The Boston Computer Society

SINCLAIR-TIMEX USER GROUP NEWSLETTER

Volume 2, Issue 5 May 1983

This newsletter is produced to inform group members of the agenda and logistics for future meetings, as well as to recap and amplify the information provided at the last meeting. It also provides a forum for members and interested parties to communicate what they have learned or developed relating to Sinclair and Timex computer products. Meetings are open to the public; however, attendees are encouraged to join the Boston Computer Society (BCS). This newsletter is free to members. Back issues are one dollar each.

USER GROUP MEETING

Date: Wednesday, May 18, 1983
Time: 7:00 p.m.
Place: Large Science Auditorium
UMass, Harbor Campus
(Directions on last page)

At the May meeting, Dan Roy will unveil the add-on color capability for the T/S-1000. The product he developed is called COLORSIN81. It features a high-resolution color display, sound, joy stick interface, and an expansion capability via a 6-slot motherboard. Display features include three modes of high-resolution color and a text mode with 24 lines, 40 characters per line. There are powerful new commands, such as DATA, READ, RESTORE, block moves, and plotting subroutines. All this for only $159.95 as a kit. In addition, Dan will demonstrate the CAI/EXATRON stringy floppy mass storage device. Dan says that the stringy floppy was essential for the development of COLORSIN81. With the stringy floppy, one can load a 16 K program in about 15 seconds. Numerous features, such as the capability to chain programs, are included in this system.

Following Dan's presentations, we will break into groups to discuss topics of interest. Tentatively, an advanced and a beginner's group are planned.

At the June meeting, Dave Miller will demostrate and explain QSAVE and FASTLOAD--programs which are available from Gladstone. If you have items to discuss at a future meeting or suggestions for presentations, contact Sue or Cliff.

WHAT'S DIFFERENT ABOUT THIS NEWSLETTER?

Don't worry, we'll tell you. This issue contains advertising. Advertising helps offset the cost of publication and debuts product information which may be of interest. We have established a few basic rules to help guide us in this area. Anyone who is interested in these guidelines or has suggestions contact Jack Hodgson, Publisher.

HIGHLIGHTS OF THE APRIL MEETING

As with the past several meetings, the April meeting was jam-packed with activity--demonstrations, hardware and software discussions, and hints.

Sue Mahoney began the meeting with a demonstration of "Ator the ABC Gator." Ator is a Timex program which synchronizes a fanciful display of the letters of the alphabet with a song recorded on the cassette tape containing the program. Simple procedures for synchronizing the computer and tape are included in the program. When synchronized, the computer flashes letters on the screen as the author sings her song. Ator is designed to teach the ABCs to preschoolers. It's interesting to note in passing that Ator, as other ABC songs, contains that long letter in the center of the alphabet with which many kids have trouble, namely LMNOP.

Following Sue's presentation, Dave Wood demonstrated the new printer he purchased and interfaced with his computer, the Okidata Microline 92. He described his initial interfacing difficulties and how these were resolved (contact Dave to save yourself these problems). He also described some of the software he developed to use with the printer. See Dave's article on page 4.

Gene Bachman showed some pictures of spectra and waveforms taken from several tape recorders which illustrated differences between different recorders. See Gene's article below.

Al Spencer reviewed the Parrot by R.I.S.T. Computer Components, Inc., P.O. Box 499, Fort Hamilton Station, NY 11209. The Parrot is a voice synthesis module which plugs into the edge connector of our computer. When the computer commands, the Parrot speaks in allophones. You must supply a speaker. By using the proper sequence of allophones, speech is generated. Al played a tape with several sentences spoken by the Parrot--all were understandable. The Parrot costs $89.95 plus $4 shipping and handling.

Also at the meeting, a number of shorter items were covered. Mike Coughlin suggested a new way to avoid RAM pack wobble. His solution involves installing an HM6264 8 by 64 K memory chip in the computer. Sue distributed the first issue of Ramblings, the Timex Computer Club newsletter. Sue also awarded Cliff Danielson and John Kemeny Timex T-shirts for their efforts on the newsletter. Will Stackman suggested the use of a Radio Shack 75 ohm auto-duplication coaxial cable for replacing the cable between the computer and the television.

A COMPARISON OF THREE RECORDERS by Gene Bachman

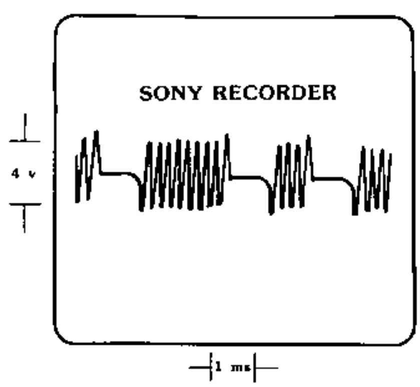
I began having loading problems after I dropped my Radio Shack recorder down the stairs. While it was in for repairs, I switched to a 10 year old, $19 Montgomery-Ward portable. The Montgomery-Ward wouldn't load at all until I installed a 10 ohm resistor across the earphone jack. I also noticed a loud background hiss when listening to a program. Timex' instructions say the computer needs 4 volts peak-to-peak from the recorder. I measured the output of the recorder with a digital voltmeter at less than one volt. This was because the voltmeter measures an average, not peak-to-peak, voltage. When the damaged Radio Shack recorder was returned, it was very unreliable. It had a hiss, which it did not have before, and the speed wavered. At this point, I decided to see just what made a recorder good or bad.

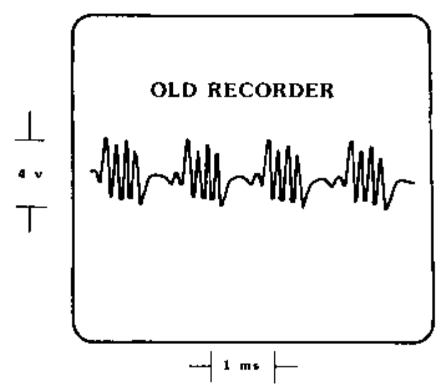
I played the same program (Psion flight simulator) on my two recorders and on a Sony instrumentation recorder into a frequency spectrum analyzer. I have access to a laboratory with such equipment. The three spectra computed from 256 samples of each signal, were so similar that no conclusions could be drawn (see frequency spectrum figure). Since I couldn't make much sense of the voltmeter readings or spectra, I finally resorted to the old reliable oscilloscope, in this case, a Tektronix storage scope.

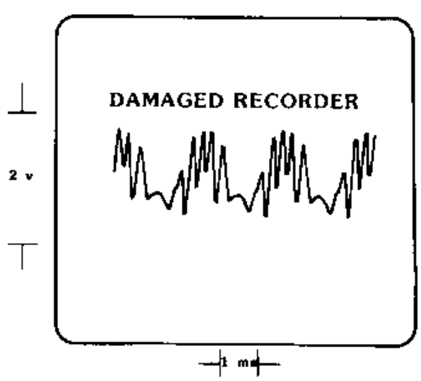
With the Sony recorder and a laboratory-grade decade amplifier, I generated a 4 volt peak-to-peak signal. The computer liked this. It loaded every program, every time. Looking at the signal on the oscilloscope, I could see short and long tone bursts obviously representing zeros and ones. Increasing the horizontal scale to 1 millisecond (ms) per division allowed me to count the number of cycles in the bursts and to measure the frequency of the tone. Four cycles of a 3.33 kHz tone represented a zero; nine cycles a one. The total time to transmit a zero, that is, the length of the tone burst plus dead time between two bursts, was 2.5 ms. This is a signaling rate of 400 baud, that is, 400 zeros can be transmitted in one second. The ones occupied 4.0 ms for a signaling rate of 250 baud. I was not able to discern the beginning or end of a byte; spaces between bits and bytes looked identical.

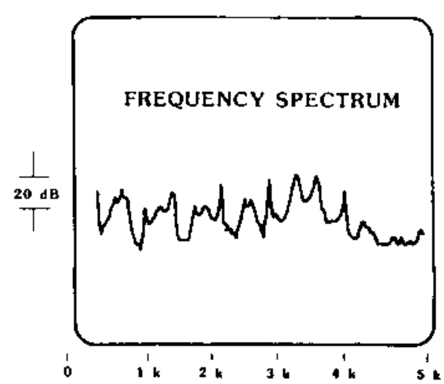
Now that I knew what the signal should look like, I played the program on the old cheap recorder and on the damaged one. The differences were obvious (see figures). Whereas the Sony signal was clean and symmetrical, the Montgomery-Ward was distorted and unsymmetrical. The Radio Shack signal was even more distorted, due, I suspect, to a bent drive shaft and misaligned heads.

From my experience, I conclude that if a recorder set at 3/4 of full volume has a lot of hiss when playing a new, unrecorded tape or has a wavering or tinny sound when playing music, it will send the computer a distorted signal. This makes it unreliable, even when loading tapes that were saved to the same recorder. On my way home from the laboratory, I bought a new Panasonic model RQ2735 and have had no more problems.









INTERFACING A REAL PRINTER TO THE TIMEX/SINCLAIR 1000 by Dave Wood

This article describes how I attached an Okidata Microline 92 dot-matrix printer to my MicroAce computer. (The MicroAce is a copy of the ZX-80 computer which I have modified to be equivalent to the T/S 1000.) I purchased the Okidata printer because of its versatility and print fidelity. For the money ($500-$600), one can get very good type quality, almost like an impact printer. The Okidata can print at 10, 12, and 17 characters per inch. It can also print double width characters with each pitch. It will accept up to 64 user-defined characters. This could be used to generate most of the Sinclair characters. The printer can also print individual dots for graphics output.

This is an example of the qua

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef
#$:?()><=+-*/;,.`@!'[]}{~&_|\^

This Is Enhanced Printing.

This Is Emphasized Printing.

This is printed at 17 characters per inch, which permit

It is also possible to print$^{\text{superscript}}$

Double Width Characters

Example of Print Quality

Electrical/Logical Interface with the Printer

The printer comes equipped with a "standard" Centronics-compatible parallel interface. Exactly what Centronics-compatible means is not immediately obvious. As I finally figured out, there are three important elements in this interface. First, 8-bit characters are passed to the printer on eight parallel data lines (one bit per wire). Second, an input strobe line notifies the printer when the data (the 8-bit character) is ready on the parallel data input lines. The strobe line is normally held at logical one (+5 volts). When the data is ready, the signal on the strobe line should go to logical zero (0 volts) for a microsecond or so and then return to a logical one. The data is actually accepted by the printer on the rising edge of this strobe pulse, i.e., when the signal level goes back to one. The third element is a busy output line which notifies the computer that the printer doesn't want to get any new data. The second and third items constitute the handshake protocol by which the computer and the printer agree on sharing the character data.

My computer is equipped with the CAI/O Board interface from CAI Instruments, Midland, Minnesota, which has, among other things, three 8-bit parallel input/output ports. This interface can be configured (programmed) to operate in different modes. The interface is memory mapped, so that programming it or writing to an output port is accomplished by POKEing to specific addresses and reading an input is accomplished by PEEKing. The automatic parallel interface mode of the CAI/O interface, which has built-in handshaking, was an obvious choice to use for the printer interface. Wrong! It is not Centronics compatible. Thus, I had to use the CAI/O interface as a simple (dumb) interface, providing the proper handshake protocol by software in my computer.

I configured the three ports on the CAI/O interface as 12 bits out (8 bits of port A for data and 4 bits of port C for control) and 12 bits in (8 bits of port B for printer signals and the other 4 bits of port C unused). The actual wiring of the cable between the Centronics-compatible connector at the printer and the dual-15 edge connector on the CAI/O interface creates the mapping of bits between the computer and the printer. Most of these bit assignments, with the exception of the port A data lines, were arbitrarily chosen.

Software Interface with the Printer

At first I implemented the software interface in BASIC. But the program was uncomfortably slow. So I wrote the program in machine language. The machine language program occupied only 242 bytes, including the ASCII conversion table. To pass a character to the machine language program, I used a fixed memory location. In this straight-forward approach, you POKE from BASIC and read from the location in the machine language program. I used the fixed address 16506 in the system variables area. My machine language program, which handles the ASCII conversion and handshake protocol is located at 32525. Thus, sending a character to the printer consists of:
POKE 16506, (character code) followed by RAND USR 32525.

Conceptually, translation from Sinclair character codes to ASCII can be handled as a table look up. In other words, one could place in RAM a table of 256 ASCII characters which correspond to the 256 Sinclair characters, then simply use the Sinclair character code to index into the table. However, a bit more thought is required. Some judgment must be used, for example, to decide how to map to the ASCII characters !, ´, #, @, and others. There are only 128 ASCII characters defined; also only 128 of the Sinclair characters are printable. My conversion program allows me to treat either normal or inverse vedio alphabet as the lower case ASCII characters.

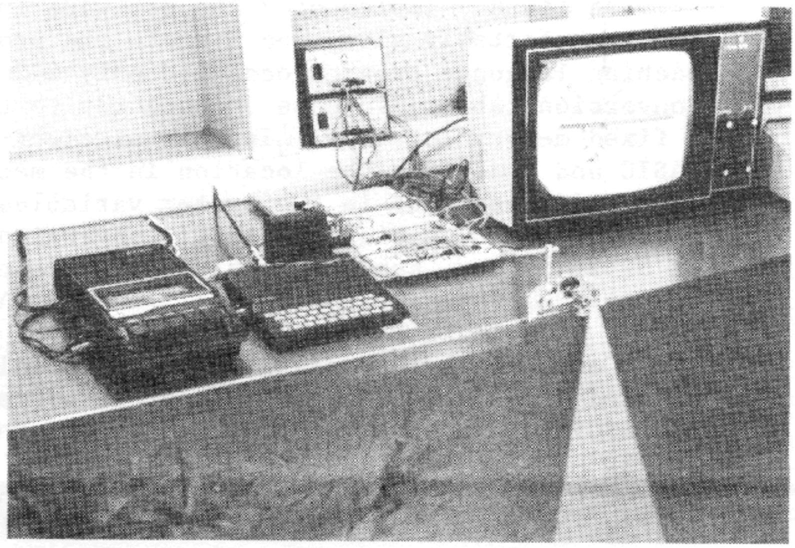
The Centronics handshake protocol is simple to implement, as the program below demonstrates. An important part of this code is use of ROM routines to test for and act upon the break key. Testing for the break key allows one to escape from the machine code and not be trapped in "never-never land" should the printer hang up.

```
{Enter with ASCII character in A reg.}

{      DELAY UNTIL PRINTER READY        }
{Set HL with input port(B) address.   }
       PRINT    LD HL,3C01h
{Test to see if printer is busy.      }
       TSTB     BIT 0,(HL)
                JR Z,OK
{Save the character in A register.    }
                PUSH AF
{Check for break key.                 }
                CALL 0F46h
{If break, exit to "D" return code.   }
                JP NC,03A6h
{Recall the char.& see if still busy.}
                POP AF
                JR TSTB

{     OUTPUT CHARACTER AND STROBE      }
{Change HL to output port(A) address.}
          OK    DEC HL
{Output the character.                }
                LD (HL),A
{Change HL to port C address.         }
                INC HL
                INC HL
{Strobe - set bit 7 low, then high.   }
                RES 7,(HL)
                SET 7,(HL)
                RET
```

THE TIMEX/SINCLAIR AS AN INTELLIGENT LAB STATION TERMINAL by Larry Becker

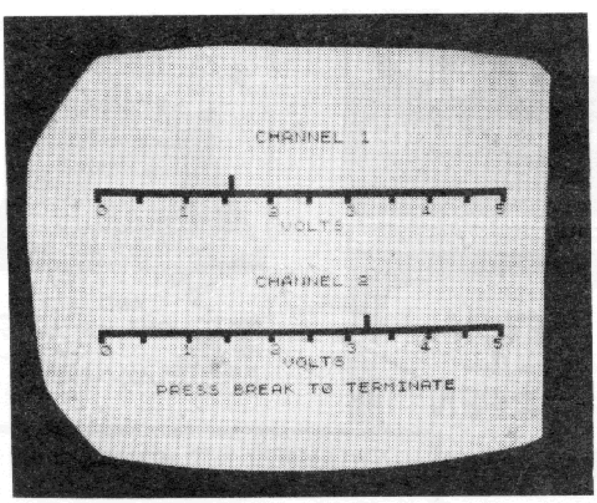


Imagine a science laboratory with up to 16 stations, each containing a computer capable of instrument control as well as analog and digital data collection. Each lab station computer could either display the data as they are being received or store the data. The stored data could then be sent to a larger computer for storage on disk and later analysis and display. The incoming data at the lab station could be sampled at selectable time intervals or, alternatively, sampled at the request of an external signal. In addition, the lab station could generate digital or analog signals for control of stepper motors or voltage-controlled instrumentation used in experiments. A nice thought, you say ... but, oh, the expense!

Now suppose that each lab station costs no more than $300 (including the computer, computer memory, interfacing hardware, and CRT monitor); and the large host computer with which the lab station communicates was an unmodified Apple computer. Interested?

During the past few months at Technical Education Research Centers (TERC), while on sabbatical leave from the Physics Department of Hiram College, I have been developing the hardware and software which will turn the Timex/Sinclair microcomputer into the intelligent lab station described above. The T/S 1000 with 16 K memory pack can be purchased for under $100. A small black and white television costs less than $100. The interface hardware which allows the above capabilities has been built and thoroughly tested. And an initial software capability has been developed. The hardware and user-friendly software should not cost more than $100. A $300 lab station <u>is</u> feasible.

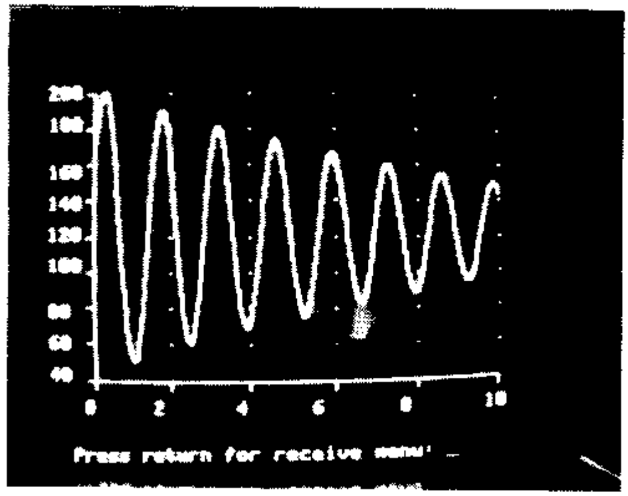
The prototype interfacing board (see figure 1) measures 7-1/2 by 5-1/2 inches. It should be possible to reduce the size to about 4 by 5 inches. Consequently, not only will the cost be low, but also the size will be such as to take up very little space at the lab station. The television monitor will be the biggest part of the system.



Preliminary software includes four programs. The first program displays the voltage levels on two of the eight analog input channels of the interface board (see figure 2). A marker on the voltage line for each channel moves back and forth as the level is changed. A program such as this would be helpful during experiment set-up to determine if the voltage levels from the equipment are within the 0 to 5 volt range needed for the interface circuitry.

The second program samples the input voltages and plots the values on a time axis while the voltage is varying. For example, it generates a sine curve on the monitor as a potentiometer is rotated by a swinging pendulum. In its present form, the program plots the curve with 32 large squares. Double this resolution is possible. A curve made up of 64 data points, however, is still much too coarse for most experiments. Therefore, this program would be used in setting up the experiment, not in collecting the actual data.

A third program allows the collection of 500 data points at sampling time intervals of multiples of 100 microseconds. Once the data have been stored in the Timex/Sinclair, the communications portion of the program, together with a receive/send program in the Apple, can transfer the 500 data points to the Apple in one half of one second. The transfer rate is 20,000 bits per second. The connection to the Apple is through the paddle port. Consequently, the transfer of data can be made to an Apple II, and Apple II+, and an Apple IIe with no hardware modification. Once the data have been transferred to the Apple, a high resolution graphics program can be run to plot the data. Figure 3 shows the display which was obtained after a 10 second collection period (500 data points) for a swinging pendulum.



A fourth program has been written which allows the Timex/Sinclair to receive data from the Apple, again at 20,000 baud. In the planning stage is software which will load programs from the Apple into the Timex/Sinclair. With this capability, a cassette tape recorder will not be needed at each station. When all is completed, the system with up to 16 lab stations networked to the Apple, will be controlled by the Apple. Each Timex/Sinclair will have the capability to request programs from the Apple. The programs will include those for specific experiments (e.g., the swinging pendulum) and general-use programs.

Since the software is still in the development stage, I would appreciate suggestions concerning types of programs you would find useful in your labs (or any other environments you envision for the low cost networking system). I left TERC to return to Hiram College at the end of March. However, I am continuing work on the project. I hope that general user-friendly software can become a reality by the end of the summer. Anyone interested in making suggestions or receiving additional details of the project may call (216) 569-5248 or write: Larry Becker, Department of Physics, P.O. Box 1778, Hiram College, Hiram, OH 44234.

DID YOU KNOW OR CARE?

The first two characters appearing together in the ZX-81 and TS-1000 ROM are Z and X. These happen to be the first two characters of the keyboard decode table which starts at location 126.

SINCLAIR STUDY GROUP

As you may be aware, there are a large number of Sinclair-Timex user groups around the U.S. and Canada. We have tried to get in contact with them by sending them our newsletter. Many have reciprocated. Recently, we asked if we could reprint some of their material. The overall response was "great."

This month we spotlight the Sinclair Study Group, 16 Lewis Street, New Haven, CT 06513. The group produces a terrific monthly newsletter, yearly subscriptions to which are only $6. SUE MAHONEY IS COMING!! This was the banner headline of the March issue. Below is Sue's report of her visit. Opposite are three edited (for space) excerpts from the SSG newsletter.

A Children's User Group by Sue Mahoney

The New Haven Sinclair Study Group is a unique user group in that the member's ages range from 8 to 14 years old. Chris Baldwin, the adult leader, founded the group last year. Chris is a teacher in one of the alternative schools in Hew Haven. The study group, although it has females, is predominately male. It is a very enthusiast and energetic group. Each member has a project - some quite elaborate. One of the group's first projects was to build the Sinclair ZX-81 kit. The youngest participant was only seven.

On my recent visit I demonstrated the T/S 2000. The group's response was overwhelming enthusium and excitement. They were literally glued to the edges of their seats. They asked many, many questions. I look forward to meeting with them again. Chris indicated that anyone interested in starting a children's group or becoming a children's group sponsor should contact him.

Chicken?

This 1 K game attempts to answer the age old question, "why did the chicken cross the road?" Guide the chicken (C) across the road to its home (H) using the 8-key. You'll soon discover there are many vehicles (V) on the road and there is no turning back.

How does the Sinclair know when the chicken is hit or gets home? Line 25 directs the computer to be ready to print the chicken at its new location. But before the chicken is printed in line 45, the computer "looks" to see what is already on the screen at the location. Line 30 PEEKs at addresses 16398 and 16399 to find the address of the next PRINT position of the display file. Line 35 then PEEKs there to see if a V (character 59) is displayed. Line 40 does the same for H (character 45).

```
 5 LET D=2
10 LET C=0
15 LET D=D+1
20 PRINT AT 0,31;"H"
25 PRINT AT 0,C;
30 LET N=PEEK 16398+256*PEEK 16399
35 IF PEEK N=59 THEN GOTO 90
40 IF PEEK N=45 THEN GOTO 10
45 PRINT "C"
50 LET U$=STR$ RND
55 FOR I=3 TO D
60 LET L=VAL U$(I)+1
65 PRINT AT 5,L;"V";AT 5,L+10;
   "V";AT 5,L+20;"V"
70 NEXT I
75 IF INKEY$ ="8" THEN LET C=C+1
80 SCROLL
85 GOTO 20
90 PRINT "SPLAT ";30*(D-3)+C
```

Poem by Matthew Quinlan

The ZX81 is compact and easy to use.
It can do anything but tie your shoes.
Small and easy to lose.
No zapping to give you the blues.

Take you on paths yet unexplored.
You can play it at home and not get bored.
You don't even need a 80 column board.

Plan your diet and not get fat.
Like learning BASIC is where it is at.
Learning BASIC is really hip.
I mean gag me with a microchip!

Antique Flag - How Old Is It? by Kent Zimmermann

The program contains 13 lines but here is a way you can enter it by typing in only four lines! Enter line 1. Now EDIT line 1: DELETE the line number and replace it with a 10. Pretty tricky all right. EDIT line 10 this time, DELETE the line number and replace it with 30. You've got the idea. Enter and EDIT lines 5, 50, and 60 to finish the program. RUN up the flag and feel good about being so clever.

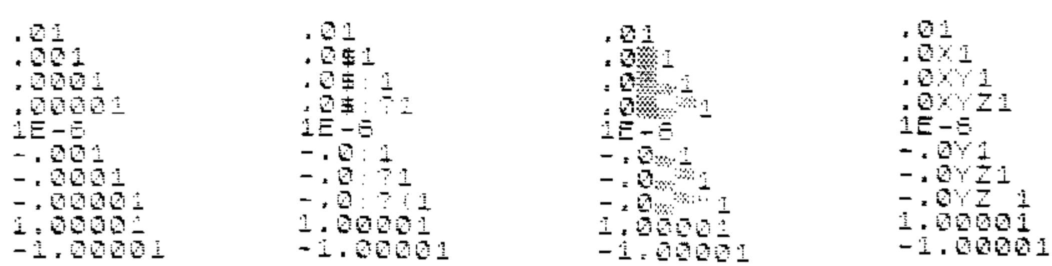
```
  1 PRINT "********XXXXXXXXXXXX"
  5 PRINT "********"
 10 PRINT "********XXXXXXXXXXXX"
 20 PRINT "********"
 30 PRINT "********XXXXXXXXXXXX"
 40 PRINT "********"
 50 PRINT "XXXXXXXXXXXXXXXXXXXX"
 60 PRINT
 70 PRINT "XXXXXXXXXXXXXXXXXXXX"
 80 PRINT
 90 PRINT "XXXXXXXXXXXXXXXXXXXX"
100 PRINT
110 PRINT "XXXXXXXXXXXXXXXXXXXX"
```

Line 1 contains 8 *'s and 20 graphics spaces
Line 5 contains 8 *'s
Line 50 contains 20 graphics spaces

ROM BUG #3

There is an error in the ROM program in our computer which causes numbers between 0.01 and 0.00001 to be LPRINTed incorrectly. The bug occurs only with printers using the LPRINT command, such as the Timex and Sinclair printers. Unlike the bugs we described in the December and January newsletters, this bug could have a direct affect on you. Thanks goes to Gary Preston, editor of the Franklin County User Group newsletter, Glade Hill, Virginia for first making us aware of the problem. Gary says that anybody who has purchased the Sinclair printer should know about the bug because it is mentioned in the printer manual. Dave Miller discovered the additional information required to complete this article.

Numbers, in magnitude (absolute value) less than one and containing two, three, or four zeros following the decimal point, are LPRINTed incorrectly. Below is what we got with the new Timex 2040 printer:



The first column is the correct output; the second is created by LPRINT B and LPRINT STR$ B; the third by LPRINT AT 0,15; STR$ B; the fourth by LPRINT .001, etc. Numbers 0.01 or larger are printed correctly. Numbers smaller than 0.00001 are printed correctly, but in scientific notation. To eliminate the problem replace the LPRINT statement with two statements, such as LET B$=STR$ B and LPRINT B$. Note that two separate statements are required. LPRINT STR$ B will not work correctly.

DISCOUNT ON NEW MAGAZINE: Timex Sinclair User is a 4-color, monthly, people-oriented magazine and will hit the North American market with 100,000 issues in May. It is a North American version of Sinclair User, which has been successful in Europe. The first issue features an exclusive interview with Dan Ross, Chief Operating Officer (V.P.) of the Timex Computer Corporation. Also, it contains an article, with photos, by Sue Mahoney about how to start a user group. It costs $2.95 or $29.95 for 12 issues. The publisher, J. Gladstone, has offered a $5 discount to user groups, which we are passing on to members. Gladstone requires a minimum order and time is limited. Contact us soon if you are interested. And, oh yes, your $24.95 subscription also gets you a free "$15 value" arcade game cassette.

EDUCATOR'S NEWSLETTER: The TEC News is a quarterly newsletter to be published by the Timex-Sinclair Educator's User Group at Texas Wesleyan College in cooperation with the Timex Computer Corporation. It is free to educators. The first edition, which is scheduled to be out in late April, will feature "Computer Literacy for a School Faculty for $1500.00" and an introduction to BASIC for elementary school teachers. Contact: M. Mark Wasicsko, Associate Dean, School of Education, Texas Wesleyan College, Ft. Worth, TX 76105.

FOR MORE INFORMATION

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DIRECTIONS TO THE MEETING

The Sinclair-Timex User Group meets in the Large Science Auditorium (Room 8/2/009) of the University of Massachussets of Boston, Harbor Campus. The Harbor Campus is only 3 miles from downtown Boston and easily accessible by public and private transportation. From the north or west, take the Southeast Expressway to Exit 17. Turn left onto Columbia Road. Enter the rotary and take the first right (Morrissey Boulevard). Bear right on the traffic island, following UMass/Boston sign. Turn left into the Campus. From the south, take Morrissey Boulevard northward to the campus. On the MBTA, take the Red Line (Ashmont Train) to Columbia Station. Transfer to the free University shuttlebus in the T parking lot.

The Boston Computer Society

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