

Electronic Engineering TIMES

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Monday, August 25, 1986

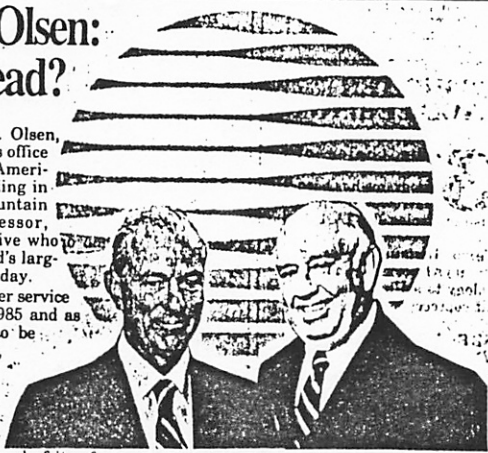
AT&T Under Olsen: What Lies Ahead?

By David Zielenziger
Sunday at midnight, James E. Olsen, 60, gets the keys to the chairman's office on the 34th floor of the landmark American Telephone & Telegraph Building in New York. He also inherits a mountain of problems from his predecessor, Charles L. Brown, 65, the executive who remodeled what had been the world's largest company into the AT&T of today.

Olsen was anointed last May, after service as AT&T's president since June 1985 and as vice chairman since 1979. He's to be succeeded by Robert E. Allen, 42, who's been running the troubled Information Systems operation.

Randall L. Tobias, 43, becomes chairman of a combined AT&T Communications and Information Systems division and head of its efforts to sell a mix of products and services. That had been forbidden by federal authorities until late spring.

Wall Street analysts, consultants and AT&T employees are split on whether the handing over of corporate power will be significant for an enterprise that's the world's largest communications company, the ninth-ranked computer maker, the



AT&T's James E. Olsen (left) and Charles L. Brown.

second-largest "captive" semiconductor house and an empire of over 330,000 people.

One school holds that Olsen, a North Dakotan who's spent his entire working life in AT&T, is hardly likely to rock boats after reaching the chairman's seat. Notes one former AT&T strate-

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'Smart' Pixel Architecture Speeds Raster Graphics

By Richard Doherty

DALLAS — Speeding up the generation of raster-scanned images has long been a goal of computer graphics scientists and engineers. Last week at Siggraph, a team of engineers from the University of North Carolina at Chapel Hill proudly showed off the result of five years of research—the Pixel-Plane machine. That system dedicates a processor decision element to every pixel in the image.

The intelligent pixel-processing method allows changes to be made in the screen display image much more selectively than do present graphics pipeline processing methods. For example, if a user wishes to change the gray scale or color of all pixels in a certain range, the pixels can be incremented to do this without changing the scale or color of more important image regions.

The prototype system shown at Siggraph is essentially a 512 x 512-pixel computer with 72 bits per pixel. Supporting that image are 2,048 custom silicon NMOS processors. Designed with 3-micron rules, each chip features 63,000 transistors and operates at 10 Mips. The prototype occupied two file-size cabinets.

Basically, the Pixel-Plane machine's front end specifies the objects on the screen in pixel-independent terms. Specialized memory chips then operate from this pixel-independent description to generate the final image. The image primitives that make up a scene are described by expressions that are "linear in screen space."

Coefficients such as A, B, C, are combined with locations such that the value for each calculated pixel is A, plus B, plus C, where x and y are the pixel's coordinate location. In this way, the information going to the screen buffer is not address and

(Continued on Page 6)

At Siggraph: Graphics μ Ps Gain Ground

By Richard Doherty

DALLAS — The latest in graphics chips started slugging it out at the Siggraph conference here last week. This new wave of programmable graphics microprocessors promises to replace so-called "hardwired" graphics controllers and to completely cut the ground from under general-purpose microprocessors for graphics displays.

Until 1980, almost all computer graphics systems relied upon conventional microprocessors for display generation and management. Then, led by the μ P7720, from NEC Corp. (Tokyo), dedicated graphics controller chips made their debut. These chips allow programmers to trigger elementary geometric shapes and fills on command.

Recently, truly programmable graphics microprocessors have become the vogue among

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Industry Groups On Tax Bill: Just OK

By Jim Van Nostrand
WASHINGTON — The electronics industry isn't flying all the victory flags it had hoped for over the compromise tax bill that Congress will vote on shortly after Labor Day.

But a survey of trade and professional groups indicates that the disappointments won't produce a high-tech revolt against final passage of the measure, which is expected to occur without opportunities for floor

amendments in either the House or the Senate.

The American Electronics Association (AEA) board voted last week to support the bill, despite major reservations about abolishing preferential, low-rate tax treatment of capital gains income.

Among the compromises of special interest to the industry:

- Research and development tax credit. The bill extends it for three years at 20 percent. Indus-

try had pressed for permanent extension of a 25-percent credit.

But the measure incorporates two industry-supported provisions. One tightens the definition of research and development qualifying for the tax credit; the other establishes a new 20-percent tax credit for supporting university basic research.

- Individual Retirement Account. A push to protect tax-deferred IRAs ran into prob-

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Users Seek Programmable Graphics Chips At Siggraph

(Continued from Page 1)

semiconductor manufacturers. The first to appear was the TMS34010, announced in January by Texas Instruments Inc. (Dallas). It was followed in May by the 82786 from Intel Corp. (Santa Clara, Calif.). Meanwhile, National Semiconductor Corp. (Santa Clara) is moving along with its five-chip family (see *EE Times*, Aug. 18, Page 1). Advanced Micro Devices Inc. (Sunnyvale, Calif.) is reported to be working on a one-chip graphics processor that will be ready by late next year, and Motorola has revised its plans for a graphics chip.

Given the reality that very few graphics software programmers ever truly "finish" their code, programmable devices appear poised to win the design competition for most new computer graphics applications in workstations and PCs.

Software Progress

The crux of the issue is the rapid progress in graphics software. The learning curve for applying a new graphics chip is essentially hyperbolic during the first months of application software design. It only approaches asymptotic limits as the hardware design becomes outdated.

For several years, graphics chip and card makers have realized that software progress always lags behind hardware emergence. Many chip makers have met this challenge by pre-

releasing data about their company's silicon graphics design direction. TI, for example, outlined its design strategy to developers at the last three Siggraph conferences, and National discussed its "open" architecture here last week.

Karl Guttag, graphics strategy manager for TI says, "The 34010's flexibility and speed support the building of graphics boards that will obsolete those based on hardwired graphics controllers or coprocessors." It appears that the next round of competition in graphics add-on boards will be among designs using the 34010.

Guttag says the architecture of the 34010, and of improved versions already in development, was created in response to developers' needs. "The clear message was to make a graphics chip that was as programmable as possible and would still give very high graphics performance."

At Siggraph, Guttag spent much of his time with 34010 developers hurling challenges at rival processor maker Intel. Guttag labels the Intel 82786 chip a "hardwired" coprocessor, saying its design precludes the total pixel programmability of the 34010. Few TI customers debated him on the subject.

With less visibility than TI, Intel has also been seeking feedback from potential customers for the 82786. Still, many designers considering the chip for their systems have been surprised by Intel's rush to market.

Also a surprise to many: Intel's sudden pullout from the industry's premier graphics conference a week before show time. In addition, months after the announcement of its much-heralded 82786 graphics processor, no add-on board vendors were freely showing a product at Siggraph.

Just one vendor, Number Nine Computer Corp. (Cambridge, Mass.) showed the chip in operation. Even then, the display driver card itself was hidden from view.

Some developers have gone so far as to call the chip's debut three months ago "premature," while fearing that any public statement to that effect might be construed as a loss in faith in Intel's timetable for the part. That might cut them off from it and anticipated 80386 design support.

"The chip was only 80 percent there," moaned one company senior executive developing an 82786-based graphics card, who asked not to be identified. "We have faith in Intel, but the lagging delivery of prototype silicon is starting to worry us."

Vocal Support

Add-on board designers who have chosen TI's programmable graphics processor are vocal on their move.

"We chose the 34010 for its RISC architecture, its 6-Mips power and its unique three-dimensional functionality," says

Jim Williams, president of Vermont Microsystems Inc. (Winooski, Vt.). "No other graphics silicon has the sophistication of the 34010," he continues. The part allows his programmers to "freely write software," a vast change from being constrained by silicon, he says.

VMI is already sampling its single-board Image Manager 640. Bundled into its architecture are many of the Programmable Graphics Adapter features VMI developed under contract for IBM back in 1983. (The multiboard IBM PGA, conceived to be the premium graphics adapter for the IBM PC AT, never quite sparked the interest of engineering and scientific graphics software makers the way VMI and IBM had hoped.)

Ahead, National intends to woo designers with its 225-MHz-wide-rate graphics processor at Wescon in Anaheim, Calif., in November. There, it will detail the full power of the DP8500 advanced graphics chip and its support family. Delivery of this programmable workhorse might be possible by late this year or early next.

Meanwhile, Motorola is rumored to be beyond the paper stage on defining a suitable graphics coprocessor for its 68020 and planned 68030 and 68040 processors. And though NEC had a booth in Dallas, its managers are silent over what sort of processors, hardwired or programmable, the company might soon fashion.

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PC WEEK

AUGUST 5, 1986
VOL. 3 NO. 31 \$2.95

THE NATIONAL NEWSPAPER OF IBM STANDARD MICROCOMPUTING

New DOS Version With 80386 Support Slated for Fall Debut

Microsoft Product Will Resemble IBM DOS 3.2 Allows Multiple Sessions

By Sam Whitmore

REDMOND, WA—Microsoft Corp. is developing a version of PC-DOS that allows users to run simultaneous 640K-byte computing sessions on Intel's 80386 microprocessor.

The forthcoming version of DOS, due this fall, will perform almost identically to the DOS 3.2 introduced in March by IBM, sources close to Microsoft said last week.

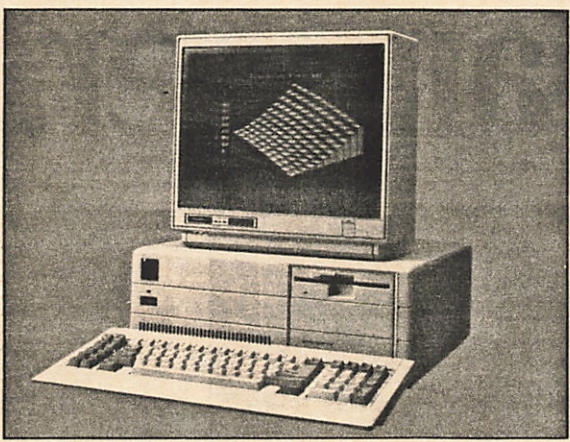
Microsoft's product is not related to forthcoming protected-mode DOS products, under development at Microsoft and IBM, that can run applications exceeding 640K bytes in size. It also has no connection to an unannounced product, often referred to as DOS 6.0, said to be a multitasking, multiuser amalgam of DOS, Unix and other operating systems.

Modified DOS 3.2

"Real-mode DOS for the '386," as sources called the Microsoft effort, is a modification of DOS 3.2 designed for use on the first generation of 80386-based PCs, which will function primarily as powerful alternatives to stand-alone 80286-based workstations. The new DOS is only slightly different from DOS versions now available for 8088-based PCs, the sources explained.

Intel's 80386 microprocessor can operate in four modes, one of

Continued on Page 6, Column 1



Tandy's 3000 HL, based on the 80286 chip, has seven expansion slots and costs \$1,699. The unit accepts add-on boards built for PCs and ATs.

Tandy Introduces Four Micros Aimed at IBM Business Market

Announcement Includes 80286-Based PC To Sell For Less Than Half the Cost of Basic IBM PC AT

By Bruce Stephen

NEW YORK—Tandy Corp. last week introduced four low-cost PC-DOS computers, including a \$1,699 80286-based PC.

Called the 3000 HL, the new 80286-based PC costs less than half as much as IBM's lowest-priced PC AT and is designed for corporate use, Tandy officials said. The unit runs four times faster than the 8088-based PC-DOS machines it is intended to replace.

Tandy also introduced two low-cost PCs similar to its model 1000, which is being discontinued. The \$1,199 1000 SX runs almost twice as fast as the Tandy 1000 and contains more standard memory and expansion slots.

The \$799 1000 EX, which contains a disk drive, microprocessor and keyboard in a single slim unit, is priced, like many less-expensive PC compatibles, well below IBM's comparably equipped PC. The IBM PC now sells for about \$1,500.

The fourth PC is the \$4,299 3000 HD, which has a 40M-byte hard disk and is designed for use as a file server, multiuser host or powerful stand-alone workstation.

Tandy will market the new computers through more than 7,000 Radio Shack retail stores across the country. Tandy, of Ft. Worth, Texas, is also increasing to 1,500 the size of its sales force

that markets computers directly to businesses.

The new HL and model 1000 machines "will become the standard for the way people look at PCs for the rest of the '80s," said Tandy Chairman John Roach.

About 20 percent smaller than the IBM AT, the 3000 HL uses a 16-bit 80286 microprocessor that users can operate at 4.77MHz or 8MHz. The HL 3000 can accommodate up to 4M bytes of memory and is sold with 512K bytes of standard memory, expandable to 640K bytes. Also included is a parallel port, one 360K-byte floppy-disk drive, but no monitor or graphics adapter.

Mixing Add-On Boards

The HL has seven expansion slots: Four are XT compatible and three are AT compatible. This means that users can combine XT and AT add-on boards.

Tandy officials said the 3000 HL replaces the current XT-compatible model 1200, built for Tandy by Tandon Corp., of Chatsworth, Calif.

"It's like getting an AT at an XT price," said Joe Levy, a senior vice president with International Data Corp. in Framingham, Mass. "Why buy a no-name when you can get Tandy for less than IBM?"

The 1000 EX will replace the

Continued on Page 6, Column 1

IBM and Developers Working on Advanced Plan to Link Computers

By Pat Bellamah

Key pieces are starting to fall into place for Advanced Program-to-Program Communications (APPC), IBM's master plan for allowing all of its computers to "speak" to each other as peers on a network.

"Several new technologies will converge in products that will appear next year and remove the existing roadblocks to APPC," said Eduardo Stecher, vice president of marketing at Software Research in Natick, Mass. The necessary elements include more APPC applications, more powerful PCs and an installed base of Token-Ring networks.

Major mainframe and PC software companies are working to adapt their products to take advantage of APPC or LU6.2, the protocol on which peer-to-peer communications is based.

For instance, Oracle Corp., of Menlo Park, Calif., will introduce in two months a new application called "SQL Star" that uses APPC, said Ken Cohen, director of product marketing. Oracle sells a database application that runs on mainframes, minis and PCs. SQL Star will be one of the first mainstream applications using APPC to reach the market.

APPC, an enhancement of

Continued on Page 8, Column 1

Software Firms Revise Warranties

By Beth Freedman

Major software companies are formulating new warranty policies designed to limit their liability for problems arising from use of their programs. The policies also will spell out what recourse users have if the software fails or is riddled with bugs.

Lotus Development Corp., IBM, Ashton-Tate, Microsoft and MicroPro International are among the companies that intend to add clauses to their warranties defining the level of responsibility they will assume for problems incurred from software use.

"These new guidelines provide an avenue for software developers to limit their liability," explained

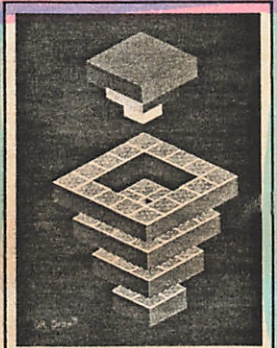
a spokesman for the Association of Data Processing Service Organizations (ADAPSO), the industry trade association that spearheaded the committee in charge of writing the new warranties.

"If a warranty is not sufficient, it opens a developer up to large potential liabilities. However, if developers provide legitimate recourse, they may be able to limit [their liability]."

The new warranties will also define specific areas and instances in which users are entitled to receive free bug fixes, new programs or refunds if the software fails, according to ADAPSO.

Lotus has just recently come

Continued on Page 8, Column 1



Intel has supply problems with the 82786 graphics chip. Page 3.

LATE NEWS

Microsoft Offers Patch To Run Windows on 3.5-Inch Disks

Officials of Microsoft Corp., in Redmond, Wash., last week announced that a free patch disk is available for Windows users who need to format 3 1/2-inch disks. The patch is also intended for developers of Windows applications using the new IBM AT keyboard.

Convergent Technologies Slates New Products

Convergent Technologies Inc., of San Jose, Calif., is reportedly

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Intel Is Fixing Bugs In Graphics Chip

By Stephen Kanzler

SANTA CRUZ, CA—Intel Corp. is struggling to eliminate bugs from its 82786 graphics coprocessor and to get working versions delivered to graphics-software developers.

The bugs have caused delays in shipments of the 82786, viewed as one of several key graphics processors coming onto the market. The chip can speed up graphics applications by a factor of 100 over existing technology, according to Intel.

The chip is fast because it processes graphics without having to rely on the PC's microprocessor, something conventional graphics boards, such as IBM's Enhanced Graphics Adapter, must do.

The first set of 82786 chips, produced last October, did not work at all, a source inside Intel said. When a reworked version of the chip was produced in December, it was plagued with bugs.

The first version of the chip had so many bugs that hardware developers who used them were unable to complete their designs.

The bugs restricted the 82786's maximum resolution capabilities

and number of colors, according to Kim DeWindt, a software manager at Graphic Software Systems in Wilsonville, Ore.

"You could get an idea of what the chip was capable of, but it was not suitable for software development," said DeWindt.

The delays in shipping the 82786 have resulted in the chip losing some ground to Texas Instruments' 34010 Graphics Signal Processor according to some developers.

Delivery by Fall

"A number of vendors have tabled their '786 designs in favor of the 34010 because they wanted to have deliverable products by Fall Comdex," said a source familiar with 82786 development who asked not to be identified.

"I expect that these companies will have 34010-based products first but will resume their '786 designs when they get working silicon," the source added.

Intel's recently completed revision of the 82786 chip is scheduled to be shipped to graphics-hardware developers in sample quantities over the next four to six weeks and, reportedly, has all ma-

ior bugs fixed. But this latest version is still not the final version, according to Intel sources.

"It will not be [the final version], because they have some additional minor tweaks that they have not corrected," said DeWindt. She said that Intel has told her that it will start on production silicon as soon as it can get new production masks that incorporate the latest changes.

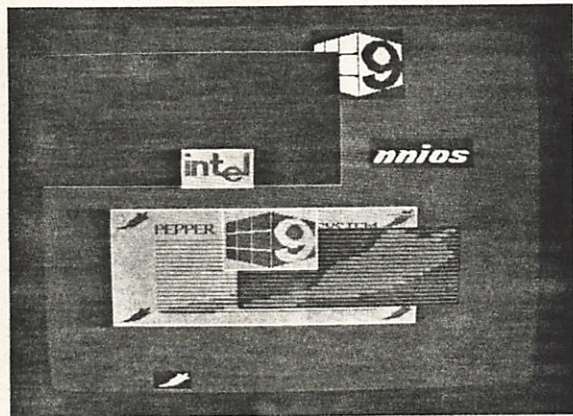
Intel sources claim that the 82786 is faster in most operations than Texas Instruments' chip, but so far developers have been unable to make a fair comparison between the chips.

"We haven't been able to determine which chip performs better," said DeWindt. "The TI chip is very fast, but we haven't been able to really compare it with the '786, because the TI chip is fully functional and the '786 has only been limping along."

Number Nine Corp., of Cambridge, Mass., is among the few companies that have committed to making a product based on the 82786. "We just got the latest version in this week," said Will Frentz, the firm's executive vice president. "They have told us that we can expect production quantities in the fourth quarter."

"We are getting samples of the new [version of the] 82786 next week, but they are behind TI in fixing bugs. We have a much higher level of confidence in the TI part," said Chuck Mauro, vice president of research and development at Video-7 Inc., of Milpitas, Calif.

"We will definitely have high-resolution products based on the TI 34010 graphics processor," he added. "The '786 is really targeted for 640-by-480 resolution and 256 colors. It has the potential to be a very low-cost enhanced graphics adapter follow-on type of product, but we don't think it is suitable for higher-resolution applications." ■



Intel's 82786 chip is used to power Number Nine's graphics board.

Expanded-Memory Board Set to Debut From Xebec Corp.

By Bruce Stephen

CARSON CITY, NV—Xebec Corp. this week will introduce a \$99 expanded-memory board for the PC.

Compatible with the Lotus/Intel/Microsoft expanded-memory specification, the Xebec Amnesia Board is configured with no memory. A version for 8088-based PCs costs \$99; a version 80286-based PCs costs \$129.

Like other expanded-memory boards, the Amnesia Board uses a technique called "bank switching," whereby the computer's processor is fooled into operating as if it were executing tasks above the DOS-imposed 640K-byte memory limit.

Users can create as many as four simulated disk drives with the Amnesia Board's memory. Information housed in a RAM disk writes more quickly to the computer screen than data stored on a floppy-disk or hard-disk drive.

The Amnesia Board, due to be shipped this week, holds up to 2M bytes of memory. The board comes with a manual and memory-configuration software that guide users through the installation of memory, said Carl Tolson, Xebec's vice president of marketing.

Coinciding with the Amnesia Board's release, Xebec has filed a lawsuit against Intel to block any future legal action Intel might take accusing Xebec of using trade secrets to manufacture the Amnesia Board.

Xebec was originally contracted by Intel Corp. in November 1984 to manufacture the Above Board, said Xebec's attorney Gene Backus. However, that

contract was terminated by Intel last October, Backus said. Following the contract cancellation, Xebec used the Above Board design as the basis for the Amnesia Board.

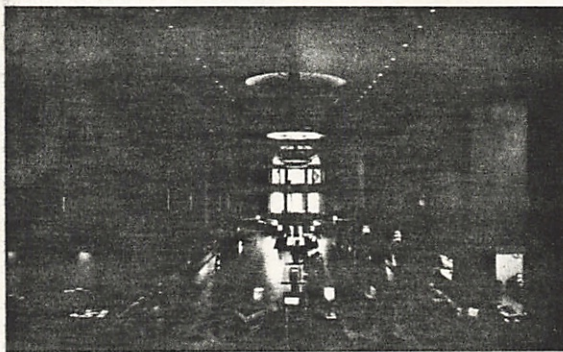
"We designed that board [the Amnesia Board] through reverse-engineering practices," said James Toreson, Xebec's chief executive officer. Xebec also hired an independent software developer to write the software that operates the Amnesia Board, he said.

Xebec's suit will attempt to persuade the 9th District Court in Douglas County, Nev., that it legally used standard reverse-engineering practices to obtain the design for the Amnesia Board, said Backus.

An Intel spokeswoman had no comment on the contract with Xebec or the lawsuit.

Xebec Corp. is located at 3679 Highway 50 E., Carson City, Nev. 89701 (702) 883-4000. ■

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Old-guard financial bastions, such as Fleet Financial Group, find the move to microcomputers is traumatic but worthwhile. Page 43.

SOFTWARE

Industry players and corporate MIS departments are out of touch with the needs of users. That is the view of information center managers who convened in Anaheim last week. Page 8.

HARDWARE

Boca Research has introduced an expanded-memory board that will run with PCs operating at clock speeds as high as 12MHz. Most memory boards will not work on PCs faster than 8MHz. Page 9.

COLUMNS

Get ready, world! It may not seem likely today, but columnist Jim Seymour predicts Microsoft's Windows will be the standard product of the "post-8088 world." Page 36.
Last week Peter Norton described the Toshiba lap-top as close to perfect. This week he looks at a few of the things that leave it just shy of earning a "10." Page 37.

STRATEGIES

Yankee tradition meets the PC at Rhode Island's Fleet Financial Group, whose more than 400 offices in 34 states are in the midst of reversing a stubborn resistance to modern technology. Page 43.

FEATURES

Is there tarnish on the IBM mystique? Having apparently accepted the view that it need not be IBM to be reliable, corporations are turning increasingly to compatibles. Page 55.

REVIEWS

Not just another speed-up board: Reviewer Garry Ray declares Orchid Technology's TurboEGA 80286 multifunction board to be a cut above the me-too crowd. Page 79.
Be all that you can be... BreakThrough, a \$740 software program from Profit Technology, flashes subliminal cues on screen to prod users to new heights of creativity. Page 79.

FOCUS ON

Texas Instruments and Intel are readying dedicated graphics chips that will greatly increase the graphics capabilities of PCs, in turn fueling a software boom. See "Focus On Graphics," Page 85.
As competition comes to a boil in the low-cost AT-compatibles market, firms are differentiating their products by packing in the features. See "Focus On Desktop Computers," Page 99.

INDUSTRY

Compaq has found that one path to profitability involves keeping margins high, which it accomplishes by eschewing the low end of the PC spectrum. Page 125.

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Industry Leaders Ready Graphics Chips, Promise Speed, Resolution, Performance

By Russell Glitman

A new generation of graphics chips from Intel Corp. and Texas Instruments promises to bring workstation-quality graphics to the PC, with speed, performance and resolution far beyond what is currently available.

The chips, Texas Instruments' TMS34010 Graphics Systems Processor (GSP) and Intel's 82786, will enable the IBM PC and compatibles to become graphics engines—machines with power and resolution superior to those graphics chips that can now be found on Apple Computer's Macintosh.

That new power, in turn, will "feed the boom in graphics software generally and in desktop publishing in particular, where you need more resolution, capability, speed and performance," said Bill Higgs, director of product marketing for Digital Research Inc., the Monterey, Calif., developer of the GEM graphical interface.

On Board in '87

The chips will be available in volume quantities late this fall and should appear in graphics boards in the spring of 1987. Current graphics software, which will be rewritten to take advantage of the power of the chips, should begin appearing shortly thereafter.

When that happens, users and volume buyers will see sharply improved graphics applications, an upward migration that industry insiders predict will bring graphics into the office and make today's style of word processing obsolete.

Graphics will "cross a threshold" with the emergence of the chips, said Edward Belove, vice president at Lotus Development Corp., in Cambridge, Mass.

"Right now, graphics gets in the way a little. For standard word processing, graphics can tend to retard performance. We're striving to overcome those barriers.

These chips help do that."

"The chips represent the next generation in graphics chips, following NEC and Motorola components that were responsible for the development of the PC add-in board market," said Lew Brentano, vice president of the graphics industry service at Dataquest, a market-research firm in San Jose, Calif.

"We're very excited about the products. They change reality and the way people will make controllers, boards and terminals in the future," said David Vanderschel, director of research and development at Nova Graphics International, in Austin, Texas.

"It will be possible to put so much graphics punch onto a single board that existing interfacing standards, like the EGA, CGA or the Hercules boards, are going to be really inadequate," Vanderschel said.

Once on the market, the chips will have a "big impact on price/performance," in terms of graphics, said Dan Fineberg, director of communications for Graphic Software Systems, headquartered in Beaverton, Ore.

The new chips will increase the execution of typical graphics applications tenfold for less than \$1,000, he predicted.

The two chips obtain their speed by freeing the PC's central processing unit (CPU) and performing graphics processing on the chip.

But some fundamental differences in the two chips, industry players said, position them for different markets.

Texas Instruments' GSP is a 32-bit microprocessor optimized for graphics-system applications. It is capable of handling 6 million instructions per second and offers a draw rate of up to 48 million pixels per second. Pixels form a digitized picture on a computer screen.

Intel's 82786 is a graphics coprocessor that operates independently of the host processor and is said to manipulate win-

dows in hardware 100 times faster than traditional software.

While both are high performance, very large scale integration (VLSI) chips that bring improved resolution and speed to graphics, TI's GSP chip is considered more flexible.

It is capable of being programmed in C language because it includes a programmable foundation for graphics algorithms. Algorithms on Intel's '786 are preset and hard wired.

"TI went for a flexible approach, but (Continued on Page 86)

At last! - Fast, On-screen FLOWCHARTS And Organization Charts

Finally! An on-screen flowchart processor that knows about flowcharts and organization charts - not just another "screen draw" program that makes you do most of the work.

Interactive EasyFlow is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With this program you can quickly compose charts on the screen. More important, you can easily modify charts so they are always up to date.

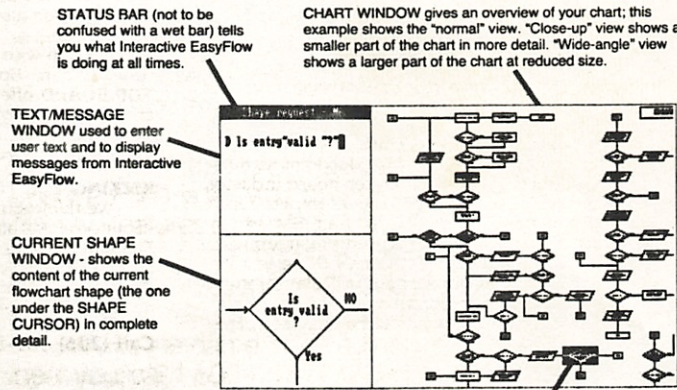
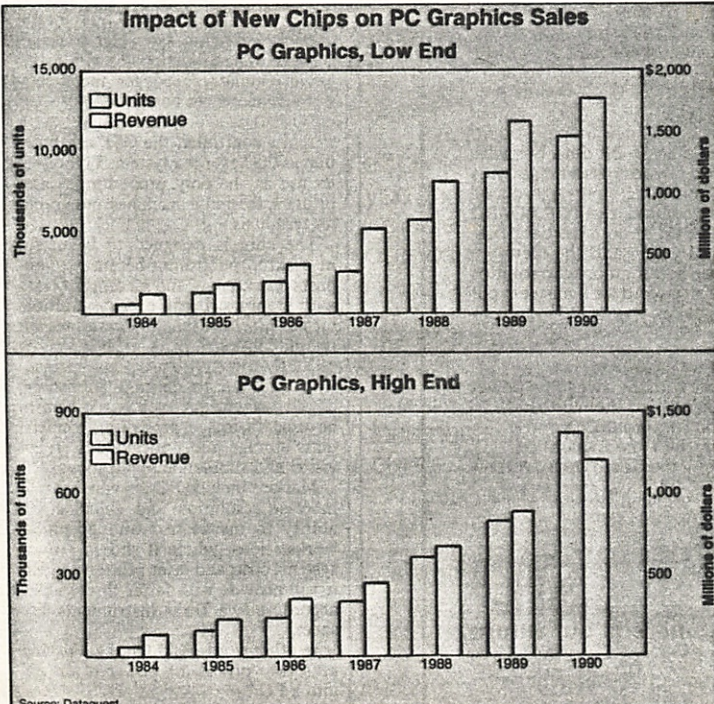
Features: • Text is automatically centered, character by character, within shapes as you type it • Text formatting controls allow you to override the automatic formatting where desired • Lines are created by specifying the starting and ending points - the program automatically generates the route • Powerful editing facilities allow shapes and even entire rows and columns of shapes to be inserted or deleted; lines are automatically re-routed as necessary • Large chart size (up to 16 shapes wide by 16 shapes high) allows very large flowcharts and organization charts to be handled with ease • Charts can be larger than the screen - the window into the chart scrolls both horizontally and vertically as necessary • Flexible printer interface allows it to work with all

printers, not just dot matrix printers. Wide charts can be printed in strips Also works with Hewlett-Packard 7475A (and compatible) plotters • Twenty standard flowcharting shapes included • Common shapes supplied in three sizes • Extensive manual (125 pages) includes many examples • Context sensitive "help" facility provides immediate assistance at any time • Number of titles can be placed on a chart • Commentary text blocks can be placed anywhere in the chart • Fast: written in 8088 assembler • Plus many more features than we can mention here.

Requires at least 256K memory, DOS-2 or higher and an IBM or Hercules compatible graphics card.

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Graphics Chips

(Continued from Page 85)

they pay a performance and development penalty," claimed Mark Olson, 82786 product manager at Intel's Graphics Components Operation, in Santa Cruz, Calif.

Despite Olson's charge, the TI chip may be the preferred one.

According to Karl Guttag, manager of graphics strategy for Texas Instruments, in Austin, there are 150 firms and corporate

divisions developing products using the TI chip. Microsoft, Nova Graphics and Graphics Software Systems have announced they will support the chip.

By contrast, Intel's Olson said 40 to 45 firms are developing products using his company's chip. One of those firms is Number Nine, the Cambridge, Mass., board maker that showed its '786-based Pepper Graphics System at the National Computer Graphics Association show, in Anaheim, Calif., this past May.

However, chip selection is not always an

either-or situation, according to Edward McNierney, manager of software development at Number Nine. His firm may also support the TI chip should it try to sell into different markets. "Each chip addresses different markets," he said.

Olson calls this point a "myth," arguing that both chips have the same level of resolution and that Intel even has a performance superiority over TI in the higher-resolution areas of 1,000 by 1,000 pixels and above.

(Continued on Page 90)

Texas Instruments' New GSP Chip Can Handle Both Text and Graphics

The new chip from Texas Instruments (TI) that will power future graphics boards is an engine devoted to graphics. It is tailored for mixing graphic with text in a variety of type styles and will significantly speed up work involving graphics.

Called the TMS34010 Graphics System Processor (GSP), the chip is a complementary metal-oxide semiconductor (CMOS) 32-bit processor. A CMOS processor requires less energy to run and gives off less heat.

It can manage 6 million instructions per second and allows a draw rate of up to 48 million picture elements (pixels per second).

The most important benefit, and the greatest innovation, is the flexibility of the chip, due to its programmability through a C language compiler.

"The GSP can display text of any complexity, and users can program it to interpret data structures any way they want," said Karl Guttag, manager of graphics strategy for TI, in Austin, Texas.

Also integrated on the chip are field manipulation and I/O functions such as DRAM control, host interface and CRT display timing.

The chip allows all operations to be performed on fields or groups of pixels. This pixel-processing feature gives hardware designers the ability to develop single-board, high-performance bit-mapped systems with displays that use both text and graphics, according to TI.

The chip itself is capable of handling instructions for drawing filled ellipses, anti-aliasing (commonly called "the jaggies"), filled polygons, rectangles and pie wedges.

Well-Stocked Tool Kit

TI is also developing graphics software and hardware support tools for the chip, including an assembler package, the C compiler, function libraries, an in-circuit emulator/debugger and a software-development board.

Since it is a processor as well as a graphics controller, the GSP can function as the host for a system. TI foresees its use as the only processor in laser printers, facsimile machines and graphics terminals.

The chip is designed to be useful in desktop publishing because it supports text kerning and merging of texts with graphics. It can execute multiple bit-per-pixel arithmetic operations on two-dimensional pixel arrays, known as PixBits.

In addition to desktop publishing, Texas Instruments expects the chip to be used in image processing, copiers, mass storage and optical disks, robot vision and simulation applications.

Markets include PCs, in which it will increase resolution and enhance the ability to merge text and graphics; workstations, where it should reduce systems cost; and laser printers, which it will provide with faster throughput, according to a Texas Instruments fact sheet.

In other words, said Guttag, the chip puts the "processing power of an AT into a PC." —R.G.

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Graphics Chips

(Continued from Page 86)

As Dataquest's Brentano observed, the controversy over which chip is best suited for which market—if indeed they are suited for different markets—is already beginning to take on “a sense of religious or political” fervor.

“Intel's is a lower end graphics chip, better suited to low-end applications typical of the personal computer . . . where you need

more interactive environments,” said McNierney, because the chip's hardware windowing capability “will be very important in multitasking '386-based PCs.”

On the other hand, TI's GSP is a “more programmable machine, a true microprocessor that you can write programs for,” he said.

The TI chip's strong points are its ability to execute complex graphical algorithms used in image processing, video and as a stand-alone processor, McNierney said. Moreover, the chip is “attractive for use in

laser printers used in desktop publishing,” he said.

Added Bret Berg, graphics product specialist for AST, in Irvine, Calif., “Each chip can almost be looked at as specialized for certain levels of graphic functions.”

Regardless of brand names, what will most impress users and volume buyers is the increased performance from machines and software using the new chips. “The performance working with a coprocessor will be amazing,” said McNierney. “It will double the processing power.”

“Users will see increased performance because the main CPU is not tied up doing graphics,” said TI's Guttag.

The full import of these chips will not be realized until software is on the market that is written to use both the chip processor and the host CPU, said McNierney.

More immediately, the chips will find applications in desktop publishing, providing what-you-see-is-what-you-get quality, with real text size and shape on the screen.

DRI's Higgs said users will no longer have the “frustration of having to work around hardware limitations in terms of resolution on the screen.” The chips will make it possible to see a full-page layout on a screen and allow the user to read text at any level of zoom. “That, in turn, will help sales of those applications,” he said, predicting graphics software sales will jump by 25 percent after boards using the chips hit the market.

The chips will “allow software to become more complex and better, to get away from the performance and memory problems,” he said.

However, both Higgs and Lotus's Belove said it will take time for new software to be developed using the full power of the chips. “Understanding how to take advantage of these chips is not readily obvious,” said Belove. But “maybe someone will have an inspiration after these chips are out.”

“VLSI [chips] are going to have an important impact on the industry,” said Jack Grimes, Intel's technical market manager

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Intel's Graphics Chip Sports Two Processors, Performance Agility

Speed is the hallmark of Intel's new 82786 coprocessor graphics chip, which its developers say will deliver an agility of performance that will bring graphics into the mainstream of office automation.

The 82786 gets its speed from the two independent processors it supports—one for graphics, the other for the display.

The processors operate simultaneously, with the graphics processor executing commands from the host's central processing unit (CPU) and updating memory, while the display processor collects bits from the memory and brings them to the screen.

The chip, in turn, can manipulate graphics and text while executing multiple windows instantaneously.

The graphics processor uses bit maps to manipulate graphics and text. The display processor then takes the data from each bit map to the screen with a feature called “hardware windows.”

To change the size, shape or information content of a window, the user moves a pointer to the bit maps. The display processor can also drive laser printers, cathode-ray monitors and LCDs.

The 82786 can also provide up to 1,024 simultaneous colors. It operates at less than one watt with 32 dynamic random-access memories (DRAM) in its dedicated graphics memory. In the video random access memory (VRAM) mode, the chip can support resolution of 1,000 by 1,000 or greater.

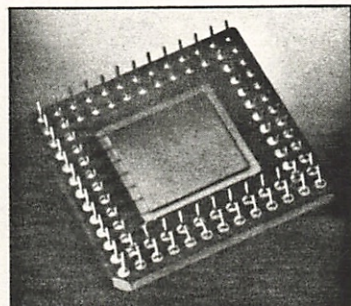
“The 82786 represents a dramatic leap forward in graphics capabilities that were formerly exclusive to expensive workstations and dedicated graphics subsystems,” said Robert Jenkins, general manager of

for the GSP chip. "It takes the performance that you have on expensive workstations and brings it to the PC," he said.

Both Olson and Grimes believe that one of the greatest benefits will be an increase in user productivity. A study by IBM found workers' performance declined dramatically when they were forced to wait even a second for their computers to carry out a command. That's all the time it takes for the mind to begin to wander, the study found.

With three-tenths of a second response time, users are three to nine times as productive, said Olson.

Intel's chip will make response time for an entire screen 25 times faster, from more than five seconds to less than a quarter second. Line drawing on an entire screen,



Intel's 82786 chip is designed to be faster, cheaper and better at graphics processing.

Intel's Microsystem Component Division, in Santa Cruz, Calif. "The 82786 executes its own instructions independently of the CPU and integrates on one chip most of the functions traditionally found on workstation graphics boards. This speeds up graphics and display operations."

The main benefit of the chip, said Intel officials, is its ability to increase productivity. According to an Intel fact sheet, document preparation that currently takes 10 to 45 minutes a page will be cut to three to 15 minutes.

A Laser Printer Future

New applications for the chip include what-you-see-is-what-you-get presentation graphics, desktop publishing and computer-aided design and engineering. Intel has received commitments from laser printer manufacturers who want to use the chip in the next generation of fast printers.

Intel's very large scale integration (VLSI) chip, combines the functions previously found on several different chips into the 82786. That integration will give users the capability now associated with CAD/CAM workstations, said Mark Olson, product marketing manager for graphics components operations at Intel.

But the main advantages will be in mainstream applications, where users can run Microsoft's Windows and spreadsheets under the chips at much faster performance levels.

"Intel's '786 plus Microsoft's Windows would give a very fast display," said Lew Brentano, vice president of graphics industry service at Dataquest, in San Jose, Calif.

"Windowing and multitasking will be a natural for the PC with the 82386 and these chips," he said, referring to Intel's and Texas Instruments' chips. "Both handle windows very efficiently... they draw things faster and enhance productivity." —R.G.

which now takes about 25 seconds, will be cut to a quarter second.

"To the user, the '786 means productivity. The system needs to respond virtually instantaneously for the user to be happy, productive," said Olson. The chips will "radically reduce iteration time" and improve user interactivity with the PC. "We can make it so the hourglass is not engraved on the display," he said.

"Many graphic applications can take two to three seconds to come up," said Dataquest's Brentano. "Both chips will

draw things faster and do more things which will enhance productivity."

The chips will "prove the worth of graphics applications," agreed AST's Berg. He believes they will enable a "dramatic increase in the performance of software."

"A lot [of applications] that were computer intensive were slowed down because the work was done in software," he pointed out.

"The performance achieved in hardware through these chips will give credence to the graphics software market." The market

has lagged because of user interface difficulties and poor performance, he said.

The '786 can also improve word processing, said Intel's Grimes, making scrolling, painting text and graphics on a screen and spreadsheet applications faster. "It's a pretty comprehensive attack on what has been limiting performance in the past," he said.

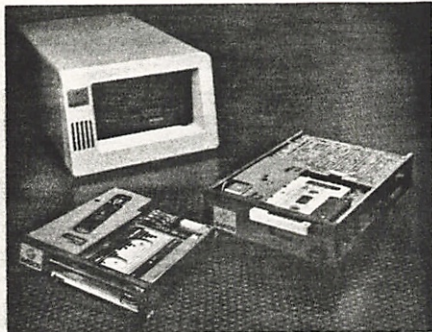
From TI's perspective, its chip will enable users to do high-quality graphics on low-cost PCs with increased performance.

"To do quality graphics, you need con-

(Continued on Page 96)

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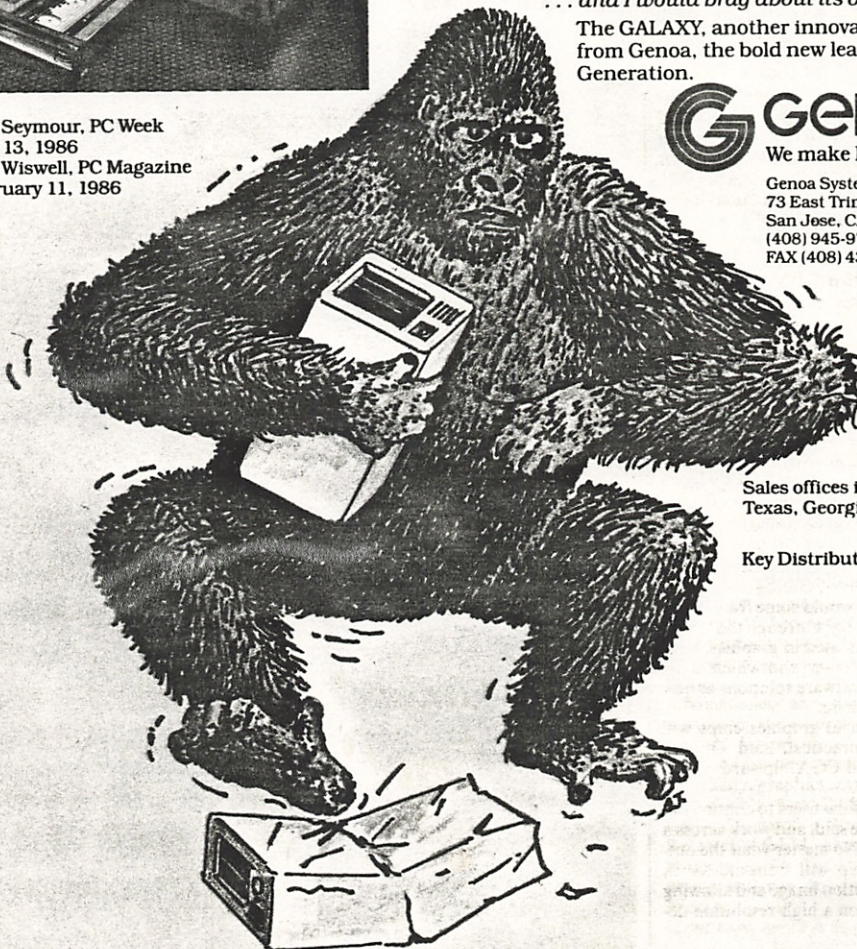
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Intel and TI Chips Could Spur New Graphics Standard

By Russell Glitman

New, sophisticated graphics chips from Intel and Texas Instruments could lead software developers to create standard interfaces between screen displays and hardware and software.

Standardization could spur the creation of more graphics software, giving users more programs with greater capabilities.

Although the chips will not be produced in volume quantities until late this year or the beginning of next, software developers are jockeying to create a standard.

Using preliminary sample chips, several companies have begun working to develop standard interfaces and software drivers.

Microsoft, Graphics Software Systems, GSS, and Nova Graphics International have already announced software support for the Texas Instruments (TI) and Intel chips. Both chips are also compatible with present standards, such as the IBM Enhanced Graphics Adapter (EGA) and Color Graphics Adapter (CGA); although in order for TI's chip to be compatible with the EGA, additional support chips are required.

"It was clear to them [Intel and TI] that they needed software support and a common standard interface as a base," said Kim DeWindt, Direct Graphics Interface Specification (DGIS) product manager at GSS, in Beaverton, Ore.

DGIS was developed by GSS as a public firmware specification to provide a standard interface between graphics hardware and software.

Both Intel and Texas Instruments have announced their support for DGIS. GSS officials have also said they will support the Texas Instrument chip with its Computer Graphics Interface (CGI) standard.

Interface support has been "a cooperative effort," said Karl Gutttag, strategy manager for graphics at Texas Instruments (TI), headquartered in Austin, Texas. He reported that TI has been working "with a number of other third-party developers."

Look for a Shakeout

The new chips, Intel's 82786 and TI's TMS34010 Graphics Systems Processor (GSP) will cause "some shakeout in the standards market," he said. While no one believes the field will narrow to one, it is possible that by the end of next year only a couple will be successful.

"There is going to be a need for more than one standard," said Gutttag. "We can adapt to whatever standard comes up."

Personally, however, Gutttag said he prefers standards that would come from developers who have thought through the fundamental instructions used in graphics, such as how a pixel is drawn, and which allow for the growth of software solutions as new hardware comes along.

The more powerful graphics chips will make standards practical, said Gutttag. With the EGA and CGA, upward migration was restricted.

Standards will allow users to continue to migrate upward, he said, and work across a series of devices. "No matter what the output device, the chip will translate for it, taking a low-resolution image and allowing it to be outputted on a high-resolution device," said Gutttag.

Intel's chip will "be a tremendous force in forcing the standardization of software," said Jack Grimes, technical marketing manager for graphics components at Intel, in Santa Cruz, Calif. "There are too many drivers."

"The chips are going to make standardization much more possible," added Mark Olson, product marketing manager for graphics components at Intel.

In fact, one of Intel's goals while designing the chip was to make GSS's CGI run fast.

"Without these chips, the overhead for writing software is too high and performance goes down," he said. "With a high-performance engine it is more likely that independent software vendors will use a standard interface."

Olson believes there will be a snowball effect once developers realize that software written with a standard interface will find a larger market.

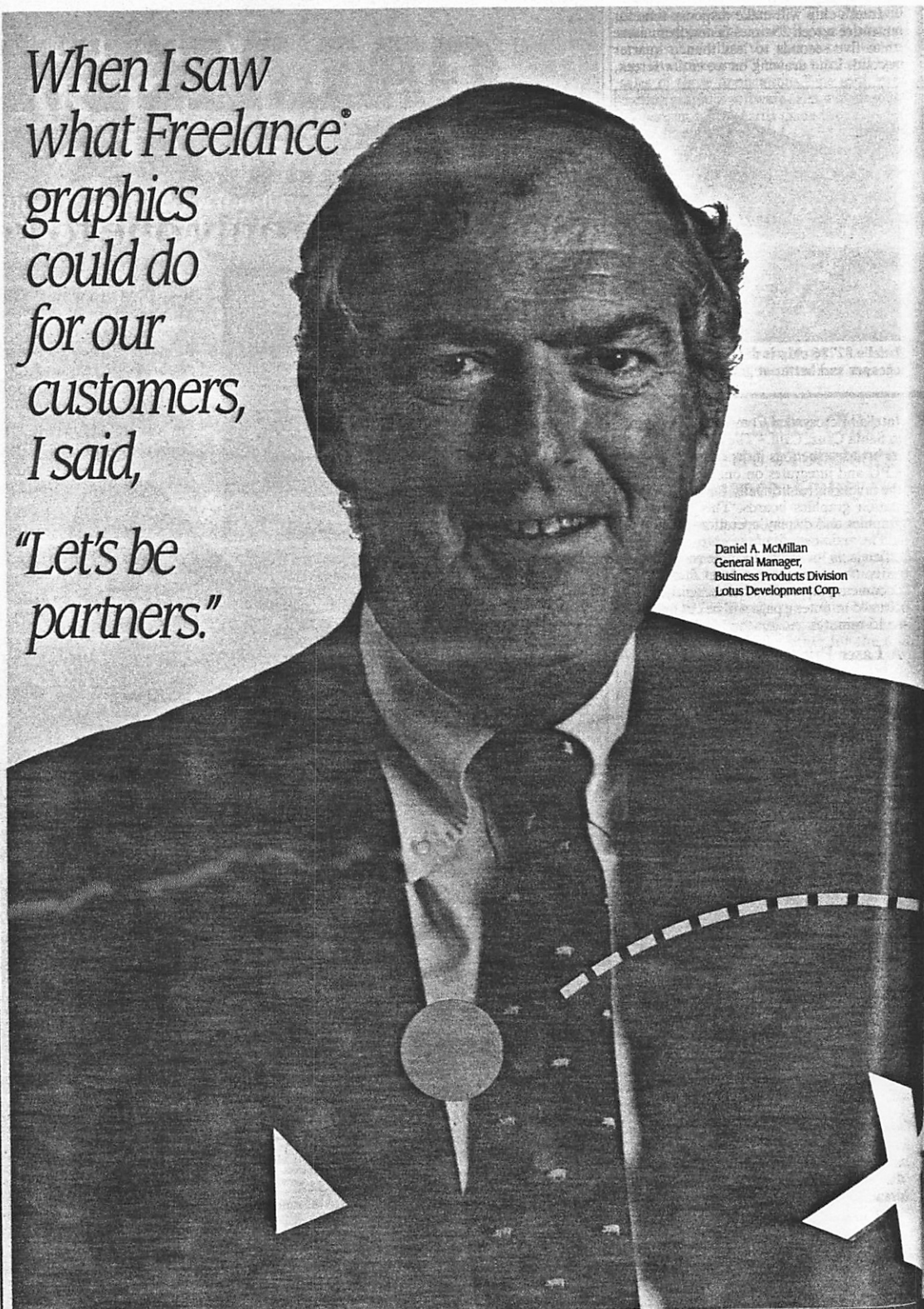
GSS's DeWindt agreed. "The chips will have a big impact on promoting and endorsing standards."

At the same time, the market may face fragmentation if the number of interfaces is not reduced. "The key is that developers are not put off from doing development by having to choose from different architectures. It is important that something draw them all together.

"DGIS provides this high-performance level . . . to open up the market quicker," DeWindt said.

Further north, in Redmond, Wash., the designer of Microsoft's Graphical Device Interface, GDI, said a half-dozen board

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Daniel A. McMillan
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makers will have Windows drivers when they come to market with the new chips.

"They simply help us enforce Windows as a standard [interface]," said John Butler, director of special opportunities marketing for Microsoft.

"The day you plug a board in with a Windows driver is the day you can start to use Windows on the new chips.

"When these boards enter the market with their different configurations speaking different languages, there will be a need for an overriding interface to make

use of the boards' full capabilities and handle the differences," he said. "Windows will be there."

Butler said he expects the new chips will improve the speed and performance of Windows, which to date, he acknowledged, has been less than desired.

"The performance of Windows on a PC XT with EGA is acceptable, but not thrilling. We expect the performance of Windows on one of these coprocessor boards to be thrilling," he said.

The performance of graphics in general

should be increased by six to 10 times, Butler said. "It makes graphical user interfaces and applications using that interface inherently simpler to use than old command-line interfaces. This kind of hardware makes graphical user interfaces run really well," he noted.

There has been a bottleneck in graphics, said David Vanderschel, director of research and development for Nova Graphics International, in Austin. His firm is developing an implementation of the International Standards Organization's Computer

Graphics Interface, CGI, that will run on boards built around the new chips. Once on the market, the bottleneck will be removed, he said.

"Graphics have been more for display only and less for human interaction. That will now change because the system will be very responsive and well suited for interacting with humans.

"The kind of stuff you see with the Macintosh will become even more beautiful, even more snappy with a more graphically orientated interface with feedback in full living color," he said.

But to fully exploit the chips, there is a need for more sophisticated interfacing protocols than that "provided by the de facto standards currently in vogue," he said.

The new chips support the implementation of CGI, said Vanderschel, and Nova is developing an implementation of it which will run on boards built around the chips. The company has been negotiating OEM deals with board manufacturers to sell them firmware that implements CGI.

Such a use requires the tailoring of micro-code to the capabilities, requirements and intended uses of each particular board. But progress has been slow, and Vanderschel said no deals have been finalized.

Number Nine, the Cambridge, Mass., board maker, has already displayed what it calls its Pepper Graphics System, a graphics board using the Intel 82786 chip.

"Pepper will be a major breakthrough in business graphics. The whole issue of what is the standard will be raised again," said company President Andrew Najda. "Pepper will make EGA show its age."

The board, unveiled at the National Computer Graphics Association show, in Anaheim, Calif. this past May, has a resolution of 640 by 480 pixels, with 8 bits per pixel creating 64 simultaneous colors from a palette of 256.

Making Compatibility a Snap

To make it easier for software developers to write to the board, Number Nine created what it calls the Number Nine Interrupt Operating Shell, NNIOS, a resolution-independent interface and development tool kit that allows software compatibility across all of the firms' product line.

"It would take software developers months to write to the Intel; writing to NNIOS is straightforward and easy," said Edward McNierney, manager of software development.

He predicted the EGA will become an entry-level board once Number Nine and its competitors begin mass production of boards based on the new graphics chips.

Production should begin early next year, with boards using both Intel's 82786 and Texas Instruments' TMS34010 GSP chips hitting the market just as "people realize that the EGA isn't anything super-fancy."

The boards should also cut down the price of getting into high-resolution graphics, said McNierney, although expensive high-resolution color monitors will be needed to take full advantage of their capabilities.

Nonetheless, they should be particularly popular in the emerging desktop-publishing field. Pepper has a 32-by-16-pixel character cell for crisp, sharp text.

Initially, graphics software packages like Autodesk's AutoCAD, T&W's VersaCAD, Microsoft's Windows and Digital Research's GEM, along with subroutine libraries like Dr. Halo, from Media Cybernetics, will run on the board, said McNierney.

(Continued on Page 96)

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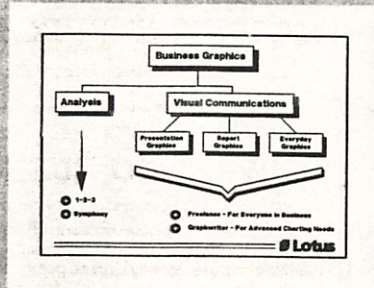
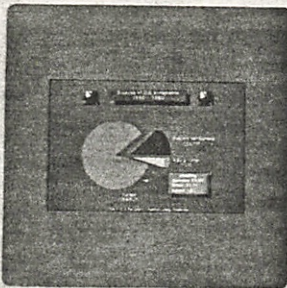
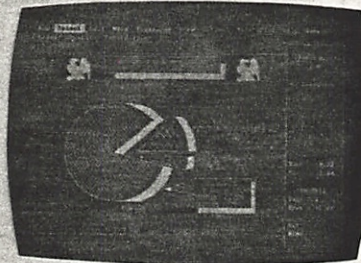
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Intel, TI Chips

(Continued from Page 93)

"The machines are complex and it will take people a while to learn how to use them effectively," he said.

Once people begin to experiment and play with the new boards, realize their power and capabilities, a new horizon for software will evolve that will help spur sales, he added.

AST, the Irvine, Calif., board maker, ex-

pects to be producing boards using both chips and the DGIS standard by next spring, said Bret Berg, graphics product specialist.

Since a software developer can access routines in hardware with the new chips, which will lead to significant increases in performance, he said the "door will open for a standard software interface." Among those he preferred are GSS's DGIS, Microsoft's Windows and the ANSI defined CGI.

In the past, standards have evolved based

on sales, but Berg said board-level manufacturers have to band together, preferably adopting DGIS, and provide a common interface on the display adapter.

"At that point, software developers will have a tool they can work with and they can write to DGIS with the AST display adapter," he said. "They can port software to DGIS and take full advantage of what the chip has to offer."

In turn, developers "will find a dramatic increase in the performance of their software," he said. ■

Graphics Chip

(Continued from Page 91)

control over variables," said TI's Guttag. "GSP can display text of any complexity and it can be programmed to interpret data structure any way the user wants."

Control over variables also means flexibility and diversity. He predicts that boards using TI's chips will provide the total solution to a variety of needs—from those of the office secretary on up to the manager and the engineer. "One graphics board for different needs," he said, citing TI's credo.

Furthermore, Guttag predicts a migration of high-quality electronic publishing and computer-aided design to the PC. Software developers will be able to migrate most of an application package, if not the entire application, to the chip.

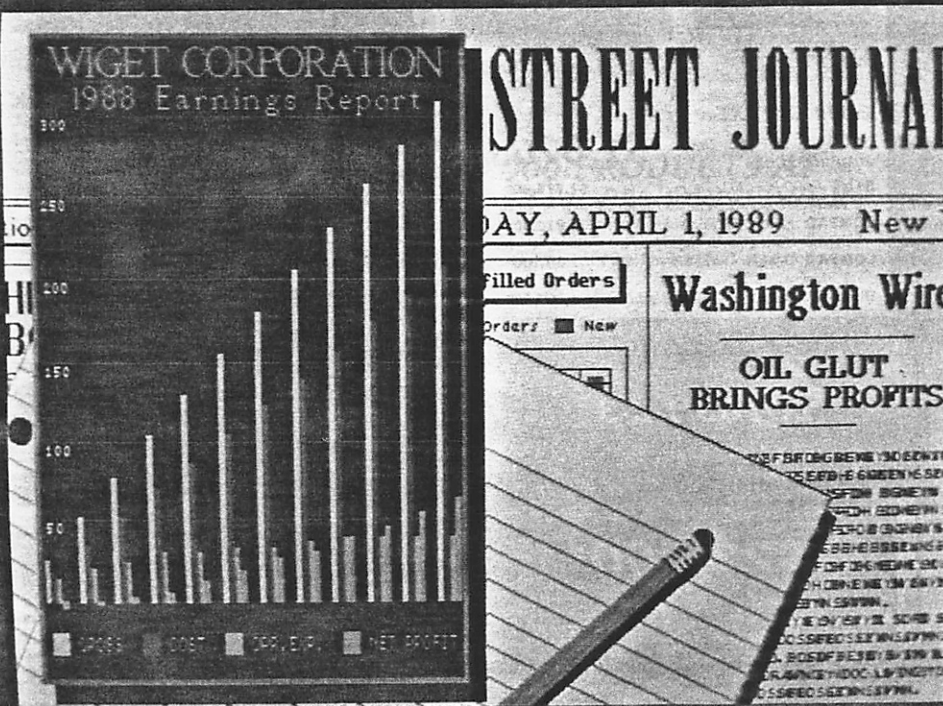
Four Ways to Use It

The chip will find uses in four categories, said Guttag. First will be users who want to migrate high-quality graphics software downward to enable it to run on boards costing between \$500 and \$1,000.

Second, people will use the chip for specific applications; for example, to compress data prior to facsimile transmission. A third area will be in the page-printer market, in thermal-dye transfer, and in LED, electrostatic and laser printers in which the GSP would act as the host CPU.

Lastly, Guttag anticipates the chip will be used as a stand-alone host CPU in a PC. "A GSP-based board has more power, by several times, than a Macintosh with higher resolution," he said.

What this all means to users, he summed up, is the ability to do anything on a computer screen that they do on paper. ■



ACTUAL UNRETOUCHED CRT DISPLAY

WHO WANTS YESTERDAY'S PAPERS?

How long has it been since you actually used your computer paint program? Have you used it for more than a couple of hours? Is it just taking up space on your hard disk or stashed away with your other unused diskettes? How many times have you read the "hype" or watched a slick demo on a new or improved paint program and paid good money for it only to find that it fell far short of your expectations and nothing like the manufacturer's promises? At RIX Softworks, Inc. we think it's time for a change and EGA PAINT™ is our answer!

You see, those other programs were originally made years ago for systems which were far more limited in their functions and display capacity than today's computers. Since then, other paint programs have simply been patched to try to keep up with the rapid growth in computer capabilities. Also, more advancements have been made in professional drafting (CAD), spread-sheet and chartmaking software whose every feature can be utilized with our EGA PAINT™!

Yes, EGA PAINT™ is a COMPLETE toolkit for your drawing and graphics needs. Whether you are a computer artist or a businessman who has never drawn anything but doodles on a notepad, if you're looking for the best presentation possible, EGA PAINT™ is your answer!

EGA PAINT™ was created specifically for users of the IBM™ Enhanced Graphics Adapter (or compatible). EGA PAINT™ takes full advantage of every feature of the new EGA Standard offer in an extremely easy to use format. (As a matter of fact, the illustration you see above was created from a captured Lotus™ screen before the user ever saw our manual!) Anyone from 6 to 60 can make dramatic, high-impact, colorful freehand graphics, flow charts, graphs, ad layouts, bar or PERT charts, schematics, etc. The only limitation is your imagination.

Why is EGA PAINT™ so effective for such a widely diverse group of users? The answer is simple, we made it that way! We knew we had to include the features users had grown to expect in standard paint programs and then take a big step forward to make EGA PAINT™ easier to use and utilize the full capabilities of the EGA color adapter. We kept you in mind when we priced EGA PAINT™ tool. With all the standard features we include, our price is 50 to 75 percent LESS than the others.

Here are a few of the standard features all of which are included in our special introductory EGA PAINT™ package:

EGA PAINT™

Full screen editing with Pop-up Menus (NO ICONS!); Enhanced Brush Control lets you change colors, patterns, widths, shapes and do palette mixing DURING editing WITHOUT losing your position; Enhanced Zoom gives you 4 to 8 times magnification AND a movable window for precise editing; Special Image manipulation lets you move, copy, tilt, rotate, enlarge or reduce sizes, save or load images anywhere you like; Fill and Pour any area you choose with any of 64 colors; Save your screens and with the Small command in up to 90% LESS disk space; and much, much more.

EGA TEXT

Choose from over 31 contemporary fonts ranging from 9 to 72 points in size, place them anywhere you wish on the screen and in any color. Stretch or reduce them to fit; change spacing; make it light, bold, extra bold, proportional, italic, underlined, etc.

EGA CAPTR

Capture any screen from just about any other program (Lotus™, Auto Cad™, MS Chart™, Windows™, etc.) and then use the EGA PAINT™ tools to edit, manipulate, add text, and enhance the color of the captured screen!

EGA PRINT™

Contains drivers for most PC compatible dot-matrix printers as well as the Okimate 20™, Epson iX20™ and the IBM Color-jet™ color printers and most Laser printers.

EGA SLIDE™

A complete slideshow program lets you display as many screens as you want, in any sequence and for any length of time! Over nine different exciting dissolves can be used for that "pro" touch!

ALL THIS AND MORE FOR THE SPECIAL INTRODUCTORY PRICE

ONLY \$79.00

(PLUS \$5.00 SHIPPING & HANDLING)

Put the POWER of EGA PAINT™ in your computer TODAY!

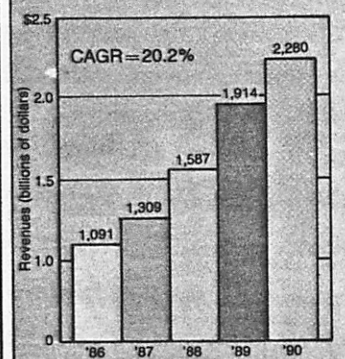
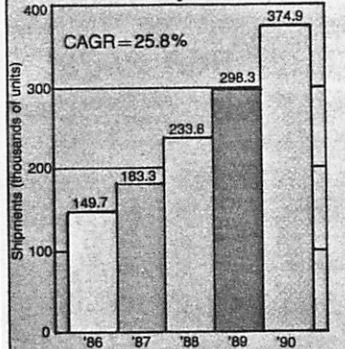


RIX SoftWorks Inc.

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EGA PAINT™ requires 384k of system memory and an IBM™ or compatible computer. A mouse is also recommended but not essential. Either a Microsoft™, Mouse Systems™, or compatible is required if you use a mouse.

Graphic Terminals Sales Projected to Rise With Availability of New Chips



*CAGR = Compound Annual Growth Rate
Source: Dataquest

OTHER PRODUCTS FROM RIX

- EGA 1-2-3 - \$39.00
 - * Drivers for Lotus 1-2-3
 - * 50% larger viewing area
 - * Hi-Res Print Screen
- EGA GRAPH - \$49.00
 - * Subroutines for Hi-Res graphics for BASIC and Pascal
 - * Supports Turbo Pascal
- EGA UTIL - \$49.00
 - * 35 & 43 line text mode
 - * Palette adjust
 - * User defined character set

CALL US NOW

1 (800) 854-0561 Ext. 878

(outside California)

1 (800) 432-7257 Ext. 878

(in California)

Visa & Master Card accepted

TECHNOLOGY UPDATE

for the system is in document imaging systems. The display memory can hold the equivalent of as many as eight 8½×11-in. digitized draw-

ings or documents. The standard board has 2M bytes of display memory; you can expand the memory to a maximum of 8M bytes.

The 82786's dynamic-RAM-control capabilities were the deciding factor in Vista's choice of a graphics engine because the company wanted

REPRESENTATIVE PC ADD-IN, GRAPHICS-ENGINE-BASED BOARDS

MANUFACTURER	MODEL	GRAPHICS ENGINE	ONBOARD MEMORY (BYTES)	RESOLUTION (BITS)	BUS	INTERFACE SUPPORT	PRICE AND COMMENTS
EMULEX	INTELLIGENT GRAPHICS CONTROLLER	34010	512k TO 4M	640×480×4, 960×720×4, 1024×768×4, 1024×1024×8, 1280×1024×8	PC/XT OR PCI/AT	C, D, W	\$1499 TO \$2499; PRICE DEPENDS ON RESOLUTION
INTERNATIONAL SOFTWARE	VIEWMATE	82786	2M TO 5M	1240×950×1	PC/XT OR PCI/AT	W	\$5400
MATROX	PG-1281	34010	512k TO 1.5M	1280×1024×4, 1280×1024×8	PC/XT OR PCI/AT	C, CGI, E, G, M, P	\$3495; EGA IS OPTIONAL
NATIONAL DESIGN	GENESIS 1024	34010	512k TO 1.5M	1024×800×4	PC/XT OR PCI/AT	CGI, D, W	\$1700; FOR 1.5M- BYTE MEMORY, ADD \$600
NUMBER NINE	PEPPER SGT	34010 AND 82786	1M TO 4M	1280×480×4, 640×480×8, 800×600×4, 1280×350×1	PC/XT OR PCI/AT	C, CGI, E, G, H, N	\$995; EGA IS OPTIONAL
	PEPPER PRO 1280	34010	1M TO 8M	1280×1024×8	PCI/AT OR RT PC	C, CGI, E, G, H, N, P	\$2995
RENAISSANCE GRX	RENDITION I	34010	512k	640×480×4, 1024×768×1	PC/XT OR PCI/AT	C, CGI, E	\$1195
TEKTRONIX	PLOT 10 PC4100	34010	1M	640×480×8	PC/XT OR PCI/AT	C, E, T	\$1800; FOR TERMINAL EMU- LATION, ADD \$995
UNIVISION	UDC-600	82786	3M	1024×1024×8, 1280×1024×8, 1024×1280×8, 1536×1280×8, 2048×1536×8	PCI/AT	W	\$3495 TO \$6995; PRICE DEPENDS ON RESOLUTION
VECTRIX	PRESTO	34010	512k	1280×1024×4, 1280×1024×8, 1024×1024×4, 1024×1024×8, 1024×768×4, 1024×768×8	PC/XT OR PCI/AT	C, D	\$1950 TO \$2650; PRICE DEPENDS ON RESOLUTION
VERMONT MICRO SYSTEMS	PAGEMANAGER 100	82786	512k	1024×1024×1	PC/XT, PCI/AT, OR RT PC	C, G, W	\$2495
	IMAGE MANAGER 640	34010	512k	640×480×8	PC/XT, PCI/AT, OR RT PC	C, W	\$1695
VERTICOM	DESKTOP 1280	82786	512k	1280×960×1	PC/XT OR PCI/AT	C, E, G, P, W	\$1295
VISTA	VCS-2000	82786	1M TO 8M	1728×2200×1	PCI/AT	W	\$3400 TO \$5000; PRICE DEPENDS ON MEMORY SIZE AND IN- CLUDES DATA COMPRES- SION/DECOM- PRESSION CAPABILITY

KEY:

C=COMPUTER GRAPHICS ADAPTER
 CGI=COMPUTER GRAPHICS INTERFACE
 D=DIRECT GRAPHICS INTERFACE SPECIFICATION
 E=ENHANCED GRAPHICS ADAPTER
 G=GEM
 H=HALO

M=MATROX ENHANCED
 N=NNIOS
 P=PROFESSIONAL GRAPHICS ADAPTER
 T=TEKTRONIX
 W=MS WINDOWS