

Simply plugging in a cable makes it possible to use the tape backup unit to service many computers. This added capability gives the Aptic unit a bonus rating. **SERVICEABILITY:** What about tape-head life, reliability, and serviceability? The ceramic-coated head will last 15,000 hours, the company said. According to the specification sheet, mean time between failures (MTBF) for the system is 10,000 hours. That's a lot of operating time. Mean time to repair (MTTR) is specified as 30 minutes, which is how long the maker estimates a typical repair should take once you've brought the unit into the shop.

Service under a 120-day warranty is available at no charge directly from the manufacturer. We've been using our PC Tape-60 unit for several months without any glitches, failures, or indications of trouble. Therefore, we can have no real or quotable experience that vouches for the claims for head life, MTBF, or MTTR. This reliability seems above the norm for this class of peripheral.

As for customer support, we called to help clarify the technical specifications without revealing we already had our PC Tape-60. The technicians were most cooperative and informative. Perhaps they

were hoping to make a sale. We called again a week later to ask the same question but this time stated that we already had a PC Tape-60. The response was just as complete and as cooperative as the first time. Aptic has certainly learned how to build a good product and how to work well with customers.

The tape cartridges cost approximately \$30 each. Compare that with the cost of a stack of floppy disks, not to mention the labor involved in formatting and labeling a stack of 40 or more floppy disks as well as the time the computer is tied up when using the DOS backup procedure, and the

economics of owning and using a tape backup system are overwhelmingly in its favor. At a suggested user price of \$1,195 for the tape cartridge system, we estimate our unit paid for itself in a month. The fact that it's highly mobile means those with several hard disk systems can spread the cost over more machines with no extra trouble.

Experience has made us fanatics about backing up everything and then updating our backups. If you never back up your hard disk because it's too much trouble, the PC Tape-60 will pay for itself the first time your disk drive drops dead.

Epson Offers The QX-16: A Sophisticated Microcomputer

BY JOHN LOMBARDI
REVIEW BOARD

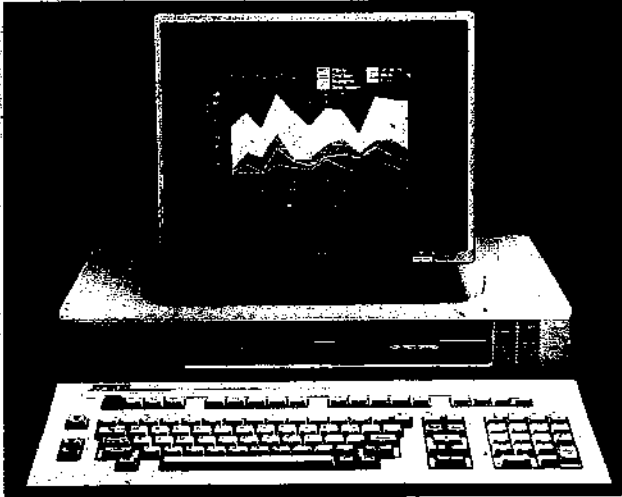
Epson, a most successful printer manufacturer, has a second entry in the microcomputer market. The first version, the QX-10, offered a number of interesting features but does not appear to have made a major impact on the market. (See "QX-10 Computer and Valdoks from Epson America," July 11, 1983.) The newest machine, the QX-16, offers new sophistication and software in a multiprocessor microcomputer.

SETUP: Presented in a handsome off-white box, the QX-16 we tested included two disk drives, electronics and power supply, three expansion slots, an elaborate keyboard attached by a coiled cord, an FX-80+ dot-matrix printer, and a high-resolution green screen. A red-green-blue color monitor is also available. The Epson is a well-constructed and presented machine, pleasing to look at and reasonably easy to use. It sets up very easily and quickly with no complications. Once out of the boxes, setup time is about 10 minutes, and we hardly needed the clear instructions.

With a nice light touch, the Epson keyboard has arrow direction keys, a full numeric keypad, two varieties of shift keys, tab keys, and 19 function keys along the top of the keyboard. In addition, a number of Epson keys have several meanings. When using Valdoks 2, the special keys and function keys make standard operations easy to remember since they are printed right on the key top. However, when using MS-DOS the keyboard differences from the IBM PC standard require some adjustment and modification of the standard instructions supplied with applications packages. The QX-16 will generate almost all the key codes available on the IBM PC keyboard, but programs that make special use of the IBM keyboard may not work as expected on the QX-16. The three expansion slots do not accept IBM PC-compatible expansion cards, but the manuals indicate that there is at least an internal modem available.

The QX-16 disk drives can use disks in a variety of formats, including CP/M-80, MS-DOS, and the Valdoks quad density format, which packs up to 720K of information on one double-sided disk. A utility is included to convert disk files from a variety of CP/M formats to and from MS-DOS.

Technically, this is a dual processor machine with three operating systems. It includes Z80A and 8088 microprocessors,



The Epson QX-16 is a dual processor machine with CP/M-80, MS-DOS 2.11, and TPM-III operating systems. It includes Z80A and 8088 microprocessors and 512K of memory.

along with 512K of memory. Delivered with the machine are CP/M-80, MS-DOS 2.11, and TPM-III operating systems.

The first makes the QX-16 into a reasonably standard CP/M-80 microcomputer using the Z80 microprocessor. In this mode, the QX-16 operates as an advanced version of the innumerable machines in this class, with a number of special programs that facilitate use of the CP/M-80 operating system and take advantage of the QX-16's special features.

The second creates an MS-DOS microcomputer using the now standard 8088 microprocessor. In this mode, the QX-16 can run much of the standard MS-DOS library although not all of the IBM PC library.

The third system is a special breed known as the Valdoks 2 machine. Valdoks 2 is an integrated applications package running under the TPM-III operating system that handles the standard microcomputer tasks of word processing, spreadsheets, filing, communications, and scheduling. Displaying an elaborately constructed sequence of menus and using all the special keys available on the QX-16 keyboard, Valdoks 2 offers an alternative to the MS-DOS/IBM-PC standard that lies somewhere between stark MS-DOS and charming Apple Macintosh.

One difficulty of reviewing the Epson QX line is that the hardware is intimately tied to the Valdoks software. Because Valdoks only runs on the Epson, and the Epson was designed around the use of Valdoks, we will review the entire system as hardware. We'll consider the three operating systems, evaluating how the machine performs as a CP/M and MS-DOS machine and dealing in more detail with the operation of Valdoks and TPM-III.

PERFORMANCE: Valdoks 2 consists of a self-contained and reasonably complete set of applications that work within an Epson environment using Epson printers and an optional Comrex Comdler hard disk

drive. While other devices can be attached to the machine, the maximum benefit comes from using Valdoks 2 and the QX-16 with Epson equipment.

The centerpiece of the application package, the word processing program known as Edit, serves as a good example of the features of this machine. "What you see is what you get" describes the essence of Edit. A reasonable number of type styles, sizes, and shapes can be put on screen as you type or afterward to get special effects such as italics, large or condensed characters, boldfacing and underlining, and super- and subscripting. All these show up on screen, some more legibly than others. Throughout word processing, Valdoks constantly updates the data disk and talks to the program disk, generating a substantial amount of disk activity.

As you enter text, the first impression is of Valdoks' remarkable capability to switch type styles and sizes at the push of a button. The screen adjusts to accommodate the new type style, maintaining the same length of line but modifying the number of characters per line to make them fit. It matters not at all if the type size changes in midline. Valdoks 2's Edit can handle it.

What appears on the screen, moreover, can quite easily be printed on an Epson printer (we received an FX-80+), mirroring on paper what appeared on the screen. The screen's high-resolution image permits rather small letters in super- and subscripts to be read with only a modest degree of difficulty, although some combinations of size and style are significantly more difficult to read than others. We disagree, however, that all or even most of the typefaces are ugly or unreadable (see First Look, August 5, 1985). Nor did we have the problem creating underlined type that was mentioned in First Look; however, underlining did require careful searching of the documentation to find the reference, then imaginative interpretation of the obscure instructions. Furthermore, Valdoks insert-

ed some unexpected code numbers at the end of the underlined text. Still, it worked.

Naturally, such sophisticated management of the screen and such careful saving of text to the disk has its price, which in this case is speed, as First Look accurately pointed out. As you type there is a small but perceptible delay between the time you press a key and the character appears on the screen; it's not enough to be measured by mere humans, but enough to make word processing feel sticky. Then, when a change in type style or other appearance feature becomes necessary, the time to update the screen grows considerably longer. Benchmarks here have little real meaning since the time seems to depend on a range of things, including whether the type size is changed. However, the delay is significant and would annoy heavy-duty word processing users.

Filing and managing documents through Valdoks 2 is easy, with lengthy file names and keywords permitted in an index that can be used to identify files of interest. Moreover, many important filing and word processing commands use one or several special dedicated keys on the QX-16 keyboard.

Valdoks 2 also has a powerful spreadsheet and a useful graphics program. The spreadsheet has most of the features we've come to expect from microcomputer tools of this genre. Unfortunately, the program is excruciatingly slow to do just about everything. With large spreadsheets or those that require substantial modifications, additions, or deletions, the Valdoks 2 program performs slowly indeed. The state of the art in spreadsheet performance and design, whether 1-2-3, Supercalc 3, or Multiplan, is well beyond the capabilities and speed of the Valdoks 2 Calc. For example, a modest spreadsheet that could be recalculated in seven seconds by 1-2-3 required a minute and 40 seconds in Valdoks 2.

The graphing program, however, is rather nice. It can use data extracted from spreadsheets or entered independently from the keyboard. The graphics displays are clear and can be modified in a number of ways to adjust size, labeling, and graph type. The subsequent printing capability on the Epson FX-80+ printer is impressive. Pie charts come out easy to see and reasonably round. This application would be fine for simple business graphics applications.

DOCUMENTATION: The QX-16 comes with a wealth of documentation in elegant binders. Unfortunately, the all-important Valdoks 2 reference manual is not yet available so we couldn't learn as much detail as we needed about this interesting machine's capabilities. A tutorial and quick setup guide provided excellent introductory advice, however, and the on-line help served to answer simple questions. Epson America maintains regional toll-free telephone numbers for technical assistance.

Outside the Valdoks 2 applications, the QX16's TPM-III operating system has a range of other smaller utilities such as programs that convert Valdoks files to ASCII files, transfer files, spool ASCII files

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printer and a debugging utility for programmers.

TPM-III is a product of Rising Star Industries, apparently is a full-feature operating system, but no manuals on TPM-III came with the QX-16 in spite of the fact that Valdoks 2 uses this system. The introductory Valdoks 2 manual indicates the existence of TPM-III utility programs, and with some explanation we were able to find them on the disks supplied. These programs use a CP/M command style and while reasonably well-documented with complete messages, they would be difficult to use successfully without the TPM-III reference manual. The manuals should be available by the time this review appears, but we did not see them.

The QX-16 comes with an RS-232C serial port and a Centronics standard parallel printer port. We were unable to get Valdoks 2 to recognize our Diablo 630 serial printer, although the introductory manuals seemed to indicate that possibility. However, under TPM-III the programmable serial port can easily be set up to match a range of communications requirements.

Valdoks 2 has other programs as part of its extensive software package. A mail program permits Valdoks 2 users to dial on-line services or bulletin boards with an appropriate modem attached to the serial port.

The Valdoks modem program has most of the features we've come to expect in communications programs for microcomputers, but since no modem came with the machine we didn't try it out.

Three other small utilities could be of substantial use under special circumstances. A macro definition program called Defkey allows the user to assign a sequence of characters to control keys that will be played back whenever you type those control keys. These keys can be set to work

in a variety of ways, equivalent to such keyboard enhancement programs as Prokey, although with somewhat less capability.

The matrix utility lets a user invest graphics characters such as might be needed to create special language characters. While these will show on the screen, only some printers can print them. A scheduler sets up an electronic calendar and appointment scheduler that works in a manner similar to those available with the many memory-resident utilities such as Sidekick.

MS-DOS: On the MS-DOS side, the manual for GW-Basic had not yet been finished, but the MS-DOS manual offers clear, excellent instructions, including a good explanation of the differences in the QX-16 implementation of MS-DOS. Some special utilities and helpful setup programs appear on the QX-16 MS-DOS disk that are unavailable on other systems, greatly facilitating setup and use.

Aside from keyboard incompatibilities, the QX-16 also has other characteristics that separate it from the fully compatible IBM PC line. The machine's internal operating speed is somewhat faster with the Norton Utility benchmark showing the QX-16 running 1.1 times as fast as an IBM PC. A test program in interpreted GW-Basic ran on the QX-16 in MS-DOS mode about 20 percent faster than on an IBM PC, as did a compiled Basic program, confirming the effect of the slightly faster speed of the QX-16's 8088.

However, more significant than such benchmarks are issues of compatibility. The Epson QX-16 does not claim IBM PC compatibility and rightly so. A number of programs for the IBM machine will not work correctly on the QX-16. Some Basic programs compiled for the IBM PC may have to be modified, recompiled, or relinked since the computer will sometimes freeze when the program completes, requiring a complete restart of the machine. Many useful compiled Basic programs do not come with the source code and thus may not be able to run on the QX-16.

More significant, the QX-16 will not tolerate IBM's Topview operating environment. Efforts to run Topview froze our machine, requiring a restart to work again with another program. Some applications such as Lotus' 1-2-3 will work reasonably well on the QX-16 as long as a special graphics driver provided with the MS-DOS operating system is installed, a relatively painless task. Unfortunately, the 1-2-3 help system does not display highlighting on the QX-16's green screen, making help very difficult to use, although the other features of 1-2-3 worked fine. Epson recommends using 1-2-3 with a red-green-blue color monitor. If the programs you need now and in the future work on the QX-16, then compatibility is no problem. Otherwise, we recommend testing the software you need on the QX-16 before buying the computer.

CP/M: When in its CP/M-80 mode, the QX-16 has the standard features of machines in this class in addition to a number of enhancements of note. CP/M-80 in this version (B2.26) uses bank switching, permitting a maximum memory capacity of 232K. In addition, this version of CP/M with the QX-16 basic input-output system supports a random-access memory disk, a Comrex Comfiler hard disk drive, and a special graphics driver.

In addition to the standard CP/M operating system utility program, this version includes programs to set and change system parameters, attach printers of various types, redefine the keyboard, transfer files to other computers, use other disk formats such as CP/M-86 for the IBM PC, and run the communications program supplied with the operating system. Date and time appear continuously in the lower right-hand corner. The system has special utilities to help define new graphics characters for the screen and to assist in

using a Comrex or Epson plotting device. As a CP/M-80 microcomputer, the QX-16 is impressive.

The Epson QX-16 is an interesting combination system with many features, some unique capabilities, and quality construction at a reasonable cost. However, the Valdoks 2 integrated applications system is severely limited by its slow operation and its incapability to easily share files from Calc to Edit to Draw. A word processing document can not be automatically created that uses information available in a spreadsheet and prints data shown on a graph, even though Valdoks 2 will easily, if somewhat slowly, move from one application to another. The number of functions available with this machine, the range of software provided, and the possibility of using three different operating systems and

application package environments may make this a desirable machine under some circumstances.

It's tough averaging the Epson QX-16 package. The user who needs careful user assistance and is willing to trade a considerable amount of performance may find Valdoks 2 useful. As a CP/M machine, on the other hand, it is superior to its 8-bit competitors in much of its performance, but no easier to use. As an MS-DOS machine, it lacks the degree of IBM PC compatibility users have come to expect. For a three-way machine, the price is fair. The unusual combination of features and capabilities may outweigh the disadvantages of slow speed under Valdoks 2 and IBM PC incompatibilities under MS-DOS, making this machine a worthwhile choice for some users.

Hardware

Summaries of reviews before September 2, 1985, used a four-terminal rating system. We now use five terminals.

Apricot Xi (ACT) — The Xi desktop is an MS-DOS, hard disk-equipped machine that strays far from the IBM fold, using 3½-inch diskettes, running no IBM software directly, and offering little expansion. What expansion can be done is accomplished by buying ACT's own cards. The screen, keyboard, and operating performance are all good, but the documentation is dismal. (7/22/85)

AT Plus 20 (Core International) — This 20-megabyte hard disk drive is built like a Sherman tank, offering exceptional performance and reliability. Even novices should be able to install the kit, and technical support is good. It is somewhat more expensive than competing products, however. (7/22/85)

Avatech 1200 (E+E Datacomm) — Although reasonably priced and now compatible with switching networks, the Avatech modem can be complicated to set up and lacks sufficient software. The unit is best for those with some modem experience. (7/8/85)

Bernoulli Box (Omega) — The IBM PC Bernoulli Box offers 20 megabytes of very fast, reliable mass storage. Making backups is fast and easy, and expandability is unlimited. However, the price is high compared to fixed hard disks available for the IBM PC and compatibles, the warranty is short, and there is a fair amount of hassle and maintenance. (8/26/85)

Bernoulli Box (Omega) — For the Macintosh, a cross between a hard disk drive and a floppy disk drive that uses a cushion of air instead of a motor to turn the disk. With flexible, removable cartridges, the Bernoulli Box provides the mass storage of a hard disk without the attendant problems of head crashes or permanent inclusion of the disk in the drive unit. (7/29/85)

CM-6426 (Computer Memories Inc.) — CMI's 20-megabyte hard disk drive, which has been supplied as original equipment on the IBM PC AT, proved to be an unreliable unit in our tests. Because even normal office jostling can lead to drive failures and lost data, we cannot recommend use of this drive. (7/22/85)

Deskpro 285 (Compaq Computer Corp.) — This accurate but expensive IBM PC AT clone is complete with a high-speed mode via its 80286 processor, making it even faster than the AT. Except for a lack of some technical information in the manuals supplied, the Compaq entry is

a classy and complete effort. (7/15/85)

EM (NEC Information Systems) — NEC's entry in the low-cost impact printer competition has full upward compatibility with the rest of the NEC line, Diablo compatibility, serial or parallel options that work without trouble, and rugged construction. The Elf should be considered by anyone wanting a low-cost, high-quality impact printer. It is much slower, however, than similarly priced dot-matrix printers that can print with nearly the same quality. (7/15/85)

Epson SQ-2000 (Epson America) — This is an expensive but good printer that uses a 24-nozzle, ink-jet printhead to achieve remarkable resolution and good speed while operating very quietly. It features a self-cleaning printhead and an easy-to-install ink cartridge. It's worth considering if you need and can afford it. (8/19/85)

Inteq 300 Modem (Intec Corp.) — This system claims to be a "complete" setup for 300-baud communications. Although the hardware works well, the modem is not Hayes compatible and cannot make use of any communications software except that supplied with the product. The publisher needs to rethink and redesign it in terms of flexibility and compatibility with modems made by Hayes. (4/8/85)

Laserwriter (Apple Computer) — This intelligent laser printer produces crisp text and typeset-quality graphics that you can enlarge, reduce, or make into transparencies. Its price is quite high, you may find it inconvenient to get started, and its printing is somewhat slow. But its print quality is hard to beat, and for certain installations requiring volume printing, both the convenience and time savings are worth the investment. (7/1/85)

Macmegabytes (Beck-Tech) — If you need 1 megabyte of memory in your Macintosh, this is a good solution. Of the two versions available, one provides 512K of main memory and a 512K RAM disk; the other includes a ROM upgrade to provide 1 megabyte of main memory. (8/12/85)

Miniscribe 6032 (Miniscribe) — Reliable and fast, this 20-megabyte hard disk drive can easily withstand normal office abuse without damage to data. Although the manual is overly technical and does not give the average user enough information on installation procedures. Support available from the manufacturer is good, and the price of the drive is reasonable. (7/22/85)

Multimodem 224 (Multi-Tech Systems Inc.) — Fully Hayes compatible, the Multimodem 224 supports Bell 103, Bell 212A, and CCITT protocols. It is reasonably priced and works with numer-

Infoworld

REPORT CARD

EPSON QX-16

	Unacceptable	Poor	Satisfactory	Very Good	Excellent
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Setup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Serviceability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SUMMARY

The Epson QX-16 runs three operating systems and, as an expensive CP/M-80 machine, performs excellently. As an MS-DOS machine, it is both expensive and relatively incompatible with the IBM PC. Using the included Valdoks applications, it is easy to use, but notably slow.

RECOMMENDATION

List price: \$2,995 with 280A and 8088 processor, 512K RAM, two 360K or 720K 5¼-inch floppy disk drives, monochrome monitor, monochrome graphics card, RGB color graphics controller, serial and parallel ports, three Epson Expansion Boxes, Valdoks 2 software, TPM-III, MS-DOS 2.11, and CP/M-80 operating systems. Manufactured by Epson America, Inc., Computer Products Division, 7790 Loma Blvd., Torrance, CA 90505; (800) 421-5426.