TEXAS INSTRUMENTS

The TI Forum

by Ron Albright

We promised it and here it is! Announcing the First Annual Computer Shopper/TI Forum Programming Contest.

The contest will run from now until December 31, 1986, by which time all entries must be postmarked. There are going to be three categories (see below) and an overall winner. The overall winner will not get the prizes for his or her individual category, thus, there will be four sets of prizes awarded. There are going to be very few rules, but I will not list them all here. You will have to write us at *Computer Shopper* for the complete set of rules (please send a SASE if you wish a reply). A few of you will need to be aware of right off the bat are:

1. The program you enter must be entirely your own creation.

2. All submissions must be on disk (I do not have a cassette cable/recorder). If you wish your disk returned, you must send a self-addressed/stamped disk mailer. I am not collecting disks, folks, but there has got to be some logic in this.

3. The program cannot have ever been sold commercially (this includes Fairware, Shareware or whatever) nor can it presently (as of September 1, 1986) exist on any national telecommunication network (including Compupuserve, Source, Delphi, or GEnie).

4. Judges for the contest will be Howie Rosenberg, a gifted Forth programmer, who will judge the Category 3 entries, Jon Zittrain who will judge Category 1, and myself (RA) for Category 2. Decisions of the judges are final and binding.

5. Prizes are subject to change without notice. Some software offered as prizes may have been previously used but is in like-new condition.

6. Unless specified otherwise in your entry form, the programs will be uploaded to Compuserv's TI Forum SIG for public downloading and sharing.

6. We have to insist that for any program, the source code be included on the entry disk. The problem is that it is sometimes difficult to tell what language a program is written (for example, a D/F80 file could be written in c99 or assembly language). We promise that the source codes will be kept in strictest confidence.

Well, now that that is out of the way, here is the (probably incomplete) prize list for the contest. We hope to be able to announce more prizes as we go along, but here is what we have to date.

Overall Winner

1. Two years free subscription to *Computer Shopper*.

2. Years free subscription to *MICROpendium* (courtesy of Laura Burns, Editor, and John Koloen, Publisher).

3. Years free subscription to *Genial's TRAVelER* diskazine (courtesy of the Editor/Publisher, Barry Traver).

4. A copy of the *Orphan Chronicles* (a book written about the history of the TI 99/4a computer).

5. A Compuserve Starter Pak (if a subscriber already, free usage time will be granted in lieu of).

6. If you have access to a modem, an on-line Conference on Compuserve's TI Forum held in your honor and a review of your software in the *Computer Shopper's* TI Forum.

7. If desired, a chance to have your program commercially distributed by Disk-Only Software (a well-known and highly-respected software distributor for IBM as well as TI computers).

8. Copy of Dark Caverns II (donated by Disk Only Software).

Category 1:
BASIC/Extended BASIC

1. One year subscription to *Computer Shopper*.

2. Complete set of 6 *SAM'S Books on the TI*

3. A copy of BASIC TIPS from Amlist.

4. A Copy of the *BEST OF 99ER* (Book from Emerald Valley Publishing).

5. Copy of the Action game/Tutorial NIGHT MISSION (Millers Graphics: on cassette).

6. Copy of JOYPAINT99 (donated by Great Lakes Software, 804 E. Grand River, Howell, MI 48843).

7. Copy of Graphx Pictures (donated by Asgard Software, POB 10306, Rockville, MD 20850).

Category 2—
Assembly

1. One year subscription to *Computer Shopper*.*

2. A complete E/A package with cartridge/manual (for back up).

3. *TI 99/4A Users Handbook* (from Weber Systems, 350 pages).

4. Copy of Advanced Diagnostics (Miller Graphics).

5. Copy of Explorer (Millers Graphics).

6. Copy of Recipe Writer (donated by Asgard Software).

Category 3—
Misc Languages (Forth, c99, Pascal, Pilot, Logo)

1. One year subscription to *Computer Shopper*.*

2. *Forth Fundamentals* (two volume set by McCabe).

3. Complete set of *FORTH NOTES* (4 issues) from the LA Users Group.

4. Copy of *Business Graphs 99* (courtesy of DOS and the author, Mike McCann).

5. Copy of "BRAIN" (DATAX Software).

6. Copy of Stamp Manager (donated by Asgard Software).

*If you are a current subscriber we will add your prize to your subscription.

Anyone interested so far?? For contest rules you must write to: TI Forum, *Computer Shopper*, P.O. Box F, Titusville, Florida 32781.

Enclose a SASE. The rules will be forwarded promptly. After the September issue of the *Computer Shopper* has been published, the rules will be posted on Compuserve's TI

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The Inner Limits

by Glenn Davis

If you have a chart that compares the speed of language implementations available for the TI you'll discover that Assembly Language is the fastest, of course. c99 is second. Forth is third. The GPL-based languages are much slower (BASIC, LOGO, Pascal). In this article I intend to give you assembly advice; tips, tricks, better code, faster code and the like. Reading the E/A manual will give some of this information, but I've noticed people often forget what's there. NOTE: The examples are intentionally incomplete, so use the ideas in writing your own code, not the code itself.

A trick: sometimes a workspace register needs to be incremented by four. You could use INC (Increment) four times, INCT (INCrement by Two) twice, or AI Rx,4 (Add Immediate). It is much faster to use C (Compare) with indirect, auto-incrementing addressing and takes only one word (with "x" indicating any workspace register):

```
C    *Rx+,*Rx+
```

Ever need to move a byte to the "other half" of a word to use a particular addressing mode but don't want anything in the unused byte? Try using **SRL Rx,8** (Shift Right Logical). Using **SRA** (Shift Right Arithmetic) will carry the sign if you need to.

One thing that confused me as an early assembly programmer was the term "logical." Reading through the E/A manual will confront you with "logical" and "arithmetic" comparisons and whatnot. It's a fancy term for "unsigned;" a logical comparison (especially as referring to the L> [logical greater-than] bit in the status register) is an unsigned comparison; bits are compared left to right. An arithmetic one considers the numbers as two's-complement. Got that?

A way to make your subroutines more readable is to use a label with **EQU $**. See the examples below. This generates exactly the same label for the assembler, but marking only entry points this way can lead to greater readability.

How about the KSCAN, huh? Your program uses 20 different function keys. The TE3 terminal emulator is a classic example of this silly code (this isn't the fault of Joe Freeman either). Assume all labels without routines are defined "elsewhere." This is the code not to use:

```
CTLKEY  CLR     R0
        MOVB    @KEYVAL,R0
        CI      R0,>0A00
        JEQ     LINEF
        CI      R0,>1B00
        JEQ     ESCAPE
              < etc. >
```

If you have many function keys use a jump-table. Assume a **BLWP** is calling **CTLKEY** and each key-code routine ends with a **RT** (return). Something like this:

```
KEYTAB  DATA CTRL0,CTRLA,CTRLB,CTRLC
        DATA CTRLD,NOFUNC,CTRLF
        DATA CTRLG
      < You get the idea >
TABEND  EQU  $

CTRL0   EQU  $
        .
        .
CTRLA   EQU  $
        .
        .
CTRLB   EQU  $
        .
        .
< and so on >

CTLKEY  EQU  $
        CLR  R1
        MOVB @KEYVAL,R1
        SRL  R1,7 * move to low byte and multiply by two
        CI   R1,TABEND-KEYTAB
        JL   NOCTRL
        BL   @KEYTAB(R1)
        RTWP
```

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1034 x 808.

The keyboard's main difference is the addition of more function keys. These are not programmable like the "F" keys on your Pro. The mouse is a typical mouse and used just like you use yours. The same holds true with the communications functions. Either LAN or telecommunications features, or both, are supported by LISP machines.

There are four LISP machines that account for the bulk of the commercially available hardware. Each of them is a bit different, yet, very much the same.

LISP Machine, Inc. (LMI) has several versions of their Lambda. Their smallest model, the Lambda/E is a modified TI Explorer. Two processors are available, the Lambda LISP processor and the MC68010. The Lambda LISP processor is for LISP and PROLOG work while the 68010 is a UNIX environment processor for use with C, FORTRAN and other high level language processing. Both of these can reside and be used in a single machine. Use of the Multibus and NuBus architectures permit easy expansion of memory and peripheral device addition. Memory (RAM) can vary from 4 megabytes to 32 megabytes. Disk capacity of up to 515 megabytes is available, with a "chaining" capability to permit over one gigabyte of online mass storage.

Symbolics, Inc., offers its 3600 series. It uses a single processor which can run both LISP programs and with enhancements, other languages. The single LISP is somewhat slower and less flexible than the Lambda combination Multibus-NuBus. RAM memory starts at 2 megabytes and on the model 3670, can be expanded to 30 megabytes. Mass storage devices start at 140 megabytes and go to 474 megabytes.

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Forum SIG for downloading. Let's make this exciting and fun and show folks out there that there still is life in the TI Community! (That is the reason for the letters for the rules!! Every letter counts!!). If you have any questions, write us at the *Computer Shopper* or you can contact both JZ (76703,3022) or RA (75166, 2473) on Compuserve (Type "Go TIFORUM" at the "!" on CIS).

Incredible Diskazine!

We continue to marvel at the ingenuity of Barry Traver, Editor of Genial Computerware's *TRAVelER* diskazine. Barry has produced a truly remarkable product which, with his latest issue (volume 3) stood the TI world on its ear in amazement. In the issue, there was a "archiver" utility which takes a group of related files (for example, a document file, and an extended BASIC program) and combines them into one large file. So what you ask? Makes keeping files together on the correct disk a breeze, and, if you use programs from electronic bulletin boards, shortens download time as the archiver actually compresses programs and files as it combines them. Further, volume 3 has a "cartoon-utility" that allows easy graphic commands to generate cartoons. Additionally, there is extended BASIC utility (written in assembly language) that allows for some 20 new commands from extended basic. And, of course, much, much more. You can subscribe to the *TRAVelER* (6 issues on a floppy-disk; 720 sectors every two months) by sending $30 to Genial Computerware, 825 Green Valley Drive, Philadelphia, PA. You have no idea what you are missing.

In Love!!

Can you fall in love with a piece of software? Well, I have. JOYPAINT99 ($49.95: Great Lakes Software, 804 E. Grand River Avenue, Howell, MI 48843) is a brand new graphics and drawing program that combines the best features of my previous favorite (Graphx) and the other popular drawing program, TI Artist. JP99 gives you a Macintosh-like user interface (icon-driven) which makes it usable virtually without a manual. I had the program running effectively in 10 minutes and I am the ultimate software klutz. What did I like best about the program? The interface for sure. Also, the drawing screen can be scrolled right and left for a total drawing palette almost twice as big as in the past. Images can be flipped horizontally or vertical-

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ly, copied and moved, magnified, filled (with any of 26 patterns), and uses a clipboard function as well. There is already a "companion" disk of artwork as well. It will even catalog a disk for you while running if you forgot the name of your artwork. Anything negative? If I push, I could complain about the text-handling for fonts (not as good as the Graphx clipart system) and the fact that it is heavily protected. But, that's nitpicking. I will use this program now in place of my old standby, Graphx. And that, alone, is saying a lot. Try it out, absolutely, if you are interested in art and the TI.

Speaking of Art...

Asgard Software (POB 10306, Rockville, MD 20850) has come out with another winner. Called "Graphx Pictures," their latest software package is a collection of 24 pictures done by such famous TI artists as Warren Agee and Anne Turner which can be displayed in a continuous fashion on a timer basis. Imagine this. You could create a graphics presentation with your TI (charts, designs, whatever), and discuss the presentation while your "slides" are being shown automatically. You can vary the timer and can speed it along by pressing the space bar to go to the next slide and override the timer. A very nice program for anyone who gives demonstrations or just likes art—the 24 pictures are worth the price alone. It works with any Graphx-compatible art and is $18. The rumor still remains (and is growing) about Asgard's new hardware projects. But they are not talking as yet. Could be really big if their hardware is half as good as their software.

Speaking of Hardware...

The new Myarc (241 Madisonville Road, Basking Ridge, NJ 07920) machine was shown in its full glory at the June 19 meeting of the Boston Computer Society's TI Users Group (as reported by Walt Howe on Compuserve). Paul Charlton showed the new machine (which runs on the 9995 chip) running some incredible graphics displays and a working (get this now!) 80 column version of TI Writer. Charlton (an intimate part of the Myarc Development Team) also said that, for example, that Forth would run 20 times faster on the new chip. The machine, now dubbed "Gen'eve" (or some such) is stated by Myarc to be ready for delivery in the early fall and should retail for between $400 and $500.

More Hardware...

Thanks to the generosity of Ryte Data (Box 210 Mountain Street, Haliburton, Ontario, KOM 1SO, Canada), I had the opportunity to look over a couple of their hardware products from Mechatronics of Germany. As a quick aside, we get letters about why don't we review this or that piece of hardware. Well, folks, its simple. Unlike columnists for other machines, JZ and I have to buy whatever we review. The commercial manufacturers that support the TI are (generally) such low-budget industries that they are unable to send their expensive wares to your Forum columnists. So, we cannot review what we don't have. Would that we were like the IBM columnists! Well, that changed at least once. R/D sent a 128K GRAM-Karte and a Maximem cartridge archiving device. The GRAM-Karte permits owners to dump, store and run modules from disk. Further, you can alter the modules once saved to disk (for example, changing the default screen colors of a module) as well. The card also delivers 13 kilobytes more storage for TI BASIC programs. In conjunction with the GPL-Assembler (the only such software available for the TI), the card enables the programmer to program in powerful Graphics Programming Language

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(GPL). Unlike other such cartridge-storing devices, this device fits in the Peripheral Expansion box, out of the way, so the module port is empty. You can also use more than one card (as many as you like) or upgrade to a 512K card. The 128K version will store any two modules; a 512K version will store 4 modules. Anyway, the card worked flawlessly for me, and I sure liked having the module port completely open. Nothing to bump into while typing. Very nice. The card useful is also splendidly constructed with no jumpers and clean lines. The card is $249.50 in the 128K version. R/D also sent a "Maximem" cartridge, which allows saving the cartridge to disk and reloading them from disk. Differs from the GRAM- Karte in that it does not store the modules. They have to be loaded from disk each time. But for $145, it's a steal. I will have more on this little number next time and, hopefully, a little about the GPL assembler. Anyway, thanks to R/D for thinking enough of the readers of the Forum to send us some hardware to test. The only bad thing is that I have to send it all back.

Response Overwhelming

The response to the c99 pieces has been great. Expect more on the language in the next issue. And thanks for the letters and keep writing.

"Brain" Has Average IQ

"The Brain," from Datax, is actually a set of Extended BASIC programs designed to serve as both a reference source and scientific calculator. It performs calculations such as annuities and compound interest, vector addition, Ohm's Law, trajectories, number base conversions, and metric-English conversions. There are also six tables: ASCII codes, TI-99/4A color codes, TMS-9900 assembly instruction set, trigonometric functions, chemical elements, and metric conversions. Performance: The Brain will load automatically through Extended BASIC, and requires at the 32K Memory Expansion Unit and at least one disk drive. The speed of the calculations did not seem to be a problem, although some of the routines are still programmed in Extended BASIC (instead of assembly routines, which are used in some portions of the program). The standard Extended BASIC floating point 12-digit numeric system is used, and large numbers are expressed in the standard "xxE + yy," meaning xx times ten to the yyth power. The formulae used for calculations are not displayed, and no graphics are used. This can be a problem, at times. For example, I followed the menus to a calculation that would find the range, maximum altitude, and time of flight for a projectile given its initial angle and speed of projection. I entered 90 degrees, expecting a range of 0, since the projectile would be firing straight up (and subsequently fall straight down). Instead, "0.00000029141" was displayed as the range. This is simply erroneous, and whether it is due to the inaccuracies of the built-in Extended BASIC trigonometric functions or a small problem in the formula itself, I could not determine. As might be gathered from the preceding example, significant figures are not used. That is, if a projectile were fired at 10 cm/s at an angle of 40 degrees (both metric and English units are accounted for), the answers should contain no more than two digits, such as a time of x.x seconds. Instead, the full 12-point floating point numbers were always used. It is not difficult to round the answer from the screen, though. The lack of graphics is a bit disturbing in some sections. For vector addition, for example, I would like to be able to actually see the vectors (and the resultant vector) displayed on the screen. However, the answers (which do not technically require any kind of figure) seem fully accurate. For the tables and help screens, the display is switched into 40-column mode, and the loading from disk, while not instant, does not take extraordinarily long for the necessary textfiles. An option to dump the tables to printer as well as to display them on the screen is included in the current version, says Datax. Loading time for the program is fairly long, and since some routines are in the "other" subprogram, one must wait while the proper section is loaded from disk even after the main program has been loaded. The long loading time may be because the Brain is copy protected and takes some time to make sure the protections are in place (and that the write protect notch is uncovered), but in any case, it does take a long time (about two full minutes) to load the original program.

Ease of Use: True to the claims of the manual and advertisements, the program is very simple and easy to use. Some of the menus may not be constructed intuitively (for example, it may take the user a few minutes to discover that "Physics," which includes calculations for falling objects, is a different section than "Trajectories"), but the program is forgiving, the error messages are in plain English, and I could not get the program to crash by entering inappropriate answers at the prompts. Help screens are accessible at most prompts, and

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TI Forum
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only a few extra commands are necessary to master navigating around the menus and table displays.

Documentation: The documentation for the Brain is nothing less than excellent. The package is done very professionally, including a small binder for the documentation and disk. The documentation fully describes the operation of the program, although it does not delve into the actual topics the program covers. "It is only logical that once the user has to use a certain routine of this software product he will know why and for what purpose he needs it," declares the manual. TI-99/4A software producers could learn a lot from the Brain's physical appearance; the manual and disk look more as if they belong to a more expensive computer than to the 99, whose third-party software often appears "homemade." A telephone number and address are also provided in the manual for additional questions, and an offer of customization is made, "for a nominal fee."

Value: The value of the program depends heavily on just who the user is. Perhaps the Brain was written with too vague of an objective in mind—to provide, as the name implies, calculations and information on any scientific topic, which is quite a lofty goal. Some routines I simply cannot see being of any use to most people. For example, I doubt few people would turn on the computer, wait for the program to load, and follow the menus simply to find the area of a rectangle, which is one of the functions. Similarly, the table of ASCII codes seems more easily generated with a one-line Extended BASIC statement/command such as FOR X=32 to 126::PRINT X,CHR$(X)::NEXT X. On the other hand, some functions, such as annuities and compound interest, or some of the electronics, could possibly be useful on a regular basis. Other features of the Brain include a calculator function, which is available at most data input prompts, and is very nicely arranged. The calculator performs the four basic functions (addition, subtraction, multiplication, and division) as well as percents. The answer is moved up to the calculator input screen for further manipulation, and the final answer is automatically moved to the prompt from which the calculator was called. The latter feature is optional, and can be modified with the accompanying default program. The default program allows the user to define screen colors and other features of the Brain, as well as to specify which of the two main programs should be loaded at the beginning, allowing a commonly used function to be ready for use upon initial loading, regardless of the subprogram on which it is located. The Brain may not be the "ultimate computing tool," as the package proclaims, or "the most advanced computing tool available for a personal computer ever," as an advertisement states, but it is worth looking into for those who make use of the functions and tables it provides.

The Brain is available from Datax for $39.95, and users group discounts are available, says Datax. For more information, write: DATAX, 1923 Linden Street, Ridgewood, NY 11385. ●

Chip Specials

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64K	(64K × 1)	120ns	1.35
STATIC RAMS			
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EPROMS			
2732A	(4K × 8)	250 ns	4.05
2764	(8K × 8)	250 ns	3.35
2764	(8K × 8)	200 ns	3.75
27C64	(8K × 8)	200 ns	5.05
27128	(16K × 8)	250 ns	3.65
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27256	(32K × 8)	200 ns	5.65
PROCESSORS			
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Screen Print Program
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Well, I decided to use the key that has LF on it. It's the "1" key if you push down the NUM LOCK. It's the same key as "Control J." LF should be line feed, but WordStar has chosen to use this key to call up the help menu. I feel that anybody who uses WordStar very often won't need this key.

You can use the screen print in Sanyo Basic, too. Figure 3 gives the Basic program. Once it's poked into memory, CALL 0 can be entered as a direct statement.

If you want any other programs to have a screen dump, you have to patch them. As you've seen, the patch is simple. It's finding where to patch, that's the big problem. About the only advice I can tell you is get into Debug, and find the keyboard interrupt, usually Interrupt 16h. Use Debug's "G" command to go one instruction beyond the interrupt. That will require you to push down a key. Then single step using Debug's "T" for trace command, to see where each key leads you. If it's a call to a subroutine, as in WordStar, it's simple. All you need is the machine code instruction "Interrupt 5" to print the screen, and a "RET" to get you back.

Why did I choose Interrupt 5 for the print screen interrupt? Mostly, because it was there, and available. The IBM PC uses this interrupt for its screen print, and I suppose this fact influenced my decision somewhat. It didn't matter, really. Interrupt 5 on the Sanyo 55X leads to an INTERRUPT TRAP HALT. What this means is that it's empty—a dead end; the Sanyo has oodles of interrupts leading to INTERRUPT TRAP HALT.

In Figure 1, I've included some comments, which will explain how Prtscn.Com works. The address at INT 5 is replaced by the start address of Prtscn.Com; this means that an INT 5 will lead to this program.

The video data for the screen happens to be located at 40:25EO. I happened upon it one day as I was flipping through the memory. All of the ASCII characters are stored there, in every other byte. The bytes in between seem to the data for reverse or normal video. However, please don't ask me what they're doing there. Ours is not to question why; and so on. Whenever MSDOS puts an ASCII character on the screen with INT 10, it stores it there. Just good housekeeping, I suppose.

Remember that you need an IRET instruction to end this program, instead of a RETF. That's because during the interrupt, all of the flags are saved, as well as the CS and IP registers. When you return from an interrupt, all these values are popped off the stack. A RETIF instruction only requires two values off the stack.

As a final note, here are two more patches to WordStar. These patches will eliminate the line on the top of WordStar's screen and the special keys at the bottom. If you don't get rid of these lines, they'll print every time you get a screen dump. You won't need these patches to run Prtscn.Com, but I offer them to those intrepid readers who want to have everything just right.

Type this:

E 5005 90 90 90 <RET>
(gets rid of the special keys)

E3452 90 90 90 <RET>
(gets shed of the file, column #,)

Like you did before, type: W <RET>, and Debug will answer "Writing 5380 bytes." ●

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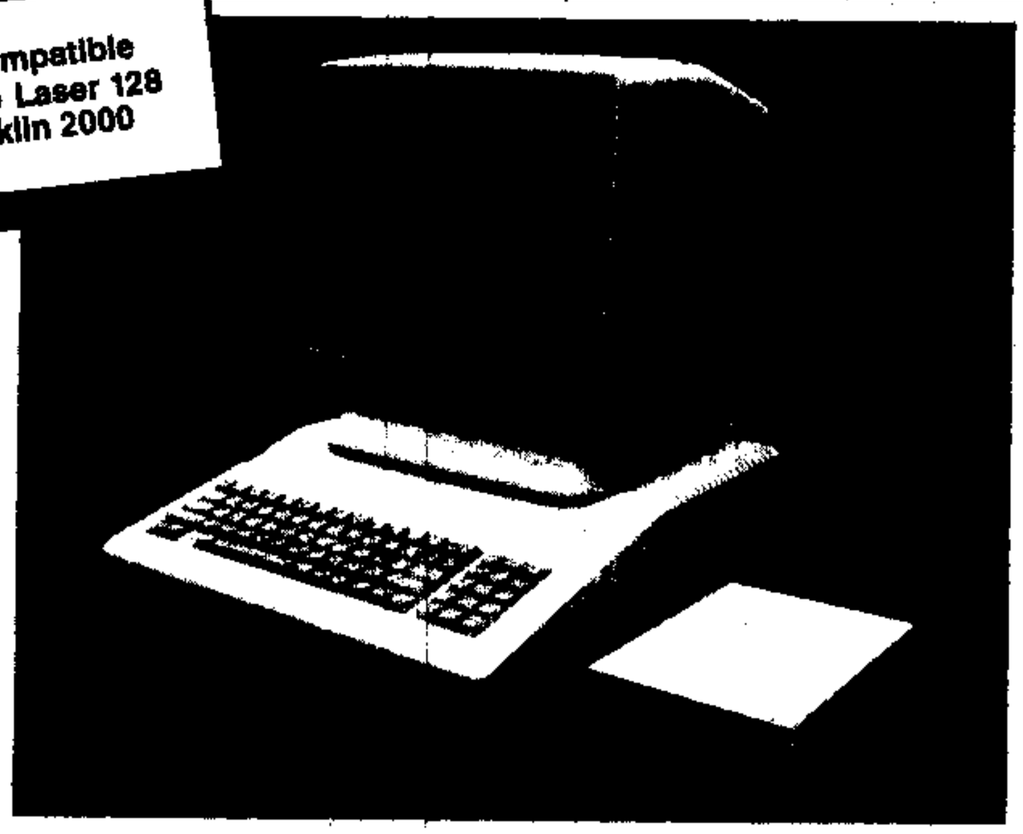

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