

Covering the TI99/4A and the Myarc 9640

MICROpendium

Volume 10 Number 2

March 1993

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**Bruce Harrison gives
away some sound trade
secrets in the Art of
Assembly.**

Reviewed this month

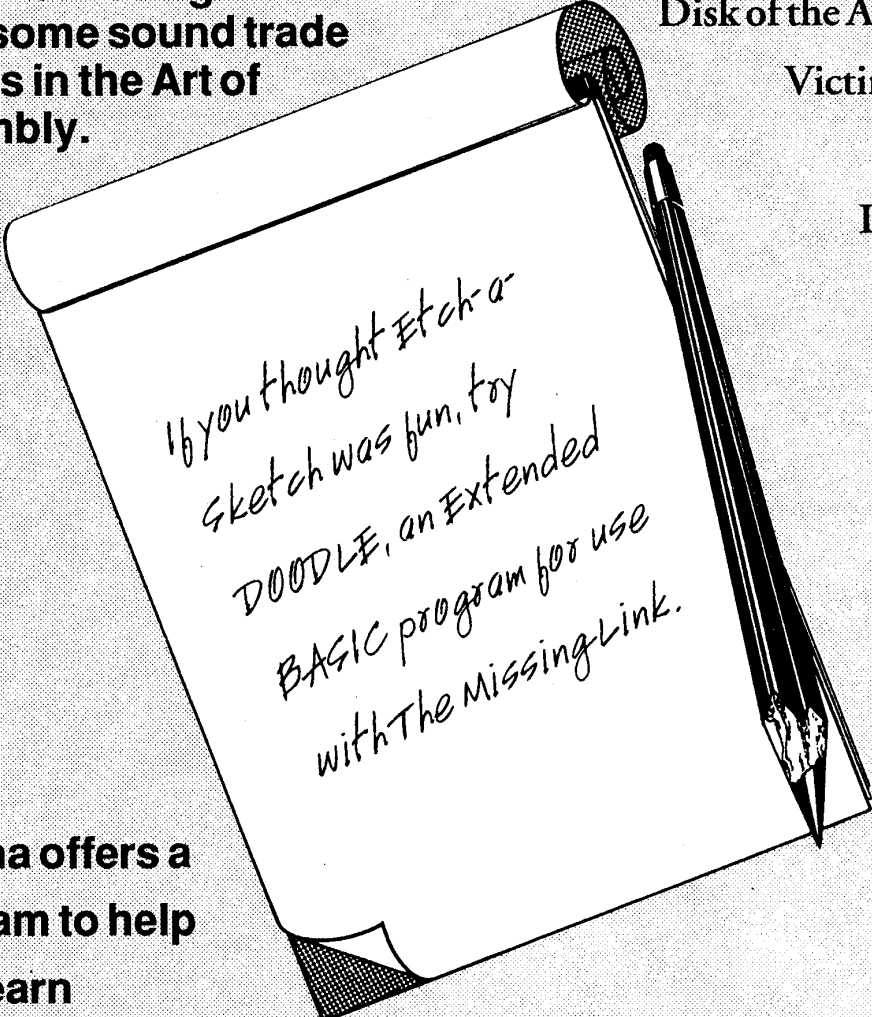
Disk of the Ancient Ones

Victim's Revenge

Skull Valley

Lost in Space

V.5 Editor



If you thought Etch-a-
Sketch was fun, try
DOODLE, an Extended
BASIC program for use
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**Regena offers a
program to help
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**MICROpendium Index
for the second half of
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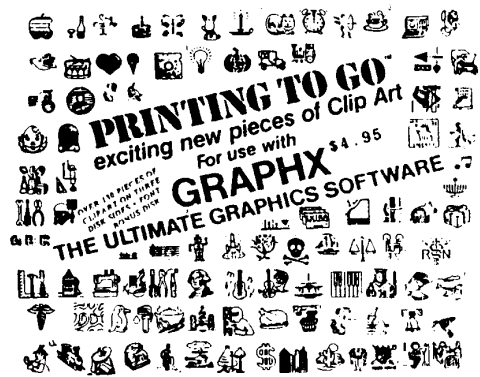


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*READ THIS

Here are some tips to help you when entering programs from MICROpendium:

1. All BASIC and Extended BASIC programs are run through Checksum, the numbers that follow exclamation points at the end of each program line. Do not enter these numbers or exclamation points. Checksum is available on disk from MICROpendium for \$4.
2. Long XBASIC lines are entered by inputting until the screen stops accepting characters, pressing Enter, pressing FCTN REDO, cursoring to the end of the line and continuing input.

Comments

Don't overdo it

You'll notice that we are minus Barry Traver's Extended BASIC (plus) column this month. Barry has carpal tunnel syndrome. In this, he joins many other computer users.

Incidence of this once relatively infrequent condition has skyrocketed in the computer age. Many grim apocalyptic scenarios have been envisioned by science fiction writers as a consequence of our increased dependence on and interaction with technology, but so far as I know, none have dealt with this reality. It may not be Alien III, but it's pretty serious for its victims.

We have an article about some prevention tips for carpal tunnel syndrome, which we will print sometime in the next couple of months. In the meantime, don't spend hours and hours at a keyboard without taking a break — even if it's your

favorite thing.

COMPUTER CHANGES

Over the last 10 years, we've made a lot of changes in our system and the way we use the computer. Probably the biggest change of all has been the Geneve. But changes occur in the types of programs we use also. "Hunt the Wumpus" used to be a favorite at our house. I had to change the line in the program that read "You lose, turkey!" to the more polite statement, "Sorry, you lose," to prevent upset feelings for our youngest. But he's going to graduate from high school this year and (I hope) he's outgrown feeling insulted by a computer.

—JK

Not a virus

Recently the article about a computer virus on the TI99/4A has been published in various newsletters and MICROpendium. This letter is being written to explain the problem outlined by Bill Gaskill, the well-known personality in the TI community who wrote the article to inform the TI community about this occurrence.

Firstly, when the TI99/4A was designed and produced by Texas Instruments back in the 1970s, one of the first things TI did was set out boundaries of how hardware and software were to be designed. Once TI bailed out in October 1983 the 99/4A community was left to fend for itself. In the years after the production of the TI99/4A was stopped, the TI community saw a proliferation of new products come to fruition which were not foreseen by TI.

With this proliferation of new hardware and software by numerous sources comes the possibility that individuals break the rules. Because TI was very tight-lipped about any of its technical information during the production days, little information was available. Individuals developed new modifications and hardware along with software by trial and error and with the bits and pieces of the technical information that eventually showed up. Not all pieces of a puzzle being known, some products broke or bent rules or changed the way things were done without their makers knowing the reason that it had been done a particular way or that they even broke a design rule set down by TI. Of course, TI broke its own rules at times, as we have found out. This occurred as TI had several different teams designing and working on projects independently of each other. This created problems, as there was no communications between groups and many changes or redoing of the same idea different ways occurred.

One person can break a rule in the design of hardware or soft-

ware, but problems occur and snowball when more than one person breaks the rules.

Secondly, and foremost, this was not a *Virus! No virus* created the !I GOTCHA! MESSAGE, nor was it a virus that created the bizarre effects or destroyed the data and programs stored on the hard drive or on floppies.

We will explain in this letter what created the problem and possible solutions, or better yet, things to keep in mind to prevent the problem in future.

WHAT IS RESPONSIBLE FOR THIS PHENOMENON?

Archiver is one of many programs that does a CALL FILES(4) or higher. Any program that calls anything other than a CALL FILES(3) while operating the Myarc HFDC causes problems. The Myarc HFDC doesn't move certain information in VDP memory which the Horizon ROS v8.14 is looking for and requires. As the HFDC controller has not moved the necessary information in VDP memory, the Horizon ROS v8.14 picks up *invalid* information which may or may not cause problems.

Here are the three most common problems:

1. Character data can be changed and characters displayed to the screen are deformed.
2. A sudden change in the screen color.
3. Destruction of the first two sectors (sectors 0 and 1) on the drive being accessed at the time by any low level access, no matter whether it is the floppy drive, hard drive or RAMdisk. This is where the !I GOTCHA! is written to diskname and invalid sectors come from.

Note: !I GOTCHA! is a prompt that was only to be displayed when cataloging an invalid drive on a RAMdisk. Without this prompt, it takes the system a long time to realize an invalid

(See Page 6)

Feedback

Eliminating extra index entries

Thanks for publishing the Advanced BASIC Load Program (January 1993). Line 230 was changed to eliminate leftover index entries from a prior read when immediately reading a shorter disk directory (with odd number of files) just after a disk read of more files, i.e., reading two or more disks in a row:

```
#230 CLOSE #1 :: B$(E)=I$&" Exit Pgm"
! OLD LINE
#230 CLOSE #1 :: B$(E)=I$&" Exit Pgm"
:: B$(E+1)="      " ! NEW LINE
```

The program was written with ABASIC 2.99 and displays in 40 columns.

Edwin G. Donovan
Monroe, Washington

Apathy appalls

One problem plaguing the TI community is apathy. A month or so ago, I wrote to several TI Users Groups requesting the details of membership. I figured that, with the current state of declining membership, they would be happy at the prospect of attracting another member. I even offered to write a column for their newsletter as I did for our

Guilford 99ers and the Hunter Valley Users Group. Boy, was I wrong! After more than a month of waiting for some sort of reply, I finally gave up. The only enthusiastic response that I got was from the Lima Users Group. The others will remain nameless to spare them embarrassment.

The bottom line is that, with the number of TI users groups dwindling, those of us who are still enthusiastic about our 99/4As should welcome new members wholeheartedly. Even a geographically remote member has something to contribute! Think about it! The users groups that both-
(See Page 7)

(Continued from Page 5)

drive number or letter was picked. It was used to speed up the error checking portion of ROS v8.14. This prompt was placed in the ROS series 8.1x for error checking.

In ROS V8.14B the prompt has been changed to NO DRIVE, or in some other version of ROS v8.14 the prompt may be DRIVE ERROR.

OTHER OFFENDERS

1. Programs other than ARCHIVER that can cause the above problems:

- TI-BASE
- Funnelweb Archiver
- Older versions of John Johnson BOOT before Dec. 1989
- Older versions of DM-1000 before V5.0
- Any other programs that perform a CALL FILES higher than CALL FILES(3) while using the Myarc HFDC.

2. Myarc floppy controller which contains an older EPROM.
3. With the TI or CorComp controllers these problems occur only if the ROS has been corrupted. Otherwise all programs work flawlessly.

A FIX FOR ROS V8.14

Here is a fix for the Horizon RAMdisk ROS V8.14 which will correct the three problems listed above.

(With a sector editor, search for the two strings below and edit them to include the provided patch in the ROS for the Horizon.

1. Look for 163E 0283 46F8 163B D020

CHANGE TO: 163E 1000 1000 103B D020

2. Look for 400F 0228 010A 069F

A - normal TI99/4A system

- TI99/4A with Myarc HFDC and TIM or SOB

or Pop-Cart

- TI99/4A with Myarc FDC and TIM or SOB or

Pop-Cart

OR

CHANGE TO: 400F 0228 010A 069F

B - TI99/4A with a Dijit Card

- TI99/4A with a Mechatronics 80-column card.

- TI99/4A with a TI Controller and TIM or SOB

or Pop-Cart.

- TI99/4A with a CorComp Controller and TIM

or SOB or Pop-Cart

CHANGE TO: 400F 0208 3EDB 069F

R.A.M.O.S.

What is R.A.M.O.S.? RAMOS stands for Random Access Memory Operating System, in short. This new and improved operating system will allow your Horizon RAMdisk to function without the major bugs that exist or have existed in earlier operating systems.

This is a totally new operating system which has been designed by OPA in conjunction with the 9T9 User Group's Assembly SIG. We have listed all known areas of problems and complaints and wish lists and programmed what I think is a superb new O/S which is simple, easy to use and gets the job done.

The Assembly SIG is now working on beta testing within the group and debugging. The debugging has been extensive and testing has been stringent. This new product will be marketed through Oasis Pensive Abacutors, 432 Jarvis St., Suites 501-502, Toronto, Ontario, Canada M4Y 2H3, release date and price to be announced.

This new RAMOS should help alleviate the problems encountered above.

Gary Bowser

John Van Weelie

9T9 User Group

Toronto, Ontario, Canada

Feedback

(Continued from Page 6)

ered to reply are the ones that I want to be a part of -- not the apathetic lot who didn't even want my money.

Robert M. Carmony
Greensboro, North Carolina

99 Computer Repair receives praise

Cor-Comp 9900 Expansion Systems can be repaired. Not having tested this has caused me to consider giving up on my TI. I've had problems for a while but nothing that I couldn't deal with, but I purchased Certificate 99 for my daughter and it was printing garbage characters I called 99 Computer Repair for information and was actually called back.

I was instructed to send the expansion system and \$50 with an explanation of the problems. Within a few weeks, my expansion box was returned and working properly. My printer is working properly again, software is not printing garbage characters and my modem is working again. It may have been "simple" memory and serial port problems, but it was nothing I could have considered repairing myself.

Because of 99 Computer Repair, I am back in the TI world.

99 Computer Repair can be reached at (714) 539-4834, 2101 W. Crescent Ave., Unit B, Anaheim, CA 92801.

Ron Levine
Memphis, Tennessee

TI gives perspective

When I was a college student on a tight budget, I learned to program on this machine. By solving Fortran programs at home in BASIC, it was easy to convert them to run on the mainframe at school. When I finished school and started this company I switched to PCs running DOS, Novell and UNIX, and Mackintoshes to find programming work. Yet my only preparation for wiring serial terminals had come in 1985, on the jubilant day that I figured out what was wrong with my TI's modem cable, and got the school's login prompt for the first time from 20 miles away.

The 99/4A has a place of its own in my office and we use it frequently. Early on, it became a label machine that could churn out large jobs without tying up another machine. More recently we've been writing some (possibly forthcoming) serial IO programs that automate the office when we're out. Furthermore, we're using the TI as a terminal for UNIX. I haven't had a chance to investigate an 80-column card yet, but we still run shell programs in 40-column mode, and it's really helpful.

We bought a used TI for our 14-month-old son for Christmas. It's durable, incredibly cheap and a tool for keeping his hands off our machines, at least most of the time. He has stepped on it, and he's banged the keys in excitement over seeing the opening screen of the Early Learning cartridge. These are no-nos; however, he really likes the system even though a little young to work with the programs. We're writing our own simple number and alphabet programs for speech, and I know this will benefit him for years to come.

We're not much for games (although we own a few), and we haven't used some of the more popular programs such as TI-Writer, since we have other word processors. What is important is that we do use it, and value it as a machine capable of many critical tasks.

Since my TI was new, it has fostered my enthusiasm for computers and everything their users can do. These days I believe I have a unique perspective. I smile to myself every time I hear individuals talk about the programs they want to learn, WordPerfect, Lotus, etc. The business world has by now chosen its stepping stones to successful employment. They lie cautiously beneath the umbrella of 100 percent compatibility.

Something is missing from the mainstream acceptance of microcomputers.

Computer knowledge has become a commodity, with everyone seeking the most common or most marketable experience and the easiest machine interaction. I salute your publication and the many readers who realize that one spreadsheet or word processor is logically similar to every other one, and that sometimes an alternative approach (or even doing things the hard way) prepares us for the bigger picture. Our company has built a business on tackling the jobs other companies won't touch, bettering ourselves every time we learn our way around a new package or machine. Experience with machines like the 99/4A makes this possible.

Mark Zeman
Cerebral Software Inc.
Arlington Heights, Illinois

1993 TI FAIRS

FEBRUARY

Fest West "North" 93, Feb. 13-14, Howard Johnson Hotel, Salt Lake City, Utah. Contact Fest West "North" 93 Committee, 1396 Lincoln Apt. B, Ogden, UT 84404 or Salt Flats BBS, (308) 394-0064.

APRIL

Northeast TI Fair, April 17, Waltham High School, Waltham, Massachusetts. Contact Ron Williams, 14 East St., Avon, MA 02322.

Canadian TI Fest, April 24, Merivale High School, Nepean, Ontario, Canada. Contact Bill Gard, 3489 Paul Anka Dr., Ottawa, Ontario, Canada K1V 9K6 or (613) 523-9396 or Fax (819) 997-2194 Attn: DMES 2.

MAY

Lima Multi User Group Conference, May 14-15, Ohio State University Lima Campus, Lima, Ohio. Contact Dave Szipp, 4191 Patterson Haplin, Sidney, OH 45365; phone (513) 498-9713 (evenings).

Fourth Annual TI Orphans Reunion, May 15, Zurich Insurance Claims Centre, 9715 Ottewell Rd., Edmonton, Alberta, Canada. Contact Ron Hohman, (403) 456-0862.

This TI event listing is a permanent feature of MICROpendium. User groups and others planning events for TI/Geneve users may send information for inclusion in this standing column. Send information to MICROpendium Fairs, P.O. Box 1343, Round Rock, TX 78680.

BASIC

Algebra: Working with exponents

By REGENA

I have been busy teaching my intermediate algebra class and reviewing the concepts of exponents. The program this month is a tutorial for multiplying and dividing numbers with exponents. You can use the same ideas to write more programs using powers of numbers with exponents, negative exponents and fractional exponents — this program was full enough with just multiplying and dividing.

Lines 110-130 use the DEFinition statement to get random numbers for the examples and problems in the tutorial more easily. R(X) will return a random number from 1 to X. R2(X) will return a random number from 2 to X. I would use this when I didn't want an exponent less than 2 because of the special cases when the exponent is 1 or 0. R3(X) will return a random number from 0 to X and is used when zero exponents are allowed.

Lines 160-220 define characters. The first eight characters are enlarged lowercase letters that will be used in the algebra examples and problems. Character 104 is a raised dot to indicate multiplication, and Character 105 is a solid line to draw fraction lines. Some of the PRINT statements will contain the lowercase letters to print these redefined characters. Remember to release the Alpha Lock key to type these characters, but press the Alpha Lock key back down for the rest of the programming.

Lines 280-290 define a red check mark used in "canceling" or reducing a fraction.

In general, variables N and N\$ refer to numbers or letters used as the base. E, E1, E2 and E3 are variables used as exponents. EC and ER are column and row numbers for an exponent.

The first screen printed illustrates exponents. Lines 350-570 use exponents with an actual number (2 through 6). Lines 580-720 print an example of a multiplication problem of two numbers with the same alphabetic base and adding the exponents. Lines 730-990 present a multiplication problem with two numbers with exponents.

Whenever an answer given is incorrect,

the correct answer is shown, often with the factors written out completely. Another problem will be given. When an answer is correct the student has the option to see another example, do another problem or continue the program.

Lines 1000-1230 multiply numbers with the same base but have higher exponents to be added.

Lines 1240-1650 present an example and problem with multiplication involving four numbers, two of different bases; for example $a^2a^3b^7$.

The CALL KEY statement is used to receive the answers in the correct positions of the exponents for each base number.

Lines 1660-1870 present an example of a fraction or division with numbers using exponents. Lines 1880-2010 print a screen of information showing that any number raised to the zero power is equal to one. Lines 2020-2290 present a fraction with exponents in which the numerator is larger than the denominator and nonzero.

Lines 2300-2840 present a problem with a fraction that may contain zero exponents.

Lines 2850-3450 introduce negative exponents, or when the bottom of the fraction has more factors than the top.

Lines 3460-4430 present a fraction with two numbers on the top and one on the bottom, all with the same base but varying exponents. The result could be a whole number or a fraction (positive or negative exponents). If the answer has a zero exponent, the student must also indicate that the answer is equal to one.

Lines 4450-4500 give the option to have another problem or end the program.

Lines 4510-4600 are a subroutine to wait for the student to press the Enter key before continuing. Either the screen will clear or the bottom line will clear before continuing.

Lines 4610-4690 are a subroutine to give the option to have another example, have another problem or continue the program. Lines 4700-4770 are a subroutine to give the option to have another problem or continue the program.

Lines 4780-4840 are a subroutine to

print the base number the proper number of times as factors depending on the exponent E.

Lines 4850-4940 blink a question mark while waiting for the student to answer a problem by filling in exponents. Lines 4950-4990 are a subroutine to print symbols and numbers on the screen using CALL HCHAR. Lines 5000-5010 conclude the program.

If you wish to save typing effort and would like a copy of this program, you may send \$4 to REGENA, 918 Cedar Knolls West, Cedar City, UT 84720. Be sure to specify that you would like "Exponents" for the TI and whether you need cassette or diskette.

EXPONENTS

```

100 REM EXPONENTS !158
105 REM BY REGENA !071
110 DEF R(X)=INT(X*RND+1) !0
1
120 DEF R2(X)=INT((X-1)*RND+
2) !163
130 DEF R3(X)=INT(X*RND) !191
140 CALL CLEAR !209
150 PRINT TAB(5); "*** EXPONEN
TS ***" !057
160 FOR C=96 TO 105 !216
170 READ C$ !254
180 CALL CHAR(C,C$) !081
190 NEXT C !217
200 DATA 3D4381818181433D,3C
4282808082423C,BCC2818181818
181,BCC280808080808 !113210
DATA 7C82807C0202827C,818181
818181433D,8142241818244281,
FF020408102040FF !119
220 DATA 0000001818,000000FF
FF !020
230 PRINT : : "AN 'EXPONENT'
IS THE LITTLE" !001
240 PRINT "RAISED NUMBER THA
T INDICATES" !037
250 PRINT "HOW MANY TIMES TH
E NUMBER" !075
260 PRINT "JUST BEFORE IT (B
ASE) IS" !153
270 PRINT "USED AS A FACTOR.
(See Page 9)

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REGENA ON BASIC—

(Continued from Page 8)

```

" !199
280 CALL CHAR(112,"010204885
02")!006
290 CALL COLOR(11,7,1)!226
300 PRINT : " 3" !067
310 PRINT " a MEANSahaha"
!186
320 PRINT : " 2 5" !153
330 PRINT " f g MEANS fhfhg
hghghghg" !156
340 GOSUB 4510 !255
350 PRINT "HERE IS AN EXAMPL
E WITH": "NUMBERS." !095
360 RANDOMIZE !149
370 N=R2(6)!252
380 E=R2(5)!242
390 GOSUB 4780 !014
400 PRINT " =" ;N^E !206
410 PRINT : "WHAT IS THE AN
SWER?" !000
420 NN=R2(5)!073
430 EE=R2(4)!054
440 IF (NN=N)+(EE=E)=-2 THEN
!237
450 N=NN !168
460 E=EE !141
470 PRINT : " " ;E !050
480 PRINT N: :!084
490 INPUT ANS !116
500 IF ANS=N^E THEN 560 !039
510 PRINT : "THE CORRECT ANSW
ER IS" !236
520 GOSUB 4780 !014
530 PRINT " =" ;N^E !206
540 GOSUB 4510 !255
550 GOTO 350 !174
560 GOSUB 4610 !100
570 ON KK GOTO 350,410,580 !
184
580 PRINT "MULTIPLYING NUMBE
RS WHICH HAVE EXPONENTS" !
034
590 N=95+R(8)!197
600 N$=CHR$(N)!193
610 E1=R2(4)!034
620 E2=R2(5)!036
630 IF E2=E1 THEN 620 !022
640 PRINT :E1;E2 !242
650 PRINT N$;" h";N$;" = ";
; !047
660 E=E1 !121
670 GOSUB 4810 !044
680 E=E2+1 !053
690 GOSUB 4810 !044
700 PRINT : :TAB(9);E1+E2 !2
11
710 PRINT TAB(7);"=" ;N$ !00
5
720 PRINT : : "NOTICE THAT IF
YOU HAVE THE SAME BASE, THE
EXPONENTS AREACTUALLY ADDED
." !193
730 PRINT : : "NOW YOU ANSWER
." !011
740 NN=95+R(8)!019
750 IF NN=N THEN 740 !139
760 N=NN !168
770 N$=CHR$(N)!193
780 E1=R2(4)!034
790 EE=R2(5)!055
800 IF EE=E2 THEN 790 !213
810 E2=EE !191
820 PRINT :E1;E2;" ?" !016
830 PRINT N$;" h";N$;" = ";
N$ !123
840 PRINT : "WHAT IS THE EXPO
NENT?" !238
850 INPUT A !211
860 IF A=E1+E2 THEN 980 !129
870 PRINT : : "THE CORRECT EX
PONENT IS";E1+E2 !166
880 PRINT : :E1;E2 !167
890 PRINT N$;" h";N$;" = ";
N$ !047
900 E=E1 !121
910 GOSUB 4810 !044
920 E=E2+1 !053
930 GOSUB 4810 !044
940 PRINT : :TAB(9);E1+E2 !2
11
950 PRINT TAB(7);"=" ;N$ !00
5
960 GOSUB 4510 !255
970 GOTO 580 !149
980 GOSUB 4610 !100
990 ON KK GOTO 580,740,1000
!143
1000 PRINT "NOW TRY LARGER N
UMBERS." !212
1010 N=95+R(8)!197
1020 E1=R(5)+9 !180
1030 E2=R(5)+9 !181
1040 E3=R(15)!037
1050 N$=CHR$(N)!193
1060 PRINT :E1;STR$(E2);E3 !
102
1070 PRINT N$;" " ;N$;" " ;N
$;" " = ";N$ !055
1080 EC=16 !119
1090 GOSUB 4850 !084
1100 ANS=10*K1 !010
1110 EC=EC+1 !137
1120 GOSUB 4860 !094
1130 ANS=ANS+K1 !191
1140 AA=E1+E2+E3 !039
1150 IF ANS=AA THEN 1220 !23
1
1160 PRINT : : "ADD THE EXPON
ENTS. THE" !225
1170 PRINT "EXPONENT SHOULD
BE" !124
1180 PRINT :E1;"+" ;E2;"+" ;E3
;"=" ;AA !091
1190 GOSUB 4510 !255
1200 PRINT "TRY AGAIN.": :!1
32
1210 GOTO 1010 !068
1220 GOSUB 4700 !190
1230 ON K1 GOTO 1200,1240 !1
14
1240 PRINT "AS LONG AS THE B
ASE IS THE SAME, YOU CAN CO
MBINE THE EXPONENTS." !071
1250 PRINT : "YOU MAY HAVE MO
RE THAN ONE BASE. ONLY ADD
EXPONENTS IF THE BASE NUM
BERS MATCH." !076
1260 N1$=CHR$(95+R(8))!093
1270 E1=R(4)!240
1280 E2=R(5)!242
1290 N2$=CHR$(95+R(8))!094
1300 IF N2$=N1$ THEN 1290 !0
17
1310 E3=10+R(9)!227
1320 E4=10+R(9)!228
1330 PRINT :E1;STR$(E2);E3;S
TR$(E4);" " ;E1+E2;STR$(E3+
E4)!201
1340 PRINT N1$;" " ;N1$;" " ;N
2$;" " ;N2$;" " = ";N1$;" " ;
N2$ !195
1350 GOSUB 4510 !255
1360 PRINT "FILL IN THE EXPO
NENTS." !106
1370 N1$=CHR$(95+R(8))!093
1380 E1=R(4)!240
1390 E2=R(5)!242
1400 N2$=CHR$(95+R(8))!094
1410 IF N2$=N1$ THEN 1400 !1
27
1420 E3=R(9)!247
1430 E4=10+R(9)!228
1440 PRINT : :E1;STR$(E2);E3

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(See Page 10)

REGENA ON BASIC—

(Continued from Page 9)

```

;STR$(E4)!144
1450 PRINT N1$;" ";N1$;" ";N
2$;" ";N2$;" " = ";N1$;" ";N
2$ !162
1460 EC=16 !119
1470 GOSUB 4850 !084
1480 A1=K1 !172
1490 EC=EC+2 !138
1500 GOSUB 4860 !094
1510 A2=10*K1 !155
1520 EC=EC+1 !137
1530 GOSUB 4860 !094
1540 A2=A2+K1 !225
1550 AA1=E1+E2 !031
1560 AA2=E3+E4 !036
1570 IF (A1=AA1)+(A2=AA2)=-2
THEN 1640 !073
1580 PRINT : : "REMEMBER TO A
DD THE": "EXPONENTS OF LIKE N
UMBERS." !154
1590 PRINT : "THE ANSWER SHOU
LD BE" !147
1600 PRINT : " &STR$(E1);"+"
&STR$(E2);" ";STR$(E3);"+";S
TR$(E4);" ";AA1;STR$(AA2)!
238
1610 PRINT N1$;" ";N2$;"
= ";N1$;" ";N2$ !063
1620 GOSUB 4510 !255
1630 GOTO 1240 !043
1640 GOSUB 4610 !100
1650 ON KK GOTO 1240,1360,16
60 !043
1660 PRINT "NOW FOR FRACTION
S OR": "DIVISION." !020
1670 N$=CHR$(102)!209
1680 PRINT : " 5" !111
1690 PRINT N$:"ii" !094
1700 PRINT " 3":N$ !223
1710 PRINT : "WRITE ALL FACTO
RS." !014
1720 N2$="h"&N$ !188
1730 PRINT : " 5" !111
1740 PRINT N$;" ";N$;N2$;
N2$;N2$;N2$ !147
1750 PRINT "ii = iiiiiiiiii"
!219
1760 PRINT " 3" !184
1770 PRINT N$;" ";N$;N2$;
N2$ !227
1780 GOSUB 4560 !049
1790 PRINT "'CANCEL' FACTORS
THAT ARE THE SAME ON TOP
AND BOTTOM OF THE FRACTION.
" !211
1800 C=9 !003
1810 ROW=13 !228
1820 RESTORE 1840 !148
1830 GOSUB 4950 !185
1840 DATA 0,8,112,5,8,112,0,
10,112,5,10,112,0,12,112,5,1
2,112 !071
1850 DATA 2,19,61,2,21,102,1
,22,50 !104
1860 PRINT : : "NOTICE THAT Y
OU SUBTRACT THEBOTTOM EXPONE
NT FROM THE TOPEXPONENT." : :
!158
1870 GOSUB 4510 !255
1880 PRINT "WHAT HAPPENS WHE
N THE": "EXPONENT ON THE TOP
IS THE SAME AS THE EXPONENT
ON THE BOTTOM?" !134
1890 N$=CHR$(98)!174
1900 N2$="h"&N$ !188
1910 PRINT : " 4" !110
1920 PRINT N$;TAB(7);"4-4
0" !243
1930 PRINT "ii = ";N$;" =
";N$ !097
1940 PRINT " 4":N$ !224
1950 PRINT : "THIS CAN ALSO B
E WRITTEN:" !216
1960 PRINT :N$;N2$;N2$;N2$ !
203
1970 PRINT "iiiiiii = 1" !25
1
1980 PRINT N$;N2$;N2$;N2$ !0
22
1990 PRINT : : "ANY NUMBER WI
TH A ZERO" !209
2000 PRINT "EXPONENT IS EQUA
L TO ONE." !052
2010 GOSUB 4510 !255
2020 PRINT "SIMPLIFY THIS FR
ACTION." !227
2030 N$=CHR$(95+R(8))!044
2040 A=R2(5)!238
2050 E2=R(4)!241
2060 E1=A+E2 !173
2070 PRINT :E1 !199
2080 PRINT N$:"ii = ";N$ !00
4
2090 PRINT E2:N$ !058
2100 EC=9 !072
2110 ER=20 !129
2120 GOSUB 4860 !094
2130 IF K1=A THEN 2280 !104
2140 E=E1 !121
2150 PRINT :TAB(6);N$;!147
2160 GOSUB 4810 !044
2170 PRINT !156
2180 CALL HCHAR(24,8,105,E*2
-1)!167
2190 E=E2 !122
2200 PRINT :TAB(6);N$;!147
2210 GOSUB 4810 !044
2220 PRINT : : "THE EXPONENT
IS ";STR$(E1);"-";STR$(E2);"
=";A !136
2230 PRINT :E1:N$;TAB(6);A !
255
2240 PRINT "ii = ";N$ !221
2250 PRINT E2:N$ !058
2260 GOSUB 4510 !255
2270 GOTO 2020 !058
2280 PRINT : : "CORRECT." !02
1
2290 GOSUB 4510 !255
2300 PRINT "SIMPLIFY THIS FR
ACTION." !227
2310 RANDOMIZE !149
2320 E1=R(9)!245
2330 E2=R(9)!246
2340 IF E2>E1 THEN 2320 !19
2350 A=E1-E2 !174
2360 N$=CHR$(95+R(8))!044
2370 PRINT :E1:N$ !238
2380 PRINT "ii = ";N$ !221
2390 PRINT E2:N$ !058
2400 ER=20 !129
2410 EC=9 !072
2420 GOSUB 4860 !094
2430 IF K1>1 THEN 2560 !061
2440 CALL HCHAR(ER+1,EC+2,61
)!106
2450 IF K1<>1 THEN 2480 !171
2460 CALL HCHAR(ER+1,EC+4,AS
C(N$))!246
2470 GOTO 2560 !089
2480 ER=21 !130
2490 EC=13 !116
2500 GOSUB 4860 !094
2510 IF A<>0 THEN 2570 !202
2520 IF K1=1 THEN 2830 !074
2530 PRINT : "ANY NUMBER TO T
HE ZERO POWERIS 1." !246
2540 GOSUB 4510 !255
2550 GOTO 1880 !174
2560 IF K1=A THEN 2830 !145
2570 PRINT : : N$;!225
2580 E=E1 !121
2590 GOSUB 4810 !044

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REGENA ON BASIC—

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2600 PRINT !156
2610 CALL HCHAR(24,3,105,E*2
-1)!162
2620 PRINT :N$;!119
2630 E=E2 !122
2640 GOSUB 4810 !044
2650 PRINT : : "'CANCEL' MA
TCHING FACTORS." !091
2660 ROW=17 !232
2670 FOR J=1 TO E2 !182
2680 CALL HCHAR(ROW,1+J*2,11
2)!189
2690 CALL HCHAR(ROW+4,1+J*2,
112)!123
2700 NEXT J !224
2710 CALL HCHAR(ROW+2,3+E1*2
,61)!121
2720 CALL HCHAR(ROW+2,5+E1*2
,ASC(N$))!005
2730 CALL HCHAR(ROW+1,6+E1*2
,A+48)!130
2740 IF A>0 THEN 2790 !231
2750 CALL HCHAR(ROW+2,8+E1*2
,61)!126
2760 CALL HCHAR(ROW+2,10+E1*
2,49)!174
2770 GOSUB 4510 !255
2780 GOTO 2300 !083
2790 IF A<>1 THEN 2770 !147
2800 CALL HCHAR(ROW+2,8+E1*2
,61)!126
2810 CALL HCHAR(ROW+2,10+E1*
2,ASC(N$))!050
2820 GOTO 2770 !043
2830 GOSUB 4700 !190
2840 ON K1 GOTO 2300,2860 !0
29
2850 REM NEGATIVE EXPONENTS
!017
2860 PRINT "HERE IS ANOTHER
TYPE OF": "DIVISION PROBLEM."
!243
2870 N$=CHR$(95+R(8))!044
2880 E1=R2(4)!034
2890 A=R2(4)!237
2900 E2=E1+A !173
2910 PRINT :E1:N$: "ii":E2:N$
!145
2920 PRINT : : "SUBTRACTING E
XPONENTS, WE GET":E1;"-";E
2;"= -";STR$(A)!129
2930 PRINT : : :N$;!225
2940 E=E1 !121
2950 GOSUB 4810 !044
2960 PRINT !156
2970 CALL HCHAR(24,3,105,2*E
2-1)!212
2980 PRINT :N$;!119
2990 E=E2 !122
3000 GOSUB 4810 !044
3010 PRINT : :!006
3020 ROW=19 !234
3030 FOR J=1 TO E1 !181
3040 CALL HCHAR(ROW,J*2+1,11
2)!189
3050 CALL HCHAR(ROW+4,J*2+1,
112)!123
3060 NEXT J !224
3070 CALL HCHAR(ROW+2,E2*2+3
,61)!122
3080 CALL HCHAR(ROW+1,E2*2+5
,49)!129
3090 CALL HCHAR(ROW+2,E2*2+5
,105,2)!090
3100 CALL HCHAR(ROW+4,E2*2+5
,ASC(N$))!008
3110 CALL HCHAR(ROW+3,E2*2+6
,A+48)!133
3120 CALL HCHAR(ROW+2,E2*2+8
,61)!127
3130 CALL HCHAR(ROW+2,E2*2+1
0,ASC(N$))!051
3140 CALL HCHAR(ROW+1,E2*2+1
1,45)!171
3150 CALL HCHAR(ROW+1,E2*2+1
2,A+48)!177
3160 GOSUB 4510 !255
3170 PRINT "SIMPLIFY:" !019
3180 N$=CHR$(95+R(8))!044
3190 E1=R2(4)!034
3200 A=R2(4)!237
3210 E2=E1+A !173
3220 PRINT :E1:N$;" 1" !0
31
3230 PRINT "ii = ii" !139
3240 PRINT E2:N$;" ";N$ !
095
3250 EC=9 !072
3260 GOSUB 4850 !084
3270 KK=K1 !208
3280 ROW=21 !227
3290 CALL HCHAR(ROW,11,61)!2
48
3300 CALL HCHAR(ROW,13,ASC(N
$))!132
3310 CALL HCHAR(ROW-1,14,45)
!185
3320 EC=15 !118
3330 ER=ROW-1 !009
3340 GOSUB 4860 !094
3350 IF (KK=A)+(K1=A)=-2 THE
N 3440 !160
3360 PRINT : : "SUBTRACT EXPO
NENTS." !090
3370 PRINT :E1;"-";E2;"= -";
STR$(A)!224
3380 PRINT : :E1:N$;" 1
-";STR$(A)!228
3390 PRINT "ii = ii = ";N$ !
049
3400 PRINT E2;TAB(6);A !036
3410 PRINT N$;" ";N$ !051
3420 GOSUB 4510 !255
3430 GOTO 2870 !144
3440 GOSUB 4610 !100
3450 ON KK GOTO 2870,3170,34
60 !184
3460 PRINT "NOW TRY A COMBIN
ATION OF MULTIPLYING AND
DIVIDING." !129
3470 N$=CHR$(95+R(8))!044
3480 E1=R3(5)!036
3490 E2=R3(5)!037
3500 E3=R3(5)!038
3510 A=E1+E2-E3 !231
3520 PRINT :E1;STR$(E2)!058
3530 PRINT N$;" ";N$ !208
3540 PRINT "iiii" !011
3550 PRINT " ";E3:" ";N$ !11
5
3560 EC=6 !069
3570 ROW=23 !229
3580 IF A<0 THEN 3620 !040
3590 PRINT : : "= ";N$ !082
3600 GOSUB 4850 !084
3610 IF K1=A THEN 4230 ELSE
3650 !168
3620 PRINT : " 1": "= ii": : "
";N$ !212
3630 GOSUB 4850 !084
3640 IF -K1=A THEN 4230 !208
3650 IF E1<>0 THEN 3680 !089
3660 PRINT : "(1";!039
3670 GOTO 3710 !219
3680 PRINT : "( ";N$;!027
3690 E=E1 !121
3700 GOSUB 4810 !044
3710 PRINT ")( ";!106
3720 IF E2<>0 THEN 3750 !160
3730 PRINT "1)" !191
3740 GOTO 3790 !043
3750 PRINT N$;!194
3760 E=E2 !122

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REGENA ON BASIC—

(Continued from Page 11)

```

3770 GOSUB 4810 !044
3780 PRINT ") " !141
3790 IF E1+E2>=E3 THEN 3880
!216
3800 IF E3>3 THEN 3860 !084
3810 LL=6 !085
3820 IF E1=E2 THEN 3840 !183
3830 LL=LL+2 !170
3840 CALL HCHAR(24,3,105,LL)
!123
3850 GOTO 3930 !184
3860 CALL HCHAR(24,3,105,E3*
2+1)!212
3870 GOTO 3930 !184
3880 IF (E1+E2)<=2 THEN 3810
!128
3890 LL=(E1+E2)*2+2 !235
3900 IF (E1<>0)+(E2<>0)=-2 T
HEN 3920 !079
3910 LL=LL+2 !170
3920 CALL HCHAR(24,3,105,LL)
!123
3930 PRINT !156
3940 IF E3>1 THEN 4000 !222
3950 IF E3=1 THEN 3980 !200
3960 PRINT "(1)" !232
3970 GOTO 4040 !038
3980 PRINT "(;N$;)" !087
3990 GOTO 4040 !038
4000 PRINT "(;N$;!102
4010 E=E3 !123
4020 GOSUB 4810 !044
4030 PRINT ") " !141
4040 PRINT : " ";STR$(E1);"+ "
;STR$(E2);"-";STR$(E3);"
";STR$(A)!030
4050 PRINT N$;"      = ";N$;
" ";!036
4060 IF A>1 THEN 4210 !122
4070 PRINT " = ";!151
4080 ON 2+SGN(A)GOTO 4130,40
90,4110 !118
4090 PRINT "1" !149
4100 GOTO 4210 !209
4110 PRINT N$ !014
4120 GOTO 4210 !209
4130 PRINT "ii":TAB(16);STR$
(ABS(A)):TAB(15);N$ !111
4140 CALL HCHAR(20,17,49)!05
6
4150 IF A<-1 THEN 4210 !059
4160 RR=20 !142
4170 CALL HCHAR(RR+1,20,61)!
095
4180 CALL HCHAR(RR,22,49)!17
2
4190 CALL HCHAR(RR+1,22,105)
!145
4200 CALL HCHAR(RR+2,22,ASC(
N$))!236
4210 GOSUB 4510 !255
4220 GOTO 3470 !234
4230 IF A<>-1 THEN 4290 !075
4240 CALL HCHAR(ROW-2,8,61)!
138
4250 CALL HCHAR(ROW-3,10,49)
!187
4260 CALL HCHAR(ROW-2,10,105
)!228
4270 CALL HCHAR(ROW-1,10,ASC
(N$))!061
4280 GOTO 4440 !184
4290 IF K1>1 THEN 4440 !156
4300 CALL HCHAR(ROW,8,61)!20
5
4310 IF K1=0 THEN 4370 !083
4320 CALL HCHAR(ROW,10,ASC(N
$))!129
4330 IF A>0 THEN 4440 !096
4340 CALL HCHAR(ROW-2,10,49)
!186
4350 CALL HCHAR(ROW-1,10,105
,2)!145
4360 GOTO 4440 !184
4370 EC=10 !113
4380 ER=ROW !077
4390 GOSUB 4860 !094
4400 IF K1=1 THEN 4440 !154
4410 PRINT : "ANY NUMBER TO
THE ZERO POWER IS 1." !171
4420 GOSUB 4510 !255
4430 GOTO 3470 !234
4440 PRINT : "THAT IS CORRECT
." !117
4450 PRINT : "CHOOSE: 1 ANOT
HER PROBLEM" !000
4460 PRINT TAB(10);"2 END PR
OGRAM" !025
4470 CALL KEY(3,K,S)!190
4480 IF (K<49)+(K>50)THEN 44
70 !154
4490 CALL CLEAR !209
4500 ON K-48 GOTO 3470,5000
!223
4510 PRINT : "PRESS <ENTER>
TO CONTINUE." !002
4520 CALL KEY(3,K,S)!190
4530 IF K<>13 THEN 4520 !174
4540 CALL CLEAR !209
4550 RETURN !136
4560 PRINT : "PRESS <ENTER>
TO CONTINUE." !002
4570 CALL KEY(3,K,S)!190
4580 IF K<>13 THEN 4570 !224
4590 CALL HCHAR(23,3,32,26)!
226
4600 RETURN !136
4610 PRINT : "THAT IS CORRECT
." !117
4620 PRINT : "CHOOSE: 1 ANOT
HER EXAMPLE" !251
4630 PRINT TAB(10);"2 ANOTHE
R PROBLEM" !080
4640 PRINT TAB(10);"3 CONTIN
UE PROGRAM" !173
4650 CALL KEY(3,K,S)!190
4660 IF (K<49)+(K>51)THEN 46
50 !080
4670 KK=K-48 !151
4680 CALL CLEAR !209
4690 RETURN !136
4700 PRINT : "THAT IS CORRECT
." !117
4710 PRINT : "CHOOSE: 1 ANOT
HER PROBLEM" !000
4720 PRINT TAB(10);"2 CONTIN
UE PROGRAM" !172
4730 CALL KEY(3,K,S)!190
4740 IF (K<49)+(K>50)THEN 47
30 !159
4750 K1=K-48 !125
4760 CALL CLEAR !209
4770 RETURN !136
4780 PRINT : " ";E !050
4790 N$=STR$(N)!198
4800 PRINT N;" = ";N$;!158
4810 FOR J=1 TO E-1 !064
4820 PRINT "h";N$;!166
4830 NEXT J !224
4840 RETURN !136
4850 ER=22 !131
4860 CALL SOUND(100,999,2)!1
47
4870 CALL KEY(3,K,S)!190
4880 CALL HCHAR(ER,EC,63)!24
5
4890 CALL HCHAR(ER,EC,32)!24
1
4900 IF S<1 THEN 4870 !034
4910 IF (K<48)+(K>57)THEN 4)
60 !039
4920 CALL HCHAR(ER,EC,K)!013
4930 K1=K-48 !125

```

(See Page 13)

THE ART OF ASSEMBLY — PART 21

Sound trade secrets

BY BRUCE HARRISON
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Last month we promised to share some of our "trade secrets" with you, and today we'll make good on that promise. We warn you in advance, though, that this won't be easy going for the reader. It wasn't easy for us either, when first we decided to make a "piano" sound on the TI. This month's sidebar contains lots of source code, all derived from one of our Assembly music products. What's shown is not a complete picture, since that would eat up much of this issue of the magazine. It is, though, an example taken directly from our actual source code, and annotated to make it possible for you to follow what it's doing.

The bulk of today's sidebar is the source code for our "piano" subroutine, which uses data put together by Dolores P. Werths, our resident musician. A small segment of that data source is shown here also. The principle involved in the piano subroutine is to send a note to the sound chip at 18400, then cause an exponential decay of the volume for that note while the generators are playing it. The exponential decay is simulated by using a "decay factor" located among the "variables" at the end of the subroutine's code. This is normally set at a fraction of the duration of a 64th note, the value of which is set by a "TEMPO" file, shown here. The value of a 64th note is just a number, typically ranging from about 180 to about 400. That sets the speed at which the music plays. The decay timing is self-modifying during each note's duration, so that the note decays quickly at first, then more gradually as it's duration goes on. That's accomplished by doubling the temporary decay number each time the volume is reduced.

To put that in perhaps more easily understood terms, let's say that the note's duration calls for 4,000 passes through the timing loop, and that the decay factor starts at a value of 50. The first 49 passes through the timing loop will thus be made without changing the volumes. On the 50th pass, the volumes for all generators will be reduced by 2 decibels, and the decay number will double, so the next reduction will happen at the 100th pass through the loop. At that pass, the decay will go to 200, then 400, then 800, and so on. Each time the decay happens, the next one is moved later in the time duration of the note. This makes a "curved" decay process with respect to time, and simulates the way the sound produced by a piano string decays after the string is struck by the piano's hammer.

(See Page 14)

Sidebar 21

- * ASSEMBLY MUSIC SOURCE CODE EXCERPTS
- * THESE ARE FRAGMENTS FOR ILLUSTRATION
- *
- * CODE BY B. HARRISON EXCEPT WHERE NOTED
- *
- * FIRST PARTS ARE ALL EQUATES TO MAKE MNEMONIC LABELS AVAILABLE
- *
- * NOTES - EQUATES FOR MUSIC PROGRAMS
- * SAVED AS "NOTES"
- *

A1 EQU >893F FIRST OCTAVE
A21 EQU >803C GENERATOR ONE
B1 EQU >803C
B1 EQU >8A38
C1 EQU >8735
C21 EQU >8732
DJ1 EQU >8732
D1 EQU >8A2F
DZ1 EQU >8F2C
EJ1 EQU >8F2C
E1 EQU >872A
F1 EQU >8128
FZ1 EQU >8D25
GJ1 EQU >8D25
G1 EQU >8B23
GZ1 EQU >8B21
A1J1 EQU >8B21 2ND OCTAVE
A11 EQU >8C1F GENERATOR ONE

* SIMILAR ENTRIES CONTINUE FOR ADDITIONAL OCTAVES ON ALL GENERATORS

* VOLUME LEVELS

*
V11 EQU >0090 MAX LOUD GEN ONE
V21 EQU >0091
V31 EQU >0092
V41 EQU >0093
V51 EQU >0094
V61 EQU >0095
V71 EQU >0096
V81 EQU >0097
V91 EQU >0098
V101 EQU >0099
V111 EQU >009A
V121 EQU >009B
V131 EQU >009C
V141 EQU >009D
V151 EQU >009E
V161 EQU >009F SILENCE GEN ONE

* SIMILAR ENTRIES FOR GENERATOR 2 V12, V22, ETC. CONTINUE

- * NANNERL'S NOTEBOOK #11 MARCHÉ IN F
- * FILE NAN11T - TEMPO VARIABLES
- * THE VALUE AT LABEL TEMP GOVERNS PLAYING SPEED FOR THE MUSIC

TEM
P EQU 349 VALUE 4 THRU 2000
SX EQU TEMP 64TH NOTE DURATION

REGENA ON BASIC—

(Continued from Page 12)

```

940 RETURN !136
4950 FOR J=1 TO C !130
4960 READ RR,COL,G !198
4970 CALL HCHAR(ROW+RR,COL,G
) !037
4980 NEXT J !224
4990 RETURN !136
5000 PRINT "THIS CONCLUDES A
N": "INTRODUCTION TO MULTIPLY

```

```

ING AND DIVIDING WITH EXPONE
NTS." : : !160
5010 END !139

```

ART OF ASSEMBLY—

(Continued from Page 13)

On each decay cycle, we check the current volume level of each generator to see if it's reached the silence level, and leave it alone if it has reached silence. Otherwise, we increment the volume being sent to that generator by one, thus lowering the volume output by two decibels. We're getting ahead of ourselves a bit.

The code section shown in today's sidebar is complex, to say the least, and is not really complete in any sense, else it would fill many pages. It's a small section of the source code for one of the "Nannerl's Notebook" compositions by Leopold Mozart. The "Piano" subroutine is complete as shown, but only a small portion of the other necessary files is shown to serve as an example of how this subroutine is used. Some of what's shown here actually creates no output to the object file. The sections called "NOTES" and "NAN1IT" simply establish mnemonic labels so that the musician can create data source files in a quasi-musical notation. The portion of "NOTES" shown covers only one octave of generator one's notes. The full file carries this scheme through seven octaves for all three generators. This same file establishes simple mnemonic labels for the volumes of notes, starting with V11 being the loudest volume for generator 1.

The "NAN1IT" part is shown here in full, and it establishes the duration values for mnemonic labels in "musical" notation based on the value TEMP, which is the duration for a 64th note. To adjust speed of playing, the musician changes only the value for TEMP, and the assembler calculates all the others.

In the musical data part, we have shown only one measure of the piece. There would also be an "action" section of code, consisting only of parts like this:

```
LI    R9,M001
LI    R13,E005
BL    @LDMEAS
```

That would cause measures 1 through 5 to be played by the subroutine. Many measures can be played with just one call to the subroutine, since it will continue playing until the R9 pointer to the data equals or exceeds the R13 pointer. Where portions of the music repeat, loops are used to count the number of times a section plays. Registers 3, 4, and 5 are not used by the subroutine, so that single, double or triple nested loops can be counted using those three registers in the "action" part of the piece's source code. In some cases, like at label M001A in the sidebar, extra labels are employed so that parts of a measure can be re-used elsewhere in the piece.

This particular implementation of the "piano" subroutine has a special feature to make it easy for the musician to have notes play as normal durations, or as staccato or legato notes. Legato means the note plays for the full duration, staccato means it plays for 3/4 duration, while "normal" means 7/8ths duration. To do that, this subroutine takes advantage of two "facts". First, that specifying the notes and volumes for three generators won't take more than 9 bytes, and second that a single byte can range up through 255. Thus the "tens" place in the "number of bytes" byte and one digit in the "hundreds" place could be used by the musician to signal things to the subroutine.

(See Page 15)

```
T    EQU 2*TEMP    32ND NOTE DURATION
S    EQU 4*TEMP    16TH NOTE
E    EQU 8*TEMP    8TH NOTE
Q    EQU 16*TEMP   QUARTER
H    EQU 32*TEMP   HALF
TT   EQU S/3       TRIPLET 32ND NOTE
TS   EQU E/3       TRIPLET 16TH
TS2  EQU TS/2      HALF OF THAT
TE   EQU Q/3       TRIPLET EIGHTH
TE2  EQU TE/2      HALF THAT
TE3  EQU TE/3      ONE THIRD OF THAT
TE4  EQU TE/4      ONE QUARTER OF THAT
STP  EQU SX/4      VERY SHORT NOTE
```

* PROGRAM ENTRY POINT SHOULD CONTAIN:

```
ENTRY MOV R11,@>8300    MOVE REGISTER 11
      LWPI WS           THEN LOAD YOUR WORKSPACE
```

* CODE TO INVOKE THE PIANO FOR ONE MEASURE LOOKS LIKE THIS

```
LI    R9,M001          BEGINNING OF A MEASURE
LI    R13,E001          END OF A MEASURE
BL    @LDMEAS          CALL THE SUBROUTINE TO PLAY THIS SECTION
```

* THE PIANO SUBROUTINE IS THIS:

* "GRAND PIANO" SUBROUTINE

* MODIFIED FOR AUTO STACCATO AND LEGATO

```
SOUND EQU >8400
LDMEAS
LM1   MOV B *R9+,R1    GET THE "NUMBER" BYTE INTO R1
      JEQ LM1          IF ZERO, TRY NEXT BYTE
      SRL R1,8         RIGHT JUSTIFY IN R1
      MOV R1,R8         MOVE THE "NUMBER" WORD TO R8
      CLR R7           CLEAR REGISTER 7
      CLR @SETFLG      CLEAR A FLAG WORD
      CLR @SETFLG+2    AND THE WORD AFTER THAT
      DIV @DECHUN,R7   DIVIDE R7-R8 PAIR BY 100
      MOV R7,@LEGFLG  R7 WILL = 1 FOR A LEGATO NOTE
      CLR R7           CLEAR R7 AGAIN
      DIV @DECTEN,R7  DIVIDE R7-R8 PAIR BY TEN
      MOV R7,R7        CHECK TO SEE IF R7 IS ZERO
      JEQ NORMA0       IF SO, JUMP AHEAD
      CI R7,7          ELSE COMPARE TO 7
      JEQ SET2         IF SO, JUMP
      CI R7,3          COMPARE R7 TO 3
      JLT SET2         IF LESS, JUMP
      MOV B @ONE+1,@SETFLG+2 ELSE SET FOR STACCATO/LEGATO ON GEN-
ERATOR 3
      AI R7,-3         SUBTRACT 3 FROM R7
      JEQ NORMA0       IF ZERO, JUMP AHEAD
      CI R7,2          ELSE COMPARE TO 2
      JLT SET1         IF LESS, JUMP
      MOV B @ONE+1,@SETFLG+1 ELSE SET FLAG FOR GENERATOR 2
      AI R7,-2         SUBTRACT 2
      JEQ NORMA0       IF ZERO, JUMP
      SET1 MOV B @ONE+1,@SETFLG ELSE SET FLAG FOR GENERATOR 1
      CLR R7           CLEAR R7
      NORMA0 MOV R8,R1  MOVE R8 BACK TO R1
      LM2   CB *R9,@ZERO ARE WE POINTING AT A ZERO BYTE?
      JEQ INC9         IF SO, JUMP
      CLR R8           ELSE CLEAR R8
      MOV B *R9,R8     MOVE A "NOTE" BYTE INTO R8
      SRL R8,12        SHIFT BY 12 SO ONLY THE LEFT NYBBLE IS
USED
      COC @ONE,R8      IS THIS AN ODD NUMBER?
      JNE BLAH         IF NOT, JUMP AHEAD
      AI R8,-9         ELSE SUBTRACT 9
      JLT BLAH         IF LESS THAN ZERO, JUMP
* AT THIS POINT, WE KNOW THAT THE BYTE POINTED TO BY R9 IS A VOLUME
BYTE
      SRL R8,1         ELSE DIVIDE NUMBER BY 2
      CB *R9,@SNDOFF(R8) SEE IF IT'S A "SILENCE" BYTE
      JEQ BLAH1        IF SO, JUMP AHEAD
      CB *R9,@STACOT(R8) SEE IF IT'S A "STACCATO" VALUE
      JNE LM7          IF NOT, JUMP
      MOV B @SNDOFF(R8),@SOUND ELSE SILENCE THE GENERATOR
      MOV B @SNDOFF(R8),@VOLUME(R8) AND PUT SILENCE IN THE VOLUME
TABLE
      JMP BLAH1        THEN JUMP
      LM7   MOV B *R9,@VOLUME(R8) PLACE THE BYTE IN VOLUME TABLE
```

ART OF ASSEMBLY—

(Continued from Page 14)

The code for this signalling works like this: If one or more generators are to play "legato", then there's a 100 in the number. The subroutine simply divides the "number of bytes" by 100, and sends the quotient to the Legato flag word (LEGFLG). It then divides the remainder by 10, and uses the quotient from that division to decide which generators are affected by legato or staccato. If the quotient of the division by ten is zero, then all generators will play at "normal" duration, which is 7/8ths of the stated duration. The encoding of the "tens" place works like this:

VALUE Meaning

1	gen 1
2	gen 2
3	gen 3
4	gens 1 and 3
5	gens 2 and 3
6	gens 1, 2, and 3
7	gens 1 and 2

The subroutine "decodes" this portion of the byte and sets flag bytes in the table at SETFLG to indicate which generators are affected by the staccato or legato condition. The remainder from the division, left in R8, is the number (1-9) of bytes to be sent to the sound chip.

Thus if the musician is specifying a new note and duration for each of the three generators, and wants a legato on generators 2 and with generator one playing a normal duration, the "number of bytes" byte would be given as 159. For a staccato on generators 2 and 3, the "bytes" byte is entered as 59.

Using decimal entries in this way made it much easier for the musician to comprehend what was going on and to control the actions of the subroutine. Of course the Assembler converts all these numbers to hex notation in the object code.

When this kind of data is assembled, there will be extra bytes left in the object code, and those will be set at zero by the assembler. For example, if the source looks like this:

```
BYTE 3
DATA AZI
BYTE V3I
DATA SX
```

The assembled values, assuming we started at an even location, would look like this in hex notation:

```
0300 803C 9200 015D
```

The subroutine detects these zero valued bytes and simply ignores them, since 0 is not a legal value for the sound chip. It also checks before taking in the duration bytes to be sure it's at an even location, since of course the left byte of the duration could be zero, and that must not be ignored.

As always, when we look at source code in preparing these articles, we see room for improvement. For example, at label START, it would work just as well and consume less memory if it

looked like this:

```
START INC R9
COC @ONE,R9
JEQ START
```

(See Page 16)

```
BLAH MOV B *R9,@SOUND MOVE THE BYTE TO THE SOUND CHIP
BLAH1 DEC R1 DECREMENT BYTE COUNT
JEQ START IF ZERO, JUMP AHEAD
INC9 INC R9
ELSE INCREMENT R9
JMP LM2 THEN JUMP BACK TO PROCESS NEXT BYTE
START INC R9 POINT AT NEXT BYTE IN DATA
COC @ONE,R9 IS R9 AN ODD LOCATION?
JEQ START IF SO, MOVE ON TO NEXT BYTE
MOVB *R9+,R1 GET HIGH BYTE OF DURATION INTO R1
SWPB R1 SWAP
MOVB *R9+,R1 GET LOW BYTE OF DURATION INTO R1
SWPB R1 SWAP SO R1=DURATION WORD FROM DATA
*
* THE FOLLOWING FIVE LINES ARE PART OF A "CALIBRATION" PROCESS
* TO MAKE THE MUSIC
* PLAY AT THE SAME PACE ON A GENEVE AS IT DOES ON A TI - TO MAKE
* THIS EFFECTIVE,
* A "DUMMY" RUN THROUGH THE SUBROUTINE'S INNER LOOP (LM4) WAS
* DONE AT THE
* BEGINNING OF THE PROGRAM. THESE LINES ARE COMMENTED OUT BECAUSE
* THEY CAN'T
* BE USED WITHOUT THAT DUMMY RUN HAVING BEEN PERFORMED.
*
* MOV R1,R0 MOVE R1 INTO R0
* CLR R1 CLEAR R1
* MYP @TINUM,R0 MULTIPLY R0 BY THE TI CALIBRATION NUMBER
* DIV @CALNUM,R0 THEN DIVIDE R0-R1 PAIR BY THE PRESENT MA-
* CHINE'S NUMBER
*
* MOV R0,R1 MOVE THE QUOTIENT BACK TO R1
* MOV R1,@SHTCNT PLACE THAT FOR NOW AT LABEL SHORT COUNT
* MOV R1,R8 AND MOVE IT INTO R8
* MOV @LEGFLG,R7 CHECK FOR LEGATO INDICATOR
* JNE STK2 IF FLAG SET, JUMP
* MOVB @SETFLG,R7 CHECK FLAG FOR GEN 1
* JNE STK4 IF NOT ZERO, JUMP
* MOVB @SETFLG+1,R7 CHECK FLAG FOR GEN 2
* JNE STK4 IF NOT ZERO, JUMP
* MOVB @SETFLG+2,R7 CHECK FLAG FOR GEN 3
* JEQ STR1 IF ZERO, JUMP
STK2 MOV R1,R7 ELSE PLACE DURATION IN R7
SRL R7,3 DIVIDE BY 8
JMP STK3 THEN JUMP
STK4 MOV R1,R7 PLACE DURATION IN R7
SRL R7,2 DIVIDE BY 4
STK3 S R7,R8 SUBTRACT 1/8 OR 1/4 FROM DURATION
MOV R8,@SHTCNT THEN MOVE THE RESULT TO SHORT COUNT
STR1 MOV R1,@DURAT AND MOVE FULL DURATION TO DURAT
MOV @ONE,R1 THEN SET R1 AT VALUE 1
MOV @DECNT,R15 PLACE THE DECAY VALUE IN R15
LM4 MOV R1,R8 MOVE THE CURRENT COUNT TO R8
CLR R7 CLEAR R7
DIV R15,R7 DIVIDE R7-R8 PAIR BY DECAY COUNT IN R15
MOV R8,R8 IS THERE ANY REMAINDER?
JNE DEC1 IF REMAINDER NON-ZERO, JUMP AHEAD
LI R14,VOLUME ELSE POINT R14 AT VOLUME TABLE
LI R7,4 FOUR GENERATORS TO CHECK
INLP CLR R8 CLEAR R8
MOVB *R14,R8 GET A BYTE FROM VOLUME TABLE
SLA R8,4 SHIFT LEFT TO STRIP OFF GENERATOR NYBBLE
CB @SILENT,R8 COMPARE BYTE TO "SILENCE" VALUE
JEQ INLP5 IF SILENT, JUMP AHEAD
AB @ONE+1,*R14 ELSE ADD ONE TO THE BYTE IN THE TABLE
INLP5 MOVB *R14,@SOUND AND MOVE THAT BYTE TO THE SOUND CHIP
INC14 INC R14 INCREMENT POINTER TO NEXT BYTE IN VOLUME
TABLE
DEC R7 DECREMENT COUNTER
JNE INLP IF NOT ZERO, REPEAT
SLA R15,1 ELSE MULTIPLY DECAY COUNT IN R15 BY 2
DEC1 INC R1 INCREMENT LOOP COUNT IN R1
C R1,@SHTCNT COMPARE TO SHORT DURATION COUNT
JNE DEC1C IF NOT EQUAL, JUMP
C @SHTCNT,@DURAT ELSE COMPARE SHORT COUNT TO FULL DURATION
JEQ DEC1C IF EQUAL, JUMP AHEAD
CLR R8 ELSE CLEAR R8
LI R7,4 PUT 4 IN R7
CLR R14 CLEAR REG 14
MOV @LEGFLG,R8 MOVE LEGATO COUNT INTO R8
JNE DEC1A IF NOT ZERO, JUMP
INLP2A MOVB @SETFLG(R14),R8 ELSE MOVE A FLAG BYTE TO R8
JEQ INC14A IF ZERO, JUMP
```

ART OF ASSEMBLY—

(Continued from Page 15)

MOV *R9+,R1

That would save us a couple of instructions, since at the point where the original code says MOV B *R9+,R1, we know we're at an even location, and thus could simply move the word as shown above. Of course this isn't going to mean we re-assemble all the music stuff just to save those few bytes, but once again it shows the fallible human qualities of your author. As you learn Assembly, you will always find such things in stuff you wrote last year, and may be tempted to kick yourself for them. Don't. Everybody who does assembly code will tell you this is common.

We're not going to bore everyone silly at this point with a line-by-line examination of the sidebar. That should make everyone happy, including the publishers. By now, if you've followed this series, you can figure out our contorted logic from the sidebar itself.

As you may know, we have released all our Assembly music products to public domain, which means that many of them are available through user group libraries, and all of them are available from Tiger Cub's PD catalog. (Catalog for a refundable \$1 from Tiger Cub Software, 156 Collingwood Ave., Columbus, OH, 43213.) We have also made up a disk of the complete source code for one number (Tchaikovsky's March from the Nutcracker Suite) that we offer at nominal cost (\$3 incl. S&H) for those who want to explore the realm of Assembly music. (Harrison Software, 5705 40th Place, Hyattsville MD 20781, ask for the march source code disk.)

Next month's topic is undecided. Perhaps we'll pursue a reader's suggestion, or some crazy idea of our own. We do appreciate having heard from some of our readers. It brightens our sometimes dull days.

Vendor rates announced for Boston fair

The first three tables for a vendor at the New England TI99/4A Home Computer Fair are \$25 apiece, according to fair officials. Additional tables are \$12.50 apiece.

The fair, scheduled from 10 a.m. to 4 p.m. April 17, is sponsored by the Boston Computer Society's TI99/4A Group. Site for the event is Waltham High School, 617 Lexington St., Waltham, Massachusetts.

Admission is \$3, \$2 for Boston Computer Society members. Children 10 and under will be admitted free with an adult.

For further information, contact Mike Francis, (617) 965-5653.

Canadian fest set

Merivale High School in Nepean, Ontario (near Ottawa), will again be the site for the Canadian TI Fest, this year scheduled for April 24.

For further information, contact Bill Gard, 3489 Paul Anka Dr., Ottawa, Ontario, Canada K1V 9K6 or (613) 523-9396 or Fax (819) 997-2194 Attn: DMES 2.

```

        MOV B @SNDOFF(R14),@SOUND ELSE SILENCE THIS GENERATOR
        MOV B @SNDOFF(R14),@VOLUME(R14) AND THE VOLUME TABLE BYTE
INC14A INC R14          INCREMENT POINTER IN R14
        DEC R7          DECREMENT COUNTER
        JNE INLP2A      IF NOT ZERO, REPEAT
        JMP DEC1C       ELSE JUMP
DEC1A  CLR R8          CLEAR REGISTER 8
        MOV B @SETFLG(R14),R8 MOVE A FLAG BYTE TO R8
        JEQ INC14B      IF ZERO, JUMP AHEAD
        MOV B @SNDOFF(R14),@SOUND ELSE SILENCE THE GENERATOR
        MOV B @SNDOFF(R14),@VOLUME(R14) AND THE BYTE IN VOLUME TABLE
INC14B INC R14          INCREMENT POINTER
        DEC R7          DECREMENT COUNTER
        JNE DEC1A      IF NOT ZERO, REPEAT
DEC1C  C R1,@DURAT     SEE IF DURATION COUNT IN R1 = FULL DURATION
        JNE LM4        IF NOT, GO BACK TO START OF LOOP
        C R9,R13       SEE IF WE'RE AT END OF POINTED DATA SECTION
        JGT RETRN      IF GREATER, GET OUT OF SUBROUTINE
        JEQ RETRN      IF EQUAL, SAME ACTION
        B @LDMEAS      ELSE GO BACK FOR NEXT NOTE
        RETRN RT       EXIT THE SUBROUTINE
* END OF SUBROUTINE
* DATA SECTION INCLUDES THE FOLLOWING:
*
DECNT  DATA TEMP/2+10  DECAY COUNT
ONE    DATA 1          VALUE ONE AS A WORD
DECHUN DATA 100       100 AS A WORD
DECTEN DATA 10        10 AS A WORD
DURAT  DATA 0         NOTE DURATION
LEGFLG DATA 0         LEGATO FLAG WORD
SETFLG BYTE 0,0,0,0    GENERATOR FLAG BYTES
SHTCNT DATA 0         SHORTENED DURATION COUNT
STACOT BYTE >9E,>BE,>DE,>FE OLD STACCOTO METHOD
VOLUME BYTE >9F,>BF,>DF,>FF GENERATOR VOLUME TABLE
SNDOFF BYTE >9F,>BF,>DF,>FF "SILENCE" BYTE TABLE
*
* FOLLOWING IS A DATA EXCERPT FOR THE FIRST MEASURE OF ONE PIECE
* NANNERL'S NOTEBOOK #11 MARCHE IN F
* MEASURE ONE ONLY
* MUSICAL DATA BY DOLORES P. WERTHS
*
M001  BYTE 9           NINE BYTES IN THIS NOTE
      DATA G21,A22,F13 2ND OCT G GEN 1, 2ND OCT A GEN 2, 1ST OCT
F GEN 3
      BYTE V31,V52,V53 VOL 3 GEN 1, VOL 5 GEN 2, VOL 5 GEN 3
      DATA TT          TRIPLET 32ND DURATION
      BYTE 3            THREE BYTES IN NEXT NOTE
      DATA F21         2ND OCT F GEN 1
      BYTE V31          VOL 3 GEN 1
      DATA TT          TRIPLET 32ND
      BYTE 3
      DATA E21
      BYTE V31
      DATA TT
      BYTE 113          LEGATO ON GEN 1, 3 BYTES
      DATA F21
      BYTE V31
      DATA E
      BYTE 163          LEGATO GENS 1,2, AND 3, 3 BYTES
      DATA G21
      BYTE V31
      DATA S
M001A BYTE 119         LEGATO ON GEN 1, 9 BYTES
      DATA A31,A22,F13
      BYTE V31,V52,V53
      DATA S+T
      BYTE 115          LEGATO ON GEN 1, 5 BYTES
      DATA G21
      BYTE V31,V152,V153
      DATA T
      BYTE 119
      DATA A31,A22,F13
      BYTE V31,V52,V53 *
      DATA S+T
      BYTE 115
      DATA B3J1
      BYTE V31,V152,V153

```


Look out Etch-A-Sketch

Doodle gives you one-key access to many functions of The Missing Link

By WALTER CHMARA

Doodle is a program that uses The Missing Link's environment. The Missing Link is a wonderful gift to the TI programmer. Finally, a way to use the bitmap mode without sacrificing the ease of Extended BASIC! (*The Missing Link is an extension of Extended BASIC permitting access to the high-resolution bit-mapped graphics and advanced text modes of the TI99/4A. It is available from Texaments, 516-475-3480. The price is \$19.95.—Ed.*)

However, there are many TI users who are just not programmers, so as flashy as the TMLDEMO program is, it does not give those folks any immediate access to all the "new" capabilities.

Doodle is a program which gives you one-key access to many of the graphics features available, so you can throw that old Etch-A-Sketch away!

Twenty keys have been assigned a function in both lower and upper case so that Alpha Lock setting is irrelevant. Follow the instructions in The Missing Link's manual for loading this program into the 16-color mode, then RUN.

The first thing you'll see on the screen is a map of what each key does when you press it. Holding CTRL and FCTN down together will dump this map to a waiting Epson compatible printer; pressing any other key will advance you to the explanation screen which

you can also dump in the same way to create a handy little reference card you can use whenever you use Doodle.

Next begins the real fun. At the top left of the screen you will see "100 100 4". The first number indicates which pixel row the point of your pen is on, the second, of course, the column. These numbers are constantly updated according to where you move the pen, which is represented on the screen by a black sprite, which the colon (or semicolon) key can also turn white or invisible, if necessary. The third number tells you which pixel of the eight pixel strip you are touching. This can be important to know when planning a detailed color doodle, since each of these horizontal strips can only have one foreground and one background color. It is also constantly updated.

The arrow keys (and those designated for diagonal movement) will draw one pixel at a time in a given direction as long as the key is held. The O key toggles through the pen's four conditions: DOWN (the top of the sprite is solid, enabling the point of the pen to turn the pixel it is touching to the foreground color), UP (the top of the sprite is hollow, causing the point of the pen to have no direct effect on the pixel), ERASE (the top of the sprite is an "E", causing the point to turn the pixel to the background color), or REVERSE (the top of the sprite is an "R", causing the pixel to be changed from background to foreground color or vice versa). The Q key toggles the screen color through all sixteen possibilities. The I key will wipe the screen clear for starting over.

The rest of the keys will require input of data at the top right of the screen to work. For instance, to change the penhue, push the A key, then enter the foreground and background color codes at the prompts (you may need to reference the color code table, I doubt that any of us have memorized it, even now.) Current colors are evidenced in the data line at the top. To simply pick up the pen and put it somewhere else on the screen, push P, then enter your coordinates. To draw a quick line from your current pen position, push L, then enter your row and column destination point. BOX(B) and FILL(V) work pretty much the same, except the pen always returns to the origin point. The K key will put a circle around your current position, you just need to input the radius. (You can also input a suppression code to make a specific arc, see page 18 of the TML manual, otherwise enter a zero.) Bear in mind that the condition of the pen will affect all of these functions. A pen that is turned off may not draw anything, so check that first before putting your fist through the keyboard! With a little planning ahead, you could combine ERASE and FILL to clear just a small portion of your doodle.

This brings us to the "greater than" and "less than" keys (or comma and period, if you prefer). The < key will load a previously saved doodle from your disk drive, the > key will save it. Just input the filename. According to the TML manual, the format is the same as TI-Artist. Remember that at any time you can dump what you have on the screen to the printer as you did before (minus the color, of course!) *The program starts on the next page.—Ed.*

D. Wright Stuff IT PAYS TO JOIN!

Send us a copy of your paid receipt for your '93 dues to a TI User Group and get \$5 off an order of \$35 or more. This offer will also be valid at the Lima TI Conference to be held May 14 & 15. Orders must be postmarked by May 30, 1993.

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DOODLE—

```

100 ! DOODLE ON SCREEN
    BY WALT CHMARA
    *Requires THE MISSING
    LINK in 16 color mode*
!101
110 A=1 :: B=1 :: S$="DSK1.P
IX1" :: CALL LINK("CHAR",64,
"0000000000000000")!063
120 CALL LINK("CLEAR"):: CAL
L SCREEN(14):: CALL LINK("PR
INT",1,25,"DOODLE ON SCREEN
BY WALT CHMARA")!221
130 CALL LINK("PRINT",10,15,
"How to use TML's cartesian
graphics")!075
140 CALL LINK("PRINT",18,15,
"capabilities at the touch o
f a key!")!070
150 FOR X=34 TO 238 STEP 34
:: CALL LINK("BOX",26,1,56,X
):: NEXT X !253
160 CALL LINK("PRINT",38,14,
"Q"):: CALL LINK("PRINT",34,
48,"W"):: CALL LINK("PRINT",
34,82,"E"):: CALL LINK("PRIN
T",34,116,"R")!129
170 CALL LINK("LINE",43,48,4
7,48):: CALL LINK("LINE",43,
48,43,52):: CALL LINK("LINE"
,43,48,51,56)!180
180 CALL LINK("LINE",43,84,5
1,84):: CALL LINK("LINE",43,
84,46,81):: CALL LINK("LINE"
,43,84,46,87)!188
190 CALL LINK("LINE",43,120,
43,124):: CALL LINK("LINE",4
3,124,47,124):: CALL LINK("L
INE",43,124,51,116)!191
200 CALL LINK("PRINT",38,150
,"I"):: CALL LINK("PRINT",38
,184,"O"):: CALL LINK("PRINT
",38,218,"P")!116
210 CALL LINK("PRINT",58,1,"
SCREEN          CLEAR
PEN PUTPEN")!252
220 CALL LINK("PRINT",66,1,"
COLOR PIXEL CONTROL SCREEN
DUER")!096
230 FOR X=51 TO 254 STEP 34
:: CALL LINK("BOX",74,17,104
,X):: NEXT X !096
240 CALL LINK("PRINT",87,31,
"A"):: CALL LINK("PRINT",91,
65,"S"):: CALL LINK("PRINT",
91,99,"D")!214

```

```

250 CALL LINK("LINE",86,63,8
6,73):: CALL LINK("LINE",86,
99,86,109):: CALL LINK("LINE
",86,63,83,66)!011
260 CALL LINK("LINE",86,63,8
9,66):: CALL LINK("LINE",83,
106,86,109):: CALL LINK("LIN
E",89,106,86,109)!151
270 CALL LINK("PRINT",87,133
,"K"):: CALL LINK("PRINT",87
,167,"L"):: CALL LINK("PRINT
",87,201,":")!099
280 CALL LINK("PRINT",106,14
,"PENHUE          CIRC LI
NE PEN-VIS")!226
290 FOR X=34 TO 238 STEP 34
:: CALL LINK("BOX",114,1,144
,X):: NEXT X !091
300 CALL LINK("PRINT",130,14
,"Z"):: CALL LINK("PRINT",13
0,48,"X"):: CALL LINK("PRINT
",130,82,"C"):: CALL LINK("P
RINT",126,116,"V")!070
310 CALL LINK("LINE",128,14,
128,18):: CALL LINK("LINE",1
28,14,124,14):: CALL LINK("L
INE",128,14,120,22)!194
320 CALL LINK("LINE",120,51,
128,51):: CALL LINK("LINE",1
24,48,128,51):: CALL LINK("L
INE",124,54,128,51)!202
330 CALL LINK("LINE",128,86,
128,90):: CALL LINK("LINE",1
24,90,128,90):: CALL LINK("L
INE",120,82,128,90)!221
340 CALL LINK("PRINT",126,15
0,"B"):: CALL LINK("PRINT",1
26,184,"<"):: CALL LINK("PRI
NT",126,218,">")!213
350 CALL LINK("PRINT",146,1,
"PIXEL CONTROL  FILL BOX
LOAD SAVE")!070
360 CALL LINK("PRINT",170,1,
"Hold (CTRL) and (FCTN) for
a printout of this keymap or
press any key to PROC'D.")!
022
370 CALL KEY(0,K,S):: IF S<>
0 THEN 380 ELSE 370 !063
380 CALL LINK("CLEAR"):: CAL
L LINK("PRINT",A,B,"Key Q to
ggles through all 16 colors.
W,E,R,S,D,Z,X, and C draw p
ixel-")!204
390 CALL LINK("PRINT",A,B,"b

```

y-pixel in a given direction . 0 toggles the pen down, up , erase, or reverse. ")!060

400 CALL LINK("PRINT",A,B,"T he : key toggles the pen spr ite between black, white, or invisible. ")!109

410 CALL LINK("PRINT",A,B,"T he top 8 pixel rows show pen location on the left, and d ata input on the right. ")!1 31

420 CALL LINK("PRINT",A,B,"C urrent penhue is reflected b y the color of the pen locat ion numbers. When K is press ed, you must input ")!194

430 CALL LINK("PRINT",A,B,"t he radius (from pen loca- ti on) and suppression code. L, V,B and P requires input of destination. ")!132

440 CALL LINK("PRINT",A,B,"F or V, make sure row and colu mn destination are below and to the right of pen locatio n. ")!094

450 CALL LINK("PRINT",A,B,"F or A, input foreground and b ackground color codes. ")!16 1

460 CALL LINK("PRINT",A,B,"Y ou can save your doodle to d isk or load one using > or < , and inputing the filename over the default. ")!092

470 CALL LINK("PRINT",A,B,"P ixel rows are numbered 1 to 184, pixel columns 1 to 240. The third number tells you where you are in the 8-pixel strip.")!060

480 CALL LINK("PRINT",A,B,"H old (CTRL) and (FCTN) for a printout of this text or pre ss any key to PROC'D.")!120

490 CALL KEY(0,K,S):: IF S<> 0 THEN 500 ELSE 490 !047

500 ! DOODLE SCREEN !058

510 CALL LINK("CLEAR")!055

520 CALL LINK("FORMAT",1,3,0)!162

530 ! DEFINE PENS !164

540 CALL LINK("CHAR",1,"0F0F (See Page 20)

DOODLE—

(Continued from Page 19)

```

1F3F3F7860800F0919393F786080
0F081F383F7860800F091F3A3978
6080")!058
550 O=1 :: F=2 :: B=5 :: R=1
00 :: C=100 :: SC=5 :: PE=2
:: Z=4 ! DEFAULTS !011
560 CALL LINK("SPRITE",1,O,P
E,R,C)!154
570 CALL LINK("PRINT",1,1,R)
:: CALL LINK("PRINT",1,25,C)
:: CALL LINK("PRINT",1,50,Z)
!157
580 CALL KEY(0,K,S):: IF S=0
THEN 580 !138
590 IF K=58 OR K=59 THEN GOS
UB 810 !236
600 IF K=81 OR K=113 THEN GO
SUB 840 :: GOTO 560 !049
610 IF K=79 OR K=111 THEN GO
SUB 880 :: GOTO 560 !094
620 IF K=65 OR K=97 THEN GOS
UB 950 :: GOTO 560 !123
630 IF K=73 OR K=105 THEN CA
LL LINK("CLEAR"):: GOTO 560
!207
640 IF K=69 OR K=101 THEN GO
SUB 990 :: GOTO 560 !202
650 IF K=88 OR K=120 THEN GO
SUB 1030 :: GOTO 560 !245
660 IF K=83 OR K=115 THEN GO
SUB 1070 :: GOTO 560 !028
670 IF K=68 OR K=100 THEN GO
SUB 1110 :: GOTO 560 !065
680 IF K=82 OR K=114 THEN GO
SUB 1150 :: GOTO 560 !106
690 IF K=67 OR K=99 THEN GOS
UB 1200 :: GOTO 560 !122
700 IF K=90 OR K=122 THEN GO
SUB 1250 :: GOTO 560 !204
710 IF K=87 OR K=119 THEN GO
SUB 1300 :: GOTO 560 !011
720 IF K=75 OR K=107 THEN GO
SUB 1350 :: GOTO 560 !055
730 IF K=76 OR K=108 THEN GO
SUB 1420 :: GOTO 560 !127
740 IF K=66 OR K=98 THEN GOS
UB 1520 :: GOTO 560 !185
750 IF K=86 OR K=118 THEN GO
SUB 1570 :: GOTO 560 !024
760 IF K=62 OR K=46 THEN GOS
UB 1620 :: GOTO 560 !019
770 IF K=60 OR K=44 THEN GOS
UB 1680 :: GOTO 560 !075
780 IF K=80 OR K=112 THEN GO
SUB 1750 !189
790 GOTO 560 !129
800 ! PEN VISIBILITY SUB !18
4
810 IF PE=2 THEN PE=16 ELSE
IF PE=16 THEN PE=1 ELSE IF P
E=1 THEN PE=2 !220
820 RETURN !136
830 ! BACKGROUND COLOR SUB !
044
840 SC=SC+1 :: IF SC>16 THEN
SC=1 !048
850 CALL SCREEN(SC)!046
860 RETURN !136
870 ! PEN DUER SUB !224
880 IF O=1 THEN O=2 ELSE IF
O=2 THEN O=3 ELSE IF O=3 THE
N O=4 ELSE IF O=4 THEN O=1 !
151
890 IF O=1 THEN CALL LINK("P
D")!156
900 IF O=2 THEN CALL LINK("P
U")!174
910 IF O=3 THEN CALL LINK("P
E")!159
920 IF O=4 THEN CALL LINK("P
R")!173
930 RETURN !136
940 ! PENHUE SUB !114
950 GOSUB 1730 :: CALL LINK(
"PRINT",1,110,"FORECOL?")::
CALL LINK("INPUT",1,160,F,2)
:: IF F>16 THEN 950 !057
960 CALL LINK("PRINT",1,110,
"BACKCOL?"):: CALL LINK("INP
UT",1,160,B,2):: IF B>16 THE
N 960 !134
970 CALL LINK("PENHUE",F,B):
: RETURN !142
980 ! UP SUB !082
990 CALL LINK("PIXEL",R+7,C)
:: R=R-1 !174
1000 IF R=0 THEN R=184 !181
1010 RETURN !136
1020 ! DOWN SUB !229
1030 CALL LINK("PIXEL",R+7,C
):: R=R+1 !173
1040 IF R=185 THEN R=1 !183
1050 RETURN !136
1060 ! LEFT SUB !216
1070 CALL LINK("PIXEL",R+7,C
):: C=C-1 :: Z=Z-1 :: IF Z=0
THEN Z=8 !032
1080 IF C=0 THEN C=240 !144
1090 RETURN !136
1100 ! RIGHT SUB !043
1110 CALL LINK("PIXEL",R+7,C
):: C=C+1 :: Z=Z+1 :: IF Z=9
THEN Z=1 !032
1120 IF C=241 THEN C=1 !146
1130 RETURN !136
1140 ! UR SUB !084
1150 CALL LINK("PIXEL",R+7,C
):: R=R-1 :: C=C+1 :: Z=Z+1
:: IF Z=9 THEN Z=1 !192
1160 IF R=0 THEN R=184 !181
1170 IF C=241 THEN C=1 !146
1180 RETURN !136
1190 ! DR SUB !067
1200 CALL LINK("PIXEL",R+7,C
):: R=R+1 :: C=C+1 :: Z=Z+1
:: IF Z=9 THEN Z=1 !191
1210 IF R=185 THEN R=1 !183
1220 IF C=241 THEN C=1 !146
1230 RETURN !136
1240 ! DL SUB !061
1250 CALL LINK("PIXEL",R+7,C
):: R=R+1 :: C=C-1 :: Z=Z-1
:: IF Z=0 THEN Z=8 !191
1260 IF R=185 THEN R=1 !183
1270 IF C=0 THEN C=240 !144
1280 RETURN !136
1290 ! UL SUB !078
1300 CALL LINK("PIXEL",R+7,C
):: R=R-1 :: C=C-1 :: Z=Z-1
:: IF Z=0 THEN Z=8 !192
1310 IF R=0 THEN R=184 !181
1320 IF C=0 THEN C=240 !144
1330 RETURN !136
1340 ! CIRCLE SUB !095
1350 GOSUB 1730 :: CALL LINK
("PRINT",1,110,"RADIUS? ")!0
93
1360 CALL LINK("INPUT",1,160
,RD,3)!026
1370 CALL LINK("PRINT",1,110
,"SUPRESS? ")!049
1380 CALL LINK("INPUT",1,160
,SUP,3)!124
1390 CALL LINK("CIRCLE",R+7,
C,RD,SUP)!051
1400 RETURN !136
1410 ! LINE SUB !213
1420 GOSUB 1730 :: CALL LINK
("PRINT",1,110,"LINEROW?")::
CALL LINK("INPUT",1,160,R2,
3):: IF R2>192 THEN 1420 !21
8
1430 CALL LINK("PRINT",1,110

```

(See Page 21)

Part 2 of the 1992 MICROpendium Index

Here is second part of the MICROpendium Index for 1992. It covers the months of July through December. The first part of the 1992 index was published in February. The index was compiled by Elton Schooling.

INDEX92B

10 REM INDEX92B MICROpendium INDEX for 1992, Jul to Dec, Publisher John Koloen, edit or Laura Burns. !118
20 REM Compiled by Elton Schooling, 4014 57th St., Sacramento, CA 95820 !173
30 REM Sort routine by David Romer and John Clulow. Ob-

tained from Boston Computer Soc., TI994/A User Group. For use with printer or with !254
32 REM screen display.
"Sort" program must be on same disk with index. !22635 REM Because of many entries the '92 index is divided into '92A, Jan to Jun and '92B, Jul to Dec !005
40 REM For your printer you may need to change line 160. !202
50 REM For longer dwell time on screen increase the DELA Y number in line 330. !210

52 CALL INIT !157
54 CALL CLEAR !209
56 CALL LOAD("DSK1.SORT")!079
60 OPTION BASE 1 !137
70 CALL CLEAR !209
80 DIM N\$(114)!202
90 INPUT "OUTPUT TO PRINTER? (Y/N)":P\$!247
100 CALL CLEAR !209
110 PRINT "WORKING" !139
120 FOR I=1 TO 114 :: READ N\$(I):: NEXT I !065
130 CALL LINK("SORT",N\$(),114)!189
140 CALL CLEAR !209
(See Page 22)

DOODLE—

(Continued from Page 20)

"LINECOL?"):: CALL LINK("INPUT",1,160,C2,3):: IF C2>240 THEN 1430 !012
1440 CALL LINK("DELSPR",0):: CALL LINK("LINE",R+7,C,R2+7,C2)!156
1450 IF C=C2 THEN 1490 !074
1460 N=MAX(C,C2)-MIN(C,C2):: IF C>C2 THEN 1470 ELSE 1480 !014
1470 FOR OP=1 TO N :: Z=Z-1 :: GOSUB 1840 :: NEXT OP :: GOTO 1490 !250
1480 FOR OP=1 TO N :: Z=Z+1 :: GOSUB 1840 :: NEXT OP !081
1490 R=R2 :: C=C2 !140
1500 RETURN !136
1510 ! BOX SUB !150
1520 GOSUB 1730 :: CALL LINK("PRINT",1,110,"BOX ROW?"):: CALL LINK("INPUT",1,160,R2,3):: IF R2>192 THEN 1520 !031
1530 CALL LINK("PRINT",1,110,"BOX COL?"):: CALL LINK("INPUT",1,160,C2,3):: IF C2>240 THEN 1530 !081
1540 CALL LINK("BOX",R+7,C,R2+7,C2)!147
1550 RETURN !136

1560 ! FILL SUB !212
1570 GOSUB 1730 :: CALL LINK("PRINT",1,110,"FILLROW?"):: CALL LINK("INPUT",1,160,R2,3):: IF R2>192 OR R2<R THEN 1570 !191
1580 CALL LINK("PRINT",1,110,"FILLCOL?"):: CALL LINK("INPUT",1,160,C2,3):: IF C2>240 OR C2<C THEN 1580 !211
1590 CALL LINK("FILL",R+7,C,R2+7,C2)!210
1600 RETURN !136
1610 ! SAVE SUB !220
1620 GOSUB 1730 :: CALL LINK("PRINT",1,110,"SAVE:")!156
1630 CALL LINK("INPUT",1,150,S\$,13,S\$)!086
1640 CALL LINK("PRINT",1,1,"@@@@@@@@@@@@@@@@"):: GOSUB 1730 !093
1650 CALL LINK("SAVEP",S\$)!21
1660 RETURN !136
1670 ! LOAD SUB !205
1680 GOSUB 1730 :: CALL LINK("PRINT",1,110,"LOAD:")!141
1690 CALL LINK("INPUT",1,150,S\$,13,S\$)!086
1700 CALL LINK("LOADP",S\$)!106
1710 RETURN !136

1720 ! WIPE SUB !226
1730 CALL LINK("PRINT",1,110,"@@@@@@@@@@@@@@@@")!168
1740 RETURN !136
1750 GOSUB 1730 :: CALL LINK("PRINT",1,110,"PUT ROW?"):: CALL LINK("INPUT",1,160,R2,3):: IF R2>192 THEN 1750 !022
1760 CALL LINK("PRINT",1,110,"PUT COL?"):: CALL LINK("INPUT",1,160,C2,3):: IF C2>240 THEN 1760 !072
1770 CALL LINK("DELSPR",0):: CALL LINK("PUTPEN",R2+7,C2)!150
1780 IF C=C2 THEN 1820 !150
1790 N=MAX(C,C2)-MIN(C,C2):: IF C>C2 THEN 1800 ELSE 1810 !166
1800 FOR OP=1 TO N :: Z=Z-1 :: GOSUB 1840 :: NEXT OP :: GOTO 1820 !070
1810 FOR OP=1 TO N :: Z=Z+1 :: GOSUB 1840 :: NEXT OP !081
1820 R=R2 :: C=C2 !140
1830 RETURN !136
1840 IF Z=0 THEN Z=8 !094
1850 IF Z=9 THEN Z=1 !096
1860 RETURN !136
1870 END !139

MICROPENDIUM INDEX PART 2—

(Continued from Page 21)

```

150 IF P$="Y" THEN 160 ELSE
290 !093
160 OPEN #1:"PIO" !253
170 PRINT #1:TAB(24);"MICROp
endum INDEX, 1992B, Jul to
Dec" !142
180 PRINT #1: : : : !103
190 FOR J=1 TO 114 :: IF J=1
05 THEN 200 ELSE 220 !118
200 PRINT #1: : : : : PRINT
#1:TAB(35);"PAGE 32" :: PRI
NT #1: : : : : : : : : :
GOTO 220 !196
210 PRINT #1: : : : : : PRI
NT #1:TAB(31);"PAGE 33, INDE
X '92B" :: PRINT #1: : : : :
: : : : : !141
220 IF J/2=INT(J/2) THEN 240
!249
230 PRINT #1:N$(J);:: GOTO 2
50 !240
240 PRINT #1:TAB(40);N$(J)!1
88
250 NEXT J !224
280 GOTO 360 !184
290 CALL CLEAR !209
300 CALL SOUND(500,110,0,131
,0,196,0)!005
310 PRINT TAB(7);"MICROpendi
um INDEX, 1992B" :: PRINT :
: !061
320 PRINT "DATE AND PAGE NO.
ARE LISTED TOGETHER. JAN 85
p.16 BECOMES 1/85/16." :: :
!005
330 FOR J=1 TO 114 :: PRINT
N$(J):: FOR DELAY=1 TO 200 :
: NEXT DELAY :: NEXT J !019
340 PRINT : !006
350 PRINT "DATE AND PAGE NO.
ARE LISTED TOGETHER. JAN 85
p.16 BECOMES 1/85/16." :: G
OTO 390 !062
360 PRINT #1: : !178
370 PRINT #1:"DATE AND PAGE
NO. ARE LISTED TOGETHER. JAN
85 p.16 BECOMES 1/85/16." !
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375 PRINT #1: : : : : : :
: : : : : PRINT #1:TAB(23);"M
ICROpendium Index, 1992B, Pa
ge 33" !143
380 CLOSE #1 !151
390 END !139

400 DATA BAS UTAH FLAG AND S
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440 DATA IMAGEWISE PLUS V3.0
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CS REV 8/92/24 !201
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ISKS REV 8/92/25,SMART CONNE
CT IBM-TI REV 8/92/26,OPTION
5 TIP USNO 8/92/29,FIBONACC
I ROUTINE USNO 8/92/29 !068
510 DATA CRU ADDRESSES USNO
8/92/29,GENEVE BATTERY CHANG
E USNO 8/92/31,CIRCLE FIGURI
NG BAS 8/92/7 !096

520 DATA GENEVE COMPATIBLE A
RT OF A/L 8/92/11,TI PROTECT
ION VIDEO TIPS 8/92/19,DOCUM
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530 DATA GRAPHICS CHICAGO UG
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570 DATA GRAM CRACKER RICH X
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640 DATA BAS SKI UTAH 11/92/
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```

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660 DATA FLAGS AND MAP REV 11/92/25, RETURN LABELS REV 11/92/26, AMORTIZATION REV 11/92/26, CHECKLOG REV 11/92/26 !031
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Harrison releases Font Dumper

Harrison Software has released the Font Dumper, which includes instructions and 32 fonts. According to Bruce Harrison of the company, the product has been tested on both the NX-1000 and NX-1020 Star Micronics models, and works in the "standard" mode on each. Users must specify which printer when ordering, he notes, as

the control sequences and DIP switch setups differ.

Neither version as supplied will work on a Geneve because of the DSRLNK routine used, he says.

The product sells for \$10 from Harrison Software, 5705 40th Place, Hyattsville, MD 20781.

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MICRO-REVIEWS

Victim's Revenge, Skull Valley and Lost in Space, V5 Editor, Disk of the Ancient Ones

By STAN KRAJEWSKI

Tired of all those loose program docs you have printed? Here is a tip I discovered on keeping your program document files in order. I went to a major office supply chain and purchased Poly Clear, Top Loading Sheet Protectors. These holders are the same size as fan-fold paper, and have three holes for insertion into a loose-leaf binder. You can put up to 20-30 pages into each pouch to keep your docs safely. You can face docs on one program out one side, and a second doc file facing the back side. This allows you to see docs for programs on both sides of the page. I used to punch holes in the paper to store them in a binder; they would wear at the holes and the pages would bend.

I've been dying to get to use and review the Horizon Mouse that I purchased. I'm still waiting from a response from Bud Mills Services and Mike Maksimik to get my software straight for it to run properly.

Ratings for the software reviewed in this column are based on the star system that follows.

☆ Leave it alone, back to the drawing board.

☆☆ Needs improvements, but workable.

☆☆☆ A good program, worth trying.

☆☆☆☆ Send your money and buy it.

NOTE: If the Geneve 9640 is *not* specifically mentioned in system requirements of any column I write, the program is TI99/4A compatible only.

VICTIM'S REVENGE, SKULL VALLEY, LOST N SPACE

☆☆

Victim's Revenge

System requirements are TI99/4A or Geneve 9640, 32K RAM, disk drive, Extended BASIC and joysticks. This SS/SD disk contains two Extended BASIC games, and one BASIC game.

Victim's Revenge starts by letting you choose one of three levels. The speech synthesizer is active if you choose to use it.

Your mission is to assassinate five people by destroying planes, balloons and boats from an underwater submersible craft. The player who accrues the most points wins in this one-player game.

The large sprites used in this game make it hard to play this game for any lengthy period. The screen is just too small for maneuvering and escaping the bombs. Although the graphics are recognizable, they are not a good quality. Joystick response is a little slow making it that much more difficult to outmaneuver the bombs. Although I kept interest in it longer than my teenage sons, my 4-year-old was able to play it and seemed to enjoy it more.

☆

Skull Valley

This BASIC game is supposed to be a dungeon-graphical-type adventure. Joysticks are used to move a square which is supposed to be you into a castle and beyond. However, after entering the castle my sons and I were able to go to the second screen, and then we died no matter what we did.

The instructions at the title screen deal more with the plot of the game rather than how to play. No one in my family liked this one.

☆☆ 1/2

Lost in Space

This is a jump and platform game. The object is to find pieces of tools and the entrance to the next cave. This game is the best of the three. There is a good degree of challenge here, and as with the other games, the joysticks are used for the jumping. My 3-year-old was too young for this one. My teenagers got nowhere fast, so they lost interest. I seemed to stay at it longer.

Obviously, these games can run from a bare console with Extended BASIC. However, a protection violation prohibits the user from loading them onto a cassette. This protection scheme should be removed and the games' instructions elaborated upon, and the games should be made avail-

able to cassette users also. I don't see 32K RAM and disk users sending for this one. There are just too many other games better than these to use with these systems.

This disk of three games is available from Mike Bowman, P.O. Box 1041, Coarsegold, CA 93614. The price is \$9.95.

☆☆☆☆

V5 EDITOR

System requirements are TI99/4A or Geneve 9640, 32K RAM, disk drives, option 5 loader or Extended BASIC, Funnelweb 4.4 and an 80-column peripheral for the TI.

Here is a text editor with many files to add with your existing Funnelweb version 4.4. It will not work with any other version. It is also only an 80-column utility at this time, although a 40-column version is under way. It is described as, "Fully multi-lingual and compares favorably with Asgard's new First Draft word processor." I tested this editor on my Geneve only, as I don't have an 80-column device for my TI. I didn't have any problems with this editor as I had with previous versions.

I did try a lot of features which really excited me, but didn't get into the foreign language character files. I wouldn't be able to find all the features on my own, so I will relate to Charles Good's article which is included with the disks. To start with, there are now help screens. Four screens load into memory upon booting the Editor. A simple "H" press will display the first screen. "Q" and "A" will let you scroll through them. Help screens are provided for both the Program Editor and the Text Editor files. A utility is also provided to convert text help screens for your use.

The SD command is similar to previous versions except that now you can load a whole file or any part of it into a 64K memory V(iew) buffer. You can view this file anytime while your document is also in memory. The "View" file stays in memory for instant windowing for both, during the (See Page 25)

MICRO-REVIEWS—

(Continued from page 24)

Text Editor or switching back and forth to Disk Review. Also, when a file loads, it lists line numbers in the command section, telling you the first line on top and the last line on the bottom of the screen as you window through. It also displays the total line numbers of the document. What really pleases me now is the "HD" command. This serves the same purpose as "SD" for us hard drive users.

Character sets are included for German, Swedish, British, French, Italian, Netherlands, Spanish and Australian (American). Files are also included for TI's multilingual version of TI-Writer. Upper ASCII codes are used to display IBM graphics.

Text can now be moved while in the command line. You can now see the line number you want to work with by just scrolling with the arrow keys. The many more features give you reason to update your Funnelweb disk. Very good documentation is also provided. It took this program to finally get me away from using

MY-Word. The only drawback I see on the Geneve is that Funnelweb disrupts the character set when you return to the Extended BASIC environment. It creates random colors on the screens and requires you to cold boot the Geneve before running another program.

To obtain this update, contact Charles Good at Lima Ohio Users Group. He is distributing this software in exchange for four SS/SD or equivalent disks (depending on your configuration) and a self-addressed stamped mailer. Send to P.O. Box 647, Venedocia, OH 45894. Don't forget, if you use it and like it, send your contribution to Tony McGovern for his continuing effort in this area.

☆☆☆☆

DISK OF THE ANCIENT ONES

This is a program for use by almost anyone. It combines many graphics, a new font, a game and a Hieroglyph Translator, all contained on four SS/SD disks.

System requirements are Geneve 9640

or TI99/4A, 32K RAM, disk drive and Extended BASIC. A joystick and dot matrix printer are required for the translator.

There are two load programs. The first is on disk "A" and autoloads this menu: A. An Historical Overview, B. Scenes From the Ages, C. The Labyrinth of Minos Game, D. The Hieroglyph Translator. The border of the menu is similar to a border included on disk that can be used and printed in color using TI-Artist Plus and a color printer. The font included can be loaded in full on TI-Artist Plus or may be loaded in parts by any other version.

By pressing A, A Historical Overview, the program will prompt you to insert diskette "D"; as usual with Notung's text files you have many choices of text, font, colors, etc. Because of the MICRO-review format I will list but cannot go into detail about each of the informative topics in this section. They are: Description of Graphics (this describes roughly 32 Instances, pictures, slides and of the font), Afterlife of an

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User Notes

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```
340 IF REMAIN>0 THEN X=Y ::
Y=REMAIN :: GOTO 330
350 A=A/Y :: B=B/Y
360 SUBEND
370 SUB MOD(A,B,REMAIN)
380 REMAIN=A-INT(A/B)*B
390 SUBEND
```

This solution does not reduce fractions to whole or mixed numbers, as I wanted it to be directly MERGEable into Shaw's program without any changes. This solution uses Euclid's Algorithm to calculate the greatest common divisor (GCD) of the numerator and denominator. Both of these numbers are divided by the GCD to reduce the fraction.

More on 3.5-inch disk drives

This comes from Merle Vogt, of Von Ormy, Texas. He writes:

This is for the purpose of expanding de-

tails about using the 3.5-inch disk drives on the 99/4A. The materials in past issues of MICROpendium have lacked many details which would make it easier for us ignorant out here. Specifically, always include the make and model number of the drive used.

Usable drives. This is a short list, showing what the local (San Antonio 99er) user group has installed and is operating.

TEAC FD 235F — This model has a 4-pin by 7-pin patch board to set up the functions. A note included with the drive shows the jumper options available. After some tests, we found that jumpers named IR, FG and HA were proper to get the drive to run with a TI disk controller card. Also, the drive has jumpers for drive selects: DS0, DS1, DS2 and DS3. All but DS3 worked correctly with the TI board, which cannot select DS3. A CorComp controller operated the drive when jumpered for DS3.

This is an 80-track drive. The TI controller can format the disks to only 40 tracks, double-sided, single-density, for

720 sectors. At this format we copied TI-Artist to a 3.5-inch disk and the program runs perfectly. Also, this drive formatted to 40 tracks, double-sided, double-density with the CorComp controller.

Mitsumi Electric Co. D357T2, Newtronics Ltd. — This unit has jumpers pruned to a minimum. There is a 3-pin block with options XT and AT at the left rear of the unit. We had to set this to XT for operation with the TI controller.

The drive select is a 6-pin block in a line. It is arranged in two groups of pins, as shown below:

```
* * * * *
```

DS41 DS3 DS2 DS1

Only one jumper is used, the center pins of each triple are obviously common. This drive uses only the five volts power connection.

We recommend that you hunt around for drives with four selects before starting this system update.

RESISTOR PACKS

(See Page 29)

Harrison Software's

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Newsbytes

Users groups change addresses

The address for the Kawartha 99ers is now c/o Glen Daniels, RR5, Peterboro, Ontario, Canada K9J 6X6, according to Daniels, who is vice president of the group.

Also, Geoff Warner, secretary of the TI99 Users of Perth (Inc.), says that group's address has changed to 3 Maru Way, Lesmurdie, Western Australia 6075.

Asgard releases Macro Assembler for memory system

Asgard Software and Asgard Peripherals have released V1.0 of the RAG Software Macro Assembler for the Asgard Memory System 128/512K card. They have also updated the RAG Software Development Kit to V1.1.

The 9900 AMS Macro Assembler allows an assembly programmer to write programs that take advantage of the extra memory provided by the Asgard Memory System cards, according to the manufacturer.

According to Asgard, the AMS Macro

Assembler also provides:

- A macro facility allowing up to 24K of macros in a single assembly file, allowing the user to define new assembly commands outside the normal set of 9900 opcodes.

- An expanded symbol table allowing up to 24K of REFFed and other symbols in a single assembly language program.

- An expanded cross-reference capability offering up to 24K for references, allowing the debugging of large programs.

- Extended support for strings and floating-point numbers.

- Support for a relocatable common data area accessible to multiple program files at the same time.

- Support for 24-bit memory addresses, allowing users to write programs taking advantage of up to 16 megabytes of RAM.

According to the manufacturer, the AMS Development Kit includes a resident menu and memory managing utility capable of customization which allows the user to make other programs and tools resident in the unused portion of memory; an updated version of the Editor/Assembler editor, and the ability to substitute any alternative; a version of RAG Linker designed for use with the AMS/AEMS cards; a customized text formatter modeled on the TI-Writer

formatter; a library of assembly language modules for accessing the extended memory provided by the AMS and AEMS cards, plus a Library Manager utility which allows the user to create libraries; and a patching utility.

V1.1 also features enhancements to the memory manager allowing removal of resident programs to free reserved and unused pages of memory. According to the manufacturer, the Development Kit provides a framework for a range of current and planned AMS/AEMS compatible development tools. It requires an AMS or AEMS memory card with at least 128K of RAM, and at least one DS/SD floppy disk. It includes more than 50 pages of user documentation and documented source code.

The products are included with all AMS and AEMS cards. Those who purchased one of these devices previously, and any interested individuals, can obtain the software by sending a blank formatted DS/DD diskette for each item to Asgard Peripherals, 1423 Flagship Dr., Woodbridge, VA 22192. For further information, call (703) 491-1267.

MICRO-REVIEWS—

(Continued from Page 25)

Egyptian and Egyptian Glossary A through Z. The latter describes many words and phrases used by the Egyptians.

Scenes From the Ages lets you view seven picture files from the disk. Here you can set your foreground and background colors along with time delay or keypress.

The Labyrinth of Minos Game is a 3-D graphical adventure. You have an option to use either joystick 1 or 2. In this adventure you walk through a maze, with the objective to find the exit. During your quest, you may encounter a creature, while you try to find some food to increase your life force and hope. If your life or hope drop to zero you die. Bumping into walls, dead-ends, backtracking or coming in contact with the creature will deplete your hope points. Each forward movement depletes your life points. You also are equipped with a torch,

but watch out; if it goes out, you'll lose the view from inside the maze. At any time you may use the frail map to see where you are located; however, using it too much will crumble it and prevent you from using it again. There is also a Load and Save option to continue the game at another time.

Finally, The Hieroglyph Translator. On-screen boxes contain the English alphabet and the Hieroglyph equivalent. You just guide the cursor with the joystick to the letter you would like translated. As you press the fire button in each box chosen, the English word appears over the Hieroglyph counterpart. A "More" box contains additional commands such as Space, Delete, Erase, Quit and Print. Your phrase may be up to 18 characters long. For longer phrases information is provided for use with TI-Artist.

The second "Load" program included on disk deals with the Translator also, except

you have an option to set up your printer and joystick number.

The documentation goes far beyond just explaining how the program works. It is 16 pages showing the _I, _P and _S formats along with general information on why Egyptians wrote their words the way they did and more.

Disk of The Ancient Ones is available from Notung Software, 7647 McGroarty St., Tujunga, CA 91042. Its modest price is \$15 plus \$1 S&H, 50 cents for each additional order.

If you would like your software or hardware reviewed in this column, you may send it to: Stan Krajewski, Route 6 Box 568-15, Live Oak, FL 32060. If you would like it returned, please include postage. If you need to call me for any reason, you may reach me at 904-364-7897 E.S.T.

User Notes

Printing the caret

This item appeared in the newsletter of the Users Group of Orange County (California). It was written by Earl Raguse.

How do you print the caret when using the TI-Writer formatter? It requires a little subterfuge, since the formatter does not print the caret, it prints a space instead. A very useful feature, but there are times when you want to defeat this feature. How? You just fool the formatter by transliterat-

ing some other printing character to print the caret.

Try this: TL 93:94

Now, whenever you put a right bracket (]) you will get a ^ . And wherever you put a caret, you still get a space.

No challenge goes unanswered

This comes from Dean S. Mah, of Red Deer, Alberta. He writes:

Since it has been a couple of months and no one has answered Stephen Shaw's challenge in the November 1992 edition, I present you with my simple and inefficient solution.

```
165 CALL REDUCE(N,L)
300 SUB REDUCE(A,B)
310 X=A :: Y=B
320 IF X<Y THEN TEMP=X :: X=
Y :: Y=TEMP
330 CALL MOD(X,Y,REMAIN)
```

(See Page 28)

READER TO READER

□ George S. Tory, 970 Tulip Ave., Victoria, BC, Canada V8Z 2P7, writes:

In the June 1990 issue an article by Travis Watford (edited by John McKechnie) described converting a Foundation 128K Card to a useful 512K RAMdisk. I have one of these and would like to do this upgrade, but have been unable to obtain an EPROM for it. I tried writing Travis Watford at the address shown and my letter came back. I also tried writing Myarc, but had no reply to two inquiries. I also asked OPA when I ordered my TIM kit, but they didn't answer my query. My next plan was to contact John McKechnie, but he was tragically murdered just around the time I started my letter to him. Where, then, can I inquire next? I have a friend with an EPROM burner, if I could get the program to put in it.

Another question I have is with regard to the TI RS232 card. Mine has the John Guion EPROM in it which works great. Dijit Systems produced an EPROM which corrected an error with regard to interrupts that was built into RS232 cards from TI, CorComp and Myarc. This caused problems particularly with BBS programs when using the Dijit AVPC. Do you know if anyone else supplies this EPROM now that Dijit is not in business? A highly desirable item would be an EPROM that contained both Dijit's correction and John Guion's enhancement!

Lastly, does anyone have a schematic of a Supercart? I have the instructions for converting a game cartridge circuit board, but would prefer to make a custom circuit board for it to obtain a better layout of parts.

□ Zonrae Russell, P.O. Box 211, Weatherford, TX 76086, writes:

Previously when I belonged to the Dallas TI Users Group, they had someone who could show you how to make modifications on the TI single-sided disk drive to make it double-sided. I could not make it to the meeting when this was presented to the members, and I wanted to get my single-sided disk drive converted over, as it makes things difficult to use the drive when the other two half-height drives are double-sided.

It would be appreciated if anyone could contact me at the above address or call me at (817) 596-5976 with the information I need to obtain this information and instructions for this project.

Further, I need to know how to get a wrap plug (loopback con-

nect) and diagnostic communications adapter tests software for the TI RS232 parallel printer plug. I need this to check out the RS232 and PE box for TI99/4A.

□ Gene Barrett, 2700 Market St. Sp. 37, Redding, CA 96001, writes:

Does anyone out there in the TI world have ham radio computer programs for the TI? I would like any programs pertaining to ham radio. I would like to be able to send Morse code by the computer and receive translated messages. Can this be done? I have a TI99/4A with 32K memory.

□ Robert M. Carmany, 1504 Larson St., Greensboro, NC 27407, writes:

In 1988 and early 1989, Charles Earl came up with Telco V2.3. Included in that excellent package were a group of terminal emulations (i.e., ADM3A, ANSI, D410, HP2392, VT52 and VT100). Unfortunately, in the intervening years, some systems have upgraded to the degree that these terminal emulations have become obsolete. I wonder if there have been any updates to include additional emulation programs that will work with Telco. The one I am interested in is the VT220 or VT340. I find that, without at least the VT220, I cannot use Telco to log on to an appropriate bulletin board. If anyone has a copy of a Telco-compatible emulation for a VT220, please contact me at the above address.

□ Herman Hovey, 2432 So. Gd. Ave. E., Springfield, IL 62703, writes:

I own an external Percom Data TX-99 disk drive with a built-in control card and power supply for the TI99/4A. I'd like to utilize the second drive option of this unit. Cannot find where and how to set the stepping time for the head of the second drive, or whether any other than Percom will work with it. I haven't found any of the conventional jumpers for Dsk0, Dsk1, etc., on the control board.

□ Jerry Price, P.O. Box 33084, Granada Hills, CA 91344 writes:

I'd like to find out if the Tandon TM101-2 and Tandon TM101-4 floppy disk drives are compatible with the TI.

Reader to Reader is a column to put TI and Geneve users in contact with other users. Address questions to Reader to Reader, c/o MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

User Notes

(Continued from Page 28)

The 3.5-inch drives do not have the plug-in resistor packs as used by the 5.25-inch drives. Rather, Ohmmeter tests indicate that each drive has internal, permanent 600 Ohm signal lines—enabling resistors. The result is that you can use up to four drives without exceeding the 150 Ohm limit allowed by the disk controllers.

The set-up being used here consists of one 3.5 drive and one 5.25 drive. There is no resistor pack in the 5.25 drive.

PROCEDURE

You should get a 720K, 3.5 drive. Do not get a high density unit. Note that we did not test any 1.44 megabyte drives. I suspect that these are high density units and would not work with a TI or CorComp controller. (A Myarc controller with a quad-density chip will work with some high density floppy drives.—Ed.)

Also, you must get the adapter kit to fit the 3.5 drive into the 5.25 mounting space. The 3.5 drives have 34-pin connectors, so there must be the adapter for 34 pins to 34 large card connectors, so you can attach the regular TI cables. Also, there must be the 4-pin power adapter to fit the old Molex power plug to the smaller 4-pin plug on the 3.5 drive.

Remember, these are 80-track drives, but with the TI and CorComp controllers you only get to use 40 tracks. That makes the maximum available 720 sectors using the TI controller and 1440 sectors using the CorComp controller. Further, the CorComp controller provides track access speed adjustment. So, it may be possible that tests on this will make these drives much faster than the 5.25 drives. I do not have specifications about this.

Using TI-Writer to LF from an RS232

This item appeared in the Lima (Ohio) TI User Group newsletter. It was written by Charles Good.

You can hook two different kinds of computers together with a cable linking the RS232 ports of both computers. The TI serial printer cable will do the trick. You can then load text files directly into TI-Writer

(or the Funnelweb editor) from a word processor program running on the other computer. You don't need a modem or a terminal program, and the other computer doesn't have to be compatible with the TI.

After cabling the two computer's RS232 ports together, boot TI-Writer, type LF (Load File) and press Enter. Then type RS232.CR for the file name and press Enter. The TI's screen will appear to lock up as the TI waits to receive the file from the RS232 port. It may be necessary to specify a baud rate in the RS232.CR file name if the default 300 baud is not satisfactory. However, TI-Writer (and Funnelweb) will not accept baud rates higher than 600. With the other computer, save or send a text file already in memory, specifying RS232 as the save file name. (PC users may have to specify a COM port rather than RS232.—Ed.) Text will then

flow into TI-Writer. When text transfer is complete, press FCTN-4 on the TI and the received text file will be displayed.

Since I don't have the TI99/4A HexBus interface, this is how I transfer text from my CC40 to my TI for processing with Funnelweb and printing with my Star printer.

The Texas Lottery

This article and program was written by Jerry Keisler of the Paris (Texas) 99/4A User Group. Keisler is president of the group.

The Texas lottery requires six numbers between zero and 50 to win. Our computer can generate these numbers. Let's look at how this is done.

RND generates a number between zero and less than one. So RND times 51 would generate a number between zero and less than 51. If we take the integer of this, we have whole numbers between zero and 50 inclusive.

```
INT(RND*51)
```

This statement will provide the same number every time the program is run.

```
RANDOMIZE
```

To get a different number each time, the statement RANDOMIZE must be included. The computer uses a random number table to produce random numbers. RND causes the computer to start the same place in the table every time the program is run.

RANDOMIZE(A)

There is one other problem. If Texas lottery is always the first program you run after turning the computer on, you will still get the same number each time. To prevent this, we need a seed for RANDOMIZE. This seed must be different each time to get different numbers. To do this, I introduce the human factor. The computer will run through a list of numbers. You press any key when you want the computer to start the program. A trap is used so you can not hold a key down and pick the first number each time.

```
170 CALL CLEAR !209
180 CALL KEY(0,KEY,STA)!238
190 CALL KEY(0,KEY,STA)!238
200 IF STA=-1 THEN 180 !019
```

If the CALL KEY in 190 sees the same key pressed as the CALL KEY in 180, then STA will show -1 for repeat key and the program will return to 180.

Now we pick a random seed for the RANDOMIZE statement.

```
220 A=A+1 !251
230 CALL KEY(0,KEY,STA)!238
240 IF STA=0 THEN 220 !120
250 RANDOMIZE (A*KEY)!239
```

If you wait for the message before pressing a key, the first key pressed will continue the program. "A" will be incremented by ones until you press a key, then the value of "A" times the ASCII value of the pressed key will be the seed for RANDOMIZE. Now we can proceed with the six random numbers.

One method is to generate all six numbers and then check them for uniqueness. If not unique, then another six are generated.

```
260 DEF Y=INT(RND*51)!166
270 PRINT A*KEY !137
280 X(0)=Y !213
290 X(1)=Y !214
300 X(2)=Y !215
310 X(3)=Y !216
320 X(4)=Y !217
330 X(5)=Y !218
340 FOR I=1 TO 5 !060
350 FOR J=I+1 TO 6 !072
360 IF X(K)=X(J) THEN 280 !243
370 NEXT J !224
380 NEXT I !223
```

Line 270 will print the seed used for each
(See Page 30)

User Notes

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group of six numbers.

Next, the numbers are printed to screen in tabbed format.

```
390 FOR I=0 TO 5 :059
400 PRINT TAB(I*4+1);X(I);:10
63
410 NEXT I :1223
420 PRINT : :1006
```

If the seed exceeds 10 billion it is reset to the current value of "Y."

```
430 IF A<(1.E+10)THEN 220 :0
68
440 A=Y :1088
450 GOTO 220 :043
```

The program returns for another seed. Using a different key each time will provide another variance for the seed.

Lines 160 and 210 were added to identify and enhance the program.

```
160 REM 6 NUMBER GROUPS :1217
210 PRINT "PRESS ANY KEY FOR
EACH": : "OF 6 UNIQUE NUMBER
S": :1027
```

8x6 UNIQUE NUMBERS

The following program will provide eight unique sets of six numbers each and show the unused numbers.

```
460 REM 8 UNIQUE SETS OF 6 N
```

```
UMBERS EACH :192
470 CALL CLEAR :1209
480 CALL KEY(0,KEY,STA):1238
490 CALL KEY(0,KEY,STA):1238
500 IF STAS=-1 THEN 480 :147
510 PRINT : "FOR 8 UNIQUE NUM
BER SETS": : "PRESS ANY KEY "
;:1095
520 A=A+1 :1251
530 CALL KEY(0,KEY,STA):1238
540 IF STA=0 THEN 520 :166
```

This is the same as 170-240 above.

Now we build a list of numbers from zero to 50.

```
550 PRINT "WORKING": :1245
560 FOR I=0 TO 50 :1108
570 R$=R$&CHR$(I):1238
580 NEXT I :1223
```

Use the seed and build unique sets of six numbers each.

Lines 620 and 630 extract the numbers. Line 640 prints the numbers in tabulated form.

Line 650 removes the used number so it will not be picked again.

```
590 RANDOMIZE (A*KEY):1239
600 FOR I=1 TO 8 :063
610 FOR J=0 TO 5 :1060
620 Z=INT(RND*LEN(R$))+1 :109
```

```
7
630 N=ASC(SEG$(R$,Z,1)):1202
640 PRINT TAB(J*4+1);N;:1128
650 R$=SEG$(R$,1,Z-1)&SEG$(R$,Z+1,LEN(R$)-Z):1039
660 NEXT J :1224
670 PRINT : :1006
680 NEXT I :1223
690 PRINT :1156
```

Then the remaining numbers are printed to the screen.

```
700 FOR I=1 TO LEN(R$):1246
710 PRINT TAB((I-1)*4+1);ASC
(SEG$(R$,I,1));:1007
720 NEXT I :1223
730 PRINT " ARE LEFT": :1025
740 R$="" :1251
```

If the seed exceeds 10 billion, it is reset to the current value of "N."

```
750 IF A<1.E+10 THEN 480
760 A=N
770 GOTO 480
```

COMBINE PROGRAMS

Lines 170 through 450 and lines 470 through 770 are complete programs and can be keyed in and run as such, or they can be joined as one program using the following:

(See Page 31)

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User Notes

(Continued from Page 30)

```
100 !SAVE DSK4.RND !250
110 CALL CLEAR !209
120 PRINT "TEXAS LOTTERY": :
"PRESS 1 FOR 6 0 GENERATOR":
:"PRESS 2 FOR 8 GROUPS OF":
:"6 UNIQUE NUMBERS" !201
130 CALL KEY(0,KEY,STA)!238
140 IF KEY=50 THEN 470 !170
150 IF KEY<>49 THEN 130 !030
```

For-numbers one through 50, change lines 260 and 560 to the following:
 260 DEF Y=INT(RND*50)+1
 560 FOR I=1 TO 50

Speech and RAMdisks

This item, by Col Christensen, appeared in Bug Bytes, the newsletter of the TI99/4A Brisbane (Australia) User Group.

I have reported previously that opening a file called "SPEECH" in BASIC with the TEII module installed doesn't work if a RAMdisk with powerup on is also in the system. I've finally come across the answer in the documents for the Explorer program. It says that only a few modules have power-up routines in them, one being the TEII module. It seems that the power-up routine in TEII must initialize the module for, apart from other things, the text to speech utility, or maybe just the presence of the device-name "SPEECH."

What happens is, when the computer is switched on and even before the screen display is turned on, it looks at the peripheral cards for power-up routines prior to scanning for module power-up. With a RAMdisk installed, the RAMdisk power-up routine takes over (to hang with any other cards or modules), does whatever setting up is required and proceeds to load its own menu onto the screen. Poor old TEII doesn't get a look in. So that's the reason.

The cure is to turn the RAMdisk power-up off.

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