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USER GROUPS

TRS-80 user groups may send the particulars of their meetings and reports of their activities for free publication in the 80-NW Journal.

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The 80-NW Journal is published bi-monthly by 80-NW Publishing, 3110 North 31st Street, Tacoma, Washington 98407, telephone (206) 759-9642

Subscription Rates:

U.S. and Canada — \$16.00 per year

Foreign — \$24.00 per year (sent Airmail)

Foreign subscriptions must be remitted in U.S. funds. Printed in the United States of America.

HUMBUG...



Scrimping and scraping can take all the fun out of Christmas and make you a Scrooge. That's why a gift subscription of 80-NW will make you feel great, and a subscription for yourself will make your joy twice as great!

Merry Christmas!

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Please address all correspondence/inquiries to:
 80-NW Journal
 PO Box 7112
 Tacoma, WA 98407

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#####80-NORTHWEST#####  
#####A JOURNAL FOR TRS-80 USERS#####  
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#####VOL. I NO. 2#####NOV-DEC 1978#####  
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The 80-NORTHWEST JOURNAL

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- FROM THE BACK BURNER AT 80-NW -

SOME OF THE THINGS "COOKING" HERE AT 80-NW ARE ALMOST TOO HOT TO KEEP QUIET, SO HERE ARE SOME OF THE THINGS YOU WILL LIKELY BE SEEING IN FUTURE ISSUES. NO DOUBT YOU SAW THE PICTURE ON OUR COVER. IT'S LEO CHRISTOPHERSONS "ANDROID NIM" GAME, AND WHAT A GAME! WE ARE SELLING IT FOR \$8.00 (\$6.00 IF YOU ARE A SUBSCRIBER) AND WE THINK IT SETS A NEW STANDARD FOR ANIMATED GRAPHICS. LEO ALSO WROTE BIO-2 (IN THIS ISSUE) AND HIS GRAPHICS THERE ARE ENVIABLE ALSO. NOW HE SAYS HE IS WORKING ON AN ENTIRELY NEW AND ORIGINAL PROGRAM FOR US - NO, WE DON'T KNOW YET WHAT IT IS. BUT YOU WILL SEE IT FIRST IN 80-NW!

HOW ABOUT A PROGRAM THAT TALKS TO YOU WHILE YOU WATCH THE SCREEN? WE HAVE ONE IN THE WORKS WHICH WILL TEACH YOU A FEW WORDS IN A FOREIGN LANGUAGE (WHAT BETTER USE FOR AUDIO?)

AND SPEAKING OF AUDIO, WE WILL BE PRESENTING
AN INTERESTING WAY OF CREATING SOUND FROM THE
TRS-80 (NO NOT A RADIO!) WITHOUT HARDWARE MODS!

THEN THERE IS THE SELECTRIC CONNECTION. THIS SHOULD BE OF INTEREST TO YOU WHO TEXT EDIT. IT IS STILL IN THE MAKING, BUT HOPEFULLY BY NEXT ISSUE, YOU WILL BE READING ABOUT IT IN GLORIOUS UPPER/LOWER CASE TYPEWRITTEN PRINT.

WE WILL TOSS ALL CAUTION TO THE WIND NEXT ISSUE
AND PRESENT OUR "CHEAPIE" VERSION OF THE TEXT
EDITOR WHICH IS NOW WRITING THIS COPY. NO, WE
ARE NOT HOLDING BACK, "CHEAPIE", IS AS HIGH AS
IT EVER GETS!!

PLUS, HOW TO "UN-NEW" A PROGRAM YOU REALLY DID NOT WANT TO WIPE OUT. SOME EXPLORATION INTO THE DEEP, DARK MYSTRIES OF THE INNARDS OF TRS-DOS. PLUS ALL THE REGULAR FEATURES, AND WHATEVER COMES UP BETWEEN NOW AND THEN. SEND US YOURS, YOU NEVER KNOW WHAT MAY COME OF IT -- AND TELL THEM YOU SAW IT IN "THE 80-NORTHWEST JOURNAL!"

It turns out sometimes that your best plans do not always work out for the best. Especially after entering a project with vim, vigor and plenty of enthusiasm. After hindsight has had its say, you realize that maybe you should have taken a slightly different tack.

Such is the case with our planned UPPER/lower case article, which was planned for this issue. We have never advocated "butchering" an otherwise fine instrument, this bit of wisdom being gleaned after almost an entire lifetime of being an electronics "tinkerer" and working on computerized equipment since the day they were still mostly vacuum tubes. Having been somewhat involved in design and testing of electronic equipment, it is easy to foresee what may happen to the TRS-80 as basic hardware modifications proliferate. Etched lines are cut, wires soldered in, chips and switches added. There is no standard, everyone does it a different way. Poor little power supply, already taxed, now grunts and groans under its new load(s). Working outside its design rating, it puts more noise, ripple and glitches on the bus, and presto! you have instant glitches and some very intermittent drop outs. Naturally, you scream to the manufacturer. Who doesn't, but whose problem is it really?

Then there is the case where you have hung a whole load of goodies onto your CPU, and used all the spare gates, etc. Now the manufacturer comes along with a really neat mod which has been engineered and tested, and uses those very same gates you have already used up. Then what? You tear out yours and put in his, and after a while your CPU board looks (and performs) like surplus scrap.

If all that isn't bad enough, there is the question of warranty. If you can do your own repair work, OK. But there are many who can't or won't. The hourly charges at the Radio-Shack repair center can really mount when they have to undo your "kludges" first!

Take the case of someone

installing their own Level II conversion. If it goes in and works then they are home free. But what if one of the Level II ROM chips turns out to be bad (it does happen)?

If the service center was doing it, they would simply replace the defective ROM and you probably wouldn't even know about it, nor would you be charged for it. But if you are doing your own, you are out \$90 and another long wait for another Level II mod (where would you find another ROM, burned in exactly like the one you need?)

Which brings us to the slight revision in our own policy. 80-NW will not publish hardware modifications to the stock TRS-80, period. We will publish hardware articles on almost anything you can hang onto it as a peripheral, such as RS-232 interfaces and all the input-output devices you can hang onto such an interface.

So now you are saying 80-NW couldn't come up with the goods on UPPER/lower case, right? Wrong! We have it. We just will not publish it in this journal. We are publishing the software driver for it, and if you read the ads in this issue carefully, you will find the hardware mod is available, separately.

So even if we can't deliver exactly as we planned to, we don't feel we have reneged on a promise.

MAKE
A NICE
DAY!

THE NEW LOOK---

You have probably noted our new format on the text pages. This is due to our recent, and very pleasant, affiliation with Kathy Huston and Rich Mulkey, of the Frontier Press. Rich and Kathy have just recently acquired a new Level II to interface with their Compugraphic IV! Their valuable assistance to an old "nuts & bolts" computer freak is very much appreciated.

ISSUE #1 IS GONE!!

We promised to send them out as long as they lasted. Issue 1 didn't last long! They were gone before issue 2 was put to bed. Our series start with this issue, however, so a complete series of *View from Top of the Stack* and *SYSTEM/COMMAND* WILL BE YOURS IF THIS IS YOUR FIRST ISSUE.

80-US?

Those of you from other than the Northwest need not be intimidated by our "regional" heading. Since we have spread to almost all of the fifty states, there is already a new logo on the drawing board (actually, it's on a mini disk), with a "US" replacing the "NW". Going monthly is also a hot subject around here, but for the time being, at least, we will have to retain our bi-monthly appearance.

HOW CAN IT BE DONE?

How does the author of good software protect his product? Seems that once one copy is sold, everyone on the block (or club) has it free. No one thinks of the originator, who worked long and hard, and gets nothing from those "free" copies. Isn't there a way to prevent it??

Letters to the Editor--

Editor's note: Looks like we are a going concern! Without prior advertising, we direct mailed to almost all the fifty states, and the response has been great!

Most gratifying was the response from Radio Shack store managers. Some quotes - "My customers who are owners of the TRS-80 will appreciate your publication. I have a notebook with first issue next to our demo"—M.E. Thompson, Oregon

We have several like that, plus a few phone calls to the same effect. Also, it seems that our machine language tutorial (starting this issue) and the namelphone file program, drew the most interest. A whole lot of comment was made concerning the "large, easy to read" program listings. We just love to hear things like that!

Then there was one from B. Beasley, Santa Ana, Ca., who said "The Journal looks great - Mike Schmidt, who is he? Anyhow I think you are off to a great start." -- Thank you B. Beasley, it is your humble editor, that's who!

Then there was this rather interesting letter.

10 P. "DEAR FRIEND"

11 P. " "

12 P. "THE OTHER DAY I WAS VISITING MY LOCAL

13 P. "RADIO-SHACK STORE AND HAPPENED TO SEE A"

14 P. "COPY OF YOUR NEW PUBLICATION AFTER LOOK"

15 P. "THIS IT OVER I KNEW IT WAS FOR ME SINCE I"

16 P. "I'M THE OWNER OF A NEW TRS-80 MICROCOMPUTER

17 P. "EQUIPPED WITH LEVEL 1 AND 4K. WE HAVE"

18 P. "ALREADY ORDERED LEVEL 2 WITH 16K."

19 P. " "

20 P. "SO PLEASE ENTER MY SUBSCRIPTION TO '80-NW"

21 P. "PLEASE START WITH THE CURRENT ISSUE, THE"

22 P. "ONE WHICH PRECEDES THE FORTHCOMING FIRST"

23 P. "LESSON IN MACHINE LANGUAGE PROGRAMMING"

23 P. "I WOULD GREATLY APPRECIATE THAT."

24 P. "SINCERELY,"

25 P. "H. A. DUNSTON"

26 P. "SEATTLE, WA"

Radio Shack Computer Services
250 N.W. 7th
Fort Worth, Texas 76106
80—NW,

Congratulations on the new TRS-80 Journal. I really think it's great. 80—NW looks like it's a well founded, well put together publication and should do well in the future. Any support that we here at Radio Shack Computer Services can do to help you and your readers with the TRS-80

please feel free to call on me.

For the edification of you and your readers, I'd like to say that Radio Shack Computer Services has now doubled its size, we added more phone lines and we're in hopes that this will help more people. Our phone number is area code 817-390-3583.

As new items are introduced in the Radio Shack TRS-80 line I'll try to feed you as much information as I can about these new items and try to field any questions that you might have to fill your readers needs.

Let me emphasize that if there's anything I can do here for you or your readers, feel free to call on me. I will do everything within company guidelines that I can to help.

Thank you and good luck.

Hugh Matthias
Manager

Don Dilley, Federal Way, Wa., had several comments which are worth passing along.

1. Careful with the @ in a Level II print @ statement. If shift @ is input, the program listing will be absolutely normal, but a syntax error for the statement will prevent execution. Use lower case @ only.

2. My Level II is picky about read statements. It wants to read the first data item over & over (as if the program contained a reset). I can prevent this by executing any enter statement, before attempting a read. This need be done only once, and solves the problem until power is turned off. I am told that Level II's delivered after mine warn that the read problem occurs after executing an input# statement, and can be prevented by poking 255 into location 16553. I find this can be used with my problem in place of the input statement.

3. My Level II manual has a boner on page 8/8. The example of loading (poking) a machine language starting address in locations 16526 & 16527 shows 208 Decimal = 7D Hex. I find 7D Hex = 125 Decimal, and their sample works if 125 is used.

4. My first failure (since getting Level I last Christmas) is failure to control the tape recorder drive. I'm told to check for a stuck relay and maybe free it with a calibrated karate chop. Haven't tried it yet.

(Thanks, Don - Ed.)

Gentlemen:

It is about time someone came out with a reasonably priced magazine written just for the TRS-80 user!!!

I gladly send \$16.00 for my first 12 month subscription!

At the moment my interests are on the serious side of the computer scene but I enjoy interesting new items also. A good review of some general ledger and accounting systems would save hours of frustration (even though the hours may be enjoyable). Also, a few ideas about using the machine to handle some of the never ending tax forms will help.

(Amen, --Ed)

Sincerely,
Everett Ives
Tacoma, WA 98466

MG Management Services
PO Box 3326
Coos Bay, Oregon 97420

I saw a copy of your Sep-Oct 1978 issue and it looks good. I am particularly interested in any programs that relate to accounting (general ledger, inventory, accounts receivable, etc.).

M.J. Johnson

(Although a complete accounting package will probably be beyond the scope of this journal, we will regularly publish business-related articles, as well as reviews of currently available commercial packages. By the time you read this, Radio-Shack will have announced their own business software. Also, we are now negotiating with Comp U Case, of Tacoma for more business programs.--Ed)

1335 State Ave.
Marysville, WA

Sir:

I feel the TRS-80 needs a users group like the DEC or the Heathkit users group. Consider this my order for your journal!

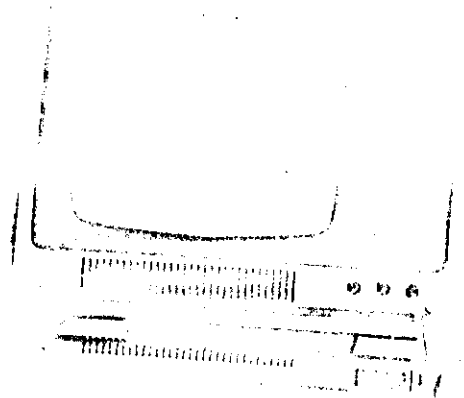
Rick Coulthurst

(Suggest you check out the TRS-80 users library of Comp U Case--see their ad elsewhere in this issue--Ed)

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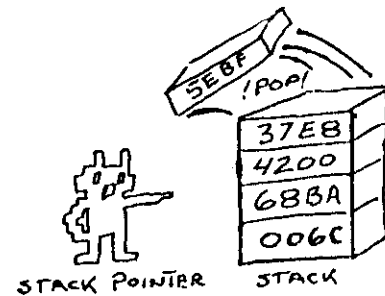
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View from the Top of the Stack

by T. Rosenbaum



How often have you wondered what goes on in the keyboard of your TRS-80? And how does it manage to display all those characters on the screen? How does the computer know how to ask the question "MEMORY SIZE"? And why is it always saying things like "HOW", "WHAT", "SYNTAX ERROR" and all kinds of other messages? Is there a basic program somewhere in the computer which does all of this, or is it done with mirrors and black magic?

Well, none of these answers are correct, although after you have finished reading this series of articles you may believe it is done with black magic!

This is the first of a series of articles which will take the beginning computer user who knows nothing at all about the "nuts and bolts" of the machine and give him a working knowledge of the internal operating system of the TRS-80. It will be assumed that the reader has a Level II machine, or that you have one on order and will be receiving it soon.

In order to understand the TRS-80 one must learn the binary number system. All digital computers, such as the TRS-80, use the binary, or base 2, number system as a basis of their operation. This is because switches, or transistors, have two reliable stable states, on and off. No other "partial states" are allowed, and neither would they be reliable. Consequently, we talk of "on" and "off", "high" and "low", "active" and "inactive" etc. These terms all refer to the state of a particular switch, transistor or integrated circuit (all or which will contain some form of transistor or switch).

The base of a number system is the number of unique symbols which can represent numbers in that system. Base 10 (decimal) has

ten different symbols--0,1,2,3,4,5,6,7,8,9. All decimal numbers are combinations of these symbols. Base 2 (binary) has two symbols--0,1--and all binary numbers are combinations of these two symbols. Following is a table of the first 16 binary numbers:

0 = 0000	8 = 1000
1 = 0001	9 = 1001
2 = 0010	10 = 1010
3 = 0011	11 = 1011
4 = 0100	12 = 1100
5 = 0101	13 = 1101
6 = 0110	14 = 1110
7 = 0111	15 = 1111

As you can see, the binary numbers are not really that different from decimal numbers. They too, have place value. But instead of an increase of 10 when moving to the left one place as in decimal, we now get an increase of twice the previous place value when moving one place to the left, I.E., moving from right to left the place values change thus: 0,1,2,4,8,16,32,64,etc.

If the computer operates using the binary system, how can it understand BASIC programs which are entered into the machine in the form of combinations of English words and numbers, such as: FOR I=1 TO 100 STEP 10?

Well, the TRS-80 has to have help in order to understand BASIC programs. This help comes in the form of the Level I or Level II ROM (*read only memory*) which is in your system. A ROM is an electronic device (integrated circuit) which permanently stores a series of binary numbers. These binary numbers can be "read" out of the ROM and stored in RAM (*random access memory*). This is what happens when you apply the power to your keyboard. The ROM contains the operating program steps (in binary, remember) and

even when the power is off, it still remembers what those steps are. Not so for the RAM, which will lose its memory, so to speak, when the power is turned off.

The difference between a Level I and a Level II ROM is that the Level II ROM stores three times as much information, which makes it much more powerful than the Level I ROM. The subroutines you had to type into Level I (square root, cosine etc.) are a permanent part of the Level II ROM, as well as many other features such as double variables, double precision, more string designations and a host of others.

The TRS-80 can only understand programs which are written in binary, or object, code. The Level II ROM contains a 12K (12 thousand) word computer program which is written in object code (binary). This program is called a BASIC Interpreter and it is what interprets the English-like basic statements and converts them into binary statements which the computer understands.

The BASIC Interpreter looks at one BASIC statement (a line of source code) and converts it into object code which the computer then executes. It then takes the next BASIC statement and converts it, and this process continues until the program is finished. This interpretation process makes it very easy to change program lines and then run, or execute, them. But it also makes the execution of the programs much slower than it would be if the program were written in object code initially. On the other hand, it takes much, much more time to write programs in object code than in source code.

By now you probably understand at least some of the elementary

(Continued on page 10)

Now you can print directly from your keyboard to the line printer. No, you do not have to use the "LPRINT" command. And no, again, there is no hardware change required! A couple of pokes is all that is required. But first, a little background.

If you look at the memory map in the Level II manual (on page D/1), you will see the video display control block, at hex 401D (16413 dec). That address plus 1 and 2 are the driver address for the screen. These locations in decimal are 16414 and 16415. Peeking at these locations will give you decimal 88 and 4. These are the normal driver addresses for the screen.

Just below this block on page D/1 is the line printer device control block. Its driver addresses are 141 and 5 in decimal.

By poking the line printer addresses into the video display control block you can make the line printer think it's the screen. And everything that would normally appear on the screen will now print on the printer!!

The statement you can use is simple, it can be used in command mode, or inside a basic program as a statement. In command mode you *poke 16414,141 : poke 16415,5* - that's all there is to it. But don't forget to turn on the line printer. If you have gone this far, you will notice that the screen is probably blank, and if you are typing in keys that there is nothing (apparently) happening on the printer either. Not to worry, it will print when you push enter. (Or when the print buffer fills up, whichever occurs first.)

To get out of this mode you can hit break (if you don't already have a ready) and type in a *poke 16414,88 : poke 16415,4* - this will return control to the screen, and you will probably see *eady* (it will drop the R). You will not see the last poke statement, because you are typing in "blind", and the printer will not print till you push enter, so type it in carefully.

You can put the same poke statements into a basic program, wherever and whenever you wish. Leave the printer on, and it will print out only those portions of your program between the first poke statement and the second.

HERE IS A REAL LIFE PROGRAM:

```
600 INPUT"DO YOU WANT LINE PRINTER OUTPUT? (1)=
    YES, (2)=NO")X
682 IFX<>1THEN700
683 POKE 16414,141:POKE 16415,5
684 FORI=1TO500:NEXT I
700 PRINT"THIS IS A TEST ONLY A TEST"
710 PRINT
720 PRINT"THIS LINE AND THE HEADING IN LINE
730 PRINT"700 ABOVE SHOULD APPEAR ON THE LINE"
740 PRINT"PRINTER AFTER A SHORT DELAY CAUSED BY"
750 PRINT"THE STATEMENT IN LINE 684. WITHOUT"
760 PRINT"THE DELAY THE PRINTER MAY DROP THE"
770 PRINT"FIRST CHARACTER - YOU JUST GOTTA GIVE"
780 PRINT"THESE MECHANICAL DEVICES TIME!"
800 POKE 16414,88:POKE 16415,4
810 INPUT"TO SEE DATA ON SCREEN ENTER 1 ELSE
    0":X
820 IFX=1 THEN 700
830 STOP
```

AFTER EXERCISING THE "1" OPTION IN LINE 810 THE PROGRAM RUNS RIGHT OVER LINE 800. SINCE YOU ARE ALREADY BACK TO BASIC MODE RUNNING INTO THAT STATEMENT AGAIN DOES NO EFFECT, AND PUSHING ANY OTHER KEY IN LINE 820 WILL GET YOU TO THE STOP STATEMENT.

BUILDING THIS INTO A PROGRAM IS EASY, YOU MAY FIND SOME DIFFICULTY IN TRYING TO MODIFY AN EXISTING PROGRAM WITH IT WHEN THE PROGRAM HAS A COMPLICATED SERIES OF GOSUB'S AND GOTO'S. YOU HAVE TO WATCH WHAT YOU ARE DOING THEN, AS YOU MAY BE HUNG UP WITHOUT DATA ON THE PRINTER OR THE SCREEN.

IT MAY BE BETTER TO FIRST PRINT THE DATA ON THE SCREEN, AND THEN USE THE OPTION TO PRINT ON THE LINE PRINTER. IT DOESN'T TAKE TOO MUCH MANIPULATION OF THE ABOVE LISTING TO ACCOMPLISH THAT. AS IN ALL PROGRAMMING, THE WAY IT WORKS BEST FOR YOU HAS TO BE THE BEST WAY, SINCE THERE ARE A JILLION WAYS OF DOING THINGS.

SO THERE YOU HAVE IT. YOU CAN NOW TALK TO THE LINE PRINTER! AND IN CASE YOU HAVEN'T THOUGHT OF IT, YOU CAN NOW LIST A PROGRAM, THEN SWITCH TO THE POKE STATEMENTS IN COMMAND MODE AND GET A SAMPLE RUN, WITH ALL YOUR COMMANDS LIKE RUN, READY, ETC SHOWING ON THE LINE PRINTER. JUST THE THING TO DO WHEN YOU SEND YOUR FAVORITE PROGRAM TO SOMEbody FOR A JILLION!!

AS WITH ALL POKE STATEMENTS, BE CAREFUL! SOME FUNNY THINGS CAN HAPPEN IF YOU "POKE" AROUND IN MEMORY. GOOD PRINTING!!

Lower Case Characters by T. Rosenbaum

By now surely every TRS-80 owner in the world has heard that his or her machine has the capability to display lower case characters. Many people offer different "fixes" in order to accomplish the conversion, all of which involve the addition of another integrated circuit, the cutting of traces on the printed circuit board and the addition of jumper wires.

Before we go any further, it must be stated that any lower case mod ever presented will result in voiding any warranty which Radio-Shack has on the equipment, and if you must do it, you do so at your own risk. You should take this into consideration before you attempt to modify your equipment.

If lower case characters can be displayed with the modification, why didn't Radio-Shack build them into the TRS-80 in the first place? We suspect it has much to do with engineering, marketing, or competition. In any case it was a decision which the manufacturer made for whatever reason.

The technical reason for lower case characters not being available is the fact that the memory which stores the characters on the display is 7 bits by 1K. This will allow 128 characters to be displayed, (64 graphics, 26 letters, 38 special characters). No room is left for lower case characters so they could not be displayed. But the character generator which translates the ASCII code into the 5 X 7 dot matrix representation of a character can translate 128 different characters (26 upper case, 26 lower case, 32 control characters and 44 special characters). There are modifications which add one 2102 memory chip (1bit X 1K) allow the video display to show all 128 characters plus all the graphics.

The character generator accepts a standard ASCII code as shown below:

ASCII Code			character displayed
Bit 7	Bit 6	Bit 5	
0	0	0	control
0	0	1	special
0	1	0	upper case
0	1	1	lower case

The normal TRS-80 video memory does not have bit 6, so a control character code is displayed as an upper case code and a lower case code is displayed as a special character code. The addition of the 2102 memory chip allows the entire character set to be displayed but reveals two weaknesses in the Level II ROM. The first is that the Level II ROM sends a control character code to the video display memory instead of an upper case character when a key is depressed.

Without the mod, this character is converted to upper case by the TRS-80, but with the mod installed, the conversion is suppressed and a control character is displayed. The second weakness is the fact that when the shift key is depressed a lower case code is generated. This is just opposite to the way a typewriter operates and causes significant problems if you want to use the TRS-80 for word processing.

The first problem can be removed with a small hardware fix, and the second can be taken care of by modifying the video driver which is contained in the Level II ROM. The ROM itself cannot be modified, of course, but the video driver can be accessed by means of a vector which is located at decimal address 16414. The video driver software mod will accomplish the following:

- 1) Display upper case when the shift key is depressed.
- 2) Display lower case when the shift key is not depressed.
- 3) Allow the use of a switch which will suppress the execution of all control functions such as carriage return, line feed, clear etc., and print the control characters corresponding to these functions instead.

An assembly language software listing of the video driver mod is listed below:

VIDEO DRIVER MOD

```

DD 6E 03 LD L, (IX+3) ; INITIALIZE REGISTERS
DD 66 04 LD H, (IX+4) ;
DD 9A 04 JP C, 049AH ;
DD 7E 05 LD A, (IX+5) ;
E7 OR A ;
28 01 JR Z, +3 ;
77 LD (HL), A ;
79 LD A, C ; LOAD CHAR TO ACCUM
FE 80 CP 80 ; CHECK IF GRAPHIC
DE A6 04 JP NC, 04A6H ; JP IF GRAPHIC OR TAB
FE 20 CP 20H ; CHECK IF CONTROL CHAR
30 11 JR NC, +13H ; JP IF NOT CONTROL CHAR
3A 08 38 LD A, 3808H ; SCAN KEY ROW 4
E6 80 AND 80H ; CHECK IF SWITCH CLOSED
28 06 JR Z, +8 ; JUMP IF NOT
79 LD A, C ;
F6 40 OR 40H ; CORRECT IF CTL CHAR
C3 7D 04 JP 047DH ; RE-ENTER BASIC
79 LD A, C ;
C3 06 05 JP 0506H ; NORMAL CONTROL CHAR
RE-ENTRY
FE 40 CP 40H ; CHECK FOR SPEC CHAR
DA 7D 04 JP C, 047DH ; RE-ENTER BASIC IF
SPECIAL CHARACTER
FF 60 CP 60H ; CHECK FOR LOWER CASE
30 05 JR NC, +7 ; JUMP IF NOT
16 20 OR 20H ; CORRECT IF LOWER CASE
C3 7D 04 JP 047DH ; RE-ENTER BASIC
E6 9F AND 9FH ; CORRECT IF UPPER CASE
C3 7D 04 JP 047DH ; RE-ENTER BASIC

```

Once the above routine is loaded into memory the video driver vector must be changed to point to this routine. The video driver vector is located at decimal 16414 and 16415. The low order address is at 16414 and high order address is at 16415. The routine must also be located in a "memory size" protected area so that the BASIC Level II ROM will not write over it.

A BASIC language program listing which will load this driver into the machine is included at the end of this article.

You will notice that after the mod is accomplished you will have a new, funny looking, cursor. □

The normal cursor is an upper case character and since the hardware mod switches the position of the upper case and control characters, the cursor will appear as a control character. This glitch could be removed with a more complicated hardware fix which is not recommended. The new cursor is sufficiently different from any of the characters you will see displayed that it will not cause any problems.

A few words of explanation regarding the new switch mentioned above. The switch must be placed between the pin 2 of Z2 and pin 6 of Z4 on the keyboard. This takes the place of one of the keys in the keyboard matrix which the TRS-80 does not use. This switch will allow the suppression of all the control functions in the TRS-80 and instead print on the screen the control character corresponding to the control function. Page C/1 of the appendix of the BASIC Level II reference manual contains a list of all the control functions.

--remember--

Word has it that there will shortly be available from Radio-Shack a line renumbering program for use in Level II TRS-80's. It will allow you to automatically renumber the lines in a basic program, with your choice of starting line and increments between lines. It will take care of such things as renumbering line references within the program, such as GOTO, GOSUB, etc. The part No. is 26-2004, and has a retail price of \$9.95

```

10 CLS:DEFINT I-N
15 PRINT "DID YOU MEMORY SIZE PROTECT?":PRINT
   BREAK AND RE-ENTER BASIC IF YOU DIDN'T
   OTHERWISE PRESS ENTER"
16 A$=INKEY$:IFA$=""GOTO16
20 INPUT "ENTER THE RAM IN YOUR MACHINE (4, 16, 32, 48)":N
30 IFN=4THENM=20400:N=1ELSEIFN=16THENM=32700:
   N=2ELSEIFN=32THENM=-16460:N=3ELSEIFN=48THENM=
   -75:N=4ELSEPRINT "TRY AGAIN":GOTO20
40 DATA221, 110, 3, 221, 102, 4, 218, 154, 4, 221, 126, 5,
   183, 40, 1, 119,
   121, 254, 128, 210, 166, 4, 254, 32, 48, 17, 58, 8, 56, 230,
   120, 40, 6, 121, 246, 64
50 DATA195, 125, 4, 121, 195, 6, 5, 254, 64,
   218, 125, 4, 254, 96, 48, 5,
   246, 32, 195, 125, 4, 230, 159, 195, 125, 4
60 PRINT "LOADING"
70 FOR K=0TO61:READJ:POKEK+K, J:NEXT
80 ONNGOTO90, 100, 110, 120
85 PRINT "ERROR -- RERUN PROGRAM":GOTO20
90 I1=176:I2=79:GOTO130
100 I1=188:I2=127:GOTO130
110 I1=180:I2=191:GOTO130
120 I1=181:I2=255
130 POKE16414, I1:POKE16415, I2

```

THE PROGRAM LISTED BELOW WILL DISPLAY ALL OF THE CONTROL CHARACTERS:

```

10CLS: ?TAB(15)"TRS-80 CONTROL CHARACTERS":?:?
20FORI=0TO7:FORJ=0TO3
30?TAB(16+J)I+J*8" ";POKE15493+I*64+J*16+64,
   I+J*8+64:NEXTJ:?:NEXTI

```

VIEW... (Continued from page 7)

principles and theory of the operation of the TRS-80. The long range goal of this continuing series of articles is to familiarize the reader with the art of programming the computer in object code. Once one is familiar with object level programming he will have unlocked the "secrets" of the computer and will more fully be able to appreciate the strengths and limitations of the machine.

Next issue a brief discussion of Boolean Logic will be presented. The presentation will not be aimed at teaching all there is to know about Boolean Logic-just enough to allow the reader to become familiar with it to be able to use it to help understand object level programming. You should be able

to find a reference book to help learn Boolean Logic at your local public library--look under "Boolean Algebra". Don't let the "algebra" fool you--it's not what you might think!

A copy of T-BUG, available at your local Radio Shack, will be necessary also. Order it if you do not have one.

Questions which you may have regarding Level II programming or any other aspects of this article will be answered by sending the question and a stamped, self-addressed envelope to: View, 80-NW, PO Box 7112, Tacoma, WA 98407.

BIORHYTHM

by I. Schmidt & L. Christopherson

—FACT OR FANCY?

Biorhythm programs have been around for a long time. They seem to be a "natural" for micro-computing enthusiasts, since they apparently do something(?), and usually are accompanied by an attractive and eye catching printout. Since no self respecting magazine would be complete without at least one such program, we will "one-up" the others, and present two (count them!) very different biorhythm schemes.

Bio-program 1 will fit into Level I, 4K, and with slight modification, will run on level II. Its printout, which can be changed to print out on the line printer, gives the day of the week, the date, the current day of the physical-emotional-intellectual cycle, comments as to various crossings, and the number of days you have lived on that day. It also has the option of printing all days, or only those which have some activity (one or more zero crossings). Although it is not as "flashy" as some of the standard displays, it is not hard to read, and provides an exact readout for each day.

Bio-program 2 will require Level I with 16K. It requires about 7K bytes of memory. *Bio-2* will give the same results as *Bio-1* insofar as crossings are concerned. The unique feature of *Bio-2* is its printout. It puts all three biographs on the screen at once, and differentiates between them in a rather interesting way. Also it is one of the few programs which we found will convert from Level I to II and run without "fixing" anything. This indicates that it can be typed into a Level II machine almost "as is" and it should run. (Level I users, as usual, will need to pay attention to the *print ats*).

The basic ingredient for a biorhythm program is a good "days between dates" routine. It is very necessary that this be accurate, because the cycles are figured using the number of days from your birthday to a current selected date. Then while you have this much, it is a simple matter to add a small routine to figure the day of the week for any given date, as in program *Bio-1*.

The days between dates must take into consideration the fact that leap years occur. Not only that they occur, but that when spanning a century year, the correct leap year is added or left out. In other words, simply dividing the year by 4 to determine if the year is a leap year is not enough. You must also see if the year in question is divisible by 100 and 400. As it turns out, no century year is a leap year unless it is exactly divisible by 400.

The reason for all this is that back in the good old days of Romans and Popes, they found that the calendar was slipping away from the usual time to plant crops. The Julian calendar did not take into consideration about .0122 of a day, and over a period of time they were 10 whole days off. In 1472 Pope Sixtus IV invited the astronomer Johann Mueller to come to Rome and make the necessary changes to the calendar. Poor Johann was assassinated for some reason or other in 1476, and nothing happened until 1582, when Pope Gregory XIII employed the services of a German mathematician, Christopher Clavius, who did all the calculations and developed the rules, giving us the present Gregorian date.

What Clavius did was to take into account the fact that the tropical year amounts to 365.2422 and not 365.25 days. This difference amounts to three days in 128X3 or 384 years, i.e., about 3 days each 400 years. When this was first enacted they decided that the day following Oct. 5 would be reckoned as Oct. 15, and everything fell back into place. Various European states did not go along with the idea at first, and it was 11 days off in 1752, at which time they decided that the day following Sept. 2, 1752, would be termed Sept. 14th. Many people did not understand the nature of the change, and thought they were being cheated. Riots broke out in England, and the people demanded they be given back their eleven days!

Later a slight change was made to the Gregorian calendar to bring

it more closely into line with the tropical year. It was still in error by one day in 3,323 years, and it has been agreed the years 4000, 8000, etc. would be without the extra day for leap year. The calendar is now correct to within one day in 20,000 years (if someone doesn't stop the world to get off!)

What this all means to us here is that you can't go back in history and do biorhythms on famous people before 1750(whatever), without doing some very fancy (and probably incorrect) calculations. Closer to home (than 1750), it means that if you span the century 1900 with a program, 1900 would normally have been a leap year (because it is divisible by 4) - but is not because it is not divisible by 400. The year 2000 (not so far off) will be a leap year tho.

—HOW DO BIORHYTHMS WORK?

Rather than simply present bio-programs and leave their interpretation blowing in the wind, we thought a little background on the meaning (or supposed meaning) would be in order. You can't say 80-NW doesn't fill an educational gap!

One of the most common errors is that you are "up" when the cycles are up, and "down" when they are down. (Maybe this gave "rise" to the common expression, "what's up?" and "what's going down?"). Whatever, - if that were true, we all would be bouncing around like yo-yo's, since the cycles constantly interchange because of their varying length (periods). According to the well known author of *Biorhythms - a Personal Science*, Bernard Gittelson (Arco Publishing co.), our weakest moments are not those of the negative phases, but when the cycle crosses zero, in either a positive going or negative going direction. The days when the cycles cross zero are known as "critical days". We all have one or the other of the cycles crossing zero at least four or five times each month. A few times per year we have two cycles crossing at the same time, and maybe about once in a year or

10 REM * DAY-DATE-BIO * (C) 1978 80-NW PUBLISHING *

11 REM * TACOMA, WA * ALL RIGHTS RESERVED *

99 CLS

100 PRINT"-----DAYS BETWEEN DATES-DAY OF WEEK-BIORYTHM-----"

110 PRINT:PRINT" A THREE PART PROGRAM"

120 PRINT"-1-DAYS BETWEEN DATES-1 JAN 1801 THRU 31 DEC 2099"

130 PRINT:PRINT"-2-DAY OF WEEK FOR DATE 1 JAN 1801 THRU 31 DEC 2099"

140 PRINT:PRINT"-3-BIORYTHM FOR ANY DAY FORWARD"

145 PRINT:PRINT:PRINT:PRINT:PRINT

150 INPUT"INDICATE YOUR CHOICE BY TYPING 1,2,OR 3 & ENTER";J

155 CLS

160 IF J=1 THEN 200

170 IF J=2 THEN 300

180 IF J=3 THEN 400

200 INPUT"1ST OR (EARLIEST) DATE (MM,DD,YYYY)";G,F,H

210 GOSUB 1000

220 K=D

230 INPUT"2ND OR (LATEST) DATE (MM,DD,YYYY)";G,F,H

240 GOSUB 1000

245 PRINT:PRINT

250 Z=D-K:PRINT"THE TOTAL DAYS BETWEEN THESE 2 DATES =" ;Z

251 GOTO 5000

300 G=01:F=01:H=1801

310 GOSUB1000

320 K=D

330 PRINT"WHAT IS THE DATE YOU WISH DAY OF WEEK FOR?"

340 INPUT"ENTER LIKE THIS (MM,DD,YYYY)"; G,F,H

345 V=G:W=F:X=H

350 GOSUB 1000

351 A(1)=D-K:PRINT:PRINT

352 GOSUB 530

360 PRINTV;W;X; " THE DAY OF THE WEEK IS - ";B\$

362 GOTO 5000

400 INPUT"ENTER YOUR BIRTHDAY (MM,DD,YYYY)";G,F,H

410 GOSUB 1000

420 K=D

430 INPUT"DATE YOU WANT BIO CHART TO START (MM,DD,YYYY)";G,F,H

432 PRINT:PRINT

433 PRINT"CRITICAL DAYS ONLY ? TYPE 0, FULL LIST TYPE 1":INPUTA

434 PRINT:PRINT"1ST DAY OF EACH MONTH SHOWS IN ANY CASE FOR REFERENCE"

440 V=G:W=F:X=H

450 GOSUB 1000

460 Z=D-K

470 G=1:F=1:H=1801

480 GOSUB 1000

490 K=D

500 G=V:F=W:H=X

510 GOSUB 1000

520 A(1)=D-K

530 Q=A(1)/7:T=INT(Q):Q=Q-T:Q=Q*100:Q=INT(Q):Q=Q/7:Q=INT(Q)

540 A(2)=Q

550 GOSUB1500

555 IF J=2 THEN RETURN

560 M=23

570 U=Z:Q=U/M:T=INT(Q):Q=Q-T:Q=Q*M:Q=Q+.05:Q=INT(Q*10)/10

```

500 IF M=23 THEN P=0:GOTO 610
590 IF M=28 THEN E=0:GOTO 610
600 IF M=33 THEN I=0:GOTO 630
610 M=M+5:Q=0:T=0
620 GOTO 570
630 GOSUB2000
640 PRINTTAB(1); "DAY"; TAB(10); "DATE"; TAB(24); "PHY"; TAB(28); "EMOT";
650 PRINTTAB(33); "INTEL"; TAB(40); "COMMENTS"; TAB(55); "DAY-COUNT"
660 PRINTTAB(1); B$; TAB(10); V; TAB(13); W; TAB(16); X; TAB(24); P; TAB(28); E;
670 PRINTTAB(33); I; TAB(40); A$; TAB(55); Z
740 W=W+1:A$=
750 IF (W=31)*((V=4)+(V=6)+(V=9)+(V=11)) THEN W=1:V=V+1
760 IF (W=32)*((V=1)+(V=3)+(V=5)+(V=7)) THEN W=1:V=V+1
770 IF (W=32)*((V=8)+(V=10)) THEN W=1:V=V+1
780 IF (W=32)*(V=12) THEN X=X+1:V=1:W=1
790 IF V=2 THEN 810
800 GOTO 840
810 Q=X/4:T=INT(Q):Q=Q-T
820 IF (Q=0)*(W=30) THEN W=1:V=V+1
830 IF (Q>0)*(W=29) THEN W=1:V=V+1:Q=0:T=0
840 A(2)=A(2)+2
850 IF A(2)>=13 THEN A(2)=0
860 GOSUB1500
900 P=P+1:E=E+1:I=I+1
910 IF P=23 THEN P=0
920 IF E=28 THEN E=0
930 IF I=33 THEN I=0
940 GOSUB2000
945 Z=Z+1
946 IF W=1 THEN 640
947 IF A=1 THEN 660
950 IF B>=1 THEN 660
952 IF B<>1 THEN 740
999 END
1000 D=(H*365)+F:L=G
1010 IF G<=2 THEN 1050
1020 L=(L*.4)+2.3
1030 L=INT(L)
1040 D=D-L:H=H+1
1050 G=((G*31)+(H-1)/4)
1060 G=INT(G):D=D+G
1070 IF H=1900 THEN D=D+1
1080 RETURN
1499 END
1500 IF A(2)=0 THEN B$=WEDNESDAY
1510 IF A(2)=2 THEN B$=THURSDAY
1520 IF A(2)=4 THEN B$=FRIDAY
1530 IF A(2)=6 THEN B$=SATURDAY
1540 IF A(2)=8 THEN B$=SUNDAY
1550 IF A(2)=10 THEN B$=MONDAY
1560 IF A(2)=12 THEN B$=TUESDAY
1570 RETURN
1999 END
2000 A$=

```

Tired of typing?
 This and most other programs in
 this issue are available in Level
 II cassettes or disk-- see page
 31.



```

2001 P=0
2005 IF((P=0)+(E=0)+(I=0))B=1:A#=IX
2010 IF((P=11)+(E=14)+(I=16))B=1:A#=IX
2020 IF((P=0)+(P=11))*((E=0)+(E=14))B=1:A#=XX CAUTION
2030 IF((E=0)+(E=14))*((I=0)+(I=16))B=1:A#=XX CAUTION
2040 IF((P=0)+(P=11))*((I=0)+(I=16))B=1:A#=XX CAUTION
2050 IF(I=0)*(E=0)*(I=0)B=1:A#=[[] DANGER!
2060 IF(P=11)*(E=0)*(I=0)B=1:A#=[[] DANGER!
2070 IF(P=0)*(E=14)*(I=0)B=1:A#=[[] DANGER!
2080 IF(P=11)*(E=14)*(I=0)B=1:A#=[[] DANGER!
2090 IF(P=0)*(E=0)*(I=16)B=1:A#=[[] DANGER!
2100 IF(P=11)*(E=0)*(I=16)B=1:A#=[[] DANGER!
2110 IF(P=0)*(E=14)*(I=16)B=1:A#=[[] DANGER!
2120 IF(P=11)*(E=14)*(I=16)B=1:A#=[[] DANGER!
2130 RETURN
5000 FOR A(0)=1TO1000:NEXTA(0)
5001 GOTO 99

```

Note: The TRS-80 Line Printer does not print up, down, right or left arrows-- but the screen will. In the program listing to the left, substitute an 'up arrow' for [and 'down arrow' for the backwards slash.



eighteen months, we have all three crossing. You can check this out when you have *Bio-1* or *Bio-2* in your computer and running. Apparently, when you have two or three crossing it is worse than just one (according to the literature on it).

Actually, the cycles are all supposed to start going up from zero the day you were born. Since the physical cycle is 23 days, the emotional is 28 days and the intellectual is 33 days, they do not repeat again until you are 21252 days old. That would make you about 58 years, 2 months and several days old! In the meantime, they cross in every which way. It is interesting to note that the emotional cycle is exactly 28 days long. This means that it will cross zero every two weeks, on the same day of the week on which you were born. It might be of interest to try and remember which day of the week you like the least before you run your program, and see if it is the day of the week on which you were born.

It has been said that several large companies have used, or are using, biorhythms to reduce their accident rates. Also that biorhythms have been used to predict the outcome of sporting events. We don't think that the results are entirely clear. It needs looking into.

—THE CHALLENGE

Our challenge to you is to come up with a good set of statistics, and armed with all these bio-programs, to come up with some objective and meaningful data. We

don't go for statements like "he was almost into his physical crossing when he had the accident", or "just three days prior to her emotional crossing", etc., etc... There are so many days already crossing that the "almosts" make it a sure bet to find some kind of correspondence. No -- what we would like to see is a few thousand auto accident cases or some such, which would be run through one of these programs (or adaptation of one).

The questions to be answered are: are one's chances for having an accident higher, the same or lower on a one, two or three crossing day than on an ordinary day? No "just abouts" allowed! Most state highway departments have that sort of data. You don't need anything but the date of the accident and the birthday of the persons involved, so no confidential information need be given by the department concerned. A sample of about 2 or 3 thousand would be nice for a start. It would take that many at least to average out those who actually do not know their real birthdate (there are some!!) and those who give the wrong (!!!!) dates of birth.

It need not necessarily be auto accidents, as there are plenty of other areas which can be explored. In-plant accidents, for example, or perhaps some teachers might keep data on student grades in relations to biorhythms, etc., etc....

Using the above as a guide, you may enter our "Biorhythm Validation Contest". Submit your program and data to us. We will hound one of the local universities for a statistician to validate your statistical method. We have a professional

programmer who will judge your program. The winning entry will be published along with all the background, in a future issue of 80-NW. And---the winner will have the supreme satisfaction of having done something for humanity--in addition to which 80-NW will kick in \$50.00 or a box of 10 mini disks whichever you prefer!

This is open to level I or II. Submit your program on tape or disk with labels as to what is what (don't make us guess!). And all entries become the property of 80-NW.

USR (Group)

Tacoma, Wa.

An informal gathering of interested TRS-80 owners meets on the first Thursday of each month at 7:30 pm at 3825 North 26th Street, Tacoma, Wa.

Nothing is ever planned, but they have demonstrated a 40K, 4 disk, 2 printer system among other things. No one is in charge - you just show up.

```

1 REM * BIORHYTHMS PROGRAM * (C)1978 80-NW TACOMA WA
  ALL RIGHTS RESERVED * CREATED BY L B CHRISTOPHERSON *
3 REM* SECOND CURVE IS EMOTIONAL, THIRD CURVE IS INTELLECTUAL.
4 REM* WHEN DISPLAY IS COMPLETE, ENTER 1 TO START ALL OVER;
5 REM* ENTER 2 TO CHANGE ONLY MONTH DISPLAYED; AND ENTER
6 REM* 3 TO CHANGE ONLY BIRTHDATE (NOT MONTH DISPLAYED).
8 X=1
10 CLS
20 PRINT@278, " ";
22 PRINT"BIORHYTHMS";
24 PRINT@463, " ";
26 PRINT"ENTER BIRTH DATE IN NUMBERS: ";
28 PRINT@528, " ";
30 INPUT"MONTH , DAY , YEAR ";J,K,L
70 E=J:F=K:G=L
90 Z=1
100 GOSUB220
103 IFZ>1500THEN10
105 GOSUB350
110 D=A
111 ONXGOTO112,112,120,112
112 CLS
113 PRINT@278,"BIORHYTHMS";
114 PRINT@396, " ";
115 PRINT"ENTER NUMBER OF MONTH AND YEAR";
116 PRINT@459, " ";
117 PRINT"FOR WHICH BIORHYTHMS ARE DESIRED";
118 PRINT@530, " ";
119 INPUT"MONTH , YEAR ";M,O
120 E=M:F=1:G=0
140 Z=1
150 GOSUB220
153 IFZ>1500THEN114
155 GOSUB350
160 D=A-D
165 IFD>-KTHEN170
166 GOSUB240
167 GOTO70
170 GOTO1000
220 IF(G<0)+(G>4000)THEN240
225 IF(E<1)+(E>12)THEN240
230 ONEGOTO260,280,260,340,260,340,260,260,340,260
240 CLS
244 PRINT@469, " ";
245 PRINT"UNREAL DATE ! ";
246 FORZ=1TO1500:NEXTZ
250 RETURN
260 IFF>31THEN240
270 RETURN
280 IFG/4=INT(G/4)THEN220
290 IFG/400=INT(G/400)THEN320
300 IFG/100=INT(G/100)THEN310
310 IFF>28THEN240
320 IFF>29THEN240

```

Level I users please note the "Print@" symbol in these listings. Please change to "Print at" where necessary.



```

330 RETURN
340 IFF>20 THEN 240
345 RETURN
350 DATA 31, 59, 90, 120, 151, 181, 212, 243, 273, 304, 334
355 DATA -1
360 RESTORE
365 FOR Z=1 TO E
370 READ A
375 NEXT Z
376 GOSUB 1500
377 Z=1
380 A=A+G*365+INT(G/4)+F+1-INT(G/100)+INT(G/400)
390 IF INT(G/4)=G/4 THEN 410
400 GOTO 450
410 IF G/400=INT(G/400) THEN 430
420 IF G/100=INT(G/100) THEN 440
430 IF E>2 THEN 450
440 A=A-1
450 RETURN
1000 P=D-INT(D/23)*23
1010 I=D-INT(D/28)*28
1020 E=D-INT(D/33)*33
1030 CLS
1035 GOSUB 1800
1040 Y=23
1050 FOR X=6 TO 122 STEP 4
1060 SET(X, Y-2)
1070 NEXT X
1075 IF D<0 THEN 1115
1080 IF P=0 THEN 1120
1090 FOR Q=1 TO P
1100 READ Z
1110 NEXT Q
1115 Q=0
1120 FOR M=3 TO 123 STEP 4
1122 IF Q=0 THEN 1130
1124 Q=Q+1
1126 NEXT M
1130 READ Z
1140 FOR Y=2 TO 43
1150 SET(X, Y-2)
1160 NEXT Y
1170 NEXT X
1180 GOSUB 1500
1185 IF D<0 THEN 1225
1190 IF I=0 THEN 1230
1200 FOR A=1 TO I
1210 READ Z
1220 NEXT A
1225 Q=0
1230 FOR M=1 TO 124 STEP 4
1232 IF Q=0 THEN 1240
1234 Q=Q+1
1236 NEXT M
1240 READ Z
1250 NEXT A
1260 NEXT Y
1270 RESET(X, Z-2)
1280 NEXT X
1290 GOSUB 1500
1295 IF D<0 THEN 1335
1300 IF E=0 THEN 1340
1310 FOR A=1 TO E
1320 READ Z
1330 NEXT A
1335 Q=0
1340 FOR X=5 TO 125 STEP 4
1342 IF Q=0 THEN 1350
1344 Q=Q+1
1346 NEXT X
1350 READ Z
1355 GOTO 1370
1360 FOR Y=2 TO 43 STEP 3
1370 SET(X, Z-2)
1375 GOTO 1390
1380 NEXT Y
1390 NEXT X
1400 GOTO 1700
1410 NEXT Y
1420 NEXT X
1430 GOTO 1700
1440 FOR Y=23 TO Z
1450 SET(X, Y)
1460 NEXT Y
1470 NEXT X
1480 GOTO 1700
1500 READ Z
1510 IF Z=-1 THEN RETURN
1520 GOTO 1500
1700 INPUT X
1705 RESET(0, 44):RESET(2, 44)
1710 ON X GOTO 10, 1720, 10, 10
1720 CLS:GOTO 0
1800 IF (M=1)+(M=3)+(M=5)+(M=7)+(M=8)+(M=10)+(M=12) THEN 2000
1810 IF M=2 THEN 1830
1820 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
1821 PRINT" 25 27 29 1";:GOTO 2020
1830 IF D/4=INT(D/4) THEN 1850
1840 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
1841 PRINT" 25 27 1 3";
1842 PRINT@961, " 2 4 6 8 10 12 14 16 18 20 22";
1843 PRINT" 24 26 28 2";
1844 GOTO 2040
1850 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
1851 PRINT" 25 27 29 2";
1852 PRINT@961, " 2 4 6 8 10 12 14 16 18 20 22";
1853 PRINT" 24 26 28 1";
1854 GOTO 2040
2000 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
2010 PRINT" 25 27 29 31";
2020 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
2030 PRINT" 25 27 29 31";
2040 PRINT@897, " 1 3 5 7 9 11 13 15 17 19 21 23";
2050 PRINT" 25 27 29 31";

```



```

2000 FORX=0T0121STEP8
2055 SET(X,Y-1)
2060 SET(X,Y):SET(X,Y+1)
2070 NEXTX
2075 PRINT@127,"*":PRINT@191,"B":PRINT@255,"I":PRINT@319,"O";
2076 PRINT@383,"R":PRINT@447,"H":PRINT@511,"Y":PRINT@575,"T";
2077 PRINT@639,"H":PRINT@703,"M":PRINT@767,"S":PRINT@831,"*";
2100 ONMIGOTO2102,2112,2122,2132,2142,2152
2101 ONM-6GOTO2162,2172,2182,2192,2202,2210
2102 PRINT@64,"J":PRINT@128,"A":PRINT@192,"N":PRINT@256,"U";
2104 PRINT@320,"A":PRINT@384,"R":PRINT@448,"Y":GOTO2250
2112 PRINT@64,"F":PRINT@128,"E":PRINT@192,"B":PRINT@256,"R";
2114 PRINT@320,"U":PRINT@384,"A":PRINT@448,"R":PRINT@512,"Y";
2116 GOTO2250
2122 PRINT@192,"M":PRINT@256,"A":PRINT@320,"R";
2124 PRINT@384,"C":PRINT@448,"H":GOTO2250
2132 PRINT@192,"A":PRINT@256,"P":PRINT@320,"R";
2134 PRINT@384,"I":PRINT@448,"L":GOTO2250
2142 PRINT@256,"M":PRINT@320,"A":PRINT@384,"Y":GOTO2250
2152 PRINT@192,"J":PRINT@256,"U":PRINT@320,"N";
2154 PRINT@384,"E":GOTO2250
2162 PRINT@192,"J":PRINT@256,"U":PRINT@320,"L":PRINT@384,"Y":GOTO2250
2172 PRINT@128,"A":PRINT@192,"U":PRINT@256,"G":PRINT@320,"U";
2174 PRINT@384,"S":PRINT@448,"T":GOTO2250
2182 PRINT@64,"S":PRINT@128,"E":PRINT@192,"P":PRINT@256,"T";
2184 PRINT@320,"E":PRINT@384,"M":PRINT@448,"B":PRINT@512,"E";
2186 PRINT@576,"R":GOTO2250
2192 PRINT@128,"O":PRINT@192,"C":PRINT@256,"T":PRINT@320,"O";
2194 PRINT@384,"B":PRINT@448,"E":PRINT@512,"R":GOTO2250
2202 PRINT@64,"N":PRINT@128,"O":PRINT@192,"V":PRINT@256,"E";
2204 PRINT@320,"M":PRINT@384,"B":PRINT@448,"E":PRINT@512,"R":GOTO2250
2210 PRINT@64,"D":PRINT@128,"E":PRINT@192,"C":PRINT@256,"E";
2212 PRINT@320,"M":PRINT@384,"B":PRINT@448,"E":PRINT@512,"R":GOTO2250
2250 V=INT(O/10):W=INT(V/10):R=INT(W/10)
2255 U=O-V*10:T=V-W*10:S=W-R*10
2260 W=R:V=640:GOSUB2600
2270 W=S:V=704:GOSUB2600
2280 W=T:V=768:GOSUB2600
2290 W=U:V=832:GOSUB2600
2300 PRINT@895," ";
2310 RESET(0,44)
2500 RETURN
2600 ONM+1GOTO2605,2615,2625,2635,2645,2655,2665,2675,2685,2690
2605 PRINT@V,"0":RETURN
2615 PRINT@V,"1":RETURN
2625 PRINT@V,"2":RETURN
2635 PRINT@V,"3":RETURN
2645 PRINT@V,"4":RETURN
2655 PRINT@V,"5":RETURN
2665 PRINT@V,"6":RETURN
2675 PRINT@V,"7":RETURN
2685 PRINT@V,"8":RETURN
2690 PRINT@V,"9":RETURN
9000 DATA23,17,13,9,6,4,3,5,7,11,15,21,25,31,35,39,41,43,42,40,37,33,29

```

Tired of typing?

This and most other programs in this issue are available in Level II cassette or disk-- see page 34.

9001 DATA23, 17, 13, 9, 6, 4, 3, 5, 7, 11, 15, 21, 25, 31, 35, 39, 41, 43, 42, 40, 37, 33, 29
 9002 DATA23, 17, 13, 9, 6, 4, 3, 5, 7, 11, 15, 21, 25, 31, 35, 39, 41, 43, 42, 40, 37, 33, 29
 9003 DATA-1
 9010 DATA23, 15, 15, 11, 7, 5, 4, 3, 4, 5, 7, 11, 15, 19, 23, 27, 31, 35, 39, 41, 42, 43, 42
 9011 DATA41, 39, 35, 31, 27, 23, 19, 15, 11, 7, 5, 4, 3, 4, 5, 7, 11, 15, 19, 23, 27, 31, 35
 9012 DATA39, 41, 42, 43, 42, 41, 39, 35, 31, 27, 23, 19, 15, 11, 7, 5, 4, 3, 4, 5, 7, 11, 15
 9013 DATA-1
 9020 DATA23, 19, 15, 12, 9, 7, 5, 4, 3, 3, 4, 6, 8, 11, 14, 17, 21, 25, 28, 32, 35, 38, 40, 42
 9021 DATA43, 43, 42, 41, 39, 37, 34, 30, 27, 23, 19, 15, 12, 9, 7, 5, 4, 3, 3, 4, 6, 8, 11, 14
 9022 DATA17, 21, 25, 28, 32, 35, 38, 40, 42, 43, 43, 42, 41, 39, 37, 34, 30, 27
 9023 DATA-1
 9024 DATA

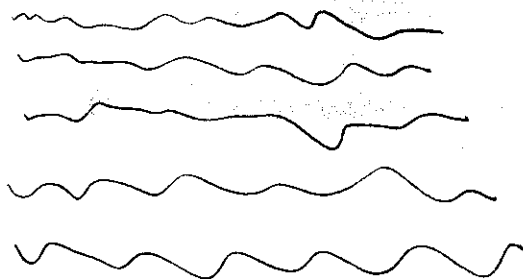


Figure 1 of Fig. 1

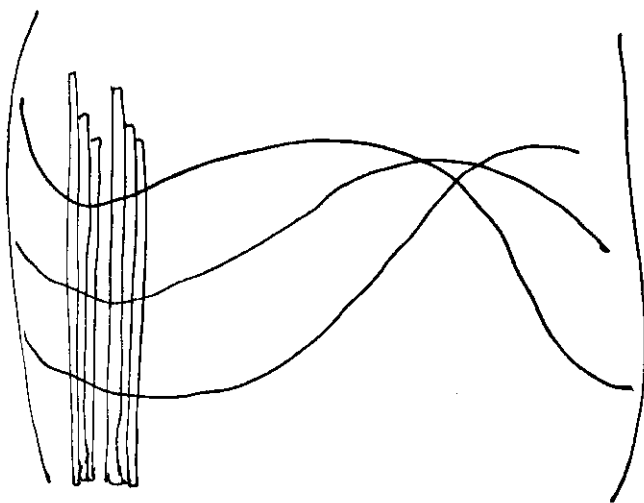


Figure 2 of Fig. 2

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ANDROID NIM—

It isn't very often you come across a program like this o

The author handed me a cassette one evening and said, "Try this". Well, it looked like just another game, until I ran it!

But what a game!! My first reaction was to laugh out loud, the impact of those first three "Androids" blinking their eyes, and looking around as if to say, "What the hell are we doing here?", was just too much.

The speed at which 15 others appear on the screen amazed me no end, and then they too start with the blinking and changing of head and hand positions. There seems to be nothing which was not taken into account, as I went on to play the game and they nod their heads in agreement. I actually fell off my chair when I tried an impossible move.

It took a while to win (I had never played the game of Nim before), and when I finally got lucky and won one, there was another neat surprise. You actually have to play the game a dozen times or more to catch all the action-- there is much going on all the time!

Needless to say, we bought the rights to this one, fast. In our opinion, this has to be the all time classic TRS-80 animated graphic game! It takes advantage of just about all the TRS-80 capability, with some very interesting innovations which will no doubt become the basis for further effort in this direction.

Everyone around here has fallen in love with these little "guys" and "Andy the Android" has already become the mascot of 80-NW. You will be seeing one or more in various places around the publication. It is a true work of art.

It is a 14K program and would take at least seven or eight pages just to list in the journal. It definitely has some commercial value, one of the best we have ever seen. Just the thing a struggling young publication like 80-NW needs to help with the bills and such... So we are offering *Android Nim* on a cassette. requires 16K Level II to run, and the price is \$8.00, first class post paid.

BY G. Thurmond

(Editor's note--this new column by Gary, of Newbury Park, CA., will deal with the exploration, use and the expansion of TRS-80 capabilities through the use of machine and assembly language programming. In particular, it will demonstrate the many uses of RSM-1 and RSM-1S, both very popular products of small systems software. Gary also informs us that there is now available from Small Systems the TRS232, a low cost software driven printer interface which connects directly to the TRS-80. Now if you have an RS-232 compatible printer or a model 33 teletype, you can have yourself a line printer!)

The following utility program is for those of you who use the RSM-1S machine language monitor and wish to output to your line printer. With this utility added to the monitor, commands are typed in the normal manner but the output is either to the screen or to the line printer and the screen. By following a command with "ENTER" the output goes to the screen only, but by using the right arrow instead of ENTER, the output goes to the line printer and the screen.

To do this, RSM-1S needs three patches, a print flag set/reset, and a printer driver. The patches cannot be made a byte at a time with the E (enter) command as this would be changing the monitor while it is being used and would crash the system. By entering the HEX code into the user area at address 4FB0 and typing U and ENTER, the code starting at 4FB0 to 4FC5 is executed and the patches are put into the keyboard, screen and command entry routines while they are not being used. The patch routine returns to the monitor and displays "COMMAND?". The code starting at 4FC6 sets the print flag if a command was entered with the right arrow, and the code starting at 4FD2 resets the print flag upon completion of a monitor command.

The line printer driver code starting at 4FDA calls the screen driver tests the print flag if on, and

printer status bit, looping until ready, then outputs the character to memory map port 37E8.

To add this utility to RSM-1S, use the E (enter) command. Enter the HEX code into the user area starting at address 4FB0 to 4FEE. Do a dump from 4FB0 to 4FEE and check for errors.

Now make a monitor cassette tape of this code with W (write tape) command. The patching part of the code may now be executed by typing U and ENTER. The printer can then be tested by typing S 4FB0 4FEE and right arrow. The symbolic dump of the code just entered should appear on the screen as well as on the line printer.

TRS-80/RSM-1S line printer driver listing as output on a line printer. Labels and comments added.

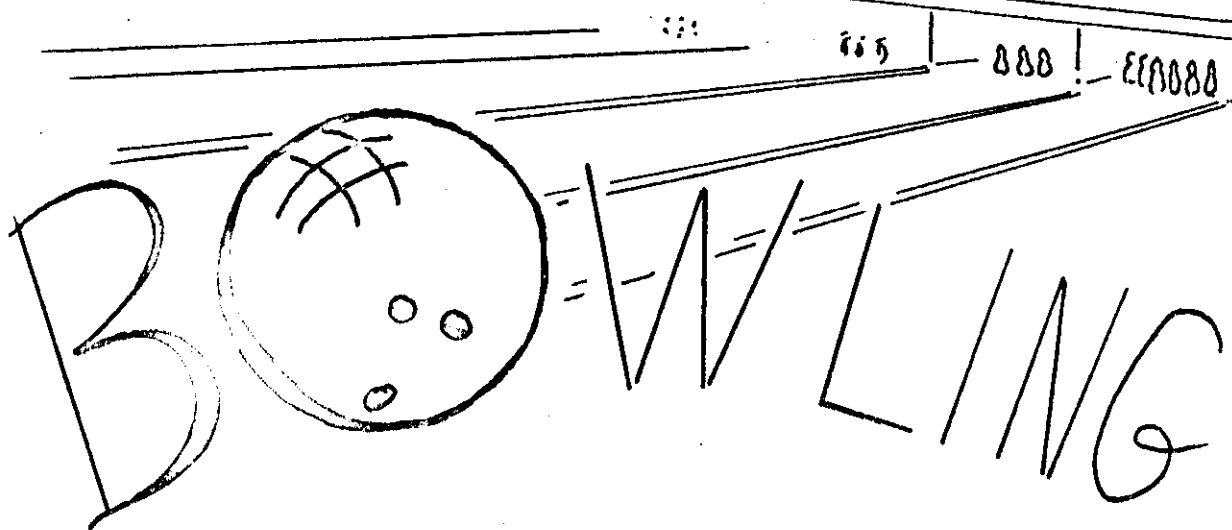
```

4FB0 3E 03  PATCH LD A,03  RSM-1S PATCHES
4FB2 32 91 42  LD A,030A
4FB4 21 08 4F  LD A,0F08
4FB6 22 55 42  LD A,0550  PATCH KEYBOARD
4FB8 0F 10  LD A,0F
4FBA 21 01 43  LD A,0101  PATCH SCREEN
4FBC 2E 02  LD A,02
4FBE 22 98 43  LD A,0398  PATCH EXECUTIVE
4FC0 09  RET  PATCH
4FC2 32 30 41  SET LD A,0330  STORE PRINT FLAG
4FC4 FE 09  CP 09  TEST FOR RIGHT ARROW
4FC6 09  RET  PATCH IF NOT
4FC8 32 10  LD A,0010  LOAD PRINT FLAG
4FCA 32 2F 41  LD A,012F  SET PRINT FLAG
4FCC 09  RET  PATCH
4FCE 09 05 42  RESET CALL 4F05  OUTPUT "COMMAND?"
4F05 07 07 0A  RET  PATCH
4F07 32 2F 41  LD A,012F  RESET PRINT FLAG
4F09 09  RET  PATCH
4F0B 09 33 42  PATCH CALL 0133  PATCH COMMAND
0133 09 09 03  RET  PATCH
4F0D 09 09 03  RET  PATCH
4F0F 09 09 03  RET  PATCH
4F11 32 2F 41  LD A,012F  SET PRINT FLAG
4F13 07 07 0A  RET  PATCH
4F15 09 09 03  RET  PATCH
4F17 09 09 03  RET  PATCH
4F19 09 09 03  RET  PATCH
4F1B 09 09 03  RET  PATCH
4F1D 09 09 03  RET  PATCH
4F1F 09 09 03  RET  PATCH
4F21 09 09 03  RET  PATCH
4F23 09 09 03  RET  PATCH
4F25 09 09 03  RET  PATCH
4F27 09 09 03  RET  PATCH
4F29 09 09 03  RET  PATCH
4F2B 09 09 03  RET  PATCH
4F2D 09 09 03  RET  PATCH
4F2F 09 09 03  RET  PATCH
4F31 09 09 03  RET  PATCH
4F33 09 09 03  RET  PATCH
4F35 09 09 03  RET  PATCH
4F37 09 09 03  RET  PATCH
4F39 09 09 03  RET  PATCH
4F3B 09 09 03  RET  PATCH
4F3D 09 09 03  RET  PATCH
4F3F 09 09 03  RET  PATCH
4F41 09 09 03  RET  PATCH
4F43 09 09 03  RET  PATCH
4F45 09 09 03  RET  PATCH
4F47 09 09 03  RET  PATCH
4F49 09 09 03  RET  PATCH
4F4B 09 09 03  RET  PATCH
4F4D 09 09 03  RET  PATCH
4F4F 09 09 03  RET  PATCH
4F51 09 09 03  RET  PATCH
4F53 09 09 03  RET  PATCH
4F55 09 09 03  RET  PATCH
4F57 09 09 03  RET  PATCH
4F59 09 09 03  RET  PATCH
4F5B 09 09 03  RET  PATCH
4F5D 09 09 03  RET  PATCH
4F5F 09 09 03  RET  PATCH
4F61 09 09 03  RET  PATCH
4F63 09 09 03  RET  PATCH
4F65 09 09 03  RET  PATCH
4F67 09 09 03  RET  PATCH
4F69 09 09 03  RET  PATCH
4F6B 09 09 03  RET  PATCH
4F6D 09 09 03  RET  PATCH
4F6F 09 09 03  RET  PATCH
4F71 09 09 03  RET  PATCH
4F73 09 09 03  RET  PATCH
4F75 09 09 03  RET  PATCH
4F77 09 09 03  RET  PATCH
4F79 09 09 03  RET  PATCH
4F7B 09 09 03  RET  PATCH
4F7D 09 09 03  RET  PATCH
4F7F 09 09 03  RET  PATCH
4F81 09 09 03  RET  PATCH
4F83 09 09 03  RET  PATCH
4F85 09 09 03  RET  PATCH
4F87 09 09 03  RET  PATCH
4F89 09 09 03  RET  PATCH
4F8B 09 09 03  RET  PATCH
4F8D 09 09 03  RET  PATCH
4F8F 09 09 03  RET  PATCH
4F91 09 09 03  RET  PATCH
4F93 09 09 03  RET  PATCH
4F95 09 09 03  RET  PATCH
4F97 09 09 03  RET  PATCH
4F99 09 09 03  RET  PATCH
4F9B 09 09 03  RET  PATCH
4F9D 09 09 03  RET  PATCH
4F9F 09 09 03  RET  PATCH
4FA1 09 09 03  RET  PATCH
4FA3 09 09 03  RET  PATCH
4FA5 09 09 03  RET  PATCH
4FA7 09 09 03  RET  PATCH
4FA9 09 09 03  RET  PATCH
4FAB 09 09 03  RET  PATCH
4FAD 09 09 03  RET  PATCH
4FAF 09 09 03  RET  PATCH
4FB1 09 09 03  RET  PATCH
4FB3 09 09 03  RET  PATCH
4FB5 09 09 03  RET  PATCH
4FB7 09 09 03  RET  PATCH
4FB9 09 09 03  RET  PATCH
4FBB 09 09 03  RET  PATCH
4FBD 09 09 03  RET  PATCH
4FBE 09 09 03  RET  PATCH
4FBF 09 09 03  RET  PATCH
4FC1 09 09 03  RET  PATCH
4FC3 09 09 03  RET  PATCH
4FC5 09 09 03  RET  PATCH
4FC7 09 09 03  RET  PATCH
4FC9 09 09 03  RET  PATCH
4FCA 09 09 03  RET  PATCH
4FCC 09 09 03  RET  PATCH
4FCE 09 09 03  RET  PATCH
4FCF 09 09 03  RET  PATCH
4FD1 09 09 03  RET  PATCH
4FD3 09 09 03  RET  PATCH
4FD5 09 09 03  RET  PATCH
4FD7 09 09 03  RET  PATCH
4FD9 09 09 03  RET  PATCH
4FDB 09 09 03  RET  PATCH
4FDD 09 09 03  RET  PATCH
4FDE 09 09 03  RET  PATCH
4FDF 09 09 03  RET  PATCH
4FE1 09 09 03  RET  PATCH
4FE3 09 09 03  RET  PATCH
4FE5 09 09 03  RET  PATCH
4FE7 09 09 03  RET  PATCH
4FE9 09 09 03  RET  PATCH
4FEB 09 09 03  RET  PATCH
4FED 09 09 03  RET  PATCH
4FEE 09 09 03  RET  PATCH

```

T. Pepin
Tacoma, Wa.

Computerized Bowling game



Here is another example of Tom Rosenbaum's interactive Level I keyboard technique. This bowling game can be as frustrating as real bowling. As the "ball" moves up and down across the "alley", you have to decide when to "throw" it. You "throw" it by pushing the *enter* key.

The ball will move down the alley straight at the "pins"-- straight for awhile at least. If you are throwing a "straight" ball, the ball will wobble randomly in its course near the pins. If you are throwing a "hook" ball, the ball will hook up the screen using a random curve.

The scoring system this program uses is not regulation bowling scoring. Instead of waiting to score a frame after a mark, the program will score the frame like an open. However, the next frame will have the extra pins added into the score correctly. The reason for this is simple: I got lazy when I wrote the scoring portion of this program.

NOTES ON LEVEL II CONVERSION

Since the interactive Level I keyboard technique doesn't work for Level II, it would seem difficult to convert this program. While it seems difficult, it really isn't. Level II has a function that is an interactive keyboard function. This is the *Inkey\$* function. By

replacing line 160 with an *Inkey\$* function, the Level I technique is duplicated. Now for the changes.

After using the program conversion tape, the first change is to line 10. Change line 10 to read:

```
10 CLS: CLEAR 50: DEFINT
   A-X: DIM A(10)
```

Delete lines 80, 90, 370, 3050.
Change line 160 to read:

```
160 C$=INKEY$: IF C$<>" "
   THEN 200
```

Change line 3030 to read *G\$* instead of *g*. Change line 3040 to read:

```
3040 IF LEFT$(G$,1)="H"
   THEN G=H ELSE G=S
```

One final change, having saved the worst for last, all multiple statement *If* lines, like 340, have to be changed to have the *then* in them:

```
340 IF (A(I)=10)*(B=1)
   THEN
```

```
   A(I+25)=2: GOTO 400
```

Here is another example of Tom Rosenbaum's interactive Level I keyboard technique. This bowling game can be as frustrating as real bowling.

The first thing you will notice when you run this program in Level II is the speed of the ball. A little bit faster, is it not? You will have to relearn how to play the game! Enjoy Bowling!

```

4 REM * COMPUTERIZED BOWLING ALLEY *
5 REM * (C) 1978 T. PEPIN * ALL RIGHTS RESERVED *
10 CLS
15 GOSUB3000
17 FORI=0T050:A(I)=0:NEXTI
20 FORX=0T0127:SET(X,25):SET(X,47):SET(X,17):NEXTX
25 FORY=18T024:SET(0,Y):SET(127,Y):NEXTY
30 FORX=26T0116STEP10:FORY=18T024:SET(X,Y):NEXTY:NEXTX
40 PRINT0271,"1    2    3    4    5    6    7    8    9    10";
50 PRINT0449,A#;
60 I=0:L=0:F=0
70 B=0
75 IF F<10 F=F+1
80 PRINT00;
90 SET(2,0):SET(3,0)
100 RESTORE
110 READ X,Y
120 IF X<0 GOTO150
130 SET(X,Y)
140 GOTO110
150 D=2:X=2:Y=28
155 I=I+1
160 IF POINT(2,0)=0 GOTO200
170 IF(Y+D<28)+(Y+D>44) D=-D
180 RESET(X,Y):Y=Y+D:SET(X,Y)
190 GOTO160
200 D=2
210 IF(POINT(X+D,Y-1))+(POINT(X+D,Y))+(POINT(X+D,Y+1)) GOTO300
220 RESET(X,Y)
230 X=X+D:IF X>127 GOTO320
235 IF(G=H)*(X>82) Y=Y-RND(0)
240 IF(G=H)+(X<80) GOTO250
242 IFRND(10)=5 Y=Y+RND(0):GOTO250
245 IFRND(10)=2 Y=Y-RND(0):GOTO250
247 IFRND(10)=9 Y=INT(Y)
250 IFY<27 Y=27
255 IFY>45 Y=45
260 SET(X,Y)
270 GOTO210
300 RESET(X,Y)
304 Y=INT(Y)
305 H=RND:R=0
307 IF(POINT(X-1,Y-1))+(POINT(X-1,Y))+(POINT(X-1,Y+1)) X=X-1
310 FORK=XT0127STEP9:R=R+3:FORJ=Y-RT0Y+R:IF(J<45)*(J>26)RESET(K,J):RESET(K+1,J)
315 NEXTJ:NEXTK
320 B=B+1
330 GOSUB1000
340 IF(A(I)=10)*(B=1) A(I+25)=2:GOTO400
345 IF(A(I)=10)*(B=2) A(I+25)=1
350 IFB=2 A(I)=A(I)-A(I-1):GOTO400
360 IFI>20GOTO400
370 PRINT00;:SET(2,0):SET(3,0)
390 GOTO150
400 GOSUB2000:A(0)=0:FORJ=1T01
401 IFJ>20GOTO412

```

```

402 IFA(J+25)=1 A(0)=A(0)+A(J+1)
403 IFA(J+25)<>2 GOTO410
405 A(0)=A(0)+A(J+2)
407 IFA(J+27)=2 A(0)=A(0)+A(J+4):GOTO410
408 A(0)=A(0)+A(J+3)
410 IFJ<21 A(0)=A(0)+A(J)
412 NEXTJ
415 IFA(I+25)=2 I=I+1
417 IF F=10 PRINT@506,A(0):GOTO425
420 PRINT@461+(INT(I/2)-1)*5,A(0);
425 IF(I=20)*(A(I+24)=2) GOTO70
426 IF(I=21)*(A(I+23)=2) GOTO70
427 IF(I=22)*(A(I+24)=2) GOTO70
430 IF(I>19)*(A(I+25)=0) GOTO440
432 IFI<21GOTO70
440 PRINT@0;
450 IF A(0)>150 PRINT"    NOT BAD!";:END
460 PRINT"    DEFINITE ROOM FOR IMPROVEMENT";
470 END
1000 A(I)=0:RESTORE
1010 READ X,Y,W,Z
1020 IF X=-1 RETURN
1030 IF POINT(X,Y) GOTO1010
1040 A(I)=A(I)+1:GOTO1010
2000 IFA(I+25)=2 PRINT@400+(F-1)*5,"X":RETURN
2010 IFA(I+25)=1 PRINT@400+(F-1)*5,"/":RETURN
2020 PRINT@400+(F-1)*5,"-":RETURN
3000 PRINT"WELCOME TO YOUR COMPUTERIZED BOWLING ALLEY!":PRINT
3010 INPUT"WHAT ARE YOUR INITIALS";A$
3020 H=1:S=2
3030 INPUT"DO YOU THROW A HOOK BALL OR A STRAIGHT BALL";G
3040 IF(G=H)+(G=5) GOTO3060
3050 PRINT"JUST TYPE 'HOOK' OR 'STRAIGHT'":GOTO3030
3060 PRINT:PRINT"OK, THIS IS HOW IT WORKS..."
3070 PRINT"    WHEN WE BEGIN, THE BALL WILL MOVE UP AND DOWN THE LANE."
3080 PRINT"TO THROW THE BALL, HIT THE 'ENTER' BUTTON. THE COMPUTER"
3090 PRINT"WILL KEEP SCORE."
3100 PRINT:INPUT"    PUSH 'ENTER' TO BEGIN";B$:CLS
3120 RETURN
4990 DATA97,36,98,36,106,39,107,39
5000 DATA106,33,107,33,115,31,116,31,115,26,116,36,115,41,116,41
5010 DATA124,28,125,28,124,33,125,33,124,39,125,29,124,44,125,44
5020 DATA-1,-1,-1,-1
5999 CLS
6000 REM * STOP HERE FOR LEVEL I, FOLLOWING CHANGES MAKE IT
      CONVERT TO LEVEL II
6001 REM *CHANGE 10 TO READ 10 CLS:CLEAR 50:DEFINT A-X:DIMN(10)
6002 REM * DELETE LINES 80, 90, 370, 3050 CHANGE LINE 160 TO
      READ 160 C$=INKEY$:IF C$<>" "THEN 200
6003 REM * CHANGE LINE 3030 TO READ G$ INSTEAD OF G
6004 REM * CHANGE LINE 3040 TO READ 3040 IF LEFT$(G$,1)="H"
      THEN G=H ELSE G=5
6005 REM * ALL MULTIPLE STATEMENT IF LINES, LIKE 340, HAVE
      TO BE CHANGED TO PUT THE 'THEN' IN THEM IE,
      340 IF(A(I)=10)*(B=1) THEN A(I+25)=2:GOTO 400

```

NYBBLES

--Level 3?--

Even though you may occasionally see such a thing as "L3 ERROR" when using Level II without a disk system, there apparently is no such thing as Level III. According to well informed sources there is only Level I, Level II and DOS. Seems the escalation of levels stops at 2, and the DOS, which started at version 2.0, and is now at version 2.1, will continue.

--Printer Ribbons--

Need a replacement ribbon for your printer? Is the copy getting so light you cannot read it any longer?

Or maybe you want to submit a listing to someone and it needs to be photocopied. You certainly want listings for publication to be crisp and black, so the will photograph properly. There is a No.4018 nylon "Matrix Black Int." ribbon available. It fits IBM printers using ribbon part No.1136653 and Centronics 700, 701 and 761. It also fits the TRS-80 line printer, and changing it is a snap, if you follow the directions on the line printer itself. And by the way, this ribbon is available from one of our advertisers. (See back cover.)

Screen Printer Distortion--

How come the screen printer seems to stretch a graphic display horizontally? It's almost as though you stretch the screen right and left. Could there be an adjustment that could be made to the speed of the motor in the screen printer which would correct this? The screen printer is the only part of the system which we lack here at 80-NW, how about some input on this one?

--Level II Upgrade--

It has been said before, but it is worth the repeat: Going from Level I to Level II for \$90, has to be one of the best bargains in the industry . .

Can you believe a bumper sticker which says: "Micro-computerists do it with pecks and pokes."

A Mail List Program

Here is a handy program you can use if you have a small mail list (Christmas cards?) to keep up. Or maybe your club can use it for the mailing of announcements, bulletins and such.

Although it is somewhat long, most of it is explained in the program itself. What is not shown are some of the neat things you can do with it. For example, to delete a name takes several minutes at best. So when you have names to delete as well as some to add, simply use the edit option. It is much faster - you simply change the name from one you want to delete and put in its place one you want to add.

Another idea which we tried on it works also. That is using the search to pull out selected items, like expiration dates, and then printing just those on the line printer. It works like this: You have your list in memory. You then break and type (in command mode) *poke 16414,141 : poke 16414,5* and *enter*. (Turn your printer on first!). Now the printer will do what the screen used to do. Then type *goto 30* and *enter*. You will not see it on the screen, but it will print on the printer will list out those items you are looking for. When you want to go back to the screen, you type *break* and *poke 16414,88 : poke 16415,4* - and you will get a *ready* (minus the R) on the screen again. Then *goto 30* again and you will not have lost your variables.

Sorts of any sort (no pun intended) take quite a long time. We did a worst case sort (the list was in backwards) on 200 names, addresses and zip codes, and it took about 14 minutes. The way this program is set up at present, it will take about 400 names/addresses. How many you can use will depend upon your memory size. Line 20 will have to be changed to your particular needs.

The program itself occupies 4 granules on the disk, about 20 sectors. The data file, with a full load of 400 names/addresses took 20 granules or 100 sectors.

The printing of addresses on labels should look just about like

the one on the back of this journal. That is the size label it is set up to print. Be careful when printing labels! We found that every other z fold wants to crawl around the platten and come through again. This can cause a mess in your printer, not to mention what it could do to the print mechanism.

Some things you might want to do to this to improve on it:

- ★ Make it delete faster.
- ★ Make the data file name a variable so you can have more than one file per disk.
- ★ Make it sort even faster (we would like that one!).

If you come up with any changes, by all means send them in!

And before we forget - the periods in the names/addresses are delimiters. So don't use periods for anything else! In case you hadn't noticed, it uses *line input*, so we can use just about anything in the line as far as punctuation goes. Anyway, the periods were chosen for delimiters because there is usually a period after the street address in any case (Like St. or Ave.)

The search feature is fun to fool around with. With it you can pull out states, names or whatever you like, and it will list them out for you. It also shows up any duplicate names in a hurry, and speaking of duplicates, the delete will delete only the first one it encounters on the way through the list. So you do not have to type the name back in.

The poke statements for the printer, mentioned earlier above, are described in more detail in another article in this issue.

This is another of our "semi-modular" type programs. If you do not have a line printer you may leave out those sections which have to do with the printer. Also, if you do not have disk, it shouldn't be very difficult to change the disk *load* and *save* routines to tape. If you do change to tape then the *instr* function (used in Disk Basic) will have to be changed to the *instring* routine, which is presented in the Level II manual.

...


```

5 REM * (C)1978 03-NORTHWEST PUBLISHING TACOMA WA *
10 CLS: CLEAR25000
15 DEFINT I: DEFSTR N, A, Z, C, T, W, B
20 DIMN(500), A(500), Z(500), C(500)
30 CLS: PRINT: PRINT
40 PRINTTAB(15)"NAME & ADDRESS LIST"
45 PRINT: PRINT"(AFTER A BREAK, RE-ENTRY POINT IS LINE 30)"
60 PRINT: PRINT"ENTER 1 TO BUILD A LIST"
70 PRINT"ENTER 2 TO SEE A LIST"
80 PRINT"ENTER 3 TO SORT THE LIST"
90 PRINT"ENTER 4 TO SAVE A LIST ON DISK"
100 PRINT"ENTER 5 TO LOAD A LIST FROM DISK"
110 PRINT"ENTER 6 TO PRINT THE LIST OUT"
115 PRINT"ENTER 7 TO EDIT WITHIN THE LIST"
117 PRINT"ENTER 8 TO DELETE A NAME FROM THE LIST"
118 PRINT"ENTER 9 TO ADD NAMES TO THE LIST"
119 PRINT"ENTER 10 TO SEARCH THE LIST"
120 INPUTQ: ONQ GOTO130, 350, 400, 660, 760, 1000, 1100, 1400, 1500, 1600
130 PRINT: PRINT: PRINT: CLS
140 PRINTTAB(20)"INSTRUCTIONS:"
150 PRINT"TYPE THE WHOLE NAME ADDRESS AND CITY, STATE ZIP ON "
160 PRINT"THE SAME LINE. BE SURE AND PUT A PERIOD AFTER THE"
170 PRINT"EXPIRATION NUMBER AND THE END OF THE ADDRESS. "
180 PRINT"(EXAMPLE: "
190 PRINT"JOHN DOE C78.3333 N OAK ST. ANYTOWN, CA 97438"
235 PRINT"TO END THE LIST PRINT 'ZZZZ' FOR THE NAME"
240 PRINT"FIRST NAME"
250 FORI=1TO1000
260 LINE INPUTC(I)
270 IFLEFT$(C(I), 2)="ZZ"THEN330
310 PRINT"NAME"; I+1
320 NEXTI
330 C(I)=C(I)+"99.99999":R=I
335 GOTO1070
340 INPUT"ENTER TO CONTINUE"; X:GOTO30
350 FORI=1TOR-1
355 PRINT"NAME"; I
360 PRINTC(I)
370 PRINT: NEXTI
380 INPUT"ENTER TO CONTINUE"; X
390 GOTO30
400 CLS: PRINT"          ENTER 1 TO SORT BY NAME
          ENTER 2 TO SORT BY EXPIRATION DATE
          ENTER 3 TO SORT BY ZIP CODE"
410 INPUTS
415 PRINT"SORTING. . . . . "
430 M=R-1
440 N=INT(M/2)
450 IFM=0THEN630
460 J=1:K=R-M
470 I=J
480 L=I+M
490 IFS=1THEN520
500 IFS=2THEN525
510 IFRIGHT$(C(I), 5)<RIGHT$(C(L), 5)THEN600ELSE540
520 IFC(I)<C(L)THEN600ELSE540
525 F1=(INSTR(C(I), ".")-3):F2=(INSTR(C(L), ".")-3)

```

USR (Group)
Federal Way, Wa.
The TRS-80 Computer Club meets at the club house of Pine Terrance Trailer Village, 21814 Pacific Hwy. South, on the second and fourth Wednesday of each month.
Contact Walt Nash at 206-824-4063 for further information.

```

500 IF (L<1) THEN 530
530 IF (L<1) THEN 530
540 T=C(I)
550 C(I)=C(L)
560 C(L)=T
570 I=I+1
580 IF I<1 THEN 500
590 GOTO 300
600 J=J+1
610 IF J>K THEN 440
620 GOTO 470
630 FOR I=1 TO J
640 PRINT C(I);
650 NEXT I:PRINT:GOTO 300
660 CLS:PRINT:PRINTING FROM DISK-----FILE NAME IS CHA/DAT"
670 OPEN "A":1,"CHA/DAT"
680 FOR I=1 TO R
690 PRINT C(I)
700 IF LEFT$(C(I),2)="ZZ" THEN 730
710 PRINT C(I)
720 NEXT I
730 CLOSE 1
740 PRINT:1;"ITEMS ARE ON THE DISK"
750 INPUT"ENTER TO CONTINUE":X:GOTO 300
760 CLS:PRINT:PRINTING FROM DISK-----
770 PRINT"FILE NAME IS CHA/DAT"
780 OPEN "A":1,"CHA/DAT"
790 FOR I=1 TO R
800 LINE INPUT C(I)
805 PRINT C(I)
810 IF LEFT$(C(I),2)="ZZ" THEN 830
820 NEXT I
830 CLOSE 1
840 R=I
900 INPUT"ENTER TO CONTINUE":X:GOTO 300
950 GOTO 300
1000 CLS:PRINT:PRINT(23)"TURN ON THE PRINTER"
1010 INPUT"ENTER TO CONTINUE":X:CLS
1020 FOR I=1 TO R
1025 GOTO 1040
1030 LINE INPUT C(I):PRINT C(I)
1040 LINE INPUT IS LIGHT" "PRINT" "
1050 PRINT:
1055 GOTO 1030
1060 NEXT I
1060 INPUT"ENTER TO CONTINUE":X:GOTO 300
1070 PRINT:1;"WILL BE LEFT ON FOR PERIODS IT IS IMPORTANT THAT"
1071 PRINT:2;"PLEASE CHECK THE FILE YOU CAN ALSO CHANGE ANY OTHER MISTAKES"
1072 PRINT:3;"AND MAKE A CHANGE"
1080 INPUT"ENTER TO MAKE A CHANGE, 0 FOR INDEX":X
1090 IF X=0 THEN 1100
1100 CLS:PRINT:PRINTING THE RECORD OF THE NAME YOU WANT TO EDIT"
1110 INPUT
1120 PRINT:1;"IS THE LINE:"
1130 PRINT C(I)
1150 PRINT:2;"THE LINE:"

```

Tired of typing??
This and most other
programs in this issue are
available in Level II cassettes
or disk-- see page 31.



```

1100 LINEINPUTC(J)
1100 PRINT"THE NAME NOW READS:";PRINTC(J)
1105 INPUT"TYPE 1 FOR ANOTHER NAME, 0 FOR INDEX";X
1190 IFX=1GOTO1100ELSE30
1195 GOTO30
1200 REM *
1210 C(I)=N(I)+A(I)+Z(I)
1230 RETURN
1240 REM *
1245 IFLEFT$(C(I),2)="ZZ"THEN1305
1250 E=INSTR(C(I),".")
1260 N(I)=LEFT$(C(I),E)
1270 F=INSTR(E+1,C(I),".")
1280 H=LEN(C(I))-F
1290 Z(I)=RIGHT$(C(I),H)
1300 A(I)=MID$(C(I),E+1,F-E)
1304 GOTO1310
1305 N(I)=LEFT$(C(I),4):A(I)="" :Z(I)="9999999"
1310 RETURN
1320 GOTO30
1400 CLS:PRINT"ENTER THE NUMBER OF THE"
1410 PRINT"NAME YOU WANT DELETED. ";:INPUTG
1420 C(I)=""
1430 FORI=GTOR-1
1450 C(I)=C(I+1)
1460 NEXTI:R=R-1
1470 PRINT"DELETED. . . ENTER 1 FOR ANOTHER, 0 FOR INDEX";:INPUTX
1480 IF X=0GOTO30
1490 IFX=1GOTO1400
1500 CLS:PRINT"GO AHEAD----- DON'T FORGET TO TYPE 'ZZZZ' TO END THE LIST"
1510 PRINT"NAME";R
1520 FORI=RTOR+1000
1530 LINEINPUTC(I)
1540 IFLEFT$(C(I),2)="ZZ"THEN1580
1565 PRINT"NAME";I+1
1570 NEXTI
1580 C(I)=C(I)+"9999999"
1585 R=I
1590 INPUT"ENTER TO CONTINUE";X:GOTO30
1600 CLS:PRINT"YOU MAY ENTER ANY NAME, ADDRESS, CITY, STATE,"
1610 PRINT"ZIP CODE, OR ANY PART OF ANY ONE. YOU WILL GET"
1620 PRINT"BACK ALL THE PERSONS WHO HAVE THAT IN ANY PART"
1630 PRINT"OF THEIR ADDRESS."
1640 INPUT"ENTER WHAT YOU ARE SEARCHING FOR";B
1650 CLS
1655 FORI=1TOR-1
1670 IFINSTR(C(I),B)<>0THEN1700
1690 GOTO1720
1700 PRINTC(I)
1720 NEXTI
1730 INPUT"ENTER 1 FOR ANOTHER, 0 FOR INDEX";X
1740 IFX=1THEN1640
1750 IFX=0THEN30

```

-DALLAS MICROCOMPUTER SHOW-

THIS IS A REPORT FROM YOUR SPECIAL CORRESPONDENT IN DALLAS. (YOU DIDN'T KNOW YOU HAD ONE, DID YOU?). DALLAS, TEXAS SAW ITS FIRST INTERNATIONAL MICROCOMPUTER EXPOSITION THE WEEKEND OF SEPT 28TH/OCT 1ST 1978 AND IT WAS EXCITING!

THE MOST EXCITING ASPECT IS THE EXCITEMENT ITSELF AND THE EXPLOSION OF INTEREST IN THE MICRO. IN 1977 THERE WAS A JOINT COMPUTER CONFERENCE IN THE DALLAS CONVENTION CENTER, WITH A SMALL MICROCOMPUTER CONTINENT IN THE BASEMENT - VERY DEFINITELY A SIDE SHOW - ONLY ONE OR TWO DOZEN EXHIBITORS. NOW A YEAR LATER, THE MICRO EXHIBITORS HAVE MOVED UPSTAIRS AND COMFORTABLY FILLED THE MAIN CONVENTION HALL - OVER 60 BOOTHS!

IT WASN'T JUST A SELL-A-THON EITHER. THERE WERE THREE FULL DAYS OF SEMINARS, WITH SPEAKERS RANGING FROM DAVID AHL TO RODNEY ZAKS AND SUBJECTS SPANNING THE MICRO SPECTRUM FROM BUSINESS APPLICATIONS FOR MICROS, THRU A RIDE ON THE S-100 BUS TO THE Z80. MY SYMPATHY GOES TO THE PLANNING COMMITTEE. HOW DO YOU PLAN A SPEAKER AGENDA FOR SUCH A DIVERSE GROUP AS MICRO-COMPUTER ENTHUSIASTS? THERE IS THE SOFTWARE FORTIO SET ON BUILDING THE WORLDS BEST AND SMALLEST COMPILER, THE ELECTRONICS WIZ BENT ON TYING EVERY NEW GADGET TO HIS S-50 BUS, THE BUSINESSMAN WITH THE GLINT OF DOLLARS IN HIS EYE

AND THE HOST OF US EAGER SOULS SEEKING TO LEARN MORE ABOUT THESE WONDERFUL NEW DEVICES CALLED PERSONAL COMPUTERS.

RADIO SHACK? THEY WERE THERE. BOOTH NUMBER ONE NO LESS! THERE WERE TRS-80'S ALL OVER, EVEN HANGING FROM THE CEILING. AND THERE WERE SALES-MEN ALL OVER. THEY WEREN'T HANGING FROM THE CEILING, BUT THEY WERE EAGER TO PROMOTE THE WONDERS OF THE TRS-80. THERE WAS A SYSTEM IN OPERATION WHICH SHOWED OFF THE PRINTER NICELY, BUT NO PROMISES OF QUICK DELIVERIES ON A DISK OR PRINTER SYSTEM. LIVING NEAR TANDY DOESN'T HELP MUCH. WE HAVE A THREE OR FOUR MONTH WAIT ALSO!

IF THE HIGHEST COMPLIMENT IS IMITATION, RADIO SHACK SHOULD FEEL COMPLIMENTED. THE WORD "TRS-80" APPEARED IN MANY BOOTHS. MICROTRONICS OF PHILADELPHIA, PA WILL SELL YOU AN INTERFACE FOR JOY STICKS, A PRINTER AND EVEN STEREO SOUND. SEVERAL DEALERS ARE PROMOTING A SELECTRIC TYPE-WRITER OR SELECTRIC INTERFACE FOR THE TRS-80. PERCOM OF GARLAND, TX PROVIDES ADD-ON DISK DRIVES FOR THE TRS-80 AND YOU CAN UPGRADE TO 16K MEMORY FOR HALF PRICE WITH KITS FROM SEVERAL ELECTRONICS HOUSES.

LET ME CONCLUDE THIS REPORT FROM TANDY-LAND WITH AN ENCOURAGEMENT TO YOU TO ATTEND THE NEXT MICROCOMPUTER EXPOSITION IN YOUR AREA. THEY ARE WELL WORTH THE TIME (AND SORE FEET).

- C J STINSON, DALLAS TEXAS -

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PRODUCT REVIEW

TRS-80 word processing— the Electric Pencil for the TRS-80

Michael Shroyer's *Electric Pencil* is a character oriented word processing system. Text is entered and manipulated as a continuous string of characters. Characters, words, lines or paragraphs may be inserted or deleted anywhere in the text. As text is typed in, and the end of the screen is reached, a partially completed word is shifted to the beginning of the following line. When text is inserted or deleted, existing text is pushed down or pulled up in a wrap-around fashion. Everything is seen on the video screen as it occurs, eliminating guesswork. Text may be reviewed by forward and reverse variable speed scrolling. Any character string may be located and/or replaced with any other character string. Specific sets of characters within encoded strings may be located and used in creating selective mailing lists. Text files may be saved, loaded or combined by use of your cassette recorder.

The *Electric Pencil* prints text using either the Radio Shack Interface and Printer or our TRS232 interface operating at 300 baud. During printing, the *Electric Pencil* automatically inserts carriage returns when needed. Line and page length, line and page spacing and left-hand margin control are all under control of the user. Justification may be selected for even right-hand margins. Pages may be numbered and titled.

The *Electric Pencil* loads and runs in any Level I or II 16K TRS-80. Asimple modification, described in the documentation, allows lower-case characters to be entered from the keyboard and displayed on the screen! If you prefer not to modify your TRS-80, you can still operate with upper case characters. The *Electric Pencil*, highly respected as one of the finest word processors available for home computers and small businesses, now opens many new uses for the TRS-80 computer!

TRS232 PRINTER INTERFACE (ASSEMBLED AND TESTED)

The TRS232 Printer Interface is a low-cost software driven output port. The interface is totally self-contained, and includes software on cassette as well as source listings for driving RS232 printers from Level II Basic or from your own machine language programs. The *Electric Pencil* also supports the TRS232 Interface, thus this one unit supports both word processing and basic program listing and documentation!

Any RS-232 compatible printer may be used with the TRS232. This includes Diablo printers, the Teletype model 43, TI Silents, etc. The TRS232 will also drive a 20 mil current loop so that 10 char per second teletypes may be used with Level II Basic (The *Electric Pencil* operates at 300 baud only).

The TRS232 is small (about 1"x2"x3") and installs in series with the power and cassette cables on your TRS-80 computer (all cable and connectors are furnished). A standard DB-25 connector on the TRS232 mates with the printer cable. The TRS232 may be left in place at all times, since it does not interfere with cassette operations.

The *Electric Pencil* is \$99.95 postpaid.

The TRS232 is \$39.95 plus \$2.00 handling and postage. You may order both for \$134.95 postpaid. California residents add 6% tax please. The above items are available from:

Small Systems Software
PO Box 366
Newbury Park, CA 91320

--Real Time Clock--

Even though the real time clock is contained in the expansion interface, it cannot be used without a mini-disk drive. The expansion interface contains the disk controller for up to four disk drives.

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80-NW is starting a column on problems - both hardware and software. If you have a particular problem in any area, with or without a solution - send it to:

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c/o 80-NW

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Tacoma, Wa. 98407

We will answer all of them.



TRS-80 SOFTWARE

TRS-80 HARDWARE



THE ELECTRIC PENCIL WORD PROCESSOR - \$99.95

Michael Shroyer's ELECTRIC PENCIL, highly respected as a superior word processor for home computers and small businesses, is now available for the TRS-80! In addition to all standard ELECTRIC PENCIL editing and printing features, this new version offers a transparent cursor, two key rollover, repeating keyboard, upper and lowercase entry and display (after simple modification - documentation included) or upper case only in unmodified TRS-80's. THE ELECTRIC PENCIL runs printers using Radio Shack's expansion interface or will operate RS-232 and 20-mil current loop printers using our TRS232 printer interface. LEVEL-I or LEVEL-II 16K computers may be used. THE ELECTRIC PENCIL opens a whole new world of practical applications for the TRS-80 computer!

*** RSM-20: A FTH MONITOR FOR TRS-80 DISK SYSTEMS! - \$29.95 ***

Finally, a monitor for disk users! This new program includes all the features of our popular RSM-15, plus it reads and writes SYSTEM tapes, has a 2-80 BROADCASTING routine, reads and writes BASIC EXERCISES directly, and PRINTS using either the Radio Shack Interface or our own TRS232! Three versions on one disk to load at the top of 16K, 32K or 48K computers.

RSM-15: A MAXIMUM LANGUAGE MONITOR FOR THE TRS-80 - \$23.95

RSM-15 provides you with 22 commands which interact directly with the 2-80 processor in your TRS-80. You may examine your RAM's, test your RAM, enter and execute machine language programs, read and write machine language tapes, and much more! A SYMBOLIC DUMP command disassembles object code and displays it as Zilog standard 2-80 mnemonic! Memory may be displayed in HEX or either of two ASCII formats, and can be EDITED, MOVED, EXCHANGED, VERIFIED, FILLED, ZEROED, TESTED, or SEARCHED for one or two-byte codes. Memory display commands may be stepped with SPACE, or aborted with BREAK. Runs in 4K.

AIR RAID: A REAL-TIME TRS-80 SHOOTING GALLERY! - \$14.95

AIR RAID is a game where large and small airplanes fly across the screen at different altitudes. A ground based missile launcher is pointed and fired from the keyboard. Missiles may be guided after launching! Aircraft explode dramatically when hit, sometimes destroying other nearby planes! Score is tallied for each hit or miss, and the highest score is saved to be challenged by other players. AIR RAID provides hours of fun for you, and is a super demonstration program for entertaining friends! Runs in 4K.

* SMALL SYSTEM SOFTWARE * P.O. BOX 366 * NEWBURY PARK, CALIF. 91320 *

TRS232 PRINTER INTERFACE - \$39.95 (Assembled and Tested)

The TRS232 is a self-contained software-driven output port and comes complete with cassette software and source listings for driving printers from LEVEL-II or BASIC or machine language programs. Diablo, Teletype, TI Silent or any RS-232 or 20-mil current loop printer may be used with the TRS232. The TRS232 is small (about 1" x 2" x 1") and installs in series with the power and cassette cables on your TRS-80 computer. A standard DIN-25 connector mates with the printer cable. The TRS232 may be left in place at all times, since it does not interfere with cassette operation. THE ELECTRIC PENCIL and RSM-20 use the TRS232, thus word processing, BASIC, and machine language applications are supported!

PARA-PORT: 2 1/2 PORT PARALLEL I/O BOARD - \$79.95 (KIT)

Our parallel port board can be used for driving LED light displays, raising external keyboards, polling sense switches, driving parallel port printers, controlling relays for lamps, sprinklers, or any other where control of external devices is desired! Included are two limited 8-bit input and output ports plus a third 4-bit status port so that full handshaking protocol may be established. Requires external 5-volt power supply.

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A fully buffered mother board to operate up to six plug-in boards. Includes 6 41-pin sockets with card guides, power supply connections, support feet, and a 40 pin ribbon cable to connect to the TRS-80 expansion port. Operate any of our boards, or use readily available 44-pin breadboards to do your own thing! Provisions to allow use of the screen printer or expansion interface are included. Available January 1. A single-slot version (order 40/44-1) is currently available for \$24.95 (\$19.95 with PARA-PORT).

ORDER TRS-80 PRODUCTS

CHIPS: \$19.95 Microchess 1.5 plays a good game of chess, uses graphics.
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All software shipped postpaid with LEVEL I and LEVEL II versions on the same cassette. All shipping for hardware items. (Calif. residents add 6% tax).

* SMALL SYSTEM HARDWARE * P.O. BOX 366 * NEWBURY PARK, CALIF. 91320 *

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#17.	STAT-I statistics	\$10
#18.	KEY-I key-access	\$10
#19.	SALE-I sale analysis	\$10
#20.	UTIL-I SORT-I & KEY-I	\$16

DISKETTE

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