

Aurora Area Apple Core Inc. Newsletter

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The Aurora Area Apple Core Inc. (AAAC) meets on the Second Thursday of each month at 7:00 P.M. in the basement of the former Suburban Bank Building, in the NorthGate Shopping Plaza (900 North Lake Street), on Route 31, Aurora. Membership is open to all persons interested in the Apple Computers and in developing their use through the exchange of ideas and information. The public is cordially invited and bring a friend. If you have any questions about the club or programs, please phone one of our officers, listed above, at a reasonable time. This newsletter is copyrighted and published monthly by the AAAC Inc.. Reproduction in whole or part is prohibited unless proper credit is given to the author of the publication. Opinions expressed herein are not necessarily those of the AAAC Inc., which assumes no liability for articles herein.

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NOTE: WE HAVE A NEW WEB ADDRESS!!! SEE ABOVE.

You can also visit our affiliated clubs web page through a link from our own clubs page. Look for the APPLEeachian link, you'll like it!

What's On Tap This Month?

This month is our annual Holiday Party. This year we will be meeting at the Pizza Hut just a block south of our regular meeting place at the corner of Lake and Illinois, reservations are at 7PM. Because of financial restraints this years party will be "Dutch Treat" (pay your own way).

What Happened Last Month!

Last month we discussed increasing the clubs dues to \$25 per year to cover our rising newsletter expenses. A vote will be taken this month at the annual holiday party. We also reinstated our club officers with the exception of the club secretary. We are currently looking for volunteers for that position. We also made our plans for next year's programs. They are...

Jan. Clones/Legalities - Feb. Publishing - Mar. Video Capturing - Apr. OCR/Scanners - May Lyle's presentation held in Rockford - Jun. Appleworks - Sept. TBA - Oct. Lost Classics - Nov. Planning for 2004 - Dec. Annual Party

We also welcomed a new member, Greg Martin from Batavia. He brought in an Apple clone and we outfitted him with a disk drive and monitor for his machine.

A2 NEWS AND NOTES

A2 News and Notes

November 2002

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- * Emulator update
- * End of an era
- * Juiced.GS issue in December
- * Magazine Merger

- Kent Dickey has announced that the Apple IIGS emulator KEGS has been upgraded to version 0.71 and may be downloaded at:
<http://kegs.sourceforge.net/>

KEGS is an Apple //GS emulator for Mac OS X, Win32, and almost any Unix/Linux machine. Different versions for these operating systems may be found at the website.

- After 24 years of supplying hardware and software to the Apple and Macintosh community, Shreve Systems will be closing out their computer division and focusing efforts into their sister company, Shreve Audio. Shreve System has enlisted the professional services of Remarketing Associates <<http://www.remarketingassociates.com/>> and will be conducting a public auction to liquidate all of our remaining inventory. This auction will be held Dec. 13 2002 at their warehouse in Shreveport, La.

- Juiced.GS editor Ryan Suenaga has announced that the next issue of the Apple II world's only remaining print magazine is due out in December. Ryan has had a long talk with the magazine's printers and no issues should be delivered to subscribers with mis-printed pages.

- Apple PugetSound Program library Exchange (A.P.P.L.E.) has announced that the Call-A.P.P.L.E. online magazine is merging with the online publication Digital Civilization. The goal is to create a larger magazine with broader coverage for

more computer platform types. In addition, beginning with the December 2002 issue of Call-A.P.P.L.E., the magazine will be available on CD-ROM. More information can be found on the group's website: <http://www.callapple.org>

* Sign Off

A2 News and Notes is produced with real or emulated Apple II computers using AppleWorks 5.1. Apple II Forever!

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APPLE II HISTORY

CONTINUES:

From the Web site: apple2history.org

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APPLE II HISTORY

APPLE II HISTORY

Compiled and written by Steven Weyhrich
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(PART 13 -- PERIPHERALS, CONT)

[v1.0 :: 31 Dec 91]

MODEMS

A modem is a unique peripheral device, because it makes use of two-way communication (both sending and receiving data to and from the computer). After the Apple Box sold by A.P.P.L.E., one of the first commercial modems available for the Apple II was the Micromodem II, made by D.C. Hayes in 1979. It sold for \$379, and worked at the standard transmission speeds of the day, 110 and 300 baud. The Micromodem was also available for the S-100 (Altair) series of computers. Hayes' product was so popular that their command set has become a standard for modems as they have advanced over the years.

By the mid-1980's Apple released two modems with their own name on them: The Apple Personal Modem 300 and Personal Modem 1200. Both were external modems, using a direct connection to the phone line (instead of the older acoustic coupler), but were more expensive than similar products of the time. By the later 1980's they were no longer in production.

INPUT DEVICES

The number one input device for the Apple II was, of course, the keyboard. There were expanded keyboards available for the II and II Plus, bypassing the uppercase-only limit. There was once even a keyboard that had plug-in modules that would redefine specialized function keys to make them specific for different programs. Another company sold pressure sensitive pads that were attached to the Apple II keyboard above the top row and could be programmed to generate series of keypresses. The original IIe had a socket for the addition of an external numeric keypad, and the IIGS and later versions of the IIe had this keypad built-in. Because of the detached keyboard in the IIGS it was possible to select between a couple of different versions of keyboards offered by Apple as well as from some third party companies.

The next most commonly used input device after the keyboard was the set of game paddles included with every II and II Plus. But some users needed more specialized ways to input data to the computer. A large number of interesting input devices were made available through the years; here follows a brief description of some of them.

Creating pictures on the hi-res graphics screen has always been a challenge, from 1977 until today. Using the game paddles or a joystick is one method that could be used, but there is some difficulty in getting accurate lines and curves. Apple addressed this problem when they released the Apple Graphics Tablet in the

late 1970's, which sold for about \$650. This was a large flat surface, about thirty inches square, with a grid printed on the surface. Using a stylus attached to a wire leading to the tablet, and appropriate software, this could be used to draw pictures on the Apple II hi-res screen. There were two different releases of the Apple Graphics Tablet. The original one, which was released when the II Plus was the latest machine, was discontinued by FCC order because of RFI (radio frequency interference) problems. The second version, to correct that problem, was released after the IIe was in production. It used two DB-9 connectors to install on the backplate of the computer, leading to the peripheral card plugged into a slot inside. (These DB-9 connectors are the same type used on the back of the IIc and IIGS for connection of a joystick). Currently the Apple Graphics Tablet is not in production.<1>

Koala Technologies has made several input devices over the years. Their first product was the Koala Pad. Released in 1983 and selling originally for \$125, this was a small graphics pad (about 8x6 inches) that plugged into the game I/O socket. It was compatible with any software that used a joystick. Using a finger or the supplied stylus, a user could draw on the pad and produce pictures on the hi-res screen with the supplied software or with some other software packages

In November 1984 Koala released Muppet Learning Keys for \$79.95. This was a device to aid preschoolers in using a computer. It was intended to help children ages three and over to learn letters, numbers, and colors, using the Muppets from Sesame Street as a learning aid. The unit used various contact surfaces to send user responses to the computer, and it attached to the Apple II via the game I/O port.<2>

The Gipson Light Pen System was also sold by Koala Technologies in 1985 for \$350. Using a card in slot 7, this device used a special pen that allowed drawing directly on the computer's monitor screen.

Other devices have been released to aid in graphics manipulation on the Apple II. The Computer Colorworks released the Digital Paintbrush System in 1984 for \$299. It worked on either the II Plus or IIe, and used a stylus attached by two thin dacron lines to potentiometers within the tablet, which tracked the position of the stylus. Movements of the stylus (tracing over a picture) were translated into drawings on the hi-res screen. The software included allowed creation of curves and lines, and used Fontrix fonts for lettering. (Fontrix was a program that could produce detailed hi-res graphics pictures, and had many characters styles, or fonts, available to label those pictures). A unique feature of the Digital Paintbrush was the ability to connect two computers using the system via a modem and phone line and allow both users to draw pictures that would appear on both computers simultaneously.<3>

The input device that made the most inroads in the Apple II world was the one that was so unique to the Macintosh: The AppleMouse II. It was released in May 1984 with a program called MousePaint (similar to the MacPaint program that came with the original Macintosh). The AppleMouse came with a peripheral card to plug into a slot on the IIe or II Plus; on the IIc it just plugged into the joystick port and the built-in hardware and firmware could handle control of the mouse. MousePaint used the standard hi-res graphics screen and worked only under the ProDOS operating system, but generally gave Apple II users the capability of doing graphics in the same way as Macintosh users had been enjoying, as well as making it possible to design programs that used the mouse as a pointing and input control device.

ComputerEyes was a video acquisition system that came out in July 1984. It allowed use of a video camera to capture images and store them on the hi-res graphics page. It was a slow-scan device that attached to the Apple game I/O socket, and produced black-and-white images in about five seconds. It worked on any Apple II with 48K, Applesoft, and DOS 3.3. Made by Digital Vision, Inc., it originally sold for \$129.95 (\$349.95 including the video camera).<4>

MUSIC AND VOICE SYNTHESIS

Apple II's have been involved in sound from the beginning, with the inclusion by Steve Wozniak of a speaker so he could make sounds for an Apple II version of "Breakout". As simple as it was, some enterprising programmers have even managed to make this single-voice speaker sound like two and even three different voices (tones) simultaneously ("Electronic Duet" comes to mind). But that was not enough for those who wanted to have better quality music production, and so production of synthesizer cards was in full swing by the early 1980's. Some of those cards included the following:

ALF Music Card (ALF Products, Inc.) was strictly a music synthesizer, with some included software to aid in producing the music. The Mountain Music System (Mountain Computer, Inc.) was a more advanced sixteen oscillator (voice) digital synthesizer, also with software to control it. Soundchaser System (Passport Designs, Inc.) was a package that included the Mountain Music System (using slots 4 and 5), plus the Soundchaser, which was a piano-style keyboard for music input, whose card went in slot 7. It allowed four track recording and sound manipulation, using the Apple II primarily as a controller. This was probably the most advanced music hardware system available in the days before the release of the IIGS.

The Drum-Key (made by PVI) was specifically a percussion synthesizer. It required an external amplifier and used included software to produce a wide variety of drum and other percussion sounds.<5>

Beginning in the late 1970's there were several speech synthesizers available for the Apple and other home computers. One brand was the TextTalker, and another (made by Mountain Hardware for \$279) was the Supertalker. In the 1980's two other popular brands were the Echo II (slot-based) and Cricket (for the modem port on the IIc) synthesizers, made by Street Electronics. These latter also included the ability to produce other sound effects, and some games released at the time had enhanced sound output when the presence of those two devices was detected. For speech reproduction, these devices usually used a method of accepting ASCII text from the computer in the form of "phonemes" to describe and produce voice through a built-in speaker. The phonemes were needed because English words have a variety of pronunciation depending on the context in which they are used. Properly programmed, the voice synthesizers could pronounce the word "root" to rhyme with either "boot" or "foot". It wasn't until the IIGS came out with the built-in capability of speech reproduction (via the Ensoniq chip) that software making use of that feature became available in any quantity.

ROBOTS AND DEVICE CONTROL

Although used primarily for education purposes, there were at least two robotic devices made to work with the Apple II. TOPO (made by Androbot, Inc.), and the Tasman Turtle (\$1000, with a smaller version called the Tot for \$300) were in use during the mid-1980's. Both used the Logo language to control movement of the robot on the floor. Logo has a graphics command set called "turtle" graphics to simplify the concept for children. A small triangle on the hi-res screen was called a "turtle", and it could be given software commands to move forward, turn, draw, or move without drawing. When TOPO or the Tasman Turtle were connected to an Apple II, the Logo language could be configured to send the same turtle graphics commands to the physical "turtle" robot on the floor. This gave students a concrete example of what their logo programs would do in "drawing" a graphics picture.

Education is not the only place where robotics has been used in an Apple II. Because of peripheral boards called "A/D Converters" (analog/digital converters), it is possible to take information from (for example) a wind speed sensor and convert it into digital information. A computer program can then take this information and send a command signal back to another device (perhaps to activate a motor that raises and lowers a cloth deck cover, depending on how windy it is). Although not a "robot" in the sense that people usually view robots, a computer-controlled device of any kind is, strictly speaking, a robot. This is the concept used in the popular X-10 system used in home control. (The Inrol/X-10 made by Mountain Hardware for \$279 was one of the first available for the Apple II). This protocol for controlling electric devices in a home has been used for

years, and programs exist for the Apple II series (including the IIc) that allow easier programming of the X-10 devices, ranging from security systems to light timers to lawn sprinkler systems.

MISCELLANEOUS HARDWARE

Here follows a short list of some other items that could be found for sale in a typical issue of an Apple computer magazine in the early 1980's:

Larger capacity disk drives were made by Lobo Drives, including an 8 inch floppy drive and other various higher density floppy disks.<6>

Hard disks, such as those made by Corvus Systems. You could get a massive 10 MB for only \$5,350 (well, it was massive compared to the 143K DOS 3.3 floppy disks).

Clocks, such as the Apple Clock made by Mountain Hardware, for \$199. A clock made it possible to time and date stamp files, and identify which version of a file was the most recent.

RESET Key Protector, which prevented accidental RESET on early Apple II's, was available for only \$3.25 from Special Systems Design.

DoubleDOS Plus was a Disk II interface card modification that had a switch to allow the user to easily switch between DOS 3.2 and DOS 3.3. It sold for \$39, by Tymac.<6>,<7>

PRINTERS

By the late 1970's and early 1980's many printers were available for use with home computers. However, the cost was often over \$1,000, which limited the number of people who could afford to buy one. Most printers offered 96 characters in the standard ASCII set, including both upper and lowercase characters. The cheaper printers could only print uppercase characters, while some of the more expensive ones were capable of accepting programmable characters or had built-in graphics characters.

There were two main types of printers available. One type operated like a typewriter by striking a piece of metal type against a ribbon and onto the paper. This type of printer was often called an "impact" or "letter quality" printer. It used either a type ball like IBM's Selectric typewriters, or a wheel with spokes that radiated out from the center, with the type characters at the end of the spokes. This latter type of letter quality printer was also called a "daisy wheel" printer, because the changeable print wheels looked something like a daisy. These printers were most commonly used by computers in businesses, as they often cost more than \$2,000 and were beyond the reach of the average home hobbyist.

The other type of printer in common use was dot matrix. These less expensive printers formed characters with a series of pins in a vertical row that struck the ribbon and produced dots on the paper. As the print head moved across the paper, the dots were printed in patterns that resembled (sometimes vaguely) letters and numbers. The matrix used to form a character was usually referred to as the number of horizontal dots by the number of vertical dots. A 5x7 matrix, for example, used up to five dots across and up to seven dots down. Some printers (like some computers of the time) did not use "descenders" on the lowercase letters that drop below the baseline ("g", "j", "p", "q", and "y"). To print lowercase letters with descenders often required nine or more vertical pins.

The Centronics 730 may well have been the first "standard" printer for the Apple II (as well as for many other microcomputers). It used a parallel cable whose pin layout went on to also become a standard for use with personal computers. That pin layout on parallel cable plugs is still in use today in 1991.<8> Centronics also had several other models, including the 737 and 739. A less expensive printer made by Centronics, the 779, used 5x7 dot matrix characters, and could print in sizes from 10 to 16.5 cpi (characters per inch), ranging from 60 cps (characters per second) at 10 cpi to 100 cps at 16.5 cpi. It also had a one-line buffer (which held up to 132 characters), but printed a limited 64 character ASCII set, all uppercase plus some special characters. As mentioned before, most personal computers of the time didn't have lowercase anyway, so this limitation wasn't necessarily a drawback. The better printers made by Centronics had a larger matrix and could produce true descenders on lowercase characters.<9>,<10>

A company named Trendcom made two printers that were significant in the history of the Apple II. They had two models, the 100 and the 200. Instead of using the mechanics solenoids that drove pins in a print head, these were thermal printers that needed a special heat-sensitive paper. Their operation was very quiet, about as loud as sliding your finger across a piece of paper. They were inexpensive compared to other printers of the day (most of which cost over \$1,000), although the printing looked very much like that produced by a dot-matrix printer. The Trendcom Model 100 printed 40 characters per line on paper that was about 4 1/2 inches wide. The Model 200 could print 80 columns per line on paper 8 1/2 inches wide. Compared to the first printer offered by Radio Shack for their TRS-80 computer (which was also a thermal printer but used an ugly silver paper), the Trendcom printers were very nice.

The significance of the Trendcom printer was that Apple chose it as the first printer they released under the Apple name. It could be programmed to control printing of each dot in a column, and so was ideal as an inexpensive means of printing Apple II hi-res graphics. Apple included a special interface card and

released the printer as the "Apple Silentype" in June 1979 for \$599. It was identical to Trendcom's Model 200 except for the Apple logo in the lower left corner of the front cover.<11> One legend suggests that part of the popularity of this printer at Apple stemmed from the fact that its small size allowed it to fit under the seat of Steve Wozniak's private airplane.<7>,<12>,<13>

Epson was another company that began early in the business of supplying printers for personal computers, and is one of the few that survives to this day. It got its start in the printer business with the Epson MX-80, one of the first dot matrix printers that sold for less than \$1,000. Popular with computer hobbyists of the time, it was capable of printing Apple II hi-res graphics with the optional Graphtrax ROMs. A later version of this printer, the Epson MX-100, became available in early 1982. The MX-100 was a wide carriage model, and could print hi-res graphics without the need to add any special hardware. Epson printers were unique because they had a special feature called a "double print" mode where a line was printed normally, then the paper was advanced 1/216 of an inch and the same line printed again. This filled in some gaps between dots on individual letters, and made printouts more pleasing to the eye. Another feature used in these printers was a "print enhancement" mode, in which the pins hit the ribbon harder and made it possible to make multiple copies using carbons.<10>,<14>

Integral Data Systems was also an early manufacturer of printers. Their IDS 125 and IDS 225 printers came out in 1979 (the 225 sold for around \$900).<15> These printers used a 7x7 matrix for creating characters. The IDS 125 used a pressure feed method (similar to the method used by typewriters to hold paper in place), while the IDS 225 used a tractor feed mechanism. The IDS printers had the flexibility of being useable with either parallel or serial interfaces (with serial speeds up to 1200 baud). It could do plotting of dot graphics, and also had an optional graphics character set built-in.<16>

By the late 1970's Integral Data Systems upgraded their printers, giving them more capabilities and flashier names. Their Paper Tiger line of printers (models 440 and 460) had an attractive typeface, and used two vertical rows of pins in the print head, slightly offset from each other. This produced overlapping dots to achieve a more solid appearance. Some models could print up to 160 cps, and of course upper and lowercase characters were supported. They were also capable of reproducing Apple II hi-res graphics (with the appropriate software). IDS also sold a printer called the Prism, which could print in color using a special multicolored ribbon.<17>

Other early printers were made by Anadex, MPI, and Microtek.

APPLE'S PRINTERS

After the Silentype printer was released in 1979, Apple looked for another printer that would produce better, more permanent output than could be achieved

with a thermal printer. One of the main problems with thermal paper was that with time the printing could fade, especially if cellophane tape was used on the paper. The Apple Dot Matrix Printer was released in October 1982 for \$699. Made from a modified C. Itoh printer, it was one of the first few dot-matrix printers that sold for under \$1,000. Apple needed it as a better quality printer than the Silentype to help promote the Apple III as a business computer. More importantly, it was chosen by Apple because it was capable of doing heavy-duty graphics reproduction (such as output from the Apple Lisa computer, still in development at that time). Known also as the Apple DMP, it used a custom ROM programmed by Apple to control the printer's features.<18>

Because Apple was looking for as many business solutions for its customers as it could find, they also announced at the same time as the DMP a daisy wheel printer called the Apple Letter Quality Printer. Costing a hefty \$2,195, and made from a modified Qume brand printer, this printer could print at a blazing 40 cps, but did produce very good quality output. It was released with the Lisa and Ile in January 1983.<18>,<19>

The Apple ImageWriter was released in December 1983 as the successor to the Apple DMP. Also made by C. Itoh, it had a faster print speed (120 cps), and could print in eight different pitches (character widths). It was a very reliable, sturdy printer, and sold originally for \$675. Later, a wide carriage version whose abilities were otherwise identical was made available. It was replaced by the ImageWriter II in September 1985. The original Apple DMP and the ImageWriter I came in the same beige color as the Apple II, II Plus, and Ile. The ImageWriter II was the same platinum color as the Apple IIGS and the newer Macintosh computers. Styled a little differently, the ImageWriter II could do everything the original ImageWriter could do, plus it was capable of printing MouseText characters and could print in color (using a special multicolored ribbon).<19>,<20>

As part of its promotion of the Apple IIc, a new printer was released. The Apple Scribe came in the same "Snow White" color as the IIc and was low in cost at \$299. It was a thermal printer, but was a significant advancement over the old Silentype. It could print on regular paper (instead of special heat sensitive paper), and could print in four colors. It could do this using a unique heat-transfer method and a wax-impregnated ribbon. It could print in a "near letter quality" mode (with overlapping dots) at 50 cps, and a draft and graphics mode (80 cps). Its major limitation, however, was a print quality that overall was often not as good as some dot-matrix printers, and a ribbon that was expensive and needed to be replaced too often. The Scribe was eventually discontinued due to these problems and low sales.<19>

In 1984 Hewlett-Packard introduced the LaserJet laser printer. This was a significant breakthrough in printer quality, and was capable of producing documents that looked professionally typeset. Apple decided to develop its own laser printer, and in January of 1985 released the LaserWriter. Although not speedy printers (with best output at four pages a minute by 1991), and very expensive (over \$2,000), they were popular with those who wanted high quality printing. At Apple, the new LaserWriter was supported only on the Macintosh, but since the printer did its work through a page description language called "PostScript", it was entirely possible for an Apple II to print on a laser printer. It was only necessary to learn the PostScript language, create a file that gave the necessary commands, and send that file to the printer through a serial interface card. Don Lancaster, long-time Apple II supporter and hacker, wrote a series of articles called "Ask The Guru" in the magazine Computer Shopper, and he gave many examples of using a laser printer with an Apple II.

Unfortunately, to this day the perception still exists that a laser printer will not work with an Apple II, even if it is a IIGS. This is partly because there are few software packages for the Apple II that will produce output as PostScript files that can be properly interpreted on a laser printer. However, programs such as "Publish-It!" will print to a PostScript-capable laser printer even on an Apple IIc. All that needs to be done is to have the right cable to connect the two devices.

One of the newest types of print technology to come to personal computers is known as the ink-jet printer. This type of printer works with a dot-matrix, but does not use pins impacting a ribbon. Rather, it uses a print head that sprays ink through as many as 64 holes in patterns to form characters as moves across the paper. The advantage over dot-matrix impact printers is its ability to form more solid characters. In fact, the quality of printout with an ink-jet printer can be almost as good as that obtained with a laser printer. The advantage over laser printers is cost. Where the best price for a laser printer in 1991 is still well over \$1,500, the cost of ink-jet printers is getting as low as \$500, and for some brands down to \$300. The disadvantage for Apple II users? Although it is easy to get the printers to reproduce text, printing graphics to work may be difficult until Apple II software packages directly support those printers. Fortunately, most of these printers will emulate some brands of dot-matrix printers, and if that brand is supported by a software program, then graphics reproduction may be possible.

Apple entered the ink-jet printer market in May 1991 when it released the Apple StyleWriter. A modification of Canon's BubbleJet printer, this printer does excellent reproduction of text and graphics--on a Macintosh. Unfortunately, Apple didn't see fit to release drivers (programs to control hardware) to make it possible to use this printer on the IIGS or IIe. It does make use of a new font (typeface) technology called TrueType, which makes it possible to have a single font that can

be made any size under software control (instead of having a separate font for each size that you might want to print). It was not until early 1992 when a program called Pointless was made available for the IIGS (not from Apple) that TrueType could be used on that computer.

Although not quite a printer, the Apple Color Plotter was released in June of 1984. It had an advantage over printers, in that it could draw smooth lines and curves. Using four colored pens in a rotating pen head, and selecting them at the computer's command, the Color Plotter worked by moving the paper up and down to draw vertical lines, and the pen left and right to draw horizontal lines. Control of the plotter was accomplished by sending text commands through a serial card, and consisted of two letter commands (DA = Draw Absolute, DR = Draw Relative, etc.) followed by parameters. It could move the pen without drawing, plot points, draw lines, arcs, and circles, and print text at any location, tilt, rotation, or scale. Lines could be drawn as solid or as patterns of dots.

Presumably this product did not take off because of the limited need for this type of graphics, and the price. Today, although the quality of screen and printer graphics is greatly improved over what was available in 1984, a plotter can still be useful in some situations. Usually, however, the right software can reproduce drawings with a dot matrix or laser printer in as good or better detail than a plotter can.<21>

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NEXT INSTALLMENT DOS
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<20> -----. "The Marketplace", Call-A.P.P.L.E., Nov 1985, p. 50.
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Report on the Computer Show:

The Computer Show this month at the College of DuPage is on December 21st, a great time and place to do your last minute Holiday Shopping! If you can help, please contact Howard . Thanks.

Happy Holidays!

Apple II Forever!