found it very thorough in its introductory presentation of each topic but flawed in the way it bounces from primer to advanced discussions of the techniques. To its credit, Memotech has not only included schematics of all its circuitry, but has also gone and explained how the video processor works. Now that's upgrade-friendly.

The Oxford Ring

Local area networking has got to be one of the hottest topics under discussion for microcomputers these days. Soon to be integrated into FDX BASIC will be the Memotech Oxford Ring software, which currently exists only as a separate program, in conjunction with an external NODE ROM cartridge ($100 each, about $75 in dozen quantities, and $20 if you want a full 256-unit system). The Ring is expandable to up to 256 nodes (individual computers), and is very simple to operate and use—merely plug a DB-25 connector into the RS-232 port on each computer in the ring, plug in the ROM cartridge, and run the Electronic Mail program.

Once the ring is established, the "master" can set the operating parameters and priority level of each node. Using the ring, you can share a mass storage device connected to any node among the ring members, with programs, data, messages, and mail movable through the ring. The linkage itself uses a serial rather than a parallel bus for connecting systems. Unfortunately, you need active RS-232 connectors with built-in relays that short out pins 2 and 3 when a computer is turned off. Otherwise the ring will fail if any node turns off.

CP/M and Utility Programs

Not satisfied with supplying only the standard Digital Research CP/M-80 version 2.2 utilities, Memotech has added a dozen of its own. These include the Silicon Disc handlers Sidisc and Sispool mentioned above, a program (Rcheck) which checks disks for both hard and soft errors, a way to ENTER a string of commands (i.e., DIR, STAT, and begin a program) on a single line, a second version of the Enter program called Startup that stores initial commands directly onto the disk for execution each time you turn the system on, a program to set the RS-232 port baud rates (Baud), a means to configure your system to be aware of which disk formats are being supported (Config), and a pair of Submit-type programs called Batch and Sub. There is also a program, Eraq, that allows you to erase common disk files with a query on each one.

NewWord Word Processor

The standard NewWord program was reviewed in an earlier issue (June 1984). However, on the FDX 1000 it comes alive in 16 simultaneously displayed (user-defined) colors signifying the various word processing functions, such as underline, bold type, sub- and superscript. I did notice that when I used the full help level I saw an appreciable amount of disk access for menu updating, which slowed the editing quite a bit.

If speed is more important to you than color, you might want to check out color NewWord before you depend on it for your word processing. Also be aware that although monochrome NewWord files can be typed out on Memotech's DMX-80 dot-matrix printer, many embedded control characters in the color version will cause strange fonts to be printed and even turn the printer offline if not printed through the program. You might encounter some difficulties if you need to transfer your color NewWord files between color and noncolor machines.

The Jaguar of CP/M Computers?

Breaking with the traditions of bland, beige, plastic cases, the Memotech "Black Knights," with their metal armor, are very impressive. But businesses don't really care about a machine whose beauty is only skin deep. As a cassette-based system, even with MTX BASIC and the NewWord ROM, the MTX-512 is unsatisfactory.

The dual disk drive FDX 1000 color business computer has the legacy of the 70s: CP/M-80, with hundreds of monochrome, nongraphic 8080/Z80 programs written for various versions of it. Another plus is the ability to use both the monitor and RGB video outputs simultaneously when using the VDEB or PANEL debugging utilities. Unlike standard BASICs, the FDX BASIC is interactive. It allows 16-color graphics, sprites, assembly language, and text manipulation, which suggests future color, graphic, and animation offerings such as the color NewWord. It's hard to tell if NewWord is so slow because of the color enhancements or because of the over-abundance of user-friendly menuing, but just imagine a spreadsheet in color with figures in black and red ink where necessary. The designs for internal and external ROM/RAM packs and a wide variety of physical and superfast Silicon Disc drive configurations have got to be considered a plus. Others are the user-friendly error messages and startup/enter utilities.

I still can't believe how much raw power is built into the MTX system, the first of the color CP/M computer systems. All-in-all I feel that it is an exceptional CP/M development system that can be used effectively for small business applications and software development. It truly brings the 8-bit system into the 1980s and could spark a new wave of 8-bit systems. A Jag? Until the NewWord is speeded up and the Ring is made fail-safe, I can't rate the MTX system in that class. But I do think it has the potential to get there.   ◇

Computer Scientist
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ed beam to move in two dimensions and create a complex and rapidly changing pattern of loops, swirls, convoluted circles and other fantastic shapes.

For preliminary tests, you can drive your laser light show with a speaker connected to an ordinary transistor radio or cassette recorder. Select a talk show or music having lots of bass for best results. After the system is operating well, you

can then connect the speaker to your computer. (Figs. 7 and 8).

Professional laser light shows often use powerful argon, krypton, helium–neon and other lasers that emit beams with a range of discrete wavelengths or colors (blue, green, red, etc.). Many of these lasers cost well over $10,000, and some require special maintenance. Most of those bright enough for professional

light shows emit beams that can damage unprotected eyes.

Helium–neon gas lasers are best suited for do-it-yourself light shows. Even a very-low-power unit emitting less than a milliwatt of optical power, considerably less than the power in a flashlight beam, can produce a striking red pattern on a wall or screen in a darkened room.

More than a dozen companies manu-